

Total No. of Questions : 12]

SEAT No. :

**P1504**

**[4759]-1**

[Total No. of Pages :7

**B.E. (Civil Engineering)**  
**ENVIRONMENTAL ENGINEERING - II**  
**(2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Solve Q.No.1 or 2, 3 or 4, 5 or 6 from section -I and Q.No. 7 or 8, 9 or 10, 11 or 12 from section - II.*
- 2) *Answer to the two sections must be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagram wherever necessary.*
- 5) *Use of logarithmic table, slide rule and electronic pocket calculator are allowed.*
- 6) *Assume suitable data, if necessary, stating it clearly.*

**SECTION - I**

- Q1)** a) State various formulas used for computation of velocity of flow in sewer. Hence explain the significance of maximum and minimum velocities to be generated in the sewer with suitable examples. **[6]**
- b) State the rational formula used for computation of storm water discharge. Hence determine the storm water discharge produced from a sewer district of 40 Hectors comprising different type of sub catchment as given below. The average intensity of rainfall in the area is 50mm/hour. **[6]**

Type of catchment	% of area	Coefficient of runoff
1. Built up area	30	0.95
2. Road surface	15	0.8
3. Open space	25	0.2
4. Lawns and gardens	40	0.15

- c) What is DO fixation? Why it is necessary to fix DO during its measurement? **[4]**

OR

**P.T.O.**

- Q2) a)** Explain the variation in sewage flow. How the variation in sewage flow is taken into account while designing the sewer. **[4]**
- b) List out various appurtenances used in sewerage system and hence explain the principle of working and need of oil & grease trap. **[4]**
- c) Design a circular sewer for conveyance of sewage generated from a town with population of 1.2 lakh and rate of water supply of 150 L/C/D. The sewer should be designed to carry maximum discharge while running 0.7 times full. Also check the velocity at minimum flow, it should be more than 0.6 m/s. Use following data. **[8]**
- Max.flow/Av.flow=3;
  - Min.flow/Ave.flow=0.34;
  - Manning's constant=0.013;
  - Hydraulic elements at partial flow condition.

Proportionate depth (d/D)	Proportionate velocity (v/V)	Proportionate discharge (q/Q)
0.7	1.12	0.838
0.4	0.902	0.337
0.3	0.776	0.196
0.2	0.615	0.088
0.1	0.401	0.021

- Q3) a)** Explain Oxygen sag, Deoxygenation and Reoxygenation curves with help of neat diagram? **[4]**
- b) Explain with neat sketch, the principle and working of grit chamber. Describe the method of disposal of grit? **[8]**
- c) State the Streeter - Phelp's equation and explain each term in equation? **[4]**

OR

**Q4) a)** Explain different zones during self-purification of stream? [8]

b) Design the screen chamber to treat a Maximum flow of 60 mld of sewage? [8]

**Q5) a)** State various modifications in Activated Sludge Process and hence explain any two with reference to process details, HRT, SRT and BOD removal efficiency. [9]

b) Design a high rate single stage trickling filter for treating domestic sewage flow of 10MLD using N.R.C. formula. Use following data. [9]

i) BOD<sub>5</sub> of raw sewage = 300 mg/L,

ii) BOD removed during primary treatment =30%,

iii) Organic loading rate = 0.8Kg/m<sup>3</sup>/d,

iv) Hydraulic loading rate = 15m<sup>3</sup>/m<sup>3</sup>/d,

v) Recirculation ratio =2.

Determine,

1) Volume of filter media

2) Dimensions of trickling filter

3) Efficiency of trickling filter

OR

**Q6) a)** Draw a neat flow diagram of sewage treatment plant with trickling filter as method of secondary treatment. [4]

b) Explain the principle and working of trickling filter. [4]

- c) Design a completely mixed activated sludge process for treating domestic sewage flow of 10MLD. Use following data. [10]
- i) BOD<sub>5</sub> of raw sewage = 300 mg/L,
  - ii) BOD removed during primary treatment = 30%.
  - iii) Permissible effluent BOD = 30mg/L.
  - iv) Permissible suspended solids in treated effluent = 30mg/L of which 65% is biodegradable.
  - v) MLSS = 3000mg/L,
  - vi) Return sludge solids concentration = 10000mg/l,
  - vii) Ratio of VSS/SS =0.8,
  - viii) Kinetic constants:  $Y = 0.5$ ,  $K_d = 0.05$ .
  - ix) Oxygen transfer capacity for aerators under field condition = 1.6 Kg/d.

Determine,

- 1) Influent and effluent BOD
- 2) Volume of aeration tank
- 3) Oxygen and power requirement
- 4) Rate of sludge wasting and sludge recirculation ratio.

### SECTION - II

- Q7)** a) Explain the symbiotic relationship between bacteria and algae in oxidation pond. [4]
- b) Differentiate between oxidation pond and aerated lagoon with reference to organic loading, HRT, BOD removal efficiency and method of aeration. [6]

- c) An aerated lagoon system is to be provided for treatment of sewage using following data: [6]
- i) Sewage flow = 10MLD,
  - ii) Raw sewage  $BOD_5 = 240\text{mg/L}$ ,
  - iii) Desired  $BOD_5$  of treated effluent =  $30\text{mg/L}$ ,
  - iv) Hydraulic residence time (HRT) = 06 day,
  - v) Growth constants = 0.5,  $K_d = 0.05$ .
  - vi) Oxygen transfer capacity for aerators under field condition 1.6 Kg/d.

Determine:

- 1) Volume and dimensions of aerated lagoon,
- 2) Volatile solids produced in the aerated lagoon,
- 3) Oxygen and power requirement.

OR

- Q8)** a) Differentiate between activated sludge process and aerated lagoon and comment on suitability of these processes for treatment of sewage. [6]
- b) Explain the principle and working of facultative aerated lagoon. [4]
- c) Design an oxidation pond for treatment of domestic sewage, using following data. [6]
- i) Sewage flow = 2MLD,
  - ii) Raw sewage  $BOD_5 = 240\text{mg/L}$ ,
  - iii) Desired  $BOD_5$  of treated effluent =  $30\text{mg/L}$ ,

- iv) Average solar radiation =  $150\text{Cal/cm}^2/\text{d}$ ,
- v) Efficiency of sunlight utilization by algae = 0.06,
- vi) Unit heat of combustion for algae =  $6000\text{Cal/g}$ ,
- vii) Depth of pond = 1m.
- viii)  $\text{BOD}_5/\text{BOD}_L = 0.68$ .

Determine,

- 1) Area and dimensions of oxidation pond,
- 2) Organic loading in  $\text{KgBOD}/\text{Ha}/\text{d}$ .
- 3) Hydraulic residence time (HRT).

- Q9)** a) Design a septic tank for 200 users. Water allowance is 120 liters per head per day. Also design a suitable soil absorption system if the percolation rate is 3min/sec. and depth of ground water table below GL is 1.5 m. **[8]**
- b) Write short note on Up-flow Aerobic Sludge Blanket Reactor (UASBR). **[5]**
- c) Explain various method of sludge disposal along with merits and demerits. **[5]**

OR

- Q10)** a) Explain the aerobic sludge digestion process and also discuss the various design parameter of aerobic digester. **[8]**
- b) Explain the method of disposal of septic tank effluent. **[5]**
- c) What do you mean by sludge thickening? Explain the various method of sludge thickening. **[5]**

**Q11)** Write short note on:

**[16]**

- a) Equalization
- b) Neutralization
- c) Sludge drying bed
- d) Discharge standard for disposal of treated effluent in river.

OR

**Q12)** Explain with a flow diagram for waste water treatment process of following industry. **[16]**

- a) Sugar
- b) Dairy
- c) Textile
- d) Distillery

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2002**

[4759]-10

[Total No. of Pages : 3

**B.E. (CIVIL ENGINEERING)**  
**HYDROINFORMATICS**  
**(2008 Course) (Elective-II) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section .*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary*

**SECTION-I**

- Q1)** a) Enlist the basic scientific disciplines of hydro informatics and explain important aspects of each on which hydro informatics is based. [6]
- b) Enumerate scope of internet and web based modeling in water resources engineering. [6]
- c) A commercial Hydroinformatics system is to be formed for managing reservoir operation with respect to release of water for an irrigation system and for domestic use for a small town what components you suggest, explain with justification. [6]

OR

- Q2)** a) Discuss about design of hydro informatics system for information regarding availability of surface water in a particular area. [6]
- b) Discuss the role of internet in rainfall forecasting system. [6]
- c) Compare numerical modeling and soft computing modeling in Hydroinformatics [6]

- Q3)** a) What is a decision support system in water resources engineering? What are its components? What is the role of government sector in decision support system?. [8]
- b) Enlist the various components of multi-criteria decision support system and explain the inter dependency of every component on each other. [8]

OR

**P.T.O.**



**Q4) a)** Name different software used in Hydroinformatics. Explain any one of them in detail. [8]

b) Discuss design of multi - criteria decision support system for drought watch giving details of information collection, analysis, prediction, estimation, decision, dissemination of the information. [8]

**Q5) a)** Differentiate between physics based modeling and data driven modeling. Give examples of each. [8]

b) Discuss design of simulation model for reservoir inflow at a dam location objective, scope, basic formulae used, underlying solution procedure, and simulation technique used. [8]

OR

**Q6) a)** What are different data driven techniques? How these techniques can be applied for development of water resources. [8]

b) Discuss design of simulation model for household sewage collection system giving details of objective, scope, basic formulae used, underlying solution procedure and simulation technique used. [8]

## **SECTION II**

**Q7) a)** Write detail note on recurrent network. [6]

b) Define normalization in Artificial neural network. What is the importance of normalization? What are typical ranges of normalization? [6]

c) Discuss conjugate gradient algorithm in detail. [6]

OR

**Q8) a)** What is over fitting of neural network? Explain in detail how it is avoided. [6]

b) How artificial neural networks compare with statistics? What is the terminology used in statistics for the following terms used in ANN? Input, output, training, generalization. [6]

c) Explain in detail the step wise procedure for carrying out cross validation. [6]

**Q9) a)** Discuss parents and children, fitness values and best fitness values with respect to genetic algorithm. [8]

b) What are Genetic operators? Explain any two of them in details. [8]

OR

**Q10)a)** Summarize the working of Genetic algorithm. [8]

b) What is real coded Genetic Algorithm? How it differs from standard Genetic Algorithm? [8]

**Q11)a)** Discuss limitations of ANN With respect to data requirement, magnitude of data, selection of architecture and lack of physical concept. [8]

b) Write the working principle of Genetic Algorithm and enlist various applications of Genetic Algorithm in Water Resources Engineering. [8]

OR

**Q12)a)** Write detail note on applications of Artificial Neural Networks in stage discharge modeling. [8]

b) What is the importance of 'fitness function' in Genetic Algorithm. And explain the operation, reproduction, cross over and mutation of Genetic Algorithm. [8]



Total No. of Questions : 12]

SEAT No. :

**P1397**

**[4759] - 100**

[Total No. of Pages :3

**B.E. (E & TC)**

**SPEECH PROCESSING**

**(2008 Pattern) (Elective - III) (404189) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, electronic and pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain in detail the sub classification of voiced speech signal based on tongue position and unvoiced speech signal based on manner and place of articulation. (i.e. the classification of vowels and obstruents) [10]
- b) What is the difference in the production of pure vowels and nasal sounds? How it is reflected in acoustic parameters? Classify nasal sounds based on place of articulation. [8]

OR

- Q2) a)** A speech signal is sampled at 16000 Hz and autocorrelation method is used to compute the pitch period. The range of the pitch frequency is 75Hz to 350 Hz. What is the minimum size of the window required to compute pitch period. If minimum window size is used and peak occur at sample number 106 What is the pitch frequency? Find the location of the peak for the pitch frequency 75 and 350 Hz? (note: the peak sample values are the sample shift values of one sided autocorrelation function). [8]
- b) What is AMDF? How will you use AMDF for pitch measurement? What is the difference in the computation of pitch using AMDF and autocorrelation method? Which is computationally efficient and why?[10]

**P.T.O.**

- Q3)** a) Explain the Autocorrelation method for computing Linear Predictor Coefficients. [8]  
b) Obtain the direct form I filter coefficients from the following reflection coefficients. [8]  
 $k_1 = -0.4878$   $k_2 = 0.3123$   $k_3 = -0.512$

OR

- Q4)** a) Explain Burg's algorithm based for Lattice method. [8]  
b) Draw a diagram of two stage Lattice and write the equations. Explain how the reflection coefficients are calculated with help of example. [8]
- Q5)** a) With the help of neat block diagram, explain the computational procedure for calculation of Mel Frequency Cepstral Coefficients. [8]  
b) With the help of neat block schematic, explain formant and pitch measurement using cepstrum. [8]

OR

- Q6)** a) Explain homomorphic processing with reference to speech processing. [8]  
b) What are LPC? What is the relation of LPC with formant. [8]

### SECTION - II

- Q7)** a) Explain adaptive filters and its application to noise removal. [8]  
b) Explain the transform domain technique used for speech enhancement. [8]

OR

- Q8)** a) Explain Wiener filter. How it is used for echo cancellation. [8]  
b) What are the different techniques used for wide band noise removal. [8]

- Q9)** a) Define the elements of HMM and explain how the model generates observation sequences. [9]  
b) Explain the various conditions that are used for the optimization of dynamic time warping algorithm. [9]

OR

**Q10)a)** From the given transition matrix draw the state diagram. **[9]**

$$\begin{bmatrix} 0.3 & 0.5 & 0.1 & 0 & 0.1 \\ 0.2 & 0.4 & 0.4 & 0 & 0 \\ 0 & 0.1 & 0.3 & 0.5 & 0.1 \\ 0 & 0.1 & 0.1 & 0.5 & 0.3 \\ 0.2 & 0 & 0 & 0.2 & 0.6 \end{bmatrix}$$

b) Explain with block schematic isolated digit recognition system. **[9]**

**Q11)a)** Distinguish between speaker identification and speaker verification. **[8]**

b) Explain in detail text-to speech conversion system. **[8]**

OR

**Q12)a)** Explain Phoneme-based synthesis related to concatenative synthesis. **[8]**

b) With the help of block schematic explain formant-based synthesizer. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P1398**

**[4759] - 101**

[Total No. of Pages :3

**B.E. (E & TC)**

**TELEVISION & VIDEO ENGINEERING**

**(2008 Pattern) (Elective - III) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer questions 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Figures to the right side indicate full marks.*

**SECTION - I**

- Q1)** a) Draw a neat sketch of composite video signal indicating the numerical values for different timing of various pulses used in CCIR-B standard. [6]
- b) What is Interlaced scanning and why it is used in Television System. [6]
- c) Explain vertical & Horizontal resolution. [6]

OR

- Q2)** a) Define following terms: [10]
- i) Hue
  - ii) Saturation
  - iii) Brightness
  - iv) Kell factor
  - v) Aspect Ratio
- b) Why is the (G-Y) difference signal not chosen for transmission? How this signal is obtained at the receiver? [8]

**P.T.O.**

- Q3)** a) With block diagram explain low level modulated TV transmitter. [8]  
b) Explain PAL decoder system for colour TV. How phase errors are eliminated. [8]

OR

- Q4)** a) Compare NTSC, PAL and SECAM system for Colour TV. [8]  
b) Draw Chromaticity diagram & explain what information is obtained from it. [8]

- Q5)** a) Discuss digital TV recording techniques. [8]  
b) Explain Advanced MAC signal transmission techniques. [8]

OR

- Q6)** a) What are the advantages of Digital TV over Analog TV. Draw block diagram of Digital TV. [8]  
b) Explain the principles of video compression and discuss various video compression formats. [8]

## **SECTION - II**

- Q7)** a) Explain the concept of  
i) Video on demand (VoD) [4]  
ii) Conditional Access System (CAS). [4]  
iii) Direct to Home (DTH) [4]  
b) Draw and explain the function of each block in HDTV receiver. [6]

OR

- Q8)** a) Discuss a live TV coverage plan for international cricket. [10]  
b) With suitable block diagram explain CCTV system in detail. [8]

- Q9)** a) What are the features of IPTV, explain the architecture of IPTV. [8]  
b) Along with a block diagram explain the working of a video door phone system. [8]

OR

- Q10)**a) Explain the 3G Mobile TV system. [8]  
b) Explain Wi-Fi system in detail. [8]

**Q11)** Write a short note on:

- a) Camcoder. [4]  
b) MP3 player. [4]  
c) Blue ray disc. [4]  
d) Handycams and Digicams. [4]

OR

- Q12)**a) Describe the construction of plasma TV and compare with LCD TV. [8]  
b) State the important specifications of DVD player. Draw a neat block diagram of DVD player & explain function of each block. [8]





Total No. of Questions : 12]

SEAT No. :

**P1399**

**[4759] - 102**

[Total No. of Pages :3

**B.E. (Electronics & Telecommunication)  
TEST AND MEASUREMENT SYSTEMS  
(2008 Course) (Elective - III) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate answer-books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Describe various levels of standards used in measurement. **[8]**
- b) The following reading are obtained for measurement of inductor 47.1, 47.3, 48.5, 48.3, 47.4, 47.5, 48.2, 48.4, 47.9, 48.6 mH. Calculate **[8]**
- i) Arithmetic mean
  - ii) Average deviation
  - iii) Standard deviation
  - iv) Probable error

OR

- Q2) a)** Explain the need of calibration. Also explain the calibration standards and traceability. **[8]**
- b) Draw & Explain block diagram of digital data acquisition system. **[8]**
- Q3) a)** With the help of neat block diagram, explain the operation of vector Voltmeter. **[8]**
- b) State & explain some important specification of commercially available digital LCR-Q meter. **[8]**

OR

*P.T.O.*

- Q4)** a) With neat diagram explain working of vector impedance meter. [8]  
b) With neat diagram explain working of true rms meter. [8]
- Q5)** a) With neat block diagram explain the principle of operation of Digital Storage Oscilloscope. [8]  
b) List and explain different types of CRO probes. What are advantages of active probe? [10]

OR

- Q6)** a) With the neat block diagram explain the working of Dual Trace Oscilloscope. Also explain alternate mode and chop mode used in CRO. [10]  
b) With neat block diagram explain the principle of operation of Digital Phosphor Oscilloscope. [8]

### **SECTION - II**

- Q7)** a) Draw the block diagram of TRF Spectrum Analyzer & explain its Operation. Also state its advantages & disadvantages. [8]  
b) With neat diagram explain total harmonic distortion analyzer. [8]

OR

- Q8)** a) Explain with neat diagram function of Logic Analyzer. [8]  
b) Explain with neat diagram selective wave analyzer. [8]

- Q9)** a) Explain in brief the technique of s-parameter using network analyzer. [8]  
b) Draw and explain the block diagram of an Arbitrary Waveform Generator. [8]

OR

- Q10)** a) What are different approaches of frequency synthesis. Explain any one. [8]  
b) With the neat diagram explain network analyzer measurement system. [8]

- Q11)a)** Give the classification of Virtual Instruments and explain each in brief. **[10]**
- b) Explain the features of LABVIEW. **[8]**

OR

- Q12)a)** Explain the detail structure of IEEE 488 bus used to interface spectrum analyzer with computer. **[10]**
- b) What are the requirements of the Automatic Test System? **[8]**



Total No. of Questions : 12]

SEAT No. :

**P1400**

**[4759]-103**

[Total No. of Pages : 3

**B.E. (E & Tc)**

**ARTIFICIAL INTELLIGENCE**

**404190(2008Course) (Elective-IV) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections must be written in separate answer papers.*
- 2) *Answer any three questions from each section .*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary*

**SECTION-I**

- Q1)** a) Give examples of problems/ games which require A.I. techniques? Give the role of A.I. in solving it. [8]
- b) Explain the architecture of a typical agent. What is a rational agent?. [8]

OR

- Q2)** a) Explain “Simple Reflex based agent” with the help of schematic diagram or pseudo code. [8]
- b) List the different properties of task environment Give the suitable example for each. [8]

- Q3)** a) Explain A\* algorithm with its pseudo code. [8]
- b) Explain the importance and use of plateau,ridge, local maxima and global maxima with respect to hill climbing algorithm. [8]

OR

- Q4)** a) Define Heuristics. Explain the significance of heuristic function in the informed search with suitable example. [8]
- b) Explain steepest ancient hill climbing and stimulated annealing in detail. [8]

***P.T.O.***

- Q5) a)** Consider the problem of deciding which place to be visited. [9]
- If summer Mount Abu.
  - If winter Jodhpur.
  - If rainy Shimla.
  - If spring Nainital.
  - It is winter.

Build the TMS style database of necessary facts to solve this problem.

- b) What are the drawbacks of predicate logic used in representation of facts? Give five examples where it becomes extremely difficult to use predicate logic for representations. [9]

OR

- Q6) a)** What is meant by non-monotonic reasoning? Differentiate between statistical reasoning and probabilistic reasoning. [9]
- b) Represent the following in semantic networks. A collage has a department computer Engineering and Ravi is the head of the department. Varsha and Ruma are staff members of the department. Varsha is married to Ajay. Ajay is a Software Programmer. They have two children and they live on MG Road. Varsha wears glasses and is 5 feet 3 inches tall. [9]

## SECTION II

- Q7) a)** Explain the significance and impact of learning in problem solving. [10]
- b) Give any two applications of neural networks. [8]

OR

- Q8) a)** Consider the following representation of block world : [10] [10]
- Start:  $ON(A,B) \wedge ON(C,D) \wedge ONTABLE(D) \wedge ONTABLE(B)$ .
  - Goal:  $ON(C,B) \wedge ON(D,A) \wedge ONTABLE(B) \wedge ONTABLE(A)$ .
- show how TWEAK (Non-Linear planning) will solve this problem.
- b) Use goal stack method to solve following Block's problem. [8]

**Q9) a)** Explain Waltz's algorithm with an example. Comment on the limitations of Waltz algorithm. [8]

b) Explain the typical architecture of Expert system. [8]

OR

**Q10)a)** What are trihedral figures (objects)? How Waltz's can be applied to propagate symbolic information. [8]

b) What is difference between expert system and traditional system? Comment on the advantages and disadvantages of expert system. [8]

**Q11)a)** Detail the Semantic analysis phase of Natural Language Processing (NLP). [8]

b) Show the parse tree for

i. John wanted to go to the movie with Sally.

ii. Print the file on the printer. [8]

OR

**Q12)a)** What are the various issues in natural language processing? Explain. [8]

b) What is NLP? Explain different phases and the evaluation process of NLP. [8]



Total No. of Questions : 12]

SEAT No. :

**P1401**

**[4759]-104**

[Total No. of Pages : 3

**B.E. (E & TC)**

**AUTOMOTIVE ELECTRONICS**

**(2008 Course) (Semester - II) (Elective -IV) (404190)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from Section -I and three questions from Section-II.*
- 2) *Attempt not more than six questions of which at least three questions must be from each section.*
- 3) *Answers to the two sections should be written in separate answer books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

- Q1) a)** Explain two stroke and four stroke engine operation with the help of following actions. **[10]**
- i) Intake
  - ii) Compression
  - iii) Power
  - iv) Exhaust
- b) Explain with diagram basic transmission system in automotive. **[8]**

OR

- Q2) a)** Explain with the help of neat diagram. **[10]**
- i) Breaking system
  - ii) Cooling system
- b) Explain working principle of fuel cell. **[8]**

**P.T.O.**

- Q3) a)** Explain working principle required for sensing of following parameters. **[8]**
- i) Exhaust gas oxygen (EGO)
  - ii) Engine speed
- b) Explain method of type pressure measurement system. **[8]**

OR

- Q4) a)** With reference to maintaining stoichiometric ratio, explain fuel injection system in automotive. **[8]**
- b) Explain any two techniques used for crankshaft angular position measurement. **[8]**

- Q5) a)** Write note on **[8]**
- i) Traction control system
  - ii) Steering control system
- b) With the help of neat diagram explain adaptive cruise control system. **[8]**

OR

- Q6) a)** What is engine management system? Explain with block diagram how it works? **[8]**
- b) Write short note on Anti-theft system. **[8]**

### **SECTION - II**

- Q7) a)** Write a C18 program to toggle only port PORT A.4 bit continuously for every 80 ms. Use timer 0, 8 bit mode, the 1:4 prescaler to create the delay.
- Assume XTAL = 10 MHz. **[8]**
- b) How embedded C is different from C programming. **[6]**
- c) Explain any one application of watch dog timer in automotive. **[4]**

OR



- Q8)** a) Draw and explain architecture of 8 bit PIC microcontroller. [8]  
b) With the help of interfacing diagram, explain PWM technique of motor speed control using PIC microcontroller. [10]
- Q9)** a) Explain the requirement of communication protocol to be used in modern automotive. [8]  
b) How cortex architecture is different from ARM-7 architecture? Suggest any one application of cortex in automotive. [8]

OR

- Q10)a)** Write short note on [8]  
i) LIN  
ii) Flexray
- b) Explain features of CAN protocol, those are suitable for automotive usage. [8]
- Q11)a)** Explain on-board and off-board diagnostics in automotive. [8]  
b) What is DTC? What information does it carries? Explain fault finding and corrective measures used in automotive diagnostics. [8]

OR

- Q12)a)** Explain basic and multiplex wiring system. [8]  
b) Explain SAE standard for emission control. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

**P1402**

**[4759]-105**

[Total No. of Pages : 3

**B.E. (E & T/C)**

**NANOTECHNOLOGY**

**(2008 Course) (Semester - II) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Solve Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6, Q7 or Q 8, Q 9 or Q 10, and Q 11 or Q 12 .*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain in detail the fundamental science behind Nanotechnology. [8]  
b) List the different tools for measuring nanostructures and explain it in detail. [8]

OR

- Q2)** a) What is polymerization? Explain the process of DNA hybridization with schematic. [8]  
b) What are the different challenges for tools to imagine Nanoscale behavior. [8]
- Q3)** a) Compare Floating Gate NVM and Nanocrystal based NVM. [8]  
b) Draw and explain the process flow for integrating Nanocrystal memory with standard CMOS technology. [8]

OR

- Q4)** a) Compare between Nanoscale materials and macro scale materials. [8]  
b) Explain the effect of electron trapping in Novel dielectric material. [8]

**P.T.O.**

**Q5)** Describe the following terms related to carbon Nanotubes. **[18]**

- a) Fabrication
- b) Properties and Types
- c) Applications

OR

**Q6)** Write short notes on the following: **[18]**

- a) Magic Number and optical properties of Nanoparticles.
- b) Single walled and Multi walled carbon Nanotube.
- c) Superconductivity in  $C_{60}$ .

**SECTION - II**

**Q7)** a) Explain the application of Azobenzene molecule in NEMS. **[8]**

- b) Explain the process of writing, reading and erasing in Azobenzene molecule using polarization? **[8]**

OR

**Q8)** a) Explain any two applications of a Cantilever device under MEMS. **[8]**

- b) Enlist the advantages of MEMS. **[8]**

**Q9)** a) Explain the steps involved in nanoimprint using e-beam lithography process. **[10]**

- b) Describe the significance of Nano-electronics in Advanced computation applications. **[8]**

OR

**Q10)a)** Explain Optical and Atomic Lithography. [10]

b) Describe briefly the functioning of Scanning Tunneling Microscope. [8]

**Q11)a)** Explain the working of single Electron Transistor and its application. [8]

b) Briefly explain the capture of light energy and generation of current in photovoltaic cell. [8]

OR

**Q12)** Write short notes on the following: [16]

a) Nanotechnology in Biomedical.

b) Molecular motors.

EEE

Total No. of Questions : 12]

SEAT No. :

**P1403**

**[4759]-106**

[Total No. of Pages : 3

**B.E. (E & TC)**

**PLC AND INDUSTRIAL PROCESS AUTOMATION**

**(2008 Course) (Semester - II) (404190)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6 from Section - I and Q7 or Q 8, Q 9 or Q 10, Q 11 or Q 12 from Section - II .*
- 2) *Right side figures indicate marks.*
- 3) *Assume data necessary.*

**SECTION - I**

- Q1)** a) Explain Transient Regulation and Steady State regulation. [8]
- b) Explain Foundation Field Bus (FFB) in Industrial applications? Comment on advantages of FFB? [8]

OR

- Q2)** a) Advantages of Digital Control Over analog control? Explain concept of stability in Digital Control System [8]
- b) Explain the Supervisory Control with suitable example? [8]
- Q3)** a) Explain need of transmitters? what are the standards used for current, voltage and pneumatic signals in industrial applications? [8]
- b) What are the applications of electronic differential Pressure Transmitters? [8]

OR

- Q4)** a) Explain Analog and Digital signal conditioning for RTD? [8]
- b) Explain with suitable examples and applications smart and Intelligent transmitters? [8]

**P.T.O.**

- Q5)** a) Explain role and working of PID controller? Draw step response characteristics of PID controller? [9]
- b) What are the Design considerations of Digital PID controller? [9]

OR

- Q6)** a) Explain tuning of PID controller? What is the effect of P, I and D parameters. [6]
- b) What is OFFSET in control applications? How it will be reduced? [6]
- c) Explain with suitable example concept of Integral Wind up? [6]

### **SECTION - II**

- Q7)** a) What is necessity of using actuators? How actuators are classified? Explain any one electrical actuator? [8]
- b) Explain role of final control element? What are the required characteristics of final control element? [8]

OR

- Q8)** a) Compare between Pneumatic and Hydraulic actuators? [8]
- b) Explain with neat diagram stepper motor as an actuator? Explain its advantages and applications? [8]
- Q9)** a) Explain interfacing of Input and Output devices with PLC? [8]
- b) Explain with one example PLC based automated system? [8]

OR

**Q10)a)** How you will decide specifications of PLC required for a particular application? Explain following terms w.r.t. PLC. **[10]**

i) Input Scan Time,

ii) Output Scan Time

iii) Timers

iv) Counters

b) What is Networking of PLC? Where it is used explain with suitable example? **[6]**

**Q11)a)** Explain the concept of statistical process control with suitable application? **[9]**

b) How Artificial Neural Network (ANN) based controllers are used in Industrial Applications? **[9]**

OR

**Q12)a)** Explain advantages of Fuzzy controller over conventional / classical controller? Explain Fuzzy controller with suitable block diagram? **[10]**

b) Compare fuzzy controller and ANN based controllers? **[8]**

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P3690**

**[4759] - 107**

[Total No. of Pages :3

**B.E. (E &TC)**

**ADVANCED SATELLITE SYSTEMS AND APPLICATIONS**

**(2008 Course) (Semester -II) (Open Elective) (404190)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections must be written in separate sheets.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data. if necessary.*

**SECTION - I**

- Q1)** a) Why is there a need for satellite communication? Explain various advantages and limitations of satellite communication. [8]
- b) Explain following terms: [8]
- i) Apogee and Perigee
  - ii) Ascending and Descending Nodes
  - iii) Argument of Perigee
  - iv) Mean and True anomaly

OR

- Q2)** a) What is a geostationary orbit? Which conditions should be fulfilled to attain a geostationary orbit? [8]
- b) What are Look angles? Derive an equation for the same. [8]
- Q3)** a) Discuss the design considerations of a communication satellite. [8]
- b) Discuss the TT & C system of a communication satellite. [8]

OR

**P.T.O.**



- Q4)** a) Compare the error probabilities for BPSK and QPSK. [8]
- b) Explain with the help of neat block diagram QPSK transmitter & receiver. Also give the mathematical analysis. [8]

- Q5)** a) Derive the Link-Power Budget equation. [10]
- b) Diagrammatically explain the combined Uplink and Downlink carrier to noise ratio. [8]

OR

- Q6)** a) Discuss the significance of system noise temperature and G/T ratio in calculation of link budget. [6]
- b) Discuss various sources of interferences between two satellite circuits. Also discuss how it affects link design calculations. [6]
- c) Comment on the following: [6]
- i) Uplink Budget
  - ii) Downlink Budget
  - iii) Overall link Budget

### SECTION - II

- Q7)** a) Explain the principle used in spectrum spreading and despreading. How is this used to minimize interference in a CDMA system? [10]
- b) With neat block diagram explain DSSS transmitter & receiver with relevant waveforms. [8]

OR

- Q8)** a) Explain the technique of TDMA. How TDMA network is advantageous over FDMA network? [10]
- b) Explain various forms of spread spectrum with relevant waveforms. [8]

- Q9)** a) Explain with neat block diagram critical components of a satellite link. [8]  
b) Compare the error probabilities for ASK and BFSK. [8]

OR

- Q10)** a) Explain with the help of neat block diagram 16 bit QAM transmitter & receiver. Also give the mathematical analysis. [8]  
b) Write a note on Tracking System. List its characteristics. [8]

- Q11)** a) Explain with neat diagram GPS Position Location principle. [8]  
b) Explain in brief GPS transmitters and receivers. [8]

OR

**Q12)** Write short notes on. (Any Four). [16]

- a) Differential GPS
- b) Remote sensing
- c) Resource Mapping
- d) Calculation for Link Margins for star network
- e) Applications of DBS TV and Radio
- f) VSAT - Earth station.



Total No. of Questions : 12]

SEAT No. :

**P4628**

**[4759] - 108**

[Total No. of Pages :3

**B.E. (E & TC)**

**ADVANCED TRENDS IN TELECOMMUNICATION  
(2008 Course) (404190) (Open Elective) (Semester - II)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) With neat diagram, explain in brief different wireless networks. [8]  
b) Explain IEEE 802.11 architecture and protocols in detail. [10]

OR

- Q2)** a) Classify Routing Protocols. Explain with neat diagram, energy efficient unicast routing algorithm. [10]  
b) Write a brief note on security of wireless Adhoc networks. [8]

- Q3)** a) Explain with one application the realization of Internet of things in RFI & technology. [8]  
b) List applications of IoT. Explain the architecture of ubiquitous computing to support IoT. [8]

OR

- Q4)** a) Explain in brief the functionality of each layer in IoT architecture with neat diagram. [8]  
b) List and brief key challenges to achieve full IoT potential. [8]

*P.T.O.*

- Q5)** a) With neat diagram, explain the working principle of wide Area Measurement System. [8]
- b) Write a brief note on:- [8]
- i) Smart City.
  - ii) Intelligent Housing.

OR

- Q6)** a) Explain the concept of Smart Grid. Explain in brief how smart meters are most tangible sign of Smart Grid. [8]
- b) With neat diagram, explain substation and feeder monitoring system architecture. [8]

### SECTION - II

- Q7)** a) With neat diagram, explain in detail heterodyne architecture of software Defined Radio. [8]
- b) What are user requirements for S D R terminals. Explain the need for network reconfigurability management. [10]

OR

- Q8)** a) Explain with neat diagram cognitive Radio architecture. [6]
- b) Write a short note w.r.t. cognitive Radio network: [12]
- i) Spectrum sensing
  - ii) Spectrum sharing
  - iii) Spectrum Mobility
  - iv) Spectrum Management

- Q9)** a) Explain with neat diagram and example the difference between MIMO Vs cooperative MIMO. [8]
- b) With neat diagram, explain cooperative communication system. List applications of cooperative communication. [8]

OR

- Q10)a)** List benefit and drawback of cooperative communication system. [8]
- b) With neat diagram, explain principle of cooperative communications based on smart antenna. [8]

- Q11)a)** Brief different regulatory and safety aspects of Tele-health care. [8]
- b) List applications of wireless communication in hospital and emergency settings. [8]

OR

- Q12)a)** Explain following requirements related to Telehealth care: [8]
- i) Reliability
  - ii) Privacy
  - iii) Trust
- b) With neat diagram, explain the usage of cognitive radio for Tele-health care. Mention spectrum usage for Tele-health care. [8]



Total No. of Questions : 12]

SEAT No. :

**P1404**

**[4759]-109**

[Total No. of Pages : 3

**B.E. (Electronics and Telecommunication)**

**Programmable system on chip**

**(2008 Course) (Semester - II) (404190) (Open Elective)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section-I and answer 3 questions from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain and compare the features of pSoC1, pSoC2 and pSoC3 families. [8]
- b) Explain with neat schematic the analog and digital blocks used in pSoC architectures. [8]

OR

- Q2)** a) What do you mean by programmable routing and Interconnects used in pSoC. [8]
- b) Draw the architectural blocks of pSoC and conventional microcontroller unit. Compare the features of pSoC and conventional microcontroller unit. [8]
- Q3)** a) With neat schematic explain the architecture of pSoC-5 device. [8]
- b) Explain the architectures of following subsystems used in pSoC-3, [8]
- i) CPU subsystem
  - ii) I/O interfaces

OR

**P.T.O.**

**Q4) a)** What are the differences between architectural features of pSoC-3 and PSoC-5. Explain each in detail. [8]

b) What are the analog and digital subsystems used in pSoC? How to design mixed signal systems using pSoC? [8]

**Q5) a)** What is the difference between pSoC memory management and conventional microcontroller memory management. Design pSoC memory module for interfacing 64KB RAM with the pSoC. [10]

b) Write a short note on “pSoC Designer Suit”. [8]

OR

**Q6) a)** What is Cypress pSoC Creator? Design and implement a Data Acquisition System using pSoC Creator. [10]

b) Write a short note on “Improvements of the pSoC”. [8]

### **SECTION - II**

**Q7) a)** Write short notes on, [8]

i) pSoC interrupt subsystem.

ii) Mixed signal architectures.

b) Explain in detail pSoC express. Design any mixed signal embedded system using pSoC express. [8]

OR

**Q8) a)** What are the hardware and software subsystems used in mixed-signal systems using pSoC. Explain each in detail. [8]

b) Explain the hardware and software components used in pSoC. [8]

- Q9) a)** Explain the architecture of following buses used in pSoC. **[8]**
- i) I2C
  - ii) SPI
  - iii) CAN
  - iv) UART
- b)** Write short notes on **[8]**
- i) Delta-sigma ADC topology.
  - ii) Digital filter Blocks.

OR

- Q10)a)** What are the differences between Op-amp and programmable gain amplifiers? What is the use of switched capacitor in amplifiers? **[8]**
- b)** Write a short notes on **[8]**
- i) Universal Digital Block.
  - ii) flash temperature Sensors.
- Q11)a)** design and implement following systems using pSoC, **[10]**
- i) Ultrasonic Parking Assistant
  - ii) Universal wide range signal generator
- b)** Draw and explain the interfacing diagrams of temperature sensors and tachometers with pSoC. **[8]**

OR

- Q12)a)** Design and implement following systems using pSoC, **[10]**
- i) Manchester Decoder
  - ii) Time signal Processing
- b)** Draw and explain the interfacing diagrams of UART based task communications. **[8]**

EEE





- Q4)** a) Explain any four principles of ISO 9001:2000 with examples from Construction sector. [8]
- b) Explain P.D.C.A cycle with an example. [4]
- c) Explain how 'Quality Circle' functions in any organization. [4]

**Q5)** Following defects are observed in a newly constructed flat:

- i) Top corner of the wall is leaking.
- ii) Water is not flushing properly from bathroom.
- a) As a Quality Manager suggest preventive and remedial measures for the above defects. [8]
- b) Determine Cost of Poor quality for each of the above defects. [8]
- (Assume suitable data).

OR

**Q6)** Explain Any Four in brief: [16]

- a) DMAIC Methodology in Six Sigma.
- b) Application of PRRT software in TQM.
- c) Importance of 'Kaizen' in TQM.
- d) Supply Chain Management in TQM.
- e) Benchmarking in TQM.

### **SECTION-II**

- Q7)** a) Define MIS. [2]
- b) Explain with a flow diagram the various components of an MIS developed for a mega residential project. [8]
- c) State various advantages of MIS in a contractor's organization. [8]

OR

**Q8) a)** What is Decision Support System? What are the various parameters of DSS? [8]

b) Explain the steps involved in the process of making a decision from inception to completion of a construction project. [10]

**Q9) a)** What is Strategic Management? [4]

b) Explain the importance of Strategic Management in MIS. [4]

c) Explain the three stages of strategic management with an example from construction sector. [8]

OR

**Q10)a)** Explain the importance of ERP in construction Sector. [6]

b) Explain with a flow chart an ERP designed for an organization working in road sector. [10]

**Q11)a)** Explain how MIS will help in planning, tendering, organizing and monitoring of a construction project. [8]

b) Explain integration of software, hardware, data and information processing with examples from construction sector. [8]

OR

**Q12) Explain in brief (Any Four):** [16]

- a) Data & Information.
- b) Types of Reports generated in MIS.
- c) Information based support system.
- d) Subsystems of an MIS.
- e) Tactical & Operational Decisions.



Total No. of Questions : 12]

SEAT No. :

**P1405**

**[4759]-110**

[Total No. of Pages : 4

**B.E. (Electronics)**

**ELECTRONICS SYSTEM DESIGN**

**(2008 Course) (Semester - I) (404201)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Discuss in detail the different stages of electronic product development. Explain the implication of skipping a particular stage in development. **[8]**
- b) Define and explain the following terms in mathematical way. **[8]**
- i) MTBF
  - ii) MTTF
  - iii) Failure Rate
  - iv) Reliability

OR

- Q2)** a) Explain the bath tub curve for reliability indicating all its regions. Also explain how failure rate can be reduced in different regions of bathtub curve. **[8]**
- b) Estimate reliability of a linear power supply with component as given in following table **[8]**

**P.T.O.**

Components	Failure Rates hours for $10^{-6}$ hours
Power transformers(1)	4.4
Rectifier Diodes(4)	0.2
Filter Capacitors (2)	0.3
Ceramic Capacitors (2)	0.3
Semiconductor Diodes (2)	0.2
Regulator IC (2)	0.6
Linear IC (2)	0.6
Resister (4)	0.2

**Q3) a)** Explain following terms for ADC & DAC. **[8]**

- i) Resolution
- ii) Full scale o/p voltage
- iii) Accuracy
- iv) Linearity

b) In analog signal conditioning what are the different factors affecting choice of opamp. **[8]**

OR

**Q4) a)** Explain instrumentation amplifier with it's different specifications. **[8]**

b) Explain error budget analysis with one example of an electronic product. **[8]**

**Q5) a)** Explain working principle of analog resistive touch screen. Interface 4-wire resistive touch screen with any microcontroller. **[10]**

b) Explain following buses & Protocols. **[8]**

i) RS-232

ii) RS-485

iii) I2C

iv) SPI

OR

**Q6) a)** What are the different factors for the selecting a particular microcontroller for any application. **[10]**

b) What are the different LED configurations? Give suitable example for the same. **[8]**

### **SECTION - II**

**Q7) a)** Explain Debugger tools & techniques for software in detail. **[8]**

b) What are the different factors affecting on the choice between Assembly & High Level language? **[8]**

OR

**Q8) a)** Explain following approaches in development of application software for electronic product. **[12]**

i) Top-Down approach

ii) Bottom-Up approach

iii) Modular Programming

iv) Water fall Model

b) What are the features of simulators? **[4]**

- Q9) a)** Define crosstalk? What should be the remedy to minimize crosstalk?[8]
- b) What are the testing standards for EMI/EMC? [8]

OR

- Q10)a)** What is the signal integrity? Justify the significance of SI. How can it be ensure in high-speed circuits? [8]
- b) Explain different design consideration while designing PCB for high speed digital circuits? [8]

- Q11)a)** Explain environmental testing? What is the need of environmental testing? What are the different factors needed to be test while environmental testing. [12]
- b) What are the compliances for the EMI/EMC? [6]

OR

- Q12)a)** What are the features & limitations of analog CRO, DSO, Logic Analyzer & Mixed signal Oscilloscopes in finding hardware / software faults?[12]
- b) Define transient Sensitivity & Monte Carlo? [6]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1406**

**[4759] - 111**

[Total No. of Pages : 3

**B.E. (Electronics Engineering)  
VLSI DESIGN  
( 2008 Pattern) (Semester -I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section-I & Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain CMOS inverter and its transfer characteristics in detail. How to achieve symmetry in these characteristics. [8]
- b) Design 4:1 Mux using transmission Gates. Compare it with conventional methods. [8]

OR

- Q2)** a) Explain the following: [8]
- i) Hot electron effect
  - ii) Body effect
- b) Explain the static & dynamic power dissipation. Derive an expression for power delay product. [8]

- Q3)** a) Explain DRAM in detail with suitable diagram. [8]
- b) Give the classification of memory with the application in each case. [8]

OR

- Q4)** a) Differentiate between SRAM & DRAM technologies. [8]
- b) Explain read/write operation of 6T SRAM cell with the help of timing diagrams. [8]

**P.T.O.**



- Q5)** a) Explain different modeling styles in VHDL coding with examples. [9]  
b) Compare in VHDL [9]  
i) Variables and Signals  
ii) Synthesizable and Non-synthesizable statements

OR

- Q6)** a) Differentiate Moore and Mealy machine with suitable examples. [9]  
b) Write a VHDL code for a JK FF. Also write a test bench for it. [9]

### **SECTION - II**

- Q7)** a) Explain in detail the classification of ASIC in detail. [8]  
b) Draw & explain CMOS architecture of SRAM. [8]

OR

- Q8)** a) Explain the term [8]  
i) CLB  
ii) LUT  
iii) IOB  
iv) Switch Matric  
b) With neat schematic explain the architectural building blocks of CPLD. [8]

- Q9)** a) Explain DFT in detail. How it can be categorized? Where it is useful. [8]  
b) What is full scan and partial scan? Explain in detail. [8]

OR

- Q10)** a) Write a short note on: BIST, JTAG and TAP controller. [8]  
b) What are the types of fault? Explain with schematic. [8]

**Q11)a)** What is power optimization? Explain the methods of optimization at various levels. [9]

b) Explain the following terms: [9]

i) Switch Box Routing

ii) Power distribution

iii) Global Routing

OR

**Q12)a)** Explain input pad, output pad and 3 stage pad design in a chip. [9]

b) What is clock skew and clock jitter? Explain different techniques of clock distribution. [9]



Total No. of Questions : 12]

SEAT No. :

P3323

[Total No. of Pages : 3

[4759]-112

**B.E. (Electronics)  
Embedded System  
(2008 Course)**

*[Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section*
- 2) *Answer to the two sections should be written in separate books*
- 3) *Figures to the right indicate full marks*
- 4) *Assume suitable data, if necessary*
- 5) *Neat diagrams must be drawn wherever necessary*
- 6) *Use of non programmable electronic pocket calculators is allowed*

**SECTION - I**

- Q1)** a) Define embedded systems. Explain Different Categories of Embedded System and application Areas. [8]
- b) Explain in brief Design metrics Challenges. The design of particular product has NRE cost of Rs. 1,00,000. How much will we have to add to the cost of the each product if we sell
- i) 100 units and ii) 200 units [10]

OR

- Q2)** a) Explain the role of software tools in Integrated Development Environment (IDE) to design Embedded System application. [10]
- b) Explain different communication protocols used for transferring data in embedded systems. [8]
- Q3)** a) List and explain specifications of a processor. Compare Harvard and Von-Neuman processor architectures. [8]

**P.T.O.**

- b) Explain use and type of interrupts in embedded application development.[8]

**OR**

- Q4)** a) Why selection of memory is critical in Embedded System? Explain the steps involved in designing Embedded System from memory selection point of view [8]
- b) Explain various processor technologies in design of embedded processors. [8]

- Q5)** a) Explain the pin connect block and general purpose input output registers in LPC 2148 [8]
- b) Explain the privileged and Non-privileged modes of operation in ARM 7 processor. [8]

**OR**

- Q6)** a) Draw and explain data flow model of an Arm processor. [8]
- b) Compare ARM mode and THUMB mode operation of ARM processor[8]

## **SECTION - II**

- Q7)** a) List features of LPC 2148 with block diagram. [8]
- b) Write and explain the code for interfacing of 4x4 matrix keyboard and LCD with LPC 2148. Display "ELECTRONICS ENGINEER" message on LCD. [8]

**OR**

- Q8)** a) State different on chip communication protocols available in LPC 2148. [8]
- b) Explain on chip ADC/DAC of LPC 2148 Also write a program for ADC interfacing to display analog input on LCD. [8]

- Q9)** a) How many tasks can be defined in  $\mu$ cos - II and what type of scheduler is used in  $\mu$ cos - II? [8]
- b) Compare the traditional OS with RTOS and state the  $\mu$ cos - II RTOS features. [8]

**OR**

- Q10)**a) Define the context Switching. What are the steps involved in  $\mu$ cos - II context switching? Why it puts additional burden on OS? [8]
- b) Compare various scheduling algorithms. [8]

- Q11)**a) Explain the message box and queue kernel objects for interprocess communication in  $\mu$ cos - II? [8]
- b) Explain digital camera with suitable block diagram and state its hardware and software requirements. [10]

**OR**

- Q12)**a) Explain the interrupt handling in  $\mu$ cos - II and draw the state diagram show interrupt related functions. [8]
- b) Explain the Embedded Systems application Cruise control [10]



Total No. of Questions : 12]

SEAT No. :

**P3691**

**[4759] - 113**

[Total No. of Pages :3

**B.E. (Electronics)**

**ADVANCED MEASUREMENT SYSTEMS**

**( 2008 Course) (Semester -I) (Elective -I) (404204)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, from Section -I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section -II.*
- 2) *Figures to right indicate full marks.*
- 3) *Assume suitable data if necessary.*

**SECTION - I**

**Q1) a)** Explain in detail signal integrity design issues. **[8]**

b) Draw and explain arbitrary waveform generator. **[8]**

OR

**Q2) a)** State and explain Electrical Validation and Debug with MSO Series Oscilloscopes. **[8]**

b) What are the Signal Integrity Testing Challenges and possible solutions? **[8]**

**Q3) a)** Draw the architecture and explain in detail logic analyzer. State applications. **[8]**

b) Explain hardware design and testing methods of spectrum analyzer. **[8]**

OR

**Q4) a)** Explain hardware design and testing methods of Network analyzer. **[8]**

b) Explain DSO trigger modes with examples. State applications of DSO. **[8]**

**P.T.O.**

- Q5)** a) Explain embedded communication using CAN. [8]  
b) What are the design issues and the role of electronic measurements for debugging in automotive electronics? [4]  
c) What are the different interfacing techniques? Explain interfacing of graphic LCD display. [6]

OR

- Q6)** a) Explain serial bus decode test instruments for USB and PCI Express. [8]  
b) Write short note on any two. [10]  
i) GSM Modem for AT commands  
ii) RF Modules  
iii) Interfacing of thermal printer.

### **SECTION - II**

- Q7)** a) Explain measurement of microwave power bridge circuit using thermistors and barraters. [8]  
b) Explain single line cavity coupling system for wavelength measurement. [8]

OR

- Q8)** a) Draw and explain the fundamental set up for advanced radar system. [8]  
b) What are microwave enclosures and electromagnetic compatibility? Explain EMI and EMC measurements. [8]

- Q9)** a) What is virtual instrumentation? Explain test system development using virtual instrumentation? [8]  
b) Explain the application of TDM and PSK in instrumentation. [8]

OR

- Q10)** a) Explain hardware and software role in virtual instrumentation. [8]  
b) Explain Lab View based Data acquisition system design. [8]

- Q11)** a) Explain application of counter for frequency and capacitance meter. [6]  
b) What are the types of ADC and DAC? Enlist the specifications of ADC and DAC. [6]  
c) Explain data loggers in detail. [6]

OR

**Q12)** Write short note on any three. [18]

- a) Automation in digital instruments  
b) Analog mixers  
c) V to F converter  
d) Universal Counter.





Total No. of Questions : 12]

SEAT No. :

**P2011**

**[4759] -114**

[Total No. of Pages : 3

**B.E. (Electronics)**

**ADVANCED POWER ELECTRONICS**

**( 2008 Course) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *All questions carry equal marks.*
- 6) *Assume suitable data, if necessary.*
- 7) *Use of logarithmic tables slide rule, moillier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION - I**

- Q1)** a) What are converters? Explain with circuit diagram working of single phase series full converter for level load. **[10]**
- b) What is the need of cooling in industries? Explain. **[6]**

OR

- Q2)** a) Explain the need of 12-pulse converter in industries? Draw suitable circuit diagram & W/F s for the same- **[10]**
- b) What is power factor conditioning of rectifier diode? Explain. **[6]**

- Q3)** a) What are DC-drives? Explain with diagram how will you control the speed of DC motor using Microcontroller. **[12]**
- b) Why cyclo converters are not preferred for Large AC power control applications? Comment on P.F. **[6]**

OR

**P.T.O.**

- Q4) a)** Explain Double sided PWM converter with circuit diagram & comment on p.f. [8]
- b) What are AC drives? Explain with neat block diagram, speed control technique of  $3\phi$  I.M by using  $\frac{v}{f}$  Method. Comment on  $T_q$  Vs  $N$  characteristics. [10]
- Q5) a)** What is soft switching in resonant converter? Explain with diagram & waveforms, working of ZVS resonant converter with suitable load. State its limitations. [10]
- b) What are different types of harmonic elimination technique. [6]

OR

- Q6) a)** What are multi level inverters? Explain with circuit diagram & comment on p.f. [8]
- b) With the help of block diagram, explain PLL control of DC drives & state its advantages. [8]

### SECTION - II

- Q7) a)** What are low drop out regulators? Explain. [6]
- b) Compare linear, switched mode & Resonant converters. [6]
- c) Advanced modulation technique. [6]

OR

- Q8) a)** What is the role of power electronics in renewable energy? Explain with diagram variable wind energy conservation system. [10]
- b) Explain with circuit diagram & waveforms working of ZCS system. [8]
- Q9) a)** What is power quality? Explain different types of power line disturbances, preventing & nullifying measurement techniques & comment on power related quality issues. [10]
- b) What are solar powered drives? Explain. [6]

OR

**Q10)a)** What is HVDC? Explain. [8]

b) What is the need of energy audit? Explain. [8]

**Q11)a)** What are synchronous rectifier? Explain. [8]

b) What is FACTS [Flexible AC X<sup>ssion</sup> system]. Explain in detail. [8]

OR

**Q12)** Write short notes on any three. [16]

a) Photo voltaic energy

b) Traction drives

c) H.F. heating

d) Battery charger circuit

e) Matrix

f) Adaptive control technique.



Total No. of Questions : 12]

SEAT No. :

**P1407**

**[4759]-115**

[Total No. of Pages : 3

**B.E. (Electronics)**

**BIOMEDICAL INSTRUMENTATION**

**(2008 Course) (Semester - I) (Elective -I) (Theory)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections must be written in separate answer-books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION - I**

- Q1) a)** Explain with block diagram medical instrumentation system. **[8]**
- b) Explain with suitable diagram action potential, resting potential, depolarization and repolarization of a cell. **[8]**

OR

- Q2) a)** What are the drawback of surface electrode? Explain different electrodes used for ECG. **[8]**
- b) State and explain sensor performance characteristics. **[8]**
- Q3) a)** Draw a block diagram of EEG machine and explain each blocks in detail. **[8]**
- b) Draw and explain 10-20 electrode system for EEG recording. **[8]**

OR

**P.T.O.**

- Q4)** a) What are the applications of EEG? Explain any 3 EEG waveforms with their frequency and significance. [8]
- b) Write a brief note on EMG. [8]
- Q5)** a) Lead I amplitude is 1.2 mV Lead III amplitude is 0.55mV with calibration of 1mV=5mm. Find Lead II, aVR, aVL, aVF values. [8]
- b) Explain an electroconduction system of the heart. [6]
- c) Write a short note on heart sounds. [4]

OR

- Q6)** a) What are the effect of artifacts on ECG recording? Draw and explain a block diagram of ECG machine. [8]
- b) Describe ECG wave form and give specification of ECG amplifier. [6]
- c) Write the equation to calculate Lead II, aVR, aVL & aVF. [4]

### SECTION - II

- Q7)** a) With the help of suitable diagram describe oscillometric method of BP measurement technique. Elaborate its merits and demerits. [8]
- b) Explain in detail R-wave triggered and P-wave triggered mode of pacemaker. [8]

OR

- Q8)** a) Explain in details Doppler shift flow velocity meter. [8]
- b) Explain the working of DC defibrillator with circuit diagram and waveform. [8]
- Q9)** a) What are the different elements included in the blood cell test? Explain the coulter counters method of cell counting. [8]
- b) What is pulse oximeter? Explain how an oximeter works. [8]

OR

**Q10)a)** What is pH of blood? Explain electrode used in blood pH measurement.[8]

b) What are the advantages & disadvantages of electronic stethoscope?[8]

**Q11)a)** What are the advantages of CT scan over conventional X-ray imaging? Explain the principle of working of CT scan machine. [9]

b) What are the advantages of laser over other light source? Explain 3 processes to form laser beam. [9]

OR

**Q12)**Write a short note on (any 3): [18]

a) Applications of Laser in medicine.

b) MRI Vs CT scan.

c) Ultrasound machine.

d) Shadow less light.

e) Orthopentamo graph.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P4273**

[Total No. of Pages : 2

**[4759] - 116**

**B.E. (Electronics) (Semester - I)**

**MECHATRONICS**

**(2013 Pattern) (Elective- I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer questions 1 or 2 ,3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12.*
- 2) *Answers to the two sections should be written In separate answer books.  
Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Define the term mechatronics. Explain the role of mechatronics in design of elevator system in detail. **[10]**
- b) Explain different types of errors involved in the measurement system. How to reduce these errors. **[8]**
- Q2)** a) Justify with suitable examples scope and importance of mechatronics with respect to interdisciplinary approach. **[10]**
- b) Explain the term static characteristics and dynamic characteristics. Explain the terms: **[8]**
- i) Speed of response
  - ii) Measuring lag
  - iii) Fidelity.
- Q3)** a) Define the term pressure. What are the units used in pressure measurement. Explain in detail LVDT for pressure measurement. **[8]**
- b) A strain gauge with a gauge factor of 4 has a resistance of  $120\Omega$  when unstrained. If strain gauge undergoes a change in length from 0.25mm to 0.255mm. Find the new value of resistance. **[8]**
- Q4)** a) Explain position measurement system using ultrasonic method. **[8]**
- b) Write a short note on proximity sensors. **[8]**

**P.T.O.**

- Q5)** a) What are the important specifications of ADC and DAC. Explain them. [8]  
b) Define the term PLC. List the different specifications of PLC. Which different inputs and outputs used in PLC. [8]

- Q6)** a) Write a short note on AD 633. [8]  
b) It is required to measure and control water flow through closed pipeline from 0-100 ltrs/hr. Design and explain control system using PIC microcontroller to control flow. Justify selection of components. [8]

### **SECTION - II**

- Q7)** a) Explain multichannel data logger system in detail. [8]  
b) Write a short note on HART protocol. [8]

- Q8)** a) With suitable diagram explain principle and working of magnetic recorder. [8]  
b) Explain RS232 standard in detail. [8]

- Q9)** a) Define the term actuator. Explain electro pneumatic actuator in detail. [8]  
b) Define the control valve. Explain different factors for selection of control valve. [8]

- Q10)** a) List the different specifications of stepper motor. Explain in detail stepper motor as electrical actuator. [8]  
b) Explain construction and working of double acting cylinder. [8]

- Q11)** a) Explain mechanical and electronic design in detail for robot walking machine. [10]  
b) Explain in detail skip control of CD player. [8]

- Q12)** a) A electronics weighing machine is used to measure 0-50kg of weight. Design weighing machine system by using strain gauge. Justify the selection of components. [10]  
b) Explain mechatronics design of a coin counter. [8]





Total No. of Questions : 12]

SEAT No. :

**P1408**

**[4759] - 117**

[Total No. of Pages :3

**B.E. (Electronics)**

**ADVANCED COMPUTER ARCHITECTURE  
( 2008 Course) (Semester -I) (Elective - II) (404205)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Discuss Flynn's classification of parallel computer in detail. [8]  
b) Explain Handler's classification. [8]  
c) What is cluster computing? [2]

OR

- Q2)** a) Discuss in detail the application of parallel processing in [12]  
i) Predictive modelling and simulation  
ii) Engineering design and automation  
b) Discuss and explain instruction level parallelism and Thread level parallelism. [6]

- Q3)** a) Consider the following pipeline reservation table [10]

Clock cycles →	0	1	2	3	4	5	6
States ↓							
S <sub>1</sub>	X		X				X
S <sub>2</sub>				X		X	
S <sub>3</sub>			X		X		

- i) Determine latencies in the forbidden list F and collision vector C.

**P.T.O.**

- ii) Draw the state transition diagram.
  - iii) List all simple cycles and greedy cycles.
  - iv) Determine minimum average latency (MAL).
  - v) For a pipeline clock period  $\tau = 20\text{ns}$ . Determine maximum throughput of the pipeline.
- b) Explain the 'Internal Forwarding Techniques'. [6]

OR

- Q4)** a) Explain with suitable examples the various types of hazards in a pipeline processor. How these hazards can be resolved? [8]
- b) Explain the static & dynamic branch prediction techniques used in a pipeline processor. [8]

- Q5)** a) State the characteristics of CRAY-1 computer system. Draw and explain the computation section of CRAY-1 vector processor. [12]
- b) Explain pipeline chaining. [4]

OR

- Q6)** a) Explain four types of vector instructions. [8]
- b) What are vector processors? Discuss two different architectural configurations of vector processor. [8]

## SECTION - II

- Q7)** a) Explain static and dynamic network topologies used in interconnection networks with proper examples. [10]
- b) Explain matrix multiplication on SIMD architecture. [8]

OR

- Q8)** a) Explain the algorithm to compute Fast Fourier Transform for SIMD architecture. [10]
- b) Explain the cube interconnection network and hypercube interconnection network. [8]

- Q9)** a) Give the typical architecture of MPP. Explain in detail. [8]  
b) Write short note on: [8]  
i) Cross bar switch  
ii) Multiport memory

OR

- Q10)**a) Explain processor characteristics of multiprocessor. [8]  
b) Explain the architecture of IBM 4 processor. [8]
- Q11)**a) What is latency hiding techniques with respect to multithreaded architecture. Elaborate any two techniques. [8]  
b) Explain the following terms associated with message passing: Synchronous and asynchronous. [8]

OR

- Q12)**a) State the following terms with respect to multithreading [8]  
i) Latency  
ii) Number of threads  
iii) Context-switching overhead  
iv) Interval between switches  
b) What is data parallel programming. Explain in detail. [8]



Total No. of Questions : 12]

SEAT No. :

**P3887**

[Total No. of Pages : 3

**[4759] - 118**

**B.E. (Electronics) (Semester - I)**

**ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS  
PLANNING**

**(2008 Pattern) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answer any three questions from each Section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain the concept of costs and explain. **[9]**
- i) Fixed cost and Variable cost
  - ii) Marginal Cost and Marginal Benefit
  - iii) Opportunity Cost
- b)** What is mean by market research? Explain the concept of **[9]**
- i) Target Market
  - ii) Primary Data
  - iii) Secondary data

OR

- Q2) a)** Explain in detail, the concept of Marketing mix. **[9]**
- b)** Explain the demand and supply curve in a market economy. Also explain the concept of equilibrium price. **[9]**

**P.T.O.**

- Q3)** a) Write a short note on markup price and markdown price with suitable examples. [8]
- b) Write down the different ways of recruiting the employees? How can you evaluate and conduct the interviews [8]

OR

- Q4)** a) What is mean by inventory? Write down the reasons by which cost of the inventory gets increased. [8]
- b) Write advantages and disadvantages of- [8]
- i) Family business
- ii) Owning a franchise

- Q5)** a) Subodh and Sarang want to start a business of furniture. Write a partnership agreement in between them. [8]
- b) What are the ways to improve the cash flow. [8]

OR

- Q6)** a) Explain how will you choose location for different businesses. [8]
- b) Is entrepreneurship right for you? Explain how you will decide it? [8]

### **SECTION -II**

- Q7)** a) Explain the basic rules of effective communication. [9]
- b) Explain the following: [9]
- i) Copyrights
- ii) Consumer protection Law

OR

- Q8)** a) What are the different types of experts? Explain in detail. [9]
- b) Distinguish between demand based pricing and competition based pricing. [9]

- Q9) a) Write a note on: [8]**
- i) Antitrust Legislation
  - ii) Sherman Act
  - iii) Clayton Act
  - iv) Robinson-Patman Act
- b) What is ethics ? Why you want to establish an ethical workplace? [8]

OR

- Q10)a) Explain the different types of ways to raise the funds for business. Why bank reject the applications of loans? [8]**
- b) Explain in brief, problem solving method. [8]
- Q11)a) Explain the concept of lease. Discuss the various kinds of commercial lease. [8]**
- b) What is the purpose of business plan? [8]

OR

- Q12)a) What are the benefits and risks involved when competing globally? [8]**
- b) Explain five steps of primary market research. [8]



Total No. of Questions : 12]

SEAT No. :

**P3692**

**[4759]-119**

[Total No. of Pages : 3

**B.E. (Electronics)  
SYSTEM ON CHIP**

**(2008 Course) (Semester-I) (Elective-II) (404205)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) What are the concepts of MEMS? Explain the working principles and applications of MEMS. [8]
- b) What are the types of mechanical transducers? Explain the construction and working principle of gyroscopes. [8]

OR

- Q2)** a) Explain the following Processes: [8]
- i) Lithography.
  - ii) CVD.
- b) Explain the working principles of transduction. What are the types of pressure sensors. [8]

- Q3)** a) Explain following control techniques used in MEMS, [8]
- i) Analog Control.
  - ii) Digital Control.
- b) Write short note on silicon piezoelectric crystal with respect to- [8]
- i) Crystal mode.
  - ii) Piezoelectric materials.
  - iii) Deformation modes and operation.

OR

***P.T.O.***

- Q4)** a) What are the material properties of Silicon and Gallium arsenide. List out the differences in material properties of both the materials. [8]
- b) Explain the concept of- [8]
- i) Mobility
  - ii) Resistivity in context to Piezo crystal.

- Q5)** a) What is thermoresistor? Explain in detail [10]
- i) Metal Film Thermoresistor.
  - ii) Semiconducting Thermoresistor.
- b) Explain working principal of biosensor for measurement of blood Glucose concentration in a patient. [8]

OR

- Q6)** a) Write short note on, [10]
- i) Cellular Biology.
  - ii) Cell based Biosensors.
- b) With respect to Transduction principle, Fabrication and Applications explain Molecule based Biosensors. [8]

### **SECTION-II**

- Q7)** a) What do you mean by compilation? Explain the compilation techniques used in System on Chip applications. [8]
- b) What are the differences between General Purpose Core and Reconfigurable System on Chip architectures? Explain each in detail. [8]

OR

- Q8)** a) Explain SoC architecture in detail. What are the advantages of SoC design over VLSI design. [8]
- b) Write short note on: [8]
- i) Design for Testability.
  - ii) Built in Self Test.



- Q9)** a) Explain the System on Chip design flow of FPGA and ASIC. What are the differences between both the design flows. [8]
- b) Explain working principle of CVD? Which CVD process is used in MEMS and SoC fabrication. [8]

OR

- Q10)**a) What do you mean by synthesis in FPGA? What are the Pros and Cons of behavioral synthesis? [8]
- b) What are the physical design automation tools used in System on Chip designs? Explain any one in detail. [8]

- Q11)**a) List and explain various packaging technologies used in Microsystem packaging. [10]
- b) What are the concepts of Hardware and software co-design? Explain in detail Hardware and software co-design. [8]

OR

- Q12)**a) Write a short note on: [10]
- i) Testable design.
- ii) Testing of Microsystems.
- b) What do you mean by mechanical Packaging? Explain in detail micro electronics micro system packaging. [8]



Total No. of Questions : 12]

SEAT No. :

**P3680**

[4759]-12

[Total No. of Pages : 4

**B.E. (Civil)**

**EARTHQUAKE ENGINEERING**  
**(2008 Course) (Semester-I) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *From Section-I answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6 and from Section-II answer Q.7 or Q.8; Q.9 or Q.10; Q.11 or Q.12.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures in bold to the right, indicate full marks.*
- 4) *IS 456, IS 1893, IS 13920 are allowed in the examination.*
- 5) *Neat diagrams should be drawn wherever necessary.*
- 6) *If necessary, assume suitable data and indicate clearly.*
- 7) *Use of electronic pocket calculator is allowed.*

**SECTION-I**

**Q1)** a) What is an earthquake? Explain in details the causes and classification of the earthquake. **[8]**

b) Explain elastic rebound theory. **[8]**

OR

**Q2)** a) Explain basic difference between Magnitude and intensity of earthquake with example. **[8]**

b) Classify and describe with suitable sketches the different types of waves generated by an earthquake and their effects on structures. **[8]**

**Q3)** a) Derive general equation of SDOF System subjected to free vibration. **[12]**

b) Define vibration. What is free and Forced Vibration? **[6]**

OR

**P.T.O.**

**Q4)** Explain the procedure for obtaining the natural frequencies for a 3 DOF system subjected to Free Vibration? **[18]**

**Q5) a)** What is earthquake analysis and why we considered only horizontal forces while designing. **[6]**

**b)** A multistory building has the following data: **[10]**

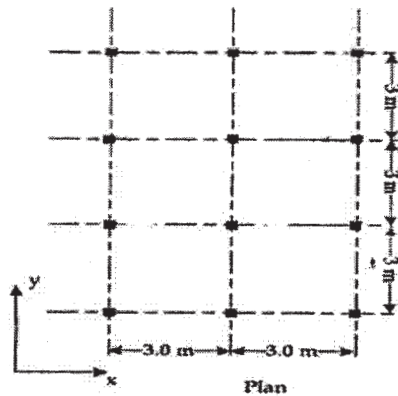
Plan dimension (overall)	= 20m × 15m
Number of bays in X-direction	= 4 @ 5m each
Number of bays in Z-direction	= 3 @ 5m each
Floor to floor height in Y direction	= 3.2m
No. of storeys	= 4 Nos.
Total height of building	= 12.8m
Size of column & beam	= 300mm × 600mm
Slab thickness	= 150mm
Live load floor	= 3 kN/sq.m.
RCC Frame infield with brick masonry	
Seismic Zone - IV	
Hard strata & 5% damping	

Estimate the seismic forces at each floor level as per IS: 1893-2002 by seismic coefficient method. Assume suitable data if necessary.

OR

**Q6) a)** Explain in details the effect of configuration of the buildings on performance in an earthquake. **[6]**

- b) The G+3 building shown in figure below is located in seismic zone IV. The floor-to-floor height is 3.5m. The building is supported on hard strata. The R.C. frames are in - filled with masonry walls. The lumped weight due to dead loads is 8 kN/m<sup>2</sup> on floors and 5 kN/m<sup>2</sup> on the roof. The floor slabs are designed for a live load of 3.5 kN/m<sup>2</sup> and the roof is designed 2 kN/m<sup>2</sup>. Estimate the seismic forces at each floor level as per IS: 1893-2002 by seismic coefficient method. Assume suitable data if necessary. [10]



### SECTION-II

- Q7)** Design a rectangular isolated footing for a column of size 250mm × 750 mm carrying axial characteristics load 2000 kN and reinforced with 8.12 mm  $\Phi$  bars in M30 grade concrete. The allowable bearing pressure of soil is 220 kN/m<sup>2</sup> at 2m depth. Use M20 & HYSD steel. [16]

OR

- Q8)** a) Describe the phenomenon of liquefaction. Explain the measure taken to reduce the effect of liquefaction. [8]
- b) Explain static analysis and dynamic analysis of structure for seismic loads. [8]
- Q9)** a) Explain Active, Passive and Hybrid control systems. [9]
- b) State merits and demerits of base isolation. [9]

OR

- Q10)** a) Explain need of isolation. Why the base isolation is effective. [10]  
b) Explain with neat sketches [8]  
i) Structural walls (shear walls).  
ii) Moment resisting frames.

- Q11)** a) What is retrofitting and restoration of structures? [8]  
b) Explain strengthening of slab and wall for RCC buildings. (Draw neat sketch). [8]

OR

- Q12)** Write short notes on (Any Four): [16]  
a) Tuned mass dampers.  
b) Torsional irregularity.  
c) Aging and Weathering.  
d) Evaluation of existing buildings.  
e) Various types of repair materials.



Total No. of Questions : 12]

SEAT No. :

**P3888**

[Total No. of Pages : 4

**[4759] - 120**

**B.E. (Electronics)**

**ROBOTICS AND AUTOMATION**

**(2008 Pattern) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Three questions from each section.*
- 2) *Figures to the right indicate full marks.*

**SECTION - I**

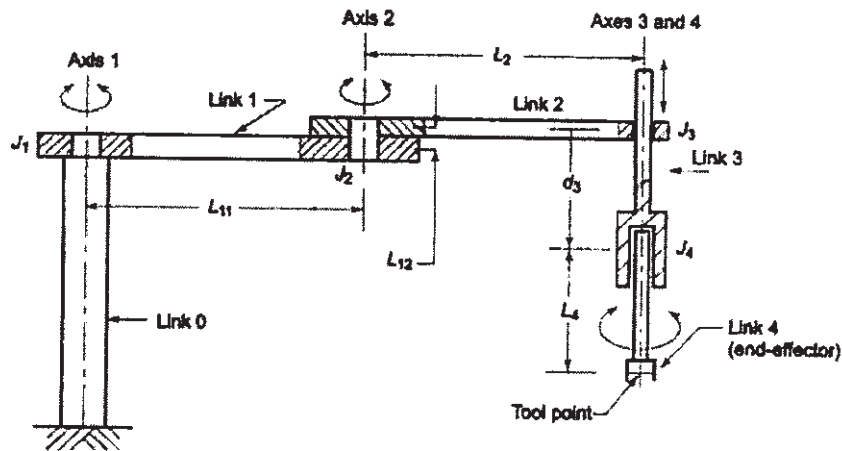
- Q1)** a) Define "ROBOT ". Write and explain the four generations of the Robots in brief. **[8]**
- b) What are the major components of the Robots. Explain any three. **[6]**
- c) Write and explain any two Industrial applications of the robots. **[4]**

OR

- Q2)** a) What are the "Three Rules (or Laws ) of the Robotics"? **[4]**
- b) What do you mean by 'Work Envelop'. Explain in brief. **[6]**
- c) Explain (Any Two): **[8]**
- i) Cylindrical Coordinate system.
  - ii) Spherical Coordinate system.
  - iii) Cartesian Coordinate system.

***P.T.O.***

- Q3)** a) What do you mean by Degree of Freedom. Explain. [4]  
 b) Obtain the direct Kinematic equation of the 4-DOF Selective Compliance Assembly Robot Arm (SCARA) robots. [8]



- c) What is 'Work Space'? Explain Reachable workspace. [4]

OR

- Q4)** a) State and explain the Newton-Euler Equation. Explain its significance. [6]  
 b) What are the steps to get DH parameters. [6]  
 c) What are the steps of the Kane's algorithm? What are the benefits of this algorithm. [4]

- Q5)** a) What are the three different types of the Grippers. Explain in brief. [4]  
 b) Differentiate Serial and Parallel Robots. [4]  
 c) Explain in Brief: (Any Four) [8]
- i) DC Motor.
  - ii) Servo Motor
  - iii) Stepper Motor
  - iv) Ultrasonic Sensor
  - v) Laser Range Finder
  - vi) Tactile Sensor.

OR

- Q6)** a) Write short note on (Any four) : [8]
- i) Gears,
  - ii) Belt and Pulley.
  - iii) Rack and Pinion.
  - iv) Slider Crack Mechanisms.
  - v) Four-Bar Linkage.
- b) What do you mean by Actuators. Classify the different actuators. [4]
- c) What is Optical Encoders, explain in brief. [4]

**SECTION -II**

- Q7)** a) What do you mean by the following features or the ability of the Robots (Any four). [8]
- i) Ability to define points in space.
  - ii) Ability to move between points.
  - iii) Program control
  - iv) Control of end effectors.
  - v) Serviceability
- b) What do mean by Error Budgeting. What are the parameters related to it. [6]
- c) Explain (Any Two) : [4]
- i) Continuous Path.
  - ii) Via Points.
  - iii) Programmed Points.

OR

- Q8)** a) What do you mean by Denavit-Hartenberg Matrix, explain in brief. [4]
- b) What is Jacobian Matrix. Write Jacobian form of DH matrix. [8]
- c) What is PATH planning. What is Trajectory. Differentiate Path and Trajectory. [6]



- Q9)** a) State and explain any two important applications of the Robotic Vision system. [4]
- b) What do you mean by Imaging Components ? Explain Point, Line and Planer Sensor. [4]
- c) Explain the following image segmentation techniques with example [8]
- i) Edge Detection.
  - ii) Contour Following.

OR

- Q10)a)** State and explain (with example) the following sensors: [8]
- i) Status Sensor
  - ii) Environmental sensor
  - iii) Noncontact sensors.
- b) What do you mean by Video Analytics. Give its benefits. [8]

- Q11)a)** “The Quality of the product depends majorly on the Robotics Intelligence.” Justify. [8]
- b) Draw and explain the standard components in a Inspection system. [8]

OR

- Q12)a)** Explain in brief: [8]
- i) PLC
  - ii) DCS system
  - iii) SCADA
  - iv) HMI
- b) State and explain any one Home Automation system. [8]



Total No. of Questions : 12]

SEAT No. :

**P3693**

**[4759]-121**

[Total No. of Pages : 3

**B.E. (Electronics)**

**COMPUTER NETWORK AND SECURITY**

**(2008 Course) (Semester - II) (404207)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, from section - I.*
- 2) *Attempt Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section - II.*
- 3) *Answers to the two sections should be written in separate answer books.*
- 4) *Neat diagrams must be drawn whenever necessary.*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain types of networks with an example and application of each. [6]  
b) Discuss network design issues. [6]  
c) Explain Frame Relay. [4]

OR

- Q2)** a) Enlist uses of networks. [4]  
b) Discuss the similarities of the reference models. [6]  
c) Explain working of and applicaion of ATM. [6]

- Q3)** a) Explain two protocols for E-mail. [8]  
b) Explain how TFTP and BOOTP work. [8]

OR

**P.T.O.**

**Q4)** Write short note on- Attempt any four: **[16]**

- a) Ping
- b) Trace route
- c) ICMP
- d) SNMP
- e) NFS

**Q5)** a) What are the various types of addressing? Explain each with example. **[6]**

- b) Explain any Link State routing. **[6]**
- c) Compare IPv4 and IPv6 protocol. **[6]**

OR

**Q6)** a) What is quality of service in a network? What are the various parameters contributing to quality of service? **[9]**

- b) Compare TCP and UDP and explain working of each. **[9]**

### **SECTION - II**

**Q7)** a) Explain various functions of Datalink layer in detail. **[9]**

- b) Discuss various elementary protocols. **[9]**

OR

**Q8)** a) What is the difference between hub, bridge and router? At which layer does each of this work. **[6]**

- b) Explain Ethernet and Fast, Switched and Gigabit ethernet. **[12]**

**Q9) a)** What are the various types of guided media? Explain each with an application. [12]

b) Explain how modem is used for internet? [4]

OR

**Q10)a)** Explain how satellite and infrared communication work. Where is each of this applied? [8]

b) Explain packet switching with its types in detail. [8]

**Q11)a)** What is Public key and Private key? Explain each with an example. [4]

b) Draw and explain a model for network security. [4]

c) Implement the RSA public key cryptosystem- using  $p=5$ ,  $q=11$  and  $d=27$  find  $e$  and encrypt the message "abcdefghij". Treat the alphabets as numerical values is  $a=1$ ,  $b=2$ .etc. [8]

OR

**Q12)a)** What is Network Simulation and what is the need of it? [6]

b) Explain network monitoring and its application. [4]

c) Explain AES. [6]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1409**

**[4759] - 122**

[Total No. of Pages :3

**B.E. (Electronics)**  
**PROCESS AUTOMATION**  
**(2008 Pattern) (Semester - II)**

*Time :3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer - books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain process control principles with- **[8]**
- i) Human Aided Control
  - ii) Automatic Control
- b) Explain the following control system evaluation criteria. **[8]**
- i) Minimum area
  - ii) Quarter amplitude

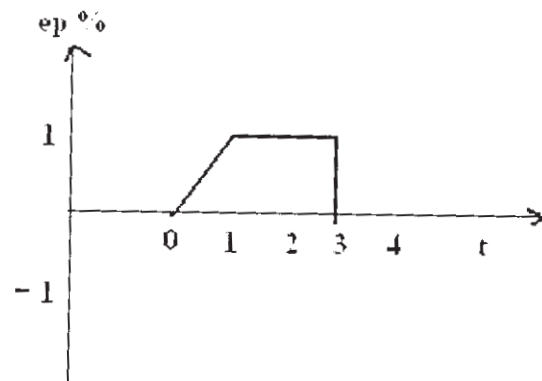
OR

- Q2) a)** Explain with suitable example process control block diagram. **[8]**
- b) Explain with suitable example following process characteristics: **[8]**
- i) Process Equation
  - ii) Process Load
  - iii) Process lag
  - iv) Self Regulation

- Q3) a)** State the equation for a proportional integral controller. Explain a OP-AMP based proportional integral (PI) mode controller. **[8]**

**P.T.O.**

- b) Given the error shown in fig. plot a graph of proportional integral controller output as a function of time.  $K_p = 5$ ,  $K_i = 1.0 \text{ s}^{-1}$ , and  $P_1(0) = 20\%$ . [10]



OR

- Q4)** a) Explain open loop transient response method of process loop tuning. [8]
- b) A proportional derivative controller has a 0.4 to 2.0V input measurement range, a 0 to 5V output,  $K_p = 5\%/%$  and  $K_d = 0.08\% \text{ per } (\% \text{ min})$ . The period of the fastest expected signal change is 1.5 sec. Implement this controller with an op-amp circuit. [10]

- Q5)** a) Explain the following sources of valve noise [8]
- i) Mechanical Vibration
  - ii) Hydrodynamic noise
  - iii) Aerodynamic noise
- b) Compare pneumatic, hydraulic and electronic systems from the process control perspective. [8]

OR

- Q6)** a) Explain the terms flashing and cavitation with respect to control valves. [8]
- b) Define valve sizing coefficient ( $C_v$ ) and state its formula? State important selection criterion of a control valve. [8]

## SECTION- II

- Q7)** a) Explain combined feedback and feed forward control scheme for a heat exchanger. [8]
- b) Explain with block diagram the concept of a self tuning regulator. [8]

OR

- Q8)** a) Explain with P & I diagram air:fuel ratio control scheme for improving combustion efficiency in a steam boiler. [8]
- b) Explain with block diagram the concept of Model Predictive Control.[8]

- Q9)** a) Explain inferential control scheme for a distillation column. [8]
- b) Draw and explain P & I diagram for surge control in a air compressor.[10]

OR

- Q10)**a) Draw & explain the P & I diagram for cascade control of multiple effect evaporator. [10]
- b) Explain with neat diagram architecture of robot controller. [8]

**Q11)** Explain with neat diagram following auxiliary process control components[16]

- a) Control Panels
- b) Strip Chart recorder

OR

- Q12)**a) Explain with block diagram Direct Digital Control System. [8]
- b) Explain with neat diagram working principle of a flow totalizer. [8]



Total No. of Questions : 12]

SEAT No. :

**P1410**

**[4759] - 123**

[Total No. of Pages :3

**B.E. (Electronics)**

**AUDIO & VIDEO ENGINEERING**

**(Elective - III) (2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain the construction of picture tube, state the reconstruction of picture in detail. [8]
- b) Justify why interlaced scanning is preferred, Explain interlaced scanning in detail also compare progressive and interlaced scanning. [8]

OR

- Q2)** a) Draw the composite video signal & explain its vertical details. [6]
- b) Describe the working of LCD TV display using schematic diagram. [6]
- c) Explain why FM is used for sound & AM is used for picture in TV system. [4]

- Q3)** a) Draw the block diagram of PAL TV receiver describe how does it produce R, G & B signals. [8]
- b) Compare NTSC, PAL & SECAM TV systems. [4]
- c) Explain any two applications of TV pattern generator. [6]

OR

- Q4)** a) Explain how wabuloscope is helpful in fault finding. [6]
- b) Draw & Explain the block diagram of NTSC colour TV transmitter. [8]
- c) Define the terms given below: [4]
- i) Aspect ratio
  - ii) Kell factor

**P.T.O.**



- Q5)** a) What are the objectives of MPEG-2 standard explain the bit print stream scalability. [6]
- b) What is MAC encoding? Explain the general format of MAC signal. [6]
- c) Compare analog & digital TV. [4]

OR

**Q6)** Write short note on: [4 × 4 = 16]

- a) Image compression
- b) TV camera
- c) MPEG - 4 system
- d) Digital TV Receiver

### **SECTION - II**

- Q7)** a) Explain the satellite TV broadcasting using neat block diagram. [8]
- b) Explain HDTV Standard in detail. [5]
- c) Calculate the bandwidth of HDTV system using 1125 lines and aspect ratio of 16:9, scanning at 60Hz with 2:1 interface. [5]

OR

- Q8)** a) Explain digital broadcasting case study of foot ball. [9]
- b) Explain CATV camera with neat block diagram also give its advantages & applications. [9]

- Q9)** a) Draw & explain the block diagram of a DVD player. Write important specifications of DVD. [8]
- b) Explain audio compression with different techniques and standards. [8]

OR

- Q10)** a) Draw and explain Blue Ray Disc. [6]
- b) Draw and explain the block diagram of mp3 player. [6]
- c) Compare Audio CD versus DVD. [4]

**Q11)** Write short notes on following:

**[4 × 4 = 16]**

- a) Cordless microphone system.
- b) Graphic equalizer & Digital filter.
- c) DTH TV system.
- d) PA system.

OR

**Q12)a)** Explain the concept of reverberation & echo mention typical reverberation period. **[8]**

- b) Explain the necessity of acoustical design for auditorium & how it can be implemented. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P1411**

**[4759] - 124**

[Total No. of Pages :2

**B.E. (Electronics)**

**IMAGE PROCESSING AND MACHINE VISION**

**(2008 Course) (404209) (Semester - II) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain the phenomena of brightness adaptation and simultaneous contrast. [9]
- b) What are the steps in image digitization? Explain image quantization in detail. [9]

OR

- Q2)** a) With the help of block diagram explain the fundamental steps in Digital Image Processing. [9]
- b) With the help of diagram explain the structure of human eye. Differentiate between photopic and scotopic vision. [9]

- Q3)** a) What is histogram matching? Give its application of advantages. [8]
- b) Explain the basic relationship between the pixels. [8]

OR

- Q4)** a) Explain Image Histogram with the help of an example. What are the applications of Histogram. [8]
- b) Explain how Image Enhancement can be done by power law transformation. [8]

- Q5)** a) What is the Image Segmentation? Explain Image Segmentation based on thresholding. [8]
- b) How are discontinuities detected in an image? Explain Point detection and Line detection. [8]

OR

*P.T.O.*

- Q6) a)** What is Hough Transform? What determines the accuracy of Hough transform? [8]
- b) What is Adaptive thresholding? Explain the Otsu's method of Adaptive thresholding. [8]

**SECTION - II**

- Q7) a)** Explain the Image Pyramid used for Multiresolution image analysis. [9]
- b) What are the various data redundancies identified in an image? Explain in detail. [9]

OR

- Q8) a)** Explain RLC coding and arithmetic coding with examples. [9]
- b) Calculate DCT of the given  $2 \times 2$  matrix. Show that DCT transform preserves signal energy. [9]

- Q9) a)** What is Texture? Explain how it can be described with statistical parameters. [8]
- b) What is boundary representation? Explain how chain codes are used for boundary representation. [8]

OR

- Q10) a)** Explain any two descriptors used for boundary description. [8]
- b) With the help of examples describe shape number for shapes of order 4,6 and 8. [8]

- Q11) a)** Explain support vector approach for pattern recognition. [8]
- b) Give the basic model of Image Degradation/Restoration Process. [8]

OR

- Q12) a)** Explain character recognition using image processing. [8]
- b) Explain one spatial filter for restoration in the presence of noise. [8]



Total No. of Questions : 12]

SEAT No. :

**P3694**

**[4759] - 125**

[Total No. of Pages :4

**B.E. (Electronics)**

**OPTICAL AND MICROWAVE COMMUNICATION**

**(Semester - II) (Elective - III) (2008 Pattern) (404209)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

- Q1) a)** Explain following types of fibers with their characteristics. **[6]**
- i) Single mode step index fiber
  - ii) Multimode step index fiber
  - iii) Multimode graded index fiber
- b) Define fiber splicing. Explain different types of fiber splicing. **[6]**
- c) An optical fiber has core refractive index of 1.5 and cladding refractive index 1.45. Calculate the following: **[6]**
- i) Critical angle
  - ii) Numerical aperture
  - iii) Acceptance angle

OR

- Q2) a)** What is LASER? Explain the working of LASER. Compare LASER with LED. **[8]**
- b) Explain how light is propagated within a fiber. Define the following terms with respect to an optical fiber. **[6]**
- i) Acceptance cone
  - ii) Numerical aperture

**P.T.O.**

- c) Explain the following characteristics of photo detectors. [4]
- i) Quantum efficiency
  - ii) Response time

- Q3)** a) A laboratory demonstration setup has a continuous 12km long optical fiber link that has a loss of 1.5dB/km. [8]
- i) Compute the minimum optical power level in dB that must be launched into fiber to maintain an optical power level of 0.3 W at the receiving end.
  - ii) Calculate the required input power in dB if the fiber has a loss of 2.5dB/km.
- b) Draw a neat diagram of a WDM system and explain its working along with components. [8]

OR

- Q4)** a) What is dispersion? Explain intermodal dispersion and intramodal dispersion. [8]
- b) Explain the mechanism of amplification in an EDFA with a suitable energy level diagram. [8]
- Q5)** a) Explain the interferometric method of distance/length measurement based on Michelson Interferometer. [8]
- b) Explain the setup for liquid level measurement with the help of a neat diagram. Also explain the structure of optical sensor used in this application. [8]

OR

- Q6)** Write short notes on: [16]
- i) LASER applications in medicine.
  - ii) Measurement of pressure and temperature using optical sensors.

## SECTION - II

- Q7) a)** Explain the following parameters of a directional coupler. **[8]**
- i) Coupling factor
  - ii) Directivity
  - iii) Isolation
  - iv) Insertion loss
- b) Determine the cutoff wavelength for the dominant mode in a rectangular waveguide of breadth 10cm. For a 2.5 GHz signal propagated in this waveguide in dominant mode; calculate guide wavelength, group velocity, phase velocity and wave impedance. **[10]**

OR

- Q8) a)** Explain the construction and working of gyrator based on Faraday's rotation principle. **[6]**
- b) State and explain the properties of scattering matrix. **[6]**
- c) A power source of 90W is connected to the input port of a directional coupler with coupling factor 20dB and directivity 35dB. Neglecting the insertion loss, find the powers at coupled, isolated and output ports. **[6]**
- Q9) a)** Explain the limitations of conventional tubes at microwave frequencies. **[8]**
- b) Draw schematic structure of two cavity klystron amplifier. Explain its working principle and operation. **[8]**

OR

- Q10)a)** Draw the structure of a travelling wave tube and explain its working. **[8]**
- b) Draw schematic structure of reflex klystron. Explain its working principle and operation. **[8]**

- Q11)**a) Explain power frequency limitations of microwave BJT. [8]
- b) Draw and explain the construction of a microwave BJT. Also explain different types of surface geometries used in it. [8]

OR

**Q12)** Explain the following microwave solid-state devices with their applications. [16]

- a) PIN diode
- b) Tunnel diode
- c) Varactor diode
- d) Gunn diode





Total No. of Questions : 12]

SEAT No. :

P3889

[Total No. of Pages : 3

**[4759] - 126**  
**B.E. (Electronics)**  
**SOFT COMPUTING TOOLS**  
**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections must be written in separate answer papers.*
- 2) *Answer any three questions from each sections.*
- 3) *Figure to the right indicates full marks.*
- 4) *Assume suitable data if necessary.*

**SECTION - I**

**Q1) a) Explain following fuzzy operations with examples: [8]**

- i) Fuzzy Union
  - ii) Fuzzy Complement
  - iii) Fuzzy Aggregation
  - iv) Sub Normal Fuzzy set
- b) Sketch and define the following membership functions mathematically. [8]
- i) Bell Membership function
  - ii) Trapezoidal Membership function

OR

**Q2) a) Explain the difference between fuzzy set and classical set. [6]**

- b) Explain the characteristics of neural network, fuzzy and Genetic systems. [10]

**P.T.O.**

- Q3)** a) Explain how to find relation between two fuzzy sets with example. [8]  
b) Explain Fuzzy Associative memory with suitable example. [8]

OR

- Q4)** a) Explain Fuzzy lambda cut set. [8]  
b) Explain extension principle with suitable example. [8]

- Q5)** a) Explain three different methods of fuzzification. [9]  
b) Explain various blocks of Fuzzy Inference System. [9]

OR

- Q6)** a) With example explain Tsukamoto Inference system. [10]  
b) Explain difference between Mamdani and Sugeno system with example. [8]

### **SECTION -II**

- Q7)** a) Train perceptron network for two input bipolar 'AND' gate patterns for four iterations with learning rate of 0.4 . Assume initial weights and bias of 0.6. [10]  
b) Explain the need for multilayer networks. [8]

OR

- Q8)** a) Explain Perceptron, its architecture and training algorithm used for it.[10]  
b) Explain the architecture of SOM and training steps involved in training of SOM. [8]

- Q9)** Explain in detail neural network application for any classification task. [16]

OR

- Q10)** Explain in detail application of neural network in image processing for classification. What are the limitations of ANN for classification? [16]

**Q11)** Explain the architecture and training algorithm used in ANFIS . What are the advantages and disadvantages of neuro fuzzy systems? **[16]**

OR

**Q12)a)** Define and explain various RBF functions. How RBF are used for classification? Explain the training algorithm used in RBF networks. **[10]**

b) Explain Neuro fuzzy control. **[6]**



Total No. of Questions : 12]

SEAT No. :

**P4629**

**[4759] - 127**

[Total No. of Pages :3

**B.E. (Electronics)**

**ADVANCED COMMUNICATION SYSTEM**

**(2008 Course) (404210) (Elective - IV) (Semester - II)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any Three questions from Section I and Three questions from Section II.*
- 2) *Answers to the two Sections should be written in seperate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Derive the formula for mobile radio propagation over water. [6]
- b) Discuss the different propagation paths in Mobile transmission. [6]
- c) With the help of suitable diagram explain: [6]
- i) Delay Spread
  - ii) Coherence Bandwidth

OR

- Q2)** a) Describe Various mechanisms available to enhance the spectral capacity in mobile system. [6]
- b) Explain Mobile point to point Lee model. [6]
- c) Explain Ground incident angle, elevation angle and reflection angle. [6]
- Q3)** a) Derive free space path loss formula for wireless communication. [8]
- b) With the help of suitable example describe various interferences occurred in reception of signal. [8]

OR

*P.T.O.*

- Q4)** a) Describe Interference reducing directional antennas and Space diversity antenna. [8]
- b) Describe the following w.r.t. mobile communication. [8]
- i) Underlay - overlay
  - ii) Handoffs & dropped calls

- Q5)** a) How security is achieved in Mobile network? Explain algorithms related to Security. [8]
- b) With neat block diagram, describe GSM architecture in detail. [8]

OR

- Q6)** a) With the help of suitable diagram, explain macro cells & microcell to enhance the capacity. [8]
- b) Describe the architecture of GPRS. [8]

### SECTION - II

- Q7)** a) Compare LEO, MEO and GEO Satellites. [4]
- b) State and explain Kepler's three laws of planetary motion. [6]
- c) Draw the block diagram and explain Attitude and Orbit Control subsystem of a satellite. [6]

OR

- Q8)** a) Draw and explain major subsystems on a satellite. [8]
- b) Define and explain the following terms with respect to the satellite communication. [8]
- i) Poles
  - ii) Latitude
  - iii) Hemispheres
  - iv) Greenwich Meridian

- Q9) a)** A SCPC-FM satellite link has an RF channel bandwidth of 45 kHz and a base band maximum frequency of 3.4 kHz. De-emphasis provides a subjective improvement in base band S/N ratio of 7dB. Calculate the base band S/N ratio for the voice channel for a receiver C/N ratio of 13 dB. If the FM demodulator has an FM threshold at 6dB, what is the link margin for this system? [8]
- b) Define and explain the following terms with reference to the FM techniques. [8]
- i) Signal to Noise Ratio
  - ii) Pre-emphasis & De-emphasis

OR

- Q10)a)** A satellite transponder has a bandwidth of 358.4 MHz. Earth stations use RRC filters with  $\alpha = 0.4$ . What is the maximum bit rate that can be sent through this transponder with BPSK and QPSK? [8]
- b) Define & explain the following terms with reference to the digital modulation techniques used on satellite links. [8]
- i) Non-uniform Quantization
  - ii) Symbol Error Rate

- Q11)a)** What are the various 'Multiple Access Techniques' used in modern satellite communications? Compare them. [9]
- b) Define and explain the meaning of VSAT? Explain various VSAT network configurations with the help of a hub. List the applications of VSAT.[9]

OR

- Q12)a)** Explain with a neat diagram the FDMA frame structure. [9]
- b) Explain the terms with respect to VSAT. [9]
- i) Link budget
  - ii) Free space path loss
  - iii) Edge of coverage loss



Total No. of Questions : 12]

SEAT No. :

**P1412**

**[4759]-128**

[Total No. of Pages : 3

**B.E. (Electronics)**

**AUTOMOTIVE ELECTRONIC SYSTEMS**

**(2008 Course) (Semester - II) (Elective -IV) (404210)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answers to the two sections should be written in separate books.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a) Explain following automotive system components [10]**

i) Suspension

ii) Safety

iii) Brakes

iv) Steering

**b) Explain 4-stroke operation of SI Engine. [8]**

OR

**Q2) a) What do you mean by ignition? Explain ignition system in brief. [8]**

**b) Explain basic transmission system & its types. [10]**

***P.T.O.***

- Q3)** a) Explain following systems with sensors used in [8]  
i) Speedometer  
ii) Airbag system
- b) Explain working & any one use of following circuits in automotive [8]  
i) Comparator  
ii) Instrumentation amplifier

OR

- Q4)** a) Explain fuel injection system in detail. [8]  
b) Explain coolant temperature sensing system in detail. [8]
- Q5)** a) What is objective of Electronic Engine Control? With block diagram, explain the same. [8]  
b) Explain following system in brief [8]  
i) Wiper control  
ii) Remote keyless entry

OR

- Q6)** a) Explain role of PID control in cruise control system. [8]  
b) Explain in detail antilock braking system. [8]

### **SECTION - II**

- Q7)** a) Enlist the requirement of processing units to be used in automotive. [8]  
b) Explain any one software testing & debugging technique used in embedded development. [8]

OR



- Q8)** a) Explain any one application in automotive that uses PWM technique for motor control. [8]
- b) What is role of watch dog timer? Explain usages of watch dog timer in automotive. [8]
- Q9)** a) What is CAN protocol? Explain suitability of it for data communication in automotive. [8]
- b) Explain on board & off board diagnostics. [8]

OR

- Q10)**a) Explain role of GPS in automotive. [8]
- b) Compare time triggered & event triggered communication protocol. [8]
- Q11)**a) Explain passenger comfort system in automotive. [8]
- b) Explain in detail wireless communication standards used in automotive. [10]

OR

- Q12)** Write short note on (Any three): [18]
- a) ARM cortex suitability in automotive.
- b) Automotive EMC standards.
- c) MOST protocol.
- d) Flex ray protocol.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1413**

**[4759]-129**

[Total No. of Pages : 3

**B.E. (Electronics)**

**ARTIFICIAL INTELLIGENCE**

**(2008 Course) (Elective-IV) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary*

**SECTION-I**

- Q1)** a) Explain what role does PEAS (performance, Environment, Actuators, Sensors) has in AI. What are the PEAS for: **[12]**
- i) Vacuum cleaner world.
  - ii) Automated taxi
  - iii) Virtual Internet
- b) With a suitable example, differentiate agent, agent function and agent program. **[6]**

OR

- Q2)** a) What are the different kinds of agent programs that embody the principles of AI systems? Explain base line difference between them and explain any one of them in detail. **[10]**
- b) With algorithmic steps, explain how depth limited search algorithm is a good combination of breadth first and depth first algorithm? **[8]**
- Q3)** a) What are different Heuristic search strategies, Explain A\* search in detail. **[10]**
- b) Explain the mathematics of constrained satisfaction problems. **[6]**

OR

- Q4)** a) Explain hill - climbing search algorithm for 8-queens state Problem. Why is Hill climbing sometimes called as greedy local search. **[8]**
- b) How is evaluation function a best combination of minimax algo. and alpha-beta algorithm? How evaluation function is mathematically represented? **[8]**

**P.T.O.**

- Q5)** a) Explain the similarities and differences involved in first order logic and propositional logic. [4]
- b) I want to state that everyone in US is smart. Which of these two statements is wrong and why?
- $\forall x \text{At}(x, \text{US}) \Rightarrow \text{Smart}(x)$
  - $\forall x \text{At}(x, \text{US}) \wedge \text{Smart}(x)$  [4]
- c) Use a diagram to show the different parts of a learning agent, explain the importance of problem generator on that. [8]

OR

- Q6)** a) Represent in logical language representation: [8]
- Some lions roar.
  - All lions have 4 legs.
  - No lion bray.
- b) Describe inductive learning and state why it is inadequate for use with AI systems. How the degree of polynomial matters in case of hypothesis? [8]

## SECTION II

- Q7)** a) Explain the role of Neural Network in learning. In relation to multi layer networks mention the weight update equation. [8]
- b) Explain the mathematics and concepts of EM (expectation-maximization) algorithm. [10]

OR

- Q8)** a) Describe inductive learning and state why it is inadequate for use with AI systems. [6]
- b) Explain the concept of knowledge in learning. [6]
- c) Use a diagram to show the different parts of a learning agent. [6]
- Q9)** a) Discuss Expert System Architecture with suitable example. [8]
- b) Explain waltz algorithm with example and comment on its limitations. [8]

OR

**Q10)a)** Draw a neat diagram of an expert system and explain the functioning of the major components. [8]

b) Write a short note on the shell and knowledge base of an expert system. [8]

**Q11)a)** Differentiate between. [12]

- Natural Language Processing(NLP) and Natural Language Generation. (NLG)
- Syntax, semantics and pragmatics.
- lexical ambiguity and syntactic ambiguity.

b) Draw the parse tree with semantic interpretations for the string “ $7+(8 \div 4)$ ”. [4]

OR

**Q12)a)** With suitable examples explain in short: Lexicon of  $\epsilon_0$  and Grammar of  $\epsilon_0$ . [8]

b) With relevant mathematics, explain Probabilistic language models. [8]



Total No. of Questions : 12]

SEAT No. :

**P1513**

[4759]-13

[Total No. of Pages : 3

**B.E. (Civil)**

**ADVANCED CONCRETE TECHNOLOGY  
(2008 Course) (Semester-I) (Theory) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) a) *From section-I, answer Q. No. 1 or Q. No. 2; Q. No. 3 or Q. No. 4; Q. No. 5 or Q. No. 6 and*
- b) *From section-II, answer Q. No. 7 or Q. No. 8; Q. No. 9 or Q. No. 10; Q. No. 11 or Q. No. 12.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the bracket indicate full marks.*
- 5) *Electronic pocket calculator is permitted.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) Enlist the basic ingredients of portland cement and also state their ill effects if used in excess. [5]
- b) Define Admixture. What are the two basic types of admixtures? Write the names of any five chemical admixtures. [5]
- c) Explain the significance, sample preparation and test procedure of aggregate impact value. [8]

OR

- Q2)** a) What is grading of aggregate? How fineness modulus of aggregate is determined? What is meant by gap graded aggregates? [8]
- b) Write any five types of cement with their suitability. [5]
- c) Explain the effect of flaky and elongated particles on the properties of concrete. [5]

**P.T.O.**

- Q3)** a) Write various ways for making light weight concrete. Write note on any one. [6]
- b) Write in detail what do you mean by light weight concrete. Name any six. Naturally occurring light weight aggregates. [10]

OR

- Q4)** a) Write a detailed note on “Design of No Fines concrete mixes”. [8]
- b) What is meant by long term performance? Explain how it differs from compressive strength of concrete. [8]

- Q5)** a) Differentiate between cracking, spalling and staining. [5]
- b) Enlist various non-destructive methods with their utility in brief. [5]
- c) Write a note on “Acoustic emission method”. [6]

OR

- Q6)** a) Explain particle packing theory. How particle is effective in high strength concrete? [6]
- b) Write notes on: [5 x 2 = 10]
- i) Probe penetration.
- ii) Pulse echo method.

## **SECTION-II**

**Q7)** Write notes on:

- a) Classification of artificial fibres. [5]
- b) Relative fibre matrix stiffness. [5]
- c) Fibre matrix interfacial bond. [4]
- d) Factors affecting properties of FRC. [4]

OR

- Q8)** a) Explain in detail the classification of artificial and natural fibres. [6]  
b) Explain: Quality control tests to ensure good performance of polymer concrete. [6]  
c) Write a note on: SIFCON. [6]

- Q9)** a) Explain behaviour of SFRC in tension. [6]  
b) Explain the various properties of hardened SCC. [6]  
c) Applications of polymer concrete. [4]

OR

- Q10)** a) Explain stress strain property and compressive strength properties of FRC. [8]  
b) Explain in detail “Polymer impregnated concrete” [8]

- Q11)** a) Explain closed mould technique for ferrocement with merits and demerits. [8]  
b) Write a note on cement mortar mix and reinforcement as constituents of ferrocement. [8]

OR

- Q12)** a) Explain how ferrocement differs than concrete. Write about tensile property of ferrocement. [8]  
b) Explain open mould technique for ferrocement with merits and demerits. [8]



Total No. of Questions : 12]

SEAT No. :

**P1414**

**[4759]-130**

[Total No. of Pages : 2

**B.E. (Electronics)**

**NANOTECHNOLOGY IN ELECTRONICS**

**(2008Course) (Elective-IV) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12.*
- 5) *Assume Suitable data if necessary.*

**SECTION-I**

- Q1)** a) Explain any four tools used for making Nanostructures. [8]  
b) List out the limitations of semiconductor technology in the context of nanostructures. [8]

OR

- Q2)** a) Explain optical properties of semiconducting nanoparticles. [8]  
b) Explain molecular modeling of Nanoparticles. [8]

- Q3)** a) Explain the principle of single electron transistor device. [8]  
b) Explain silicon Nanocrystal Non-volatile memory bit cell. [8]

OR

- Q4)** a) Draw and explain the process flow for integrating nanocrystal memory with standard CMOS technology. [8]  
b) Explain different nano CMOS devices with their application. [8]

- Q5)** a) Explain with schematic apparatus to make metal nanoparticles. [9]  
b) Explain applications and properties of carbon Nanotube. [9]

OR

**P.T.O.**



- Q6)** a) Write short notes on the following. [9]  
i) Nature of Carbon Bond.  
ii) Nanoclusters.
- b) Explain Structure and superconductivity of  $C_{60}$ . [9]

**SECTION II**

- Q7)** a) What are different types of molecular switches? Explain the application of any one. [8]  
b) Explain any two applications of a Cantilever device under MEMS. [10]

OR

- Q8)** a) What are the differences between mechanical behavior of micro-machines and macro-machines? What are the challenges and remedies, while design such systems? [10]  
b) Explain the challenges while designing NEMS. [8]

- Q9)** a) Explain Atomic Lithography while fabricating NEMS. [8]  
b) Describe the functioning of Transmission Electron Microscope. [8]

OR

- Q10)** a) Explain briefly the any one of the novel dielectric nano-material for future transistors. [8]  
b) Explain how it is possible to control and manipulate light in nano- materials used as communication channel. [8]

- Q11)** Write Short notes on the following. [16]  
a) Generation of current in photovoltaic cell.  
b) Molecular motors

OR

- Q12)** a) Explain the construction and application of any one sensor using nano-structured material. [8]  
b) Explain the role of Nano material in Biomedical applications. [8]



Total No. of Questions : 12]

SEAT No. :

**P3695**

[4759] - 132

[Total No. of Pages :3

**B.E. (Production)**

**MACHINE TOOL DESIGN**

**(2008 Pattern) (Semester - I) (411081)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt one question from each unit of Section I and Section II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of non-programmable electronic pocket calculator and statistical tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**(Unit - I)**

- Q1)** a) List the general recommendations for developing the gearing diagram. [4]  
b) Design a nine speed gear box for the head stock of a lathe, the spindle speeds ranging from 28 rpm to 1000rpm. Draw the structural diagram and show the layout of the gears and connection to motor. [14]

OR

- Q2)** a) Prove that the maximum loss of economic speed is constant in geometric progression and show that the value of geometric progression ratio ' $\phi$ ' lies between 1 & 2. [8]  
b) Explain in detail the hydraulic stepless drive with a neat sketch. [10]

**(Unit - II)**

- Q3)** a) State the various steps involved in designing structures of a general purpose machine tool. [8]  
b) Explain the concept of static and dynamic stiffness of machine tool and state the procedure for estimating them. [8]

OR

- Q4)** a) Describe the main functions of machine tool structures. Draw the sketches of different types of cross sections used for machine tool beds and columns. [8]  
b) In designing the bed of a machine tool, it is often found that the hollow rectangular cross-section is the most suitable one. Justify? [8]

**P.T.O.**

**(Unit - III)**

- Q5)** a) Classify the various types of configuration of the guides used in machine tools, based on material, lubrication system, drives control etc. [8]
- b) Show that the rigidity of the hydro dynamically lubricated slides is always less than that of hydrostatic slide way. [8]

OR

- Q6)** a) Explain the specific merits and demerits of plastic guides commonly used in machine tools. Name some of the filled and unfilled plastic guides. [8]
- b) Describe with neat sketches the various methods used for the compensation of wear of guides. [8]

**SECTION - II**

**(Unit - IV)**

- Q7)** a) What are the basic consideration in designing the spindle unit supports and spindle ends in a high speed machine tools? Sketch unit supports and spindle ends in a high speed machine tools? [10]
- b) Why it is essential to preload the bearings of spindle mountage? [8]

OR

- Q8)** a) Explain the working principle of recirculating ball screws commonly used in CNC versions. What are it special advantages? [8]
- b) Explain with neat sketches the methods of backlash (pitch error) adjustment in sliding friction power screws. How do these errors affect the performance of the machine tool? [10]

**(Unit - V)**

- Q9)** a) Why is damping of machine tools important? How is it accomplished? [6]
- b) Write a note on dynamic characteristic of the cutting process. [6]
- c) Why is thermal expansion of machine tool components important? [4]

OR

- Q10)a)** What do you understand by stick-slip motion? Explain with a suitable example. **[8]**
- b) Describe the procedure followed in performing acceptance tests for machine tools. **[8]**

**(Unit - VI)**

- Q11)a)** Explain the importance of aesthetics as a requirement in machine tool design with a suitable example. **[8]**
- b) Explain the concept of ergonomics as applied to different parts of machine tool. **[8]**

OR

- Q12)a)** Discuss the modern trends in design of machine tools. **[8]**
- b) Describe how CAD techniques can be applied in design of machine tool structures. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P1415**

**[4759] - 133**

[Total No. of Pages : 4

**B.E. (Production)**  
**MANUFACTURING AUTOMATION**  
**( 2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** For a swash plate type of pump following data operates: **[10]**

- Number of pistons = 6
- Piston diameter = 30 mm
- Pitch circle diameter of the cylinder = 180mm
- Input power = 8 KW.
- Volumetric efficiency = 85%
- Mechanical efficiency = 86%

Calculate theoretical pump displacement and angle of swash plate if maximum pressure and speed at which pump operates is 120 bar and 1000 rpm respectively.

b) Compare meter out and meter in circuits with respect to efficiency, uniformity of feed rate, and negative load carrying capacity. **[6]**

OR

**Q2) a)** Explain with suitable example the terms related to filter: **[8]**

- i) beta rating
- ii) absolute ratings

**P.T.O.**

- b) For a pressure compensated flow control valve, explain:
- Constructional features (with neat sketch) [4]
  - Principle of working [2]
  - Applications [2]

- Q3)** a) A punching operation requires a flow of 120 lpm for 0.6 seconds. Determine the volume change in accumulator during discharging if the total cycle time is 4 seconds. [4]
- b) For a meter in hydraulic circuit, calculate the pump pressure required to achieve 30 bar pressure at full bore end of cylinder if the pressure loss across various elements is as below: Flow control valve = 12 bar, direction control valve (both side) = 4 bar, filter = 3 bar. [4]
- c) With neat sketch prove that extension speed of regenerative circuit is about twice that of normal circuit. [8]

OR

- Q4)** a) Calculate the tube thickness of a hydraulic cylinder having following data: [8]
- Testing strength of cylinder material = 7300 kgf/cm<sup>2</sup>
  - Cylinder bore diameter = 50 mm.
  - System pressure = 200 kgf/cm<sup>2</sup>
  - Factor of safety = 4:1
- b) Explain with neat sketch the design aspects of hydraulic reservoir. [8]

- Q5)** a) Draw a position step diagram and design suitable circuit for a 3 cylinder pneumatic system in which the cylinders extend sequentially but retracts simultaneously. [10]
- b) The door of a sand feeding hopper is actuated by a double acting pneumatic cylinder. When hopper is full, the door is opened and sand fall into a wagon underneath. The door should be closed after a delay of 5 seconds to ensure that all the sand has emptied out. Draw suitable pneumatic circuit. [8]

OR

- Q6)** a) Draw a pneumatic circuit for a large stamping press to ensure that the part is in place, the clamps are engaged and the safety guards are closed before the press can operate. Also explain its working. [8]
- b) Explain with neat sketch the cylinder mountings used in pneumatic systems. [6]
- c) Explain the advantages of electronic control of pneumatic systems. [4]

### SECTION - II

- Q7)** a) Discuss the advantages of microcontrollers over microprocessors in control operations. [8]
- b) Explain the digital to analog converter as an input device. [8]

OR

- Q8)** a) What is the difference between an embedded and external memory microcontroller. [8]
- b) Explain with suitable example four addressing modes of a micro-processor. [8]

- Q9)** a) Draw the PLC logic diagram to control a process which is desired to start by turning on the motor in 10 seconds after the part touches the limit switch. The process should be terminated automatically when the finish part touches the second limit switch. An emergency switch will stop the process any time when it is pressed. [10]

- b) Explain limitations of PID control. [6]

OR

- Q10)** a) How would a derivative controller with  $K_D = 5s$  responds to an error that varies as  $1.8 \sin(0.08t)$ ? [4]
- b) State the conditions in which the PI controller should be used. [4]
- c) Explain formulation of linear quadratic optimal control problem. [8]

- Q11)a)** A feeder selector device at one of the stations of an automatic assembly machine has a feed rate of 22 parts/min and provides a throughput of one part in four. The ideal cycle time of the assembly machine is 10 sec. The feeder stops for 18 parts in feed track and will start while 8 parts in feed track. Determine how long will it take for the feeder to turn on once it is turned off and how long it will take to turn off once it is turned on? **[10]**
- b) What factors should be considered while deciding the type of transfer device to be used in automated systems. **[8]**

OR

**Q12)Write short notes on:** **[18]**

- a) Rotary disc feeder.
- b) Indexing mechanisms.
- c) Synchronous and non synchronous material transfer.





Total No. of Questions : 12]

SEAT No. :

**P3890**

[Total No. of Pages : 5

[4759] - 134

**B.E. (Production Engg.) (Semester - I)**

**OPERATIONS RESEARCH**

**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt questions 1 or 2, 3 or 4, and 5 or 6 from section I.*
- 2) *Attempt questions 7 or 8, 9 or 10, and 11 or 12 from section II.*
- 3) *Draw neat flowcharts or state algorithms, if needed.*

**SECTION - I**

**Unit - I**

**Q1) a)** Solve by simplex method **[10]**

$$\text{Minimize } Z = 2y_1 + 3y_2$$

$$\text{Subject to } y_1 + y_2 \geq 5$$

$$y_1 + 2y_2 \geq 6$$

$$y_1, y_2 \geq 0$$

- b) A retail store stocks two types of shirts A and B. These are packed in attractive cardboard boxes. During a week the store can sell a maximum of 400 shirts of type A and a maximum of 300 shirts of type B. The storage capacity, however, is limited to a maximum of 600 of both types combined. Type A shirt fetches a profit of ₹ 2/- per unit and type B a profit of ₹ 5/- per unit. How many of each type the store should stock per week to maximize the total profit? Formulate a mathematical model of the problem. **[8]**

OR

**Q2) a)** Solve by dual simplex **[10]**

$$\text{Minimize } z = 2x_1 + 3x_2$$

$$\text{Subject to } 2x_1 + 2x_2 \geq 30$$

$$x_1 + 2x_2 \geq 10$$

$$x_1 \geq 0, x_2 \geq 0$$

- b) What are the various phases of solving OR problem? **[8]**

**P.T.O.**

**Unit - II**

**Q3) a)** “An assignment problem is a special case of transportation problem” Explain. [6]

b) A company has five jobs V, W, X, Y and Z and five machines A, B, C, D and E. The given matrix shows the return in Rs. of assigning a job to a machine. Assign the jobs to machines so as to maximize the total returns. Machines Returns in ₹ [10]

<i>Jobs</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
V	5	11	10	12	4
W	2	4	6	3	5
X	3	12	5	14	6
Y	6	14	4	11	7
Z	7	9	8	12	5

OR

**Q4) a)** Find the optimum solution to the following transportation problem in which the cell contain the transportation cost in rupees. [10]

	W1	W2	W3	W4	W5	available
F1	7	6	4	5	9	40
F2	8	5	6	7	8	30
F3	6	8	9	6	5	20
F4	5	7	7	8	6	10
Required	30	30	15	20	5	100 (total)

b) Explain MODI method [6]

**Unit - III**

**Q5) a)** What is Goal programming? Distinguish it from linear programming. [6]

b) A company has 8 salesmen, who have to be allocated to four marketing zones. The return of profit from each zone depends upon the number of salesmen working that zone. The expected returns for different number of salesmen in different zones, as estimated from the past records, are given below. Determine the optimal allocation policy. [10]

Sales marketing in zones ₹ x 000

No.of Salesmen	Zone 1	Zone 2	Zone 3	Zone 4
0	45	30	35	42
1	58	45	45	54
2	70	60	52	60
3	82	70	64	70
4	93	79	72	82
5	101	90	82	95
6	108	98	93	102
7	113	105	98	110
8	118	110	100	110

OR

- Q6)** a) Discuss Geometric programming and its applications. [6]  
b) Discuss branch and bound technique of Integer programming. [6]  
c) Discuss state and stage as used in Dynamic programming. What is recursive function? [4]

**SECTION - II**

**Unit - IV**

- Q7)** a) The maintenance cost and resale value per year of a machine whose purchase price is ₹ 7000 is given below [10]

Year	1	2	3	4	5	6	7	8
maintenance cost in ₹	900	1200	1600	2100	2800	3700	4700	5900
Resale value in ₹	4000	2000	1200	600	500	400	400	400

- When should the machine be replaced?  
b) Discuss Minimax and Maximin rule with saddle point. [6]

OR

- Q8)** a) Discuss individual and group replacement policies. [6]  
b) Reduce the following game by dominance and find the game value. [10]

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

**Unit - V**

- Q9)** a) Worker come to tool store room to receive special tools for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attendant) is 40 seconds. Determine [10]  
i) Average queue length  
ii) Average length of non-empty queues  
iii) Average number of workers in the system including the worker being attended  
iv) Mean waiting time of an arrival  
v) Average waiting time of an arrival (worker) who waits and  
vi) Determine whether to go in for an additional tool store room attendant which will minimize the combined cost of attendants' idle time and the cost of workers' waiting time. Assume the charge of skilled worker ₹ 4 per hour and that of tool store room attendant ₹ 0.75 per hour.  
b) Discuss: Inventory costs [6]

OR

- Q10)** a) A particular item has a demand of 9000 units per year. The cost of one procurement is ₹ 100 and the holding cost per unit is ₹ 2.40 per year. The replacement is instantaneous and no shortages are allowed. Determine **[10]**
- The economic lot size,
  - The number of orders per year,
  - The time between orders,
  - The total cost per year if the cost one unit is ₹ . 1.
- b) Discuss minimum cost service rate. **[6]**

**Unit - VI**

- Q11)** a) Explain the following terms in networks **[8]**
- Earliest time
  - Latest time
  - Event slack
  - Critical path
- b) The following table gives data on normal time and cost and crash time and cost for a project: **[10]**

Activity	Normal		Crash	
	Time (days)	Cost (₹.)	Time (Days)	Cost (₹.)
1 - 2	6	60	4	100
1 - 3	4	60	2	200
2 - 4	5	50	3	150
2 - 5	3	45	1	65
3 - 4	6	90	4	200
4 - 6	8	80	4	300
5 - 6	4	40	2	100
6 - 7	3	45	2	80
		470		

The indirect cost per day is ₹.10.

- Draw the network diagram for the project
- Find the critical path
- Determine minimum total time and corresponding cost.

OR

**Q12)a)** Explain the following terms in Networks **[8]**

- i) Difference between PERT and CPM
- ii) Resource smoothing
- iii) Dummy in network analysis
- iv) Difference between activity and event

**b)** A project has the following activities and their characteristics: **[10]**

Activity	Preceding activity	Time in weeks		
		to	tm	tp
A	---	4	7	16
B	---	1	5	15
C	A	6	12	30
D	A	2	5	8
E	C	5	11	17
F	D	3	6	15
G	B	3	9	27
H	E,F	1	4	7
I	G	4	19	28

- i) Draw the PERT network.
- ii) Identify the critical path.
- iii) Determine mean project completion time.
- iv) Find the probability that the project is completed in 36 weeks.



Total No. of Questions : 12]

SEAT No. :

**P3324**

**[4759] - 135**

[Total No. of Pages : 2

**B.E. (Production) (Semester - I)**  
**PLASTIC ENGINEERING**  
**(2008 Pattern) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain Addition and Condensation in plastic processing. **[10]**  
b) Discuss Additives used in the plastic. **[8]**

OR

- Q2)** a) Discuss coloring of plastics.  
b) Explain Polymerization of plastic.

- Q3)** a) Discuss specifications used for injection molding machine. **[8]**  
b) Discuss Injection mould designs considerations. **[8]**

OR

- Q4)** a) Explain types of runners in injection molding.  
b) Explain functions of register ring and sprue bush.

- Q5)** a) Explain single screw extruder with suitable sketch. **[8]**  
b) Explain Extrusion of pipes with suitable sketches. **[8]**

OR

**P.T.O.**



Total No. of Questions : 12]

SEAT No. :

**P3696**

**[4759] - 136**

[Total No. of Pages :4

**B.E.**

**PRODUCTION**

**Industrial Robotics**

**( 2008 Course) (Semester - I) (Elective - I) (411084)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Enlist the chronology of development process in each Robot generation. **[8]**

b) Define Industrial Robot & classify the robot. **[8]**

OR

**Q2) a)** Explain with sketch six degrees of freedom associated with the robot manipulator. **[8]**

b) Explain the following terms associated with robot: **[8]**

- i) Accuracy
- ii) Repeatability
- iii) Robot Work Envelope
- iv) payload Capacity

**P.T.O.**



- Q3) a)** For a pick and place type of robot, the link parameters table is given below: [8]

i	$\alpha_{i-1}$	$a_{i-1}$	$d_{i-1}$	$\theta_{i-1}$
1	0	0	0	30°
2	-90	0	2	0°
3	0	3	0	90°

Determine the location of the end point of the link 3 with respect to the base.

- b) List the steps involved in DH convention. [8]

OR

- Q4) a)** Explain the Inverse kinematics associated with planar 3R manipulator. [8]

- b) For a pick and place type of robot, the link parameters table is given below: [8]

i	$\alpha_{i-1}$	$a_{i-1}$	$d_{i-1}$	$\theta_{i-1}$
1	0	0	0	45°
2	-90	0	2	-90°
3	0	5	0	60°

Determine the location of the end point of the link 3 with respect to the base.

- Q5) a)** Classify gripper & describe with neat sketch magnetic gripper. [9]

- b) Discuss the various considerations in gripper design and selection. List the different types of gripper. [9]

OR

- Q6) a)** Describe [9]

- i) Vacuum gripper
- ii) Ultrasonic gripper.

- b) Explain with neat sketch: [9]
- i) Gear and Rack method of actuating the gripper
  - ii) Cam-actuated gripper
  - iii) Screw-type gripper actuation

**SECTION - II**

- Q7)** a) Define a Robot Sensor. Why there is a need of Sensor? Highlight the features of Sensor. [8]
- b) Describe machine vision system with the help of block diagram. [8]

OR

- Q8)** a) State various Sensing devices used in Robot workcell. [8]
- b) The given data represents  $8 \times 8$  arrays of pixels. Each element in the array indicates the grey level value of the pixels. [8]
- i) Construct histogram for the array and obtain appropriate threshold value.
  - ii) Convert the picture into a black and white image. The data is as:

10	11	10	11	12	12	12	12
13	15	17	17	17	17	15	13
14	17	19	19	19	19	18	14
13	17	19	20	20	19	18	13
12	17	19	20	21	19	18	12
12	17	19	19	19	19	18	12
11	15	18	18	18	18	15	11
12	11	10	11	12	12	12	12

- Q9) a) Explain: [8]**
- i) Manual mode of programming
  - ii) Lead through mode of programming
  - iii) Textual robot language
  - iv) Off-line programming mode.

- b) Explain generations of Robot programming Language. [8]

OR

- Q10)a) Explain 'WAIT', 'DELAY', 'SIGNAL', 'DEPART' commands with suitable example. [8]**

- b) Explain the hydraulic system used for robot system with advantages & Limitations. [8]

- Q11)a) How is software and hardware of robot, handshaking with PC done?[9]**

- b) Explain the working of RS232C interface used in Robotics system. [9]

OR

- Q12)a) Write a note on: [9]**

- i) Spot welding
- ii) Machine loading and unloading
- iii) Spray Painting

- b) Describe the concept of safety in robotics. [9]



Total No. of Questions : 12]

SEAT No. :

**P1416**

**[4759]-137**

[Total No. of Pages : 3

**B.E. (Production Engineering)**

**c: POWDER METALLURGY**

**(2008 Course) (Semester - I) (Elective -I) (411084)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6 from section I and Q7 or Q 8, Q 9 or Q 10, Q 11 or Q 12 from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) Write a short note on the Hoganas process. [6]
- b) Explain the influence of Tap density, compressibility and compactibility on the behavior of powders. [6]
- c) Explain the water atomization method for production of powders. [6]

OR

- Q2)** a) Explain the permeability method and sedimentation method to characterize the size of powders. [6]
- b) On what factors is the spherical shape of atomized metal powder dependent? Explain. [6]
- c) Describe the rotating electrode process. [6]
- Q3)** a) What are the factors which increase the green density of metal powders. Explain them. [8]
- b) Write a short note on the equipments needed for die compacting. [8]

OR

**P.T.O.**

**Q4)** a) State the variables in the powder mixing process and explain the effect of any 2 variables during mixing of powders. [8]

b) Describe the double cone mixer and the V mixer. [8]

**Q5)** a) State the different types of sintering furnaces and explain any one furnace with a neat sketch. [8]

b) State the advantages and limitations of liquid phase sintering. [8]

OR

**Q6)** a) Explain mechanical alloying of powders. [8]

b) Explain any two mechanisms of material transport in sintering. [8]

### **SECTION - II**

**Q7)** a) Compare CIP process with HIP process. [8]

b) Explain roll compaction and the effects of powder characteristics on powder rolling. [8]

OR

**Q8)** a) Write short notes on: [8]

i) Encapsulation

ii) Spray Deposition

b) Explain in detail explosive compaction. [8]

**Q9)** a) Write short notes on: [8]

i) Advantages and limitations of powder metallurgy.

ii) Steam treatment.

b) Explain the various heat treatments given to P/M parts. [8]

OR

**Q10)a)** What is impregnation? Where it is used? [8]

b) Distinguish between coining and sizing. [8]

**Q11)** Explain manufacturing of the following with the help of a neat flow chart. [18]

a) Gears

b) Cemented Carbide tools

c) Filters

OR

**Q12)** With the help of a neat flow chart explain production details of the following: [18]

a) Electrical contact materials.

b) Brakes and clutch lining material.

c) Lamp filaments.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2012**

**[4759] -138**

[Total No. of Pages : 3

**B.E. (Production)**

**MICROPROCESSOR APPLICATIONS**

**(2008 Course) (Elective - I) (Semester - I) (411084)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer question Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I & Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, whenever necessary.*

**SECTION - I**

- Q1)** a) What are the functions of Microcontrollers? [8]
- b) Compare microprocessors and microcontrollers. [8]

OR

- Q2)** a) Differentiate the following. [8]
- i) Harvard and Von Neumann architecture
  - ii) RISC and CISC processors
- b) Explain the typical processor architecture. [8]

- Q3)** a) Explain the use of address bus, data bus and control bus in instruction execution. [8]
- b) What are the different phases of instruction execution? Explain instruction fetch, decode and Execute. [8]

OR

**P.T.O.**

**Q4) a)** Draw schematic diagram for interfacing EPROM and RAM to 8085. With typical example explain briefly. [8]

b) What is the use of interrupts? Explain Hardware and software interrupts. [8]

**Q5) a)** With the help of block diagram, explain architecture of 8051. [10]

b) Explain the function and modes of timer/counter. [8]

OR

**Q6) a)** With memory map explain internal memory organization of 8051. [10]

b) Explain the serial communication. What is function of SCON register? [8]

### **SECTION - II**

**Q7) a)** Explain different addressing modes with the help of one instruction of each mode. [8]

b) Explain following instructions of 8051. [8]

i) Push

ii) LJM P

iii) ADC

iv) ANL

OR

**Q8) a)** What are the different types of branch instructions. Illustrate with examples. [8]

b) What are different software tools for programming of 8051? [8]

**Q9) a)** Define PLC and state features of PLC. How PLC can be used in CNC? [8]

b) How PLC can be used in boiler and furnaces? [8]

OR



**Q10)a)** How 7 segment display can be interfaced with 8051? Write a program to display message. **[8]**

b) Interface 8 bit DAC to 8051 and write a program to generate triangular waveform. **[8]**

**Q11)** Design a system for Data acquisition using 8051 microcontroller for measuring any two parameters. Draw circuit diagram with suitable sensor and signal conditioning. Display the parameters on LCD. **[18]**

OR

**Q12)a)** Compare RS232 and RS485 protocol. **[8]**

b) Explain following buses with application: **[10]**

i) USB bus

ii) I<sup>2</sup>C Bus



Total No. of Questions : 12]

SEAT No. :

**P1417**

**[4759] - 139**

[Total No. of Pages :3

**B.E. (Production)**

**ERGONOMICS AND HUMAN FACTORS IN ENGINEERING**

**( 2008 Course) (Semester - I) (Elective -II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Discuss the importance of work and rest cycle in design of physical work. **[8]**
- b) What are human machine systems? Compare man and machine elements of the such systems. **[8]**

OR

- Q2) a)** Discuss how cardiovascular system and respiratory system of body respond to physiological strain? **[8]**
- b) Define work efficiency. Explain various factors which affect energy consumption. **[8]**

- Q3) a)** What do you mean by promoting lumbar lordosis in seat design? Discuss how to reduce disc pressure, static loading of back muscles and postural fixity while seating. **[8]**
- b) Discuss how to decide out of reach requirements using anthropometric data. **[8]**

OR

**P.T.O.**

**Q4) a)** What are various considerations while deciding horizontal work surface height for seated personnel? [8]

b) Explain the concept of normal and maximum area while designing horizontal work surface area. [8]

**Q5) a)** Explain following elements in case of visual displays of static information. [10]

i) stroke width

ii) width to height ratio

iii) size

iv) case

v) layout

b) Discuss various types of speech recognition systems and human factors issues in design of speech operated controls. [8]

OR

**Q6) a)** What is the purpose of providing resistance in the controls. Explain various types of resistances used in controls with applications. [10]

b) Discuss the design of [8]

i) Automobile brake and Accelerator pedals

ii) Multifunctional hand controls

## **SECTION - II**

**Q7) a)** What are the recommended limits for MMH tasks as per biomechanical, physiological and psychophysical approach. [8]

b) What do you mean by BMR (basal metabolism rate) and MAP(maximum aerobic power). Explain the factors which affect BMR and MAP. [8]

OR

- Q8)** a) What are various ways to reduce the risk of MMH tasks. [8]  
b) Discuss following variables that influence the level of stress placed on the body during lifting. [8]  
i) horizontal position of the load  
ii) Frequency of lifting  
iii) Object characteristics

- Q9)** a) Discuss the effects of lighting on performance. [8]  
b) What do you mean by acclimatization to cold and heat stress? Explain. [8]

OR

- Q10)**a) Explain Following measures [8]  
i) Effective temperature  
ii) Wet Bulb globe temperature  
iii) Heat Index  
iv) Wind chill Index  
b) Explain the procedure to establish noise exposure limits as per OSHA. [8]

- Q11)**a) List down major steps in system design. Explain basic design stage in detail. Discuss rules for allocating functions in design stage. [9]  
b) Define accident. Discuss various ways of reducing accidents. [9]

OR

- Q12)**a) What do you mean by interface design in designing a system? Explain considerations while applying human factors data during interface design. [9]  
b) Explain human factors considerations for the following elements in design of vehicle [9]  
i) Cab  
ii) Transmission system  
iii) Information systems  
iv) Head lights



Total No. of Questions : 12]

SEAT No. :

P1514

[4759] - 14

[Total No. of Pages : 6

B.E. (Civil Engineering)

QUANTITY SURVEYING, CONTRACTS AND TENDERS

(2008 Course) (401009) (Semester -II)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any 3 questions from each section.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6) Assume suitable data, if necessary.

SECTION- I

- Q1) a) A person wish to construct a building as per the following plan fig1. Explain the utility of plan, sectional elevation in working out the detailed estimate. [5]

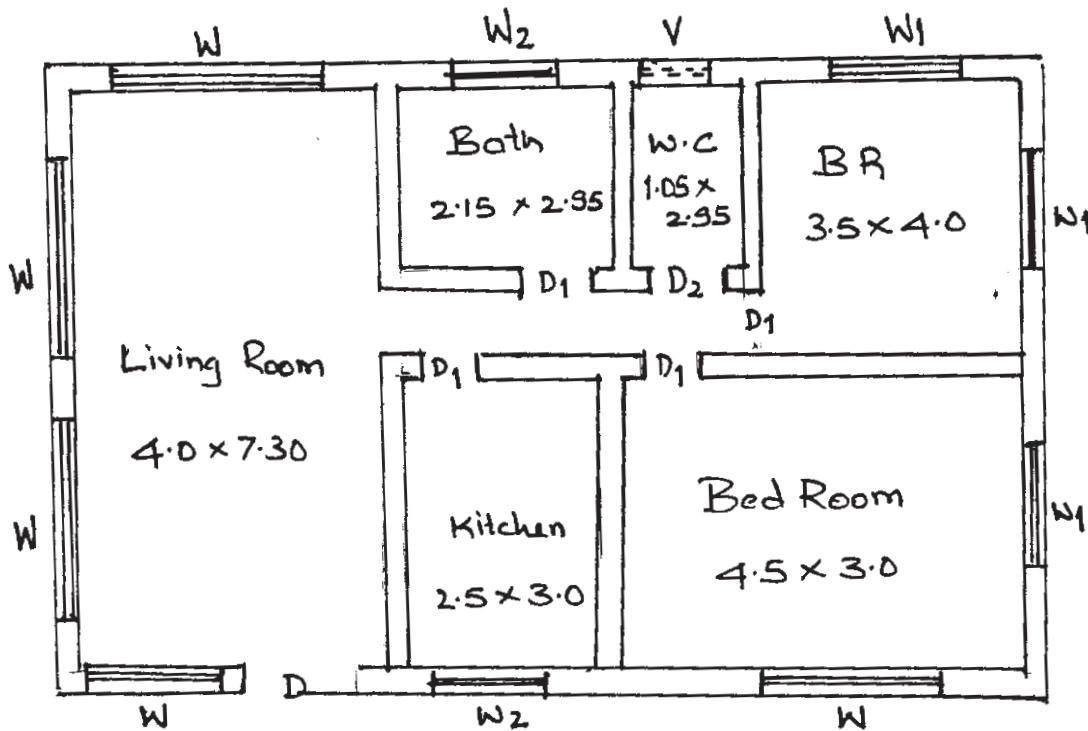


Fig (1) PLAN

P.T.O.

b) Work out the cost of construction of the following items by (1) long and short method [13]

- i) PCC in foundation
- ii) DPC
- iii) RCC lintel and beam assuming steel at 1% of RCC
- iv) BM 1.6 for superstructure

OR

Q2) a) What are the different methods of detail estimate? Explain centre line method of estimation and carryout the detailed estimate & obtain the quantity for following fig 2. [14]

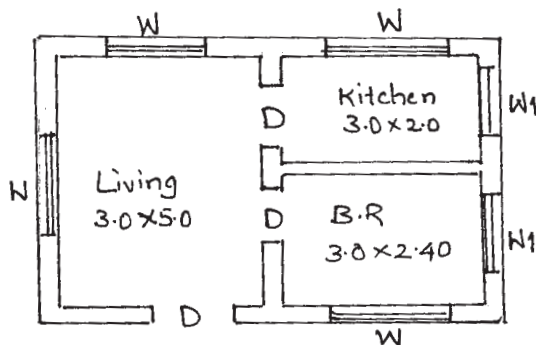


Fig 2 PLAN

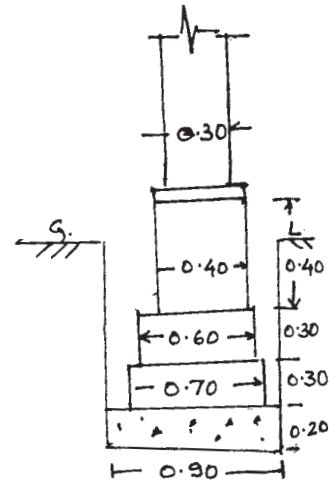


Fig 2a Foundation Detail

Fig(1)  
 Doors, D = 0.90 x 2.10  
 D1 = 0.75 x 2.10  
 D2 = 0.60 x 1.80  
 Window, W = 1.50 x 1.20  
 W1 = 1.20 x 0.90  
 W2 = 0.90 x 1.05  
 Ventilates V = 0.45 x 0.60

Fig(2)  
 Doors D = 0.90 x 2.10  
 Window W = 1.20 x 1.50  
 W1 = 0.90 x 1.20

Note:- Foundation detail common to both Q.No 1(a) & 2(a) as per fig 2(a).  
 Doors, windows, etc common for both

All Dimension in metre.

Q.No. 1(a) & 2(a)

- i) Earth Work Excavation for foundation
  - ii) Brick Masonry in CM 1:6
  - iii) Damp Proof Course
- b) What is the unit of measurement of [4]
- i) Pointing
  - ii) Plastering
  - iii) RCC lintel
  - iv) Wood works for doors

**Q3) a)** What is approximate or preliminary estimate and what is the purpose of approximate estimate. Explain the annual maintenance estimate and revised estimate. [6]

- b) A (G+2) building has a carpet area of 800m<sup>2</sup> in each floor. The area occupied by corridor verandah, staircase, etc is 25% and area occupied by wall, column is 10%, water supply 7.5% Electrification 8.5%, contingency 4%. Prepare a preliminary estimate considering cost of ground floor Rs 1500/- sq-m, Rs 1700/- for I floor, Rs 1850/- for I floor. [10]

OR

**Q4) a)** Fig 3, shows section along the shorter span of a room of size 7×12m internal dimension. The thickness of slab is 15cm. Assume 5cm end cover and 2.5cm cover at top & bottom. [10]

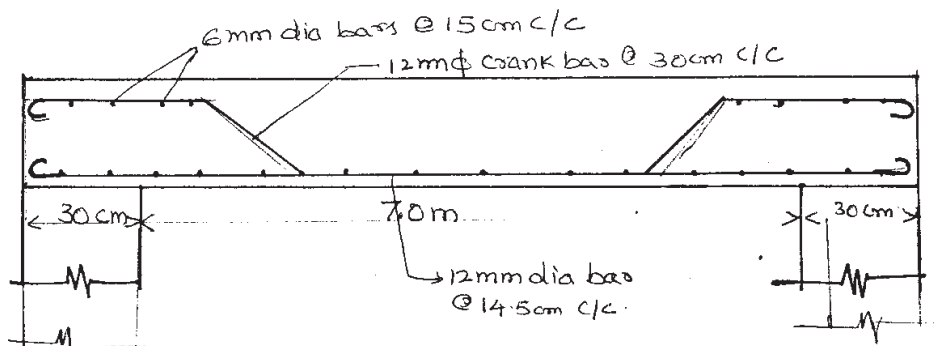


Fig 3

- b) What are the different methods of calculating sectional area of road in banking. Explain the Mid section method of calculating earthwork with typical table for calculation. [6]

**Q5) a)** Explain the importance of specification in preparing estimate and what are the objectives of Specifications. What are standard specification and specification for performance? Explain How control over quality of material and workmanship is achieved by specification. [8]

- b) Draft a detailed specification for earthwork embankment (without OMC). [8]

OR

**Q6) a)** Explain importance of Rate Analysis and what are the factors affecting rate analysis. Explain in detail the procedure for rate analysis. [4]

- b) Explain task work and how does it vary. Work out the labour requirement for [4]

i) Reinforcement for R.C.C. work &

ii) I class brick masonry in CM 1:6 in super structure.

- c) Prepare rate analysis for RCC work in column with proportion 1:1.5:3, with cement course sand, 2.5cm ballast with all material, T & P complete. [8]

### SECTION - II

**Q7) a)** A construction equipment was purchased for Rs. 5,00,000/-with annual rate of interest of 6%. Determine life of the equipment ('n' years) if annual sinking fund is Rs. 3,000/- and salvage value is Rs. 60,000/-. [8]

- b) What is meant by 'Depreciation'? State its significance in valuation with example. Discuss merits and demerits of 2 methods of finding depreciation. [6]

- c) Enlist the factors that may affect the value of a building. Discuss any one factor in detail with example. [4]

OR



- Q8) a)** Determine book value of a property consisting of a land (plot of area 1000m<sup>2</sup>) and building (built-up area of 600m<sup>2</sup>) in the year 2013 assuming scrap value 10% of the original cost. The original land cost in 1973 was Rs. 100/- per m<sup>2</sup> and the cost of built-up area in the same year was Rs. 900/- per m<sup>2</sup>. Assume that the construction specifications are first class and the land cost has remained unchanged. **[8]**
- b) A rectangular plot has 35m width along the road and 95m depth at right angles to the road. Calculate the value of the land using method of belting. Assume that cost of the first belt of 20m depth is Rs. 200/- per m<sup>2</sup>. **[6]**
- c) State two differences each between: **[4]**
- Sentimental Value-Distress Value
  - Salvage Value - Scrap Value

- Q9) a)** Give the classification of 'works' as per the P.W.D. **[6]**  
Explain the essential pre-requisites as per the P.W.D. procedure before starting the execution of a 'work'.
- b) What is meant by a tender? Discuss importance of types of tenders and tendering procedure with respect to any one specific construction work. **[5]**
- c) State various methods of tendering systems with respect to civil engineering works. **[5]**

A billionaire lady wants to construct a bungalow with all possible modern security provisions and facilities in it. Suggest a suitable tendering method she should adopt for inviting tenders for construction of the bungalow. Justify your suggestion.

OR

- Q10)a)** State two differences each between: **[6]**
- Sentimental Value-Distress Value
  - Salvage Value - Scrap Value
- b) Discuss the terms: Retention Money, Acceptance of a Tender. **[5]**

- c) Discuss the following terms as per the P.W.D. [5]
- i) Original Works
  - ii) Revised administrative approval

**Q11)a)** State whether True or False, giving proper justification: (Zero marks will be given if justification is not written) [6]

- i) A wife approaches an arbitrator for her divorce case.
  - ii) A contractor may sign a contract with the divorced wife of an industrialist.
  - iii) Only a judge retired from High Court or higher court can be an arbitrator for dispute with respect to a dispute in the execution of a Civil Engineering contract.
- b) Briefly explain the contents of a typical contract. [5]
- c) What is the meaning of ‘arbitration’? Discuss various types of arbitration. [5]

OR

**Q12)a)** Differentiate clearly between: Item Rate Contract and Lump-sum Contract. [6]

- b) State four issues that may be referred to an arbitrator. Discuss the powers of an arbitrator. [5]
- c) What is meant by ‘General’ and ‘Special’ conditions of contract? Clearly explain with appropriate examples. [5]



Total No. of Questions : 12]

SEAT No. :

**P1418**

**[4759] - 140**

[Total No. of Pages :3

**B.E. (Production)**

**MATERIALS AND LOGISTICS MANAGEMENT**

**( 2008 Course) (Sem. - I) (Elective - II) (Revised) (411085)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume Suitable data if necessary.*

**SECTION - I**

**Q1) a)** Define Value Engineering. What are the phases involved in Value Analysis? Explain each phase briefly. **[9]**

b) What are the objectives of materials management from Return on Investment point of view? **[9]**

OR

**Q2) a)** Explain Material Requirement Planning (MRP1) with flow chart. **[9]**

b) Explain Make or Buy decision with example. **[9]**

**Q3) a)** Explain Purchase Cycle with flowchart. **[8]**

b) Explain documents used in Importing: **[8]**

i) Letter of credit

ii) Bill of Lading

OR

**Q4) a)** Explain different objectives of Purchasing. **[8]**

b) What is Vendor Rating? Explain any one method in detail. **[8]**

**P.T.O.**

- Q5) a)** What is store identification? Explain KODAK system of codification briefly. [8]
- b) How study of waste management techniques helps to manage surplus and obsolete material? [8]

OR

- Q6) a)** Explain Last In First Out (LIFO) and First In First Out (FIFO) methods of material issuing. [8]
- b) What is stock verification? Differentiate between annual stock taking and Continuous stock taking. [8]

## **SECTION - II**

- Q7) a)** Explain functional areas of Logistics in brief. [8]
- b) List the types of warehouses. Explain any two in brief. [8]

OR

- Q8) a)** Define warehousing. Explain the economic and service benefits of warehouse. [8]
- b) List different modes of Transportation. Explain any two in brief. [8]

- Q9) a)** Explain the drivers of supply chain management. [8]
- b) What is supply chain? Explain the significance of three key supply chain decision phases. [8]

OR

- Q10) a)** What is the importance of demand in supply chain? How the demand risk is managed in supply chain? [8]
- b) What is strategic fit in supply chain management? Explain the steps involved in achieving strategic fit. [8]

**Q11)a)** Explain Fixed Period (P) system and Fixed Quantity (Q) system in brief. [9]

b) The demand for an item is 18000 per year. Production rate is 100 units/day. [9]

The carrying cost is Rs.0.15/unit/month and the setup cost is Rs.500 per setup. The shortage cost is Rs.20 per unit/year.

Find:

i) Economic Batch Quantity

ii) Maximum Inventory

iii) Maximum Stockout.

OR

**Q12)a)** What is safety stock? How lead time affects safety stock in finished goods inventory? [9]

b) An item is produced at the rate of 50units/day. The demand is 25units/day. Setup cost is Rs.100/setup, holding cost is Rs.0.01/unit/day. [9]

Find:

i) Cycle time

ii) Minimum total cost/run.



Total No. of Questions : 12]

SEAT No. :

**P1419**

**[4759] - 141**

[Total No. of Pages :2

**B.E. (Production Engineering)**  
**c: SIMULATION AND MODELING**  
**( 2008 Course) (Semester - I) (Elective - II) (411085)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve Q-1 or Q-2, Q-3 or Q-4, Q-5 or Q-6, Q-7 or Q-8, Q-9 or Q-10, Q-11 or Q-12.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume Suitable data if necessary.*
- 5) *Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is allowed.*

**SECTION - I**

- Q1)** a) Discuss various terminology used in simulation. [6]  
b) Discuss different laws of probability distribution. [10]

OR

- Q2)** a) Distinguish between discrete and continuous systems with example. [8]  
b) Discuss the advantages of simulation. [8]

- Q3)** a) Discuss the applications in production management. [8]  
b) Define-Physical, Mathematical, Static and Dynamic simulation models. [8]

OR

- Q4)** a) Monte-Carlo simulation methods and their application in queuing. [8]  
b) What is system and system environment? List the components of a system with example. [8]

**P.T.O.**

- Q5) a)** Explain different methods for input data representation. [10]  
b) Discuss use of random numbers in simulation with example. [8]

OR

- Q6) a)** Explain different data collection methods in simulation. [10]  
b) Explain meaning of one tailed test and two tailed test. [8]

## SECTION - II

- Q7) a)** Explain output analysis for dynamic state simulation. [8]  
b) Discuss Factors considered in selecting generator. [8]

OR

- Q8) a)** Discuss exponential and normal distribution with application. [8]  
b) Explain any two methods for output data analysis. [8]

- Q9) a)** Discuss about a simulation of a job manufacturing shop. [9]  
b) State the need of simulation in manufacturing and material handling system. [9]

OR

- Q10) a)** Discuss about a simulation of a flexible manufacturing cell. [8]  
b) Discuss simulation of a season ticket issuing counter of a transport corporation. [10]

- Q11) a)** Explain in detail important feature of witness simulation software. [8]  
b) Discuss the concept of simulated factory. [8]

OR

- Q12) a)** Comments on simulation languages. [8]  
b) Discuss the steps for development of simulation software. [8]



Total No. of Questions : 12]

SEAT No. :

**P3325**

[Total No. of Pages : 2

[4759] - 142

**B.E. (Production) (Semester - I)**  
**PLANT ENGINEERING & MAINTENANCE**  
**(2008 Pattern) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1)** a) How will you measure performance and productivity of plant? [8]  
b) Explain various types of maintenance? [8]

OR

- Q2)** a) What is Parato chart? Explain in detail [8]  
b) Discuss principles of plant management. [8]

- Q3)** a) Discuss plant facility related to building. [8]  
b) Explain types of layout? [8]

OR

- Q4)** a) Explain how the Information Technology is useful for optimization of layout? [8]  
b) What are PQRS analysis and REL chart? [8]

- Q5)** a) Explain predictive base maintenance? [8]  
b) Explain maintenance of power plant industries? [10]

OR

- Q6)** Write short notes on following. [18]  
a) MICLASS software for classification and coding.  
b) Simulation for spare part management.  
c) Maintenance management.

**P.T.O.**



**SECTION - II**

- Q7)** a) Explain schedule of preventive management. [8]  
b) What is reliability? Discuss in detail. [8]

OR

- Q8)** a) Discuss various preventive maintenance with life cycle costing [8]  
b) Explain mathematical model for life cycle costing model. [8]

- Q9)** a) What are various types of measure taken for safety of plant? [8]  
b) Discuss issues related to recycling and wastages. [8]

OR

- Q10)** a) What is energy audit? Explain its importance with example. [8]  
b) Explain pollution control issues in chemical plants. [8]

- Q11)** a) What are ferrography & hot ferrography? [8]  
b) Discuss condition based maintenance. [10]

OR

- Q12)** a) Explain with example organization that is implantation Total Productive Maintenance. [10]  
b) Discuss RAM analysis? [8]



Total No. of Questions : 12]

SEAT No. :

**P1420**

**[4759] - 143**

[Total No. of Pages :6

**B.E. (Production Engineering)**  
**COMPUTER INTEGRATED DESIGN AND MANUFACTURING**  
**( 2008 Course) (Semester - II) (411087)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicates full marks.*
- 5) *Use of logarithmic tables, slide rule, mollier charts, electronic pocket Calculator and steam table is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain the different network topology in CAD/CAM system. [6]
- b) A rectangle ABCD has vertices A(5,5), B(15,5), C(15,10) and D(5,10). It has to be rotated by  $45^\circ$  in anticlockwise direction about point P(20,15). Determine the new coordinates of the rectangle. [10]

OR

- Q2)** a) Explain with suitable example the following concept and specify differences among them. [6]
- i) Wire frame model
  - ii) Surface model
  - iii) Solid model
- b) A triangle PQR has its vertices at P(0,0), Q(6,0) and R(3,4). It is to be translated by 3 units in X direction and 2 units in Y direction and then it is to be rotated in anticlockwise direction about the new position of point R through  $60^\circ$ . Find the new position of the triangle. [10]

**P.T.O.**

- Q3) a)** Explain different types of coordinate systems used in the FEA. [6]
- b) A stepped bar is as shown in the fig.2. An axial load  $F = 20000\text{N}$  is applied as shown. Using the FEA method calculate the following [12]
- Nodal displacements
  - Stress in each section and
  - Reaction forces

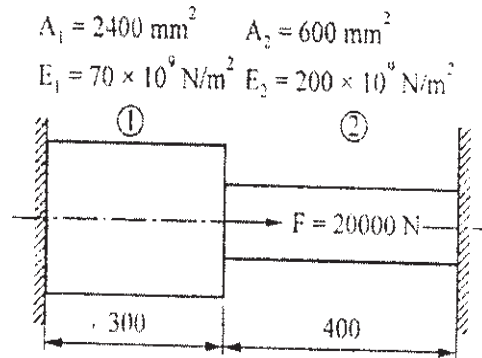


Fig. 2

OR

- Q4) a)** State and explain various types of elements used in the Finite Element Analysis. [6]
- b) Fig. 3 shows the cluster of four springs. Calculate deflection of each spring when a force of  $2000\text{N}$  is applied. Model the spring as 1D spar element. [12]

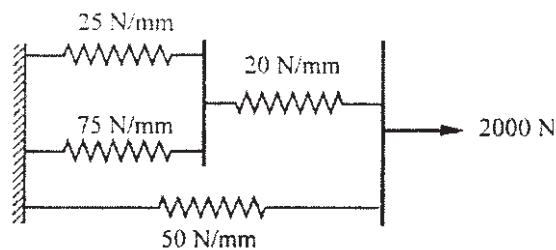
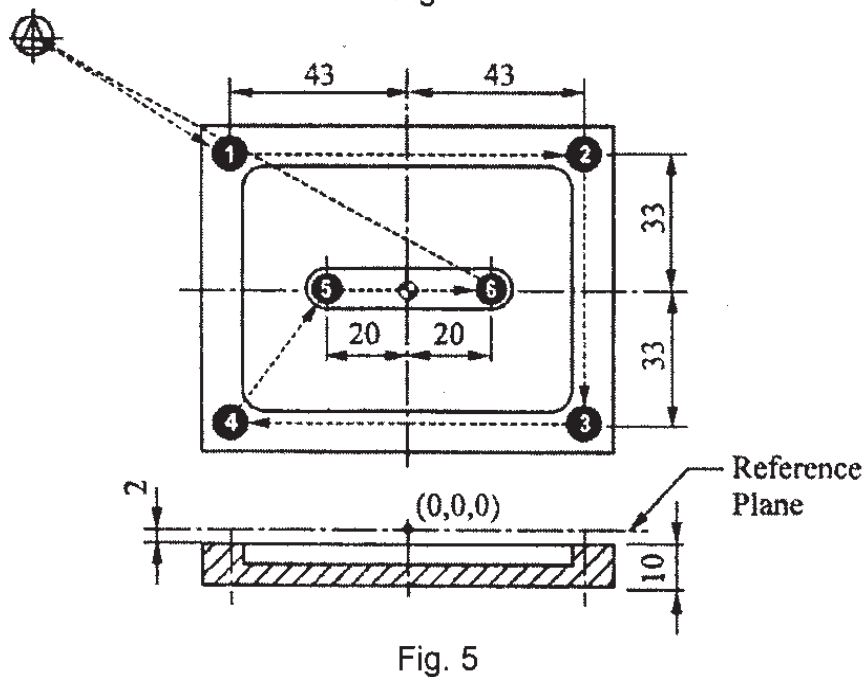
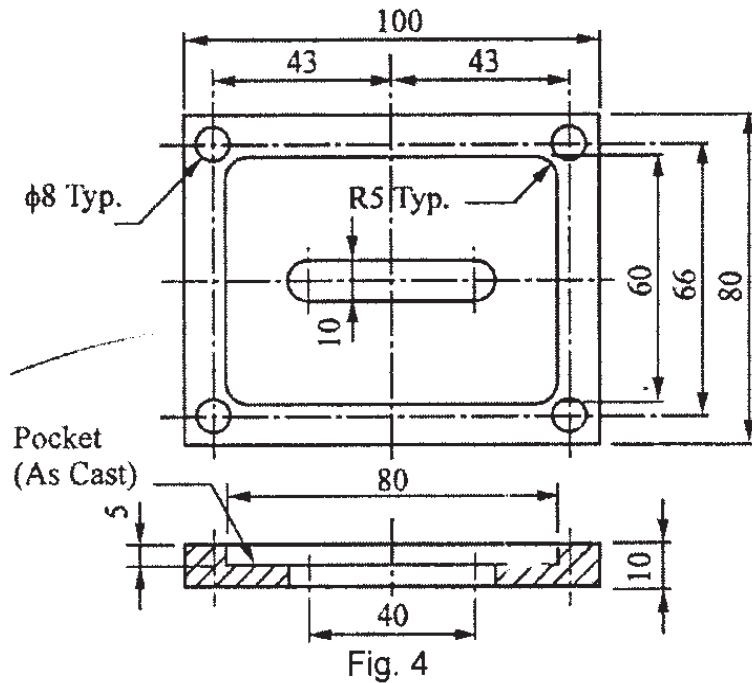


Fig. 3

- Q5) a)** Explain the absolute and incremental positioning system. [6]

- b) Write a CNC program using G and M codes for drilling and milling the component as shown in the fig.4, drill path is shown in fig.5 and milling cutter path in fig.6. A milling cutter of 10mm diameter and drill of 8mm diameter is available. [10]



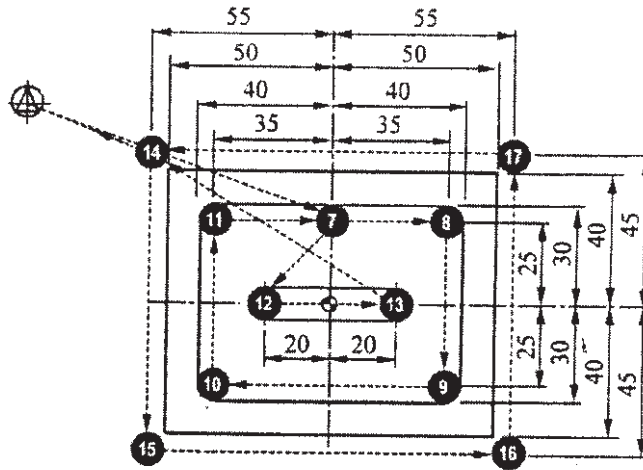


Fig. 6

OR

- Q6) a) Explain the different methods of tool length compensation on CNC. [6]
- b) Write a manual part program to machine the component as shown in fig.7 and tool path is shown in fig.8. Assume the speed as 200 rpm and feed rate at a rate of 0.35mm/revolution. [10]

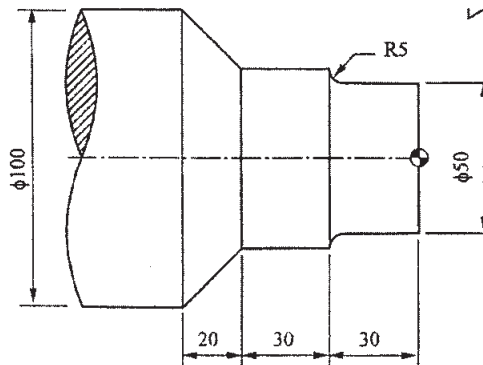


Fig. 7

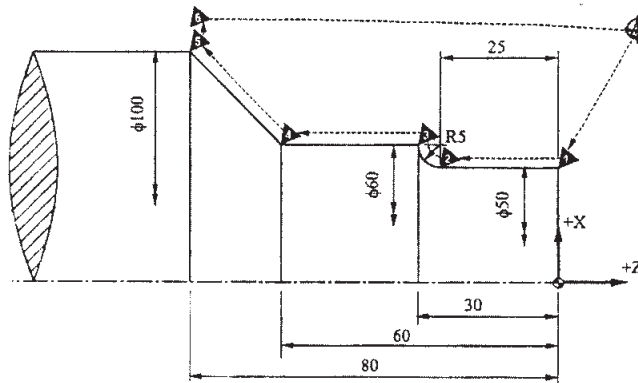


Fig. 8

## SECTION - II

- Q7)** a) Explain the various phases of ERP implementation. [6]  
b) Write short note on computer aided inspection and quality control. [10]

OR

- Q8)** a) Discuss MRPI & MRP II in modern manufacturing system with sketch. [8]  
b) Discuss the following techniques of concurrent Engineering [8]  
i) Quality Function Deployment  
ii) Failure Mode & Effect Analysis

- Q9)** a) What is flexible manufacturing system (FMS)? Explain the classification of FMS based on [12]  
i) Number of Machines  
ii) Level of flexibility and  
iii) Types of layout  
b) What do you mean cellular manufacturing? Explain in brief. [6]

OR

- Q10)** a) Explain Rank Order Clustering( ROC) algorithm for grouping parts and machines. [10]  
b) Explain with suitable example how production flow analysis helps in cell formation in grouping of parts. [8]

- Q11)a)** Explain with neat sketch IBM concept of CIM. **[8]**
- b) Explain with neat sketch Fused Deposition Method (FDM) with its highlights. **[8]**

OR

- Q12)a)** Explain with neat sketch the Siemens Model of CIM. **[8]**
- b) Explain with neat sketch Laminated Object Manufacturing (LOM). **[8]**



Total No. of Questions : 12]

SEAT No. :

**P1421**

**[4759] - 144**

[Total No. of Pages :4

**B.E. (Production Engineering)**  
**PROCESS PLANNING AND TOOL SELECTION**  
**(2008 Course) (411088) (Semester - II)**

*Time :3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION - I**

- Q1) a)** Explain the following terms: **[8]**
- i) operation,
  - ii) routing
  - iii) process picture and
  - iv) operation route sheet
- b) Explain the importance of “communication” in the field of engineering. **[8]**

OR

- Q2) a)** What is a manufacturing system? And what are the main elements in its composition? **[8]**
- b) How is process planning related to production planning and to what planning and control functions does it directly contribute? **[8]**
- Q3) a)** Describe the main types of drawing employed in engineering? Which of these is most appropriate to process planning and why? How many functional surface may be indentified? **[8]**
- b) Identify and describe at least five types of geometrical tolerances. **[8]**

OR

**P.T.O.**



**Q4) a)** What is a datum? What is the advantage of using a datum? Is it always possible to establish a physical datum? Explain with example. [8]

b) How is surface finish defined and measured? How is surface finish indicated on an engineering drawing? [8]

**Q5) a)** Explain the rule for adding and subtracting the dimensions. Explain with suitable example. [9]

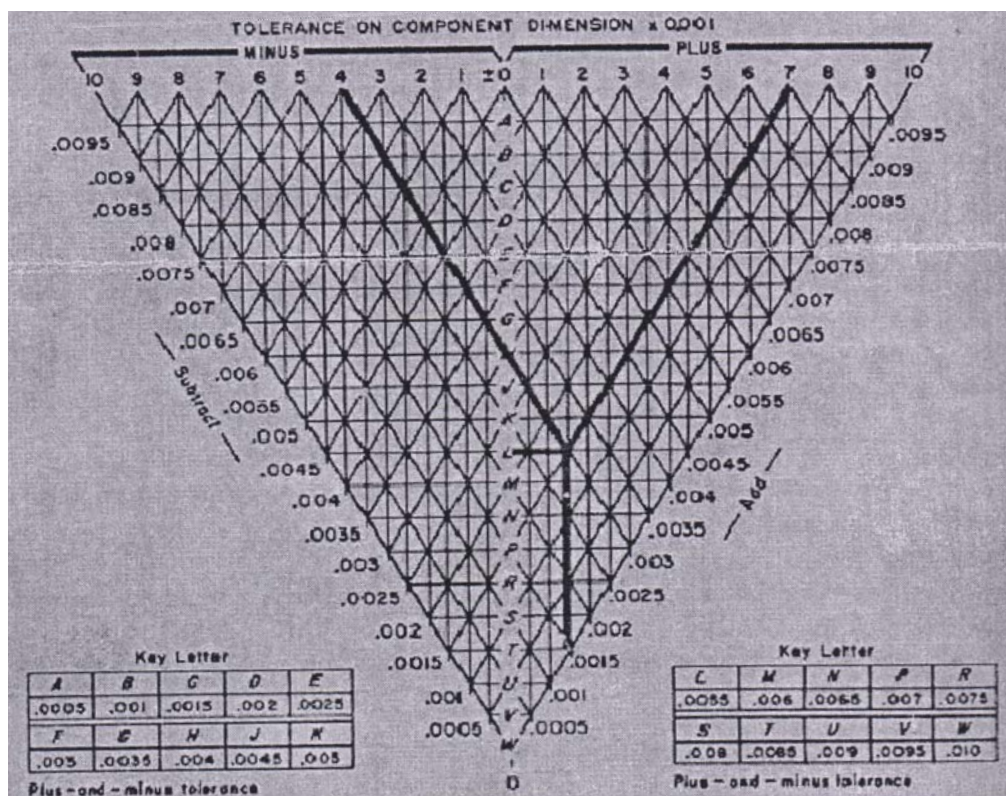
b) Convert the following to dimensions with equal bilateral tolerances. [9]

i)  $5.250^{+0.006}_{-0.003}$

ii)  $1.500^{+0.008}_{-0.001}$

iii)  $3.750^{+0.002}_{-0.005}$

Use following tolerance conversion chart as in Fig. 1.



**Fig.1. Tolerance conversion chart**

OR  
2

- Q6)** a) List the possible causes of work-piece deflection while in the location system of holding device. [9]
- b) What are the rules for locating long cylindrical and short cylindrical work-pieces? Explain with neat diagrams. [9]

## SECTION- II

- Q7)** a) Explain the steps involved in machine selection method with a neat flow chart. [8]
- b) What are the advantages of using commercial tooling over Regular and Special tooling? What should be the order of procurement of tools? [8]

OR

- Q8)** a) Distinguish between General purpose machines (GPM) and special purpose Machines (SPM). [8]
- b) What is the main function of clamping device? Discuss some clamping and locating devices. [8]

- Q9)** a) What is an auxiliary operation? How can supporting operation be distinguished from auxiliary operation? [8]
- b) Explain Automatic time standard system (ATS) in CAPP. [8]

OR

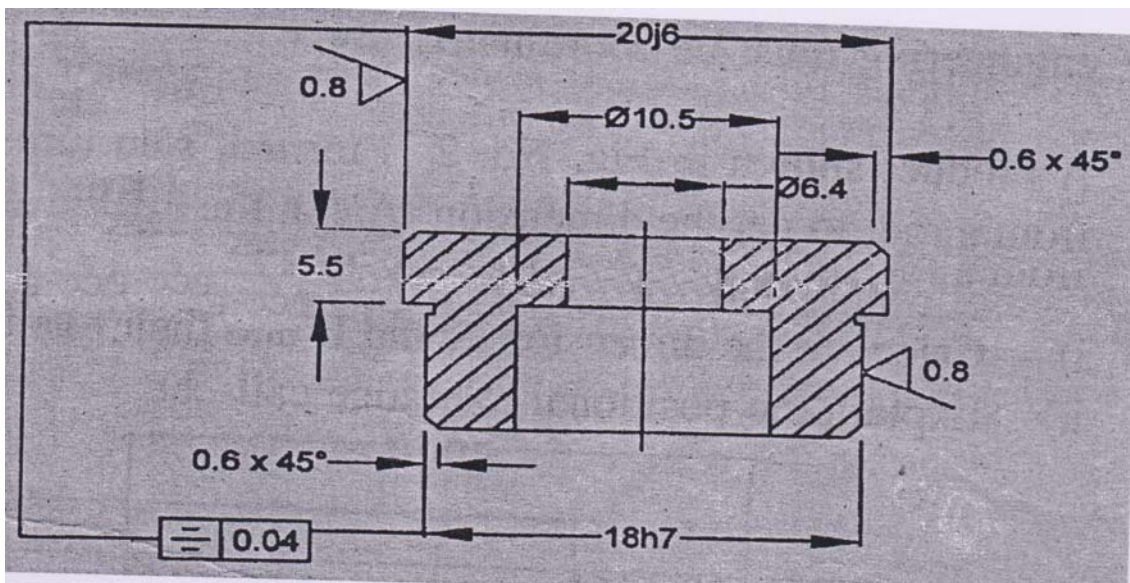
- Q10)**a) Explain the difference between product critical areas and process critical areas with a sketch. [8]
- b) What are steps in generative process planning system? Explain with a neat flow chart. [8]

- Q11)**a) Sketch the symbols used for locators, clamps, supports and combination of these items. [6]

- b) List some of the possible uses of process picture. [6]
- c) What information is provided on operation route sheet? [6]

OR

**Q12)** Fig. no.2 shows the working drawing of “TENON” with the required dimensions and geometrical tolerances. Stock size is  $25 \times 15 \times 30$ . The total number of pieces to be produced are 5000. Material is HCS. General tolerance is  $\pm 0.1$ . All dimensions are in mm. List the processes that you recommend to produce this part. Propose a process plan to machine the “TENON”. [18]



**Fig.2. TENON**



Total No. of Questions : 12]

SEAT No. :

**P1422**

**[4759]-145**

[Total No. of Pages : 2

**B.E. (Production Engineering )  
AUTOMOBILE ENGINEERING  
(2008 Course) (Elective-III) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary*
- 4) *Figures to the right side indicate full marks.*

**SECTION-I**

- Q1)** a) Explain the difference between Two and Four Stroke Engines. [8]  
b) Explain the working of simple carburetor. [8]  
c) Why is the frame narrow at the front? [2]

OR

- Q2)** a) List various types of frame and describe in brief the conventional frame. [8]  
b) Describe the working of four stroke petrol engine with neat diagram. [8]  
c) What do you mean by "Chassis" in automobile? [2]

- Q3)** a) What is the purpose of a radiator in an automobile? Explain its construction. [6]  
b) What is the optimum cooling? Explain. [6]  
c) What is pressure cap? Draw Diagram for the same. [4]

OR

- Q4)** a) Explain water cooling system with the help of diagram. [8]  
b) What is the effect of inadequate cooling and overheating of engine parts. [8]

- Q5)** a) What are the functions of the lubrication system in an automobile? [8]  
b) Explain Magneto ignition system. [8]

OR

**P.T.O.**

- Q6)** a) Explain in brief wet sump lubrication. [8]  
b) What are the requirements of good ignition system? [8]

**SECTION-II**

- Q7)** a) Explain the operation of an epicyclic gear box. [8]  
b) Explain the working of differential with the help of Diagram. [8]

OR

- Q8)** a) With the help of neat sketch, working of synchromesh gear box. [10]  
b) What is mean by double declutching? Explain?. [6]

- Q9)** a) Discuss the following properties of suspension system. [10]  
1) Damping  
2) Camber

- b) What is the function of suspension system? [6]

OR

- Q10)**a) Write short note on self levelling suspensions? [8]  
b) What are the components of the steering system?. [8]

- Q11)**a) Describe in brief the construction and working of drum brakes. [8]  
b) Why disc brakes are better than drum type brakes?. [6]  
c) Define the following terms [4]  
1. Brake Shoes  
2. ABS

OR

- Q12)**a) Give the troubleshooting chart for cooling system with its complaint, cause and remedy. [8]  
b) Explain different types of maintenances with example. [8]  
c) Define Parking brake. [2]



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 3

**P1423**

**[4759]-146**

**B.E. (Production)  
MECHATRONICS**

**(2008 Pattern) (Elective-III) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right side indicate full marks.*
- 4) *Assume Suitable data wherever necessary.*

**SECTION-I**

**Q1) a)** Explain in short the programming devices used in PLC programming. **[8]**

b) Compare PLC's with other types of controllers. **[8]**

OR

**Q2) a)** Explain in detail any four applications of PLC's. **[8]**

b) Discuss in brief any four input/ output specifications of PLC. **[8]**

**Q3) a)** Multibit register/BCD output interfaces provide parallel communication. **[8]**

b) Explain in detail types of racks in discrete I/O system. **[8]**

OR

**Q4) a)** Explain in detail types of remote I/O systems used in PLCs. **[8]**

b) What are the types of memory systems used in PLCs? **[8]**

***P.T.O.***



- Q5) a)** Explain any four electrical specifications used in PLCs. [8]
- b) Explain with neat sketch transformation of an analog signal into a binary or BCD value. [10]

OR

- Q6) a)** Explain with neat sketch Process for inputting analog data to a word location. [8]
- b) An input module, which is connected to a temperature transducer, has an A/D with a 12-bit resolution. When the temperature transducer receives a valid signal from the process (0 to 600°C), it provides, via a transmitter, a +1 to +5 VDC signal compatible with the analog input module.
- i) Find the equivalent voltage change for each count change (the voltage change per degree Celsius change) and the equivalent number of counts per degree Celsius, assuming that the input module transforms the data into a linear 0 to 4095 counts, and
- ii) Find the same values for a module with a 10-bit resolution. [10]

## SECTION-II

- Q7) a)** Fast- input interfaces detect input pulses of very short duration. Explain with neat sketch. [8]
- b) What is the necessity of special type of I/O modules? Explain in detail it's types. [8]

OR

- Q8) a)** What are positioning interfaces? Explain with neat sketch PLC system using stepper modules to control three axes. [8]
- b) Proportional-integral-derivative (PID) interfaces are used in process applications that require continuous closed-loop control employing the PID algorithm. [8]

- Q9) a)** Explain with neat sketch Grafcet language used in PLC programming. **[8]**
- b) Explain in detail the One-shot output and Transitional contact instruction. **[8]**

OR

- Q10)a** Explain with neat sketch any two timer instructions used in PLC Programming. **[8]**
- b) Data conversion instructions change the contents of a given register from one format to another. Explain. **[8]**

- Q11)a)** What are types of thermal transducers? Explain with neat sketch construction and working of RTD. **[8]**
- b) Explain linear variable differential transformer(LVDT) mechanism with it's any one application. **[10]**

OR

- Q12)a)** What are flow transducers? Explain with neat sketch Motion Detection Fluid flow-meter. **[8]**
- b) What are the types of strain gauges? Explain with neat sketch construction and working of any one strain gauge. **[10]**





Total No. of Questions : 12]

SEAT No. :

**P1424**

**[4759]-147**

[Total No. of Pages : 3

**B.E. (Production)**

**METAL WORKING TRIBOLOGY**  
**(2008 Course) (Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** Explain the structure of a tribo-system. **[6]**

b) Explain Apparent evaluation of contact stiffness of a joint. **[10]**

OR

**Q2) a)** How do you characterize a surface. **[6]**

b) Explain Abbot's bearing area curve. **[10]**

**Q3) a)** What are the sliding friction mechanisms? **[8]**

b) Explain stick slip motion of friction measurement. **[10]**

OR

**Q4) a)** Derive a modified Bowden and Tabor friction equation. **[8]**

b) Derive friction equation involving hard material. **[10]**

**Q5) a)** Explain Lubrication used for wire drawings extrusion. **[6]**

b) Discuss the parameters affecting wear and how do you prevent them. **[10]**

OR

***P.T.O.***

- Q6)** a) Explain lubrication used for forging and give applications for the process used in forging. [10]
- b) Derive Theories of Wear. [6]

### SECTION-II

- Q7)** a) Explain “Boundary friction” lubrication with application. [4]
- b) What is meant by ‘Viscosity Index’ of lubricant where that is applied? [4]
- c) Explain different modes of lubrication. [8]

OR

- Q8)** a) With figure explain semi liquid friction. [12]
- b) What are the properties required in lubricants? [4]
- Q9)** a) Explain Radial journal bearing under hydrodynamic condition including Reynold’s equation. [12]
- b) Derive ‘Petroff’ equation involving concentric bearing. [6]

OR

- Q10)**a) Derive the equation for hydrodynamic lubrication

$$\frac{dp}{dx} = 6\mu u \left[ \frac{h-h^*}{h^3} \right].$$

(all having usual symbols). [10]

- b) Find out leakage in litres/min through a shaft of 35mm $\Phi$  which is running concentric to sleeve of 25.3 mm $\Phi$ , 35mm length using water under pressure of 5 bar. [8]

**Q11)a)** Derive an equation for two rectangular plates approaching each other involving squeeze film operation. **[10]**

b) Two circular plates of 125 mm  $\Pi$  approaching each other with velocity of 12.5 cm/s in liquid of  $\mu = 0.035$  Pas. Find out pressure, load and time for film thickness to come down from 0.25 mm to 0.005 mm. **[6]**

OR

**Q12)a)** Derive squeeze film equation for Circular plate approaching a rigid surface. **[10]**

b) Write short notes on: **[6]**

i) Rail wheel tribology.

ii) Squeeze film lubrication.



B.E. (Production)

FINITE ELEMENT ANALYSIS

(2008 Course) (Semester-II) (Elective-III) (411089)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from Section-I and any three questions from Section-II.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assumptions made should be clearly stated and justified.

SECTION-I

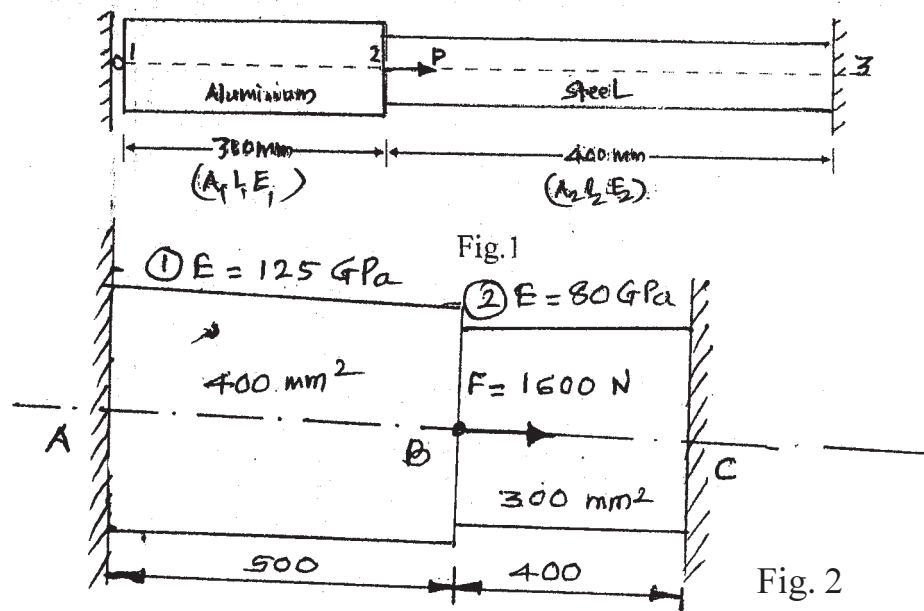
Q1) a) What do you understand by the finite element model? Give an example of modeling a mechanical component. [8]

- b) Determine the nodal displacements at node 2, stresses in each material and support reactions in the bar shown in Fig. 1. due to applied force  $P = 400 \times 10^3$  N and temperature rise of  $30^\circ\text{C}$ . Given  $A_1 = 2400$  mm<sup>2</sup>,  $A_2 = 1200$  mm<sup>2</sup>,  $E_1 = 0.7 \times 10^5$  N/mm<sup>2</sup>,  $E_2 = 2 \times 10^5$  N/mm<sup>2</sup> and  $\alpha_1 = 22 \times 10^{-6}/^\circ\text{C}$ ,  $\alpha_2 = 12 \times 10^{-6}/^\circ\text{C}$ ,  $E = 200 \times 10^5$  N/cm<sup>2</sup>. [10]

OR

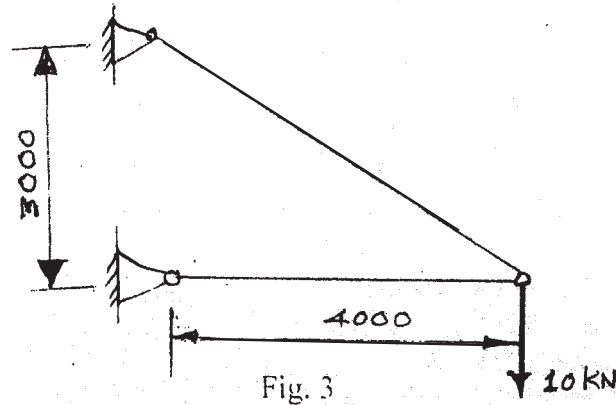
Q2) a) Explain element stiffness matrix by potential energy approach. [8]

- b) For the compound section shown in Fig. 2 fixed at both ends. Estimate reactions at both ends and stresses when force of 1600 N is applied at the change of cross section. Use penalty approach. [10]



Q3) a) Write note on banded skyline solution. [6]

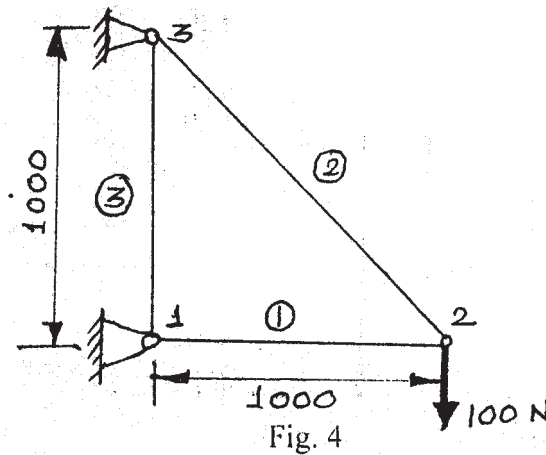
b) A two member truss is shown in fig. 3. The cross sectional area of each member is  $200 \text{ mm}^2$  and the modulus of elasticity is  $200 \text{ GPa}$ . Determine the deflection reactions and stresses in each of the members. [10]



OR

Q4) a) Discuss thermal effect in truss member. [6]

b) Fig. 4 shows a truss consisting of three elements whose  $AE/L$  value is  $1000 \text{ N/mm}$ . Calculate the deflection at node 2. [10]



Q5) a) Discuss finite element modeling plane frame. [6]

b) A two dimensional loaded plate is shown in fig. 5. Determine the displacement of nodes 1 and 2 using plane stress condition by considering it as a single element. Ignore body forces. Also determine the reaction forces and the stresses in the element. Assume thickness as  $10 \text{ mm}$ ,  $E = 70 \text{ GPa}$  and  $\mu = 0.3$ . [10]

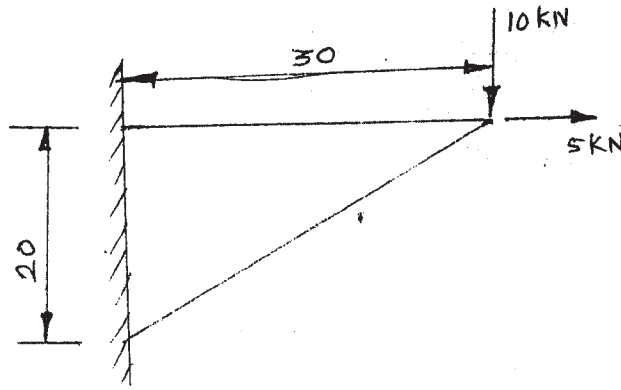


Fig. 5

OR

Q6) a) Explain two dimensional problem using constant strain triangle. [8]

b) The stresses at node points 1, 2 and 3 are 90, 120 and 160 MPa respectively. Determine the stress at point P for the coordinates as shown in the fig. 6. [8]

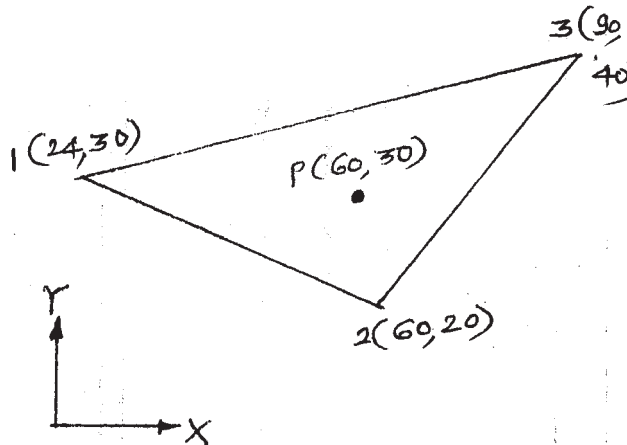


Fig. 6

### SECTION-II

Q7) a) Discuss the generalized three dimensional stiffness matrix of a beam Element. [6]

b) Analyze the beam shown in Fig. 7 by finite element method and determine the end reactions. Also determine the deflections at mid spans given  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $I = 5 \times 10^6 \text{ mm}^4$ . [12]

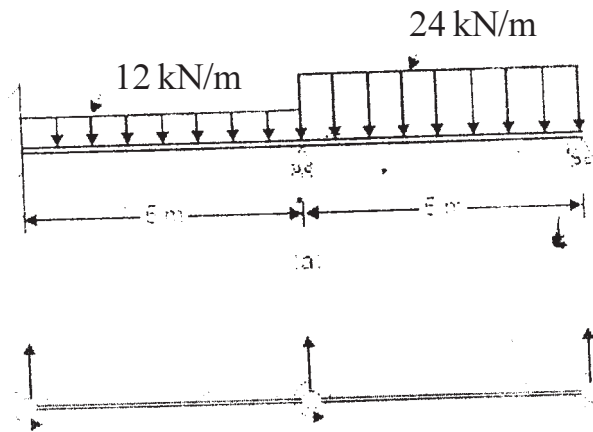


Fig.7.

OR

**Q8) a)** Fig. 8 shows an indeterminate pin connected plane stress with cross sectional area of diagonal members equal to  $2000 \text{ mm}^2$  and all other members with cross sectional area of  $1000 \text{ mm}^2$ . If Young's modulus  $E = 200 \text{ kN/mm}^2$ . [12]

- i) Assemble global stiffness matrix.
- ii) Determine load vector if temperature of member 1-3 increases by  $25^\circ\text{C}$ . Given  $\alpha = 12 \times 10^{-6}/^\circ\text{C}$ .
- iii) Determine load vector if member 1-3 is longer by  $0.2 \text{ mm}$ .
- iv) Introduce Boundary Conditions.

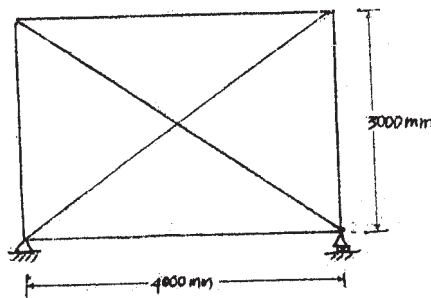


Fig. 8

b) Discuss ISO-parametric elements. [6]

**Q9) a)** Discuss thermal effects in ID elements. [6]

b) A load member is as shown in fig. 9. The loading is initially done at  $20^\circ\text{C}$ . The temperature the rises to  $60^\circ\text{C}$ . Determine the nodal displacements and the elemental stresses developed. [10]

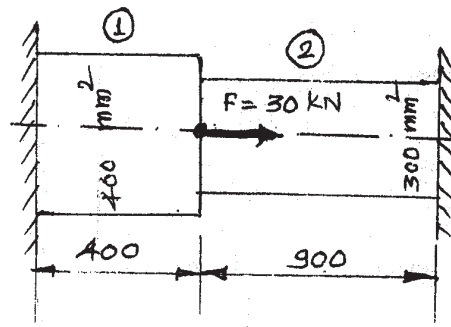


Fig. 9

OR

- Q10)**a) Discuss briefly thermal effects in 2D elements. [4]
- b) Consider the bar shown in fig. 10. Determine the nodal displacements, element stresses and reactions, if the temperature rises by  $60^{\circ}\text{C}$ . Assume modulus of elasticity for the complete bar as 200 GPa and coefficient of thermal expansion as  $12 \times 10^{-6}/^{\circ}\text{C}$ . [12]

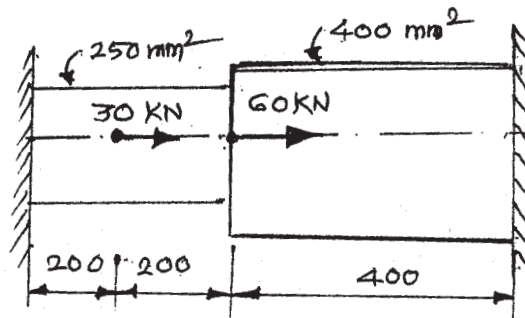


Fig 10

- Q11)** Write short notes on: [16]
- Mesh generation.
  - Functions and phases in FEA software.

OR

- Q12)** Write short notes on: [16]
- Mesh generation techniques.
  - Solving a design problem using a FEA Package.





Total No. of Questions : 12]

SEAT No. :

P3326

[Total No. of Pages :2

[4759]-149

**B.E. (Production) (Semester - II)**

**WORLD CLASS MANUFACTURING (Elective - IV)**

**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION -I**

- Q1)** a) What do you understand from word manufacturing excellence? [8]  
b) Explain Hall's frame work. [8]

OR

- Q2)** a) Discuss Schonberger's WCM model. [8]  
b) Explain merits & demerits of Maskeel's WCM model. [8]

- Q3)** a) How will you use value stream mapping in WCM? [8]  
b) What is value added manufacturing? Explain in detail. [8]

OR

- Q4)** a) Explain principles of Toyota Production System. [8]  
b) What is bench marking? [8]

- Q5)** a) Explain lean production systems. [8]  
b) Discuss 5S in detail? [10]

OR

- Q6)** Write short notes on following. [18]  
i) Poka Yoke  
ii) TPM  
iii) WCM store practices

**P.T.O.**

**SECTION - II**

**Q7)** a) How Human Resource department of WCM organization is different from conventional organization? [8]

b) Write short note on "people are used as problem solver in WCM. [8]

OR

**Q8)** a) Explain Features of WCM training. [8]

b) Discuss motivation and reward techniques of world class organization. [8]

**Q9)** a) Discuss features of modern performance system. [8]

b) Explain AMBIT tool of performance measurement. [8]

OR

**Q10)**a) Write short note on "POP system". [8]

b) Write TOPP system of WCM performance? [8]

**Q11)**a) Describe any one case study of any Indian company related to WCM? [8]

b) What is clean manufacturing? Explain its importance in manufacturing. [10]

OR

**Q12)**a) What is green manufacturing? Discuss in detail. [8]

b) Write short note on 'agile manufacturing'. [10]



Total No. of Questions : 12]

SEAT No. :

**P1515**

**[4759] - 15**

[Total No. of Pages :4

**B.E. (Civil)**

**TRANSPORTATION ENGINEERING - II**

**(2008 Pattern) (Semester -II)**

*Time :3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section -I & Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 2) *Answers to the two Sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollies charts, electronics pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Neat diagrams must be drawn wherever necessary.*

**SECTION - I**

- Q1) a)** What are the various methods of classification of roads? Briefly outline the classification based on location and function as per Nagpur road plan. **[6]**
- b) Discuss the Second Twenty year Road development plan of 1961-1981 and its salient features. **[4]**
- c) Explain in brief the Following: **[6]**
- i) Traffic Volume Survey
  - ii) Origin and Destination study

OR

- Q2) a)** Briefly explain the requirements of an Ideal alignment. **[6]**
- b) Explain in brief the Engineering Surveys needed for Highway Location. **[6]**
- c) Write a short note on Traffic signs. **[4]**
- Q3) a)** Draw a Typical cross section of National Highway in Embankment. **[4]**

**P.T.O.**

- b) Define Stopping Sight Distance. Determine the stopping sight distance for a vehicle moving with the design speed of 80 Km/h for Two way traffic on a two lane road. Assume suitable data as per IRC recommendations. [6]
- c) Define Camber. What are the objects of providing camber. Discuss the effects of shape of camber. [6]

OR

- Q4)** a) Derive an expression for finding the Extra widening on horizontal curves. [6]
- b) What are the objects of providing Transition curves on the horizontal highway alignment. [4]
- c) Write a short note on PIEV theory. [6]
- Q5)** a) Explain in brief the Laboratory procedure of determining Impact Value of road aggregate. [6]
- b) Draw a neat labeled cross section of Flexible and Rigid pavement. [6]
- c) The CBR value of Subgrade soil is 5%, calculate total thickness of pavement using design formula developed by the U.S. Corps of Engineers. Assume Wheel load = 4100 Kg and Tyre Pressure = 6 Kg/cm<sup>2</sup>. [6]

OR

- Q6)** a) Explain in brief the Laboratory procedure of determining Grade of Bitumen. [6]
- b) Write a short note on types of joints in Rigid Pavement. [6]
- c) Calculate the radius of relative stiffness and Equivalent Radius of Resisting section using following Data: Wheel Load = 5100 kg, Pavement thickness = 18cm, Poisson's ratio = 0.15, Modulus of Subgrade reaction = 6.0 Kg/cm<sup>3</sup>, Modulus of Elasticity of Cement Concrete =  $3.0 \times 10^5$ , Radius of contact area = 15 cm. [3+3]

## SECTION- II

- Q7)** a) Explain in brief the following: [6]
- i) Minimum Circling radius
  - ii) Apron and Taxiway
- b) Discuss types of survey to be carried out for site selection of an Airport? [4]
- c) Write a short note on Wind Rose Diagram and its importance. [6]

OR

- Q8)** a) Explain with the help of a sketch, three controls for Rolling, Pitching and Yawing Movements of a Aeroplane. [6]
- b) State the advantages and disadvantages of air Transportation. [5]
- c) What is meant by Basic Runway length. Discuss the corrections that are to be applied for determining Basic runway length. [5]
- Q9)** a) A bridge needs to be constructed across an Alluvial stream having discharge of  $300\text{m}^3/\text{sec}$ . Calculate the depth of maximum scour when the bridge consists of: [6]
- i) Two spans of 35m each, and
  - ii) Three spans of 30m each

Assume the value of silt factor = 1.1.

- b) Derive an Equation for economic span of the Bridge. Also state the assumptions. [6]
- c) Write a short note on Scour Depth. [4]

OR

- Q10)** a) Define Bridge. State the various points to be considered while selecting an Ideal Bridge site location. [4]

- b) The catchment area of stream is of sandy soil with thick vegetation cover and the area of catchment is 5000 hectares. The length of the catchment is 20Km and the fall in level from the critical point to the bridge site is 150m. Calculate the peak runoff for designing the bridge if the severest storm recorded yields 20Cm of rain in 5 hours. Assume coefficient to account for losses due to absorption = 0.10 and coefficient to account for distribution of rainfall in space = 0.77. [6]
- c) Define the following terms: [6]
- i) Afflux
  - ii) Free Board
  - iii) Scour Depth

- Q11)**a) Define Pier. State the requirements of good Pier. [6]
- b) Why Bearings are provided in bridges. Explain in brief the Roller type of bearing. [6]
- c) Write a short note on Erection and Maintenance of Bridges. [6]

OR

- Q12)**a) How will you account for the following in the design of Highway Bridge. [6]
- i) Live Load
  - ii) Dead Load
  - iii) Buoyancy
- b) Explain in brief the various types of Culverts. [6]
- c) Explain in brief the necessity of Movable Span bridges. Also state the various types of Movable Span bridges. [6]



Total No. of Questions : 12]

SEAT No. :

**P2013**

**[4759] - 150**

[Total No. of Pages :4

**B.E. (Production)**

**INTELLIGENT MANUFACTURING SYSTEMS**

**(2008 Course) (Elective - IV) (411090) (Semester - II)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any Three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Define CIM and its components. Explain how it can be implemented in the automation of the production organization. **[8]**
- b) Define the term “feature.” Classify the manufacturing features. What are the advantages of feature-based modeling in manufacturing applications? **[8]**

OR

- Q2)** a) Discuss the role of CAD/CAM systems in the manufacturing facility. Describe briefly the CAM cycle in a feature - based design environment. **[8]**
- b) What is the purpose of process planning? Why is Computer Aided Process Planning (CAPP) useful in manufacturing? Discuss some of the benefits of CAPP. **[8]**
- Q3)** a) Develop a taxonomy of the pioneering works in artificial intelligence and expert systems? **[8]**
- b) Discuss briefly on ‘Computationally Intelligent Systems’. Explain different building blocks of computationally Intelligent Systems. **[8]**

OR

**P.T.O.**

- Q4)** a) Define ‘Artificial Intelligence’. List with reasons the ten most important manufacturing problems suitable for expert system applications. [8]
- b) Discuss the differences between ‘knowledge’ and ‘ignorance’ with respect to artificial intelligence applications. Does having “knowledge” imply having “intelligence”. [8]
- Q5)** a) Discuss the basic differences between a knowledge base and a data base? Why is the user interface an important consideration in expert system? [9]
- b) Develop an integrative solution model that links abstraction, construction and validation requirements of an expert system problem. [9]

OR

- Q6)** a) Discuss the differences between declarative knowledge and procedural knowledge. Outline how a knowledge engineer acquire declarative knowledge and procedural knowledge. [9]
- b) Explain the following with an example. [9]
- i) Inductive and deductive reasoning
  - ii) Breadth - First search
  - iii) Depth - First search

## SECTION - II

- Q7)** a) What is ‘Machine Learning’? Explain with an example how neural Networks are useful in Machine Learning? [8]
- b) What is conceptual learning? List and characterize the basic concept learning strategies. [8]

OR

- Q8)** a) What is an artificial neuron? Discuss the basic equation associated with a neuron? [8]
- b) Discuss the differences between “Representation” and “Learning” in neural networks. Explain in brief the computational complexity of learning? [8]



- Q9) a)** What is knowledge Based Group Technology (KBGT)? Explain with a neat diagram the structure of KBGT? [8]
- b) Discuss in detail the classification and cluster analysis approaches to Group Technology? [10]

OR

- Q10)a)** What are the typical constraints in the group technology problem in automated manufacturing systems? [8]
- b) Consider the following machine - part incidence matrix. Determine mutually separable machine cells and part families using Rank Order clustering Algorithm. [10]

		Part Number									
		1	2	3	4	5	6	7	8		
A =	1		1	1		1					Machine Number
	2	1					1				
	3				1				1		
	4	1						1			
	5			1		1				1	
	6				1						
	7		1	1		1				1	

- Q11)a)** Consider the following formation of an expert system team:

Individual	Role
Domain expert	Source of knowledge
Knowledge Engineer	Channel for knowledge transfer
Management	Source of resources
AI sponsor	Source of motivation
Systems personnel	Integration
Users	Supply of application

Suggest how the rules of the various individuals can be coordinated to facilitate an effective end product. [8]

- b) What are the organizational problems that can evolve from the rapid introduction of expert systems technology? [8]

OR

**Q12)** Explain with examples the role of Artificial Intelligence in the following areas : [16]

- a) Process Planning  
b) Facility Planning



Total No. of Questions : 12]

SEAT No. :

P3327

[Total No. of Pages :2

[4759]-151

**B.E. (Production) (Semester - II)**

**TOTAL QUALITY MANAGEMENT (Elective - IV)**

**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a) Explain various dimensions of quality. [10]**

b) Discuss Different types of barriers in TQM Implementations. [8]

OR

**Q2) a) Explain relation of quality and cost, quality and market share, quality and price. [10]**

b) Explain basic concepts of TQM. [8]

**Q3) a) Explain Deming's 14 points for Top Management. [8]**

b) Explain concept of PDCA cycle. [8]

OR

**Q4) a) Explain principle of 5S. [8]**

b) Explain Crosby's 14-point programme. [8]

**Q5) a) Explain Ishikawa's seven quality tools. [8]**

b) Explain concept of TPM. [8]

OR

**Q6) a) Explain concept of FMEA. [8]**

b) Discuss benefits of QFD in TQM Implementation. [8]

***P.T.O.***

**SECTION -II**

- Q7)** a) Explain various types of failures. [10]  
b) Explain three Practical approaches to increase the reliability. [8]

OR

- Q8)** a) Thirty air-conditioners designed for use in space shuttle were operated for 1000 hours in a test facility. Three of airconditioners failed during the test one after 300 hours and the after 500 hours. Compute the failure rate and mean time between failure. [10]  
b) A circuit board has four components A,B,C and D having reliability of 0.980. 0.992. 0.850 and 0.970. What is the reliability of circuit board? To increase reliability of circuit board, a component C is redesigned and improved reliability for component C is 0.985. Compute the system reliability after improvement. Also compute system reliability, if circuit board is modified and component C is placed with a back up component to work automatically when primary component fails. [8]

- Q9)** a) Discuss stages of Audit. [8]  
b) Explain importance of cross functional teams. [8]

OR

- Q10)**a) Explain concept of six sigma. [8]  
b) Discuss importance of Auditor ethics. [8]

- Q11)**a) What are the expectations in ISO 14001 from organization? [8]  
b) Explain ISO/TS16949:2002 for Automobile Industry. [8]

OR

- Q12)** Write short notes on the following : [16]  
i) Objectives of CMMI.  
ii) Procedure of ISO certification.



Total No. of Questions : 12]

SEAT No. :

**P3697**

**[4759] - 153**

[Total No. of Pages :8

**B.E. (Production S/W)**

**OPERATIONS RESEARCH AND MANAGEMENT**

**(2008 Course) (Semester - I) (411121)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right indicate full marks.*
- 4) *Assume suitable data wherever necessary.*

**SECTION - I**

**Q1) a)** Maximize  $Z = 12x_1 + 15x_2 + 14x_3$

Subject to the constraints

$$-x_1 + x_2 \leq 0$$

$$-x_2 + 2x_3 \leq 0$$

$$x_1 + x_2 + x_3 \leq 100$$

$$x_1 \text{ unrestricted; } x_2, x_3 \geq 0.$$

**[8]**

b) Solve using, two phase simplex method

Maximize  $Z = 5x_1 + 8x_2$

Subject to the constraints

$$3x_1 + 2x_2 \geq 3$$

$$x_1 + 4x_2 \geq 4$$

$$x_1 + x_2 \leq 5$$

$$x_1, x_2 \geq 0.$$

**[10]**

OR

*P.T.O.*

**Q2) a)** Minimize  $Z = x_1 - 3x_2 + 2x_3$

Subject to the constraints

$$3x_1 - x_2 + 2x_3 \leq 7$$

$$-2x_1 + 4x_2 \leq 12$$

$$-4x_1 + 3x_2 + 8x_3 \leq 10$$

$$x_1, x_2, x_3 \geq 0.$$

[8]

b) Solve using, Big M method

$$\text{Maximize } Z = 3x_1 - x_2$$

Subject to the constraints

$$2x_1 + x_2 \geq 2$$

$$x_1 + 3x_2 \leq 3$$

$$x_2 \leq 4$$

$$x_1, x_2 \geq 0.$$

[10]

**Q3) a)** Solve the following transportation problem.

[8]

	X	Y	Z	Availability
A	8	7	3	60
B	3	8	9	70
C	11	3	5	80
Demand	50	80	80	

b) Solve the travelling salesman problem with the following cost matrix.[8]

		Cities			
		A	B	C	D
Cities	A	$\infty$	46	16	40
	B	41	$\infty$	50	40
	C	82	32	$\infty$	60
	D	40	40	36	$\infty$

OR

**Q4) a)** Solve the following transportation problem by VAM. **[8]**

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	Supply
A	2	7	4	5
B	3	3	1	8
C	5	4	7	7
D	1	6	2	14
Demand	77	9	18	

**b)** A company has 4 salesman A, B, C & D. These salesmen are to be allotted 4 districts 1, 2, 3 & 4. The estimated profit per day for each salesman in each district is given in the following table: **[8]**

	1	2	3	4
A	16	10	14	11
B	14	11	15	15
C	15	15	13	12
D	13	12	14	15

What is the optimal assignment which will yield maximum profit?

**Q5) a)** A manufacturing company processes 6 different jobs on two machines A & B. Number of units of each job and its processing times on A & B are given in table. Find the optimal sequence, the total minimum elapsed time and idle time for each machine. **[8]**

Job No.	No. of units of each Job	Processing Time	
		Machine A (minutes)	Machine B (minutes)
1	3	5	8
2	4	16	7
3	2	6	11
4	5	3	5
5	2	9	7.5
6	3	6	14

- b) Compare demand rate uniform and production rate infinite with demand rate non uniform and production rate infinite of inventory models with deterministic demand. [8]

OR

- Q6)** a) A machine operator has to perform three operations, turning, threading and knurling on a number of different jobs. The time required to perform these operations (in minutes) for each job is known. Determine the order in which the jobs should be processed in order to minimize the total time required to turn out all the jobs. [8]
- b) A particular item has a demand of 9000 units/year. The cost of one procurement is Rs. 100 and the holding cost per unit is Rs. 2.40 per year. The replacement is instantaneous and no shortage are allowed. Determine: [8]
- The economic lot size.
  - The number of orders per year.
  - The time between orders.
  - The total cost per year if the cost of one unit is Rs. 1.

**SECTION - II**

- Q7)** a) On average 96 patients per 24 hour day require the service of an emergency clinic. Also on average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average servicing time of 10 min. and that each minute of decrease in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from  $1\frac{1}{3}$  patients to  $\frac{1}{2}$  patient? [8]
- b) Solve the following game: [8]

	$B_1$	$B_2$	$B_3$
$A_1$	1	7	2
$A_2$	0	2	7
$A_3$	5	1	6

OR



**Q8) a)** Workers come to tool store room to receive special tools (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attendant) is 40 seconds. Determine: **[8]**

- i) Average queue length.
- ii) Average length of non empty queues.
- iii) Average number of workers in system including the worker being attended.
- iv) mean waiting time of an arrival.
- v) average waiting time of an arrival (worker) who waits.
- vi) The type of policy is to be established. In other words, determine whether to go in for an additional tool store room attendant which will minimize the combined cost of attendants idle time and the cost of workers waiting time. Assume the charges of a skilled worker Rs. 4 per hour and that of tool room attendant Rs. 0.75 per hour.

**b)** Solve the following game: **[8]**

	$B_1$	$B_2$	$B_3$	$B_4$
$A_1$	3	2	4	0
$A_2$	3	4	2	4
$A_3$	4	2	4	0
$A_4$	0	4	0	8

**Q9) a)** At a sales depot the arrival of customers and the service times follow the following probability distributions. **[8]**

Arrival Time (minutes)	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Probability	0.02	0.06	0.10	0.25	0.20	0.14	0.10	0.07	0.04	0.02

Service Time (minutes)	0.5	1	1.5	2	2.5	3
Probability	0.12	0.21	0.36	0.19	0.07	0.05

Estimate the average waiting time and percentage of idle time of the server, by simulation for 10 arrivals.

- b) Machine A costs Rs. 45,000 and the running cost is Rs. 1000 for the first year increasing by Rs. 10000 per year afterwards. Another machine B costs Rs. 50,000 and operating cost is Rs. 2000 for the first year increasing by Rs. 4000 per year subsequently. If we have machine A now, should we replace it with B? If so find the best time for replacement. [8]

OR

- Q10)a)** A tourist car company finds that during the past 200 days the demand for the car has the following frequency distribution. [8]

Service Time (minutes)	0	1	2	3	4	5
Probability	16	24	30	60	40	30

Using random numbers simulate the demand for a period of 10 weeks.

- b) The probability distribution of the failure time of a certain type of electric bulb is given below: [8]

Week	1	2	3	4	5	6	7	8
Prob. Of Failure	0.05	0.13	0.25	0.43	0.68	0.88	0.96	1.0

The cost of individual replacement is Rs. 4 per bulb. The cost of group replacement is Rs. 1 per bulb. If there are 1000 bulbs in use find the optimal replacement policy under

- i) Individual replacement
- ii) group replacement.

- Q11)a)** A company plans the following activities promoting its business. [8]

Activity	Description	Time (weeks)	Preceding activity
A	Organize sales office	6	-
B	Hire salesman	4	A
C	Train salesman	7	B
D	Select advertising agency	2	A
E	Plan advertising campaign	4	D
F	Conduct campaign	10	E
G	Design package	2	-
H	Set up packing facilities	10	G

I	Packing initial stocks	6	H, J
J	Place order with manufacturer	13	-
K	Select distributors	9	A
L	Sell to distributors	3	C, K
M	Transport the stock	5	I, L

- i) Draw the network diagram.
  - ii) Determine the critical path.
  - iii) Find the total float, free float and the independent float of the activities.
- b) A small project is composed of 7 activities whose time estimates are listed in the table below: **[10]**

Activity	1-2	1-3	1-4	2-5	3-5	4-6	5-6
Optimistic time estimate	1	1	2	1	2	2	3
Most likely time estimate	1	4	2	1	5	5	6
Pessimistic time estimate	7	7	8	1	14	8	15

- i) Draw the project network and identify all the paths through it.
- ii) Find the expected duration and variance.
- iii) What is the expected project length?
- iv) Calculate the variance and standard deviation of project length.
- v) What is the probability that the project will be completed at least three weeks earlier than expected? No more than 3 weeks later than expected?
- vi) If the project due date is 18 weeks, what is the probability of not meeting the due date?
- vii) What due date has about 90% chance of being met?

OR

**Q12)a)** The utility data for a network is given below. The activity durations are in weeks and the cost in rupees. The indirect cost per day is Rs. 1000 per week. Determine the optimum project schedule. **[12]**

Activity	Normal		Crash	
	Time (days)	Direct Cost (Rs.)	Time (days)	Direct Cost (Rs.)
1-2	8	7000	3	10000
1-3	4	6000	2	8000
2-3	0	0	0	0
2-5	6	9000	1	11500
3-4	7	2500	5	3000
4-6	12	10000	8	16000
5-6	15	12000	10	16000
5-7	7	12000	6	14000
6-8	5	10000	5	10000
7-8	14	6000	7	7400
7-9	8	6000	5	12000
8-9	6	6000	4	7800

b) Define the terms:

**[6]**

- i) Dummy Activity
- ii) Looping
- iii) Activity On Node (AON) diagram



Total No. of Questions : 12]

SEAT No. :

**P1426**

**[4759] - 154**

[Total No. of Pages : 3

**B.E. (Production S/W)  
MECHATRONICS AND ROBOTICS  
( 2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from Section - I and any three questions from Section -II.*
- 2) *Answers to the two sections should be written in Separate answer-books.*
- 3) *Use of calculator is allowed.*
- 4) *Figures to the right indicate full marks.*
- 5) *Answer one question from 1&2, 3&4, 5&6, 7&8, 9&10, 11&12.*

**SECTION - I**

**Q1)** Define Mechatronics. Explain the mechatronics system used in Automatic Transmission system of Typical Luxury Car. **[18]**

OR

**Q2)** Explain the following (Any 3) **[18]**

- a) First Order System
- b) ADC-DAC Converter
- c) Data Acquisition System used in CNC Machine (DAQ)
- d) Signal conditioning

**Q3)** a) With neat sketch explain the elements of microcontroller along with example. **[8]**

b) Draw the architecture of 8085 microprocessor. **[8]**

OR

**Q4)** a) Explain TTL & CMOS circuits. **[6]**

b) Explain the different addressing modes of 8085. **[6]**

c) Application of Microprocessor in Manufacturing Industry. **[4]**

**P.T.O.**

- Q5)** a) Explain Various Commands used in Assembly language. [8]  
b) Write an assembly language programme to adding of 1 to 100 numbers. [8]

OR

- Q6)** a) What is interfacing & explain any two types of interfacing. [8]  
b) Explain Handshaking and buffer along with example. [8]

### **SECTION - II**

- Q7)** a) What is a PLC? Explain the basic structure of PLC with block diagram. [8]  
b) Explain criteria for selection of PLC & specification of PLC. [8]

OR

- Q8)** Draw the PLC ladder logic diagram for fully automatic Machine. [16]

- Q9)** a) Write a short note on Steeper motors. [8]  
b) State & Explain sensors used to measure following. [8]  
i) Vision system for robot  
ii) Climate Control System in Air Conditioner

OR

- Q10)** Explain the following (Any 3) [16]

- a) Role FEM in Gripper Design  
b) Fragile Type of Gripper  
c) Electrical actuators  
d) MOSFET

- Q11)** a) Define Robot & List Types of Robot and Explain any one. [10]  
b) Explain difference between Intelligent robot and Highly Intelligent. [8]

OR

**Q12)** Write a Short note on the following. [18]

- a) Dynamic Properties of Robot.  
b) Obstacle Avoidance Technology used in Robotics  
c) Applications of Robot in Casting Industry.



Total No. of Questions : 12]

SEAT No. :

**P1427**

**[4759] - 155**

[Total No. of Pages : 3

**B.E. (Production Sandwich)  
ADVANCED PRODUCTION TECHNOLOGY  
( 2008 Course) (Semester - I) (411123)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Discuss the process parameters for High speed machining. For which materials this process is adopted? State its benefits. [8]
- b) Compare dry & near dry machining operation. [8]

OR

- Q2)** a) Explain in process of Hard turning. Where it is used? [8]
- b) Explain the set-up for near dry machining process. State advantages and limitations. [8]

- Q3)** a) Explain Magnetic float polishing (MFP) process and its applications. [8]
- b) Explain the use of nano-metrology in ultra-precision measurement. [8]

OR

- Q4)** a) Explain Abrasive flow machining. State merits and demerits of the same. [8]
- b) Explain basic aspects of Nano-manufacturing. Give examples of nano-products. [8]

**P.T.O.**



- Q5)** a) Explain computer aided inspection and quality control in automated industry. [10]  
b) Explain Enterprise Resource Planning. [8]

OR

- Q6)** Write a short notes on (Any Two): [18]  
a) Optiz coding and classification system.  
b) Rapid Prototyping.  
c) Rank order clustering

### SECTION - II

- Q7)** a) Explain the elements of Toyota Production System. [8]  
b) Explain material handling using robots in automated assembly line. [8]

OR

- Q8)** a) Explain the types of Automated Guided Vehicles and explain the guidance technologies used for AGVS. [8]  
b) Explain vibratory bowl feeders and hopper feeders. [8]

- Q9)** a) A vane pump has a rotor diameter of 50mm. A cam ring diameter of 75mm and a vane width of 50mm. The eccentricity is 8mm. Calculate the volumetric efficiency, if the pump has an actual flow of 110 lpm at 1500 rpm and rated pressure. [8]  
b) Explain the types of filters used in hydraulic system and state the sources of contamination. [8]

OR

- Q10)**a) Explain with suitable sketch any two of following: [8]  
i) 4/3 Directional Control Valve  
ii) 3/2 Directional Control Valve  
iii) Pilot operated Check Valve  
b) Explain the assembly fitting of double acting cylinder with a neat sketch.[8]

- Q11)a)** Explain with neat sketch Meter-in circuit and Meter-out circuit. [9]
- b) A pneumatic cylinder is needed to press-fit a pin to a hole. Design a circuit diagram with a pre-condition that while actuating, both the hands of operator should be engaged. [9]

OR

- Q12)a)** Explain the sequential circuit using clamping and drilling operation in industrial application. [9]
- b) Classify Accumulators. [9]

A ballast type accumulator with a cross section diameter of 0.30 m generates a constant pressure of 100 bars. Determine the weight of ballast used. What should be the stroke length to have a capacity of 200 Liters?



Total No. of Questions : 6]

SEAT No. :

**P3891**

[Total No. of Pages : 2

[4759] - 156

**B.E. (Production Sandwich) (Elective - I)**

**MACHINE TOOL DESIGN**

**(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*

**SECTION - I**

**Q1)** a) Explain the types of motor for the drive. [8]

b) Explain the procedure for designing speed gear box. [8]

OR

a) Explain design considerations for stepless drive.

b) Write a note on principle of self locking.

**Q2)** a) Explain the concept Static and Dynamic stiffness. [8]

b) Write the design considerations for housing structure. [8]

OR

a) Explain the function of machine tool structure and their requirements.

b) Explain design procedure for column. Also explain the commonly used sections and their applications.

**Q3)** a) Draw and explain the different shapes of Slideways. [8]

b) Explain the methods of Adjoining clearance in slideways. [10]

OR

Write the features of power screws and Explain a design of sliding friction power screws

**P.T.O.**

**SECTION - II**

- Q4)** a) Explain the methods of preloading ball bearing. [8]  
b) Explain the function of spindle unit and also the requirements. [8]

OR

Explain the types of Air- lubricated bearings with neat sketch

- Q5)** Explain the Kudinov's Dynamic cutting forces Expression. [16]

OR

Write a generalized model of Dynamic Cutting Forces

- Q6)** a) Explain design consideration for Special Purpose machines. [9]  
b) Explain recent trends in machine tools. [9]

OR

- a) Explain design consideration for Computerized Numerical Control.  
b) Explain layout of Vertical Milling Machine.



Total No. of Questions : 12]

SEAT No. :

**P1428**

**[4759]-157**

[Total No. of Pages : 3

**B.E. (Production Sandwich)  
AUTOMOBILE ENGINEERING**

**(2008 Course) (Semester - I) (Elective -I) (411124)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) List various types of frame and describe in brief the conventional frame. **[8]**
- b) Explain the working of simple carburetor. **[8]**
- c) What do you mean by “Chassis” in automobile? **[2]**

OR

- Q2)** a) Explain the difference between Two and Four Stroke Engines. **[8]**
- b) Explain various types of fuel flow system. **[8]**
- c) What do you mean by articulated vehicle? **[2]**
- Q3)** a) Explain in detail the components used in water cooling system with neat diagram. **[10]**
- b) What is the optimum cooling? Explain. **[6]**

OR

**P.T.O.**

**Q4)** a) What is the effect of inadequate cooling and overheating of engine parts? [8]

b) What is pump circulation system? Explain. [8]

**Q5)** a) Explain Battery ignition system. [8]

b) List out the various tests performed on lubricants. [8]

OR

**Q6)** a) What are the requirements of good ignition system? [8]

b) What are the different types of lubricant? [8]

### **SECTION - II**

**Q7)** a) Explain the operation of an epicyclic gear box. [8]

b) Explain the working of differential with the help of Diagram. [8]

c) Why is clutch pedal “free play” important? [2]

OR

**Q8)** a) With the help of neat sketch, explain the construction and operation of sliding mesh gear box. [12]

b) What is meant by double declutching? Explain? [6]

**Q9)** a) Discuss the advantages of Independent suspension over dependent suspension. [8]

b) Sketch and explain Ackermann steering mechanism. [8]

OR

**Q10)a)** What are the advantages and disadvantages of rubber spring? [8]

b) What are the components of the steering system? [8]

**Q11)a)** Write short note on [10]

i) Vacuum brake

ii) Air brake

iii) Caliper

iv) Parking brake

b) What is mean by servicing? And explain different types of servicing. [6]

OR

**Q12)** Give the troubleshooting chart for following with its complaint, cause and remedy [16]

a) Gear Box

b) Cooling system

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1429**

**[4759]-158**

[Total No. of Pages : 3

**B.E. (Production Sandwich)**  
**COMPUTER INTEGRATED MANUFACTURING AND**  
**INDUSTRIAL ROBOTICS**  
**(2008 Course) (Semester - I) (411124) (Elective -I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any three questions from section I and any three questions from section II.*
- 2) *Answers to the two sections should be written in separate answer- books.*
- 3) *Use of calculator is allowed.*
- 4) *Figures to the right indicate full marks.*
- 5) *Answer one question from 1 & 2, 3 & 4, 5& 6, 7 & 8, 9 & 10, 11 & 12.*

**SECTION - I**

- Q1)** a) List out the different models used in CIM? Draw the neat sketch of IBM models and compare with various models? **[12]**
- b) Explain development models in CIM. **[4]**

OR

- Q2)** a) Explain the Recent Trends in Rapid Prototyping along with example. **[8]**
- b) Explain the following in detail. **[8]**
- i) Concept of Solid ground curing.
  - ii) Application Rapid tooling methods to press tool manufacturer.
- Q3)** a) Explain the basic Anatomy of Robotics. **[8]**
- b) Derive the equation of Kinematics using Homogeneous Transformation. **[8]**

OR

**P.T.O.**



**Q4) a)** Explain the Principle of Denavit-Hartenberg's convention for dynamics. Analysis of joints along with suitable example. [12]

b) Explain the concept of Spatial mechanism. [4]

**Q5) a)** Explain the Hybrid drives used in Robotics. [6]

b) Using a schematics diagram represent a hydraulic circuit to explain the drives system of bang-bang robot having waist motion. Shoulder and Arm expansion respectively. [12]

OR

**Q6) a)** Explain different types of actuators used in typical Robot along with sketch. [10]

b) Write a short note on power transmission system in Robotics. [4]

c) Explain the concept of basics motion system. [4]

### SECTION - II

**Q7) a)** Classify the various types Grippers used in Robotics. [8]

b) A 7.5 kg rectangular block is gripped in the middle and lifted vertically at velocity 2.87 m/s. If it accelerates to this velocity at  $27.5 \text{ m/s}^2$  and the coefficient of friction between the gripping pad and block is 0.48. Calculate minimum force that would prevent slippage. [8]

OR

**Q8) a)** Explain concept finite element analysis in grippers designs for special type of gripper. [8]

b) Write a short note on design consideration for gripper design. [8]

**Q9) a)** What are the different types of sensors used in Robotics? Classify. [8]

- b) Distinguish between tactile sensor and non Tactile sensors. [4]
- c) What do you mean by range sensors and proximity sensors? [4]

OR

- Q10)**a) What is robot vision? What are the types of vision sensors used to take the Image of an object? [8]
- b) Explain important technique use in robot vision system. [8]
    - i) Thresholding
    - ii) Region growing
    - iii) Edge detection
    - iv) Template matching

- Q11)**a) Explain along with sketch the application Robot in the following area.[12]
- i) Foundry
  - ii) Chemical Industry
  - iii) In medical field
- b) Explain the application of Robot in Mining Industry detail. [6]

OR

- Q12)**Write a short note on following: [18]
- a) Modular Design concept in Robotics.
  - b) Obstacles avoidance technique in robotics.
  - c) VAL Languages used for programming in robot.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P3892**

[Total No. of Pages : 2

[4759] - 159

**B.E. (Production Engineering - S/W) (Semester - I)**

**PLASTIC ENGINEERING**

**(2008 Pattern) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

**Unit - I**

- Q1)** a) Explain condensation of polymerization with an example. [9]  
b) Discuss commonly used additives in plastic. [9]

OR

- Q2)** a) Explain about the commonly used alloys in plastic. [9]  
b) Explain the types of polymerization. [9]

**Unit - II**

- Q3)** a) Explain injection moulding consideration. [8]  
b) Explain importance of register ring, sprue bush, cavity & core inserts. [8]

OR

- Q4)** a) Explain Injection moulding cycle. [8]  
b) Write a short notes on mould ability features and ejection of moulds. [8]

**Unit - III**

- Q5)** a) Discuss extrusion costing & lamination with suitable sketches. [8]  
b) Explain vented barrel extruder. [8]

OR

- Q6)** a) Discuss Coextrusion of films and sheets. [8]  
b) Discuss extrusion problems & extruder performance. [8]

***P.T.O.***

**SECTION - II**

**Unit - IV**

- Q7)** a) Explain basic principles of blow moulding. [9]  
b) Discuss types of blow moulding. [9]

OR

- Q8)** a) Compare injection & extrusion blow moulding. [9]  
b) Explain stretch blow moulding. [9]

**Unit - V**

- Q9)** a) Discuss problems in thermoforming. [8]  
b) Explain thermoforming processes with a suitable sketch. [8]

OR

- Q10)** a) Explain vacuum forming with suitable sketches. [8]  
b) Discuss about the various factors which affects the thermoforming process. [8]

**Unit - VI**

- Q11)** a) Explain tapping and trading process used for finishing and machining of plastics. [8]  
b) Discuss guide lines for tool geometry. [8]

OR

- Q12)** a) Discuss turning and milling of thermosetting and thermoplastic. [8]  
b) Discuss machining of plastic. [8]



Total No. of Questions : 6]

SEAT No. :

P3322

[Total No. of Pages :2

**[4759]-16**  
**B.E. (Civil)**  
**ADVANCED STRUCTURAL DESIGN**  
**(2008 Pattern) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any two questions from Section I and two questions from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures in bold to the right, indicate full marks.*
- 4) *If necessary, assume suitable data and indicate clearly.*
- 5) *IS 800, 801,811, 456, 1893 and Steel Table are permitted in the examination.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION -I**

- Q1)** a) Explain the design procedure for a simply supported beam subjected to a uniformly distributed load using cold form light gauge steel. **[10]**
- b) A light gauge steel rectangular box section  $180 \text{ mm} \times 90 \text{ mm} \times 2 \text{ mm}$  is used as a column. The effective length of the column is 2.6 m. Determine the safe load capacity of the section. **[15]**

- Q2)** A castellated beam with hexagonal openings is to be designed for a simply supported span of 12 m. The provisions of ducts restrict the spacing of openings at 350 mm c/c. The total load imposed on the beam is 6kN/m. Design the beam. **[25]**

- Q3)** Analyze the gable frame shown in Fig. 1 and design member BC. Take  $W = 25\text{kN}$ . **[25]**

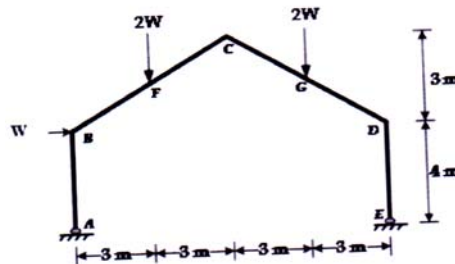


Fig.-1

**P.T.O.**

## SECTION - II

- Q4)** a) Write a note on the methods available for the analysis of flat slabs. [5]  
b) Design an interior panel of a flat slab of size  $4\text{ m} \times 4\text{ m}$ . The flat slab is to be provided with a drop. The slab is supported on circular columns of size 350 mm diameters. The imposed load on the slab is  $5\text{ kN/m}^2$ . Use M 25 grade of concrete and Fe 415 grade of steel. Sketch the details of reinforcement. [20]

- Q5)** Design a grid slab of size  $9\text{ m} \times 6\text{ m}$ . The imposed load on the slab is  $4\text{ kN/m}^2$ . Use M 25 grade of concrete and Fe 415 grade of steel. Sketch the details of reinforcement. [25]

- Q6)** a) Write a note on hydrodynamic forces in tanks. [5]  
b) An elevated water tank is 10 m in diameter and 5 m high. The depth of water is 4.70 m. It is supported on a concrete staging of 8 columns located on the circumference of a circle of 8 m diameter. The height of the staging is 16 m and horizontal bracing is provided at a vertical spacing of 4 m. The circular columns are 500 mm in diameter. Steel bars of 25 mm diameter are provided as diagonal bracing in all the bays as shown in Fig.2. The structure is located in Zone III and founded on Type III type of soil. The weight of the empty tank may be taken as 2000 kN. Obtain the equivalent stiffness for the staging. Also, obtain the base shear for  
i) tank full, and  
ii) tank empty condition.

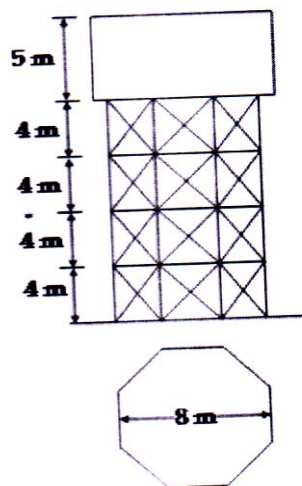


Fig. 2



Total No. of Questions : 12]

SEAT No. :

**P1430**

**[4759] - 160**

[Total No. of Pages :3

**B.E. (Production Sandwich Engineering)  
ERGONOMICS AND HUMAN FACTORS IN ENGINEERING  
( 2008 Course) (Semester - I) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer any three questions from each section.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right side indicate full marks.*
- 5) Use of Calculator is allowed.*
- 6) Assume suitable data if necessary.*

**SECTION - I**

- Q1) a)** Describe gross body and local muscular activity in relation with ergonomics. **[10]**
- b) How does work load and work efficiency have an impact on ergonomics issues. **[8]**

OR

- Q2) a)** Write a note on strength and endurance. **[8]**
- b) What is biomechanics? Explain in brief. **[6]**
- c) Describe work rest cycle in brief. **[4]**

- Q3) a)** Differentiate between work surface height and working height. **[8]**
- b) Describe how is workspace envelope for standing personnel designed with ergonomics perspective. **[8]**

OR

**P.T.O.**

- Q4)** a) Discuss the various principles of seat design. [8]  
b) Discuss any four principles of arranging components in physical space. [8]

- Q5)** a) Discuss the types of information that is processed with visual displays. [8]  
b) Describe auditory displays? Discuss in brief. [8]

OR

- Q6)** a) What is C/R Ratio? How to decide optimum C/R ratio? [8]  
b) Describe the concept of visibility. [8]

### **SECTION - II**

- Q7)** a) Discuss effect of noise on performance. [9]  
b) Discuss control along the path and control along receiver for noise exposure. [9]

OR

- Q8)** a) Discuss the physiological effect of heat on performance. [9]  
b) Describe color systems. Also discuss the energy considerations during selection of luminaries. [9]

- Q9)** a) Discuss the task description and analysis in systems design. [8]  
b) What do you mean by interface design? What data is applicable in such situations. [8]

OR



- Q10)a)** Discuss the term errors and accidents. [8]
- b) Discuss a case in which you have come across application of human factors engineering? [8]

- Q11)a)** What is WFS? What are its types? Explain Detailed WFS in brief. [12]
- b) Explain the Reach element used in MTM-1? What are its classes? [4]

OR

- Q12)a)** Explain MOST and its types in brief. [8]
- b) Write a note on Mento Factor System in brief. [8]



Total No. of Questions : 12]

SEAT No. :

**P3698**

**[4759]-161**

[Total No. of Pages : 3

**B.E. (Production S/W)**

**MATERIALS MANAGEMENT & LOGISTICS**

**(Revised) (2008 Course) (Semester-I) (Elective-II) (411125)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data if necessary.*
- 4) *Answer to the two sections should be written in separate answer books.*

**SECTION-I**

**Q1) a)** What are the phases involved in Value Analysis? Explain each phase briefly. [9]

b) What are the objectives of materials management? [9]

OR

**Q2) a)** Explain Material Requirement Planning (MRP1) in detail. [9]

b) Explain Make or Buy decision with example. [9]

**Q3) a)** Explain Purchase Cycle with flowchart. [8]

b) Explain documents used in Importing: [8]

i) Letter of credit.

ii) Bill of Lading.

OR

**Q4) a)** Explain different objectives of Purchasing. [8]

b) What is Vendor Rating? Explain any one method in detail. [8]

**Q5) a)** What is store identification? Explain KODAK system of codification briefly. [8]

b) How study of waste management techniques helps to manage surplus and obsolete material? [8]

OR

**P.T.O.**

- Q6)** a) Explain Last In First Out (LIFO) and First In First Out (FIFO) methods of material issuing. [8]
- b) What is stock verification? Differentiate between annual stock taking and Continuous stock taking. [8]

**SECTION-II**

- Q7)** a) Explain functional areas of Logistics in brief. [8]
- b) List the types of warehouses. Explain any two in brief. [8]

OR

- Q8)** a) Explain the economic and service benefits of warehouse. [8]
- b) List economic factors of transportation. Explain any four in brief. [8]

- Q9)** a) What are the types of selective control of inventory? Explain any two in detail. [8]
- b) Alfa industry estimates that it will sell 24000 units of its product for the forthcoming year. The ordering cost is Rs. 150 per order and the carrying cost per unit per year is 15% of the purchase price per unit which is Rs. 50. Find: [8]
- i) Economic order size.
  - ii) No. of orders per year.
  - iii) Time between successive orders.

OR

- Q10)**a) Derive expression for Economic Order Quantity (EOQ) assuming instantaneous replenishment system. [8]
- b) Rhon Industry needs 5400 units/year of a bought out components which will be used in its main product. The ordering cost is Rs. 250 per order and the carrying cost per unit per year is Rs. 30. [8]
- Find:
- i) Economic Order Quantity.
  - ii) No. of orders per year.
  - iii) Time between successive orders.

**Q11)a)** Explain Fixed Period system and Fixed Quantity system in brief. [9]

b) The annual demand of a product is 36,000 units. The average lead time is 3 weeks. The standard deviation of demand during the average lead time is 150 units/week. The cost of ordering is Rs. 500 per order. The cost of purchase of the product per unit is Rs. 15. The cost of carrying per unit per year is 20% of the purchase price. The maximum delay in lead time is 1 week and probability of this delay is 0.3 assume a service level of 0.95. [9]

i) What is the reorder level if Q system is followed?

ii) If P system is followed, what is the maximum inventory level?

OR

**Q12)a)** A firm has demand distribution of demand during a constant lead time with a standard deviation of 400 units. The firm wants to provide 95% service. [9]

i) How much safety stock should be carried for them?

ii) If the demand during lead time averages 1500 units, what is the appropriate reorder level?

b) What is safety stock? How lead time affects safety stock in finished goods inventory? [9]



Total No. of Questions : 12]

SEAT No. :

**P3699**

**[4759]-162**

[Total No. of Pages : 4

**B.E. (Production-Sandwich)**  
**FINANCIAL MANAGEMENT AND COST CONTROL**  
**(2008 Pattern) (Semester-I) (Elective-II) (411125)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section-I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section-II.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) How will you define Financial Management? What are the goals of Financial Management? [8]
- b) Explain with suitable examples any two profitability ratios. [8]

OR

- Q2)** a) Explain difference between 'Wealth Maximization' and 'Profit Maximization'. [8]
- b) Following are the figures are extracted from the books of ZYX Limited as at 30-04-2015. [8]

Particulars	Amount (Rs.)
Net sales	24,00,000
Operating expenses	18,00,000
Gross Profit	6,00,000
Non operating Expenses	2,40,000
Net Profit	3,60,000
Current Assets	7,60,000
Inventories	8,00,000

**P.T.O.**

Particulars	Amount (Rs.)
Fixed Assets	14,40,000
Total Assets	30,00,000
Net Worth	15,00,000
Debt	9,00,000
Current Liabilities	6,00,000
Total Liabilities	30,00,000
Working Capital	9,60,000

Calculate:

- i) Gross Profit Ratio.
- ii) Net Profit Ratio.
- iii) Return on Assets.
- iv) Net worth to debt.

**Q3) a)** What is Capital Budgeting? What major steps are involved in the capital budgeting process? **[8]**

**b)** Cash flows for two mutually exclusive projects are shown below: **[8]**

Year	$CF_M$	$CF_N$
0	(100)	(100)
1	10	70
2	60	50
3	80	20

Both projects have a cost of capital of 10%

- i) Calculate the payback for both projects.
- ii) Calculate the NPV for both projects.
- iii) Calculate the IRR for both projects.
- iv) Calculate the MIRR for both projects.

OR

**Q4) a)** Explain how a crossover discount rate is calculated, and how does it affect capital budgeting decisions? [8]

b) ABC and Co. is considering a proposal to replace one of its plants costing Rs. 60,000 and having a written down value of Rs. 24,000. The remaining economic life of the plant is 4 years after which it will have no salvage value. However, if sold today, it has a salvage value of Rs. 20,000. The new machine costing Rs. 1,30,000 is also expected to have a life of 4 years with a scrap value of Rs. 18,000. The new machine, due to its technological superiority, is expected to contribute additional annual benefit (before depreciation and tax) of Rs. 60,000. Find out the cash flows associated with this decision given that the tax rate applicable to the firm is 40%. (The capital gain or loss may be taken as not subject to tax). [8]

**Q5) a)** What is working capital? What are the factors affecting the amount of working capital? [9]

b) Explain the concept of funds and funds flow statements and state the advantages of fund flow statements. [9]

OR

**Q6) a)** What is operating cycle? How is the concept important while calculating the amount of working capital? [9]

b) Explain different ways for sources of working capital. [9]

### **SECTION-II**

**Q7) a)** What is Labour Turnover? What are the causes of Labour Turnover? [8]

b) Discuss any two methods of pricing issues of materials. [8]

OR

**Q8) a)** Distinguish between Straight Line method and Reducing Balance Method of Depreciation. [8]

b) Discuss any two methods of Secondary Distribution of Overheads. [8]

- Q9) a)** Define and explain briefly the following variances: **[8]**
- i) Material price variance.
  - ii) Material usage variance.
  - iii) Material mixture variance.
  - iv) Material yield variance.
- b) Grinders Ltd., is engaged in producing a standard mix using 60 kg of chemical X and 40 kg of chemical Y, the standard loss of product is 30%. The standard price of X is Rs. 5 per kg and of Y is Rs. 10 per kg. the actual mixer and yield variance as follows: **[8]**
- X 80 kg @ Rs. 4.50 per kg and  
Y 70 kg @ Rs. 8.00 per kg
- Actual yield 115 kg. Calculate material variance.

OR

- Q10)a)** Explain the term Standard Costing. How does it help in achieving cost control? **[8]**
- b) Define budget control. What are the pre-requisites for the implementation of budget control. **[8]**
- Q11)a)** What is Cost Volume Profit Analysis? What are its assumptions? **[9]**
- b) How is Marginal Costing useful in “Make or Buy Decisions”? Illustrate assuming suitable data. **[9]**

OR

- Q12)a)** Explain the features of Process Costing. **[6]**
- b) Distinguish between Joint Products and By-Products. **[6]**
- c) Explain the concepts-Normal Loss, Abnormal Gain and Equivalent Production. **[6]**





Total No. of Questions : 12]

SEAT No. :

**P1431**

**[4759] - 163**

[Total No. of Pages :3

**B.E. (Production Sandwich)  
PRODUCT DEVELOPMENT  
( 2008 Course) (Semester -I) (Elective - II) (411125)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Que.No.1 or Que.No.2, Que.No.3 or Que.No.4, Que.No.5 or Que.No.6 from Section -I and Que.No.7 or Que.No.8, Que.No.9 or Que.No.10, Que.No.11 or Que.No.12 from Section -II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION - I**

- Q1)** a) What do you mean by product design? Explain in brief the different factors in product design? **[8]**
- b) What is modern product development process? Explain the role of product development team in product development planning with reference to ISO standard. **[10]**

OR

- Q2)** a) What is prototyping? Explain the methods of rapid prototyping in detail. **[10]**
- b) Write short notes on: **[8]**
- i) Concurrent Design
  - ii) Quality Function Deployment

**P.T.O.**

- Q3) a)** Explain the following terms: [8]
- i) Market Segmentation
  - ii) Customer population
- b) Explain in short the Economic Analysis of product? [8]

OR

- Q4) a)** What is Mission Statement and Technical Questioning? Explain the economic Analysis of Product. [8]
- b) What are the different methods of gathering customer needs information? How will you analyze the information? [8]

- Q5) a)** Describe Pugh's Concept in detail with example? [8]
- b) Write short notes on: [8]
- i) FMEA
  - ii) System Modeling

OR

- Q6) a)** Explain the different steps of product development based on product function? [8]
- b) Explain augmentation & aggregation in short? [8]

### **SECTION - II**

- Q7) a)** What is reverse engineering? Explain the advantages & disadvantages of reverse engineering. [8]
- b) What is product tear down process & explain its different methods?[8]

OR

- Q8)** a) What is product portfolio & architecture explain with suitable example. [8]  
b) What is indented assembly cost analysis & explain function form. [8]

**Q9)** Explain the following terms: [16]

- a) Design for manufacture
- b) Design for assembly
- c) Product testing
- d) Field trials

OR

**Q10)a)** Explain the phases of product life cycle with its corresponding technologies. [8]

- b) Explain the following terms: [8]
- i) Product Testing
  - ii) Field Trials

**Q11)a)** What is product life cycle? Explain its needs & benefits? [8]

b) Explain in short Emergence of PLM & significance of PLM. [10]

OR

**Q12)a)** Explain in short reliability concept in product development. [10]

- b) Write short notes on: [8]
- i) Product data & Product work flow
  - ii) Importance of customer involment.



Total No. of Questions : 12]

SEAT No. :

**P1432**

**[4759]-164**

[Total No. of Pages : 2

**B.E. (Production Sandwich Engineering)  
SUPPLY CHAIN MANAGEMENT  
(2008 Pattern) (Elective-III) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary*

**SECTION-I**

**Q1)** a) Describe decision phases in a supply chain. [9]

b) Discuss the SC Macro processes in a firm. [9]

OR

**Q2)** a) Discuss “Stage of achieving strategic fit” and brief about how to achieve it. [9]

b) Discuss the components of facilities decisions. [9]

**Q3)** a) Write a note on risk management in forecasting. [8]

b) Write a note on aggregate planning using linear programming [8]

OR

**Q4)** a) Identify cycles & push-pull boundary in supply chain when you are Purchasing **TABLET PC** from a shop in your city. [10]

b) How to implement aggregate planning in practice? [6]

**Q5)** a) When are the quantity discounts justified in supply chain? Differentiate between lot size based and volume based quantity discounts. [9]

b) What is the role of safety inventory in supply chain? How is the appropriate level of safety inventory determined? [7]

**P.T.O.**

OR

- Q6)** a) Explain the economies of scale to exploit fixed costs. [8]  
b) Explain the role of IT in forecasting [8]

**SECTION-II**

- Q7)** a) Write a note on package carriers in detail. Explain with a good example. [9]  
b) What is distribution channel? Write a note on DC in accordance to transportation networks. [9]

OR

- Q8)** a) Discuss the role of transportation in supply chain? Mention the various modes of transportation with their strengths and weaknesses [9]  
b) Explain the use of milk runs for shipping via DC. Also explain tailored networks [9]

- Q9)** a) What is bullwhip effect and how does it relate lack of coordination in supply chain? [8]  
b) Discuss the impact of E business in customer service. [8]

OR

- Q10)**a) List the various obstacles for coordination in supply chain [8]  
b) How the design of distribution network has been effected due to evolution of E business [8 ]

- Q11)**a) What are supply chain macro processes and why an enterprise has to focus on the macro processes? [8]  
b) Explain the procedure of implementing pricing and revenue management in practice. [8]

OR

- Q12)** a) What is decision tree? Summarize basic steps in decision tree analysis. [8]  
b) Discuss the role and importance of revenue management in supply chain [8]



Total No. of Questions : 12]

SEAT No. :

P4630

[Total No. of Pages : 2

[4759]-165

B.E. (Production S/W)

PLANT ENGINEERING AND MAINTENANCE

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from each section.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6) Assume suitable data, if necessary.

**SECTION - I**

**Q1)** a) Discuss the functions of plant management. [8]

b) Explain how will you do assessment of maintenance work. [8]

OR

**Q2)** a) Explain classification of maintenance work. [8]

b) Discuss use of Parato chart in detail. [8]

**Q3)** a) What are basic facilities required for plant? [8]

b) Explain PQRST analysis & REL chart. [8]

OR

**Q4)** a) List the facilities required for plant & discuss it in detail. [8]

b) Discuss how the computer is useful for optimization of layouts. [8]

**Q5)** a) Discuss condition based maintenance. [8]

b) List & discuss maintenance problems occurring in product & process type industries. [10]

**P.T.O.**

OR

- Q6)** Write short notes on following : [18]
- a) Maintenance of power plant industries.
  - b) Simulation & software for spare part management.
  - c) Software for classification & coding.

**SECTION - II**

- Q7)** a) What is reliability? Discuss in detail. [8]
- b) Explain various preventive maintenance with life cycle costing. [8]

OR

- Q8)** a) Discuss mathematical model for life cycle costing. [8]
- b) Explain significance of cost factor in the maintenance. [8]

- Q9)** a) Explain issues related to recycling & wastages. [8]
- b) Discuss plant safety in detail. [8]

OR

- Q10)** a) What do you understand from energy conservation & management. [8]
- b) Explain various accident prevention practices & codes. [8]

- Q11)** a) Explain ferrography & hot ferrography. [8]
- b) Discuss RAM analysis. [10]

OR

- Q12)** a) What is reliability centred maintenance. [8]
- b) Explain "Total productive maintenance". [10]



Total No. of Questions : 12]

SEAT No. :

**P3700**

**[4759] - 166**

[Total No. of Pages :2

**B.E. (Production Sandwich)**

**INDUSTRIAL RELATIONS & HUMAN RESOURCE MANAGEMENT**

**(Elective - III) (2008 Course) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Neat diagrams must be drawn wherever necessary.*

**SECTION - I**

**Q1)** a) Explain in detail about the impact of globalization and information technology on industrial relations. [9]

b) What is trade union? Explain the problems faced by trade union. [9]

OR

**Q2)** a) What is industrial Relation? Explain scope, objectives of industrial relations. [9]

b) Define collective Bargaining. Explain the reasons for its success and failure. [9]

**Q3)** a) Explain role of HR manager & structure of HR department. [8]

b) Discuss HR strategies and organizational strategies. [8]

OR

**Q4)** a) Explain Personnel Administration. State its objectives and principles. [8]

b) Describe elements of HRD systems. Also discuss their goals, elements. [8]

**Q5)** Write short Notes (any two): [16]

- a) Objectives of manpower planning.
- b) Succession planning.
- c) Promotion.

OR

*P.T.O.*



- Q6)** Write short Notes (any two): **[16]**
- a) Recruitment resources.
  - b) Reward and compensation strategies.
  - c) Job rotation.

**SECTION - II**

- Q7)** a) Discuss various methods of training. **[9]**  
b) Explain tools & aids used for effective training. **[9]**

OR

- Q8)** a) Discuss need & objectives of employee training. **[9]**  
b) What are major procedures of training? **[9]**

- Q9)** a) Explain in detail competency Mapping. **[8]**  
b) Explain how performance management system can be aligned with business strategies of an organization. **[8]**

OR

- Q10)** a) Discuss various methods of performance appraisal. **[8]**  
b) Explain strategic importance of 360 degrees feedback. **[8]**

- Q11)** Write short notes on (any TWO) **[16]**
- a) Industrial democracy.
  - b) Golden handshake.
  - c) Role of HRD in developing IR.

OR

- Q12)** Write short notes on (any TWO) **[16]**
- a) Retrenchment and layoff.
  - b) Employee Morale.
  - c) Downsizing and project based employment.



Total No. of Questions : 6]

SEAT No. :

**P3893**

[4759] - 167

[Total No. of Pages : 2

**B.E. (Production Sandwich) (Semester - II)**  
**MARKETING MANAGEMENT (Elective - III)**  
**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Answer any three questions from section - I and any three questions from section- II.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assumptions made should be clearly stated and justified.*

**SECTION - I**

**Q1)** Explain different marketing philosophy of business with suitable example. [16]

OR

Explain Understanding and monitoring the environment in marketing management.

**Q2)** Explain how to analyzing Consumer Behavior. What are different perspectives of organizational buyers in industrial markets? [16]

OR

Explain different marketing management tools for understanding consumer's decision processes.

**Q3) a)** Explain how you will position products in defined market segment. [10]

b) Explain formulating marketing strategies. [8]

**P.T.O.**

OR

- a) Explain the concept planning marketing program. Also explain Gathering marketing information.
- b) Explain in brief Managing Product.

**SECTION - II**

- Q4)** a) Explain strategy used for development of new product. [8]  
b) Explain the concept Price Theory. [8]

OR

- a) Write in brief marketing intermediaries.
- b) Explain Establishing and managing prices.

- Q5)** Explain managing sales force and sales territories with suitable example. [16]

OR

- a) Explain the concept Services marketing.
- b) Write short note on Non-profit and social marketing.

- Q6)** a) Explain Marketing research and its importance. Also explain scope of marketing research. [9]  
b) Explain Structure of Marketing research with suitable example. [9]

OR

- a) Write a short on tools used in Market research.
- b) Explain role of quantitative techniques in marketing research.



Total No. of Questions : 6]

SEAT No. :

[Total No. of Pages :2

**P3701**

**[4759] - 168**

**B.E. (Printing)**

**TECHNOLOGY OF GRAVURE**

**( 2008 Course) (Semester -I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to two sections should be written separately.*
- 2) *Draw neat diagram wherever necessary.*

**SECTION - I**

**Q1) a)** Explain the benefits of Engraving over Etching process. **[8]**

b) Cell geometry plays an important role in ink transfer. Explain. **[10]**

OR

Explain Gravure cylinder making by engraving process. **[18]**

**Q2) Write Notes on** **[16]**

- a) Epitaxy
- b) Circulation of Electrolyte
- c) Contaminants in plating
- d) Current Density of Electrolyte

OR

Explain the factors governing copper plating. **[16]**

**Q3) Explain in detail Gravure Machine principle.** **[16]**

OR

Explain the types of solvent based inks. **[16]**

**P.T.O.**

**SECTION - II**

**Q4)** Rheology plays an important role in ink transfer. Explain. **[18]**

OR

Explain in detail doctor blade loading of gravure press. **[18]**

**Q5)** Explain the effect of pressure and hardness on printability. **[16]**

OR

Explain the different loading techniques of an impression system. **[16]**

**Q6)** Explain in detail Shaftless technology for a Gravure press. **[16]**

OR

Write notes on: **[16]**

- a) Missing Dots
- b) Voids
- c) Dynamic Balancing
- d) Idle Rollers



Total No. of Questions : 6]

SEAT No. :

**P3702**

**[4759]-169**

[Total No. of Pages : 2

**B.E. (Printing Engineering)  
DIGITAL IMAGING & PRINTING  
(2012 Course) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve any 3 questions from each section.*
- 2) *Figures to the right indicate full marks.*

**SECTION-I**

**Q1)** What is Digital and Physical dimension resolution? Explain requirements of digital resolutions as per print processes. **[18]**

OR

Compare properties of Bitmap and Vector Images. **[18]**

**Q2)** Explain advantages of RAW file formats. **[16]**

OR

Explain RAW image processing options in detail. **[16]**

**Q3)** Explain in detail structure & working of a DSLR. **[16]**

OR

Explain structure of CMOS and CCD sensors in detail. **[16]**

**SECTION-II**

**Q4)** Explain Dye Sublimation processes. **[18]**

OR

Describe: **[18]**

- a) Thermal transfers.
- b) Thermal Inkjet in detail.

***P.T.O.***

**Q5)** Explain Variable data Process. [16]

OR

Explain Print on Demand concept. [16]

**Q6)** State and explain Future trends in digital printing. [16]

OR

Explain plant layout of a full fledged Digital press. [16]



Total No. of Questions : 12]

SEAT No. :

**P1516**

[4759] - 17

[Total No. of Pages :4

**B.E. (Civil)**

**ADVANCED FOUNDATION ENGINEERING**

**(Elective - III) (2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any THREE questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed & IS codes & IRC codes are not allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain the following: **[10]**
- i) IS - 1892-1979 provisions for subsoil explorations.
  - ii) Significant depth & its guide rules.
- b) Discuss in brief different case studies for failures of foundation. **[7]**

OR

- Q2) a)** Discuss the 'Geophysical Methods' in detail according to IS-1892-1979. **[9]**
- b) Discuss IRC provisions for number of borings & different guidelines, for depth of exploration. **[8]**

- Q3) a)** A square footing of 1.5M size, rests at a depth of 1.5M in 4.5M deep, saturated clay. The clay is Nc with  $q_u = 70$  kPa,  $LL = 60\%$ ,  $r_{sat} = 22$  KN/m<sup>3</sup>,  $W = 40\%$  &  $G = 2.7$ . Determine the safe load, which the footing can carry with a FOS = 3 against shear. Also determine the settlement. Use,  $N_c = 5.7$ ,  $N_q = 1$  &  $N_r = 0$ . **[9]**
- b) Compare the following for Raft foundation design, **[8]**
- i) Conventional Method.
  - ii) Soil line method.

OR

**P.T.O.**



**Q4) a)** Explain the steps for ‘Hansen’s Method’ for shallow foundation design, subjected to inclined loads. [9]

b) Discuss various softwares used for Geotechnical designs & explain ‘Geo-slope’. [8]

**Q5) a)** How will you determine ‘Qa’ from a cyclic pile load test? Explain by drawing a sample graph. [6]

b) A square concrete pile, 30 cm in size & 5M long, subjected to a horz. load of 5 KN & a moment of 4 KN-m at GL.  $E = 3.1 \times 10^6 \text{ N/cm}^2$  &  $\eta_h = 20 \text{ N/cm}^3$ . Determine the following. [10]

i) Total deflection

ii) Total slope

iii) Total moment

iv) Total shear

v) Total soil Reaction.

Assume pile head free & use following coefficients,  $z = 0$ .

$A_y$	$A_s$	$A_m$	$A_v$	$A_p$
2.435	-1.623	0.000	1.000	0.000
$B_y$	$B_s$	$B_m$	$B_v$	$B_p$
1.623	-1.750	1.000	0.000	0.000

OR

**Q6) a)** What is LLP? How  $E_s$ ,  $T$  &  $\eta_h$  is determined for a LLP? [8]

b) Explain stepwise the ‘Reese & Matlock’ method. [8]

## **SECTION - II**

**Q7) a)** A clay layer 5M thk is consolidated with the help of sand drains of 30 cm  $\phi$ , spaced at 2.7 M c/c. Determine the influence of the drain wells on the Av. degree of consolidation at the time when the degree of consolidation in the clay without wells ( $U_z$ ) would be 20%. Assume square pattern & compute the improvement in  $U$ , for the following cases,

i)  $K_r = K_z$

ii)  $K_r = 5 K_z$

Use following data;

for $U_z = 20\%$ ,	$T_v = 0.031$
$T_r = 0.070$	$U = 30\%$
$T_r = 0.085$	$U = 35\%$
$T_r = 0.373$	$U = 85\%$
$T_r = 0.455$	$U = 90\%$

[10]

- b) Explain the methods for determination of LCC of 'Under-reamed pile' for following cases, [7]
- i) Clayey soil.
  - ii) Sandy soil.

OR

- Q8)** a) Explain the steps for design of 'Sand-drains'. [9]
- b) Discuss the following tests for 'Under-reamed piles' as per IS-2911-Pt-III-1973, [8]
- i) Initial test.
  - ii) Routine test.

- Q9)** a) Explain the design provisions for, [8]
- i) Well curb.
  - ii) Cutting edge.
  - iii) Staining thickness.
  - iv) Bottom plug.
- b) Discuss the following: [9]
- i) NSD as per IRC.
  - ii) Lacey's criteria for NSD & grip length.

OR

- Q10)**a) Explain 'Banerjee & Gangopadhyay Analysis'. [9]
- b) Discuss the provisions made as per IRC for Caisson design. [8]

- Q11)a)** Differentiate clearly between ‘Rockfill cofferdam’ & ‘Cellular cofferdam’ w.r. to design & construction. [8]
- b) Explain the steps for the design of ‘Anchored sheet pile’ using ‘Free Earth Support’ method. [8]

OR

- Q12)a)** Discuss common types of ‘Cofferdam’ construction. [8]
- b) Compute the embedment depth & pull in the anchor rod, for a sheet pile cofferdam of 6M high, retaining soil as a back fill & soil below dredgeline is same with following properties,
- $\phi = \phi' = 30^\circ$ ,  $C = 0$ ,  $r_{\text{sat}} = 22 \text{ KN/m}^3$ ,  $r = 19 \text{ KN/m}^3$ . Anchor rod is 1m below the top. GWT = 3M above the D.L. Use ‘Free Earth Support’ Method. [8]



Total No. of Questions : 6]

SEAT No. :

**P3703**

**[4759] - 170**

[Total No. of Pages :2

**B.E. (Printing)**

**ADVERTISING AND MULTIMEDIA**

**( 2008 Course) (Semester -I) (408285)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Draw diagrams wherever necessary.*

**SECTION - I**

**Q1)** What is media research? Explain in details.

**[18]**

OR

What is marketing research? Explain in details the process of marketing research.

**Q2)** Explain cognizance model used for effective advertising.

**[16]**

OR

Explain AIDA model used for effective advertising.

**Q3)** Explain following types of advertising in details:

**[16]**

- a) Public Relations advertising
- b) Public Service advertising

OR

What are different types of advertising? Explain product advertising and service advertising in details.

**P.T.O.**

## SECTION - II

**Q4)** What is role of copywriter and visualiser in the advertising agency? Explain in details **[18]**

OR

What are the different elements for construction of effective print advertising? Describe each in details.

**Q5)** What are the different approaches for market segmentation? Explain in details. **[16]**

OR

What is market segmentation? Explain types of segmentation in details.

**Q6)** With respect to Psychology used in advertisement; explain the following:**[16]**

- a) Consumer behavior
- b) Attitude, personality and self concept
- c) Information processing, external environment

OR

What is campaigning? Explain the significance of campaigning with respect to launching of the product/services.



Total No. of Questions : 6]

SEAT No. :

**P3328**

[4759] - 171

[Total No. of Pages : 2

**B.E. (Printing)**

**QUALITY CONTROL TECHNIQUES IN PRINTING**

**(Elective - I) (2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Assume suitable data, if necessary.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION - I**

**Q1)** List out Quality Characteristic and explain them in detail. **[16]**

OR

Explain Cost of Quality with suitable example of each type.

**Q2)** Eight consecutive lots of printed sheets received from a vendor were inspected by sampling process. The sample size was varied. The number of defectives in each sample recorded as under. **[18]**

Sample No.	1	2	3	4	5	6	7	8
Sample Size	120	135	70	90	150	130	70	70
No. of Defectives	4	3	0	2	4	1	2	3

Construct a control chart for Fraction defective & describe whether the printed sheets are in control or not.

OR

For a sampling plan determine probability of acceptance of following Percentage defectives, also draw a OC Curve

$N = 9000$ ,  $n = 55$ ,  $c = 2$

Sr. No.	1	2	3	4	5	6
Percentage Defective	0.4%	0.8%	2%	4%	6%	12%

**P.T.O.**

- Q3)** a) Explain in detail Job Production & Mass Production. [8]  
b) Describe Lean manufacturing system in detail. [8]

OR

Explain in detail world class Manufacturing. [16]

### **SECTION - II**

- Q4)** Explain any two optical & physical properties of paper. [18]

OR

Explain following properties related to Ink :

- |            |             |
|------------|-------------|
| a) Flow    | b) Color    |
| c) Opacity | d) Adhesion |

- Q5)** Explain need of monitor profile with respect to obtained quality printing. [16]

OR

Explain Offset Lithography process control with help of profile creation.

- Q6)** Explain the process of press standardization & characterization for Digital printing. [16]

OR

Describe factors to be considered for press finger printing of Offset Printing.



Total No. of Questions : 6]

SEAT No. :

**P3704**

**[4759]-174**

[Total No. of Pages : 2

**B.E. (Printing Engineering )  
SECURITY PRINTING  
(2008 Course) (Semester-I) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Solve any 3 questions from each section.*
- 2) Figures to the right indicate full marks.*

**SECTION-I**

**Q1)** What is a security document? Explain with examples. **[18]**

OR

Describe optical security documentation in detail.

**Q2)** Explain Security Printing procedures. **[16]**

OR

Explain Intaglio process application for bank note printing.

**Q3)** Explain types of cards in security printing. **[16]**

OR

Explain thermal printing in security applications.

**SECTION-II**

**Q4)** Explain cheque system and its security features. **[18]**

OR

Describe:

- i) hologram applications.
- ii) Complex fills system.

***P.T.O.***



**Q5)** Explain invisible data printing. **[16]**

OR

Explain security ink properties.

**Q6)** State and explain data encryption systems for information security. **[16]**

OR

Explain advancements in security printing features.



Total No. of Questions : 6]

SEAT No. :

**P3894**

[Total No. of Pages : 2

[4759] - 177

**B.E. (Printing Engineering)**

**PACKAGE DESIGN AND TECHNOLOGY**

**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

**Q1)** Explain Types of craft papers for packaging. State combinations of Bursting strength element in details. **[18]**

OR

Explain in detail Duplex types and manufacturing process

**Q2)** Explain in detail printing challenges for duplex boards. **[16]**

OR

Describe printing processes suitable for craft paper printing in detail

**Q3)** Explain manufacturing process of corrugation rolls and types. **[16]**

OR

State process for punching type cartons with example

**Q4)** State process of making a jigged die in detail. **[16]**

OR

Explain process of laser die making in detail

**P.T.O.**

**Q5)** Calculate cost of 35 ply carton for all 150 gsm, narrow flute carton with dimensions 4x5x6 inches. (universal type). paper cost 33 rs /kg Conversion 15 rs/kg. **[16]**

OR

Calculate weight of 5 ply carton for all 250 gsm, narrow flute carton with dimensions 7 x 12 x 9 inches. (universal type) assume suitable data

**Q6)** State and explain importance of Edge crush test in Packaging and relation with Box compression test **[18]**

OR

Explain any 6 test in detail for cartons.



Total No. of Questions : 6]

SEAT No. :

**P2014**

**[4759]-178**

[Total No. of Pages : 4

**B.E. (Printing)**

**PRINT PRODUCTION PLANNING AND CONTROL**

**(2008 Course)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1)** Explain any two functions of Production Planning in detail with suitable examples. **[16]**

OR

Explain any two functions of Production Control in detail with suitable examples. **[16]**

**Q2)** Construct a network diagram for a project comprising of activities B, C, E, F, G, H, I, J, L, M, N, P and Q such that the following precedence relationships are satisfied. **[16]**

B < E, F      C, F < G      C < L      E, G < H  
H, L < I      H < J      L < M      H, M < N  
I, J < P      N < Q

OR

The activities along with their dependency relationships are given below. Draw the arrow diagram. **[16]**

Activity	Immediate predecessor
A	---
B	---
C	---
E	A
F	A, B
G	B, C

**P.T.O.**

H	C
I	E, F
J	G, H
K	H

**Q3)** A fabricator has one cutting press, one welding machine and number of design for the jobs. The times required in minutes to perform the cutting and welding operations for each job are known. We wish to determine the order in which jobs should be processed in order to minimize the total time required to turn out all the designs. **[18]**

Jobs	1	2	3	4	5	6
Cutting time	25	115	45	15	85	105
Welding time	75	95	85	55	25	05

OR

A foreman wants to process four different jobs on three machines, shaping, drilling and tapping in the same sequence. Decide optimal sequence for the jobs to minimize the total elapsed time to process all the jobs. **[18]**

Jobs	Shaping (minutes)	Drilling (minutes)	Tapping (minutes)
1	14	4	19
2	19	9	5
3	9	7	14
4	24	7	9

**SECTION-II**

**Q4)** A company has to assign four workers A, B, C and D to four jobs W, X, Y and Z. The cost matrix is given below. Find the optimum assignment schedule and total corresponding cost. **[16]**

Jobs/Worker	W	X	Y	Z
A	1100	1300	500	1000
B	700	600	400	900
C	300	400	500	600
D	700	800	400	1100

OR

4 different jobs can be done on 4 different machines. The matrix below gives the cost in rupees of producing job  $i$  on machine  $j$ . How should the jobs be assigned to the various machines so that the total cost is minimized. [16]

Machines/Jobs	$M_1$	$M_2$	$M_3$	$M_4$
$J_1$	5	7	11	6
$J_2$	8	5	9	6
$J_3$	4	7	10	7
$J_4$	10	4	8	3

**Q5)** A company manufacturing television has four plants with a capacity of 125, 250, 175 and 100 units respectively. The company supplies TV sets to its four showrooms which have a demand of 100, 400, 90, 60 units respectively. The transportation cost per unit is given in table below. Find out the optimum transportation schedule which will minimize the cost of transportation. [16]

Showrooms/ Plants	1	2	3	4	Supply
A	90	100	120	110	125
B	100	105	130	117	250
C	111	109	110	120	175
D	130	125	108	113	100
Demand	100	400	90	60	

OR

The following table shows all the necessary information on the availability of supply to each ware house the requirement of each market and the unit transportation cost from each ware house to each market. Find the optimum schedule and minimum total transportation cost. [16]

Market/ Warehouse	P	Q	R	S	Supply
A	6	3	5	4	22
B	5	9	2	7	15
C	5	7	8	6	8
Requirement	7	12	17	9	

**Q6)** A firm produces 3 products. These products are processed on 3 different machines. The time required for manufacturing one unit of each of the 3 products and daily capacity of the 3 machines is given in the table below. It is required to determine the daily number of units to be manufactured for each product. The profit per unit for product 1, 2 and 3 is Rs. 4, 3 and 6 respectively. It is assumed that all the quantity produced are consumed in the market. Formulate the LP model. **[18]**

Machine	Time per unit (minutes)			Machine capacity (minutes per day)
	Product 1	Product 2	Product 3	
$M_1$	2	3	2	440
$M_2$	4	-	3	470
$M_3$	2	5	-	430

OR

A company manufactures 2 products A and B. The profit per unit of A and B is Rs. 90 and 100 respectively. The company is required to supply 300 units of product B to its regular customers. Product A requires machining on machine  $M_1$  only and for one unit of A, one hour of  $M_1$  is required. Product B requires machine  $M_2$  only and machine hours on  $M_2$  has enough hours available to manufacture any number of units of product B.  $M_1$  has 500 hour available. Product A and B both require one labor hour each and company has 700 labor hours available. To determine the number of units of A and B to be manufactured, satisfying given conditions. Formulate the LP model. **[18]**



Total No. of Questions : 12]

SEAT No. :

P3329

[Total No. of Pages :3

**[4759]-179**  
**B.E. Printing**  
**ELECTRONIC PUBLISHING**  
**(2008 Pattern) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt any three questions from each section.*
- 2) *Figures to the right indicate full marks.*

**SECTION -I**

**Q1) a)** Explain the following HTML tags with example and syntax

i) <table>

ii) <img>

[10]

- b) Explain different image file formats in detail. Compare and explain which image file format is best in web page. [8]

OR

**Q2)** Write HTML programme to generate following design. Use CSS file.[10]

Day	Title	Date
Some text should be written in this column.	Some text should be written here	Please insert picture here
	Please insert picture here	

- b) Explain design challenges in online rich text editor.

[8]

**P.T.O.**



**Q3)** Design e-newspaper which includes home page and one more page. Write HTML programme for the same. [16]

OR

**Q4) a)** Explain different features of e-pub, Mobi and AZW file format. [8]

b) Explain wiki, blog and face book text editing features [8]

**Q5) a)** Explain the following SQL statements with example [12]

i) DELETE

ii) UPDATE

iii) INSERT

b) Explain any 4 differences between XML and HTML with example.[4]

OR

**Q6) a)** Create an SQL database to store information of 5 Books.[16]  
First table Should contain Book Name and Author.  
Second table should contain Book Name and subject.  
Third table should contain Book Name and cost of the book.

b) Write an SQL query for above database to display Book Name, Author, Cost and subject for any one book.

## SECTION - II

**Q7)** Explain all the 8 processes performed in website development. [18]

OR

**Q8)** What are the Basic Considerations and elements of Web page Design and Layout; explain in greater details.

**Q9)** Compare and contrast between PDF and EPUB as a format to be used for e-publishing stating the pros and cons of each. **[16]**

OR

**Q10)** State various types of web sites working, and their applications. **[16]**

**Q11)a)** Explain content management system (CMS) **[8]**

b) Explain any one application which uses CMS. **[8]**

OR

**Q12)a)** Explain main features of dot net like common language runtime (CLR), cross language interoperability. **[10]**

b) Explain enterprise content management system (ECMS). **[6]**



Total No. of Questions : 6]

SEAT No. :

**P1517**

**[4759] - 18**

[Total No. of Pages :3

**B.E. (Civil Engg.)**

**ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS**

**(Elective - III) (2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams should be drawn wherever necessary.*

**SECTION - I**

- Q1)** a) Explain the characteristics of older secondary rocks in Maharashtra State in terms of their distribution, engineering properties with suitable examples. **[8]**
- b) Nature of tachylytes in Deccan Trap area. **[6]**
- c) Pinching and bulging of dykes in deccan trap area. **[4]**

OR

- a) Explain the characteristics of older metamorphic rocks in Maharashtra State in terms of their distribution, engineering properties with suitable examples. Field Characters of dykes in Maharashtra. **[8]**
- b) Groups of Basaltic flows. **[6]**
- c) Field Characters of Fractures. **[4]**
- Q2)** a) Discuss in detail any two case histories of dams on Maharashtra where tail channel erosion is occurring. **[9]**
- b) Treatment to given to a dyke crossing dam alignment. Explain with suitable case histories. **[7]**

OR

*P.T.O.*

- a) Discuss in detail case histories of Varasgaon and Mula dam sites where economy has been achieved. [9]
- b) Dams on Limestone and Quartzites. [7]

**Q3)** Write notes on:

- a) Multi aquifer system in Deccan Trap area. [4]
- b) Granular disintegration. [4]
- c) Water bearing characters of dykes. [4]
- d) Amygdaloidal Basalt as an aquifer. [4]

OR

- a) Transported soils of Maharashtra state. [4]
- b) Occurrence of sand in Deccan Trap area. [4]
- c) Any two methods of conservation of water. [4]
- d) Compact Basalt as an aquifer. [4]

### **SECTION - II**

- Q4)** a) Significance of RQD in classification of rocks. Explain with suitable examples. [7]
- b) Describe any two mechanical properties of rock masses. [7]
  - c) Electrical resistivity method. [4]

OR

- a) Explain 'Q' System classification of rock masses. [7]
- b) Describe any three physical properties of rock masses. [7]
- c) USBM classification of rock masses. [4]

- Q5)** a) The feasibility of jointed quartzite from tunneling point of view with case histories. [6]
- b) What are the prerequisite of rock masses from bridge foundation point of view? Explain with suitable case histories. [10]

OR

- a) Location and depth of drill holes from bridge foundation point of view. [6]
- b) Explain tunneling conditions through Amygdaloidal basalts. Add a note on Stand up time of a rock mass during tunneling. [10]

- Q6)** a) Width of fault zone. [4]
- b) Open excavation in city areas. [4]
- c) Suitability of Deccan trap basalt as a construction material. [8]

OR

- a) Artificial grounds. [4]
- b) Dyke rock as construction material. [4]
- c) Relationship between dams and earthquakes. [8]



Total No. of Questions : 6]

SEAT No. :

P3330

[Total No. of Pages :3

[4759]-180

**B.E.Printing Machine Maintenance (Elective - III)**  
**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections in separate answer books.*
- 2) *All questions compulsory.*

**SECTION -I**

- Q1)** a) Draw a neat diagram of the ratchet & pawl mechanism where is it used in the offset press. How is it maintained [10]
- b) What is difference between AC motors and DC motors. [6]

OR

Draw the diagram of bevel gears. Compare spur,

- a) helical & bevel glars
- b) Explain the purpose of belt drive use is shectfed offset machines .Draw a neat diagram of 'v' belts.What are their advantages.

- Q2)** Explain stepwise procedure to dis-assemble and re-assemble rollers of unit. [16]

OR

Prepare a daily, monthly, weekly maintenance checklist for ink supply unit and dampening solution supply unit

**P.T.O.**

**Q3)** State and explain different maintenance strategies to improve operational effectiveness in a press. **[18]**

OR

Explain how life of motors and electrical components can be improved. State maintenance carried out for these equipments.

**SECTION - II**

**Q4)** a) What are the safety norms & policies to be followed by the management and individual employee for having a safe & hazard free environment. **[9]**

b) Explain uses of the following **[9]**

i) thermographic devices

ii) Digital ultrasonic scanner.

OR

a) What are the steps of preventive maintenance of a blanket to increase life. Draw a neat sketch.

b) What is the need for an operator's manual. State points to be considered when developing one

**Q5)** a) Write short notes: **[16]**

i) Antifriction bearings

ii) Clutches

iii) Brakes

iv) Gear box

OR

Define what is a hazard. State any 2 physical & chemical hazard in granure printing plant.

**Q6)** Explain working of a former folder. State its daily, weekly, monthly maintenance to get neat folds. **[16]**

OR

Explain working & construction of a hot air dryer. Draw a neat sketch of dryer in web press. Explain its maintenance.





Total No. of Questions : 6]

SEAT No. :

**P3705**

**[4759] - 182**

[Total No. of Pages :2

**B.E. (Printing)**

**FLEXIBLE PACKAGING**

**(2008 Course) (Semester - II) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to two sections should be written separately.*
- 2) *Draw neat diagram wherever necessary.*

**SECTION - I**

**Q1)** Write properties and applications of the following.

**[18]**

- a) HDPE
- b) PET G
- c) PS

OR

Explain the role of plastics in Packaging.

**[18]**

**Q2)** Explain in detail configuration of Gravure Machine. Also explain specific requirements of Gravure printing for flexible packaging.

**[16]**

OR

Explain in detail configuration of Flexo Machine. Also explain specific requirements of Flexo printing for flexible packaging.

**[16]**

**Q3)** Explain along with diagram Wet lamination techniques.

**[16]**

OR

Explain along with diagram Extrusion process.

**[16]**

**P.T.O.**

**SECTION - II**

**Q4)** Explain the concept Report Pouch. **[16]**

OR

Explain in detail Lamitubes. **[16]**

**Q5)** Explain the types of closures for various applications. **[16]**

OR

Describe shrink packaging technique for a given product. **[16]**

**Q6)** Mention the packaging technology for the following products. **[18]**

- a) Tea Powder
- b) Biscuits
- c) Juices
- d) Butter

OR

Mention deterioration factors for the following. **[18]**

- a) Milk
- b) Mineral Water
- c) Beer



Total No. of Questions : 12]

SEAT No. :

**P1433**

**[4759]-185**

[Total No. of Pages : 3

**B.E. (Information Technology)**

**INFORMATION ASSURANCE AND SECURITY**

**(2008 Course) (Semester - I) (414441)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section I and 3 questions from section II*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a) Differentiate:** **[8]**
- i) Active and passive attacks
  - ii) Authentication and Authorization
- b) State the Chinese remainder theorem with example. **[8]**

OR

- Q2) a) Explain the following terms with example:** **[10]**
- i) Confusion & Diffusion
  - ii) Secret Splitting & Secret Sharing.
- b) State and Prove Fermat's Theorem. **[6]**

**P.T.O.**

- Q3)** a) In a public key cryptosystem using RSA, given  $N=187$  and the encryption key (E) as 17, find out the corresponding private key(D). [6]
- b) Explain Data Encryption Standard (DES) symmetric cryptographic algorithm along with different modes of operations. [10]

OR

- Q4)** a) What are the key requirements of message digest & why SHA is more secure than MD5. [8]
- b) Draw AES block diagram and explain the steps in detail. [8]
- Q5)** a) What is man in the middle attack? Explain with example the Diffie-Hellman Key exchange algorithm. [9]
- b) Explain the key distribution scenario using private key algorithm. [9]

OR

- Q6)** a) Explain X.509 standard for digital certificate. [9]
- b) What is digital signature. Explain the steps to create a digital signature using Digital signature Algorithm (DSA). [9]

### **SECTION - II**

- Q7)** a) List the benefits of IPSec. Distinguish between tunnel and transport mode in IPSec. Describe briefly how IPSec works. [8]
- b) What problem was Kerberos designed to address. Describe Kerberos Realm. [8]

OR

- Q8)** a) Discuss SSL with respect to 4 phases. [8]
- i) Establish security capabilities.
  - ii) Server authentication and key exchange.
  - iii) Client authentication and key exchange.
  - iv) Finish.
- b) State various categories of Intrusion Detection System. [8]

- Q9)** a) Explain the concept of mobile payment system. [8]  
b) Explain ISO 27001 security standard and state its purpose. [8]

OR

- Q10)**a) What is dual signature? Why dual signatures are needed?  
Explain mathematically and by schematic diagram how it is generated. [8]  
b) Explain electronic payment system. List the characteristics of e-payments.  
Explain list of requirements to evaluate e-payments system. [8]

**Q11)** Write short notes on: [18]

- a) Identity Theft.  
b) Security by Obscurity.  
c) Computer Forensics.

OR

- Q12)**a) Describe the term “Industrial Espionage” in detail with example. [9]  
b) Write short note on Indian IT Law 2000, 2008 amendments. [9]

EEE

Total No. of Questions : 12]

SEAT No. :

**P1434**

**[4759] - 186**

[Total No. of Pages : 4

**B.E. (Information Technology)**  
**OBJECT ORIENTED MODELING AND DESIGN**  
**( 2008 Course) (Semester - I) (410443)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and*
- 2) *Solve Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Neat diagrams must be drawn wherever necessary.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Write a short note on XML. [6]
- b) Explain the following UML concepts with an example: [6]
- i) Difference between association and link.
  - ii) Relation between Interface and Class.
- c) Explain how we can use stereotypes, tagged values, constraints for modeling School Database Management System. Assume suitable data. [6]

OR

- Q2)** a) How class diagram is used to model logical database schema? Explain with suitable example. [6]
- b) Write short note on: Rational Unified Process. [6]
- c) Explain with suitable example following stereotypes: [6]
- i) friend
  - ii) become
  - iii) instance of

**P.T.O.**

**Q3) a)** Draw a class diagram for Railway Reservation System using advanced notations. Assume suitable data. [8]

b) Develop the Main and Alternate flows of events of “Withdrawal of Cash from ATM System”. [8]

OR

**Q4) a)** What type of elements a package can own? Explain ‘importing and exporting’ concept related to package diagram with suitable example. [8]

b) Hospital management system is a platform through which patient’s problems can be advised online. The main idea of hospital management system is to provide treatment to the patient without meeting the doctor. Firstly, there are three main characters: the doctor, the patient and the organizer. Whenever a patient has any problem related to health, he posts online. The organizer logs in and reads the particular Problem and then takes advice from a doctor and sends prescription to the relevant patient. The same prescription can be referred in future. The doctor can login and prescribe solution to the problem. These are viewed by the organizer and post back the advice to the patient. Patient then pays the fees by cheque/cash/credit card to the organizer and it is in turn paid to the corresponding doctor. Organizer itself plays the role of administrator i.e. maintaining the database, updating the system, paying the doctors, collecting the fees & also issue new members unique id and password and keep them updated. Draw Use Case diagram by making use of advanced notations for given context. [8]

**Q5) a)** Explain different types of relationships that can be used with packages by giving suitable Example. [6]

b) In the context of the composite structure diagram, explain with example the concept and notation for: [6]

i) Port

ii) Connector

iii) Part

c) What is interface? Give notation for an interface in two different ways. [4]

OR

- Q6)** a) Differentiate between. [8]
- i) Instantiate and Instance of
  - ii) Include and Extend
- b) The book club has members. The book club sells books to its members. The member places orders for books, which the book club full fills. Each order contains one or more than one books. The books are written by author(s). The publisher publishes the book. An author can write more than one books and a book can have more than one author. A book is published by a publisher, but a publisher publishes many books. A member can place more than one order. The member also can choose not to place an order. The book club sells may books. Draw a class diagram using advanced notations for given context. [8]

### SECTION - II

- Q7)** a) Differentiate between:. [8]
- a) Activity diagram and Flow Chart
  - b) Signal and Call Operation
- b) Draw Sequence diagram for ‘Two Party Telephone Call’. Represent following things: [8]
- i) Timing Constraints
  - ii) Create
  - iii) SelfCall
  - iv) Iteration

OR

- Q8)** a) You have to model a software system for controlling a Air Conditioner (AC). The AC can be either ON or OFF. In the ON state there are two possibilities.COOLING mode or HEATING mode. There are buttons to change from one mode to other mode automatically based on room temperature crossing cutoffs (Cooling if temperature > 30 degree centigrade and Heating if temperature < 10 degree centigrade). All buttons work only if Power is in On. Draw a state diagram for given system. [8]
- b) What is the purpose of timing diagram? Explain with example. [8]



**Q9) a)** OTOS's pharmacy is the distributor of various pharmaceuticals products. They have a huge network of customers. The registered customers can only book orders for the specified products. If the specified products are available, the required quantity is checked against the quantity on hand (QOH). If the required quantity is less than QOH, a deliver challan is prepared by sales person and at the same time an invoice is prepared by accountant which contains the cost of ordered items and previous outstanding balance (if any). Then the products and invoice is sent to the customer. Draw activity diagram with: **[10]**

- i) Swim lanes,
- ii) Fork and Join,
- iii) Object Flow

**b)** Draw a sequence diagram for 'Issuing a book from College Library'. Represent following things: **[8]**

- i) Alt Operator
- ii) Return Message
- iii) Self Call

OR

**Q10)a)** What is history state? Explain with example. **[6]**

**b)** Explain advanced features of state machine with example. **[6]**

**c)** Draw an Interaction Overview Diagram for a system of your choice. **[6]**

**Q11)a)** What is the relation between component and interface? Explain the concept of import and export interface with example. **[8]**

**b)** Draw component diagram for Railway reservation system. **[8]**

OR

**Q12)a)** How to model an Embedded System using deployment diagram? Explain with example. **[8]**

**b)** Explain the concept of Pattern and Frame with suitable example. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P1435**

**[4759] - 187**

[Total No. of Pages : 3

**B.E. (IT)**

**SOFTWARE TESTING AND QUALITY ASSURANCE**

**( 2008 Course) (Semester -I) (414442)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer question number 1 or 2,3 or 4,5 or 6 from section I.*
- 2) *Answer question number 7 or 8,9 or 10,11 or 12 from section II.*
- 3) *Answers to the two sections should be written in separate answer books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain testing verses debugging. Differentiate between unit testing and integration testing. [8]
- b) Explain in short any four methods of system level testing. [8]

OR

- Q2)** a) Is complete testing possible? When to stop testing? Explain the difference between random testing and testing using error guessing. [8]
- b) Explain unit test planning in detail. [8]

- Q3)** a) What do you mean by white box testing? Explain the different test case design for white box testing. [8]
- b) Explain in detail different functions/responsibilities to be handled in a testing life cycle or process. [8]

OR

- Q4)** a) Explain the different stages of defect prevention process (DPP). [8]
- b) Explain the difference between the following: [8]
- i) Test plan and test strategy.
  - ii) Defect severity and Defect priority.

**P.T.O.**

- Q5) a)** Explain with example the GQM method for identifying software measures. [10]
- b) What is customer problem metric? What are approaches to achieve low PUM. [8]

OR

- Q6) a)** How do you calculate defect density and defect removal rate? Discuss ways to improve these rates for a better quality product. [10]
- b) Write a note on control flow structures also focus on sequencing and nesting of flow graphs. [8]

### **SECTION - II**

- Q7) a)** What does SQA ensure? What are the goals of SQA activity? [10]
- b) Explain the following terms w.r.t software quality: [8]
- i) Quality
  - ii) Cost of Quality
  - iii) Quality Assurance
  - iv) Quality control

OR

- Q8) a)** Illustrate with example the use of following techniques in improving quality. [8]
- i) Code inspection
  - ii) Project planning.
- b) List Ishikawa's Seven Basic Quality Tools. Explain any three with diagram and example. [10]
- Q9) a)** What is six sigma? Explain the terms DMAIC and DMADV with reference to six sigma. [8]

- b) List all the requirements of ISO 9000 and ISO 9001. [8]

OR

**Q10)a)** How does ISO 9000/9001 ensure production of good quality software? [8]

- b) Explanation for the PDCA cycle with reference to ISO 9000:9001. Diagram? [8]

**Q11)a)** Explain the various levels of CMM along with the KPA's for the levels. [8]

- b) Explain in detail the Quantitative Process Management KPA. [8]

OR

**Q12)a)** Explain the goals and activities performed in the following KPA's: [8]

- i) Software Configuration Management.  
ii) Organization Process Definition.
- b) How is defect prevention and process change management brought into practice? [8]



Total No. of Questions : 12]

SEAT No. :

**P1436**

**[4759]-188**

[Total No. of Pages : 3

**B.E. (Information Technology)**

**a: ADVANCED DATABASE MANAGEMENT**

**(2008 Pattern) (Semester - I) (Elective -I) (414443)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answer any three questions from each section.*
- 2) Answers to the two sections must be written in separate answer-books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Assume suitable data wherever necessary.*

**SECTION - I**

- Q1) a)** Explain PL/SQL Transactions. What is save point & cursor? **[8]**
- b) How can you trap exceptions in PL/SQL? Write a code fragment to trap any three exceptions. **[8]**

OR

- Q2) a)** Explain difference between procedure & function in PL/SQL. Consider following database. **[8]**

Employee (Emp\_id, Emp\_name, Emp\_salary).

Write a procedure which read the Emp\_salary from database. If salary is less than 20,000/- then increase it by 10% otherwise by 5%. Update Database accordingly.

- b) What is Cursor in PL/SQL? Explain its types with their attributes. Also explain how to open cursor, fetch cursor, close cursor using suitable example. **[8]**

**P.T.O.**

- Q3)** a) What are TP Monitors? Explain the TP Monitor architectures. [8]  
b) Write short note on Main Memory Databases? [8]

OR

- Q4)** a) Explain transactional workflow with suitable example. [8]  
b) Write down different methods for concurrency control? [8]

- Q5)** a) Where you need to use complex data types? Also explain structured data types and inheritance in object based databases. [8]

- b) A car rental company maintains a vehicles database in its current Fleet. For all vehicles, it includes the vehicle identification number, license number, manufacturer model, date of purchase and color. Special data are included for certain types of vehicle. [10]

Trucks: Cargo capacity

Sports cars: horsepower, renter age requirement.

Vans: Number of passengers

Off-road vehicles: ground clearance, drivetrain (four-or two-wheel drive)

Construct an SQL: 1999 schema definition for this database. Use inheritance where appropriate.

OR

- Q6)** a) Describe XML query algebra operation. Describe use of X-Query for path Expression and FLWOR expression in DBMS. [8]

- b) Explain XML DTD representation for nested relational schema. [10]

### **SECTION - II**

- Q7)** a) Explain Kimball database design methodology for data warehouse. [9]

- b) Present a diagrammatic representation of typical architecture and main components of data warehouse. [9]

OR

- Q8)** a) Explain Data Marts-Reasons and issues. [9]  
b) Explain all schemas used in Data warehouse. [9]
- Q9)** a) Write a note on classification-Decision Trees. [8]  
b) What is k-means algorithms used for? Explain with help of example. [8]

OR

- Q10)** Write short notes on (any two): [16]  
a) Bayesian Classifiers.  
b) Difference between OLTP and OLAP.  
c) OLAP benchmarks and applications.

- Q11)**a) Explain Database Defense Mechanism? [8]  
b) Explain statistical database auditing. [8]

OR

- Q12)**a) Explain what the need of granting and revoking privileges is. [8]  
b) Explain Oracle's named Exception Handlers. [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2015**

**[4759] -189**

[Total No. of Pages : 4

**B.E. (Information Technology)  
ARTIFICIAL INTELLIGENCE  
( 2008 Course) (Elective - I) (Semester - I) (414443)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate sheet.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Explain Turing test. Machine can be made intelligent artificially but ultimately human make the machines. So who is more intelligent -the artificial machine or the person? Discuss. **[8]**

b) Differentiate between an agent and an object. List down the characteristics of intelligent agent. **[8]**

OR

**Q2) a)** Explain Minimax search procedure with suitable example. **[8]**

b) What is Swarm Intelligent? Where swarm intelligence is used? **[8]**

**Q3) a)** Explain production systems with the help of 8-puzzle example. **[8]**

b) In a crypto-arithmetic puzzle, the variable A,B,C,D, E and F can take values from 1 to 7. The variables must all be different and, when taken as digits, they must satisfy the following sum. Solve the following problem as CSP:- **[8]**

$$AB + CD = EF$$

OR

**P.T.O.**



**Q4) a)** What is meaning of word heuristics in the context of search strategies? What conditions on A\* search is required to guarantee completeness and optimality. [8]

b) What are the problems that may arise in hill climbing searching? How they can be handled? Explain. [8]

**Q5) a)** Explain with Example, how first order logic sentences are converted into conjunctive normal form (CNF). [6]

b) Discuss with examples the scope and limitations of knowledge representation using Propositional logic and First Order Predicate logic. [6]

c) Prove that “sarthak is happy” with the help of following facts expressed in CNF. [6]

$\neg \text{pass}(X, \text{history}) \vee \neg \text{win}(X, \text{lottery}) \vee \text{happy}(X)$

$\neg \text{study}(X) \vee \text{pass}(Y, Z) \neg \text{lucky}(W) \vee \text{pass}(W, U)$

$\neg \text{study}(\text{sarthak}) \text{lucky}(\text{sarthak})$

$\neg \text{lucky}(U) \vee \text{win}(U, \text{lottery})$

OR

**Q6) a)** What do you understand by unification in Predicate logic? Give an example to illustrate. [6]

b) Express the following sentences in predicate logic formulae. [6]

i) Fragile things break if they fall

ii) Tennis balls are not fragile

iii) Tennis balls don't break if they fall.

c) Draw a conceptual dependency graph for the sentence “A dog is greedily eating a bone”. [6]

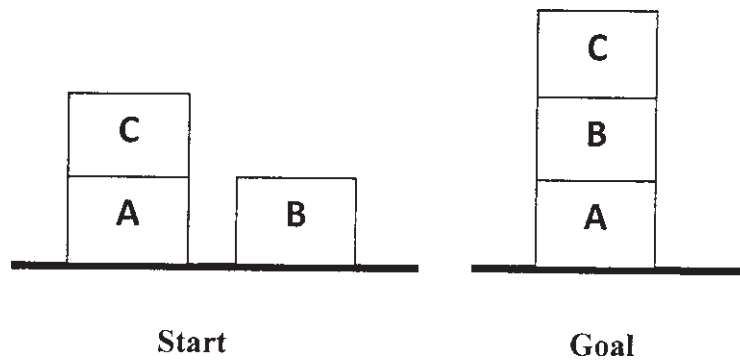
## SECTION - II

**Q7) a)** Explain how vision is used for manipulation and navigation. Give suitable examples to justify your answer. [9]

b) What is planning? Explain the main components of a planning system. [9]

OR

- Q8) a)** Consider the following block world problem where we wish to proceed from the *start to goal* state. [9]



Describe the *start* and *goal* states for the above problem using STRIPS types of the operator. Also specify the precondition of the first operator used for solving the first goal of the goal stack planning.

- b) Write short notes on (ANY TWO). [9]
- Image formation
  - Object Recognition
  - Hierarchical planning
  - Extracting 3D information

- Q9) a)** Explain the basic components of expert system. How can we make expert system knowledge base reusable? [8]
- b) What is a Hopfield Network? How is it used in learning a network? [8]

OR

- Q10) a)** Give a simple mathematical model for a neuron. What are the two choices for activation function? [8]
- b) Describe in detail the steps involved in the knowledge Engineering process. [8]

- Q11) a)** Explain the structure of Prolog program. Also write the features of Prolog language? [8]

- b) Write brief notes on following with respect to prolog. [8]
- i) Cuts
  - ii) Recursion

OR

- Q12)**a) Explain the data types in prolog programming language also write the areas in which prolog programming language is used. [8]
- b) Write brief notes on following. (ANY TWO). [8]
- i) Genetic Algorithms.
  - ii) Distributed AI.
  - iii) Backtracking In Prolog.



Total No. of Questions : 12]

SEAT No. :

**P1518**

**[4759] - 19**

[Total No. of Pages :3

**B.E. (Civil Engineering)**

**ADVANCED ENVIRONMENTAL MANAGEMENT**

**(Elective - III) (2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve Q. No. 1 or 2, 3 or 4, 5 or 6 from section - I and Q. No. 7 or 8, 9 or 10, 11 or 12 from section - II.*
- 2) *Answers to the two sections must be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagram wherever necessary.*
- 5) *Use of logarithmic table, slide rule and electronic pocket calculator are allowed.*
- 6) *Assume Suitable data, if necessary stating it clearly.*

**SECTION - I**

**Q1)** Write in detail about:

**[16]**

- a) The background and development of ISO 14000 series.
- b) The development of National Environmental Policy during various five year plans.

OR

**Q2)** Write a note on:

**[16]**

- a) Water Act, 1974.
- b) Air Act, 1981.

**Q3)** a) Explain in details, the principles and elements of environmental management system (EMS). **[8]**

b) Discuss in detail the Environment Protection Act - 1986 as an umbrella act. **[8]**

OR

**Q4)** a) Explain the Municipal Solid Waste Rules 2000. **[8]**

b) Write the links between ISO 14000 and ISO 9000 in a tubular form. **[8]**

**P.T.O.**

- Q5) a)** Explain the pollution indices in air monitoring and air quality assessment. [9]
- b) Discuss the National Ambient Air quality (NAAQ) Standards for SPM, SO<sub>x</sub>, NO<sub>x</sub> & CO. [9]

OR

- Q6) a)** The ambient air quality for Mumbai, Pune and Nagpur are given below: [10]

Sr. No.	City	SPM ( $\mu\text{g}/\text{m}^3$ )	So <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	CO ( $\mu\text{g}/\text{m}^3$ )
1	Mumbai	170	78	2200
2	Pune	230	72	2600
3	Nagpur	210	87	1700

Determine the air pollution index for each city and thereby name the city having more air pollution.

- b) Discuss the role of meteorological parameters in the dispersion of air pollutants in the atmosphere. [8]

### SECTION - II

- Q7) a)** Explain what you understand by Biomedical waste. Discuss the different methods for collection and disposal of Biomedical waste. [8]
- b) Discuss the energy recovery from solid waste. [8]

OR

- Q8) a)** Explain the various methods of collection and disposal of Municipal Solid Waste. Also discuss the site selection criteria for disposal of MSW. [8]
- b) Discuss the treatment and reuse options for industrial waste water management. [8]

- Q9) a)** Explain colour coding system for biomedical waste management and their collection in different coloured bins or bags. [9]
- b) Explain with reference to hazardous waste: [9]
- i) Toxicity
  - ii) Reactivity
  - iii) Corrosivity

OR  
2

- Q10)a)** Contrast between refuse and garbage. [9]  
List down the most significant property of the city refuse which guides the adoption of each of the following methods of refuse disposal.
- i) incineration
  - ii) Sanitary landfill
  - iii) Composting
- b) Discuss the classification of the wastes generated from the following sources: [9]
- i) Hospitals
  - ii) Electroplating plant
  - iii) Schools and
  - iv) Restaurants

- Q11)a)** Discuss the methodology for preparing Environmental Impact Assessment. [8]
- b) Explain the procedure to carry out the Environmental Impact Assessment of Thermal Power Plant. [8]

OR

- Q12)a)** Explain any two types of check list method for EIA. [8]
- b) Discuss the EIA of construction activities. [8]



Total No. of Questions : 12]

SEAT No. :

**P1437**

**[4759]-190**

[Total No. of Pages : 5

**B.E. (Information Technology)**

**c: COMPILER DESIGN**

**(2008 Pattern) (Semester - I) (414443) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer-books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) With the help of the block diagram explain phases of the compiler. Also write down output of each phase of the compiler for expression  $X=Y * Z / 2$  where X and Z are of float type and Y is of integer type. [10]
- b) Explain Lex specification with example. [6]

OR

- Q2)** a) Explain the following terms- [6]
- i) Cross compiler
  - ii) Bootstrapping
  - iii) Incremental compiler
- b) Differentiate between compiler and an interpreter. [4]
- c) Define token, pattern, lexeme. [6]

**P.T.O.**

**Q3)** For the following grammar

$$S' \rightarrow S\#$$

$$S \rightarrow qABC$$

$$A \rightarrow a \mid bbD$$

$$B \rightarrow a \mid \epsilon$$

$$C \rightarrow b \mid \epsilon$$

$$D \rightarrow c \mid \epsilon$$

- a) Compute First and Follow. [9]
- b) Construct predictive parsing table. [6]
- c) Show sequence of parsing steps for the string qbbcab# [3]

OR

**Q4)** Consider the following grammar, and construct the LR (1) parsing table.[18]

$$S \rightarrow L = R$$

$$S \rightarrow R$$

$$R \rightarrow L$$

$$L \rightarrow * R$$

$$L \rightarrow id$$

$$L \rightarrow \epsilon$$

**Q5) a)** Write syntax directed translation to translate the following 'for' statement into three address code statements. [8]

$$S \rightarrow \text{for } (E1, E2, E3)S_1$$



b) Write three address sequences for the following:

i) switch ( ch ) [4]

```
{  
    case 1 : a = b * c;  
            Break;  
    case 2 : a = b / c;  
            Break;  
}
```

ii) while x > y do [4]

```
    if c < d then  
        a = b + c  
    else  
        a = b - c
```

OR

**Q6)** a) What is Backpatching? How flow translation of Boolean expression is done using backpatching? [8]

b) Differentiate between L - attributed definitions and S-attributed definitions. [8]

### SECTION - II

**Q7)** a) Write short note on activation records. [8]

b) Explain different source language issues. [8]

OR

- Q8)** a) Explain following storage allocation schemes with proper examples: [8]
- i) Stack storage allocation
  - ii) Heap storage allocation
- b) Explain the significance and design of symbol table in the context of compiler. [8]
- Q9)** a) Discuss the various principle sources of code optimization. [10]
- b) Write Quadruple and Triple representation of following expression. [8]
- $$a := b / - c - b / - c + b * c$$

OR

- Q10)a)** i) ‘Loop Unrolling’ involves replicating the body of the loop to reduce the required number of tests if number of iterations are constant. Apply the technique to the loop shown below [5]
- 1) Once and
  - 2) Twice and explain its purpose in code optimization.
- ```

k = 200;
while (k >= 0)
{
    arr[k] = 0;
    k--;
}

```
- ii) ‘Loop Jamming’ is a technique that merges the bodies of two loops if the two loops have the same number of iterations and they use the same indices. Apply this technique to following code fragment and explain its role in optimization. [5]
- ```

for (I = 0; I < 10; I ++)
    for(I = 0; I < 10; I ++)
        X [I, J] = 0;
for (I = 0; I < 10; I ++)
    X[I, J] = 1;

```
- b) Describe any code generation algorithm you know with suitable illustration. [8]

- Q11)a)** Explain different features of object oriented programming with example. [8]
- b) How can overloading and overriding of functions in object oriented programming languages handle by compiler? Explain in detail. [8]

OR

- Q12)a)** Explain differences between class based language and object based language with example. [8]
- b) Write short note on data abstraction and information hiding. [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1438**

**[4759]-191**

[Total No. of Pages : 3

**B.E. (IT)**

**ADVANCED OPERATING SYSTEM**

**(2008 Course) (Semester - I) (Elective -I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections must be written in separate answer-books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data wherever necessary.*

**SECTION - I**

- Q1)** a) Explain any five Unix commands for system administration. [10]
- b) Explain any two Inter process communication mechanisms. [8]

OR

- Q2)** a) Differentiate between multiuser and multitasking O.S. Explain the architecture of operating system. [10]
- b) Give the significance of process synchronization primitives. Explain any two process synchronization primitives. [8]
- Q3)** a) Enlist and explain services performed by Multitasking OS. [8]
- b) Explain the concept of Mailbox in multitasking OS. Give the functional specification of primitive CreateMBox (). [8]

OR

- Q4)** a) Explain the various system lists maintained by KMOS. [8]
- b) Draw and explain process state transition diagram in KMOS. [8]

**P.T.O.**

- Q5)** a) Discuss the design issues of multiprocessor systems. [8]  
b) Enlist various interconnection types. What are the differences between separate supervisors and Master-Slave Systems? [8]

OR

- Q6)** a) Discuss the various multiprocessor design considerations. [8]  
b) Explain the wave scheduling with eg. [8]

**SECTION - II**

- Q7)** a) Define Zones. Describe the data structure required for zone management. [10]  
b) Explain the following system calls with eg. [8]  
i) kcalloc ( )  
ii) kfree

OR

- Q8)** a) Differentiate between kcalloc ( ) and vmalloc ( ) system calls with example. [10]  
b) Explain with neat diagram slab layer allocator. [8]
- Q9)** a) Discuss I/O structure and role of DMA. [8]  
b) Explain the characteristics of I/O devices. [8]

OR

- Q10)** a) Explain the concept of disk caching with suitable example. [8]  
b) What is an I/O interface? Explain in detail its type. [8]

**Q11)a)** Explain system calls **[8]**

i) mount

ii) read

iii) I seek

iv) link

b) Explain in detail VFS. **[8]**

OR

**Q12)** Write short notes on following: **[16]**

a) Slab coloring.

b) File descriptors.

c) Contiguous memory management.

d) File Unification.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P4276**

**[4759] - 191A**

[Total No. of Pages : 3

**B.E. (Information Technology)**

**EMBEDDED SYSTEMS**

**(2008 Pattern) (Elective - II)**

*[Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *In section I attempt : Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6.  
In section II attempt: Q.No. 7 or Q. No. 8, Q. No. 9 or Q.No. 10, Q.No. 11 or Q.No. 12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) What are the advantages of using ASIC & SOC in embedded systems? Explain. [8]
- b) Classify different embedded systems. List commonly used microcontrollers in each category. [8]

OR

- Q2)** a) What are the embedded systems? How they are different than general purpose systems? [6]
- b) What are the different components of an embedded system? [6]
- c) Name the area of applications for the following processors : [4]
- i) Digital signal processor.
  - ii) Media processor.

- Q3)** a) What are the different applications of timers in Embedded systems? How watchdog timer is different? [6]
- b) Explain the techniques to optimize the use of power in an embedded system? [6]
- c) What are the types of memory that can be used in an embedded system? Justify their used. [6]

OR

**P.T.O**

- Q4)** a) How a designer selects EPROM, RAM and peripherals required for an adaptive cruise control system? Explain. [8]  
b) Explain the process of converting a C program into a file for ROM image. [4]  
c) Explain in brief the use of following in an embedded system : [6]  
i) Real time clock  
ii) UART

- Q5)** a) List and describe five types of device driver functions. [8]  
b) Name features of RS-232C. Explain the RS-232C signals used for communication. [8]

OR

- Q6)** a) Explain different features of CAN protocol. [8]  
b) How does host recognize the device insertion in USB protocol? Explain in detail. [8]

### SECTION - II

- Q7)** a) Explain the advantages of programming embedded systems using high-level languages. [8]  
b) Queue data structure of C language is used for networking applications. Explain. [6]  
c) When do you use assembly language for embedded system programming? [4]

OR

- Q8)** a) Compare Java and C++ programming and their suitability for embedded systems. [6]  
b) What is cross compiler? How it is different than generic compiler? Give example for cross compiler. [6]  
c) What is in-circuit emulator? Give details of its use in embedded system development. [6]

- Q9)** a) When do you require RTOS? [6]  
b) With the help of neat diagram, explain cooperative round robin scheduling model for RTOS. What is interrupt latency time for this scheduling model. [10]

OR



- Q10)** a) With the help of neat diagram, explain preemptive scheduling for RTOS. [8]  
b) How can you manage without RTOS? [8]

- Q11)** a) Differentiate MicroC/OS-II and Vx Works based on features and their area of application. [6]  
b) With the help of neat system block diagram, explain the system requirements and tasks for an adaptive cruise control system in a car. [10]

OR

- Q12)** a) How tasks are managed in MicroC/OS-II? Explain in detail. [8]  
b) With help of neat diagram, explain synchronization of tasks and IPCs for TCP/IP network application. [8]



Total No. of Questions : 12]

SEAT No. :

**P1439**

**[4759] -192**

[Total No. of Pages :2

**B.E. (I.T.)**

**MOBILE COMPUTING**

**( 2008 Course) (Semester - I) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain detail PCS architecture with neat diagram. [8]  
b) Explain in detail 1G, 2G and 3G technology. [8]

OR

- Q2)** a) Describe the three Handoff strategies MCHO, NCHO and MAHO. [8]  
b) Explain in detail the concept of frequency reuse. [8]

- Q3)** a) How security is important in Mobile computing? Explain with diagram different security algorithm in GSM. [8]  
b) Explain in detail GSM addresses and identifiers. [8]

OR

- Q4)** a) What is role VLR and HLR? Explain in detail roaming example. [8]  
b) Explain in detail GSM MAP service framework. [8]

**P.T.O.**

- Q5)** a) What are advantages and applications of SMS? Draw and explain SMS architecture. [9]  
b) Explain Mobile originated messaging and Mobile terminated messaging. [9]

OR

- Q6)** a) What is number portability? Describe three types of number portability. [9]  
b) What is hot billing approach? Compare prepaid and postpaid solution. [9]

**SECTION - II**

- Q7)** a) Explain in detail WAP protocol stack. [8]  
b) Explain in detail with neat diagram GPRS architecture. [8]

OR

- Q8)** a) Explain in detail CDMA technology. [8]  
b) Explain features, advantages, applications and limitations of GPRS. [8]

- Q9)** a) Explain various features and header format of IPv6. [8]  
b) What is the importance of home agent and foreign agent in mobile IP? [8]

OR

- Q10)** a) What is the basic purpose of DHCP? How can DHCP be used for mobility and support of mobile IP. [8]  
b) What is MANET? Explain Dynamic source routing in MANET. [8]

- Q11)** a) Explain in detail Spread spectrum technology. [8]  
b) Explain in detail UMTS technology. [10]

OR

- Q12)** a) What is Piconet & Scatternet? Explain in detail Bluetooth technology. [8]  
b) Write a short note on: (any two). [10]  
i) RFiD  
ii) WLL  
iii) WiMAX



Total No. of Questions : 12]

SEAT No. :

**P2016**

**[4759]-193**

[Total No. of Pages : 2

**B.E. (Information Technology)**

**MULTIMEDIA SYSTEMS**

**(2008 Course) (Semester-I) (414444) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section-I.*
- 3) *Answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section-II.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of calculator is allowed.*
- 7) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) Define multimedia system. What are its building blocks? [6]  
b) Elaborate the role of multimedia in education and industry. [6]  
c) What are txt, doc and pdf text formats. [6]

OR

- Q2)** a) Explain architecture of multimedia database system. [6]  
b) Explain MHEG and SGML architecture. [6]  
c) What is text compression? Explain Huffman Coding as text compression technique. [6]

- Q3)** a) Elaborate on TIFF and BMP image file formats. [8]  
b) Elaborate any two Lossy compression techniques. [8]

OR

- Q4)** a) Explain Shannon-Fano algorithm with example. [8]  
b) Explain transform coding with example. [8]

***P.T.O.***

- Q5)** a) What is MIDI? Explain MIDI messages. [8]  
b) Explain RMF and WMA audio file formats. [8]

OR

- Q6)** a) Elaborate Delta modulation (DM) and state how it is different from adaptive delta modulation. [8]  
b) Explain MPEG in detail. [8]

### **SECTION-II**

- Q7)** a) Write a short note on H261, H263. [6]  
b) Explain MOV video file format. [6]  
c) Explain video editing. [6]

OR

- Q8)** a) Write short note on EDTV and HDTV. [6]  
b) Explain video Compact Cassette and Camcorder. [6]  
c) Explain video signal formats. [6]

- Q9)** a) What is virtual reality? Write a short note on forms of Virtual Reality. [8]  
b) What are VR devices? Explain any one virtual reality device. [8]

OR

- Q10)**a) Explain Virtual Reality applications. [8]  
b) Elaborate the basics of VRML. [8]

- Q11)**a) What is animation? Explain types of animations. [8]  
b) Explain morphing and motion cycling animation. [8]

OR

- Q12)**a) Explain applications of animation. [8]  
b) Write note on 3D max. [8]



Total No. of Questions : 12]

SEAT No. :

**P1440**

**[4759] - 194**

[Total No. of Pages :3

**B.E. (IT)**

**DISTRIBUTED SYSTEMS**

**( 2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1)** a) Describe architecture model of Distributed System design. How these models play important role in the design of a distributed system? [9]
- b) Discuss different challenges in designing distributed system. [9]

OR

- Q2)** a) Describe the working of distributed system based upon middleware software systems. Also clearly describe the roles played by middleware in distributed system. [9]
- b) What is a failure model? Explain different failures in detail. [9]

- Q3)** a) What is a Remote Method Invocation? How would you incorporate persistent asynchronous communication into model of communication based on RMIs to remote object? [8]
- b) What is socket? What is the difference between connection-oriented socket and connection-less socket? [8]

OR

**P.T.O.**

**Q4) a)** What is CORBA? Describe the general organization of CORBA system with help of a neat diagram. [8]

b) Compare local method invocation and remote method invocation. Explain the role of proxy and skeleton in remote method invocation in detail. [8]

**Q5) a)** Explain the concept of logic clock and their importance in distributed system. A clock of a computer system must never run backward. Explain how this issue can be handled in an implementation. [8]

b) Explain Ricart and Agrawala's algorithm for mutual exclusion in detail. [8]

OR

**Q6) a)** Suppose that the coordinator crashes. Does this always bring the system down? If not, under what a circumstance does this happened? Is there any way to avoid the problem and tolerate the crash of the coordinator? [8]

b) Define global state. Explain consistent cut and inconsistent cut with suitable example. [8]

### SECTION - II

**Q7) a)** How does the NFS Automounter help to improve the performance and scalability of NFS? [9]

b) Write a short note on [9]

i) Global name service

ii) X.500 directory service

OR

**Q8) a)** Explain following term with respect to Naming entities: [9]

i) Names

ii) Identifiers

- iii) Addresses
- iv) Name Spaces
- b) Explain synchronization and naming in NFS. [9]

- Q9)** a) Explain different implementation approaches to DSM. [8]
- b) What is Data centric consistency model? Explain in detail. [8]

OR

- Q10)**a) Explain monotonic reads and monotonic write. [8]
- b) What is thrashing? Why thrashing is an important issue in DSM systems and what methods are available for dealing with it. [8]

- Q11)**a) What is Byzantine's General problem? Describe Lamport's algorithm to solve this problem. [8]
- b) Explain following points related to fault tolerance issues in Distributed Systems: [8]
- i) Availability
  - ii) Reliability
  - iii) Failure Models
  - iv) Triple modular redundancy

OR

- Q12)**a) Explain basic reliable multicasting. How it could be made scalable. [8]
- b) Draw state transition diagram for Two phase commit protocol and highlight the states where the participant is get blocked. Also mention the drawbacks of 2PC. [8]





Total No. of Questions : 12]

SEAT No. :

**P1441**

**[4759] - 195**

[Total No. of Pages :3

**B.E. (Information Technology)**

**INFORMATION RETRIEVAL**

**(2008 Pattern) (414449) (Semester - II)**

*Time :3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two Sections should be written in separate answer books.*
- 2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section -I & Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Describe 'index term weighing'. [8]  
b) Explain the properties of dissimilarity coefficients used in information Retrieval. [8]

OR

- Q2)** a) Describe different matching coefficients. [8]  
b) Let Document 1 =  
{CPU, keyboard, RAM, VGA, SMPS, USB, CD-ROM, Printer}  
Document 2 =  
{CPU, VGA, Simulator, OS, Video, USB, Printer, Scanner, Compiler}  
Find the similarity between two documents using different matching coefficients. [8]

- Q3)** a) Explain with example signature file structure. [8]  
b) Compare with example suffix trees & suffix arrays. [8]

OR

- Q4)** a) Draw the generalized structure of an inverted file & Explain the algorithm for building an Inverted file of a given document. [10]

**P.T.O.**

- b) Generate an Inverted file for a given text. [6]

‘This is a text. A text has many words. Words are made form letters’.

- Q5)** a) Explain the architectural issues in digital libraries. [8]

- b) Explain the terms Precision and Recall and calculate the same for the following example. [10]

The set of relevant documents for query

$q = \{d3, d7, d8, d11, d14, d19, d23, d25\}$

A new retrieval algorithm returns following answer set

$=\{d1, d2, d3, d7, d9, d10, d14, d20, d23, d24, d25\}$ .

OR

- Q6)** a) Explain TREC document collection with tasks & Evaluation measures at TREC conferences. [10]

- b) Explain different document models, its representations and access. [8]

## SECTION- II

- Q7)** a) Explain with diagram and example how the MIMD architecture is used in parallel IR. [8]

- b) Explain with example how the ‘Query Processing’ is done in distributed IR. [10]

OR

- Q8)** a) Explain with diagram how inverted file is used in MIMD architecture. [8]

- b) Explain Collection Partitioning & Source Selection in Distributed IR. [10]

- Q9)** a) Explain multimedia data support in commercial DBMS. [8]  
b) Write short note on MULTOS query language. [8]

OR

- Q10)**a) Explain how GEMINI is applied to color images. [8]  
b) What is feature extraction in Multimedia IR? How is it helpful for data retrieval? [8]

- Q11)**a) What is role of web crawlers in search engine? How it works? [8]  
b) Explain distributed architecture of search engine. [8]

OR

- Q12)**a) Write short note on: Search Engines. [8]  
b) Write short note on: Characterizing the Web. [8]



Total No. of Questions : 12]

SEAT No. :

**P1442**

**[4759]-196**

[Total No. of Pages : 3

**B.E. (Information Technology)**

**REAL TIME SYSTEMS**

**(2008 Course) (Semester-II) (Elective-III) (414450)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** Explain following terms in brief: **[8]**

- i) Periodic and aperiodic tasks.
  - ii) Time constraints in hard and soft RTS.
- b) How can engineers estimate the worst-case run time of a program, given the source code and target architecture? Draw and explain Schematic of a timing estimation system. **[8]**

OR

**Q2) a)** Draw and explain basic model of Digital Control Real Time System. **[8]**

b) Describe in brief the effect of the following in the estimation of the run-time of the program: **[8]**

- i) Use of Cache.
- ii) A Pipelined Architecture.

**Q3) a)** Explain the classification of uniprocessor scheduling algorithm. With the help of suitable example explain the RM scheduling algorithm. **[10]**

**P.T.O.**

- b) Why Priority inversion mechanism is not suited for real-time applications. Write appropriate solution for this problem. [8]

OR

- Q4)** a) Explain the preemptive Earliest Deadline First(EDF) Algorithm with the help of suitable example. In what way the preemptive EDF is different from RM scheduling algorithm. [10]
- b) Determine which of following tasks is RM schedulable. [8]

Task	Execution Time	Period
1	2	10
2	5	20
3	20	40
4	5	50

- Q5)** a) What are the various benefits of packages? [6]
- b) Explain following policies with respect to task scheduling: [10]
- i) Task Dispatching policy.
  - ii) Entry queuing policy.

OR

- Q6)** a) Describe the Adaptive Earliest Deadline (AED) algorithms used in transaction priorities. State the drawback of AED algorithm. How the Adaptive Earliest Deadline (AEVD) avoid this drawback. [10]
- b) How are timestamps assigned to transaction so that serialization consistency is maintained? Explain with suitable example. [6]

## SECTION-II

- Q7)** a) What is the polled Bus Protocol? [8]
- b) Describe the methods of sending messages. [10]

OR  
2

- Q8)** a) Discuss network architecture issues in real time systems. [10]  
b) What is Stop-and-Go Multihop Protocol? [8]
- Q9)** a) With the help of block diagram explain the capability of RT Linux. [8]  
b) Describe the following capability of real time operating system. [8]  
i) External - Internal Interrupt Handling.  
ii) Memory management through virtual memory mapping and memory locking.

OR

- Q10)**a) List and explain the capabilities of RTOS. [8]  
b) State the commonly found features of commercial RTOS. [8]
- Q11)**a) How is redundancy used for fault tolerance? [8]  
b) Discuss the causes of the failures and describe the types of faults in RTS. [8]

OR

- Q12)**a) Write short notes on: [8]  
i) Time Redundancy.  
ii) Information Redundancy.
- b) Describe the following software redundancy methods: [8]  
i) N-Version Programming.  
ii) Recovery Block Approach.



Total No. of Questions : 12]

SEAT No. :

**P3706**

**[4759] - 197**

[Total No. of Pages :3

**B.E. (Information Technology)  
SOFTWARE ARCHITECTURE**

**(Semester - II) (Elective - III) (2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three Que. from Section I and three Que. from Section II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Make suitable assumptions wherever relevant and appropriate.*

**SECTION - I**

**Q1) a)** Define the given term/concept and give examples. **[10]**

- i) Software architecture
- ii) Stakeholders in architecture.

b) Explain Architecture Business Cycle activities in detail. **[8]**

OR

**Q2) a)** How the collaboration can be used to model the system of components and connectors. **[10]**

b) Explain with suitable example: **[8]**

- i) Architecture is high-level design
- ii) Architecture is the overall structure of the system
- iii) Behavior of each software element is part of the architecture
- iv) Architecture has component & connectors.

**Q3) a)** Explain Templates for documenting interfaces. **[8]**

b) Following concern in context of modifiability: “when is a change made and who makes it”. **[8]**

OR

**Q4) a)** Write short note on following: **[8]**

- i) Modifiability Tactics.
- ii) Security Tactics.

b) What is Quality Attributes? Explain quality attributes of web application? **[8]**

**P.T.O.**

- Q5)** a) Describe Abstract Factory pattern with respect to intent, application and solution. [8]  
b) With structure explain observer pattern. Give examples of the same. [8]

OR

- Q6)** a) How observer pattern can be used to design a digital and an analog clock. Explain with the structure and behavior. [8]  
b) Write a short note on Model View Controller (MVC) and its application? [8]

### **SECTION - II**

- Q7)** a) Compare Different architecture styles. [10]  
b) Explain concept of: [8]  
i) Loose coupling.  
ii) Addressing quality attributes through multi tier architecture.

OR

- Q8)** a) Explain three tier architecture with reference with to presentation, business and persistence layers. [10]  
b) Write short note on following: [8]  
i) Coupling in XML.  
ii) Structure of XML.

- Q9)** a) Compare and contrast EJB 2.0 EJB 3.0. [8]  
b) Write short note on following: [8]  
i) JSP  
ii) JSF

OR



- Q10)a)** Explain with example and Advantages of [8]
- i) Web Server
  - ii) Application Server
- b) Explain with example: [8]
- i) CGI
  - ii) Application Server

- Q11)a)** Explain DLL Servers in detail. [8]
- b) What kind of responsibilities does a web client have? How can one make web client more dynamic. [8]

OR

- Q12)a)** Describe .NET Architecture. What is role of CLR, CLS, CTS and CLI in it? [8]
- b) Write short note on following: [8]
- i) .NET web services
  - ii) Legacy Application



Total No. of Questions : 12]

SEAT No. :

**P1443**

**[4759]-198**

[Total No. of Pages :2

**B.E. (Information Technology )**

**ADVANCED GRAPHICS**

**(414450) (2008Course) (Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section-I and 3 questions from section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) Write the properties of B-Spline curves. [6]  
b) Determine the Bezier Blending function for five control points, plotted each function and label the maximum and minimum function values. [8]  
c) Describe any two 3D display methods. [4]

OR

- Q2)** a) Explain different types of polygons with related equations. How polygon tables are used for representing polygon surfaces. [10]  
b) Explain the perspective projection and parallel projection diagrammatically? [4]  
c) Write the parametric equations for the polygon and parametric surfaces. [4]

- Q3)** a) An animation sequence is to be developed to show a car accelerating from stationary position and then moving with constant speed. Show how the accelerations can be simulated for this purpose? [8]  
b) Explain various methods for controlling animation. [8]

OR

- Q4)** a) What are the four steps in Animation sequence? Explain any two steps in detail. [8]  
b) Define Real-time Animation. Discuss any two devices used for producing animation. [8]

***P.T.O.***

- Q5)** a) Explain the Boolean operations in CSG. [8]  
b) Explain the concept of primitive instancing with eg. [8]

OR

- Q6)** Write a short note on following: [16]  
a) B-Rep and its data structures  
b) Data structures for Polygon surfaces  
c) Spatial-partitioning representations  
d) Polygon Meshes

**SECTION-II**

- Q7)** a) Explain CIE chromacity diagram in detail. [10]  
b) Explain basic illumination models. [8]

OR

- Q8)** a) Illustrate the unique cube representation for RGB model. Enlist at least four differences between RGB and CMY color model. [8]  
b) What is the significance of rendering? Explain various types of polygon rendering methods. [10]

- Q9)** a) Compare between flat shading and Gouraud shading. Explain Phong shading. [8]

- b) Explain HSV and HLS color models. [8]

OR

- Q10)**a) Explain the basic illumination models. [8]  
b) Explain the concept of beam tracing with eg. [8]

- Q11)**a) Describe any two special devices that are used for man machine interaction in virtual reality systems. [8]

- b) Define Virtual Reality. Explain various application areas of virtual reality. [8]

OR

- Q12)** Write a short note on following: [16]

- a) Virtual Reality Languages  
b) Ray Tracing  
c) Additive color mixing approach  
d) Specular Reflection





Total No. of Questions : 12]

SEAT No. :

**P1444**

**[4759]-199**

[Total No. of Pages : 2

**B.E.(I.T)**

**ADVANCED COMPUTER NETWORK  
(414450) (2008 Course) (Elective-III) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary*

**SECTION-I**

**Q1)** a) What are the network elements? Draw neat diagram of network architecture? [8]

b) State similarities and differentiate various wireless networks such as Bluetooth, Wi-Fi and Wi-Max. [10]

OR

**Q2)** a) How packets are transported in datagram and virtual circuit network? [8]

b) Explain ATM reference model and its protocol stack. [10]

**Q3)** a) Draw a neat diagram of ATM header? [8]

b) What is Network Address Translator? Explain in detail with example. [8]

OR

**Q4)** a) Explain mobility management issues in wireless networks. [8]

b) Explain addressing schemes in ATM networks? [8]

**Q5)** a) How dynamic routing optimization is carried out with different algorithm? [8]

b) Explain how "Availability of network" is calculated using MTBF and MTTR. [8]

OR

**P.T.O.**

- Q6)** a) Explain Markov chain model for circuit-switched network? [8]  
b) What are the parameters specified in quality of service? Explain in details? [8]

**SECTION-II**

- Q7)** a) Explain 5 different delays encountered by ATM cell with the help of figure. [8]  
b) Explain architecture of wireless network. State its applications. [10]

OR

- Q8)** a) What are VPN's? Explain the significance of Tunneling in VPN'S. [10]  
b) Explain how ATM network can transport IP packets. [8]

- Q9)** a) Explain in brief protocol suite, H.323 for IP telephony. [8]  
b) Explain blocking probability in circuit switch network. [8]

OR

- Q10)**a) Explain various features of IPV6? [8]  
b) Explain DSR protocol for Ad-hoc network. [8]

- Q11)**a) Explain the features of reactive and proactive routing protocols for MANET's. [8]  
b) Explain how firewall is implemented in the network. [8]

OR

- Q12)**a) Explain cluster based network architecture for ad- hoc networks. [8]  
b) Explain in detail PGP Protocol. [8]



Total No. of Questions : 12]

SEAT No. :

**P1505**

[4759] - 2

[Total No. of Pages : 3

**B.E. (Civil)**

**DAMS & HYDRAULIC STRUCTURES**

**( 2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and three questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain the concept of construction of R.C.C. Dams and state and explain the advantages of R.C.C. Dams. [8]
- b) Write short note on. [8]
- i) Dam Instrumentation
  - ii) Strengthening of dams.

OR

- Q2)** a) What are different types of arch dams? And explain any one type of arch dam. [8]
- b) What are different factors that govern the selection of site for dam. [8]
- Q3)** a) State any four forces acting on gravity dam and write their equations.[8]
- b) What is phenomenon and significance of [10]
- i) Steady seepage condition
  - ii) Sudden drawdown condition

OR

- Q4)** a) Write any four forces acting on a slide of an earthen dam failure envelope with the help of a sketch of free body diagram of forces and write their equations. [10]

**P.T.O.**

- b) If drainage gallery is not provided in gravity dam, then what will happen to its stability? Explain with help of sketch. Also write an equation of pressure if gallery is provided in gravity dam. [8]

- Q5) a)** What is economic height of dam? How it is determined? Calculate the economic height using following data. [8]

Ht(m)	Cost of construction (Crores in Rs.)	Storage Mm <sup>3</sup>
13	4	46
23	7	101
33	10	176
43	15	250
53	21	328
63	26	401
70	36	505

- b) What is filter? Why it is provided? Write the design criteria of filter. Also, state types of filters. [8]

OR

- Q6) a)** State middle third rule and with help of sketch explain its significance. [8]  
 b) What is phreatic line? Enlist the steps to draw the phreatic line. [8]

### SECTION - II

- Q7) a)** State the classification of spillways and explain functioning of ogee spillway. Also enlist design steps of ogee spillway. [8]  
 b) Why gates are provided on spillways? Explain functioning of radial gate with help of sketch. [8]

OR

- Q8) a)** What is diversion head work? Draw its layout and state its components. [8]  
 b) Write down equations for following. [8]

- i) Correction on account of mutual interference  
 ii) Exit gradient

Explain the terms of above equations with help of sketch.



- Q9) a)** Enlist the steps in designing of trapezoidal lined canal. [10]  
b) When the syphon and aqueduct is selected as appropriate CD work? Explain with sketch. [8]

OR

- Q10)a)** Define [8]  
i) Capacity factor  
ii) Time factor  
iii) Lining of canal  
iv) Limiting velocity  
b) Differentiate between cross-regulator and head regulator with help of sketch. [10]

- Q11)a)** What is river training? Why it is done? Explain classification of river training. [8]  
b) With help of sketch, explain layout of hydropower plan. State the different components and their functions. [8]

OR

- Q12)a)** What is groyne? State classification of groyne. [8]  
b) Define. [8]  
i) Load factor  
ii) Utilization factor  
iii) Capacity factor  
iv) Assessment of power potential.



Total No. of Questions : 12]

SEAT No. :

**P1519**

[4759] - 20

[Total No. of Pages :3

**B.E. (Civil)**

**CONSTRUCTION MANAGEMENT**

**(Elective - III) (2008 Course) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q. 1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section - I and Q. 7 or Q.8, Q.9 or Q. 10, Q. 11 or Q. 12 from section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain with example components of infrastructures which plays critical role in economic development of the country. [12]
- b) What do you mean by project overrun? Explain in detail. [6]

OR

- Q2)** a) What is mean by project management consultant? Explain his role from appointment upto completion with one particular example in construction sector. [12]
- b) How construction projects are monitored and their reporting is done?[6]

- Q3)** a) Define scheduling. What are uses and advantages of scheduling? Explain LOB technique. [8]
- b) Explain time & motion studies with applications in construction management. [8]

OR

- Q4)** a) Explain work breakdown structure. Prepare WBS for the construction of bridge across river. [8]
- b) Define work study. Explain flow process chart with example. [8]

*P.T.O.*

- Q5)** a) Explain need and importance of labour laws in construction industry. [4]  
b) Explain the following terms: [12]  
i) Project balance sheet.  
ii) Profit and loss account.  
iii) Working capital.

OR

- Q6)** Write short Note on: [16]  
i) Project cash flow projection.  
ii) Interstate Migrant Workers Act.  
iii) Workman's Compensation Act 1923.  
iv) Capital investment.

**SECTION - II**

- Q7)** a) Explain in detail different types of risks. [10]  
b) Write note on: [8]  
i) Value engineering applications in construction industry.  
ii) Role of insurance in risk management.

OR

- Q8)** a) Explain the different phases of a value engineering Job Plan. [10]  
b) Explain with example how mathematical models are useful in risk management. [8]
- Q9)** a) Write down procedure of training supervisors and executives in a big project. [8]  
b) Define EOQ? Derive its expression. [8]

OR

- Q10)** a) What is role of Material management in construction sector. [8]  
b) What is performance appraisal and job Evaluation? Explain steps in job evaluation. [8]

**Q11)a)** What is ANN explain? Write down applications of artificial intelligence in construction management. **[8]**

b) What is an expert system? Write down the applications of expert system in construction. **[8]**

OR

**Q12)** Write short note on: **[16]**

i) Fuzzy logic.

ii) Genetic algorithm.

iii) Biological neuron.

iv) Applications of Neural networks in Construction Engineering.



Total No. of Questions : 12]

SEAT No. :

**P1445**

**[4759] - 200**

[Total No. of Pages :3

**B.E. (I.T.)**

**BIOINFORMATICS**

**(2008 Course) (Semester - II) (Elective-IV) (414451)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and three questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Define Bioinformatics. Explain any four protein databases with most suitable example of each. **[8]**
- b) What is central Dogma of Molecular Biology. Explain with neat diagram. Why is Bioinformatics referred to as information science? **[8]**

OR

- Q2)** a) Explain Bioinformatics applications with respect to the following areas: **[8]**
- i) Microarrays
  - ii) Drug Discovery
  - iii) Sequence Assembly
- b) Explain the significance of DNA, RNA and protein Molecules. Explain DNA with neat diagram. **[8]**

- Q3)** a) Explain how microarray data analysis is applied in Bioinformatics with the help of neat diagram. **[8]**
- b) What is sequence alignment? List the different methods of computational sequence alignment in detail. **[8]**

OR

**P.T.O.**

**Q4) a)** List the various statistical analysis tools. What is meant by sensitivity and specificity of a tool? Explain any one statistical analysis tool in detail. **[8]**

b) What is the significance of user interface & information theory in Bioinformatics? Explain the user interface hierarchy alongwith neat diagram. **[8]**

**Q5) a)** Explain in detail the text mining process in NLP. **[8]**

b) What is sequence alignment? List various sequence alignment methods. Explain any two methods of sequence alignment in detail. **[10]**

OR

**Q6) a)** What are the types of machine learning processes? Explain any two processes in detail with neat diagram. **[8]**

b) Define sequence alignment. Explain following two sequence alignment methods in detail: **[10]**

i) Dynamic Programming

ii) Word method

## **SECTION - II**

**Q7) a)** Explain the ab-initio and Heuristic methods of protein structure Prediction in detail with neat diagram. **[8]**

b) What is the need of collaboration & communication in Bioinformatics? Draw the neat diagram of collaboration & communication model with proper hierarchy. Also explain synchronous & asynchronous collaboration. **[10]**

OR

**Q8) a)** Explain the comparative modeling process of protein structure Prediction. **[8]**

b) What are the components involved in modeling & simulation system? Explain the basic components in this modeling and simulation system in detail with neat diagram. **[10]**

- Q9) a)** Explain FASTA algorithm in detail. List various implementations of FASTA [8]
- b) Differentiate between FASTA and BLAST algorithm. Listing major differences between the two. [8]

OR

- Q10)a)** Explain BLAST algorithm in detail. Discuss PSI-BLAST method in brief. [8]
- b) What is an E-value? Explain its significance in FASTA search. [8]

- Q11)a)** What is Genetic Engineering? Explain its major applications in brief. [8]
- b) Explain the process of interchange and transformation of pollutants in atmosphere, hydrosphere & lithosphere. [8]

OR

- Q12)a)** Discuss the various factors responsible for degradation in the ecosystem. [8]
- b) Explain drug discovery process. What is the importance of the cell cycle in the drug discovery process. [8]



**NEURAL NETWORK AND EXPERT SYSTEMS**  
**( 2008 Pattern) (Elective - IV) (Semester - II) (414451)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

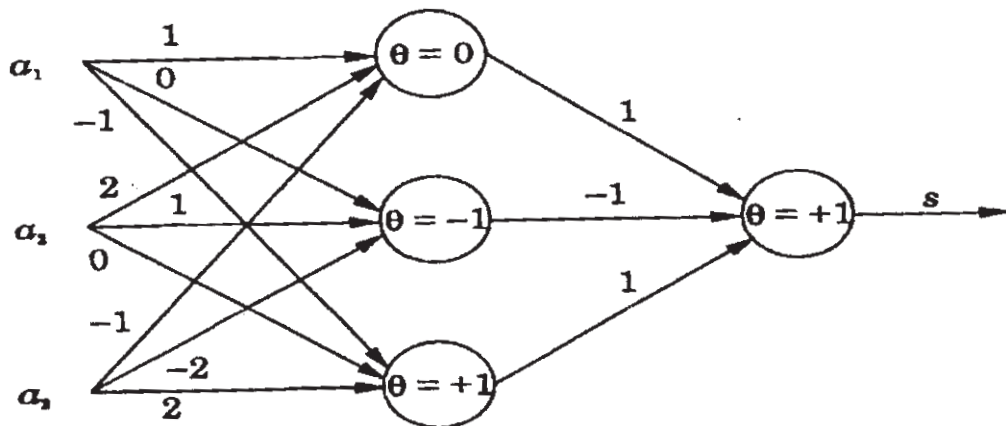
- 1) Answers to the two sections should be written in separate answer- books.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.

**SECTION - I**

- Q1) a)** Explain McCulloch-Pitts Model of neurons. Represent NAND and NOR gate using MP neurons. [7]
- b) Explain with examples, differences between the following pattern recognition tasks: [9]
- i) Association vs classification
  - ii) Classification vs mapping
  - iii) Classification vs clustering

OR

- Q2) a)** What is activation function? State its types. Explain Sigmoid function in detail. [8]
- b) What is MP Neuron Model? Give the output of the following network for the input [1 1 1]T. [8]





- Q3)** a) Explain following learning laws in detail. [9]  
i) Hebb's law  
ii) Perceptron learning law  
b) Explain and compare supervised and unsupervised learning in detail. [7]

OR

- Q4)** a) Distinguish between linearly separable and linearly inseparable problems. Why a single layer of perceptron cannot be used to solve linearly inseparable problems. [8]  
b) What are feed forward neural networks? Explain pattern classification and regression using Multi-layer feed forward neural networks. [8]

- Q5)** a) Explain construction of optimal hyperplane for linearly separable pattern with respect to support vector machine. [9]  
b) What are radial basis function networks? How it is used to perform complex pattern classification task? [9]

OR

- Q6)** a) Explain radial basis function networks in the form of layered structure. [9]  
b) Write a short note on optimal hyperplane for non separable patterns. [9]

## **SECTION - II**

- Q7)** a) Explain Hopfield network algorithm to store and recall a set of bipolar patterns. [8]  
b) Explain Boltzman machine architecture together with the Boltzman learning law. [9]

OR

- Q8)** a) What is SOFM? Draw and explain its architecture. How training is done in SOFM? [9]  
b) Write a short note on "Recurrent Neural Networks". [8]

- Q9)** a) Explain the rule based architecture of expert system. [8]  
b) What are the advantages in keeping knowledge base separate from control module in knowledge based system? [8]

OR

- Q10)** a) Explain with neat diagram blackboard system architecture and its components. [8]  
b) What is uncertainty? Explain two approaches that deal with uncertainty problem. [8]

- Q11)** a) What is PROLOG? Explain how knowledge is represented in PROLOG? [9]  
b) Write a short note on ELIZA. [8]

OR

- Q12)** a) List programming languages for AI problems. Comment on language constructs in LISP. [9]  
b) Write a short note on MYCIN. [8]



Total No. of Questions : 12]

SEAT No. :

**P1446**

**[4759]-202**

[Total No. of Pages : 3

**B.E. (Information Technology)**

**GEO INFORMATICS SYSTEM**

**(2008 Pattern) (Semester - II) (Elective -IV)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain the methods to correct pixel misplacement errors in remotely sensed images? **[10]**
- b) Explain how basic element of image interpretation performs their role in image processing? **[8]**

OR

- Q2)** a) Explain in detail the phases of digital image processing? **[10]**
- b) Discuss in detail the major differences between global and local methods of interpolation? **[8]**
- Q3)** a) What is imaging sensor system? Give detailed classification? **[8]**
- b) Describe in detail spatial resolution and spectral resolution with example? **[8]**

OR

**P.T.O.**

- Q4)** a) List any six applications of RADAR and explain any one in detail? [8]  
b) Explain SLAR and SAR in detail? [8]
- Q5)** a) What is GIS? Explain GIS work flow in detail with example? [8]  
b) Explain web-based GIS? What are the major issues which need to be addressed at the time of designing web-based GIS? [8]

OR

- Q6)** a) Define GIS? List and explain terminologies in GIS with example? [8]  
b) What is cartographic model? Explain the major stages involved in cartographic modelling? [8]

### **SECTION - II**

- Q7)** a) What is the need of transformation? Explain translation, scaling and rotation in detail? [10]  
b) Explain the errors and its impact of GIS data? [6]

OR

- Q8)** a) Explain each of the following w.r.t. spatial statistics: [10]  
i) Random and Independent variable  
ii) Probability density and joint probability distribution.
- b) Explain the factors affecting quality of GIS data? [6]
- Q9)** a) “Raster is faster, but vector is corrector”, Justify? Write the respective strengths and weakness of raster and vector data structures in GIS. [8]  
b) Give the classification of data in GIS. Explain with example? [8]

OR

**Q10)a)** What is raster GIS model? Explain GRID, IMGRID and MAP raster model in detail? [8]

b) Explain in detail layer based GIS data management approach with example? [8]

**Q11)a)** Explain how GIS can be used for disaster management? Assume suitable data? [10]

b) Explain in detail GIS application, design and development? [8]

OR

**Q12)a)** Explain how GIS can be used for vehicle routing and scheduling by municipal corporation? Assume suitable data? [10]

b) Explain the role of GIS database in GIS projects design in detail? [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1447**

**[4759]-203**

[Total No. of Pages : 3

**B.E.IT**

**BUSINESS INTELLIGENCE**

**(2008Course) (Elective-IV) (Semester-II)(414451)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section .*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*

**SECTION-I**

- Q1)** a) Explain Structured and unstructured data. What are the challenges in implementation of Data Warehouse?. [8]
- b) Explain Subject Orientation and Application Orientation in data warehouse. Give example. [8]

OR

- Q2)** a) Explain usage of data warehouse in retail sales system. [8]
- b) How is an OLTP system useful in an organization? What are its applications. [8]

- Q3)** a) DW has one dimension called 'Product' with attributes like product\_ID, Product\_Name, Product\_Category.  
The product ice cream has Product\_ID =15, Product\_Name= "Ice. Cream" and Product\_Category= "Dairy".

On 1<sup>st</sup> Apr 2014 the product category of ice cream is changed to

"Cold Storage" Elaborate 3 ways to handle this scenario [8]

- b) Write a short notes on
- i) Star Schema
  - ii) Snowflake Schema.

[8]

OR

**P.T.O.**

- Q4)** a) List out the important characteristics of a dimension table. Explain conformed dimensions. [8]
- b) Explain transaction and recurring snapshot types of dimensional modeling. Highlight two main differences between these two modeling types. [8]
- Q5)** a) What is ETL? Explain the architecture of ETL. [9]
- b) Explain the following terms [9]
- i) Data Extraction & Cleansing.
  - ii) Data scrubbing
  - iii) Cubes

OR

- Q6)** a) What is data Staging? Explain its Explain Its pros and cons. [6]
- b) How are following scenarios handled in the ETL process: [6]
- i) NULL values are present in the Operation Data Source.
  - ii) Multiple abbreviations for the same value e.g. Pune is represented as PUN, POONA, Pune etc in Operational Data Source.
- c) Data sources form which the data is extracted for ETL process can be heterogeneous at many times. What are the typical challenges involved in handling such data sources? [6]

## SECTION II

- Q7)** a) What is OLAP? Explain “slicing and dicing”, “drill down and Roll-up” and “Multidimensional” with respect to the OLAP. [9]
- b) Explain reporting architecture with suitable diagram. [7]

OR

- Q8)** a) What is the importance of visualization in BI system? Explain any 4 types of charts including their purpose and significance in details. [8]
- b) Explain different levels of securities implemented in DW applications. Explain report level security in details. [8]

- Q9)** a) List different statistical techniques for data analysis. Explain any one of them. [6]
- b) Explain any one method of hierarchical clustering with an example. [10]

OR

- Q10)** a) There are 2 sets of data mining algorithms - supervised and unsupervised. Elaborate the major difference between the 2. Clustering is one of them. Is it supervised or unsupervised? Why? Explain any one technique that is used for clustering numeric data. [10]
- b) Given the data from the stock market it needs to be predicted that how a particular stock will perform in future. Which analysis technique can be used? Justify. [6]

- Q11)** a) What is BIG Data? List different technologies available for supporting BIG data. [9]
- b) Explain following terms
- i) Operational BI.
  - ii) Agile BI. [9]

OR

- Q12)** a) Explain BI on Cloud. [2]
- b) Explain real time BI. Explain its application in detail. [9]
- c) Explain salient features of Netezza. [7]





Total No. of Questions : 12]

SEAT No. :

**P1448**

**[4759]-204**

[Total No. of Pages : 2

**B.E. (Computer Engineering)**  
**CLOUD COMPUTING**  
**(2008 Course) (Semester-II) (Elective-IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate answer-books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*

**SECTION-I**

- Q1)** a) Define Cloud? Discuss different cloud computing service models? [6]  
b) Discuss Organizational Scenarios in cloud computing. What are the benefits and limitations of cloud in business model? [10]

OR

- Q2)** a) Discuss Google App.Engine. [10]  
b) What is utility computing? Discuss. [6]
- Q3)** a) What is hypervisor? What are different hypervisor vulnerabilities? [10]  
b) Compare SOAP and REST? [6]

OR

- Q4)** a) Discuss Ajax. What do you mean by asynchronous interfaces?. [8]  
b) What is multitenancy? What is multi-schema approach? [8]
- Q5)** a) Define cloud file system.Compare GFS With HDFS. [10]  
b) Discuss map reduce model with suitable example. [8]

OR

- Q6)** a) What is HBase? Explain in detail. [10]  
b) Explain different parallel architectures. Elaborate differences between row oriented and column oriented approach. [8]

***P.T.O.***

## SECTION-II

**Q7)** a) Discuss cloud security concerns with respect to public, private and hybrid cloud. [8]

b) Define trusted cloud computing with suitable examples? [8]

OR

**Q8)** a) What is Virtual Machine? Discuss VMM in detail. [8]

b) How does one can ensure secure execution environments and communications in cloud environment? [8]

**Q9)** a) What are the issues in cloud computing? Discuss Quality of Service Issues in Cloud Computing. [8]

b) Discuss dependability. Explain data migration with suitable example. [8]

OR

**Q10)** a) Explain cloud middleware. Discuss a grid of clouds. [10]

b) Explain sky computing. How the load balancing is done in cloud?. [6]

**Q11)** a) What is Nimbus? Discuss in detail the cloudinit.d and context broker. [10]

b) Explain different features and functions of Virtual Computing Lab. [8]

OR

**Q12)** a) Discuss Eucalyptus implementation and its components. [10]

b) Discuss and differentiate Open Nebula and Nimbus. [8]



Total No. of Questions : 12]

SEAT No. :

**P1449**

**[4759]-205**

[Total No. of Pages : 3

**B.E. (Computer Engineering)**  
**DESIGN & ANALYSIS OF ALGORITHMS**  
**(2008 Course) (Semester - I) (410441)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from section- I and three questions from section -II.*
- 2) *Answers of section - I and section - II should be written on separate answer sheets.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagram wherever necessary.*
- 5) *Make suitable assumptions wherever necessary.*

**SECTION - I**

**Q1) a)** Give Greedy Prim's minimum spanning tree algorithm. Also explain it with suitable example. **[10]**

b) Solve following recurrence: **[8]**

$$t(n) - 2 t(n-1) = 3^n$$

OR

**Q2) a)** Write an algorithm for Knapsack greedy problem.

Find an optimal solution for following knapsack problem:

$$n=4, M=70, w= \{10, 20, 30, 40\}, P = \{20, 30, 40, 50\} \quad \text{[10]}$$

b) Write an algorithm for merge sort. State its time complexity by solving recurrence equation of merge sort. **[8]**

**Q3) a)** Let  $n = 4$  and  $\{k_1, k_2, k_3, k_4\} = \{\text{do, if, int, while}\}$ .

$$\text{Let } p(1:4) = \{3, 3, 1, 1\}$$

$$\text{Let } q(0:4) = \{2, 3, 1, 1, 1\}$$

Compute & construct OBST for above values. **[8]**

**P.T.O.**

- b) State and explain the principle of dynamic programming. Name the elements of dynamic programming and give the difference between dynamic programming and Greedy method. [8]

OR

- Q4)** a) Explain multistage graph problem with forward approach using dynamic programming with an example. [8]

- b) Define the Traveling Salesperson Problem. Solve the TSP problem using Dynamic programming where the edge lengths are given as: [8]

0 10 15 20

5 0 9 10

6 13 0 12

8 8 9 0

- Q5)** a) Explain in detail backtracking strategy and give control abstraction for the same. [8]

- b) Write the control abstraction for LC-Search. Explain how Traveling Salesperson problem is solved using LCBB. [8]

OR

- Q6)** a) Write an algorithm on Hamiltonian cycles using Backtracking Strategy. [8]

- b) Write an algorithm to solve n queen's problem using backtracking methods. What is the time complexity of this algorithm? [8]

### SECTION - II

- Q7)** a) State and explain in detail Cook's theorem. [10]

- b) Describe with example following class:

i) P                      ii) NP [8]

OR

**Q8)** a) Prove that CNF-SAT is polynomially transformable to DHC, hence DHC is NP-complete. [10]

b) Explain NP hard code generation problem. [8]

**Q9)** a) Explain in detail with example Logarithmic time merging algorithm. [8]

b) Explain with example parallel evaluation of expression. [8]

OR

**Q10)**a) Explain All pairs shortest paths. Also give parallel shortest paths algorithm. [8]

b) State and explain pointer doubling problem with algorithm, what is the time complexity of this algorithm. [8]

**Q11)**a) Explain Resource - Allocation algorithm with deadlock avoidance. [8]

b) Explain in detail sorting and convex Hull algorithm. [8]

OR

**Q12)**a) Explain Image edge detection algorithm. [8]

b) Explain how Huffman's technique is used for data coding. [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1450**

**[4759] - 206**

[Total No. of Pages : 4

**B.E. (Computer Engineering )  
PRINCIPLES OF COMPILER DESIGN  
( 2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from Section I and three questions from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain various phases of compiler with example. List various errors detected in each phase of compiler. **[8]**
- b) Design SLR parsing table for following grammar: **[8]**
- $S \rightarrow AS|b$
- $A \rightarrow SA|a$
- c) Compare Recursive Descent parser and predictive parser. **[2]**

OR

- Q2)** a) Why Lexical analyzer and parser are two separate phases? How they are combined in single pass? **[4]**
- b) Show that following grammar is LR (1) but not LALR. **[8]**
- $S \rightarrow Aa | aAc | Bc|bBa$
- $A \rightarrow d$
- $B \rightarrow d$

**P.T.O.**

c) Test whether following grammar is LL (1)? [6]

$S \rightarrow iEtSS'|a$

$S' \rightarrow eS | \epsilon$

$E \rightarrow b$

**Q3) a)** What is the need of type checking and type analysis? [4]

b) What are synthesized and inherited attributes? Give proper examples. [4]

c) What are advantages of Syntax Directed Translation (SDT)? Explain how intermediate code is generated using Top-down translation scheme. [8]

OR

**Q4) a)** What is type casting? Explain implicit and explicit type casting, with example. What changes should be made in semantic analyzer to add type casting. [8]

b) Differentiate between L-attributed definition and S-attributed definition. [4]

c) What is semantic analysis? Give some examples of errors that are detected during semantic analysis. [4]

**Q5) a)** Explain commonly used intermediate code representations. Give one example for each. [8]

b) Write a syntax directed translation scheme for “if E then S”. [8]

Generate code for following statement using the above scheme:

if  $a < b$  and  $c > d$  then  $a = b + c$ .

OR

**Q6) a)** Give syntax directed translation scheme for Assignment statement. [6]

b) Explain syntax directed translation scheme for Arrays. Generate quadruples for the following: [10]

$A[i][j] = B[i][j] + C[i][j]$

where A, B and C are arrays of size  $10 \times 20$ .

## SECTION - II

**Q7) a)** Explain following storage allocation schemes with proper examples. **[12]**

- i) Stack storage allocation
- ii) Static storage allocation
- iii) Heap storage allocation

**b)** For the following 'C' program, show the details of the activation records, if **[6]**

- i) Stack allocation is used
- ii) Heap allocation is used

```
main ( )
{
    int * p;
    p = fun ( );
}
int * fun ( )
{
    int i = 23;
    return & i;
}
```

OR

**Q8) a)** Explain following parameter passing techniques using suitable examples. call by value, call by reference, call restore, call by name. **[8]**

**b)** Compare static scope with dynamic scope. Illustrate with suitable example. **[10]**



- Q9)** a) Explain Dynamic programming algorithm for code generation. [8]  
b) Explain with example: [8]  
i) Basic blocks and flow graph  
ii) Peephole optimization

OR

- Q10)**a) What are different issues in code generation? [6]  
b) Explain simple code generation algorithm. Generate code for following 'C' program. [10]

```
main ()  
{  
    int i;  
    int a [10];  
    while (i ≤ 10)  
        a [i] = 0;  
}
```

- Q11)**a) Discuss the principle sources of code optimization. Give proper examples wherever necessary. [8]  
b) Explain fundamental data flow properties. [8]

OR

- Q12)**a) What is "ud chain"? Explain Gen set and Killset for ud chain. [6]  
b) What is Global common sub-expression? Write an algorithm for elimination of Global common sub-expression. [6]  
c) Explain in brief: [4]  
i) Reaching definitions  
ii) Live variables



Total No. of Questions : 12]

SEAT No. :

**P1451**

**[4759] - 207**

[Total No. of Pages : 3

**B.E. (Computer Engineering)**  
**OBJECT ORIENTED MODELING AND DESIGN**  
**( 2008 Pattern) (Semester -I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answer three questions from section I and three questions from section II.*
- 2) Answers to the two sections should be written in separate answer-books.*
- 3) Neat diagrams must be drawn wherever necessary.*

**SECTION - I**

**Q1) a)** Explain the Basic Building Blocks of the UML 2.0. **[8]**

b) What are basic built-in types used in OCL expressions? **[8]**

OR

**Q2) a)** Explain 4+1 Architecture of UML 2.0. **[8]**

b) Explain OMG standards MDA and XMI. **[8]**

**Q3) a)** Draw and Explain looping and streaming in activity diagram. **[8]**

b) Draw the Use Case Diagram for the Credit card processing. The merchant submits a credit card transaction request to the credit card payment gateway on behalf of a customer. Bank which issued customer's credit card would approve or reject the transaction. If transaction is approved, funds will be transferred to merchant's bank account. Identify the actors, use cases and use full advance notation to draw the diagram. **[8]**

OR

**Q4) a)** What are different Activity nodes used in activity diagram. Draw and explain with example? **[8]**

b) Enlist different relationships used in use case diagram. Explain with example. **[8]**

**P.T.O.**

- Q5)** a) How do we represent private, public and protected visibility in class diagrams? [6]
- b) What does associations, aggregation and composition in a class diagram mean? [6]
- c) Draw a class diagram with full notations for enrollment of student for seminar. Assume the scope. [6]

OR

- Q6)** a) Explain connectors, ports and pins with reference to composite structure diagrams. [6]
- b) Explain Import, Access and Merge in the Package Diagram for ATM System. [6]
- c) What is the need of object diagram in UML? Draw object diagram for the question 5(c)? [6]

## **SECTION - II**

- Q7)** a) Explain composite states with example in State Chart Diagram. [6]
- b) What are different interaction operators used in sequence diagram? Explain briefly with example. [6]
- c) What is the significance of communication diagram. Draw communication diagram for question 8(a). [6]

OR

- Q8)** a) Explain and Draw sequence diagram for Online Examination of FPL subject of F.E Students in your college? [6]
- b) Explain the significance of Interaction Overview Diagram with example? [6]
- c) How do you show the time constraints on messages in interaction diagrams? Explain with example. [6]

**Q9) a)** Component diagram models implementation view. Justify the answer with example. [8]

b) Draw the deployment Diagram for online shopping web application? [8]

OR

**Q10)a)** Explain Artifact instances and execution environments in Deployment diagram. [8]

b) Draw the component Diagram for event registration system? [8]

**Q11)a)** Explain in brief: Singleton design pattern and Abstract factory pattern. [8]

b) Give the solution for observer design pattern. [8]

OR

**Q12)a)** Explain the design pattern template with an example? [8]

b) How do you reverse engineer a class diagram? [8]



Total No. of Questions : 12]

SEAT No. :

**P3895**

[Total No. of Pages : 2

[4759] - 208

**B.E. (Computer Engineering)  
IMAGE PROCESSING (Elective - I)**

**Image Processing  
(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn, wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain the fundamental steps in Digital Image Processing. [8]  
b) With reference to relation between pixels, explain the following terms. [8]  
i) Neighbors of Pixel  
ii) 4-connectivity  
iii) 8-connectivity  
iv) Mixed connectivity

OR

- Q2)** a) Write short note on Digital imaging Hardware and Software. [8]  
b) What is digital image processing? Explain sampling and quantization. [8]
- Q3)** a) What is mean by image enhancement? List and explain image enhancement techniques in spatial domain. [8]  
b) What is need of image preprocessing? Explain Log transformation and Power-Law transformation. [8]

OR

- Q4)** a) Explain Hadamard and Walsh transformation. [8]  
b) Explain the method of contrast stretching using histogram equalization. [8]
- Q5)** a) What is image segmentation? Explain image segmentation based on thresholding. [10]  
b) Explain Chain codes and B-Splines for boundary representation. [8]

**P.T.O.**

OR

- Q6)** a) With the help of appropriate mask explain the following. [10]  
i) Point detection  
ii) Line detection  
iii) Edge detection  
b) What is region splitting and merging? [8]

**SECTION - II**

- Q7)** a) What do you mean by Image denoising? Explain different noise model in image? [10]  
b) What is image restoration? How it differs from image enhancement. [8]

OR

- Q8)** a) Write short note on [10]  
i) Lucy Richardson Filtering  
ii) Blind Deconvolution  
b) Explain band-pass filter and Notch filters [8]

- Q9)** a) What is the need of object representation and classification method. [8]  
b) Explain the methods used for lossless image compression. [8]

OR

- Q10)**a) What are the advantages of variable-length coding? [8]  
Find the Huffman code for following symbols.  
Source      a1      a2      a3      a4      a5      a6  
Probability 0.1    0.4    0.06   0.1    0.04   0.3  
b) Explain how chain code can be used for boundary representation. [8]

- Q11)**a) Write short note [10]  
i) Principal Component Analysis  
ii) Character Recognition Application  
b) What is Image Pyramids? [6]

OR

- Q12)**a) How the compression is achieved in JPEG 2000. [6]  
b) Write short note [10]  
i) Haar Wavelet  
ii) Sub-band coding



Total No. of Questions : 12]

SEAT No. :

**P1452**

**[4759]-209**

[Total No. of Pages : 3

**B.E. (Computer Engineering)**

**b: DESIGN AND ANALYSIS OF COMPUTER NETWORKS**

**(2008 Course) (Semester - I) (Elective - I) (410444)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1) a)** What is arrival statistics and service statistics in M/M/1 system. Explain Markov chain formulation. **[9]**
- b) Message arrive independently to a system at the rate of 10 pm. Their length is exponentially distributed with an average of 3600 characters. They are transmitted on a 9600 bps channel. A character is 8 bit long. **[9]**
- i) What is average service time, arrival rate, service rate?
  - ii) What are the average number of message in queues & number of message in queue?

OR

- Q2) a)** In a small convenience store there's room for only 4 customers. The owner himself deals with all the customers - he likes chatting a bit. On average it takes a customer 4 minutes to pay for his/her purchase. Customers arrive at an average of 1 per 5 minutes. If a customer finds the shop full, he/she will go away immediately. **[9]**
- i) What fraction of time will the owner be in the shop on his own?
  - ii) What is the mean number of customers in the store?
  - iii) What fraction of customers is turned away per hour?
  - iv) What is the average time a customer has to spend for check-out?
- b) Describe exponential random variable and memory less property of random variable. **[9]**

**P.T.O.**

- Q3)** a) Explain physical and logical designing issues of Network Backbone?[8]  
b) Explain hierarchical and collapsible network architecture? [8]

OR

- Q4)** a) List and explain common resources used in system design with their metrics. [8]  
b) Explain various optimization techniques like multiplexing parallelism, virtualization, soft state etc. used in system design? [8]
- Q5)** a) A computer on 6 Mbps network is regulated by token bucket. The bucket is filled at the rate of 1 Mbps. It is initially filled to capacity with 8 megabits. How long can the computer transmit at the full 6 Mbps? [8]  
b) Explain the rate controlled scheduling for generated service connection?[8]

OR

- Q6)** a) Explain in details ATM forum end-to-end rate controlled scheme and credit based schemes of closed loop flow control. [8]  
b) Explain WFQ? What is the advantage of worst case fair weighted fair queuing (WF<sup>2</sup>Q) over WFQ? [8]

### **SECTION - II**

- Q7)** a) Explain different traffic model in details? [9]  
b) Explain leaky-bucket regulator with help of diagram. [9]

OR

- Q8)** a) Explain, what are the different time scale and mechanism used at these time scale for traffic management? [9]  
b) What is peak-load pricing. Explain if peak-rate allocation is reasonable for data traffic? [9]



- Q9) a)** Explain router architecture with suitable diagram. [8]
- b) Explain expanded tries scheme in details. [8]

OR

- Q10)a)** Divide a network 192. 168.4.0/24 into two sub networks having host size of 50. Find subnetwork address, subnet mask and IP address range for the sub network? [8]
- b) Explain OSPF Routing algorithm. [8]
- Q11)a)** Discuss security issues at transport layer with suitable example and possible solutions? [8]
- b) What are the functions of network Layer? Explain? [8]

OR

- Q12)a)** Explain bandwidth management. [8]
- b) Explain which points are considered while planning and implementing network. [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2003**

[4759] - 21

[Total No. of Pages :3

**B.E. (Civil Engineering)**

**INTEGRATED WATER RESOURCES AND PLANNING**

**(Elective - IV) (Semester - II) (2008 Course) (401008)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) What is National Water policy? Explain the recent norms of National Water Policy in detail. [8]
- b) Discuss in detail the present institutional frameworks for water management. [6]
- c) Write a short note on scope for privatization in the field of water resources. [4]

OR

- Q2)** a) Explain the variability of water in 'time & space', relationship and according to it write the importance of water as a 'finite resource'. [8]
- b) Write the basic principles of planning and financing of any water resources project. [6]
- c) What is acquisition and use of rights in water resources management. [4]

- Q3)** a) What are soft computing techniques? Enumerate various soft computing techniques. Write application of any one of the soft computing techniques for modeling stream flow. [8]
- b) Distinguish between probability density function and probability distribution function. [8]

OR

**P.T.O.**

- Q4)** a) Write short note on: [8]  
i) Application of GA in runoff prediction in a catchment.  
ii) Use of Fuzzy Logic in water resources planning & management.  
b) Define correlation and regression? What is difference between correlation coefficient and regression coefficient? What is the relation between them? [8]

- Q5)** a) State and explain general methods of flood damage assessment. [8]  
b) What are different types of Drought? Explain severity index of drought with suitable examples in India. [8]

OR

- Q6)** a) What is the use of geoinformatics in flood forecasting and its management? [8]  
b) Enumerate in detail the structural and non-structural measures to control the flood? Explain with suitable examples. [8]

### **SECTION - II**

- Q7)** a) Explain in detail 'recycling and reuse' of water resources. [8]  
b) What is 'inter-basin water transfer'? Explain its merits and demerits with suitable case study example. [10]

OR

- Q8)** a) Write a note on estimation & forecasting of water demands of domestic & industrial sector, navigation and recreational water demands. [8]  
b) What is mean by Irrigation efficiency? Give the estimation of water demand for irrigation sector. [10]

- Q9)** a) Write a note on control of water logging and its different types. [8]  
b) Explain how the social impact of water resource development is related to agroindustry and what its impact on Hydro electric power generation. [8]

OR

- Q10)a)** Enlist the direct and indirect benefits of water resource development and explain any one of them in detail. [8]
- b) Correlate the various aspects of water quality management to protect the vital ecosystems. [8]

- Q11)a)** What is Decision Support System for Integrated Water Resource Planning and Management? Explain with suitable example. [8]
- b) Explain the concept of perspective plan for watershed development in a basin and its management. [8]

OR

- Q12)a)** Write short note on: [8]
- i) Applications of ANN in flood prediction
- ii) Basic concept of Fuzzy Logic and its applications related to IWRM.
- b) State and define four statistical parameters used in different statistical methods. [8]



Total No. of Questions : 12]

SEAT No. :

**P1453**

**[4759]-210**

[Total No. of Pages : 3

**B.E. (Computer Engineering)**  
**ARTIFICIAL INTELLIGENCE**

**(2008 Course) (Semester - I) (Elective -I) (410444)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Attempt three questions from section I and three questions from section II.*
- 2) Answers to the two sections must be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain the Artificial Intelligence applications. **[8]**
- b) Define the following terms with example. **[8]**
- i) State
  - ii) Search tree
  - iii) Successor function
  - iv) Branching factor

OR

- Q2) a)** What are Intelligent Agents? Explain the architecture of a typical agent. **[8]**
- b) Compare different uniformed searching strategies. **[8]**

**P.T.O.**

- Q3)** a) Explain hill climbing algorithm. Explain plateau, ridge, local maxima and global maxima. [8]
- b) Explain A\* algorithm with its pseudo - code. [8]

OR

- Q4)** a) Explain alpha beta cut off with an example-show a game tree to explain. [8]
- b) Define the term Heuristic fun? Explain its significance in informed search with example. [8]
- Q5)** a) Explain MINI-MAX search algorithm with example. [10]
- b) Elaborate various approaches for solving constraint satisfaction problems. [8]

OR

- Q6)** a) Solve SEND + MORE = MONEY as a constraint satisfaction problem. [10]
- b) Elaborate on limitations of MINI-MAX search algorithm. What are the ways to overcome it. [8]

### SECTION - II

- Q7)** a) What is the significance of planning? Which are the various components of typical planning system. [8]
- b) State the rules and steps for converting a given well predicate logic statement to clausal form. [8]

OR

- Q8)** a) Explain Bayes rule with examples. [8]
- b) What is a fuzzy set. Explain fuzzy logic concept with example. [8]
- Q9)** a) Explain unification algorithm with example. [8]
- b) Elaborate on various forms of learning. [8]

OR

- Q10)a)** Write a note on learning by deduction and learning by Induction. [8]
- b) Explain decision tree algorithm with suitable example. [8]
- Q11)a)** Write a case study of expert system for medical diagnosis. [10]
- b) Explain concept of syntactic analysis with suitable example. [8]

OR

- Q12)a)** Elaborate the issues involved in natural language processing? Explain the steps involved in this process. [10]
- b) Explain the significance of morphological analysis and pragmatic analysis in NLP with suitable example. [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1454**

**[4759]-211**

[Total No. of Pages : 3

**B.E. (Computer Engineering)**

**d: SOFTWARE ARCHITECTURE**

**(2008 Course) (Semester - I) (Elective -I) (410444)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *From Section -I, answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6).*
- 3) *From Section -II, answer (Q7 or Q8) and (Q9 or Q10) and (Q11 or Q12).*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right side indicate full marks.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** With neat diagram explain architecture business cycle in brief. **[6]**
- b) What is Software Architecture? Explain in brief.  
Comment on the architecture activity: Creating the business case for the system. **[8]**
- c) Comment “Architecture is a high level design”. **[4]**

OR

- Q2) a)** Explain decomposition, uses and class with reference to module based structures. **[8]**
- b) Define and explain architectural pattern, reference models and reference architectures. **[4]**
- c) Write note on documenting Software Architecture. **[6]**

**P.T.O.**



- Q3)** a) Explain quality attributes of a web application. [8]  
b) With the help of appropriate diagram explain availability scenario and testability scenario. [8]

OR

- Q4)** Explain following in the context of quality attributes [16]  
a) Quality attribute scenario.  
b) Usability aspect observed in MS-WORD.  
c) Business qualities.  
d) Maintain data confidentiality.

- Q5)** a) Write note on Chain of responsibility and mediator pattern. [8]  
b) Define Design pattern. Write C++ or JAVA code for Singleton pattern. [8]

OR

- Q6)** a) With structure and example explain Abstract Factory pattern. [8]  
b) What is proxy pattern? Explain variants of proxy pattern? [8]

### **SECTION - II**

- Q7)** a) With neat diagram explain how MVC is supported by Java. [8]  
b) Explain the need of JDBC. [2]  
c) What is Enterprise Java Beans? Explain entity, message and session beans. [8]

OR

- Q8)** a) Explain role of middleware in 3-tier architecture. [6]  
b) Explain following [12]  
i) RMI  
ii) JMS

- Q9)** a) Explain Java applet life cycle. [8]  
b) Explain various technologies used to develop client side. [8]

OR

- Q10)**a) Compare XML and HTML. [4]  
b) Explain 3-tier architecture with diagram. [8]  
c) Write note on AJAX. [4]
- Q11)**a) Enlist and explain various server side technologies. [8]  
b) What is java web service? Explain the relationship between web services and SOA. [8]

OR

- Q12)**a) Explain with diagram struts architecture. [8]  
b) Explain following: [8]  
i) JSP  
ii) Java Servlet

EEE

Total No. of Questions : 12]

SEAT No. :

**P1455**

**[4759] - 212**

[Total No. of Pages :3

**B.E. (Computer Engineering)**

**MULTIMEDIA SYSTEMS**

**( 2008 Course) (Semester - I) (Elective - II) (410445)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I & Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

**Q1) a)** What is MMDBMS? Explain the characteristics of Multimedia database. **[8]**

b) Differentiate between Multimedia file system and Conventional file system. **[8]**

OR

**Q2) a)** What is multimedia? Explain building blocks of multimedia. **[8]**

b) What is streaming? Explain SIP and RSVP protocols for streaming. **[8]**

**Q3) a)** What is image enhancement? Explain how it is achieved using the contrast stretching and histogram equalization. **[8]**

b) Explain Shannon-Fano compression algorithm by taking a suitable example. **[8]**

OR

**Q4) a)** Explain bitmap file format? Explain special features of .bmp files. **[8]**

**P.T.O.**

- b) Generate the Huffman encoding tree and codes for the example-Characters A,B,C,D and E have the following probability of occurrence: [8]

$$p(A) = 0.16, p(B) = 0.51, p(C) = 0.09, p(D) = 0.13, p(E) = 0.11.$$

- Q5)** a) Compare [8]

- i) PCM and DM
- ii) MPEG 4 and MPEG 7.

- b) Explain CD and DVD formats. [10]

OR

- Q6)** a) Explain how audio is captured and stored in computers? [8]

- b) Discuss the factors that determine size of file and quality of sound for audio capture and playback. What are various chunks present in a sound file stored as WAV format? [10]

### SECTION - II

- Q7)** a) Explain various features of H.261 and H.263. [8]

- b) Which are the different video broadcasting techniques? Compare them. [8]

OR

- Q8)** a) Which are the different layers in MPEG? Define and explain I,P and B frames with reference to MPEG. [8]

- b) Explain any two audio file formats. [8]

- Q9)** a) Differentiate between 2D and 3D animation. Explain different techniques of animation. [10]

- b) Explain the architecture of OpenGL. [8]

OR

- Q10)**a) Write a small program in Open GL to create any 2D/3D animation. [10]  
b) Explain the use of animation in website development. [8]

- Q11)**a) Explain Movie on Demand Concept in Multimedia. [8]  
b) Explain various networking components required for a reliable Multimedia data transmission. [8]

OR

**Q12)** Write short notes on following: [16]

- a) VoIP.  
b) Quality of Service in Multimedia data transmission.  
c) Multimedia Applications.



Total No. of Questions : 12]

SEAT No. :

**P1456**

**[4759] - 213**

[Total No. of Pages :3

**B.E. (Computer Engineering)**

**MOBILE COMPUTING**

**( 2008 Course) (Semester - I) (Elective -II) (410445)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I & Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** State reasons behind the design of GSM system. **[8]**
- b) Define the following terms: **[10]**
- i) Teleservices,
  - ii) Bearer services
  - iii) Supplementary services

OR

- Q2) a)** State main objectives of future PLMTS. **[8]**
- b) Explain in detail GSM network structure. **[10]**
- Q3) a)** State reasons for choosing two different multiframe timings for speech and signaling channels. **[8]**
- b) List the messages (information) transmitted over BCCH, FCCH, and SCH. Justify why hopping cannot be used for these channels. **[8]**

OR

**P.T.O.**

- Q4)** a) State reasons for using a dummy burst over the air. [8]  
b) Explain frequency hopping in detail. What is slow frequency hopping (SFH) and fast frequency hopping (FFH)? [8]

- Q5)** a) What are various factors for which the location update reject message may be sent from MSC to mobile? Elaborate on each of those reasons. [8]  
b) Explain the concept of “Off-Air Call Setup.” What are the advantages of this scheme? [8]

OR

- Q6)** a) Define functions performed within the following procedures: [8]  
i) Identification  
ii) Encryption and ciphering  
iii) Call clearing  
iv) IMSI attach and detach  
v) Location update  
b) Why is initialization necessary for mobile after the power is turned on? [8]

### **SECTION - II**

- Q7)** a) Explain four different types of security services provided by GSM. [8]  
b) Describe the following terms: [8]  
i) Challenge  
ii) Response  
iii) Anonymity  
iv) Authentication  
v) Encryption  
vi) TMSI  
vii) IMSI  
viii) LAI

OR

**Q8) a)** Why do you think that PLMN needs increased protection against eavesdropping compared to a regular telephone system? State the main objectives of the operator and the subscribers in this area. **[8]**

b) Why is it absolutely essential for the operator to have authentication of the visiting subscriber? **[8]**

**Q9) a)** Narrate all reasons of handoff. Define the term “Directed handoff”. **[8]**

b) Compare spectrum efficiency of CDMA with TDMA. **[8]**

OR

**Q10)a)** Name the three classes of handover. What are the two modes of handover? **[8]**

b) Explain both the spread spectrum technologies. **[8]**

**Q11)a)** What is the difference between acknowledged and unacknowledged modes of operation in LAPD<sub>m</sub> messages? **[8]**

b) Enumerate the basic functions of MM,CC and RR layers. Illustrate with some examples. **[10]**

OR

**Q12)a)** What is the main purpose of TMSI reallocation? **[8]**

b) Show the complete message coding for: call confirmed, call proceeding, location updating request, channel release, immediate assignment, and partial release. **[10]**





Total No. of Questions : 12]

SEAT No. :

**P1457**

**[4759] - 214**

[Total No. of Pages :4

**B.E. (Computer Engineering)**

**EMBEDDED SYSTEMS**

**( 2008 Course) (Semester - I) (Elective - II) (410445)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I & Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain how Digital Signal processor and Media processor are different than a general purpose processor. [6]
- b) Which functional features in the processor architecture make it known as an 'Embedded processor'? [6]
- c) Discuss recent trends in embedded systems development in terms of processors and tools. [6]

OR

- Q2)** a) Which factors decide the complexity of Embedded Systems? Enlist different classes of Embedded Systems based on complexity. [6]
- b) What are different application areas of Embedded Systems? Give examples. [6]
- c) Discuss various components in layered architecture of Embedded Systems. [6]

- Q3)** a) Discuss various operating modes of ARM architecture based processor. [6]

**P.T.O.**

- b) Discuss various ways of Power management in an Embedded System.[6]
- c) What is the importance of Watchdog Timer in an Embedded System?[4]

OR

- Q4)** a) A Mobile Phone system is to be designed. For this application, select the appropriate processor based on [8]
- i) Instruction cycle time
  - ii) Bus width
  - iii) MIPS
  - iv) On chip cache
  - v) On chip RAM/ROM.
- b) Discuss few advanced structural units in a processor and their impact on performance of a processor. [4]
- c) Differentiate between ARM7 and ARM9 architectures. [4]

- Q5)** a) Which topology is used by devices to communicate through USB protocol? Discuss the data transfer mechanism using USB protocol in details. [8]
- b) Describe various optical devices commonly used in Embedded Systems. Also mention their applications. [4]
- c) What are data converters? What is their significance in Embedded Systems? [4]

OR

- Q6)** a) Discuss CAN protocol w.r.t. following points: [8]
- i) Standard data frame format
  - ii) Arbitration Mechanism
  - iii) Different types of frames
  - iv) Bit stuffing
- b) Discuss the I<sup>2</sup>C protocol used to transfer data between two devices in details. How arbitration takes place in the system? [8]

## SECTION - II

- Q7)** a) Discuss various debugging tools used in developing an embedded system. [6]
- b) What is In-Circuit-Emulator? Give details. [6]
- c) Explain the process of converting an assembly program into a file for ROM image. [6]

OR

- Q8)** a) Explain the process of converting a C program into a file for ROM image. [6]
- b) Explain the use of data structures namely stack and tree in brief. [6]
- c) How Java is useful in embedded system programming? Also mention its disadvantages. [6]

- Q9)** a) Compare the following scheduling models of RTOS, based on worst case latency: [6]
- i) Cooperative Round Robin
- ii) Cooperative ordered list.
- iii) Cooperative Time slicing (Rate monotonic).
- b) What care must be taken to eliminate shared data problem? [6]
- c) Differentiate between RTOS and embedded OS. [4]

OR

- Q10)** a) Discuss different ways in which interrupts are handled in RTOS environment. [6]
- b) What are virtual device drivers? Explain. [6]
- c) Compare assembly language programming and high level language programming. [4]

- Q11)a)** Give details of hardware and software components of mobile phone. **[4]**
- b) Write short notes on any three. **[12]**
- i)  $\mu$ COS - II
  - ii) Vx Works
  - iii) Embedded Linux
  - iv) Special OS features for automotive systems.

OR

- Q12)a)** Explain Automatic cruise control system with respect to hardware and software components. **[8]**
- b) Differentiate between Embedded OS and desktop OS. **[4]**
- c) Differentiate between soft real time operating system and hard real time operating system. **[4]**



Total No. of Questions : 12]

SEAT No. :

**P1458**

**[4759] - 215**

[Total No. of Pages :3

**B.E. (Computer Engineering)**  
**SOFTWARE TESTING AND QUALITY ASSURANCE**  
**( 2008 Course) (Semester - I) (Elective - II) (410445)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from Section -I and three questions from Section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1)** a) What is verification and validation? Compare with examples. [8]  
b) Explain the software testing life cycle. [8]

OR

- Q2)** a) Give the importance of Software testing in Software Production cycle. State the principles of Software Testing. [8]  
b) Explain the defect report with an example. [8]

- Q3)** a) Explain the graph based and boundary value analysis testing methods with examples. [10]  
b) Explain test case design for online login and order operations. [8]

OR

- Q4)** a) What is the need of black box testing? Compare with white box testing with methods. [10]  
b) Explain with purpose domain testing and documentation testing. [8]

**P.T.O.**

- Q5) a)** Explain any two coverage testing methods. [8]  
b) How do you derive test cases in loop testing? Explain with example. [8]

OR

- Q6) a)** Explain the need and application of white box testing with two methods. [8]  
b) Explain object oriented testing method. [8]

### **SECTION - II**

- Q7) a)** Explain the project and productivity testing metrics. [8]  
b) Explain the GUI testing and scenario testing. [10]

OR

- Q8) a)** Describe sanity testing and validation testing. [10]  
b) Explain how measurement tools and metrics improve the testing process. [8]

- Q9) a)** Explain the GQM metric and Quality control. [8]  
b) Explain the quality factors in Quality management. [8]

OR

- Q10) a)** Explain in brief. [12]  
i) Six Sigma  
ii) Software Quality Assurance  
iii) TQM  
b) How cost of quality influences quality management? [4]

- Q11)a)** Explain the manual testing with example and test cases. **[8]**
- b) How automation helps in testing? Explain with a tool. **[8]**

OR

- Q12)a)** Explain the features of a testing tool for functional testing. **[8]**
- b) Explain GUI testing with a testing tool. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P1459**

**[4759] - 216**

[Total No. of Pages : 3

**B.E. (Computer Engineering)  
DISTRIBUTED OPERATING SYSTEMS  
( 2008 Course) (Semester - II) (410448)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answer 3 questions from each section.*
- 2) Answers to the two sections should be written in separate answer books.*
- 3) Figures to the right indicate full marks.*
- 4) Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) In what respect are distributed computing systems better than parallel processing systems? Give examples of three applications for which distributed computing systems will be more suitable than parallel processing systems. [7]
- b) Explain the RPC mechanism in detail with the help of a diagram. [7]
- c) Explain different issues in Inter Process Communication. [4]

OR

- Q2)** a) Discuss the relative advantages and disadvantages of the various commonly used models for configuring distributed computing systems? Which model do you think is going to become the most popular model in future? Give reasons for your answer. [7]
- b) Explain different desirable features of good message passing system. [7]
- c) What is group Communication? [4]

- Q3)** a) Explain in detail middleware models and services provided by middleware. [8]
- b) Differentiate between internal synchronization and external synchronization of clocks in a distributed systems. Externally synchronized clocks are also internally synchronized, but the converse if not true. Explain why. [8]

OR

***P.T.O.***



- Q4)** a) Explain different architectural models of distributed system. [8]  
b) How do clock synchronization issues differ in centralized computing systems and distributed computing systems? [8]

- Q5)** a) Compare centralized algorithms and distributed algorithms for Mutual exclusion. [8]  
b) Discuss why advance knowledge of the resource usage of processes is essential to avoid deadlocks. Why the deadlock avoidance strategy is never used in distributed systems for handling deadlocks? [8]

OR

- Q6)** a) Explain Token-Passing Approach for Mutual Exclusion. [8]  
b) Prove that the following resource allocation policies prevent deadlocks: [8]  
i) Ordered requests  
ii) Collective requests

### **SECTION - II**

- Q7)** a) Explain mechanisms for building distributed file system. [10]  
b) Explain components of load distributing algorithms. [8]

OR

- Q8)** a) Explain issues to be considered in design of DSM system. [10]  
b) Explain differences between load balancing and load sharing approaches? [8]

- Q9)** a) What is an access matrix? Explain how the following issues can be handling in a security system that uses access matrix for access control [8]  
i) Deciding the contents of access matrix entries  
ii) Validating access to objects by subjects.  
b) Explain the approaches for backward error recovery. [8]

OR

- Q10)a)** Explain the difference between synchronous checkpointing and asynchronous checkpointing. [8]
- b) Explain the majority based dynamic voting protocol in detail. [8]

- Q11)a)** Explain the basic Service Oriented Architecture with suitable diagram. [8]
- b) Enlist concepts of Cluster and Grid Computing, and explain how Grid Computing is different from Cluster Computing. [8]

OR

- Q12)a)** Explain the major steps involved in SOA design and development. [8]
- b) Enlist different types of Grids and explain how Grid computing works. [8]



Total No. of Questions : 12]

SEAT No. :

**P1460**

**[4759] - 217**

[Total No. of Pages :4

**B.E. (Computer)**

**ADVANCED COMPUTER ARCHITECTURE**

**(2008 Pattern) (410449) (Semester - II)**

*Time :3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer to the two Sections should be written in separate answer books..*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Explain in brief general classification of multiprocessor based on following techniques. **[12]**

- i) Degree of coupling
- ii) Memory access
- iii) Flynn's classification
- iv) Feng's classification

b) Explain Implicit and Explicit parallelism. **[6]**

OR

**Q2) a)** What is scalable computer system? Explain various parameters affecting scalability of computer system. **[10]**

b) State and explain features of Itanium Architecture for software pipelining support. **[8]**

**Q3) a)** Design a six bit multiplier using CSA Tree. How it can be viewed as k-stage arithmetic pipeline? With same Hardware how an n-bit multiplier can be designed? Assuming single clock cycle per processing stage, find the total No. of clock cycles for the same. **[10]**

b) Discuss the various features of SPARC Architecture. **[6]**

OR

**P.T.O.**

- Q4) a)** Consider a 4 stage pipeline processor. The number of cycles needed by the four instructions  $I_1, I_2, I_3, I_4$  in stages  $S_1, S_2, S_3, S_4$  are as shown below **[8]**

	$S_1$	$S_2$	$S_3$	$S_4$
$I_1$	2	1	1	1
$I_2$	1	3	2	2
$I_3$	2	1	1	3
$I_4$	1	2	2	2

Calculate total number of cycles needed to execute the following loop for ( $i = 1$  to 2)

```

{
    I1;
    I2;
    I3;
    I4;
}

```

Also draw the space time diagram showing execution of all instructions through successive pipeline stages.

- b)** Identify All of the RAW, WAR and control Hazards in following instruction sequence. **[8]**

```

DN    r2, r5, r8
SUB   r9, r2, r7
ASH   r5, r14, r6
MUL   r11, r9, r5
BEQ   r10, #0, r12
OR    r8, r15, r2

```

- Q5) a)** With suitable examples, explain the necessity of data Routing in array processors. **[8]**

- b) Discuss a problem of  $3 \times 3$  matrix multiplication on a mesh network. Obtain its time complexity. [8]

OR

- Q6)** a) Explain the programming model of cray-1 vector Architecture. [8]  
b) What is use of data Routing functions? With examples discuss the necessity of data routing in array processors. [8]

## SECTION- II

- Q7)** a) Explain following bus arbitration algorithms in brief. [9]  
i) RDC  
ii) FCFS  
iii) Polling  
b) Discuss COWs and NOW's architecture with suitable block diagrams. [9]

OR

- Q8)** a) Explain with typical cluster computing Architecture the various operating system issues to be handled in the design of cluster computing system. [9]  
b) What are different Multiprocessors Architectures? What are Network and software factors limiting performances of these systems? [9]

- Q9)** a) With suitable examples explain shared memory parallel programming. What is SPMD programming? [8]  
b) Explain with examples the use of synchronization primitives in parallel programming. [8]

OR

- Q10)** a) With standard constructs and features explain how parallelism is achieved in data parallel programming? [8]

- b) Explain use of following primitives used in parallel programming. [8]
- i) Send ( )
  - ii) Receive ( )
  - iii) Fork ( )
  - iv) Join ( )

- Q11)**a) With suitable example explain how parallel algorithms are written for multiprocessor systems. [8]
- b) Explain in detail the steps usually followed for generating a multiprocessing application from a sequential application. [8]

OR

- Q12)**a) Explain the classification of parallel algorithms with suitable examples. [8]
- b) How parallel virtual machine acts as a programming interface for parallel processing? [8]



Total No. of Questions : 12]

SEAT No. :

**P1461**

**[4759]-218**

[Total No. of Pages : 2

**B.E. (Computer Engineering)**

**PATTERN RECOGNITION**

**(410450) (2008 PATTERN)(Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Figures to the right indicate full marks.*
- 2) *Answer THREE questions from each section.*
- 3) *Answers to the two sections should be written in different answer sheets.*
- 4) *Assume suitable data wherever necessary.*

**SECTION-I**

**Q1) a)** Describe the basic modules in designing a pattern recognition system. **[8]**

b) What are the issues in design of pattern recognition system? How feature extraction is important for pattern recognition? **[10]**

OR

**Q2) a)** What do you mean by patterns? How segmentation and grouping is important components of pattern recognition system? **[8]**

b) Define Pattern recognition. What are the different methods for pattern recognition? Give the application of pattern recognition. **[10]**

**Q3) a)** Define bayes rule. What is probability density function? Define minimum error rate classification. **[8]**

b) Explain Feature space, Loss function, Risk, and Bayes risk in brief. **[8]**

OR

**Q4) a)** Explain Bayes criterion, Maximum a Posteriori (MAP) criterion, and Maximum Likelihood Criterion. **[8]**

b) Explain decision hyperplanes and perceptron with suitable examples. **[8]**

**Q5) a)** Explain various parameter estimation method of pattern classification. **[8]**

b) Explain recursive Bayes incremental learning method with example. **[8]**

OR

**P.T.O.**

- Q6)** a) Discuss maximum Likelihood approach used for parameter estimation. [8]  
b) What are sample covariance, and absolutely unbiased estimator? Explain in detail. [8]

**SECTION-II**

- Q7)** a) Define within- class scatter matrix & between-class scatter matrix. Discuss the discriminate analysis for 2-class problem. [8]  
b) What is Overfitting problem? Explain in detail with suitable example. [8]

OR

- Q8)** a) What is mean by Context-dependent classification? Explain Discrete Hidden Markov Model and continues density hidden Markov. [8]  
b) What is problem of finding the best direction? Explain how scatter matrix is useful to solve this problem. [8]

- Q9)** a) Explain what is the difference between parametric and non parametric density estimation. Explain kernel density estimation. [8]  
b) Explain the steps involved in SVM training, in brief. [8]

OR

- Q10)** a) Explain batch perceptron algorithm for finding a solution vector in brief. [8]  
b) Explain non parametric technique for directly estimating the posteriori probabilities in brief. [8]

- Q11)** a) What is pattern clustering? How it differs from classification? Explain k-mean clustering algorithm. [10]  
b) Justify the significance of Nominal data and String in a classification problem with suitable example. [8]

OR

- Q12)** a) What is the difference between classification and clustering. State and explain various techniques used for clustering. [10]  
b) Justify the significance of Nominal data and String in a classification problem with suitable example. [8]





Total No. of Questions : 12]

SEAT No. :

**P1462**

**[4759]-219**

[Total No. of Pages : 2

**B.E. (Computer Engineering)  
HIGH PERFORMANCE NETWORKS  
(2008 Course) (Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q.8,Q.9 or Q.10,Q.11or Q.12 from section II*
- 2) *Answer to the two sections should be written in separate answer-books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*
- 5) *Figures to the right indicate full marks.*

**SECTION-I**

**Q1)** a) Discuss in short about 1000 BASE- X family with suitable applications. **[8]**

b) Explain high level system architecture of Gigabit. **[10]**

OR

**Q2)** a) Explain in short the need of flow control in gigabit Ethernet? How it is supported? **[8]**

b) Differentiate between 10, 100, 1000 Mbps n/w based on their MAC characteristics. **[10]**

**Q3)** a) Explain physical configurations for ISDN User-Network Interfaces with examples. **[8]**

b) Explain in brief elementary functions for ISDN **[8]**

OR

**Q4)** a) Describe the SS7 protocol architecture. **[8]**

b) Explain Frame-Mode Control Signaling with example. **[8]**

**Q5)** a) Explain in short the functional architecture of B-ISDN. **[8]**

b) What is Quality of Service? Explain in detail the various ATM QoS parameters specifying their category of assessment. **[8]**

**P.T.O.**

OR

- Q6)** a) Explain in details the ATM adaptation layer. [8]  
b) What are the different ATM Service Categories? Explain in details. [8]

**SECTION-II**

- Q7)** a) Draw and explain a typical ADSL equipment configuration. [8]  
b) Draw and explain the general block diagram of DMT Transmitter. [8]

OR

- Q8)** a) Explain architecture of VDSL. [8]  
b) Explain in short why are some variations of xDSL asymmetric? [8]

- Q9)** a) Explain step-by-step MPLS operations that can occur on data packets in an MPLS domain. [8]

- b) Explain working of RSVP. [8]

OR

- Q10)** a) Describe the following terms related to MPLS operation [8]  
i) LER ii) LSR iii) LDP iv) LSP  
b) Explain tunneling in MPLS. [8]

- Q11)** a) What is Wi-Fi? Explain with configuration steps. [10]  
b) What is WiMax? Explain in details. [8]

OR

- Q12)** a) Comment on any 3 WiMax QoS classes along with suitable Application support. [8]  
b) Explain the following terms related to WiMax  
i) Fixed wireless access  
ii) Nomadic wireless access [10]



Total No. of Questions : 12]

SEAT No. :

**P4624**

[4759] - 22

[Total No. of Pages :15

**B.E. (Civil)**

**ADVANCED TRANSPORTATION ENGINEERING  
(2008 Course) (Elective - IV) (Semester - II)**

*Time : 4 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 2) *Answers to the two sections should be written in separate answer-books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Neat diagrams must be drawn wherever necessary.*

**SECTION - I**

**Q1)** Develop a comprehensive traffic and transportation plan considering that you are the administrative authority responsible for implementation of this plan, for developing a smart city. [Flow charts to be prepared]. **[18]**

OR

**Q2)** Elaborate in detail various surveys which are necessary for the effectiveness of planning transportation systems in urban areas. **[18]**

**Q3)** With respect to urban Transport Technology explain the following:

- a) Track guided bus **[6]**
- b) Bus rapid transit **[6]**
- c) Linear Induction Motor Technology **[4]**

OR

**Q4)** Detail out the 7 very important technologies used in the development and implementation of Intelligent Transport Systems (ITS). Discuss advantages and applications of ITS. **[10+3+3]**

**P.T.O.**

**Q5)** Compare and Contrast between the traditional methods and the modern or discounted cash flow methods used for evaluating transportation options. [2 methods in each category to be considered]. **[16]**

OR

**Q6)** With any case study explain how Benefit Cost analysis is done by the consultants before deciding a choice of the transport options such as flyovers or road-widening or metros etc. **[16]**

### **SECTION - II**

**Q7)** Explain with sketches:

- a) Turning Movements. **[6]**
- b) Grade separated intersections. **[6]**
- c) Parking lots on roads. **[4]**

OR

**Q8)** Discuss the various factors involved in:

- a) Signal design including the synchronization aspects. **[8]**
- b) Use of instrumentation systems for traffic monitoring and control. **[8]**

**Q9)** Explain the design philosophy of flexible pavements as well as the overlays on them, based on IRC-37, IRC-81 codes as well as the Benkelmen Beam Surveys. **[18]**

OR

**Q10)** With neat labelled sketches explain the various types of distresses which occur in the flexible pavements. Explain how the pavement condition rating is done and how the pavement condition index is used in the management of pavement distresses? **[18]**

**Q11)** Design a rigid pavement as per IRC-58 based on the following data: [16]

- a) 2 way CVPD = 3000
- b) Flexural strength of concrete = 45 kg/cm<sup>2</sup>
- c) Effective modulus of subgrade reaction = 13.5 kg/cm<sup>2</sup>/cm length
- d) Elastic Modulus of concrete =  $3.5 \times 10^5$  kg/cm<sup>2</sup>
- e) Poissons ratio = 0.18
- f) Coefficient of Thermal expansion of concrete =  $10 \times 10^{-6}$  per ° centigrade
- g) Tyre pressure = 8.4 kg/cm<sup>2</sup>
- h) Traffic growth rate = 5%
- i) Design life = 15 years
- j) Spacing of contraction joints = 4.2 m
- k) Slab width = 3.8m
- l) Load safety factor = 1.02
- m) Maximum Temperature difference between the top and bottom of the slab = 24°C
- n) Centre to centre distance between tyres = 36 cms
- o) Axle Load spectrum is as follows:

Single Axle Loads		Tandem Axle Loads	
Load in Tons	%	Load in Tons	%
20	0.8	36	0.3
18	1.1	32	3.0
16	3.8	28	4.0
14	12.0	24	4.0
12	18.0	20	2.0
10	24.0	16	1.0
less	25.0	Less than 16	1.0

- p) Trial thickness = 32 cms

q) Use following table if required:

L/l or B/l	C	L/l or B/l	C
1	0.000	7	1.035
2	0.042	8	1.075
3	0.178	9	1.085
4	0.445	10	1.080
5	0.725	11	1.060
6	0.925	12	1.000

Check whether the pavement is safe for

- i) Critical condition with dowel bars and
- ii) Critical condition without dowel bars

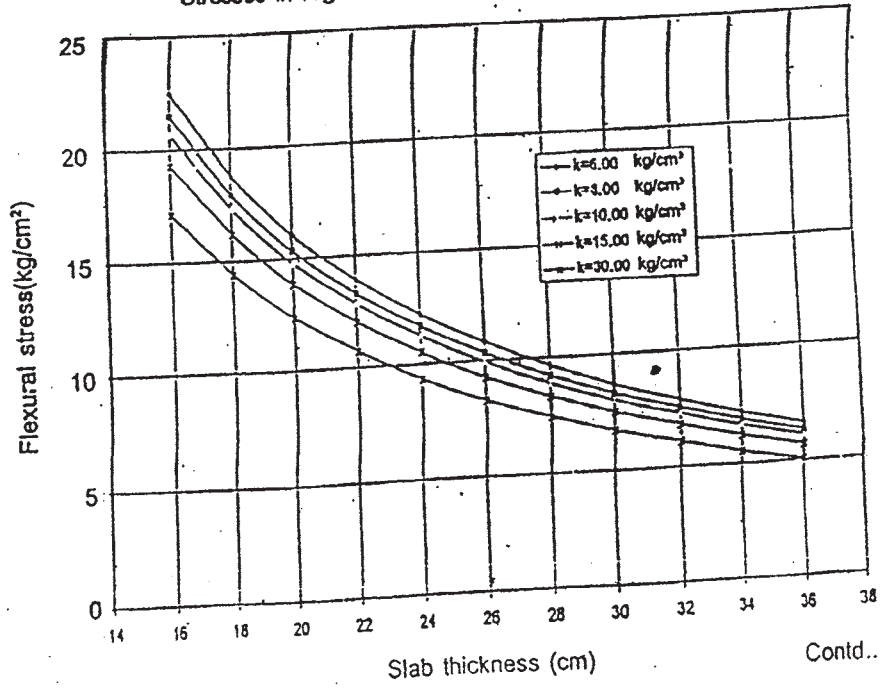
Design the pavement for withstanding all the other critical pavement conditions.

OR

**Q12)** Design the rigid pavement using the data mentioned in Q11, except for the fact that the CVPD (Two way) is increased by 15%. **[16]**

Appendix-1

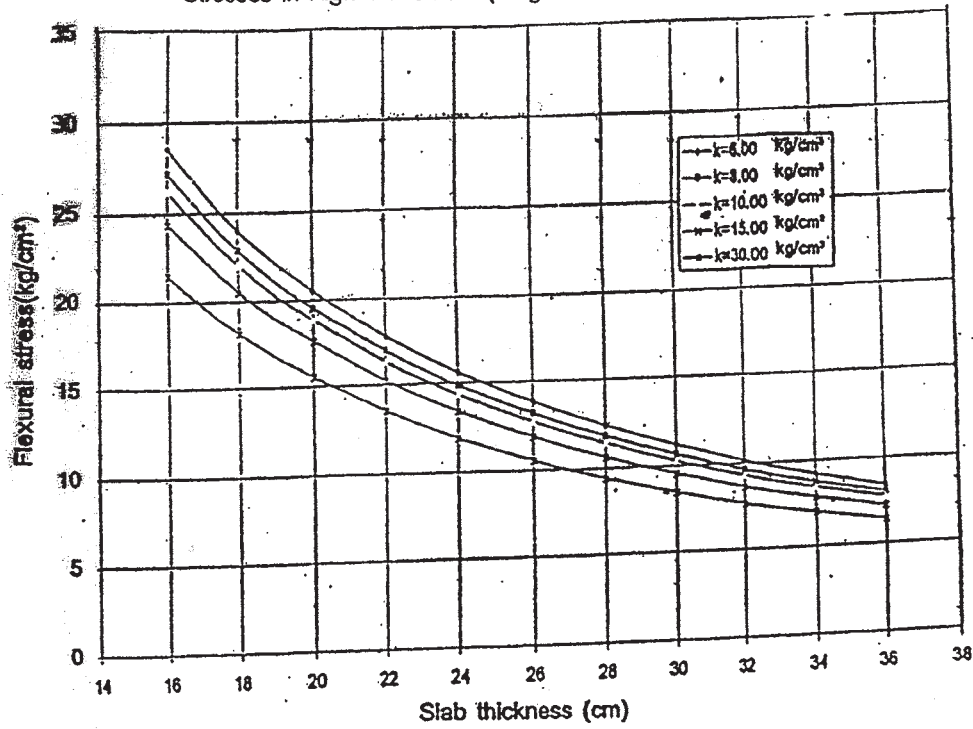
Stresses in Rigid Pavement (Single Axle Load = 6 tons)



IRC:58-2002

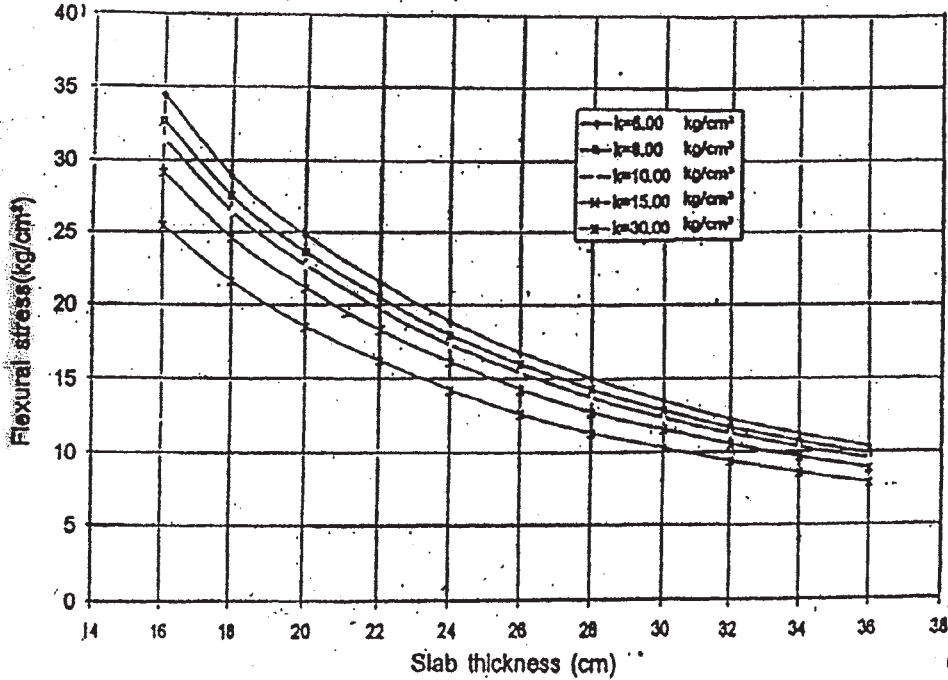
Contd..

Stresses in Rigid Pavement (Single Axle Load = 8 tons)



Contd..

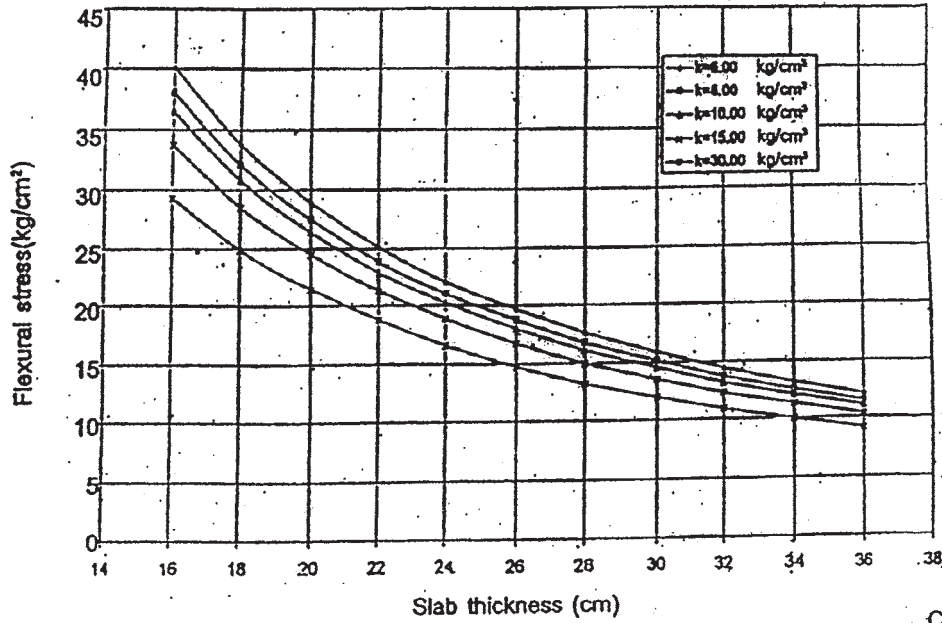
Stresses in Rigid Pavement (Single Axle Load = 10 tons)



Contd..

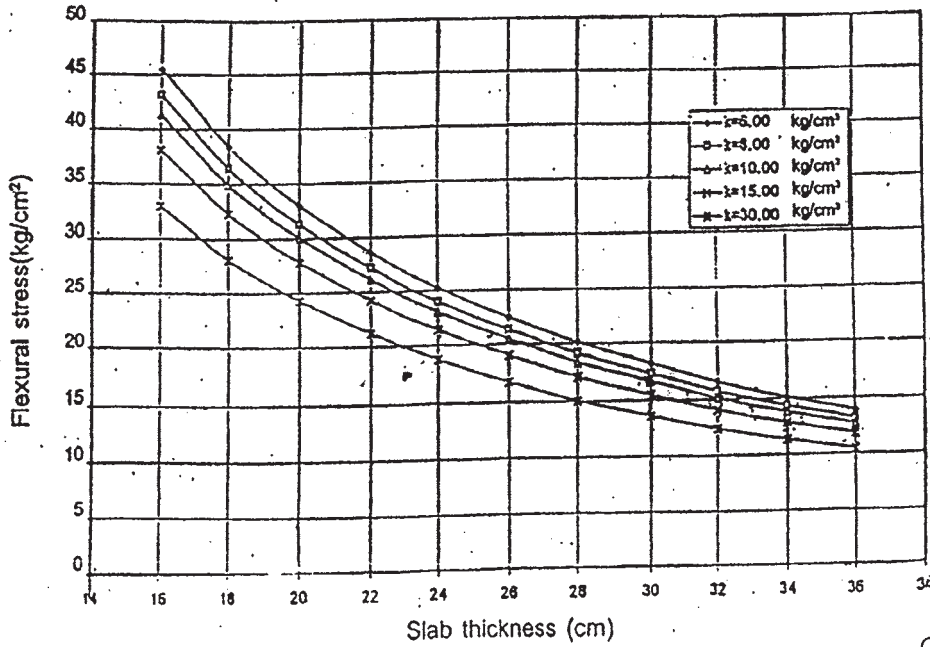


Stresses in Rigid Pavement (Single Axle Load = 12 tons)



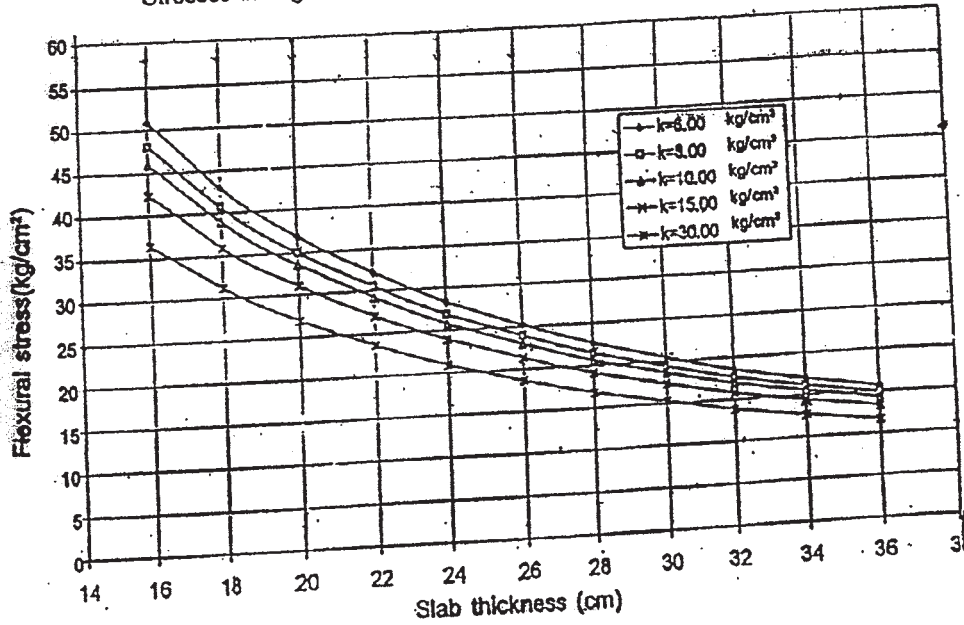
Contd..

Stresses in Rigid Pavement (Single Axle Load = 14 tons)



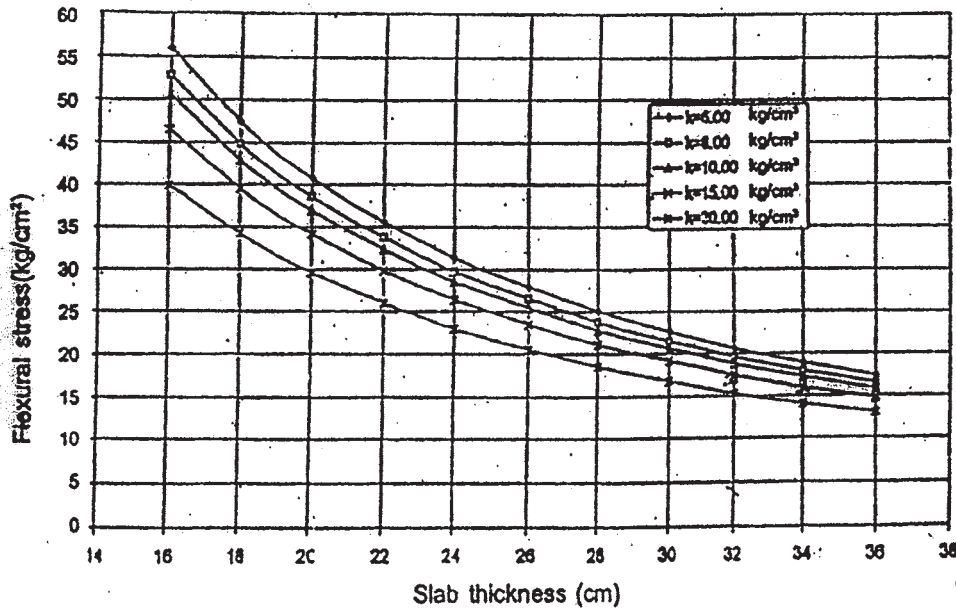
Contd..

Stresses in Rigid Pavement (Single Axle Load = 16 tons)



Contd..

Stresses in Rigid Pavement (Single Axle Load = 18 tons)

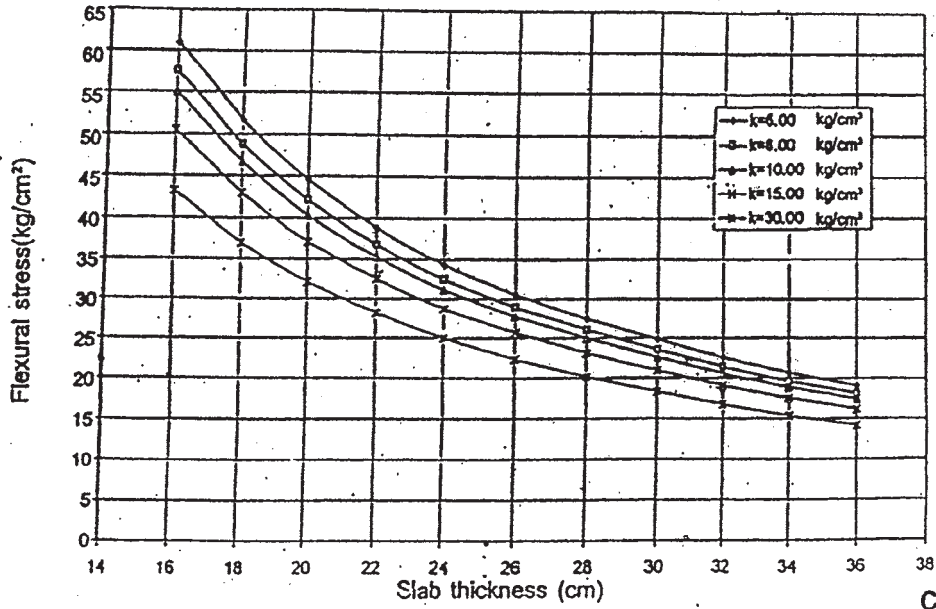


Contd..

Appendix-1 (Contd.)

IRC:58-2002

Stresses in Rigid Pavement (Single Axle Load = 20 tons)

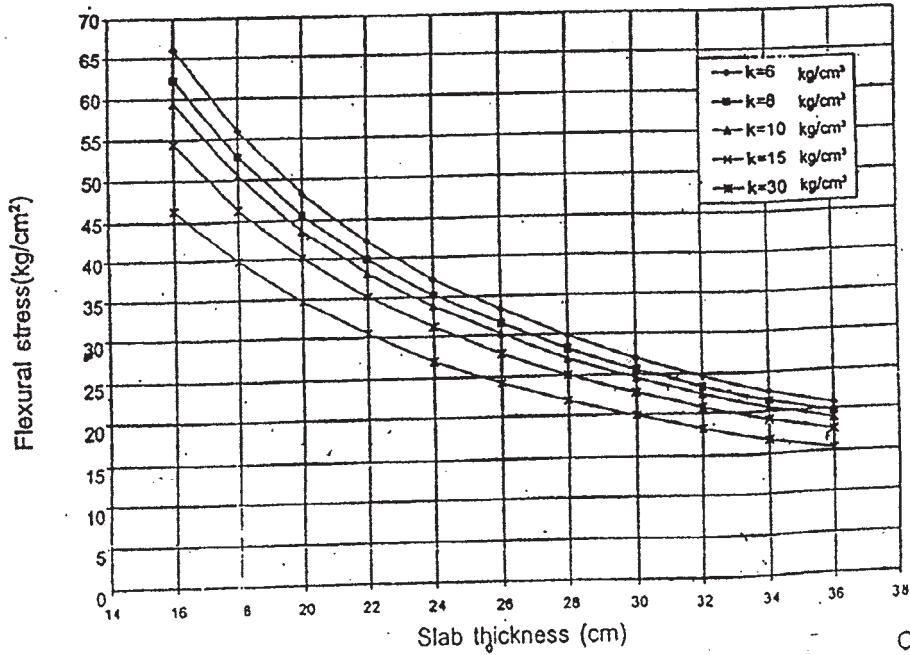


Contd..

Appendix-1 (Contd.)

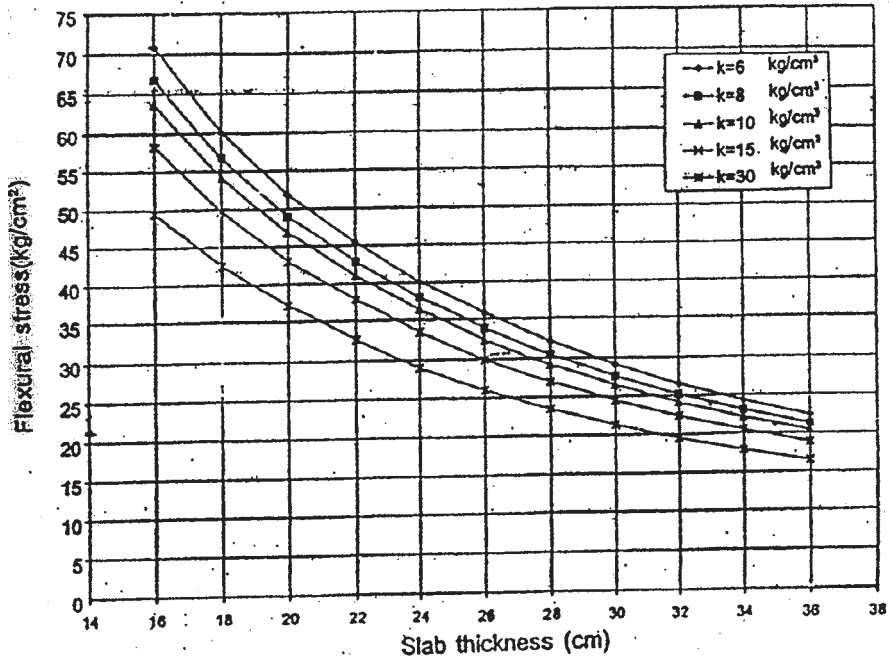
IRC:58-2002

Stresses in Rigid Pavement (Single Axle Load = 22 tons)



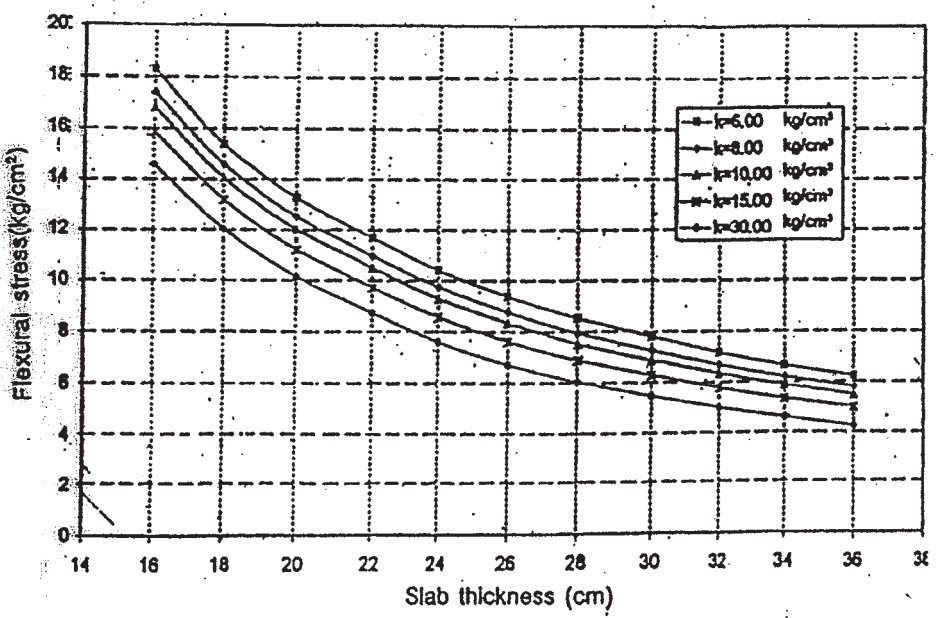
Contd..

Stresses in Rigid Pavement (Single Axle Load = 24 tons)



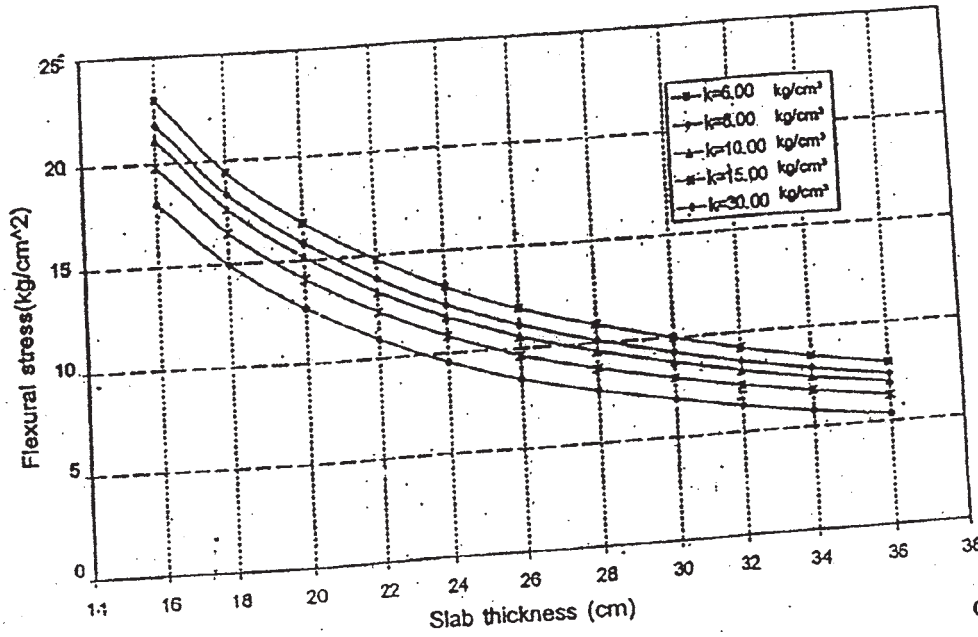
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 12 tons)



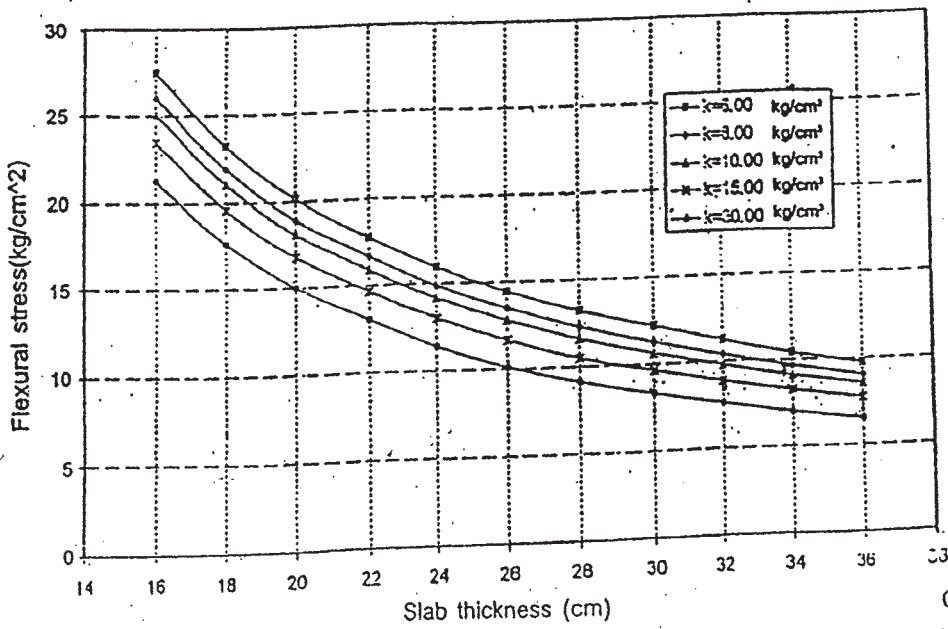
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 16 tons)



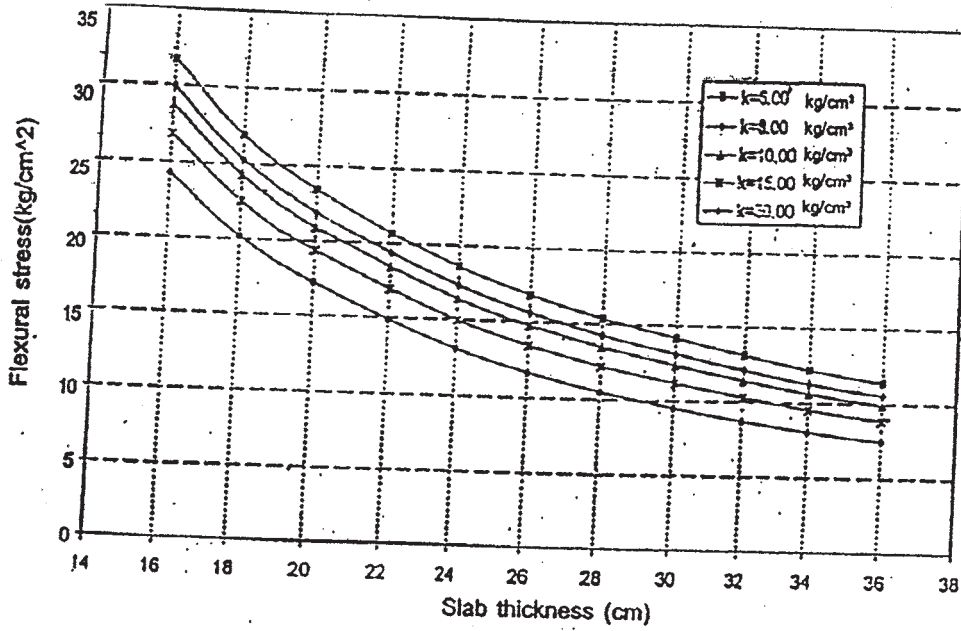
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 20 tons)



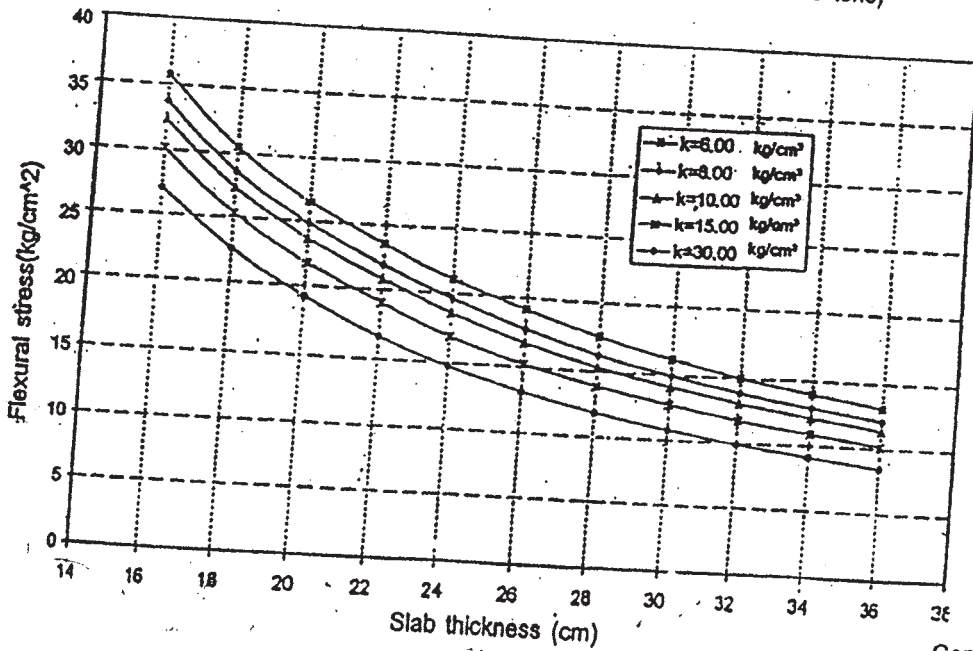
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 24 tons)



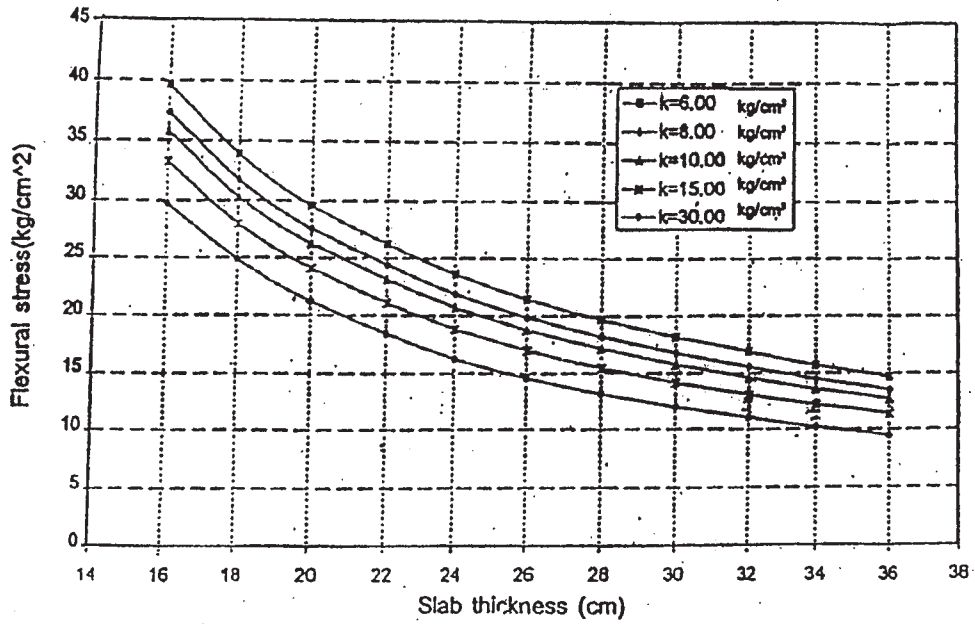
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 28 tons)



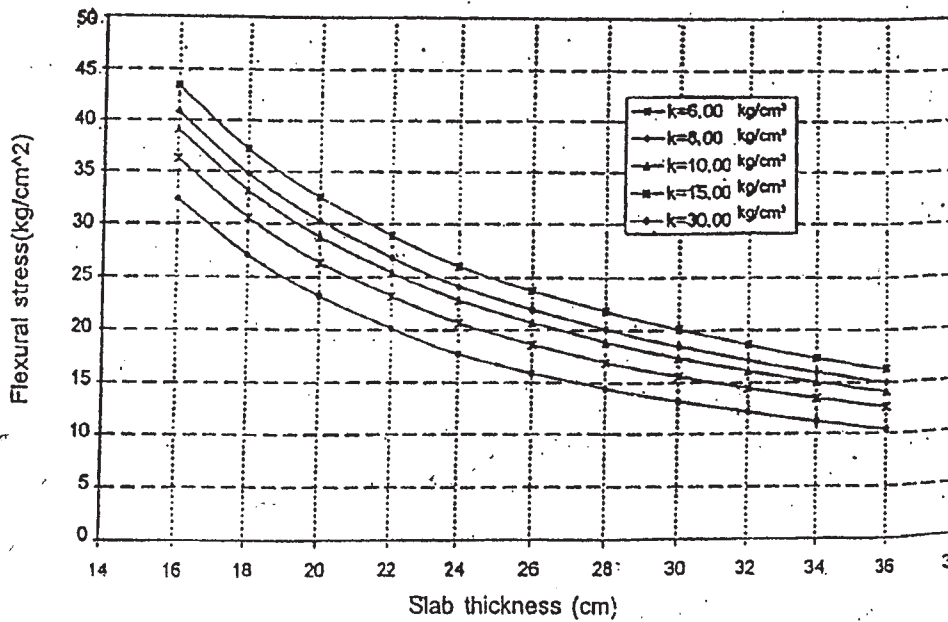
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 32 tons)



Contd..

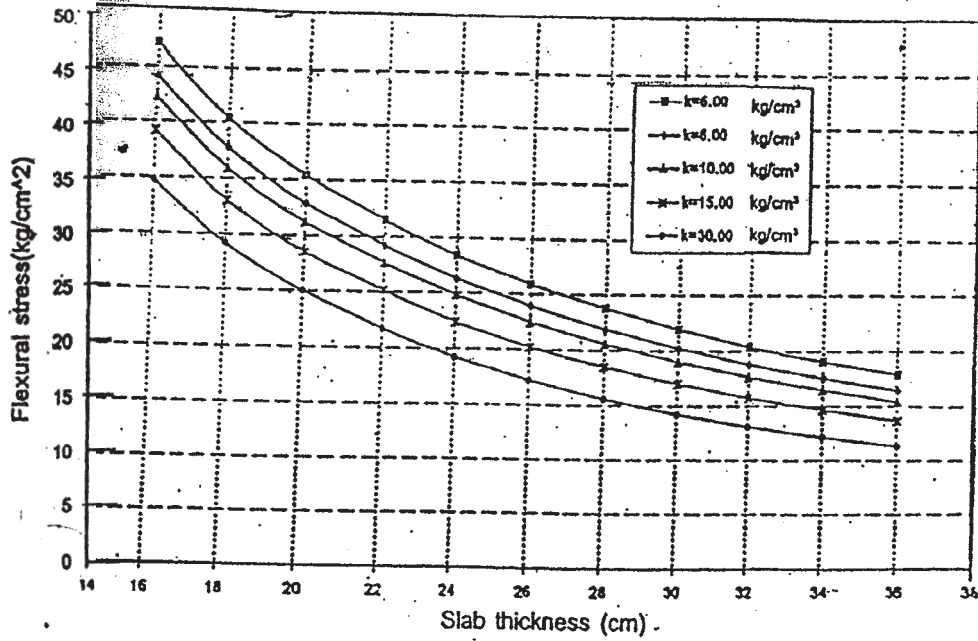
Stresses in Rigid Pavement (Tandem Axle Load 36 tons)



Contd..

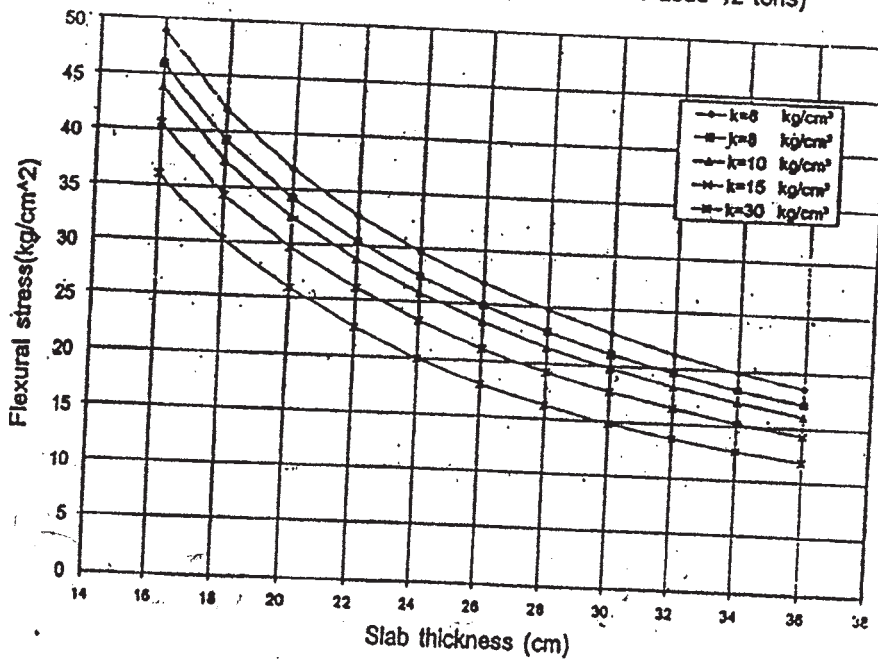


Stresses in Rigid Pavement (Tandem Axle Load 40 tons)



Contd..

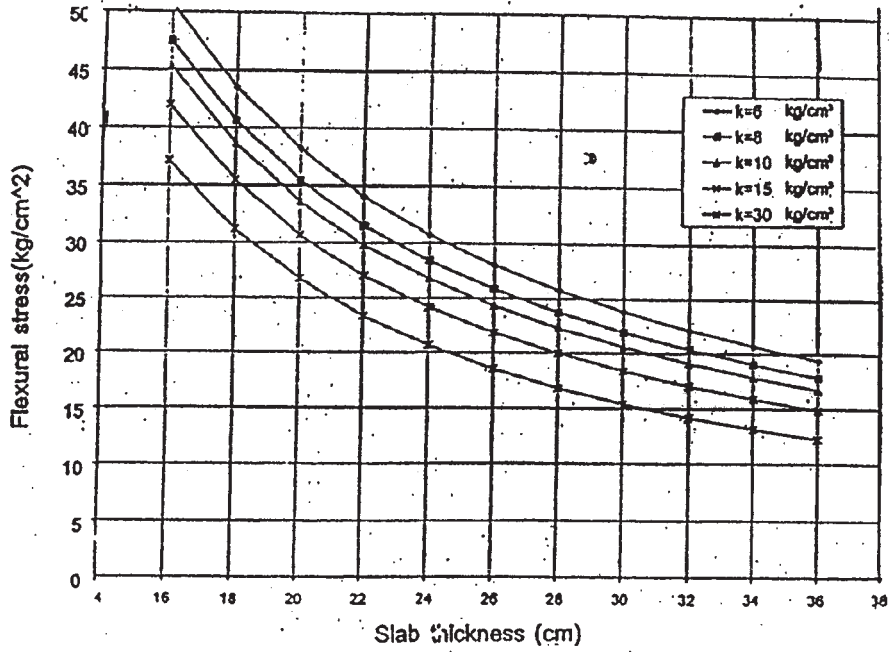
Stresses in Rigid Pavement (Tandem Axle Load 42 tons)



Contd..



Stresses in Rigid Pavement (Tandem Axle Load 44 tons)



Total No. of Questions : 12]

SEAT No. :

**P1463**

**[4759]-220**

[Total No. of Pages : 2

**B.E. (Computer )**

**NEURAL NETWORKS**

**(2008 Course) (Semester-II) (Elective-III) (410450)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Attempt Q.1or Q.2, Q.3 or Q.4, Q.5or Q.6 from section I and Q.7 or Q.8,Q.9or Q.10,Q.11or Q.12 from section II*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary*

**SECTION-I**

- Q1)** a) Discuss the basic architecture of a Biological Neural Net and compare it with Artificial Neural Net. **[8]**
- b) What is Linear Separability? Illustrate with example. Can single perceptron classify linear separable patterns? **[8]**

OR

- Q2)** a) Explain the McCulloch-Pitts(MP) model and its implementation for the realization of NOR gate. What is the importance of bias term? **[8]**
- b) Compare LMS, Perceptron and delta learning laws. **[8]**
- Q3)** a) Draw and explain the architecture of RBFN (Radial Basis Function) Network? How it act as classifier? **[10]**
- b) What is the use of activation functions in ANN training? Discuss any 2 activation funtions. **[8]**

OR

***P.T.O.***

**Q4)** a) What is linearly Non-separable classification problem? Can single Perceptron solve such problem? Discuss ADALINE computing model of a neuron. [10]

b) Discuss in brief the significance of learning constant, learning law and momentum term in back propagation training. [8]

**Q5)** a) How associative memory models classified? With diagram explain the working of Auto-associative Neural Network. [8]

b) What is meant by simulated annealing? What is annealing schedule? [8]

OR

**Q6)** a) With example illustrate the concept of stochastic update and thermal equilibrium. [8]

b) Explain the architecture of Boltzmann machine. [8]

## SECTION-II

**Q7)** a) How the self-organizing network is trained? Illustrate the Kohonen's learning with suitable example. [10]

b) Compare between competitive learning and vector quantization. Why it is called as unsupervised learning? [8]

OR

**Q8)** a) What is plasticity- stability dilemma problem? Explain the ART Training algorithm used for pattern clustering. [10]

b) Discuss the architecture of Recurrent Neural Network. [8]

**Q9)** a) How an optimization problem is formulated for a solution using a neural network model? Explain with example. [8]

b) Draw and explain the architecture of Bidirectional Associative Memory. [8]

OR

**Q10)a)** Explain with architecture and algorithms, the use of ANN in handwritten digit recognition. [8]

b) Discuss in brief auto-association and hetero-association process used for neural processing. [8]

**Q11)a)** How Fuzzy sets are different than traditional set? How Fuzzy logic can be used with Neural Networks for supervised or unsupervised learning? [8]

b) What do you understand by Soft Computing? Explain and compare its different components/tools with features. [8]

OR

**Q12)a)** Compare Neuro Fuzzy systems with traditional Neural systems. State the advantages and disadvantages. [8]

b) Explain the Neuro- Fuzzy architecture of Fuzzy Back propagation training. How the architecture is different than traditional Feed Forward Nertwork [8]



Total No. of Questions : 12]

SEAT No. :

**P1464**

**[4759]-221**

[Total No. of Pages : 4

**B.E. (Computer Engineering)  
ADVANCED DATABASES  
(2008 Pattern) (Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section-I and 3 questions from section-II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) What do you mean by parallel database system? Explain its Architecture with neat diagram. **[8]**
- b) Explain speed up and scale up in parallel database system. **[5]**
- c) What are the different partitioning techniques in parallel database system. **[5]**

OR

- Q2)** a) State and explain parallel database design issues. **[8]**
- b) Explain range partitioning sort in parallel database system along with its suitability. **[5]**
- c) State and explain the difference between Interquery & Intraquery parallelism. **[5]**

- Q3)** a) State and explain different data storage technique in the distributed database system. **[8]**
- b) What is Deadlock? How Deadlock is handled in the distributed database system? **[8]**

OR

**P.T.O.**

- Q4)** a) Explain any two methods to handle the concurrency control in the distributed database system. [8]
- b) State and explain 2PC protocol. Which additional phase is added in the 3PC protocol explain its significance. [8]
- Q5)** a) What is N tier architecture? Explain its advantages with example. [8]
- b) Explain the following with reference to the web architecture. [8]
- i) Web server.
  - ii) Application server.
  - iii) Mail server.
  - iv) CGI.

OR

- Q6)** a) Explain the following: [12]
- i) XML DTD.
  - ii) XML SCHEMA.
  - iii) X Query.
  - iv) SOAP.
- b) What are the different XML parser? Explain. [4]

### **SECTION-II**

- Q7)** a) State & explain the detailed architecture of Data warehouse with its basic components. [8]
- b) Explain the different schema design for Data warehouse with suitable example. [8]

OR

**Q8) a)** What is noisy data? Explain data cleaning process. How missing values are handled. [8]

b) Explain the following operations of OLAP on multidimensional data. [4]

i) Roll up & drill down.

ii) Slice & dice.

c) Explain the difference between OLAP & OLTP. [4]

**Q9) a)** A Database has Six transactions. Let min support = 20% & Confidence = 75%. [8]

TXN ID	Items
100	X, Y, Z
200	X, Z, W
300	Y, W
400	U, V, W
500	V, Y, Z
600	U, X, Z

i) Find the frequent item set by using Apriori Algorithm.

ii) List all strong association rules.

b) Differentiate between classification & Clustering. [5]

c) What is outlier analysis? Explain its significance. [3]

OR

**Q10)a)** What is best split? Explain ID3 algorithm to create decision tree. [8]

b) Consider the following data set [8]

Food item	Protein content	Fat content
F1	1.1	60
F2	8.2	20
F3	4.2	35
F4	1.5	21
F5	7.6	15
F6	2.0	55
F7	3.9	39

Find the cluster for the object in the dataset by using K-means algorithm, if  $K = 4$ .

**Q11)a)** State the difference between data mining & Information Retrieval. [6]

b) Write short note on the following: [12]

i) Inverted Index.

ii) Ontology.

iii) TF-IDF.

OR

**Q12)a)** Explain the typical architecture of an Information Retrieval system. [6]

b) Write short note on the following: [12]

i) Precision & Recall.

ii) False positive & False drop.

iii) Random walk method.



Total No. of Questions : 12]

SEAT No. :

**P1465**

[4759] - 222

[Total No. of Pages :3

**B.E. (Computer)**

**VLSI & DIGITAL SYSTEMS DESIGN  
(2008 Pattern) (Semester - II) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data. if necessary.*

**SECTION - I**

**Q1)** a) Compare Speed-Power Performance of available technologies. [8]

b) Explain the types of technology scaling. [9]

OR

**Q2)** a) Explain the layout design rules for devices and interconnects. [9]

b) Explain the classification of IC technology based on design style. [8]

**Q3)** a) Explain Shallow Trench Isolation (STI) with process flow. [8]

b) Explain fabrication process for CMOS device. [9]

OR

**Q4)** a) Explain fabrication of Cu interconnects with suitable diagram. [8]

b) Write a short note on [9]

i) Gate formation

ii) Contact formation

iii) Source drain region formation

**P.T.O.**

- Q5)** a) Explain basic properties of Silicon Wafer. [4]  
b) Explain purification steps of raw silicon wafer. [4]  
c) Explain Chemical vapor oxidation technique. [8]

OR

- Q6)** a) Write a short note on [8]  
i) Optical Lithography  
ii) Thermal Oxidation  
b) Explain wet etching and plasma etching. [8]

**SECTION - II**

- Q7)** a) Explain Island style and Row based FPGA architectures in detail. [8]  
b) Explain different Modeling styles in HDL. [9]

OR

- Q8)** a) Explain the following terms with examples. [9]  
i) Identifier  
ii) Variable  
iii) Array  
b) Write VHDL Code for Lift Controller. [8]

- Q9)** a) Explain the types of programmable logic devices in details. [8]  
b) Explain Application Specific IC's Design Flow. [4]  
c) Explain CMOS inverter with VTC. [4]

OR

- Q10)a)** Explain static and dynamic behavior of CMOS devices and Circuits. **[8]**
- b) Explain role of software tools in digital design. Explain the types of software tools in VLSI design. **[8]**

- Q11)a)** Explain the metastability in details. **[5]**
- b) List out different steps for designing Clocked synchronous state machine. **[8]**
- c) Explain merits and demerits of CPLD. **[4]**

OR

- Q12)a)** Explain timing parameters for Read and Write Operation in Static RAM. **[8]**
- b) For Combinational Logic design explains the following. **[9]**
- i) Timing diagram
  - ii) Propagation Delay
  - iii) Timing specification



Total No. of Questions : 12]

SEAT No. :

**P1466**

[4759] - 223

[Total No. of Pages :6

**B.E. (Computer)**

**OPERATION RESEARCH**

**(2008 Pattern) (Elective - IV) (Semester - II) (410451)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to right indicates full marks.*
- 5) *Use of non programmable calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Describe the components associated with basic structure of linear programming model. [5]
- b) What are the major assumptions of linear programming model for reducing the complex real world problems into a simplified form? [5]
- c) Use Simplex method to solve following linear programming problem. [8]

$$\text{Maximize } Z = 3x_1 + 5x_2 + 4x_3$$

Subject to constraints

$$2x_1 + 3x_2 \leq 8$$

$$2x_2 + 5x_3 \leq 10$$

$$3x_1 + 2x_2 + 4x_3 \leq 15$$

$$\text{and } x_1, x_2, x_3 \geq 0.$$

OR

- Q2)** a) Describe the steps of simplex algorithm for obtaining an optimal solution to linear programming problem. [8]

**P.T.O.**

b) Use graphical method to solve following linear programming problem. [10]

$$\text{Maximize } Z = 2x_1 + x_2$$

Subject to constraints

$$x_1 + x_2 \leq 10$$

$$x_1 + x_2 \leq 6$$

$$x_1 - x_2 \leq 2$$

$$x_1 - 2x_2 \leq 1 \text{ and } x_1, x_2 \geq 0.$$

**Q3) a)** Discuss the difference between decision making under certainty, under uncertainty and under risk. [8]

b) Consider the game with pay-off matrix. Determine optimal strategies for players A and B. Determine value of a game. Is the game is fair or strictly determinable? [8]

Player A	Player B		
	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
A <sub>1</sub>	-1	2	-2
A <sub>2</sub>	6	4	-6

OR

**Q4) a)** The following matrix gives the payoff (Rs) of different strategies (alternatives) S<sub>1</sub>, S<sub>2</sub> and S<sub>3</sub> against conditions (events) N<sub>1</sub>, N<sub>2</sub>, N<sub>3</sub> and N<sub>4</sub>. [8]

Calculate the decision taken under following approaches.

- i) Pessimistic
- ii) Optimistic
- iii) Equal probability
- iv) Regret

Strategy	State of Nature			
	$N_1$	$N_2$	$N_3$	$N_4$
$S_1$	4000	-100	6000	18,000
$S_2$	20,000	5,000	400	0
$S_3$	20,000	15,000	-2000	1,000

- b) What is Role of probability distribution function? What are different types of continuous probability distribution function? [8]

**Q5) a)** Draw and explain structure of queueing system. [8]

- b) Let on an average 4 customers arrive after every 2 minutes in a system. Calculate [8]

- i) Probability of no more than 2 minutes gap between successive arrivals.
- ii) Average time between successive arrivals.
- iii) Probability of interarrival time between successive arrivals.

OR

**Q6) a)** What do you mean by Queue discipline? Explain static and dynamic queue discipline to serve customers of the queue. [8]

- b) A Group of Engineers has two terminals to aid in their calculations. The average computing job requires 20 minutes of terminal time, and each engineer requires some computation about once every 0.5 hour. That is, mean time between calls for service is 0.5 hours. Assume that these are distributed according to an exponential distribution. [8]

If there are six engineers in the group, find

- i) Expected number of Engineers waiting to use one of the terminals.
- ii) The total lost time per day.

## SECTION - II

- Q7) a)** There are seven jobs, each of which has to go through the machines A and B in the order AB. Processing times in hours are as follows. [9]

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine:

- i) Sequence of Jobs that will minimize total elapsed time T
  - ii) Total elapsed time T
  - iii) Idle time for machine A and B
- b)** Explain following terms in PERT/CPM. [9]
- i) Earliest time
  - ii) Latest time
  - iii) Total activity time
  - iv) Event slack
  - v) Critical path

OR

- Q8) a)** What are the elements that characterize a sequencing problem? Explain principal assumptions made while dealing with sequencing problems. [9]
- b)** An architect has been awarded a contract to prepare plans for an urban renewal project. The job consist of the following activities and their estimated times. [9]

Activity	Description	Immediate Predecessors	Time (days)
A	Prepare preliminary sketches	-	2
B	Outline specifications	-	1
C	Prepare drawings	A	3
D	Write specifications	A,B	2
E	Run off prints	C,D	1
F	Have specifications	B,D	3
G	Assemble bid packages	E,F	1

- i) Draw network diagram of activities for the project.
- ii) Indicate the critical path, and calculate total float and free float for each activity.

**Q9) a)** Solve the following non-linear programming problem using separable programming algorithm. **[8]**

$$\text{Max } Z = 3x_1 + 2x_2$$

Subject to constraints

$$g(x) = 4x_1^2 + x_2^2 \leq 16, x_1, x_2 \geq 0$$

- b) What do you mean by separable programming and separable convex programming? Separate functions  $f(x) = 9x_1^2 + 5x_2^2 - 5x_1 + 2x_2$  into two functions. **[8]**

OR



- Q10)a)** State and explain procedure of solving Non-linear programming problem. [8]
- b) Write a note on Geometric programming. [8]

**Q11)a)** Draw and explain functional Relationship among components of Dynamic programming. [8]

- b) A man is engaged in buying and selling identical items. He operates from a warehouse of capacity of 500 items. Each month he can sell any quantity that he chooses upto the stock at the beginning of the month. Each month, he can also buy as much as he wishes for delivery at the end of the month, so long as his stock does not exceed 500 items. For next four months he has following error-free forecasts of cost & sales prices.

month n	1	2	3	4
Cost	27	24	26	28
Sales price	28	25	25	27

if he currently has stock of 200 items, what quantities he sell & buy in the next four months? Find the solution using dynamic programming. [8]

OR

**Q12)a)** What is the dynamic recursive Relation? Explain the recursive nature of computation in dynamic programming. [8]

- b) Use dynamic programming to find the value of [8]

$$\text{Max } Z = y_1 * y_2 * y_3$$

Subject to constraints

$$y_1 + y_2 + y_3 = 5 \text{ and } y_1, y_2, y_3 \geq 0.$$



Total No. of Questions : 12]

SEAT No. :

**P1467**

**[4759] - 224**

[Total No. of Pages :2

**B.E. (Computer Engineering)  
INFORMATION SECURITY  
(2008 Course) (Elective - IV) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from Section I and three questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** What are different attributes of security? Explain each in detail. **[10]**

b) Discuss different standards related to Information security. **[8]**

OR

**Q2) a)** Explain OSI security architecture in detail. **[10]**

b) What are different issues of IS? Explain each in detail. **[8]**

**Q3) a)** What is cryptography? Explain polyalphabetic ciphering with suitable example. **[8]**

b) Explain round function of DES algorithm in detail. **[8]**

OR

**Q4) a)** Enlist block ciphering modes of operation. Explain CBC mode in detail. **[8]**

b) Differentiate AES and DES algorithms. **[8]**

**Q5) a)** What is RSA? If RSA prime No.  $p = 3$ ,  $q = 11$ ,  $e = 3$  and  $m = 00111011$  (m-message), then calculate private key  $d$  and cipher text. **[8]**

b) Enlist problem of key managements using private key cryptography. Why Diffie-Hellman algorithm is used in network security. **[8]**

OR

**P.T.O.**

- Q6)** a) What are practical issues of RSA algorithm? Discuss each issue in detail. [8]  
b) Explain Elliptical curve cryptography with suitable algorithmic steps. [8]

**SECTION - II**

- Q7)** a) What is kerberos? Explain all steps of kerberos with suitable diagram. [10]  
b) What is X.509? Explain roles of X.509 in detail. [8]

OR

- Q8)** a) What is Message Digest? Explain MDS algorithm in detail. [10]  
b) Define MAC. Discuss HMAC in detail. [8]

- Q9)** a) Define Ip sec. Discuss Ip sec protocols in detail. [8]  
b) What is intrusion Detection system? Enlist and explain different types of IDS. [8]

OR

- Q10)** a) Explain steps of SSL Handshaking protocols. [8]  
b) Enlist and explain firewall design principles in short. [8]

- Q11)** a) What is PGP? Explain operations of PGP. [8]  
b) Explain working principles of SET with suitable diagram. [8]

OR

- Q12)** Write a short note on followings. [16]  
a) Security services  
b) Smart cards  
c) S/MIME  
d) Electronic commerce security.



Total No. of Questions : 8]

SEAT No. :

**P3707**

**[4759] - 226**

[Total No. of Pages :3

**B.E. (Petrochemical)  
REACTION ENGINEERING - II  
( 2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt any three questions from each section.*
- 2) *Answers to the two sections should be written in two separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data wherever necessary.*
- 5) *Use of steam tables and electronic calculator is allowed.*

**SECTION - I**

**Q1)** Tertiary Butyl Alcohol, an important octane enhancer, is produced by liquid phase hydration of isobutene over a catalyst. **[16]**

- a) Propose possible reaction mechanisms based on Langmuir-Hinshelwood theory.
- b) Derive a rate law assuming the surface reaction is rate-limiting.

**Q2)** A laboratory packed bed reactor, housing 1Kg catalyst, yields following kinetic data under a condition of very large recycle of product flow. Feed concentration of A may be taken as 10mol/m<sup>3</sup>. **[18]**

C <sub>A</sub> mol/m <sup>3</sup>	1	2	3	6	9
v <sub>0</sub> lit/hr	5	20	65	133	540

Reaction is  $2A \rightarrow R+S$ . Find the amount of catalyst needed for 95% conversion for a flow rate of 10 kmol/hr feed stream having concentration of A as 3.6 mol/m<sup>3</sup> assuming the gas phase and solid phase mixing behaviour in the reactor to be:

**P.T.O.**

- a) Plug Flow type
- b) Mixed Flow type

**Q3)** Diffusion-free kinetics of a gas phase catalytic reaction  $A \rightarrow 2R$  is given as  $-r_A = 0.17 C_A^2$  mol/m<sup>3</sup> cat.s. Calculate the catalyst volume needed to achieve 80% conversion of pure A fed at the rate of 1500 Kmol/hr assuming. [16]

- a) Negligible pore diffusion resistance and
- b) Strong pore diffusion resistance. (Take catalyst pellet size as 10mm and effective pore diffusivity to be  $2.8 \times 10^{-6}$  m<sup>2</sup>/m cat.s).

**Q4)** Discuss in brief. [16]

- a) Optimum pellet diameter in fixed bed reactor
- b) Various effects of pore diffusion
- c) Industrial use of fluidized bed reactor
- d) Mechanisms of catalyst poisoning.

## SECTION - II

**Q5) a)** Sketch and explain typical concentration profiles for various kinetic regimes obtained in gas-liquid reactions. [4]

- b) Derive relationship giving enhancement factor when all reaction occurs instantaneously in the liquid film. [12]

**Q6)** An acidic impurity A in a gaseous stream is to be removed so as to reduce its partial pressure from 750 Pa to 40Pa (total pressure is 200KPa) by reacting it with a base B dissolved in water in a packed tower operated in a counter-current manner. Overall gas side mass transfer coefficient is 0.0065mol/hr.m<sup>3</sup>.Pa. Gas side resistance to mass transport in absence of the reaction is 30% whereas

the liquid film contributes the remaining 70% resistance. Henry's constant is 45 Pa.m<sup>3</sup>/mol.L/G ratio is 5 times the minimum required for plain absorption. Calculate minimum concentration of B needed at the top of the tower to ensure minimum height of the tower. Also calculate this minimum height. [18]

- Q7)** a) Explain shrinking unreacted core model employed in solid-gas reactions. [10]
- b) Spherical particle of ZnS with initial diameter of 5cm is subjected to roasting in presence of air. Roasting reaction yields SO<sub>2</sub> as also the layer of ZnO<sub>3</sub>. Molar density of solid may be assumed to be 0.07 mol/cm<sup>3</sup>. Diffusivity of gas through the product layer is 0.06cm<sup>2</sup>/s. Calculate the time required for 85% conversion of the particle. [6]
- Q8)** a) Give examples of fixed bed and fluidized bed reactors from process industry. [8]
- b) Compare hydrodynamic behaviour of non-ideal reactors with that of ideal reactors. [8]



Total No. of Questions : 12]

SEAT No. :

**P3708**

[4759]-227

[Total No. of Pages : 3

**B.E. (Petrochemical)**  
**PROCESS DYNAMICS AND CONTROL**  
**(2008 Course) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10, Q.11 or 12.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier Charts, electronic pocket calculator and steam table is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) Discuss the characteristics of the first order system for a step input function. Give the physical significance of the term time constant. [8]
- b) Explain the second order underdamped system characteristics. Define each term involved in it. [8]

OR

- Q2)** a) The overall transfer function of the control system is given by

$$G(s) = \frac{5}{2s^2 + 1.63s + 5}$$

A Step change of magnitude 5 is introduced into the system. Determine the Overshoot, Period of Oscillation, Rise time, Ultimate value of response and Maximum Value of Response. [12]

- b) What do you mean by Interacting and Non Interacting systems. [4]

- Q3)** a) Explain the feedback control scheme for the shell and tube heat exchanger with neat figure. [8]
- b) Draw a neat diagram for Distillation column control scheme. [8]

OR

**P.T.O.**

**Q4) a)** Explain the Cascade control scheme for a Jacketed Stirred tank reactor. [8]

b) What is the significance of block diagram reduction in process control? Explain with a suitable example. [8]

**Q5) a)** A step change of magnitude 4 is introduced into a PI controller. If the value of  $K_c$  is 6 and reset rate is 0.5. Plot the response of the controller. [12]

b) Discuss the factors affecting the choice of the controller. Elaborate with example. [6]

OR

**Q6)** Write a short note on the following: [18]

a) Procedure of Controller tuning by Z-N Rules.

b) Process Safety Interlocks.

c) Good control criteria.

### SECTION-II

**Q7) a)** Explain the stability of the system and setting of controller gain for the system following  $G(s) = \frac{K_c(0.5s+1)}{s(s+1)(s+0.5)}$  using Routh criterion. [12]

b) Explain the utility of frequency analysis. [6]

OR

**Q8) a)** Explain the Bode diagram for the first order system. [12]

b) What do you mean by stability of a control system? [6]

**Q9)** Distinguish between the following with the help of neat diagram. [16]

a) Positive feedback and Negative feedback.

b) Feedforward control and Feedback control.

OR



- Q10)a)** Explain with neat diagram the Ratio Control strategy. [10]  
b) Explain the Adaptive control strategy with the help of suitable example. [6]

- Q11)a)** Explain the control components of SCADA. [8]  
b) Explain the Network communication components of SCADA. [8]

OR

- Q12)a)** Explain the Hardware of a PLC system. [8]  
b) Explain the application of PLC with suitable example. [8]



Total No. of Questions : 12]

SEAT No. :

**P3896**

[Total No. of Pages : 3

**[4759] - 228**

**B.E. (Petrochemical Engineering)  
ENVIRONMENTAL ENGINEERING  
(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn, wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume Suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Discuss in details about "Kyoto Protocol". Discuss the role of UNFCCC. [6]  
b) Elaborate on 'Adsorption of Gaseous Pollutants on Solids'. [6]  
c) Discuss in detailed about separation, handling and transportation of Biomedical waste. [6]

OR

- Q2)** a) Explain impact of Petroleum & Petrochemical industry on environment starting from crude oil production to refining. [9]  
b) How the project is decided for CDM? What are its criteria? What are examples of projects in CDM? [9]

- Q3)** a) Flue gases from thermal power station, flowing at rate of 1000 m<sup>3</sup>/min and containing practicles in size range of 1 to 100 microns, are sent to multi tray settling chamber for preliminary separation of practicles. The settling unit, 5 m long and 5 m wide, contains 25 trays including bottom shelf, spaced uniformly 30 cm apart. Determine minimum particle size that can be separated in the unit. Assume stroke's law to be applicable:[12]

Data:                      Temperature of gases = 200 °C  
                                 Density of gases = 0.001 g/cm<sup>3</sup>  
                                 Viscosity of gases = 0.035 cp  
                                 Density of particles = 2.2 g / cm<sup>3</sup>

- b) With the help of flow diagram, explain working, advantages & disadvantages of suspended particulate matter (SPM) removal in Electrostatic precipitator (ESP). [4]

**P.T.O.**

OR

- Q4)** a) Give the detailed classification of Primary and Secondary air pollutants with their adverse effects for any two each. [10]  
b) What is the basis used for selecting the air pollution control equipment? What are the factors affecting choice of air pollution control equipment?[6]
- Q5)** a) Discuss with neat sketches five types of 'Plume Behaviours' with the conditions required for formation of these plumes and impact created on surrounding. [8]  
b) Discuss the Meteorology factors influencing air pollution. [8]

OR

- Q6)** Write a short note on following : (Any 4) [16]  
a) Carbon credits  
b) Source Correction method for air pollution  
c) Control of NO<sub>x</sub> in a complex fertilizer plant.  
d) Environmental laws for air pollution.  
e) Temperature lapse rates and stability,  
f) Adsorption technique for air pollution control.  
g) Impact of climate change on human life.

## **SECTION - II**

- Q7)** a) Discuss the general limits / norms specified for disposal of treated wastewater on land, in river and in sea water? [8]  
b) Show the interrelationship of solids found in wastewater with help of diagram. [8]

OR

- Q8)** a) Discuss the various operations for generation of wastewater in any process plant. [8]  
b) What is the significance of COD/BOD ratio? Give the limitations of BOD test. [8]
- Q9)** a) Discuss principle, construction, working, advantages and disadvantages of 'Activated Sludge Process' (ASP) with neat sketch. [10]  
b) Differentiate between anaerobic and aerobic process (minimum 5 points)[6]

OR

- Q10)**a) What do you mean by Suspended growth process and Attached growth process? Explain with example. What are preconditions needed to operate these processes. Which process you will recommend municipal sewage treatment and why? [8]
- b) What do you understand by “SMOG”? Give its classification. What are the favorable situations to form SMOG? What are its ill effects on environment and human body? [8]
- Q11)**a) Discuss the sources and method of treatment for dairy industry waste with neat sketch. [9]
- b) Discuss principle, construction, working, advantages and limitations of ‘Up-flow Anaerobic Sludge Blanket’ (UASB) process with neat sketch. [9]

OR

- Q12)** Write a short note on (Any four) [18]
- a) Importance of regulations for hazardous waste.
- b) Difference between aerobic and anaerobic process
- c) ISO 14000
- d) OSHA
- e) Hazardous waste classification
- f) Facultative pond system.
- g) Difference between attached growth process and suspended growth process.



Total No. of Questions : 12]

SEAT No. :

**P3681**

[4759] - 23

[Total No. of Pages :5

**B.E. (Civil)**

**STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS  
IN CIVIL ENGINEERING**

**(2008 Course) (Elective - IV) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Three hundred incoming students take mathematics exam consisting of 75 multiple choice questions. The following table gives the distribution of the scores of the exam. Find mean, median, mode and variance. **[10]**

Total scores	5-15	15-25	25-35	35-45	45-55	55-65	65-75
No. of students	2	0	8	36	110	78	66

- b)** Construct a bar chart for the frequency distribution given below. **[6]**

Class Interval	72-75	75-78	78-81	81-84	84-87	87-90
Frequency	2	1	1	2	1	4

OR

**P.T.O.**

- Q2) a)** The frequency distribution of heights of 100 students at a university is as follows. Find coefficient of skewness and coefficient of Kurtosis. [10]

Height (in)	60-62	63-65	66-68	69-71	72-74
Frequency	5	18	42	27	8

- b) Explain in brief various methods of sampling. [6]

- Q3) a)** Vehicles pass through a junction on a busy road at an average rate of 300 per hour. [6]

- i) Find the probability that none passes in a given minute.
- ii) What is the expected number passing in 2 minutes.
- iii) Find the probability that this expected number actually pass through in a given 2 minute period.

- b) The number of rainy days in the first week of July for a period of 50 years is recorded as given below. [10]

No. of rainy days	0	1	2	3	4	5	6	7
No. of years	2	9	15	13	7	3	1	0

Assuming that binomial distribution can be used to model this event, test the goodness of fit for binomial distribution at 5% significance level. Use the following chi square distribution table.

degree of freedom →	7	6	5	4
$\alpha = 0.95$	2.167	1.635	1.145	0.711
$\alpha = 0.05$	14.067	12.592	11.07	9.488

OR

- Q4) a)** The annual runoff of a stream is modelled by a normal distribution with mean and standard deviation of 5000 and 1000 ha-m respectively. [10]

- i) Find the probability that the annual runoff in any year is more than 6500 ha-m.
- ii) Find the probability that it would be between 3800 and 5800 ha-m.

Use the standard normal distribution table given below.

Z	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
Area	0.2257	0.2580	0.2881	0.3159	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332

- b) Fit a Poisson distribution to the following data and test the goodness of fit at 5% significance level. [6]

x	0	1	2	3	4	5	6
freq.	275	72	30	7	5	2	1

Use Chi square table given in Q. 3b.

- Q5) a) Following table shows the weights in kg, heights in inches and ages in years of 5 boys. Find the least square regression equation of  $y$  on  $X_1$  and  $X_2$ . Estimate the weight of a boy who is 9 years old and 54 in tall. [9]

y-weight	64	71	53	67	55
$X_1$ -Height	57	59	49	62	51
$X_2$ -Age	8	10	6	11	8

- b) The following are the measurements of pressure head difference and the corresponding discharge measured by venturimeter. Find the value of discharge when pressure head difference  $p = 10$  cm. [9]

P(cm)	1	4	9	16	25
Q(cc/s)	100	200	300	400	500

OR

- Q6) a) The following table shows the average temperature and precipitation in a city for the month of July during the years 1989-1998. Find correlation coefficient. [12]

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Temp(°F)	78.1	71.8	75.6	72.7	75.3	73.6	75.1	75.3	73.8	70.4
Preci(in)	6.2	3.6	3.4	2.8	1.8	2.8	4.1	2.6	1.2	4.2

- b) Using Gauss interpolation formula, find the population in 1935. [6]

year	1930	1932	1934	1936	1938	1940
Population in Crores	12	16	21	27	32	40

**SECTION - II**

- Q7) a)** Solve the following system of equations by Gauss Elimination method. [8]

$$3x + y + 2z = 3; 2x - 3y - z = -3; x + 2y + z = 4$$

- b) Solve the following system of equations using Gauss-seidal iteration method. (3 iterations). [8]

$$8x - y + z = 18; 2x + 5y - 2z = 3; x + y - 3z = -6$$

OR

- Q8) a)** Solve the following system of equations using Gauss-Elimination method. [8]

$$10x + y + z = 12; 2x + 10y + z = 13; x + y + 5z = 7.$$

- b) Solve the following system of equations by Gauss seidal method. (3 iterations) [8]

$$5x - 2y + z = -4; x + 6y - 2z = -1; 3x + y + 5z = 13.$$

- Q9) a)** Using Bisection method, find the root of  $\tan x + x = 0$  upto two decimal places which lies between 2 and 2.1. [8]

- b) Using Newton Raphson method, find the real root of the equation  $x^2 + 4 \sin x = 0$ . Correct upto 4 decimal places. Take  $x_0 = -1.9$ . [8]

OR

- Q10) a)** Find the root of the equation  $x \cdot e^x = \cos x$  correct upto 4 decimal places using false position method in the interval (0,1). [10]

- b) Explain secant method. [6]



**Q11)a)** Find the value of  $\int_0^{0.6} e^x \cdot dx$  taking number of intervals equal to 6, correct upto 4 decimal places by Simpson rule. **[8]**

b) A river is 80 feet wide. The depth in feet of the river at a distance  $x$  from one bank is given by the following table. Find the area of cross section of the river. **[10]**

x	0	10	20	30	40	50	60	70	80
d	0	4	7	9	12	15	14	8	3

OR

**Q12)a)** Evaluate  $I = \int_0^1 \frac{1}{1+x^2} dx$  taking 7 ordinates. **[8]**

b) Use Gauss Quadrature formula to evaluate  $I = \int_2^3 \frac{\cos 2x}{1 + \sin x} \cdot dx$ . **[10]**



Total No. of Questions : 12]

SEAT No. :

**P3709**

**[4759] - 230**

[Total No. of Pages : 4

**B.E. (Petrochemical Engineering)**  
**NOVEL SEPARATION PROCESSES**  
**( 2008 Course) (Semester - I) (Elective - I) (412404 -B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn and well commented.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket Calculator and steam tables, is allowed.*
- 5) *Figures to the right side indicate full marks.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Classify various separation processes by giving suitable example(s). Discuss equilibrium and rate based separation processes. [10]
- b) Write a note on: "Energy requirement for separation Processes". [8]

OR

- Q2)** Discuss various membrane modules with neat sketches for membrane separation processes by giving merits and demerits of each of them. [18]

- Q3)** a) Discuss in brief on: adsorptive bubble separation techniques. [8]
- b) Reverse osmosis of salt solution at 25°C is tested with a  $5.5 \times 10^{-3}$  m<sup>2</sup> cellulose acetate membrane. On one side of the membrane is 1.5 mol NaCl/kg H<sub>2</sub>O solution at 50 atmospheres (abs.) pressure, on the other is 0.020 mol NaCl/kg H<sub>2</sub>O at atmospheric pressure. The permeation rate is 95 ml/hour. [8]

Determine the following:

- i) the solvent permeability and
- ii) the rejection rate

OR

**P.T.O.**

**Q4)** A 10-micron tubular membrane is used to recover salt A from a dilute solution. The solutions to either side are at 0.025 and 0.003 kmol/m<sup>3</sup>, with mass transfer coefficients of  $3.5 \times 10^{-5}$  and  $2.5 \times 10^{-5}$  m/s respectively. The distribution coefficient is 0.85 and the diffusivity of A in the membrane is  $2.8 \times 10^{-10}$  m<sup>2</sup>/s. **[16]**

- a) Calculate the percentage of total resistance to mass transfer contributed by the membrane.
- b) Calculate the membrane area needed to allow recovery at 0.025 kmol/hr.
- c) If the velocities of both solutions are doubled, estimate the membrane resistance in this case. Assume that flow inside the tube is turbulent and mass transfer follows the Gilliland, Sherwood & Linton correlation.

**Q5) a)** A liquid containing dilute solute A at a concentration  $3 \times 10^{-2}$  kgmol/m<sup>3</sup> is flowing rapidly by a membrane of thickness,  $3 \times 10^{-5}$  m. The solute diffuses through the membrane and its concentration on the other side is  $0.55 \times 10^{-2}$  kgmol/m<sup>3</sup>. The mass transfer coefficient  $k_{c1}$  is large and can be considered as infinite and  $k_{c2} = 2.22 \times 10^{-5}$  m/s.

Data: Distribution coefficient =  $K' = 1.55$  and Diffusivity,  $D_{AB} = 8 \times 10^{-11}$  m<sup>2</sup>/sec in the membrane. **[8]**

- b) Discuss in brief Diffusion type model for Reverse osmosis. **[8]**

OR

**Q6) a)** A heart-lung machine uses a 0.175mm silicone rubber membrane with a permeability of  $6.40 \times 10^{-7}$  cm<sup>3</sup> O<sub>2</sub>(STP)mm/s. cm<sup>2</sup>cmHg. The machine is to supply 35cm<sup>3</sup>/min of oxygen to a patient, where the partial pressure of oxygen in the blood is the equivalent of 30mmHg. The machine is supplied with pure oxygen at 700mmHg, so gas film resistance can be neglected. If the resistance on the blood side were neglected also, how large would the membrane need to be? **[12]**

- b) Write a brief note on: "Hydrotopes". **[4]**

## SECTION - II

**Q7)** Answer the following.

**[18]**

- a) Give classification of Chromatographic separation. State principles of GC.
- b) Discuss in brief the adsorption isotherm models with equations.
- c) Write down Purnell equation for chromatographic separation. Explain different terms involved in it.

OR

**Q8)** Discuss in detail the process principles involved in Pressure Swing Adsorption (PSA) and Temperature Swing Adsorption (TSA) with industrial applications.

**[18]**

**Q9)** A waste stream of alcohol vapour in air from a process was adsorbed by activated carbon particles in a packed bed having a diameter of 5cm and length of 15cm containing 79.4 g of carbon. The inlet gas stream having a concentration of  $c_0$  of 500ppm and a density of  $0.00115\text{g/cm}^3$  entered the bed at a flow rate of  $750\text{ cm}^3/\text{s}$ . Data gives the concentration of the breakthrough curve. The break-point concentration is set at  $c/c_0 = 0.025$ .

Data: Breakthrough concentration

Time, h	$c/c_0$
0.0	0.0
3.0	0.0
3.5	0.002
4.0	0.030
4.5	0.155
5.0	0.395
5.5	0.600
6.0	0.900
6.2	0.935
6.5	0.975
6.8	0.990

- a) Determine the break-point time, the fraction of total capacity used up to the break point, and
- b) Determine the length of the unused bed. Also determine the saturation loading capacity of the carbon.
- c) If the break-point time required for a new column is 6.5hr, what is the new total length of the column required? [16]

OR

- Q10)**
- a) Explain different types of adsorbents with their properties used in industrial operations. [8]
  - b) Write down Van Deemter equation for Chromatography. Explain the meaning of each parameters involved in this equation. Derive an expression for optimum value of the mobile phase velocity and the plate height in terms of these parameters. [8]

- Q11)**
- a) Discuss in brief the process principles involved in Elution Chromatography. Derive the retention equation: [10]

$$t_R = t_M \left( 1 + \frac{1-\epsilon}{\epsilon} K \right); \text{ All symbols have their usual meaning.}$$

- b) Two amino acids, A and B were separated by liquid chromatography. The following data is available: [6]

Amino Acid	$T_R$ , (minutes)	W(minutes)
A	4.25	0.55
B	5.15	0.65

- i) Calculate the resolution of amino acids.
- ii) Calculate the plate number for amino acid, A

OR

- Q12)** Write Short notes on: [16]

- a) Reactive Separations.
- b) Isoelectric Focusing
- c) Zone Melting



Total No. of Questions : 12]

SEAT No. :

**P3710**

**[4759] - 231**

[Total No. of Pages :3

**B.E.**

**PETROCHEMICAL ENGINEERING**

**Elements of Fluidization Engineering**

**( 2008 Pattern) (Elective - I) (412404)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Discuss the relative advantages and disadvantages of fluidization engineering-provide suitable example. **[8]**
- b) Provide one example of fluidization in refinery complex and cite another example of fluidization for bioprocesses. Discuss both processes with help of neat diagram. **[8]**

OR

- Q2)** a) Obtain the mathematical expression to calculate minimum fluidization velocity. **[8]**
- b) Define quality of fluidization. Lists down the major factors affecting it-provide proper explanation. **[8]**

- Q3)** a) A bed of angular sand of mean sieve size  $778 \mu\text{m}$  is fluidized by air. The particle density is  $2540 \text{ kg/m}^3$   $\mu_{\text{air}} = 18.4 \times 10^{-6} \text{ kg/ms}$ ;  $\rho_s = 1.2 \text{ kg/m}^3$ . If 24.75 kg of sand be charged to a bed of 0.216m inch diameter and bed have incipient fluidization height of 0.447m, find **[10]**

- i) porosity at minimum fluidization condition,

**P.T.O.**

- ii) the pressure drop across the bubbling bed and
  - iii) the incipient fluidization velocity
- b) Obtain the expression of minimum fluidization velocity based on pressure balance equation. [6]

OR

- Q4)** a) Compare between Pipe Grids and Spargers-draw neat sketches. [8]
- b) With help of neat diagram discuss methods of Geldart's classification of particles Explain the importance of such classification. [8]

- Q5)** a) What are the key challenges in measurements of multiphase system? How can these be tackled? [10]
- b) Write a detailed note on hydrodynamics of bubbling fluidized bed. Draw neat sketches-provide suitable examples. [8]

OR

- Q6)** a) Discuss the process of Coalescence and bubble break-up with help of neat sketches. Also indicate the source of solids inside bubble and its effects. [9]
- b) What is particle entrainment and carryover in fluidized bed discuss with help of suitable example. [9]

## **SECTION - II**

- Q7)** a) How are the solid particles getting mixed within a fluidized bed reactor? Highlight the key challenges in proper mixing. [8]
- b) Write a stepwise procedure of design of a cyclone separator needed for fast fluidized bed. [8]

OR

- Q8)** a) With help of diagram explain how fluidized bed can be used for drying solids. [8]
- b) How can fluidized bed be used as Heat Exchangers. Explain with help of suitable example. [8]

- Q9) a)** What is agglomeration and sintering in fluidized bed operation? Explain the means of tracking them. [9]
- b) With help of neat diagram explain the similarities between Fluidized bed and Bubble Column and discuss the model of both types of reactors.[9]

OR

- Q10)a)** What are different internals used commonly in fluidized bed. [4]
- b) Write a short note on freeboard region and its usability. [4]
- c) With help of all the important assumptions obtain Kunii-Levenspiel Model of flow through a Fluidized Bed Reactor. In this context explain Davidson Bubble movement through the bed. [10]

- Q11)a)** Scale-up of Fluidized bed reactors is always tricky and a risky affair-Elaborate with help of suitable example. Briefly explain how these issues can be sorted out. [8]
- b) Explain the chemical looping reactor operation with help of neat diagram. [8]

OR

- Q12)a)** With help of neat diagram explain modern day FCC operation. [8]
- b) Discuss Fluidized bed operation for synthesis of Acrylonitrile. Provide neat sketch of the reactor. [8]





Total No. of Questions : 8]

SEAT No. :

**P3897**

[Total No. of Pages : 2

[4759] - 232

**B.E. (Petrochemical Engineering)**

**GREEN CHEMISTRY**

**(2008 Pattern) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1) a)** Discuss applications of super critical carbon dioxide with particular reference to green chemistry. **[8]**

b) Discuss the concepts of environmental management systems and ecolevels. **[8]**

**Q2)** Comment on use of biomass as a green feedstock for chemicals manufacture. Explain how biomass can be converted in to useful chemical products. **[16]**

**Q3)** State and discuss in detail the twelve principles of green chemistry with appropriate examples wherever possible. **[16]**

**Q4) a)** Demonstrate how you will apply the concept of atom economy with help of an example. **[9]**

b) Mention challenges in use of the following as green processes: **[9]**

i) Photochemical synthesis

ii) Phase Transfer Catalysis.

**P.T.O.**

## SECTION - II

- Q5)** a) Compare green synthesis of adipic acid with a more traditional route. [8]  
b) Discuss chemical engineering challenges in electroorganic synthesis. [8]
- Q6)** a) Compare the conventional process with green process for manufacturing lactic acid. [8]  
b) Write a note on process intensification. [8]
- Q7)** a) Discuss how green chemistry approach takes care of process safety. [8]  
b) Discuss conventional and possible green methods for preparation of aniline. [8]
- Q8)** Write notes
- a) Solar energy in chemical manufacture. [9]  
b) Causes and prevention of global warming. [9]



Total No. of Questions : 12]

SEAT No. :

**P3331**

[Total No. of Pages : 2

[4759] - 233

**B.E. (Petrochemical Engineering) (Elective - II) (Semester - I)  
OPTIMIZATION TECHNIQUES FOR PROCESS INDUSTRIES  
(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary*

**SECTION- I**

**Q1)** With neat sketch, explain in details the Objective Function, Constraints, and Feasible Region formulations. **[16]**

OR

**Q2)** Discuss in details and draw pictorial sketch of numerical optimization framework. **[16]**

**Q3)** How Newton's method is useful in solving optimization problems using unidirectional search? **[18]**

OR

**Q4)** Note the steps involved in simplex method as a numerical optimization method. **[18]**

**Q5)** Explain the Convex and Concave Functions for non linear programming. **[16]**

OR

**Q6)** Illustrate the Unconstrained NLP with the concept of local minimum and saddle point. **[16]**

**SECTION- II**

**Q7)** A chemical manufacturer produces a chemical from two raw materials R1 and R2. Although R1 can be purchased at ₹ 5000 per ton, R2 is less expensive and can be obtained at ₹ 1181 per ton. The manufacturer wants to determine the amount of each raw material required to reduce the cost per ton of product to a minimum. Formulate the problem as an optimization problem and comment. **[16]**

**P.T.O.**

OR

**Q8)** Transform the following linear program into standard form: [16]

Minimize:  $f = x_1 + x_2$

Subject to:  $2x_1 + 3x_2 \leq 6$

$x_1 + 7x_2 \geq 4$

$x_1 + x_2 = 3$

$x_1 \geq 0, x_2$  unconstrained in sign

**Q9)** With tree diagram elaborate on the multiobjective optimization methods. [16]

OR

**Q10)** For Multi Objective Process optimization systems, note the need and concept of non dominated set. [16]

**Q11)** Given a mixture of four chemicals A, B, C, D for which different technologies are used to separate the mixture of pure components. The cost of each technology is given in table below. Formulate the problem as an optimization problem with tree and network representations. [18]

Cost of separators in ₹ 1000 / year.

Separator	Cost
A/BCD	50
AB/CD	170
ABC/D	110
A/BC	40
AB/C	69
B/CD	228
BC/D	40
A/B	144
B/C	50
C/D	329

OR

**Q12)** Manufacturing process optimization is to be carried out in an existing petrochemical plant. With details, note the types of objective functions and models used in. [18]



Total No. of Questions : 12]

SEAT No. :

**P3711**

**[4759]-235**

[Total No. of Pages : 4

**B.E. (Petrochemical Engineering)  
NATURAL GAS TECHNOLOGY  
(2008 Course) (Semester-I) (Elective-II) (412405)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer Q. No. 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right side indicate full marks.*
- 5) Use of calculator is allowed.*
- 6) Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** Elaborate on geographic distribution by type of gas. **[8]**

b) Describe origin of natural gas. **[8]**

OR

**Q2) a)** Elaborate on different types of natural gas composition and regional disparities. **[8]**

b) Explain in detail thermal gas reservoir. **[8]**

**Q3) a)** Explain in detail analysis of composition of natural gas. **[8]**

b) Discuss sour gas and sweet gas. **[6]**

c) Elaborate on viscosity of gas mixtures. **[4]**

OR

**Q4) a)** Discuss the phase diagram of a reservoir fluid. **[8]**

b) Find the viscosity for a gas with composition in mole % of  $C_1 = 90.5$ ,  $C_2 = 2.3$ ,  $C_3 = 2.3$  at 3000 psia and 540 °R. **[6]**

**P.T.O.**

Data:

Component	M <sub>i</sub>	P <sub>ci</sub>	T <sub>ci</sub>	$\mu_{lgi}$
C <sub>1</sub>	16.043	667.8	343.1	0.0110
C <sub>2</sub>	30.070	707.8	549.8	0.0092
C <sub>3</sub>	44.097	616.3	665.7	0.0082

- c) Elaborate on heating value of natural gas. [4]

**Q5)** a) Explain in detail predicting hydrate formation by equilibria chart method. [6]

b) Explain in detail hydrate prevention. [6]

c) Write a short note on water content of natural gas. [4]

OR

**Q6)** a) Describe in detail nucleation step in hydrate formation. [6]

b) Discuss kinetics of hydrate formation. [6]

c) Write a short note on hydrate formation during drilling. [4]

### **SECTION-II**

**Q7)** a) Explain in detail dehydration of natural gas by adsorption. [8]

b) Describe with flow sheet refrigeration cycle by expansion turbine for natural gas. [8]

OR

**Q8)** a) A separator to be operated at 1000 psia, is required to handle a well stream with gas flow rate 7 mmscfd at GLR 40 bbl/mmscf. Determine the separator size required for [8]

i) Vertical separator.

ii) Horizontal single-tube separator.

iii) Spherical separator.

Assume a liquid (oil + water) density of 52 lbf/ft<sup>3</sup>, ideal gas with gravity 0.8, operating temperature equal to 110 °F, a retention time 3 min and 1/2 full of liquid conditions.

b) Discuss in detail gas permeation. [8]

- Q9)** a) Explain with flow sheet natural gas liquefaction using TEALARC process with two pressure level. [6]
- b) Explain in detail construction and working of centrifugal compressor. [6]
- c) Discuss LNG carriers with Technigaz integrated tank. [6]

OR

- Q10)**a) Discuss safety precautions for natural gas pipeline. [6]
- b) Describe in detail different gas chains. [6]
- c) Write a short note on design of pipeline transport installations. [6]

- Q11)**a) Describe in detail production of higher alcohols and ethers from methane. [8]
- b) Write a short note on: [8]
- i) Production of gasoline from methanol.
- ii) Oxidative coupling process.

OR

- Q12)**a) Explain in detail methanol production using ICI process. [8]
- b) Write a short note on natural gas storage. [8]

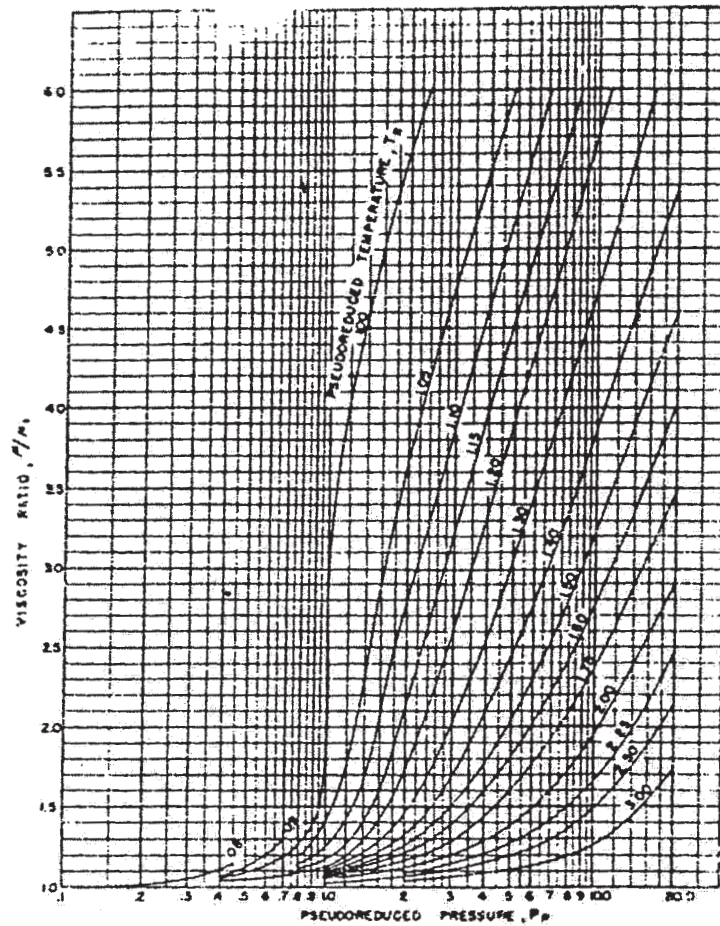


Figure 4 - b. Viscosity ratio versus pseudoreduced pressure.





Total No. of Questions : 8]

SEAT No. :

P3898

[Total No. of Pages : 5

[4759]-237

B.E. (Petrochemical)

REFINERY PROCESS DESIGN

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Attempt any three questions from each section.
- 2) Answers to the two sections should be written in two separate answer books.
- 3) Figures to the right indicate full marks.
- 4) Use of steam tables and electronic calculator is allowed.
- 5) Make use of K.Charts, LMTD correction factor curves and Gilliland Curve given in the end wherever appropriate.
- 6) Assume suitable data wherever necessary.

**SECTION - I**

- Q1)** Vapor leaving the topmost tray in a multicomponent distillation column consists of 70 Mol% n-butane, 20 Mol% n-pentane, and 10 Mol% n-hexane. Column pressure is 5 bar. Vapor is fed to a total condenser from which reflux is returned to the column. Calculate temperatures of vapor from the column top and reflux liquid. If reflux ratio is 3.5 , calculate vapor and liquid compositions for two theoretical plates below the top plate. **[18]**
- Q2)** Feed to a C2 splitter is 30% vaporized liquid having 52% ethylene and 48% ethane (Mol%). The column operates at 8 bar pressure. Purities of both top and bottom products are expected to be 99%. Calculate minimum reflux ratio needed using Underwood equations. Assuming operating reflux to be 1.2 times the minimum, calculate the theoretical stages needed for the separation. Assuming plate efficiency to be 75% and tray spacing to be 60 cm, calculate height of the tray column needed for the purpose. **[16]**
- Q3)** a) Discuss Packie Charts from rating and design point of view. **[8]**  
b) Explain how coil outlet temperature (COT) for the furnace heater for ATU feed can be determined using feed zone calculations. **[8]**

**P.T.O.**

- Q4)** a) Describe in brief flooding and weeping problems in distillation column.[8]  
b) Draw and discuss typical control scheme used in distillation operation.[8]

**SECTION - II**

- Q5)** a) Describe the procedure used in the design of a shell and tube heat exchanger for a specified duty with specific reference to the following:[14]  
i) Placement of fluids.  
ii) Heat transfer coefficients.  
iii) Configuration choice.  
iv) Pressure drops.  
v) Baffle spacing.  
vi) Tube pitch.  
b) State the heat transfer coefficients you will assume in the following situations : [2]  
i) Steam condensing.  
ii) Hydrocarbon liquid boiling.
- Q6)** a) Discuss in brief Hottel's method for fired heater design. [10]  
b) Discuss constructional features of fired heater used in refinery operations. [6]
- Q7)** With reference to centrifugal pump operation and design, discuss: [18]  
a) Cavitation.  
b) Energy saving measures.  
c) Operating characteristics.
- Q8)** Discuss :  
a) Anti-surge in Centrifugal Compressor. [5]  
b) Centrifugal pump operating point. [5]  
c) Choice of process pump. [6]

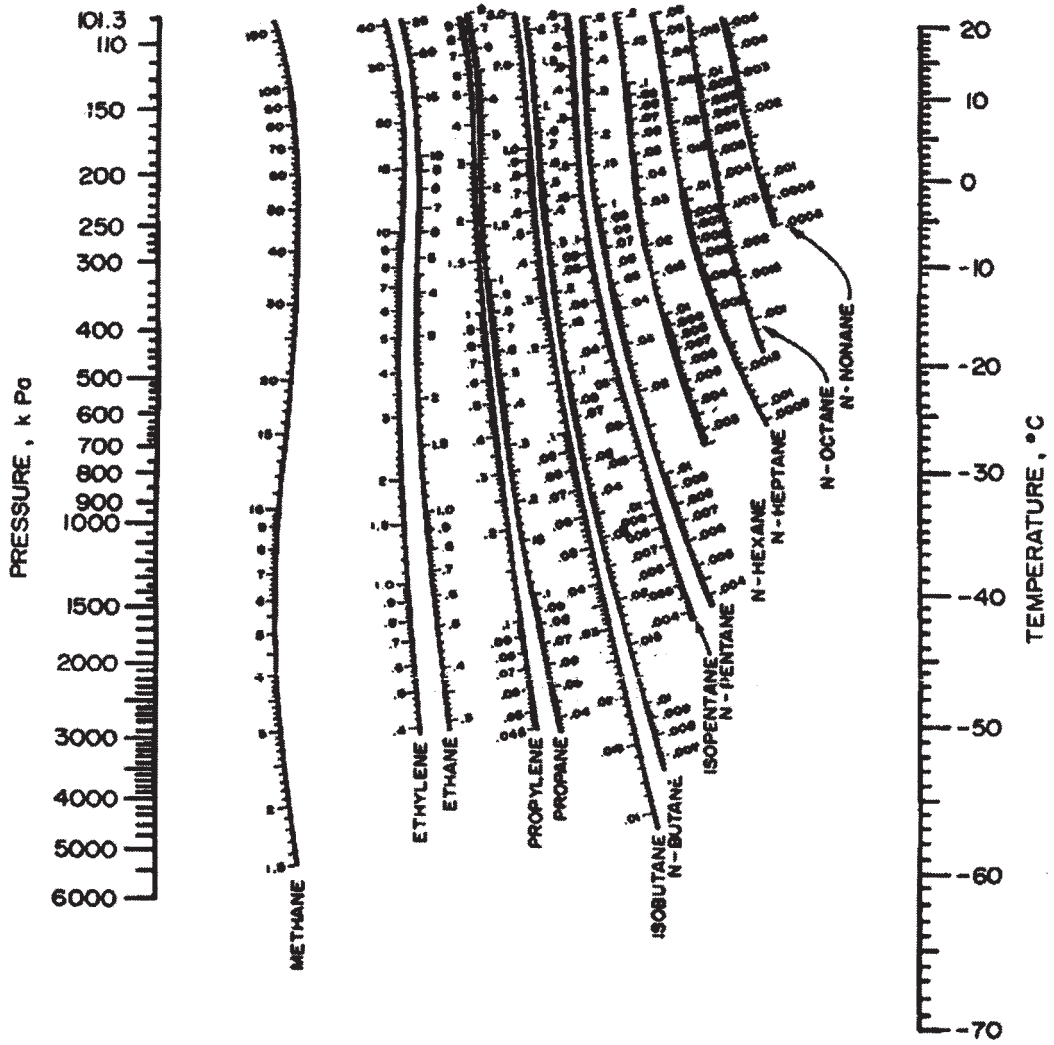


FIG 1: K-Chart for low temperature range

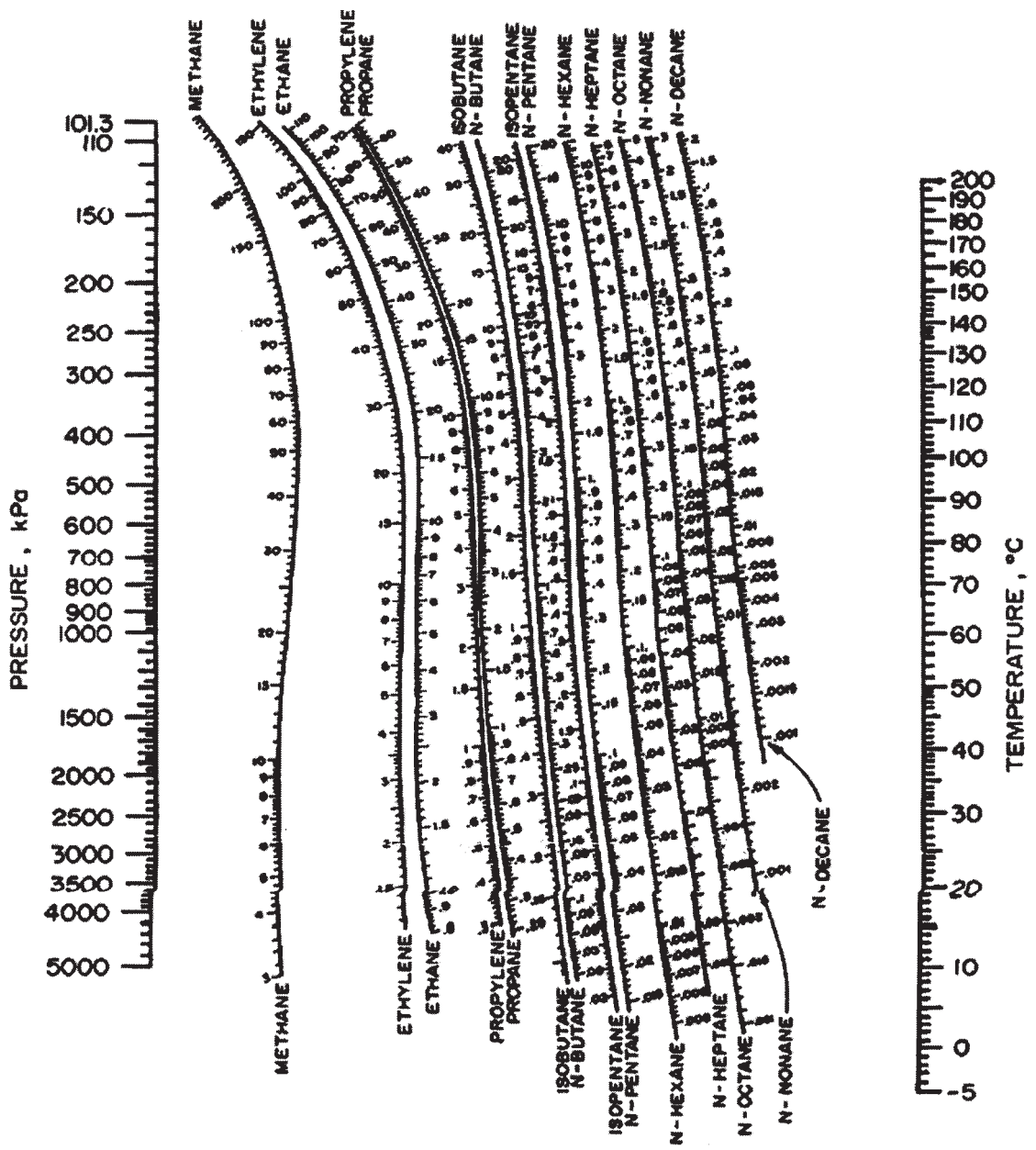
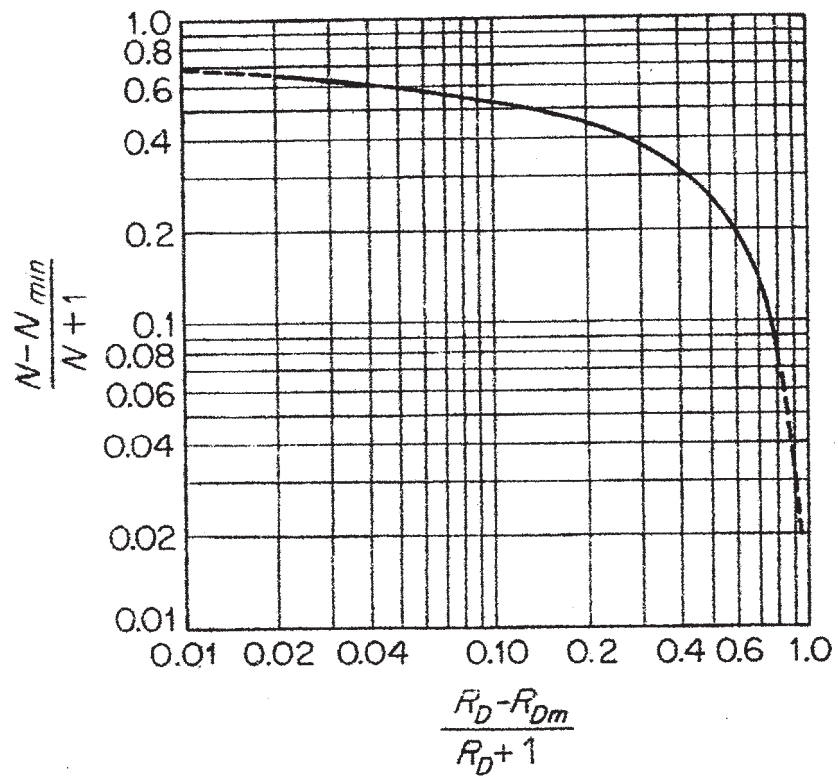


FIG 2: K-Chart for high temperature range



**FIG 3: Gilliland Curve**

\* \* \*

Total No. of Questions : 12]

SEAT No. :

**P3712**

**[4759]-238**

[Total No. of Pages : 4

**B.E. (Petrochemical)**

**PLANT DESIGN AND PROCESS ECONOMICS**

**(2008 Course) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10, Q.11 or 12.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier Charts, electronic pocket calculator and steam table is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** Explain the components of Project Planning of a Chemical Process Plant. **[8]**

b) Explain the equipment data sheet for a pressure vessel. Draw a representative data sheet showing the structure. **[8]**

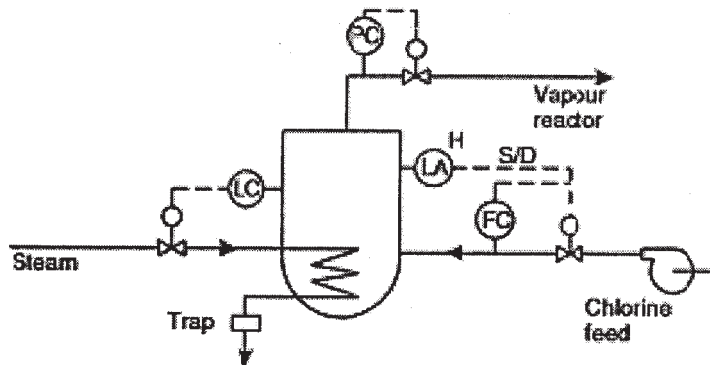
OR

**Q2) a)** Explain the components of the Sales Contract of a Process Plant. **[8]**

b) Explain the Data Sheet of a Centrifugal Pump. Draw a representative data sheet showing the structure. **[8]**

**Q3) a)** State the guide words involved in HAZOP study. **[3]**

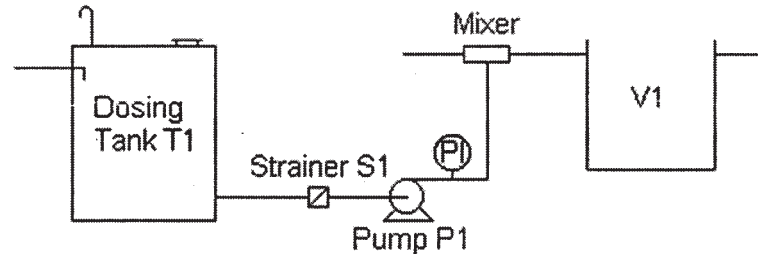
b) Perform the HAZOP study for the figure which shows a chlorine vaporiser, which supplies chlorine at 2 bar to a chlorination reactor. The vaporiser is heated by condensing steam. **[15]**



OR

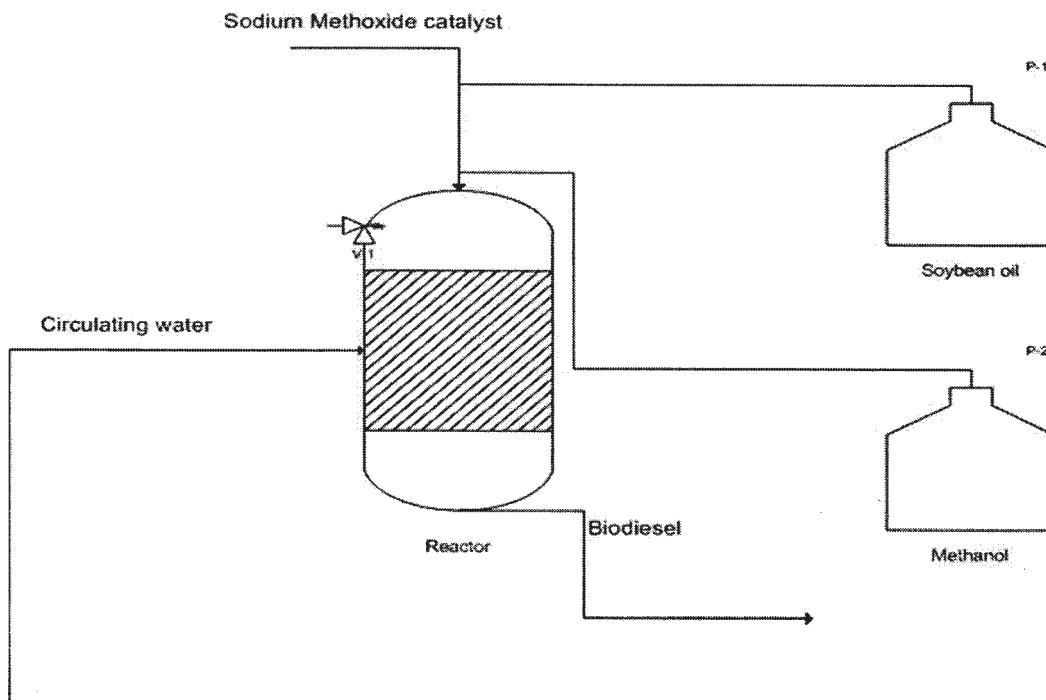
**P.T.O.**

**Q4) a)** Dosing in process is addition of small quantities of a chemical into a process fluid at intervals to give sufficient time for the chemicals to react. The figure given below is for one such dosing operation with a strainer mainly used to protect pipeline from foreign material. The mixer is used to mix the dosing chemical and process fluid which then goes to the reacting vessel VI. Perform the HAZOP study of the process. [15]



b) Give the symbols used for various types of valves in a P & ID. [3]

**Q5)** The Figure is of the transesterification process to produce biodiesel. Soybean oil, methanol, and the sodium methoxide catalyst are pumped in to the reactor. The temperature of the reactor is regulated by the circulation water. The resulting biodiesel is then pumped out of the reactor and goes on to other processes so that it can be sold. Add the pumps, sensors and valves that are needed to successfully control the process and Draw the P & ID diagram of the given process with all standard symbols and rules of P & ID diagram. [16]



OR  
2

- Q6)** a) What do you mean by MSDS? Explain the contents and structure of MSDS for a hydrocarbon liquid chemical. [8]
- b) Write a short note on P & ID diagram giving its significance, rules and general structure. [8]

### SECTION-II

- Q7)** a) Write a short note on 1. Profitability Ratios 2. Turnover Ratios. [12]
- b) Discuss the limitations of Financial Statement. [4]

OR

- Q8)** a) Explain various categories of Total Capital Cost estimations based on accuracy and its utility. [12]
- b) Explain the significance of a company's annual report. [4]

- Q9)** a) Write a short note on cost indexes and its utilities. [6]
- b) The total capital investment for a chemical plant is Rs. 1,50,00,000 and the plant produces 4 million Kgs of the product annually. The selling price of the product is Rs. 4/kg. Working capital investment is from company funds and no interest is charged. Raw material cost for the products are Rs. 0.45/kg labor Rs. 0.4/kg, utility Rs. 0.2/kg and packing Rs. 0.4/kg. Distribution costs are 5% of the total product cost. Estimate: Manufacturing cost/kg of the product, Total Product cost/year and Profit/kg of product before taxes. The working capital is usually 15% of the Total Capital investment. [12]

OR

- Q10)**a) Calculate the 2015 cost for a vacuum rotary filter 5m long and 2m in diameter. If the cost of similar filter was Rs. 80,000/- per 50 m<sup>2</sup> of the peripheral area in the year 2000. The cost index in 2000 was 350 and in 2015 it is 585. [9]
- b) A Piece of equipment having a negligible salvage value is estimated to have a service life of 10 years. The original value of the equipment is Rs. 40000. Find the depreciation charges for the sixth year using Straight Line Method and Sum of Year Digits Method. [9]



**Q11)a)** Explain graphically what do you mean by Break Even analysis. [8]

b) A standard type heat exchanger with a negligible scrap value costs Rs. 40000 and will have a useful life of 6 years. Another proposed heat exchanger of equivalent design capacity costs Rs. 68000 but will have a useful life of 10 years and a scrap value of Rs. 8000. Assuming effective compound interest rate of 8% per year, determine the selection of heat exchanger by comparing the capitalized costs. [8]

OR

**Q12)a)** A Project is expected to have a cash flow for 5 years as follows after all expenses and taxes. The initial fixed capital investment is 10,00,000 and working capital is 15% of the fixed capital. [8]

Time in years	Cash flow Rs.
0-1	2,00,000
1-2	2,70,000
2-3	3,30,000
3-4	4,00,000
4-5	4,75,000

Find the Payout time.

b) Write a short note on Discounted Cash Flow Method of evaluating the rate of return. [8]



Total No. of Questions : 12]

SEAT No. :

**P3713**

**[4759] - 239**

[Total No. of Pages :3

**B.E. (Petrochemical Engineering)**  
**PROCESS MODELING AND SIMULATION**  
**(2008 Course) (Elective - III) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

**Q1)** Ethylene Glycol is flowing through a constant-diameter cylindrical pipe. The flow is turbulent having plug-flow conditions. There are no radial gradients in velocity or any other properties. However, axial gradients can exist. Density and velocity can change as the fluid flows along the axial or z direction. Develop the model describing the system applying total continuity equation. **[16]**

OR

**Q2)** Modeling of petrochemical process plants need consideration of various property sets. Enlist them and explain the role of Equations of State and Transport Equations in details. **[16]**

**Q3)** In a Naphtha stabilization process in a refinery, three tanks are arranged in series. Tank 1 does not interact with 2 and 3, whereas tanks 2 and 3 interact with each other. Tank 2 has a flow outlet and outlet of tank 3 is pumped to tank 1 as a recycle. Develop steady state mathematical model for the process and note various state variables involved. **[18]**

OR

**Q4)** Weir flow on a tray in a Crude Distillation Unit is proportional to 2.1<sup>th</sup> power of the height of liquid over the weir. Draw a neat labeled diagram and explain the flow dynamics to establish equilibrium on the tray in the distillation column system. **[18]**

***P.T.O.***

**Q5)** For Hydrodesulphurization unit, optimum composition is to be obtained. Following are the equations generated using process variables. Solve using Gauss Elimination method to arrive at a solution: **[16]**

$$6x_1 - x_2 - x_3 = 11.33$$

$$-x_1 + 6x_2 - x_3 = 32$$

$$-x_1 - x_2 + 6x_3 = 42$$

OR

**Q6)** Bisection method is to be applied to find the root of following equation: **[16]**

$$x^3 - 1.8x^2 - 10x + 17 = 0$$

The root lies between the interval (1, 2). Calculate roots at the end of four iterations.

### **SECTION - II**

**Q7)** Note the definitions and briefly describe: Sequential Modular and Equation Oriented Approach in solving modules using process simulation techniques. **[18]**

OR

**Q8)** Explain with neat diagram, the architecture and working of process simulators applied to simulate complex petrochemical processes. **[18]**

**Q9)** The state-space models are to be applied for separation processes which uses boiling point as the separation principle. Write the methodology used along with applications. **[16]**

OR

**Q10)** Product B is produced and reactant A is consumed in each of the three perfectly mixed CSTRs by a first-order reaction occurring in the liquid. Temperatures and the liquid volumes are assumed to be constant (isothermal and constant holdup). Develop model for the system and enlist the state space key variables. **[16]**

**Q11)** With classifications, briefly note any two applications of empirical models leading to process optimization in Hydro cracking process. **[16]**

OR

**Q12)** What are various advantages of Bubble column reactor?

Reactant A is fed as a bubbling gas through a distributor into the bottom of the liquid-filled reactor. A chemical reaction occurs between A and B in the liquid phase to form a liquid product C. Reactant A must dissolve into the liquid before it can react. Draw a labeled diagram and note the equations involved in the same. **[16]**



**B.E. (Civil Engineering)**

**FINITE ELEMENT METHOD IN CIVIL ENGINEERING  
(2008 Pattern) (Semester - II) (Open Elective) (401008)**

Time : 3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two Sections should be written in separate books.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of non programmable calculator is allowed.
- 5) Assume suitable data, if necessary.

**SECTION - I**

Q1) a) Suggest the effective node numbering scheme and hence determine minimum half band width for the plane truss as shown in Figure 1. [8]

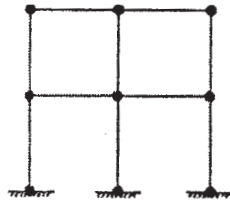


Figure 1

b) Determine the deformations of each springs connected and supported as shown in Figure 2. [8]

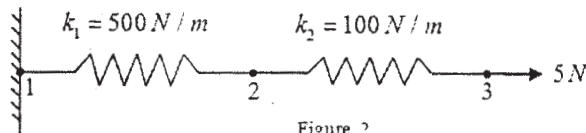


Figure 2

OR

Q2) Figure 3 shows a plane truss with three members. All members are of length 1000mm and cross-sectional area 600 mm<sup>2</sup>. Young's modulus is 150 kN/mm<sup>2</sup>. Determine unknown joint displacements of the truss. [16]

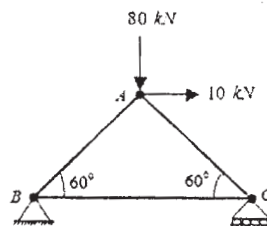


Figure 3

P.T.O.

- Q3)** A continuous beam (Figure 4) has fixed support at node 1 and roller supports at nodes 2 and 3. Analyse the beam using finite element method and draw SFD and BMD. Take  $E = 200 \text{ GPa}$  and  $I = 4 \times 10^6 \text{ mm}^4$ . [18]

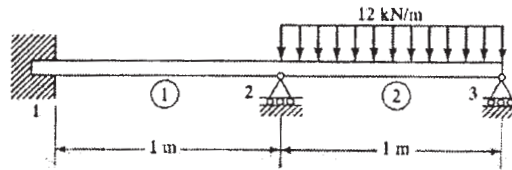


Figure 4

OR

- Q4)** Analyse the frame shown in Figure 5 using finite element method and draw bending moment diagram. [18]

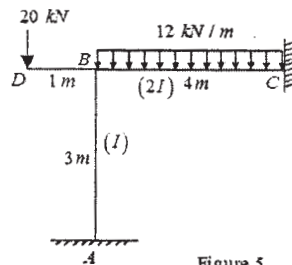


Figure 5

- Q5)** a) Derive the differential equations of equilibrium for 3D elasticity problem and show that shear stresses are complimentary. [8]  
 b) Explain in brief state of stress and strain at a point. [8]

OR

- Q6)** a) Derive Saint - Venant's strain compatibility conditions for 3D elasticity problem. [8]  
 b) Derive strain-displacement relationships for 3D elasticity problem. [8]

### SECTION - II

- Q7)** a) State the convergence criteria for the choice of the displacement function in FEM. [6]  
 b) Coordinates of nodes of CST element are node 1(1, 2), node 2(5, 3) and node 3(4, 6). At interior point 'P' if  $x = 3.3$  and value of  $N_1 = 0.3$ . Find 'y' coordinate of point 'P' and value of  $N_2$  and  $N_3$ . [10]

OR

- Q8)** a) Derive the natural coordinates ( $\xi$ ) of two noded bar element. [6]  
 b) Derive the stiffness matrix of two noded beam element with length L and two DOFs at each node. [10]

- Q9)** a) Distinguish between CST and LST elements. [4]  
b) Derive the element stiffness matrix for plane stress constant strain triangular (CST) element and show that sum of shape functions is equal to unity. [12]

OR

- Q10)** a) Derive shape functions of eight noded hexahedron element using Lagrangian interpolation function. Use natural coordinate system  $(\xi, \eta)$ . [8]  
b) Derive shape functions of eight noded rectangular serendipity element. Use natural coordinate system  $(\xi, \eta)$ . [8]

**Q11)** Explain strain-displacement and stress-strain relationships for triangular problem. Hence, derive necessary matrices for formulation of stiffness matrix of triangular axisymmetric element. [18]

OR

**Q12)** Explain strain-displacement and stress-strain relationships for 3D problem. Hence, derive necessary matrices for formulation of stiffness matrix of 3D tetrahedron element. [18]



Total No. of Questions : 8]

SEAT No. :

P3899

[Total No. of Pages : 2

[4759]-240

**B.E. (Petrochemical Engineering)**  
**FINE CHEMICAL INDUSTRIES**  
**(2008 Pattern) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from Section - I and three questions from Section - II*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) Compare fine chemicals market with bulk chemicals at national level. Give pertinent examples of fine and bulk chemicals. [10]  
b) Discuss environment friendly manufacture of fine chemicals. [8]
- Q2)** a) Explain role of catalyst in fine chemical processes with examples. [8]  
b) Discuss growth trends in Indian fine chemicals sector. [8]
- Q3)** a) Discuss separation processes crucial to fine chemicals manufacture.[10]  
b) Discuss markets for fine chemicals at global level. [6]
- Q4)** a) Explain the concept of mixed plants with reference to medium sector.[10]  
b) Discuss with examples how waste production is minimized in fine chemicals sector. [6]

**P.T.O.**



## SECTION - II

- Q5)** a) How can a batch operation be converted into continuous one? Is there any merit in such conversion? [12]  
b) What do you mean by scale down methodologies? [6]
- Q6)** a) Discuss in detail manufacturing process for any dye intermediate. [10]  
b) Explain importance of scale of operation on economy of a process plant in fine chemical sector. [6]
- Q7)** a) Write a note on ion exchange resins as catalysts. [10]  
b) Discuss emerging feedstocks for manufacturing fine chemicals. [6]
- Q8)** Compare : [16]  
a) Supercritical Extraction vs Solvent Extraction  
b) Heterogeneous vs homogeneous catalysis



Total No. of Questions : 12]

SEAT No. :

**P3900**

[Total No. of Pages : 3

**[4759]-242**

**B.E. (Petrochemical Engineering)**  
**RENEWABLE ENERGY SOURCES**  
**(2008 Pattern) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator and steam table is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** a) Give a comparative account of total energy consumption with a special emphasis on renewable energy basket for the advanced and developing countries of the world. **[10]**

b) With help of suitable examples explain the real advantages of renewable energy resources. **[8]**

OR

**Q2)** a) Discuss the major difficulties in getting energy from various Renewable Energy sources – Provide suitable examples. **[9]**

b) Non conventional energy resources are a must for sustainable world – Explain and elaborate with help of suitable examples. **[9]**

**Q3)** a) Explain the various techniques and methods of measurement of solar radiation, draw neat sketches. **[8]**

b) Give your critical comment on solar cell based independent village versus connecting the available energy on the main grid for larger distribution. **[8]**

OR

**P.T.O.**

- Q4)** a) Discuss the new advancement of photo voltaic cell technologies and the challenges to utilize abundant sunlight available in India. [8]
- b) How water desalination can be done effectively with help of solar energy explain in details. [8]

- Q5)** a) Critically evaluate the concept of Biorefinery. Mention the available feedstocks and expected products. [6]
- b) With help of neat diagram explain the fluidized bed gasifier. Discuss the design aspect as well. [10]

OR

- Q6)** Composition of a vegetable oil is given below: [16]  
C16:0 = 14.5%, C18:0 = 5.1%, C18:1 6 = 21.5%, C18:1 12 = 2.6 %, C 18:29, 12 = 53.6% and C 18:3 5,9, 13 rest  
C 18: 1 6 signifies an 18 carbon fatty acid chain with one double bond located at carbon 6.  
Calculate amount of methanol required for trans-esterification of 5.7 lit of this oil, if 72 % excess methanol based on stoichiometric requirement needs to be used for complete conversion.  
Assume density of soybean oil to be 0.88 and that of methanol 0.8 kg/lit.  
If overall 83.4 % conversion be achievable, calculate mass of Biodiesel and glycerol produced. Consider 52 % of vegetable oil used undergoes saponification in presence of homogeneous NaOH catalyst.

### SECTION - II

- Q7)** a) Discuss the major challenges faced by OTEC technology. Highlight how the commercial feasibility of OTEC can be increased. [8]
- b) Give a detailed account of Wind Energy potential in India. Compare advantages and disadvantages of wind energy. [8]

OR

- Q8)** a) With help of neat diagram discuss the design features of helical turbine.[8]
- b) With help of neat diagram explain various parts of wind turbine generator units. [8]

**Q9)** a) Comment on origin and distribution of geothermal energy in Indian subcontinent. [8]

b) Explain the concept of Geotechnical Well and discuss the methods of extraction of energy out of it. [8]

OR

**Q10)** a) Explain the process of liquid dominated (wet steam) system of geothermal energy extraction with neat sketch. [8]

b) Describe various energy extraction technologies used with hydrothermal (geothermal) resources. [8]

**Q11)** a) List down different types of fuel cells often used and compare between them based on types of electrolytes employed, operating ranges, fuel types and the oxidants utilized. [10]

b) Discuss the advantages and disadvantages of fuel cells. Write a detailed note on applicability of the Fuel Cells in Indian scenario. [8]

OR

**Q12)** a) Discuss the importance of storage of electrical energy. Name different types of cells can be utilized. Discuss operation of any one of the cell. [8]

b) With help of schematic diagram explain the principle of operation of Fuel Cells. Comment on Cathode, Anode and the type of Electrolytes. [10]



Total No. of Questions : 10]

SEAT No. :

P3901

[Total No. of Pages : 3

[4759]-243

B.E. (Petrochemical Engineering)

**PETROLEUM EXPLORATION AND PRODUCTION  
OPERATIONS  
(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw suitable diagrams wherever necessary.*

**SECTION - I**

- Q1)** a) Write an equation for Original Oil In Place and Original Gas In Place. How parameters given in the equation are determined? [10]
- b) Write a note on proven reserves, production and consumption of crude oil in India. [5]

OR

- Q2)** a) What are source and reservoir rocks? Explain with suitable examples from India [10]
- b) Explain any one type of structural trap. [5]

- Q3)** a) How presence of hydrocarbons is recognized using logs? [10]
- b) Write a note on 'Standard Geological Timescale' and the major events in them. [5]

OR

- Q4)** a) Explain borehole environment with the help of suitable examples. [10]
- b) What is pattern recognition in seismic interpretation? [5]

**P.T.O.**

- Q5)** Write notes on any four of the following : **[20]**
- a) Wettability.
  - b) Relative Permeability
  - c) Abnormal Pressure.
  - d) Types of subsurface water.
  - e) Composition and impurities in oil.
  - f) Reservoir Drive Mechanism.
  - g) Movable and Residual Oil Saturation.
  - h) Waterflooding.

**SECTION - II**

- Q6)** a) Draw a neat figure to show various components of a typical oil well drilling rig and explain different parts. **[10]**
- b) What is GTO? **[5]**

OR

- Q7)** a) What is meant by Intelligent Well Completions? Explain with suitable examples. **[10]**
- b) Describe the relationship between mud weight and borehole stability. **[5]**

- Q8)** a) Write a note on Role of horizontal wells in increasing reservoir recovery. **[5]**
- b) Draw and describe typical configuration of a Gas Lifted Well. **[10]**

OR

- Q9)** a) Write in brief about Principles of Pump Performance Analysis **[5]**
- b) How Nodal Analysis helps in forecasting of future well production? **[10]**

**Q10)** Answer in brief Any four of the following :

**[20]**

- a) Continuous Gas Lift.
- b) ESP.
- c) Inflow Performance Relationship. IPR.
- d) Alkaline Flooding.
- e) Unconventional Gas Reservoirs.
- f) Comparison of Insitu combustion and steam.
- g) Foam as an EOR agent.



Total No. of Questions : 12]

SEAT No. :

P3902

[Total No. of Pages : 4

[4759]-244

B.E. (Petrochemical Engineering)

CATALYST SCIENCE AND TECHNOLOGY

(2008 Pattern) (Semester - II) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.
- 2) Answer three questions from each section.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of calculator is allowed.
- 6) Assume suitable data, if necessary.

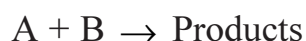
**SECTION - I**

- Q1)** a) Study of Catalysis requires multidisciplinary skill set – explain and elaborate. [8]
- b) List down four important characteristics of industrial catalysts briefly explain each one of them. [8]

OR

- Q2)** a) Define : [6]
- i) Activity.
  - ii) Selectivity.
  - iii) Active site.
  - iv) Turnover frequency.
- b) Write a short note on Homogeneous catalysis. [4]
- c) With help of neat diagram explain why catalytic reactions are faster. [6]

- Q3)** For a newly synthesized promising catalyst, following gas phase reaction is conducted in fixed bed reactor [16]



where, all of the reactants are adsorbed appreciably on the active sites of catalyst. Considering Langmuir - Hinshelwood mechanism derive the overall rate expression in terms of partial pressure of the respective components.

**P.T.O.**



It is observed that the products are also adsorbed appreciably.

If the reaction is carried at elevated temperature, adsorption of B becomes negligible, obtain the rate expression for this specific case and compare between the speed of reactions.

OR

- Q4)** a) Differentiate between coke formation and poisoning of a catalyst. [6]  
b) Derive Langmuir adsorption isotherm – mention the important assumptions. [6]  
c) With help of neat diagram explain hysteresis of adsorption. [4]
- Q5)** a) Low temperature ( $-195.8^{\circ}\text{C}$ ) nitrogen adsorption data were obtained for an Fe- $\text{Al}_2\text{O}_3$  ammonia catalyst. The results of 25.2 g sample were [12]

Pressure (mm Hg)	8	50	102	148	258	330	442	500	550
Vol. ads. ( $\text{cm}^3$ ) at $0^{\circ}\text{C}$ and 1 atm	51.3	65	74	81.5	99	110	135	153	182

The vapor pressure of  $\text{N}_2$  at  $-195.8^{\circ}\text{C}$  is 1 atm. Estimate the surface area of the catalyst in square meter per gram basis.

Data: Density of liquid  $\text{N}_2$  at  $-195.8^{\circ}\text{C}$  is  $0.808 \text{ g/cm}^3$ .

- b) In an experiment to determine the pore volume and catalyst particle porosity the following data were obtained on a sample of activated silica (granular 4 to 12 mesh size).

Mass of catalyst sample placed in chaber = 101.5 g

Volume of helium displaced by sample  $45.1 \text{ cm}^3$

Volume of mercury displaced by sample =  $82.7 \text{ cm}^3$

OR

- Q6)** a) Explain any method of synthesis of catalyst – draw neat diagram and explain its advantages. [8]  
b) Differentiate between Textural and Structural Promoters. [4]  
c) With help of neat sketches explain the measurement of crushing strength of the industrial catalysts. [6]

## SECTION - II

- Q7)** a) What are the need of catalyst characterization? Name any three methods and briefly explain the information obtained. [8]
- b) With help of suitable diagram explain the sintering phenomena on supported metal catalyst. Discuss the methodology to be adapted to reduce sintering in case of commercial catalyst. [8]

OR

- Q8)** a) Define Zeolites and highlight its shape selectivity with help of suitable examples. [8]
- b) Draw neat diagram to elaborate and discuss the special structures of zeolites. [8]
- Q9)** a) Catalytic Reforming is a challenging operation – Elaborate and explain with help of process description with a special emphasis on Catalysts involved and its regeneration. [8]
- b) Draw neat diagram of Trickle bed reactor and explain its operation with special emphasis on temperature control for hydrodesulfurization of diesel. [8]

OR

- Q10)** a) With help of neat diagram explain the Catalytic Cracking Process with a special note on Catalyst involved and the Reactor Configuration. [8]
- b) Explain the usage of supported metallic catalyst on hydrogenation of vegetable oil – Provide reactor configuration and draw neat diagram. [8]
- Q11)** a) Write detailed note on temperature control of multiphase reactor. [6]
- b) What is Fischer Tropsch Synthesis? Write down representative reactions and the highlight importance of the process. Give a detailed analysis of the catalysts suitable for the process. [8]
- c) Discuss the importance of support in catalysis, name three important support commonly used. [4]

OR

- Q12)** a) Write down the kinetics of ammonia synthesis. What types of catalyst are best suited for the process? Draw a neat diagram of the reactor and discuss its configuration as well as operations in details. [9]
- b) With help of neat diagram explain methanol synthesis reactor. Highlight the technical advancement done in recent times. [9]



Total No. of Questions : 8]

SEAT No. :

**P3714**

**[4759] - 247**

[Total No. of Pages :5

**B.E. (Petroleum Engineering)  
RESERVOIR ENGINEERING - II  
(2008 Course) (Semester - I) (412381)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Questions No 2(two) and 8(eight) are compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Answer 3 questions from Section I and 3 questions from Section II.*
- 5) *Neat diagrams must be drawn wherever necessary.*
- 6) *Use of a non-programmable calculator, log-log, and semi-log paper is allowed.*
- 7) *Assume suitable data if necessary.*

**SECTION - I**

- Q1) a)** Derive the diffusivity equation in radial coordinates. **[6]**
- b) What are the various types of solutions to the diffusivity equation? Which one is most commonly used for well test interpretation purposes? **[10]**

- Q2)** Given below is the following data: **[18]**

Flowrate - 20 stbd;

Net pay = 150ft;

FVF - 1.475 rb/stb;

Re - 3000ft;

Pi - 3000psi;

Porosity - 0.23;

Compressibility -  $1.5 \times 10^{-5}$  psi<sup>-1</sup>;

Viscosity - 0.72 cp

**P.T.O.**

Well radius - 0.5 ft;

K - 0.1md;

The following bottom-hole pressure after 13 hours of production of 1380 psi. Compute the skin in this case. Further, the well is stimulated, and the skin is reduced to 0. The flowrate is 20 stb/d and after 5 hours the flowing bottom-hole pressure was recorded to be 2380 psi. Write down whether the treatment can be deemed successful? Why or why not? Give appropriate reasons.

- Q3)** a) Explain the concept of Superposition in space, with appropriate figures. [4]
- b) Explain with appropriate diagrams, the various flow regimes that you see in a horizontal well test. [4]
- c) A new oil well produced 400 stb/day for  $2 \pm$  days; then it was shut-in for a pressure buildup test, during which the data in Table below were recorded. The other data were:  $B_o = 1.25$ rb/stb,  $h = 20$  ft,  $\phi = 0.20$ ,  $r_w = 0.29$ ft,  $c_t = 19.5 \times 10^{-6}$ , and viscosity = 1.1 cp. From these data, estimate the formation permeability,  $k$ ,  $pi$ , and skin factor  $s$ . Use the Semi-Log graph. [8]

Shut-in time, Del-t (hr)	$(t_p + \text{Del-t})/\text{Del-t}$	$p_{ws}$ (psia)
0	-	1165
2	37.0	1801
4	19.0	1838
8	10.0	1865
16	5.5	1891
24	4.0	1905
48	2.5	1925

- Q4)** a) What do you mean by ETR, MTR and LTR? Explain with the help of a graph, and show their utility in well test interpretation. [6]
- b) Explain the various flow periods of a DST, along with appropriate figures. [10]

## **SECTION - II**

- Q5)** a) What is pseudo pressure?  
b) Explain Isochronal and Modified Isochronal Well test. [16]
- Q6)** Explain the difference between a semi-log, log-log and a Horner plot. [16]
- Q7)** What is the difference between a type curve and a decline curve? What are the various types of type curves and decline curves? Explain with appropriate diagrams. [16]
- Q8)** Define and explain the pressure derivative plot. Draw and explain the diagnostic plot giving five examples. [18]

Formulas for the exam

For E (i) function values, refer to the table given with the examination paper

$$p = p_i + 70.6 \frac{qB\mu}{kh} \text{Ei} \left( - \frac{948\phi\mu c_i r^2}{kt} \right)$$

$$t_D = \frac{0.000264kt}{\phi\mu_o c_i r_w^2}$$

$$p_{ws} = p_i - \frac{162.6 q_o \mu_o \beta_o}{kh} \log \left[ \frac{t_p + \Delta t}{\Delta t} \right]$$

$$p_D = -\frac{1}{2} \text{Ei} \left( - \frac{r_D^2}{4t_D} \right)$$

$$s = 1.151 \left[ \frac{p_{1hr} - p_{ws}(\Delta t=0)}{m} - \log \left( \frac{k}{\phi\mu_o c_i r_w^2} \right) + 3.23 \right]$$

$$p_{wf} = p_i - \frac{162.6 q_o \mu_o \beta_o}{kh} \left[ \log t + \log \left( \frac{k}{\phi\mu_o c_i r_w^2} \right) - 3.23 + 0.869s \right]$$

$$p = p_i + 70.6 \frac{qB\mu}{kh} \left[ \ln \left( \frac{1,688\phi\mu c_i r^2}{kt} \right) \right]$$

$$\frac{(3.975 \times 10^5) \phi\mu c_i r_w^2}{k} < t < \frac{948\phi\mu c_i r_e^2}{k}$$

$$p_{1h} = p_i + m \left[ \log \left( \frac{k}{\phi\mu_o \beta_o c_i r_w^2} \right) - 3.23 + 0.869s \right]$$

$$p(r,t) = LS(r,t) = p_i - \frac{70.6 Q \mu}{kh} \left[ -E_i \left( - \frac{948.1 \Phi \mu c_i r^2}{kt} \right) \right]$$

$$k = \frac{162.6 q_o \mu_o \beta_o}{mh}$$

TABLE 1.1—VALUES OF THE EXPONENTIAL INTEGRAL,  $-Ei(-x)$

$-Ei(-x), 0.000 < x < 0.209, \text{interval} = 0.001$										
x	0	1	2	3	4	5	6	7	8	9
0.00	+°	6.332	5.639	5.235	4.948	4.726	4.545	4.392	4.259	4.142
0.01	4.038	3.944	3.858	3.779	3.705	3.637	3.574	3.514	3.458	3.405
0.02	3.355	3.307	3.261	3.216	3.176	3.137	3.098	3.062	3.026	2.992
0.03	2.959	2.927	2.897	2.867	2.838	2.810	2.783	2.756	2.731	2.706
0.04	2.681	2.658	2.634	2.612	2.590	2.568	2.547	2.527	2.507	2.487
0.05	2.468	2.449	2.431	2.413	2.395	2.377	2.360	2.344	2.327	2.311
0.06	2.295	2.279	2.264	2.249	2.235	2.220	2.206	2.192	2.178	2.164
0.07	2.151	2.138	2.125	2.112	2.099	2.087	2.074	2.062	2.050	2.039
0.08	2.027	2.015	2.004	1.993	1.982	1.971	1.960	1.950	1.939	1.929
0.09	1.919	1.909	1.899	1.889	1.879	1.869	1.860	1.850	1.841	1.832
0.10	1.823	1.814	1.805	1.796	1.788	1.779	1.770	1.762	1.754	1.745
0.11	1.737	1.729	1.721	1.713	1.705	1.697	1.689	1.682	1.674	1.667
0.12	1.660	1.652	1.645	1.638	1.631	1.623	1.616	1.609	1.603	1.596
0.13	1.589	1.582	1.576	1.569	1.562	1.556	1.549	1.543	1.537	1.530
0.14	1.524	1.518	1.512	1.506	1.500	1.494	1.488	1.482	1.476	1.470
0.15	1.464	1.459	1.453	1.447	1.442	1.436	1.431	1.425	1.420	1.415
0.16	1.409	1.404	1.399	1.393	1.388	1.383	1.378	1.373	1.368	1.363
0.17	1.358	1.353	1.348	1.343	1.338	1.333	1.329	1.324	1.319	1.314
0.18	1.310	1.305	1.301	1.296	1.291	1.287	1.282	1.278	1.274	1.269
0.19	1.265	1.261	1.256	1.252	1.248	1.243	1.239	1.235	1.231	1.227
0.20	1.223	1.219	1.215	1.210	1.206	1.202	1.198	1.195	1.191	1.187
$-Ei(-x), 0.00 < x < 2.09, \text{interval} = 0.01$										
x	0	1	2	3	4	5	6	7	8	9
0.0	+°	4.038	3.335	2.959	2.681	2.468	2.295	2.151	2.027	1.919
0.1	1.823	1.737	1.660	1.589	1.524	1.464	1.409	1.358	1.309	1.265
0.2	1.223	1.183	1.145	1.110	1.076	1.044	1.014	0.985	0.957	0.931
0.3	0.906	0.882	0.858	0.836	0.815	0.794	0.774	0.755	0.737	0.719
0.4	0.702	0.686	0.670	0.655	0.640	0.625	0.611	0.598	0.585	0.572
0.5	0.560	0.548	0.536	0.525	0.514	0.503	0.493	0.483	0.473	0.464
0.6	0.454	0.445	0.437	0.428	0.420	0.412	0.404	0.396	0.388	0.381
0.7	0.374	0.367	0.360	0.353	0.347	0.340	0.334	0.328	0.322	0.316
0.8	0.311	0.305	0.300	0.295	0.289	0.284	0.279	0.274	0.269	0.265
0.9	0.260	0.256	0.251	0.247	0.243	0.239	0.235	0.231	0.227	0.223
1.0	0.219	0.216	0.212	0.209	0.205	0.202	0.198	0.195	0.192	0.189
1.1	0.186	0.183	0.180	0.177	0.174	0.172	0.169	0.166	0.164	0.161
1.2	0.158	0.156	0.153	0.151	0.149	0.146	0.144	0.142	0.140	0.138
1.3	0.135	0.133	0.131	0.129	0.127	0.125	0.124	0.122	0.120	0.118
1.4	0.116	0.114	0.113	0.111	0.109	0.108	0.106	0.105	0.103	0.102
1.5	0.100	0.0985	0.0971	0.0957	0.0943	0.0929	0.0915	0.0902	0.0889	0.0876
1.6	0.0863	0.0851	0.0838	0.0826	0.0814	0.0802	0.0791	0.0780	0.0768	0.0757
1.7	0.0747	0.0736	0.0725	0.0715	0.0705	0.0695	0.0685	0.0675	0.0666	0.0656
1.8	0.0647	0.0638	0.0629	0.0620	0.0612	0.0603	0.0595	0.0586	0.0578	0.0570
1.9	0.0562	0.0554	0.0546	0.0539	0.0531	0.0524	0.0517	0.0510	0.0503	0.0496
2.0	0.0489	0.0482	0.0476	0.0469	0.0463	0.0456	0.0450	0.0444	0.0438	0.0432
$-Ei(-x), 2.0 < x < 10.9, \text{interval} = 0.1$										
x	0	1	2	3	4	5	6	7	8	9
2	$4.89 \times 10^{-2}$	$4.26 \times 10^{-2}$	$3.72 \times 10^{-2}$	$3.25 \times 10^{-2}$	$2.84 \times 10^{-2}$	$2.49 \times 10^{-2}$	$2.19 \times 10^{-2}$	$1.92 \times 10^{-2}$	$1.69 \times 10^{-2}$	$1.48 \times 10^{-2}$
3	$1.30 \times 10^{-2}$	$1.15 \times 10^{-2}$	$1.01 \times 10^{-2}$	$8.94 \times 10^{-3}$	$7.89 \times 10^{-3}$	$6.87 \times 10^{-3}$	$6.16 \times 10^{-3}$	$5.45 \times 10^{-3}$	$4.82 \times 10^{-3}$	$4.27 \times 10^{-3}$
4	$3.78 \times 10^{-3}$	$3.35 \times 10^{-3}$	$2.97 \times 10^{-3}$	$2.64 \times 10^{-3}$	$2.34 \times 10^{-3}$	$2.07 \times 10^{-3}$	$1.84 \times 10^{-3}$	$1.64 \times 10^{-3}$	$1.45 \times 10^{-3}$	$1.29 \times 10^{-3}$
5	$1.15 \times 10^{-3}$	$1.02 \times 10^{-3}$	$9.08 \times 10^{-4}$	$8.09 \times 10^{-4}$	$7.19 \times 10^{-4}$	$6.41 \times 10^{-4}$	$5.71 \times 10^{-4}$	$5.09 \times 10^{-4}$	$4.53 \times 10^{-4}$	$4.04 \times 10^{-4}$
6	$3.60 \times 10^{-4}$	$3.21 \times 10^{-4}$	$2.86 \times 10^{-4}$	$2.55 \times 10^{-4}$	$2.28 \times 10^{-4}$	$2.03 \times 10^{-4}$	$1.82 \times 10^{-4}$	$1.62 \times 10^{-4}$	$1.45 \times 10^{-4}$	$1.29 \times 10^{-4}$
7	$1.15 \times 10^{-4}$	$1.03 \times 10^{-4}$	$9.22 \times 10^{-5}$	$8.24 \times 10^{-5}$	$7.36 \times 10^{-5}$	$6.58 \times 10^{-5}$	$5.89 \times 10^{-5}$	$5.26 \times 10^{-5}$	$4.71 \times 10^{-5}$	$4.21 \times 10^{-5}$
8	$3.77 \times 10^{-5}$	$3.37 \times 10^{-5}$	$3.02 \times 10^{-5}$	$2.70 \times 10^{-5}$	$2.42 \times 10^{-5}$	$2.16 \times 10^{-5}$	$1.94 \times 10^{-5}$	$1.73 \times 10^{-5}$	$1.55 \times 10^{-5}$	$1.39 \times 10^{-5}$
9	$1.24 \times 10^{-5}$	$1.11 \times 10^{-5}$	$9.99 \times 10^{-6}$	$8.95 \times 10^{-6}$	$8.02 \times 10^{-6}$	$7.18 \times 10^{-6}$	$6.44 \times 10^{-6}$	$5.77 \times 10^{-6}$	$5.17 \times 10^{-6}$	$4.64 \times 10^{-6}$
10	$4.15 \times 10^{-6}$	$3.73 \times 10^{-6}$	$3.34 \times 10^{-6}$	$3.00 \times 10^{-6}$	$2.68 \times 10^{-6}$	$2.41 \times 10^{-6}$	$2.16 \times 10^{-6}$	$1.94 \times 10^{-6}$	$1.74 \times 10^{-6}$	$1.56 \times 10^{-6}$





**B.E. (Petroleum Engineering)**  
**PETROLEUM FORMATION EVALUATION**  
**(2008 Pattern) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the questions of both the sections should be written in separate answer books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume additional data if required.

**SECTION-I**

Q1) Answer the following in brief:

[20]

- a) What is evaluation of a formation?
- b) Spectral Gamma ray.
- c) Resolution of different logging tools.
- d) Utility of Caliper log.
- e) Coring and core analysis.

Q2) a) Read following log carefully. Explain different tracks.

[10]

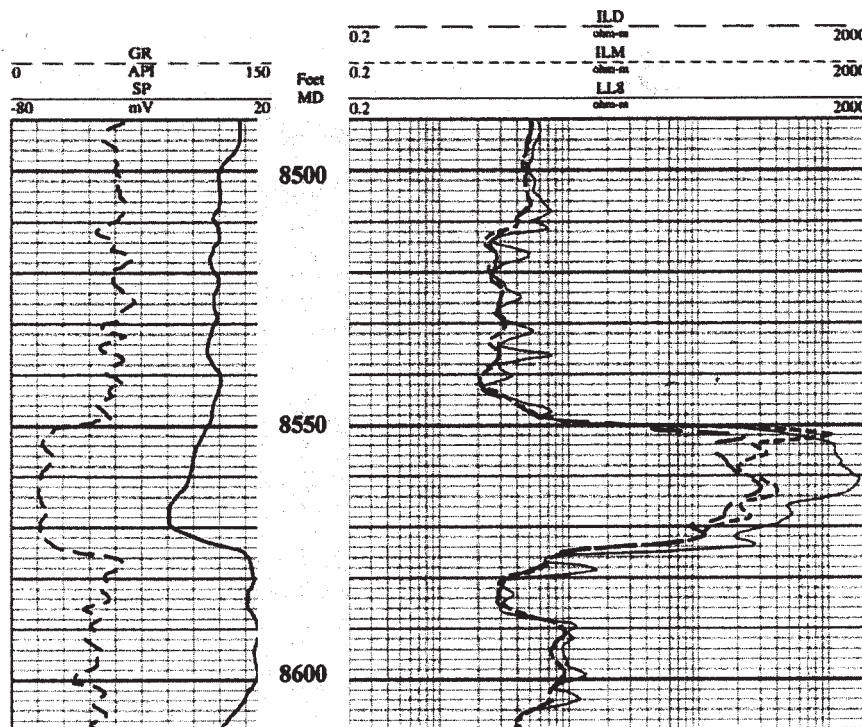


Figure 1 for Q.2.(a) and Q 8(a)

What information may be obtained from the log given in different tracks?  
What is the resolution of data given?

b) Explain in brief principle of SP log. [5]

OR

**Q3)** a) Draw and describe borehole environment emphasizing different zones and fluids. [10]

b) How abnormal pressure is recognized using logs? [5]

**Q4)** Explain important resistivity logging methods with the help of neat sketches. [15]

OR

**Q5)** What is cased hole logging? Explain them in brief? [15]

### **SECTION-II**

**Q6)** Outline the procedure for determination of water saturation using logs. [15]

OR

**Q7)** Write notes on Any Three of the following: [15]

- a) Image Logs,
- b) Waxman and Smit Model,
- c) Origin of overpressure,
- d) Recognition of fractured reservoir,
- e) MN Plots and utility,
- f) Sonic Log.

**Q8)** a) Use log given in figure 1 to answer the following questions: [10]

- i) Lithological variation and approximate thickness,
- ii) Relationship between track 1 and 3 based on log signatures,

- iii) Clean formation, if any and details with proper justification,
  - iv) Do you find any zone of interest based on cross relationship of logs.
- b) Write in brief about Dual Water Model. [5]

OR

**Q9)** How are sedimentary environments interpreted from logs? Give suitable examples. [15]

**Q10)** Answer in brief Any Four of the following: [20]

- a) Interpretation of oil and gas show during mud logging.
- b) Recognition of porous and non-porous carbonates.
- c) LWD.
- d) Recognition of movable hydrocarbons.
- e) Perforation.
- f) Recognition of cyclicity in the sequence.
- g) Shale volume calculation and significance.



Total No. of Questions : 6]

SEAT No. :

**P3716**

**[4759] - 249**

[Total No. of Pages :2

**B.E. (Petroleum)**

**WELL ENGINEERING AND DESIGN**

**(2008 Course) (Semester - I) (412383)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Assume suitable data if necessary.*
- 4) *Use of electronic pocket calculator is allowed.*

**SECTION- I**

- Q1)** a) Discuss casing shoe depth selection procedure in detail. [6]
- b) Discuss Leak off test in details calculate formation fracture strength. If Surface leak off pressure is 1000 psi, shoe depth 10,500 ft TVD, Mud weight used for leak off test is 9.8 ppg. [10]
- c) Explain Kick tolerance in brief. [2]
- Q2)** a) Discuss radius of curvature survey method to determine change in inclination and azimuth. [8]
- b) Discuss geometry of the “L” type well trajectory in detail. [8]
- Q3)** a) Discuss accumulator system of BOP in detail. [8]
- b) Drilling fluid density = 11.5ppg, SIDPP = 500 psi, Influx density = 2.5 ppg, Influx height = 200ft. Calculate SICP. [4]
- c) Discuss weight and wait method in brief. [4]

***P.T.O.***

## SECTION - II

- Q4)** a) Discuss AFE calculations in detail. [6]
- b) Discuss liner setting and cementation process with suitable sketch. [10]
- Q5)** a) A grade E drill string has a tension load of 190,000lb at 4,500ft, determine permissible bending stress. If drill pipe OD 4.5", ID 3.826", 16ppf. Discuss dogleg severity in brief. [8]
- b) Discuss drill string design based on Tension, collapse, bending and torque in vertical and directional wells. [8]
- Q6)** a) Discuss field method of optimizing bit hydraulics with flow behaviour parameters Hedstrom number and Renold number. Discuss different pressure losses in the system.
- b) Discuss Newtonian and Bingham plastic flow model in detail.

[18]



Total No. of Questions : 12]

SEAT No. :

**P4626**

[4759] - 25

[Total No. of Pages :2

**B.E. (Civil)**

**GEOINFORMATICS**

**(2008 Pattern) (Open Elective) (Semester - II)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Explain interaction of EMR with Earth's Surface. **[9]**

b) What is remote sensing? Explain the different stages of Remote Sensing? **[9]**

OR

**Q2) a)** Explain EMS. State the characteristics of different frequencies. **[8]**

b) What are the elements of Visual Image Interpretation? Explain their significance and factors influencing them. **[10]**

**Q3) a)** What are the elements of Remote Sensing? Explain these in brief. **[8]**

b) Explain in detail, characteristics of LANDSAT. **[8]**

OR

**Q4) a)** What is FCC? What is the significance of FCC in recognizing terrain features. **[8]**

b) Short Notes on: **[8]**

i) Relief Displacement.

ii) Drainage Pattern.

**P.T.O.**

- Q5)** a) Write in brief importance of remote sensing in water resources. [8]  
b) Explain in detail use of remote sensing in terrain analysis. [8]

OR

- Q6)** a) Explain RS Application in canal irrigation with flow chart. [8]  
b) Describe with flow chart application of remote sensing in ground water assessment. [8]

**SECTION - II**

- Q7)** a) What is GIS? Explain in detail its components. [9]  
b) Write notes on: [9]  
i) Map Features.  
ii) Map scale and its importance.

OR

- Q8)** a) Explain in brief history of GIS and its development. [8]  
b) Write notes on: [10]  
i) Hardware and Software for GIS.  
ii) Map Resolutions.

- Q9)** a) What is a Map? Explain different types of Map Projection systems and its need? [12]  
b) Discuss errors in GIS. [4]

OR

- Q10)** a) What is Geospatial Data Model? Explain in brief RDBMS. [12]  
b) Discuss in short Buffering. [4]

- Q11)** a) Write an essay on Data collection and input processing in GIS. [10]  
b) Explain Unsupervised Classification. [6]

OR

- Q12)** a) What is GPS? Explain its importance in RS and GIS. [8]  
b) Explain in brief: [8]  
i) Raster Model.  
ii) Digital Image Processing.



Total No. of Questions : 10]

SEAT No. :

**P3717**

**[4759] - 250**

[Total No. of Pages :4

**B.E.**

**PETROLEUM ENGINEERING**

**Petroleum Exploration**

**( 2008 Pattern) (Semester - I) (Elective - I) (412384)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the questions of both the sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

**SECTION - I**

**Q1)** Answer any four of the following.

**[20]**

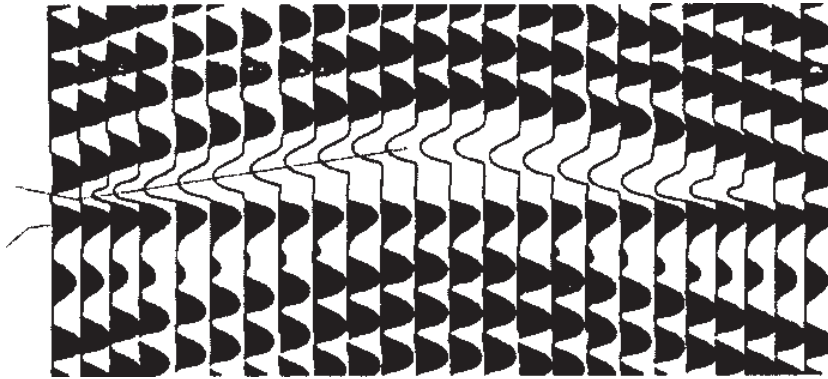
- a) Draw and describe gravity effect of a horizontal rod.
- b) Electrode arrays in Schlumberger and Wenner configuration.
- c) Electrical properties of rocks.
- d) Magnetic susceptibility of rocks and minerals.
- e) Isotope surveys in geochemical exploration of petroleum
- f) Radioactive decay processes.

**Q2)** a) Explain with the help of suitable diagrams normal move out and dip move out. **[10]**

**P.T.O.**



- b) Describe and Interpret the seismic image given below. [5]



OR

- Q3) a)** Draw and explain velocity gradient and velocity filtering? [10]

- b) What are different energy sources used in offshore seismic data acquisition? [5]

- Q4)** What is 3D seismic? What are different interpretation tools available for correct understanding of subsurface? [15]

OR

- Q5)** Explain following in brief. [15]

- a) Pattern Recognition
- b) Time structure maps
- c) Vertical Seismic Profile
- d) Recognition of unconformity
- e) DHIS

**SECTION - II**

- Q6)** a) What are microseepages? Explain the same with suitable examples. [10]  
b) Explain different geochemical correlation methods. [5]

OR

- Q7)** What are frontier and explored basins? How one may proceed for exploration in these basins? [15]

- Q8)** a) How structure contour maps are useful in the understanding of geometry of formations? Give some examples. [10]  
b) Calculate the Geological risk involved and state whether the risk involved in the search of hydrocarbons is low or high? [5]

EVENT	PROBABILITY
Maturity of source rock	0.85
Migration path to reservoir	0.90
Reservoir rock with porosity and permeability	0.85
Trapping mechanism	0.80
Existence and persistence of seal	0.80

OR

- Q9)** a) Explain in brief different terms used in reserves as suggested by SPE/AAPG. [5]  
b) Give an equation to calculate Original Oil and Gas in Place (OOIP & OGIP). What are the uncertainties associated with each parameter considered in the equation. [10]

**Q10)** Answer the following in brief, any five.

**[20]**

- a) Delineation of additional in place volumes by different means,
- b) Chances of errors in reserves estimation,
- c) Critical elements of petroleum system,
- d) NELP in India,
- e) Natural data structures,
- f) Coal Bed Methane,
- g) Stratigraphic traps,
- h) Recognition of a structural play.



Total No. of Questions : 12]

SEAT No. :

**P3718**

**[4759] - 251**

[Total No. of Pages :3

**B.E. (Petroleum Engineering)  
PETROLEUM ENGINEERING**

**Advanced Instrumentation and Process Control in Petroleum Industry  
( 2008 Pattern) (Elective - I) (412384)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answers to the two sections should be written in separate answer book.*
- 2) Answer three questions from each section.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right side indicate full marks.*
- 5) Use of Calculator is allowed.*
- 6) Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Give the classification of electric motors. Explain with neat diagram principle, construction and working of AC motor. **[10]**
- b) Write short note on speed control of DC motor. **[6]**

OR

- Q2)** a) Describe the various types of Logic Gates with its truth table used frequently in Oil and Gas Industries. **[8]**
- b) Differentiate between the Analog and Digital Instruments and discuss their advantages and disadvantages. **[8]**

- Q3)** a) Give the classification of temperature measuring instruments. Describe with neat diagram construction, principle and working of thermocouple. **[8]**
- b) Describe with neat diagram construction, principle and working of bourdon tube pressure gauge. **[8]**

OR

**P.T.O.**

- Q4)** a) Define torque. Explain principle, construction and working of proximity torque sensor with neat diagram. [8]
- b) With help of neat diagram explain the construction, principle and working of any device used for measuring the flow of crude through a pipeline. [8]
- Q5)** a) What is the need of process control in petroleum industry - Explain with help of suitable examples. [6]
- b) What do you mean by dynamics and what is steady state? [4]
- c) Explain the P,D and I mode of controller actions with help of diagram. Provide mathematical expression of each. Why PID mode is considered to be the best of the lot? [8]

OR

- Q6)** a) With help of relevant examples discuss various important features of SCADA systems. [8]
- b) Name the controllers ideal for the following: [4]
- i) Gas pressure monitoring and control
- ii) Crude flow monitoring and control
- c) Write a short note on Controller Tuning. [6]

## **SECTION - II**

- Q7)** a) Why the accuracy and repeatability is worsen in Real World problems compared to that of the Laboratory Study. [6]
- b) Explain the need of Limit Switches and Alarm Systems in Upstream Industry. [6]
- c) What are the design goals of automatic remotely controlled fracturing processes- explain with help of proper sketches. [6]

OR

- Q8) a)** With help of schematic diagram explain Cascade Control. Discuss the controllers employed and the control mechanism in details. [9]
- b) Differentiate between PLC, DCS and PC- based Control Systems. [9]

- Q9) a)** Discuss kick risk evaluation model (REM) with help of suitable diagram. [8]
- b) Explain with help of suitable case study any advanced control architecture for the underbalanced drilling operation. [8]

OR

- Q10)a)** With help of neat sketch explain the PLC based control of two phase separator of crude from aqueous phase. [8]
- b) What is Dynamic Positioning of Floating Vessels-with help of suitable diagram explain how it helping in the deep sea operations. [8]

- Q11)a)** Discuss the key features of the emergency shutdown system -Elaborate the methodology also. [8]
- b) What are the technical challenges in subsea manifold wells-highlight the possible solution as well. [8]

OR

- Q12)a)** List down important characteristics of ideal multiphase flow meter. [8]
- b) How automated control can be implemented to steam injection process-discuss with aid of neat sketch of the process. [8]



Total No. of Questions : 12]

SEAT No. :

**P2017**

**[4759]-254**

[Total No. of Pages : 2

**B.E. (Petroleum Engineering)**  
**PETROLEUM REFINING TECHNOLOGY**  
**(2008 Course) (Semester-I) (412385 A) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

**Q1)** a) Give the classification of crude oil. [8]

b) Discuss in details the various low boiling components of a refinery. [8]

OR

**Q2)** a) Write a note on the various types of octane numbers. [8]

b) What is ASTM distillation? Explain in detail. [8]

**Q3)** a) Describe the process of single stage desalting of crude oil. [8]

b) Enlist the various crude distillation products. [8]

OR

**Q4)** a) Discuss regarding the dry, wet and damp operation of a vacuum unit. [8]

b) Write a note on the Atmospheric Topping Unit (ATU). [8]

**Q5)** a) Discuss the process flow for a typical catalytic cracking process. [9]

b) Explain the process of Fluid coking with the help of a neat labeled diagram. Compare the yield with delayed coking process. [9]

OR

**P.T.O.**

- Q6)** a) Discuss the process of hydrocracking in detail. [9]  
b) What is the need for air blowing of bitumen? Discuss the process of air blowing of bitumen. [9]

**SECTION-II**

- Q7)** a) Discuss the isomerisation process to increase the octane number. [9]  
b) What is alkylation? Discuss the hydrofluoric acid process for alkylation. [9]

OR

- Q8)** a) What is catalytic reforming? Give the reactions that take place in catalytic reforming. [9]  
b) Describe the semi regenerative process for catalytic reforming. [9]

- Q9)** a) Write a note on propane deasphalting. [8]  
b) Explain the process of ketone dewaxing of lube oil. [8]

OR

- Q10)**a) With the help of a neat labeled diagram, explain the process of NMP extraction for lube oil base stock. [8]  
b) Explain the finishing processes for the preparation of lube oil base stock. [8]

- Q11)**a) Write a note on the batch blending and the line blending process. [8]  
b) Write a short note on the atmospheric pollution due to refineries. How is it controlled? [8]

OR

- Q12)**a) Explain the method of hydrogen production by steam reforming. [8]  
b) Write a note on the SCOT process for sulphur recovery. [8]





Total No. of Questions : 10]

SEAT No. :

**P3719**

**[4759]-256**

[Total No. of Pages : 3

**B.E. (Petroleum Engineering)**

**NON CONVENTIONAL HYDROCARBON RESOURCES**

**(2008 Pattern) (Semester-I) (Elective-II) (412385 (C))**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams should be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume additional data if necessary.*

**SECTION-I**

- Q1)** a) What is continuous accumulation system? How is it different from conventional petroleum system? [10]
- b) Classify the non-conventional sources of hydrocarbons. [5]

OR

- Q2)** a) Explain following terms: Sandy Shale and Shaly Sand, Shale oil and Oil shale, unconventional gas. [10]
- b) Describe in brief technological challenges in the production of heavy and extra heavy oil. [5]

- Q3)** a) Give classification of Shale gas reservoir based on grain size, composition and brittleness. [10]
- b) Comment on the recognition of hydraulic units in the unconventional reservoirs. [5]

OR

- Q4)** a) An undersaturated coal system has the following reservoir parameters: [10]

Drainage area = 160 acres, thickness = 15 ft, porosity = 3%, Initial pressure = 650 psia, desorption pressure = 450 psia, total compressibility =  $16 \times 10^{-5} \text{ psi}^{-1}$ . Estimate the total volume of water that must be produced for the reservoir pressure to decline from initial pressure to desorption. Pressure.

- b) Write in brief about hydrate formation in natural environment. [5]

**P.T.O.**

**Q5) Answer Any Four from the following: [20]**

- a) Simplified Process Schematic for Fischer-Tropsch Coal-to-Liquids Systems.
- b) Free gas and absorbed gas in CBM.
- c) Draw a typical desorption isotherm as a function of coal rank.
- d) Hydrate problems during production.
- e) Core analysis in shale reservoir.
- f) TOC % in Tight Gas sand, shale gas and CBM.

**SECTION-II**

**Q6) a) A volumetric gas reservoir has the following production history. [10]**

Time, t (years)	Reservoir pressure, p(psia)	Z	Cumulative production, Gp(MMMscf)
0.0	1798	0.869	0.00
0.5	1680	0.870	0.96
1.0	1540	0.880	2.12
1.5	1428	0.890	3.21
2.0	1335	0.900	3.92

The following data is also available:

$$\phi = 13\%, S_{wi} = 0.52, A = 1060 \text{ acres}, h = 54 \text{ ft.}, T = 164^\circ\text{F}.$$

Calculate the Gas Initially In Place Volumetrically.

- b) Write a note on radioactivity in Shale. [5]

OR

**Q7) a) Explain in brief different types of proppant and their functions in hydraulic fracturing. [10]**

- b) Describe causes of formation damage and perforation damage. [5]

**Q8) a)** Describe the CBM gas production profile with the help of neat diagram. **[10]**

b) An undersaturated coal system has the following reservoir parameters:

Drainage area = 160 acres, thickness = 15 ft, porosity = 3%

Initial pressure = 650 psia, desorption pressure = 450 psia,

total compressibility =  $16 \times 10^{-5}$  psi<sup>-1</sup>.

Estimate the total volume of water that must be produced for the reservoir pressure to decline from initial pressure to desorption pressure. **[5]**

OR

**Q9)** Explain with the help of neat diagrams role of Geomechanics in the understanding of behavior of the tight reservoirs. **[15]**

**Q10)** Write notes on Any Four of the following: **[20]**

- a) Environmental problems related to drilling and production.
- b) Management of produced water.
- c) Methods of extraction of Heavy oil.
- d) Relative permeability curves.
- e) Pressure drop in skin zone in vertical and horizontal well.
- f) Prevention and control methods in gas hydrate formation.
- g) Shale gas resource assessment in India.



Total No. of Questions : 12]

SEAT No. :

P3903

[Total No. of Pages : 3

[4759] - 257

**B.E. (Petroleum)**

**CARBON MANAGEMENT IN PETROLEUM INDUSTRY**

**(Elective - II) (2008 Pattern)**

*Time : 3 Hours]*

*[Maximum Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No.6, from Section – I and Q. No. 7 or Q. No.8, Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12 from Section – II.*
- 2) *Answers to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Discuss in detail the effects of global warming on environmental and social changes. What are the primary drivers of it? [10]
- b) What is Kyoto protocol? What is its significance? Also write barriers towards proper implementation of it. [8]

OR

- Q2)** a) How carbon credit is important for various industrial sectors and the economical development of different Nation's? Explain with a case study.[12]
- b) Describe, carbon cycle', in brief. [6]
- Q3)** a) Write the names of various green house gases. Discuss the impact of emission of gases from various Industrial sectors on the environment and life on the earth. [8]
- b) 'This is an arrangement under the Kyoto Protocol allowing industrialized countries with a green house gas reduction commitment to invest in emission reducing projects in developing countries as an alternative to what is generally considered more costly emission reductions in their own countries.' Write the name of this arrangement; describe this with its advantages and disadvantages. [8]

OR

**P.T.O.**

**Q4)** How different major and minor industrial sectors are responsible for carbon emission? Give the details of those operations of upstream and downstream sector that are responsible for carbon emission. [16]

**Q5)** a) Discuss in brief CO<sub>2</sub> storage, transportation and its limitations in brief.[6]  
b) Describe in brief carbon capture and sequestration in deep geological formations. [10]

OR

**Q6)** a) Discuss any one case study of carbon sequestration. Include, objectives, data available, challenges, methodology and advantages in it [12]  
b) List the different approaches of carbon sequestration. [4]

### **SECTION - II**

**Q7)** a) Classify different sources of energy? [4]  
b) Why renewable energy is important? Explain in detail. [6]  
c) Explain in brief, the principle of operation of any two methods of renewable energy generation and their limitations. [8]

OR

**Q8)** 'Industrialization and globalization have changed the context of business, accelerating economic growth and intensifying social and environmental risks and impacts.' Discuss in detail role of 'sustainable development' in this background. Also write it's long term benefits. [18]

**Q9)** a) Differentiate between biogas, biofuel and solid biomass. [6]  
b) What is bio-gas? Explain the systematic process of, 'bio-gas generation'. Write its advantages and limitations. [10]

OR

**Q10)** Discuss in detail energy production from biomass. Include the general techniques of energy production from biomass and limitations of each in brief. [16]

**Q11)** a) Discuss the scope and methods of carbon credit generation from the point of Petroleum Industry. [8]  
b) Write in detail general methods of energy saving and energy management. [8]

OR

**Q12)** Write short notes on :

**[16]**

- a) Cleaner fuels and refining processes.
- b) New engines to operate with cleaner hydrocarbons, hydrogen and renewable fuels.
- c) Cleaner alternative sources of energy
- d) Minimization of internal energy consumption and other emission reduction methods



Total No. of Questions : 12]

SEAT No. :

**P4277**

**[4759] - 258**

[Total No. of Pages : 6

**M.E. (Petroleum Engineering) (Semester - II)**

**IMPROVED OIL RECOVERY AND RESERVOIR SIMULATION**

**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or 10, Q11 or 12.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams should be drawn wherever necessary.*
- 5) *Use of a non-programmable calculator, log-log and semi-log paper is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Classify different types of EOR techniques and explain how EOR process is different than secondary recovery or pressure maintenance program. **[8]**
- b) For a typical water flood initial oil saturation is 0.6 and residual oil saturation in the swept region is 0.3. What will be the recovery factor if volumetric sweep efficiency at the economic limit is 0.7? **[4]**
- c) Draw neat schematic sketch and show peripheral flooding and central flooding for an anticline reservoir. **[4]**

OR

- Q2)** Oil is being displaced by water in a horizontal, direct line drive under the diffuse flow condition. The rock relative permeability functions for water and oil are given in following table. **[16]**

Sw	Krw	Kro	Sw	Krw	Kro
0.20	0	0.800	0.65	0.170	0.050
0.30	0.009	0.470	0.70	0.208	0.027
0.35	0.020	0.370	0.75	0.251	0.010
0.40	0.033	0.285	0.80	0.300	0
0.50	0.075	0.163			
0.55	0.100	0.120			

$B_o = 1.28$  rb/std and  $B_w = 1.0$  rb/stb for initial reservoir pressure which is constantly maintained. Assume that the relative permeability and PVT data are relevant for both cases. Compare the values of the producing water cut at

**P.T.O.**

surface conditions and cumulative oil recovery at breakthrough for following fluid combinations. Draw fractional flow plots and apply Welge's graphical technique.

Viscosity in cp		
Case	Oil	Water
1	70	0.5
2	8	1

- Q3)** a) What is hot water flooding and CSS? Also write in brief the general design considerations and general selection or screening criteria to implement thermal recovery methods. [8]
- b) Draw neat schematic and describe the SAGD mechanism in brief. [6]
- c) How will you calculate steam injection rate and oil steam ratio for a steam flooding project? Explain. [4]

OR

- Q4)** a) Calculate the mobility ratio and amount of oil recoverable at the end of a certain tertiary recovery program if, overall sweep efficiency is 0.70. Other data : Area = 14.5 km<sup>2</sup>. Initial oil saturation at the start = 0.7. Residual oil saturation at the end = 0.3. Porosity = 0.23. Pay zone thickness = 18 meter. Bo = 1.25. Bw = 1.0. Kro = 0.62, Krw = 0.22. Oil Viscosity = 0.9CP. Water Viscosity = 0.9. Also Calculate the time elapsed between the start of injection and arrival of the front at the production well if constant fluid injection rate is 6000m<sup>3</sup>/day. [8]
- b) What is microscopic displacement efficiency or pore scale efficiency? Describe the factors affecting to it is brief. [6]
- c) Write a short note on, 'miscible drive'. [4]
- Q5)** a) Discuss the general design considerations from, 'preparation of a polymer solution to be injected into the reservoir' to 'necessary separation facility' for a Polymer flooding program. Also write suitable reservoir parameters or screening criteria to implement this kind of project. [12]
- b) Write the advantages and limitations of, 'carbon dioxide flooding', in brief. [4]

OR

- Q6)** a) Compare between Water flooding and Polymer flooding. [8]
- b) Write a short note on : [8]
- i) Surfactant flooding
  - ii) Microbial EOR



## SECTION - II

- Q7)** a) State the Lax Equivalence Theorem. Explain with a diagrammatic representation, the concepts of stability, consistency and convergence. Explain the importance of each of these terms in numerical simulation. [8]
- b) Show how the expansion of Taylor's series leads to the forward, backward and central difference techniques used in numerical simulation. [4]
- c) What are the objectives of reservoir simulation and what data is required for creating a reservoir simulation model? [4]

OR

- Q8)** a) List down the major steps involved in reservoir simulation, along with a detailed description. [4]
- b) Differentiate between "first order derivative" and "Approximation of first order derivatives". [4]
- c) Write a short note on truncation errors and analyze the truncation errors associated with the schemes derived from Taylor's series. [8]

- Q9)** Derive the 1-D flow equation in Cartesian coordinates. [18]

OR

- Q10)** 1-D, linear, horizontal single phase diffusivity equation is given by:

$$\frac{\partial^2 P}{\partial x^2} = \left( \frac{\phi \mu c}{k} \right) \frac{\partial P}{\partial t}$$

Write the difference equation for the above, using 3 explicit and 3 implicit methods. [18]

- Q11)** For two phase flow of oil and gas in a linear, horizontal porous medium, the equations can be written as : [16]

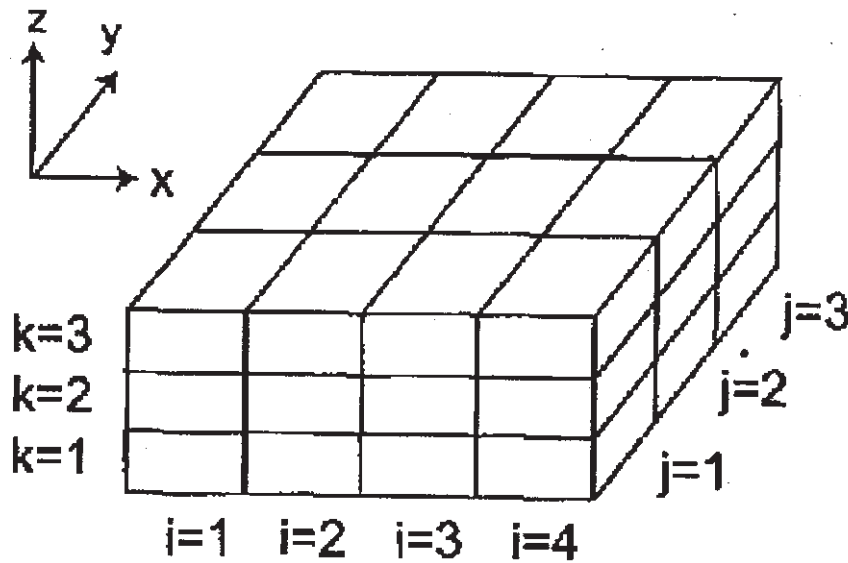
$$\frac{\partial}{\partial x} \left( \frac{k k_{ro}}{\mu_o B_o} \frac{\partial P_o}{\partial x} \right) - q'_o = \frac{\partial}{\partial t} \left( \frac{\phi S_o}{B_o} \right)$$

$$\frac{\partial}{\partial x} \left( \frac{k k_{rg}}{\mu_g B_g} \frac{\partial P_g}{\partial x} + R_{so} \frac{k k_{ro}}{\mu_o B_o} \frac{\partial P_o}{\partial x} \right) - q'_g - R_{so} q'_o = \frac{\partial}{\partial t} \left( \frac{\phi S_g}{B_g} + R_{so} \frac{\phi S_o}{B_o} \right)$$

Write the flow equations in discretized form, in terms of transmissibilities and pressure differences.

OR

**Q12)** Well produces from (3,2,2) @ 133.3 STB/D.  $\Delta x = 250$  ft;  $\Delta y = 300$  ft;  $\Delta z = 33.333$  ft;  $h = 100$  ft;  $k_x = 270$  md;  $k_y = 220$  md;  $k_z = 50$  md.  $F_{vf} = 1.0$  rb/stb;  $\rho = 55$  lbm/ft<sup>3</sup>;  $\mu = 2$  cp. Write the flow equation for block (3,2,2) [16]



Formulas/Equations for the exam

$$\int_{t^n}^{t^{n+1}} \{T_{x_{i-1/2}} [(p_{i-1} - p_i) - \gamma_{i-1/2} (Z_{i-1} - Z_i)]\} dt + \int_{t^n}^{t^{n+1}} \{T_{x_{i+1/2}} [(p_{i+1} - p_i) - \gamma_{i+1/2} (Z_{i+1} - Z_i)]\} dt$$

$$+ \int_{t^n}^{t^{n+1}} q_{m_i} dt = \frac{V_{b_i}}{\alpha_c} \frac{d}{dp} \left( \frac{\phi}{B} \right)_i [p_i^{n+1} - p_i^n],$$


---

$$\int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{m_i} dt = m_{a_i}$$


---

$$T_{z_{i,j,k-1/2}}^m [(p_{i,j,k-1}^m - p_{i,j,k}^m) - \gamma_{i,j,k-1/2}^m (Z_{i,j,k-1} - Z_{i,j,k})]$$

$$+ T_{y_{i,j-1/2,k}}^m [(p_{i,j-1,k}^m - p_{i,j,k}^m) - \gamma_{i,j-1/2,k}^m (Z_{i,j-1,k} - Z_{i,j,k})]$$

$$+ T_{x_{i-1/2,j,k}}^m [(p_{i-1,j,k}^m - p_{i,j,k}^m) - \gamma_{i-1/2,j,k}^m (Z_{i-1,j,k} - Z_{i,j,k})]$$

$$+ T_{x_{i+1/2,j,k}}^m [(p_{i+1,j,k}^m - p_{i,j,k}^m) - \gamma_{i+1/2,j,k}^m (Z_{i+1,j,k} - Z_{i,j,k})]$$

$$+ T_{y_{i,j+1/2,k}}^m [(p_{i,j+1,k}^m - p_{i,j,k}^m) - \gamma_{i,j+1/2,k}^m (Z_{i,j+1,k} - Z_{i,j,k})]$$

$$+ T_{z_{i,j,k+1/2}}^m [(p_{i,j,k+1}^m - p_{i,j,k}^m) - \gamma_{i,j,k+1/2}^m (Z_{i,j,k+1} - Z_{i,j,k})]$$

$$+ q_{sc_{i,j,k}}^m = \frac{V_{b_{i,j,k}}}{\alpha_c \Delta t} \left[ \left( \frac{\phi}{B} \right)_{i,j,k}^{n+1} - \left( \frac{\phi}{B} \right)_{i,j,k}^n \right],$$


---

$$T_{y_{i,j-1/2}}^m [(p_{i,j-1}^m - p_{i,j}^m) - \gamma_{i,j-1/2}^m (Z_{i,j-1} - Z_{i,j})]$$

$$+ T_{x_{i-1/2,j}}^m [(p_{i-1,j}^m - p_{i,j}^m) - \gamma_{i-1/2,j}^m (Z_{i-1,j} - Z_{i,j})]$$

$$+ T_{x_{i+1/2,j}}^m [(p_{i+1,j}^m - p_{i,j}^m) - \gamma_{i+1/2,j}^m (Z_{i+1,j} - Z_{i,j})]$$

$$+ T_{y_{i,j+1/2}}^m [(p_{i,j+1}^m - p_{i,j}^m) - \gamma_{i,j+1/2}^m (Z_{i,j+1} - Z_{i,j})] + q_{sc_{i,j}}^m = \frac{V_{b_{i,j}}}{\alpha_c \Delta t} \left[ \left( \frac{\phi}{B} \right)_{i,j}^{n+1} - \left( \frac{\phi}{B} \right)_{i,j}^n \right]$$


---

$$\int_{t^n}^{t^{n+1}} \left( \frac{u_x A_x}{B} \right) \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} \left( \frac{u_x A_x}{B} \right) \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \left[ \left( \frac{\phi}{B} \right)_i^{n+1} - \left( \frac{\phi}{B} \right)_i^n \right]$$


---

$$T_{x_{i-1/2}}^m [(p_{i-1}^m - p_i^m) - \gamma_{i-1/2}^m (Z_{i-1} - Z_i)] + T_{x_{i+1/2}}^m [(p_{i+1}^m - p_i^m) - \gamma_{i+1/2}^m (Z_{i+1} - Z_i)] + q_{sc_i}^m = \frac{V_{b_i}}{\alpha_c \Delta t} \left[ \left( \frac{\phi}{B} \right)_i^{n+1} - \left( \frac{\phi}{B} \right)_i^n \right]$$

$$T_{x_{i+1/2},k} = \left( \beta_c \frac{k_x A_x}{\mu B \Delta x} \right) \Big|_{x_{i+1/2},k} = \left( \beta_c \frac{k_x A_x}{\Delta x} \right)_{x_{i-1/2},k} \left( \frac{1}{\mu B} \right)_{x_{i+1/2},k} = G_{x_{i-1/2},k} \left( \frac{1}{\mu B} \right)_{x_{i+1/2},k}$$

$$T_{y_{i,j+1/2},k} = \left( \beta_c \frac{k_y A_y}{\mu B \Delta y} \right) \Big|_{y_{i,j+1/2},k} = \left( \beta_c \frac{k_y A_y}{\Delta y} \right)_{y_{i,j-1/2},k} \left( \frac{1}{\mu B} \right)_{y_{i,j+1/2},k} = G_{y_{i,j-1/2},k} \left( \frac{1}{\mu B} \right)_{y_{i,j+1/2},k}$$

$$T_{z_{i,j,k+1/2}} = \left( \beta_c \frac{k_z A_z}{\mu B \Delta z} \right) \Big|_{z_{i,j,k+1/2}} = \left( \beta_c \frac{k_z A_z}{\Delta z} \right)_{z_{i,j,k-1/2}} \left( \frac{1}{\mu B} \right)_{z_{i,j,k+1/2}} = G_{z_{i,j,k-1/2}} \left( \frac{1}{\mu B} \right)_{z_{i,j,k+1/2}}$$



Total No. of Questions : 12]

SEAT No. :

**P3904**

[Total No. of Pages : 4

**[4759] - 259**

**B.E. (Petroleum) (Semester - II)**

**PETROLEUM PRODUCTION ENGINEERING - II**

**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q.No. 1 or Q.No. 2, Q.No. 3, or Q.No. 4. Q.No. 5 or Q.No.6, from Section - I and Q.No. 7 or Q.No. 8, Q.No. 9 or Q.No. 10, Q.No. 11 or Q.No. 12 from Section - II.*
- 2) *Answers to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Design a horizontal two-phase separator to process crude into gas flowing at the rate of 8 MMSCFD having specific gravity 0.7 and oil at the rate 2000 bopd with 50° API gravity, The operating pressure and temperature are 900 pisa and 50° F respectively. **[14]**

Data:  $\mu = 0.01$  cp,  $Z = 0.85$ ,  $d_m = 140$  micron,  $C_D = 0.34$  (initial value), density of water = 62.4 lb/ft<sup>3</sup>, residence time = 3 min.

Calculate :

- i) Density of oil (lb/ft<sup>3</sup>).
- ii) Density of gas (lb/ft<sup>3</sup>).
- iii) Terminal velocity of liquid drops (ft/s).
- iv) Reynolds's no. Re (Comment on nature of flow).
- v) Drag coefficient  $C_D$
- vi) If calculated value of  $C_D$  does not match with the initial value, then using iterative procedure calculate final values of Re,  $C_D$  and hence the terminal velocity.
- vii) Effective length  $L_{eff}$  based on liquid capacity constraint and Seam-to-seam length  $L_{ss}$  of the vessel (for different values of diameter of the separator -16, 20, 24, 30,36,42,48 inches).
- viii) Calculate the slenderness ratio.

**P.T.O.**

Select the required size (diameter  $d$  and seam-to-seam length  $L_{SS}$ ) of the separator so that the slenderness ratio close to 3.

- b) Explain advantages and limitations of horizontal separators over vertical separators. [4]

OR

- Q2) a)** Design a horizontal three-phase separator to process crude into gas flowing at the rate of 6 MMSCFD having specific gravity 0.7, oil at the rate 4000 bopd with 40° API gravity, and water (density 1.07) at the rate 2500 bpd, The operating pressure and temperature are 900 pisa and 50° F respectively. Data:  $\mu = 10$  Cp,  $Z = 0.8$ ,  $d_m = 500$  micron,  $C_D = 0.34$  (initial value),  $\beta = 0.26$  [12]

Calculate:

- i) Density of oil (lb/ft<sup>3</sup>).
- ii) Maximum oil pad thickness with retention time (for both, oil and water) of 10 min.
- iii) Maximum diameter of vessel for oil pad thickness constraint. Calculate value of the product  $d^2L_{eff}$  based on liquid retention constraint (i.e. to achieve oil and water retention time of 10min).
- iv) Effective length  $L_{eff}$  based on liquid retention constraint and seam-to-seam length  $L_{SS}$  of the vessel (for different values of diameter of the separator -60, 72, 84, 96, 108inch).
- v) Calculate the slenderness ratio.

Select the required size (diameter  $d$  and seam-to-seam length  $L_{SS}$ ) of the separator so that the slenderness ratio close to 3.

- b) With neat sketches explain control loops for interface level control with and without oil chamber. [6]

- Q3) a)** Design a vertical treater for oil (50° API, S.G. 0.8, viscosity 7 cp) at the rate of 3000 bopd at 90° F. [10]

Calculate :

- i) Minimum diameter of water droplet to be settled from oil to achieve water- cut of 1%.
- ii) Value of the product  $d^2h$  for the vessel based on oil retention time constraint of 20 min.
- iii) The height  $h$  of coalescing section for different values of diameters (50, 60, 70, 80 inch) of the vessel.

The heat input required (in MMBtu/hr) for the treater to be operated at 120°F, such that only 10 % water (S.G. =1) is left in the oil.

- b) Explain the operations to be performed in treating produced water. [6]

OR

- Q4)** a) Calculate diameter and height of vertical separator for produced water treating system at the rate of 5000 bpd (S.G. 40° API, viscosity = 1 cp). The diameter of oil droplets to be separated is 200 micron (with S.G.=0.8). Take  $F=1$  and retention time 10 min. [8]
- b) With neat sketches explain construction of atmospheric storage tanks (fixed and floating roof types) for liquids. State limitations of each type.[8]

- Q5)** a) Explain Pilling and Bedworth rule and find out the nature of the film when Aluminum oxidizes to  $Al_2O_3$  Given [8]
- i) atomic weight of oxygen = 16 g,  
ii) Atomic weight of Aluminum = 26.98 g.  
iii) Density of Aluminum = 2.70 g/cc,  
iv) Density of Aluminum oxide = 3.70 g/cc.
- b) Explain Anodic coatings and Cathodic coatings. [4]
- c) Differentiate between dry corrosion and wet corrosion. [4]

OR

- Q6)** a) For Cathodic protection. a ship hull requires current density of 15 mA/mt<sup>2</sup>. Zinc (divalent) used as sacrificial anode. What is the quantity of Zinc required per mt<sup>2</sup> of hull surface for protection to last 10 years? Given 1 mole of Zinc has mass of 0.06537 kg. Number of electron in 1 A/sec =  $6.25 \times 10^{18}$ . [8]
- b) Explain causes of corrosion and factors affecting corrosion rate. [4]
- c) Describe Pitting corrosion and Crevice corrosion. [4]

### SECTION - II

- Q7)** a) What is formation damage? Draw schematic sketch and explain the concept of it. [4]
- b) What are the different methods to recognize formation damage problem? Also write various reasons for occurrence of it in a near wellbore region. [6]
- c) What is critical rate of oil production? What will be the impact of incorrect sizing of a surface production facility and restrictions in it on, overall production performance of a reservoir? Explain. [8]

OR

- Q8)** a) Write various reasons for decline in oil and or gas production from a wellbore and reservoir. Also write solution in brief to improve the production performance of these assets. [10]
- b) What is Scale? What are the causes of scale formation? Explain different scale problems in production operation. [4]
- c) Describe scale remediation techniques in detail. [4]
- Q9)** a) Explain analysis of paraffins and asphaltenes in crude oil by various testing methods. [8]
- b) Explain causes and consequences of sand production in wells. [8]

OR

- Q10)** a) Explain sand control techniques in wells. [8]
- b) Explain use of slotted liners and wire-wrapped screens which contain gravel pack for sand control in wells. [8]
- Q11)** Write short notes on: [16]
- a) intelligent well completions
- b) challenges associated with heavy oil production
- c) multilateral wells
- d) subsea production

OR

- Q12)** a) Discuss in brief different methods of heavy oil recovery. [8]
- b) Draw suitable diagram and explain down hole separation and processing of oil, gas and water. [8]





Total No. of Questions : 12]

SEAT No. :

**P2004**

[4759] - 26

[Total No. of Pages :3

**B.E. (Civil)**

**HYDROPOWER ENGINEERING**

**(2008 Course) (Semester - II) (Open Elective) (401008)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer booklet.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain hydroelectric power in India and estimation of hydropower potential with flow duration curve. [8]
- b) Explain the process of Nuclear power generation? What are its limitations? [8]

OR

- Q2)** a) Describe briefly the sources of hydrologic data in India. Explain hydrological analysis for the water power projects. [8]
- b) Discuss the relative merits and demerits of hydropower as compared to other power sources. [8]

- Q3)** a) Write short note on: [8]
- i) Micro hydro plant.
  - ii) Valley dam plant.
- b) What are the principle components of hydroelectric plants? Draw the typical sketch and discuss the utility of each component. [8]

OR

- Q4)** a) Explain the location and main components of tidal plant in detail. [8]
- b) What is run of river plant? What are the parts and arrangements of such a plants? Explain with neat sketch. [8]

*P.T.O.*

- Q5)** a) Show that capacity factor is equal to product of load factor and utilization factor. [4]
- b) Explain the significance of load duration curve. [4]
- c) A run-of-stream station with an installed capacity of 14,000 kW operates at 30% weekly load factor when it serves as a peak load station and its entire capacity is firm capacity. What should be the lowest discharge in the stream so that the station may serve as the base load station? It is given that the plant efficiency is 70% when working under a head of 22 m. Also calculate the daily load factor of the plant when the discharge in the stream rises to 15 cumec. [10]

OR

- Q6)** a) Why it is necessary to predict future load demand? What are the methods of load forecasting? [8]
- b) The load on hydel plant varies from a minimum of 12,000 kW to maximum of 44,000 kW. Two turbo generators of capacities 22,000 kW each have been installed. Calculate [10]
- i) Total installed capacity of the plant
  - ii) Plant factor
  - iii) Maximum demand
  - iv) Load factor
  - v) Utilization factor

### SECTION - II

- Q7)** a) Explain any four electrical equipments for the power house. [8]
- b) Explain underground powerhouse and types of arrangement of underground powerhouse with sketch. [8]

OR

- Q8)** a) Explain the criteria for dimensions of superstructures bays for the powerhouse. [8]
- b) Explain constructional and design features of generator in hydropower generation. [8]

- Q9) a)** Write short notes on: [8]
- i) Cavitation of turbines
  - ii) Water hammer in turbines
- b) The internal and external diameters of an outward flow reaction turbine are 2 m & 2.5 m respectively. The turbine is running at 280 rpm and the rate of flow of water through the turbine is  $6.5\text{m}^3/\text{sec}$ . The width of runner at inlet and outlet is equal to 300 mm. The head on turbine is 140 m. Neglecting the thickness of vanes and taking the discharge radial at outlet, determine: [10]
- i) Velocity of flow at inlet and outlet
  - ii) Vane angle at inlet and outlet

OR

- Q10)a)** Explain classification of turbines according to various criteria in detail. [8]
- b) Determine the number of turbines and diameter of runner for a power plant having 40 cumecs inflow, 20 m head. The efficiency of turbine is 75% with the speed of 200 rpm. Assume the specific speed as 250 and speed ratio as 0.80. [10]
- Q11)a)** Explain the concept of carbon credit? Give its significance. [8]
- b) Explain in detail different criteria for economic considerations of hydroelectric power plant. [8]

OR

- Q12)a)** Explain the duties of electricity generating companies in detail. [8]
- b) What are the factors governing the pricing of electricity? [8]



Total No. of Questions : 12]

SEAT No. :

**P4278**

[4759] - 261

[Total No. of Pages : 3

**B.E. (Petroleum Engg.)**  
**DEEP WATER TECHNOLOGY**  
**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use to logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Discuss effect of an environmental forces on drill ship and explain linear wave theory in detail. **[9]**
- b) Discuss effect of loading 9-5/8" casing on deck to Center of gravity of a drilling vessel. Calculate new gross Center of gravity by adding 200 tons of 9-5/8" casing on a deck at a vertical Center of gravity 130ft. If present displacement of a ship is 13,000 tons and KG at this displacement is 62 ft. **[9]**

OR

- Q2)** a) Discuss selection and uses of ROV in detail. **[9]**
- b) Discuss effect of removing weight from higher VCG than vessels KG to metacentre. **[6]**
- c) Explain Ballast control in brief. **[3]**
- Q3)** a) Discuss in details loads acting on riser system. **[3]**
- b) Discuss use of Mud boost line and riser fill up valve in brief. **[4]**

**P.T.O.**

- c) Discuss penetration test and Exploration test. [6]
- d) Calculate riser margin using following data [3]
- Water depth - 700 ft., RKB to sea level - 50ft.
- Mud density - 11 ppg, sea water density 8.5 ppg
- Well TVD - 10,000 ft.

OR

- Q4)** a) Discuss 26" drilling , casing and cementation operation in brief. [8]
- b) How to calculate choke line friction loss in subsea well control. [4]
- c) An offshore well drill from semisubmersible encounters shallow gas sand at 670 ft RKB. The pore pressure 770 ft gas water contact is 320psi. Water depth at location is 200 ft and rig's air gap is 70 ft. is this zone likely to kick. If 9ppg mud is in use? Hydrostatic gas gradient 0.01 psi/ft. [4]

- Q5)** a) Explain subsea cementing procedure with suitable sketch. [8]
- b) Explain Mohr-coulomb criteria of rock failure in detail. [8]

OR

- Q6)** a) Discuss stresses around well bore and well bore instability - upper and lower mud weight limits in detail. [10]
- b) Derive expression for compressibility. [6]

$$C_{EFF} = \Phi C_F + (1 - \Phi) C_S$$

Consider simplified porous material behaviour.

## SECTION - II

- Q7)** Discuss production platform design, development and planning in detail. (Different environmental forces with Morison equation). [16]

OR

**Q8) a)** Discuss different types of platform, explain one of the platform in detail with depth and design limitations. [8]

b) Explain Jack up rig design and construction in detail. [8]

**Q9) a)** Discuss vertical tree subsea completion in detail with suitable sketch. [9]

b) Write short note on : [9]

i) Manifold

ii) Jumper

iii) Umbilical.

OR

**Q10)a)** Discuss offshore production three phase separator design and selection in detail. [9]

b) Discuss EOR techniques used in deep water Hydro carbon production. [9]

**Q11)a)** Discuss different types of pipe laying vessels in detail. [12]

b) Discuss multiphase pattern of flow in detail. [4]

OR

**Q12)** Discuss Weymouth equation for horizontal flow with assumptions and effect of assumptions in detail. Discuss gas flow in parallel pipelines in brief. [16]



Total No. of Questions : 12]

SEAT No. :

P4279

[Total No. of Pages :4

[4759]-262

**B.E. (Petroleum Engineering)**  
**TRANSPORT OF OIL AND GAS**  
**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt three questions from each section. Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Answers to the two sections must be written in separate answer book.*
- 3) *Figures to the right indicates full marks.*
- 4) *Neat diagram should be drawn wherever necessary.*
- 5) *Use a non programmable calculator.*
- 6) *Assume suitable data if necessary and clearly state it.*

**SECTION -I**

- Q1)** a) Explain different hydrocarbon properties which are useful for designing of oil and gas pipelines and storage facilities in detail? **[10]**
- b) Short note: **[8]**
- i) Complex flow systems
  - ii) Flow regimes in horizontal pipelines

OR

- Q2)** Solve for pressure drop in 2", 4" and 6" ID gas lines using general equation, Panhandle and Weymouth equation  $\epsilon = 0.004$  (Assume old steel)  $Z = 0.67$  Gas viscosity = 0.013 Consider good operating condition, gas flow rate = 20 MMscfd, gas gravity = 0.85  $P_1 = 900$  psi,  $T = 120$  deg F,  $C = 120$ , length = 3000 m. **[18]**

**P.T.O.**

**Q3) a)** Given following information of a centrifugal compressor answer the following conditions: [8]

Operating conditions:  $P_s = 800$  psia,  $P_d = 1200$  psia,  $T_s = 529.7$  deg R,  $T_d = 582.6$  deg R,  $Q_{g,sc} = 400$  MMSCFD

Gas properties:  $SG = 0.65$ ,  $k = 1.3$   $Z_{ave} = 0.95$

Calculate:

- i) isentropic efficiency?
  - ii) Actual volumetric flow rate?
  - iii) Isentropic head?
  - iv) Power requirement (assume 80% mechanical efficiency)?
- b) Explain with a neat sketch construction, working principle of a reciprocating compressor? [8]

OR

**Q4) a)** Explain in brief: [8]

- i) Gas-liquid interface pulsating dampener
  - ii) Net positive suction head
- b) Explain with a neat sketch Construction, working principle of double acting piston pump? [8]

**Q5) Short note on:** [16]

- a) Selecting Pipe Sizes
- b) Minimum pipe wall thickness
- c) Head loss in valves and pipe fittings
- d) Pipe end connections



OR

**Q6)** Short note on: [16]

- a) Erosional flow
- b) Codes and standard used for pumps
- c) Use of Weymouth, Panhandle A and Panhandle B equation
- d) Pressure rating classes

**SECTION - II**

**Q7)** a) Explain with help of process flow diagram LNG liquefaction Process. [8]

- b) Explain in detail about natural gas to ammonia and urea process with block diagram . [8]

OR

**Q8)** a) Differentiate between LNG, CNG and LPG with respect to all properties? [8]

- b) Explain with help of process diagram gas to methanol. [8]

**Q9)** a) Write about gas to liquids-Fischer-Tropsch route with block diagram.[8]

- b) Explain gas to power process in detail? [8]

OR

**Q10)** Explain in brief about: (any four) [16]

- a) Materials used for subsea piping
- b) Safety and supervision of subsea pipelines
- c) FPSO
- d) Cathodic protection for pipelines
- e) Asphaltene, paraffin and hydrate inhibition method in pipelines

**Q11)a)** Draw and explain Group gathering station in detail? [9]

b) Explain different types of pigging operations in detail. [9]

OR

**Q12)**Short notes on: [18]

a) Types of valves used in facility piping

b) Instrumentation and controls used in GGS

c) Pipeline coating and insulation



Total No. of Questions : 10]

SEAT No. :

**P4632**

**[4759] - 263**

[Total No. of Pages : 3

**B.E. (Petroleum Engineering) (Semester - II)**

**ENVIRONMENT TECHNOLOGY AND SAFETY IN  
PETROLEUM INDUSTRY  
(2008 Pattern) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

**Instructions to the candidates:**

- 1) *Answer 3 questions from each section.*
- 2) *Que 5 & Que 10 are compulsory.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of non programmable electronic pocket calculator is allowed.*
- 7) *Assume Suitable data, if necessary.*

**SECTION - I**

- Q1)** a) What are the types of solids contained in waste water? Give detailed classification. [6]
- b) Discuss the impact of natural gas flaring on Environment in details. What are the majors taken to reduce the impact? [6]
- c) What are characteristics of produced waters in Petroleum industry? How are these harmful to environment? [6]

OR

- Q2)** a) What is HAZOP Analysis? What are merits and demerits of HAZOP? [6]
- b) Discuss classification of Air pollutants in details. [6]
- c) Discuss hazardous materials used in petroleum industry. [6]
- Q3)** a) Draw a simple flow sheet showing all aspects of produced water treatment. [8]
- b) What are Indian and international produced water discharge standard with reference to petroleum industry. [8]

**P.T.O.**

OR

- Q4)** a) Write note on Accidental discharges of petroleum fields to environment. [6]
- b) Explain any four important parameters used internationally to assess quality of produced wastewater. [6]
- c) What are physical principles used in following equipment Plate condensers, Gas/Air filtration units, hydro cyclones, skim pipes. [4]
- Q5)** a) What are methods to curb noise pollution from [8]
- i) Seismic operations
- ii) Compressions
- b) What are equipment used for treatment of produced water. What are demerits of DGF equipment? [8]

**SECTION - II**

- Q6)** a) Write short notes on: [6]
- i) Work Permit system
- ii) Root cause analysis
- iii) Job safety analysis
- b) What are objectives of well abandonment and plugging? [4]
- c) Write merits and demerits of FMEA, JSA, what- if analysis. [6]

OR

- Q7)** a) Discuss in details on OHSAS 18001. [9]
- b) What are Safety audits? What are benefits of safety audits? [3]
- c) What are the procedures for onshore/ offshore well abandonment? [4]

- Q8)** a) What are environmental aspects of oil field operations with respect to [6]
- i) Seismic
  - ii) Drilling
  - iii) Production
  - iv) Offshore
- b) What are the different types of primary & Secondary treatment available for wastewater treatment? Write in details about any two treatments. [6]
- c) What are effects of emulsification on the oil spills? [6]

OR

- Q9)** a) Discuss “Biochemical Oxygen demand and Chemical Oxygen demand in details. [6]
- b) What do you mean “Sludge volume index” and give formula to calculate the same. Also, give values for good as well as poor sludge. [6]
- c) What are effects of oil spills on aquatic life? [6]
- Q10)**a) What are common legislation applicable to oil field operations. [6]
- b) What are reactive/ proactive system models of HSE management? [6]
- c) Discuss factors affecting oil spill movements. [4]



**P3905**

**[4759] - 264**

**B.E. (Petroleum Engineering)  
PETROLEUM ECONOMICS  
(Elective - IV) (2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Use of graph paper is allowed.*
- 3) *Figures to the right indicate marks.*
- 4) *Assume additional data if necessary.*

**SECTION - I**

**Q1) a) Answer any three of the following : [15]**

- i) Hydrocarbon Resources and Reserves
  - ii) Reserves to Production Ratio
  - iii) Natural Gas Major Trade Movements
  - iv) Crude Oil Benchmark Blends
  - v) Reserves accretion and discovery of field size scenario in past 20 years.
- b) The recoverable reserves for a small field are estimated to be 2.0 million barrels. It is necessary to develop a production forecast to evaluate profitability over the tenure of the project. Similar cases have yielded an initial rate of 800 BOPD with uniform decline of 10 % for first five years of production followed by 15 % thereafter till the end of the tenure. Develop and present the production forecast in a tabular form and calculate the time required to recover the estimated reserves. [10]

OR

**Q2) a) Assume following data:**  
Average crude oil price in 2013 and 2014 was \$ 92 and \$ 105 respectively. Keeping in mind this trend which is consistent also for the increase in oil price since 2009, it was decided to develop a forecast for oil price with an increase of 6 % every year since 2013 for next 10 years. Accordingly the forecast was evolved for 10 years for a base price of \$72 / barrel.

**P.T.O.**

It is seen that the oil produced has higher sulphur content and TAN which is creating an oil price differential of 8.5 %.

Following the trend of decline in oil price in 2015, it was further decided to consider oil price increase for first four years with oil price differential and followed by a slide in oil price in the fifth year by almost 15 %. The oil price will further increase from fifth to eighth year by 6 % and will again fall by 15 % in the Ninth year with an increment of 6% in the tenth year.

Prepare three different forecasts in a tabular form for oil price showing original increase in oil price for 10 years, oil price differential @8.5 % and increase-slide in price. [10]

- b) Explain Exponential Decline with a suitable diagram. [10]
- c) Write a note on Oil Trading. [5]

**Q3) a) Answer the following in brief : [10]**

- i) NPV and PVI,
  - ii) Errors in Reserves Calculation,
  - iii) Incremental Analysis,
  - iv) Recognition of Uncertainty in Project Assessment,
  - v) Replacement Analysis.
- b) An oil company has installed an offshore production facility for \$10 million in the first year of the project. The annual maintenance cost of the facility is \$ 60,000 per year for the 2<sup>nd</sup> year, increasing by \$10,000 per year upto 10<sup>th</sup> year. In the 11<sup>th</sup> year, a major overhaul is conducted at a cost of \$ 500,000. The overhaul has helped in keeping the maintenance costs fixed at \$150,000 per year for the remaining 10 years. At the end of 20 years, the facility is sold for a sum of \$2 million.

If the market interest rate is 10 % per year, calculate the present value of all the costs over the 20-year period. Draw a cash flow diagram for the problem. [15]

OR

**Q4) a) Write in brief on any three of the following : [15]**

- i) Difference in Volumetric Assessment for Prospective Resources during Post Discovery, Appraisal and Development stage,
- ii) Peak oil theory and Hubert curves,
- iii) Elements of a project cash flow,
- iv) Payback and Return on Investment (ROI),
- iv) Scenario based assessment.

- b) The company management is deciding whether or not it should accept a project with an initial cost of 4.5 million dollars. Net cash inflows are expected to be 9 million dollars each for all four years of operations. In the fifth year, the land must be returned to its natural state at a cost of 25 million dollars. Develop and plot the NPV profile for the project. Should the project be accepted at a rate of return of 8%? Should it be accepted at a rate of return of 15%? [10]

### SECTION - II

- Q5) a) Consider the following investment opportunities that might be available to a company with a **current priority in “low risk involved”**. [10]

Asset	Opportunity	Total Investment( M = 10 <sup>6</sup> \$)
A	Drilling exploration wells in an area with no history of occurrence of hydrocarbons	\$25 M
B	Exploration project adjacent to producing field	\$10 M
C	Redevelopment in producing field	\$25 M

If a budget of \$ 30 M is available for allocation of projects for next year, **which is the best way to spend money acknowledging the factors of uncertainty and risk?**

- i) 100% allocation in asset C and 50 % allocation in asset B.
- ii) 80 % allocation in asset C, 50% in asset B and 20% in asset A.
- iii) 60 % allocation in asset C, 50 % in asset B and 40 % in asset A.

**Justify your decision with suitable arguments for each alternative.**

- b) A company is planning to drill a well in a promising area. Geologists and engineers estimate that there is a 35% chance that it will be a dry hole. The dry hole cost is \$65,000.

If the well is successful, it is estimated that there is a 60% chance that it will have reserves of 30,000 barrels, a 30% chance of 60,000 barrels, and a 10% chance of 90,000 barrels and the NPV corresponding each reserve value is \$60,000, \$120,000 or \$180,000, respectively.

Draw a suitable decision tree and suggest whether it is profitable to drill a well based on the expected monetary value (EMV) for this proposal. Show all calculations. [10]



- c) An oil company has mapped a prospect and concluded that the resources may be as high as 40 million barrels and the probability of success (POS) is estimated to be 15%.

The data acquired, the interpretations and the cost of the exploration well will amount to 30 million USD. If a discovery is made, the NPV will be 90 million USD. [5]

- 1) Calculate the expected monetary value.
- 2) Find the break even POS

OR

- Q6) a)** An asset was purchased for \$ 96,000 with an estimated service life of 10 years and has a salvage value of \$ 12,000. Calculate its depreciation using straight line (SLD), and double declining (DDB) methods. Prepare a plot of book value against number of years and compare the results obtained by both methods. [10]

- b) There are two field development options for waterflood implementation These are [10]
- i) Develop the field right away without a pilot and
  - ii) Do a pilot first and if the pilot is successful then go for the full field implementation.

Without the pilot, there is a 60% chance the project will generate NPV of 110 MM\$, 40% chance the waterflood is not feasible, and the project loses NPV of – 3.5 MM\$. If the pilot option is opted for, it is estimated the probability of pilot's success is 70%. If the pilot is successful, there is 90% probability of generating NPV of 80 MM\$ and 10% chance of losing 1 7.5 MM\$. If the pilot fails, the resulting NPV will be – 43 MM\$. Create decision tree and give decision on the basis of maximizing EMV. Show all calculations.

- c) Write in brief about Depletion. [5]

- Q7) a)** A 50,000-barrel field is developed with a total cost of \$550,000. The operating cost over the productive life of the field is estimated at \$ 320,000 per year. Assume Royalty of 15 %, income tax is 35 %, oil price of \$ 65/ bbl, and recovery of CAPEX and OPEX. Calculate the share of government and operator in this project. Show the distribution properly.[5]

- b) While drilling a wildcat well, a tool is stuck. The engineers have two options: (1) to fish for the tool or (2) sidetrack the well above the stuck position. The cost for each option and the associated probabilities are given in the table that follows. Based on expected value analysis, select the most economically viable option. [5]

	Outcome	Probability	Cost,M\$
Fishing	Routine	35%	126
	Troublesome	65%	380
Sidetrack Immediately	Routine	85%	245
	Troublesome	15%	436

c) Write in brief about production sharing contract in India. [15]

OR

Q8) a) Following is the data given for economic evaluation of the project from the commencement of the commercial production. Before production, five years were spent for exploration and development. Hence after signing the block, the production commences from the sixth year. [20]

Year	Annual production, million barrels	Year	Annual production, million barrels
1	2.043	6	0.873
2	1.695	7	0.772
3	1.453	8	0.683
4	1.314	9	0.592
5	1.044	10	0.519

Use following assumptions for calculations

- ✓ Exploration cost is 30 million dollars equally spread over first three years after signing the block.
- ✓ Development cost is 75 million dollars equally spread over from fourth to sixth year
- ✓ Production cost is \$ 3.00/ bbl, constant throughout the project.
- ✓ Oil price is \$70/ barrel, constant throughout the project.
- ✓ Royalty is 10 % on annual production, to be deducted from gross revenue.
- ✓ Rate of return is 10%.

- ✓ Cost recovery is 80 % and is allowed to deduce with the commencement of commercial production. The unrecovered cost is allowed to carry forward to next year.
- ✓ Profit petroleum is to be shared between government and contractor @ 60 % and 40 % respectively.
- ✓ Contractor is entitled to pay 30 % income tax on profit.

Prepare a tabular form giving details of annual production, cumulative production, gross cash flow, royalty, net cash flow, cost recovery, recovered cost, profit petroleum, government share and contractor share, income tax, profit for operator, NPV for operator BFIT and AFIT.

How is one barrel distributed?

- b) Write in brief about importance of Investment Multiple in the Production sharing contract of India. [5]



Total No. of Questions : 10]

SEAT No. :

**P4280**

**[4759] - 265**

[Total No. of Pages :3

**B.E. (Petroleum Engineering)**  
**PETROLEUM PRODUCTION ENHANCEMENT AND**  
**OPTIMIZATION**  
**(2008 Pattern) (Semester -II) (Elective - IV) (412390B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answer to the two sections must be written in separate answer books.*
- 2) Answer 3 questions from Section I and 3 questions from Section II.*
- 3) Figures to the right indicate full marks.*
- 4) Q2(two) in Section I is compulsory.*
- 5) Either of Q5(five) or Q6 (six) in Section II are compulsory.*
- 6) Neat diagrams must be drawn wherever necessary.*
- 7) Use of a non-programmable calculator, log-log, and semi-log paper is allowed.*
- 8) Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) What do you mean by a SRT? Explain in detail. **[6]**
- b) What is the impact of Young's Modulus on the width of a pumped hydraulic fracture? Explain with equations and appropriate diagrams. Also explain the concept of Poisson's ratio. **[10]**
- Q2)** a) Estimate the surface pressure and horse power requirements considering the following scenario: **[10]**
- i)  $FG = 0.8$  psi/ft
  - ii) MD Perforations =Top: 9,780 ft; Bottom: 9,810 ft
  - iii) 3 1/2" tubing 6.5 lb/ft
  - iv) YF 130 with  $SG = 1$
  - v) Rate =40 bpm

**P.T.O.**

- vi) Frictional pressure gradient = 400 psi/1000ft
  - vii) Number of Perforations = 4 perfs/ft; Diameter of Perforations = 0.4"
  - viii) Perforation friction = 12.7 psi
  - ix)  $P_{NET} = 240$  psi
- b) What is closure pressure, and how does Data frac help in computing the same. **[8]**
- Q3)** a) With the help of a diagram, explain the various pressure terms used in DataFrac and calibration test. **[10]**
- b) Write short notes on: **[6]**
- i) Friction pressure losses near the wellbore
  - ii) Step down test
- Q4)** a) Calculate the fracture gradient under the following conditions: **[10]**
- i) Casing 7", #29 to 3,500ft
  - ii) M.D. top perf 3,250ft
  - iii) M.D. bottom perf 3,348ft
  - iv) Fluid being pumped - OIL API gravity 35°
  - v) ISIP = 1,400 psi
- b) What is the difference between 2D and 3D fracture models? What are the individual types? Explain with appropriate diagrams. **[6]**

## SECTION - II

- Q5)** What do you mean by optimization? In general why it is necessary to go for optimization in Petroleum Production related processes or equipments? List, at least six general situations in which you may need to go for production optimization. **[18]**

OR

- Q6)** a) What are the different methods to unload a liquid loaded gas well? Explain the flow regimes and plunger lift mechanism used in it. [9]
- b) Describe in brief, various techniques to boost oil production from a given reservoir under normal operating conditions. [9]

**Q7)** Discuss in detail, short, medium and long term methods to optimize field production. Also write general bottlenecking problems and discuss in brief what needs to be done to achieve highest recovery factor with maximum efficiency. [16]

OR

- Q8)** a) Write the various techniques or tools that are available to improve the production performance of a field. Explain any one of them along with application. [8]
- b) What is production optimization? Explain various methods of production optimization for self-flowing well. [8]

**Q9)** Discuss in brief, how long term planning and optimization techniques of well completion or well design for a high pressure, high permeability reservoir will help you to minimize following problems along with better production management and minimum water and gas coning. [16]

- a) Well stimulation
- b) Re-perforation with reference to OWC and GOC
- c) Water and gas shut off jobs

OR

**Q10)** Discuss any one case study, in detail to explain the application and scope of production optimization that was applied either for a well bore or a field to improve the productivity. [16]

- a) Write the objective or problem statement of the case study
- b) Describe the challenges involved, data available, techniques and step by step approach that was taken to utilize the available resources and improve the overall efficiency of the production facility under consideration.
- c) Indicate the findings or results of discussion using graph and explain them with mathematical equations if any.



Total No. of Questions : 12]

SEAT No. :

**P4281**

**[4759] - 266**

[Total No. of Pages :7

**B.E. (Petroleum Engineering)  
WELL CONTROL METHODS  
(2008 Pattern) (Elective - IV) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Using following well data, calculate number of 92ft stands that can be pulled out dry before well starts to flow. **[4]**

Well depth = 10,750 ft TVD, Casing shoe depth = 5,930ft TVD, Mud gradient = 0.789 psi/ft, Formation pressure = 8,410 psi, Casing capacity = 0.1499 bbl/ft, Open hole capacity = 0.1458 bbl/ft, Drill pipe metal displacement = 0.0080 bbl/ft, Drill pipe capacity 0.0176 bbl/ft.

**b)** Using following well data, calculate **[4]**

- i) Casing shoe strength in psi
- ii) MAASP, if mud density is increased to 12.6 ppg.

Data given

Well MD 13,500ft, well TVD 12,400ft, casing shoe MD 10,400ft, casing shoe TVD 9,300ft, Leak off mud density 10.6ppg, surface leak off pressure 2,200 psi.

**P.T.O.**

- c) What is ECD? When circulating with a 12ppg mud at 10,000ft., ECD is 12.3 ppg. Calculate what is an annular pressure loss. [4]
- d) What is “Swabbing” and “Surging”? What are the causes and effects of swabbing and surging? [4]

OR

- Q2)** a) Explain types of gas migration in a shut in well. Why is it necessary to let the gas expand while it migrates? [6]
- b) While drilling, pump pressure was 2000 psi at 70 spm with 11ppg mud. What will be the approximate pump pressure, if pump speed is reduced to 50 spm and mud weight increased to 13 ppg? [4]
- c) Discuss U tube concept in detail. [4]
- d) What is meant by “Primary” and “Secondary” well control? [2]
- Q3)** a) You are in a well; control situation while drilling. Explain the sequence of actions that you would take if the company policy is “soft shut in”. [6]
- b) Discuss positive signs of kick in brief. [4]
- c) After detecting kick well was shut in and stabilised shut in pressures were SICP = 700psi, SIDPP = 540 psi, Pit gain = 20bbl, While circulating for kill mud, both pressures were rising. What will happen to bottom hole pressure? [4]
- d) After lowering casing, which operations are to be taken care of prior to conducting a leak off test. [4]

OR

- Q4)** a) Gas migration without expansion [12]
- i) when gas is at bottom
- ii) Gas top at 4000ft

Calculate SIDPP, SICP, SIDPP.

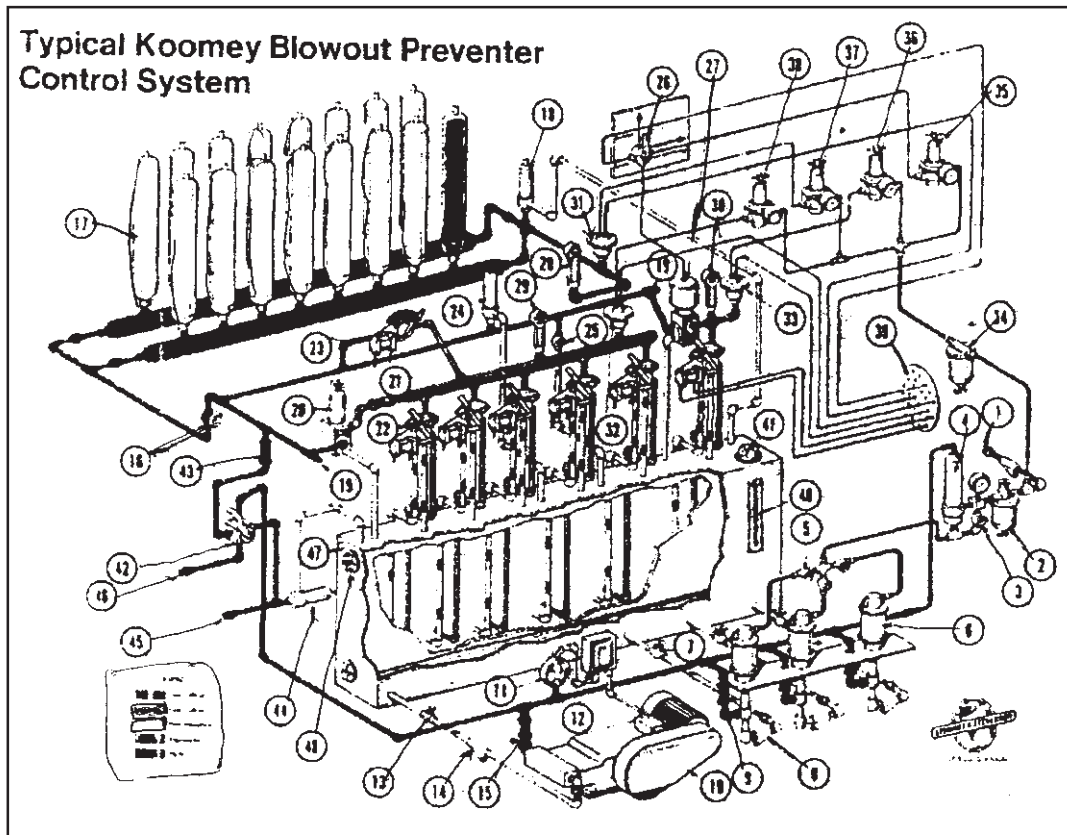
Data:

Well T.D. = 9,000ft, Mud density = 12ppg, Well bore 8-1/2”. Formation pressure = 6,000 psi, influx volume = 40bbl, Influx height = 570ft, Influx gradient = 0.12psi/ft.



- b) Calculate influx gradient and type of influx with following data [6]  
 Mud weight 12.3ppg, SIDPP 350psi, SICP = 700psi, influx height = 963 ft

- Q5) a) Write component number [8]



Component	Number
Air Pump	
Accumulator bottles	
Hydraulic fluid reservoir	
Accumulator pressure relief valve	
Manifold pressure regulator	
Pressure transmitter	
4 ways/3 positions valve	
Annular pressure regulator	

- b) A 3,000 psi control unit has 20, ten gallon capacity bottles with a precharge pressure of 900psi. How many gallons of usable fluid is available according to recommendation laid down in API RP 53? [4]
- c) What is diverter? Discuss uses of diverter system. [4]

OR

- Q6)** a) Determine the Usable Volume Per Bottle using following data for Surface and Subsea application. [10]

Volume per bottle = 10 gal

Pre-charge pressure= 1,000 psi

Maximum pressure = 3,000 psi

Minimum pressure remaining after activation = 1,200 psi

Pressure gradient of hydraulic fluid = 0.445 psi/ft

Water depth = 1,000 ft

- b) Draw and explain Choke Manifold in brief. [6]

## SECTION - II

- Q7)** a) Discuss weight and wait method in detail. [9]
- b) Explain the application of a “Volumetric Method” in well control situation. Explain the method in detail. [9]

OR

- Q8)** Well data: [18]

Casing 8-5/8” depth = 2,000ft, Well depth = 10,000ft, Number of stands pulled = 10, Drill string stripped 4-1/2”, string displacement 2bbl/std., Mud density = 9.6ppg, Influx 10bbls of gas, Drill string annular capacity 0.0406 bbl/ft, Hole diameter 7-7/8”, Hole capacity = 0.0603 bbl/ft, Z = 1.1, BHP = 5,000psi, BHP Temperature = 620°R, Gas Sp gr = 0.6, SICP = 75 psi

Describe procedure for stripping 10 stands back to bottom and SICP when bit at bottom.

**Q9) Well data**

**[16]**

8-1/2" hole depth 13,600 ft MD/5,000 ft TVD

KOP 2,000ft,

End of build-up = 5,400 ft MD/4,285 ft TVD

9-5/8" shoe depth 9,000 ft MD/4,600 ft TVD

5" drill pipe capacity = 0.0178 bbl/ft

5"HWDP 180ft capacity 0.0087 bbl/ft

6.25" drill collar 150ft capacity 0.0061 bbl/ft

Mud weight 10.9ppg, volume open hole to drill collar 0.0323 bbl/ft

Volume open hole to drill pipe 0.0459 bbl/ft

Volume casing/drill pipe 0.0515 bbl/ft

Shoe leaked at 1120 psi with 10.4 ppg mud

Mud pump output 0.12 bbl/stks

SCR 625 psi @ 30spm

SIDPP 875 psi, SICP 895 psi, Pit Gain 15 bbl.

Use driller's method

Calculate

- a) Kill Mud weight
- b) ICP
- c) FCP
- d) Dynamic pressure loss at KOP
- e) Remaining SIDPP at KOP
- f) Circulating pressure at KOP
- g) Dynamic pressure loss at EOB
- h) Remaining SIDPP at EOB.

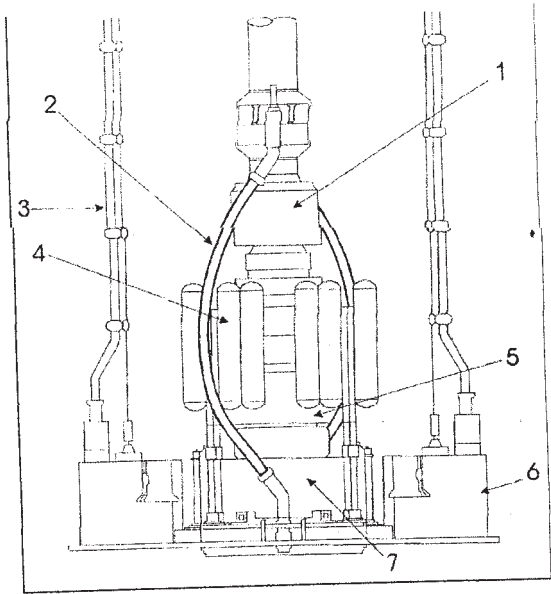
OR

**Q10)** Explain the effect on “Circulating pressure”, “Casing pressure” and “BHP” of following problems while circulating out a kick. **[16]**

- a) Plugged bit nozzle
- b) Washed out bit nozzle
- c) Choke plugged
- d) Choke washed out
- e) Total pump failure
- f) Plugged annulus.

**Q11)a)** In which environment (WBM or OBM) kick detection is difficult and why? **[8]**

b) Match the items listed below to the numbers indicated on the Lower Marine Riser Package (L.M.R.P.). **[8]**



Subsea accumulator \_\_\_\_\_

Annular preventer \_\_\_\_\_

LMRP connector \_\_\_\_\_

Ball/flex joint \_\_\_\_\_

Control POD \_\_\_\_\_

Umbilical \_\_\_\_\_

Kill and Choke line loop \_\_\_\_\_.

OR

**Q12)** Discuss BOP function test and pressure test for BOP upper pipe ram with suitable sketch in detail. **[16]**



Total No. of Questions : 12]

SEAT No. :

**P1468**

**[4759]-268**

[Total No. of Pages : 3

**B.E. (Chemical Engineering)**  
**PROCESS DYNAMICS & CONTROL**  
**(2008 Course) (Semester - I) (409343)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** Develop the complete mathematical model equations of a non-isothermal CSTR starting from the laws of conservation of mass and energy, for a first - order reaction:  $A \rightarrow B$

List all the variables involved and state the assumptions made. **[16]**

OR

**Q2)** Develop the complete mathematical model of a single liquid level tank system assuming nonlinear relation between the outlet flowrate 'F' and the liquid level 'h'. Linearize the nonlinear term around  $h_0$  and find the transfer function of the system relating the liquid level 'h' to the inlet flowrate  $F_1$ . **[16]**

**Q3) a)** For a second order system with following transfer function **[8]**

$$G(s) = \frac{15}{(16s^2 + 3s + 1)}$$

when a step change of magnitude 5 is introduced into the system find

- i) Rise time,
- ii) Ultimate value of response,
- iii) Decay ratio,
- iv) Overshoot.

**P.T.O.**

- b) Write the time-equation and the transfer function of a PID controller and give the advantages and disadvantages of each P, I and D actions. [8]

OR

**Q4)** A first-order process is controlled by a PD-controller. Determine the following, assuming  $G_m = G_f = 1$ . [16]

- Overall closed-loop transfer function.
- Order of the closed-loop system.
- Offset equation for a unit step input in  $Y_{SP}(s)$ .
- Overall gain of the closed-loop system.

**Q5)** Draw the root locus of the system with the following transfer function, [18]

$$G(s) = \frac{12K_c(s+0.5)}{(s+1)(s+2)(s+3)}$$

Mention all the steps and comment on the stability of the system.

OR

- Q6)** a) Check the stability of the closed loop system with the following transfer function,  $CE = s^4 + 4s^3 + 6s^2 + 2s + 3 = 0$  [9]
- b) Explain notion of stability in terms of BIBO with some example pole placements on the complex plane. [9]

### SECTION - II

**Q7)** Sketch the Bode plots of the following system, mentioning each step in detail, [16]

$$G(s) = \frac{(2s+1)}{(4s+1)(s+1)}$$

OR

**Q8)** Draw the Nyquist plot for the system,

**[16]**

$$G(s) = \frac{1}{(2s+1)(4s+1)}$$

Show all steps in detail and comment on the stability of the system based on the Nyquist stability criteria.

**Q9) a)** Explain feed-forward control of a three tank composition control system with a neat process diagram. **[8]**

b) Discuss the override control scheme of steam boiler for steam rate control with the process diagram and basic block diagram. **[8]**

OR

**Q10)a)** What is Smith predictor control system? Explain with the block diagram. **[8]**

b) Differentiate between feed-back and feed-forward control systems. **[8]**

**Q11)a)** Describe the details of working of PLCs and its programming procedure through a simple ladder diagram. **[9]**

b) Explain the Direct Digital Control (DDC) system through a neat block diagram. **[9]**

OR

**Q12)a)** Explain the conversion of analog signals to digital signals in a digital control system. **[9]**

b) Describe the SCADA control system and its applications to a chemical industry. **[9]**

*EEE*



Total No. of Questions : 12]

SEAT No. :

P1469

[4759] -269

[Total No. of Pages : 3

B.E. (Chemical)

CHEMICAL REACTION ENGINEERING - II

( 2008 Course) (Semester - I) (409344)

Time : 3 Hours]

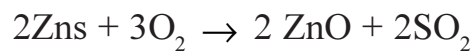
[Max. Marks : 100

Instructions to the candidates:

- 1) Answer 3 questions from Section I and three questions from Section II.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6) Assume suitable data, if necessary.

**SECTION - I**

- Q1) a) Explain selection of model for non-catalytic reaction particle. [6]
- b) Spherical particle of Zinc blend of size  $R = 1\text{mm}$  are roasted in an 8% oxygen stream at  $900^\circ\text{C}$  and 1atm pressure. The stiochiometric of the reaction is: [12]



Assuming that the reaction proceeds by shrinking core model.

- i) Calculate the time needed for complete conversion of a particle and relative resistance of ash layer diffusion during this operation.
- ii) Repeat for particle of size  $R = 0.05\text{mm}$ .

Data:-  $\rho_B = 4.13 \text{ gm/cm}^3 = 0.0425 \text{ mol/cm}^3$ ;

Reaction rate constant =  $K_s = 2 \text{ cm/sec}$ ;

for gases in ZnO layer,  $D_e = 0.08 \text{ cm}^2/\text{sec}$

Note that film resistance can safely be neglected.

OR

P.T.O.

**Q2)** A feed consisting of 30% of 50- $\mu$ -radius particles, 40% of 100- $\mu$ -radius particles and 30% of 200- $\mu$ -radius particles is to be fed continuously in a thin layer onto a moving grate crosscurrent to a flow of reactant gas. For the planned operating conditions the time required for complete conversion is 5, 10 and 20 min. for the three sizes of particles. Find the conversion of solid for residence time of 8 min. in reactor. [18]

- Q3)** a) Explain film conversion parameter in detail. [8]  
b) Explain the mass transfer and the reaction kinetics regimes in the fluid-fluid reaction. [8]

OR

**Q4)** The concentration of undesirable impurities in air (1 bar) is to be reduced from 0.1% to 0.02% by absorption in pure water. Determine the height of the tower required for counter current operations. [16]

Data:  $K_{Aga} = 0.32 \text{ mol/hr. m}^3 \cdot \text{pa}$

$K_{Ala} = 0.1/\text{hr.}$

$H_A = 12.5 \text{ pa} \cdot \text{m}^3/\text{mol.}$

Flow rates,  $f_g/\text{ACS} = 1 \times 10^5 \text{ mol/hr} \cdot \text{m}^2$

$f_x/\text{ACS} = 7 \times 10^5 \text{ mol/hr} \cdot \text{m}^2$

Total molar density of liquid = 56,000 mol/m<sup>3</sup>.

- Q5)** a) Explain the major steps involved in the preparation of the catalyst. [8]  
b) Explain the characteristics of the catalyst. [8]

OR

- Q6)** a) Explain the methods of determination of catalyst pore volume and solid density in detail. [6]  
b) Explain the method of determination of catalyst surface area. (BET method). [10]

## SECTION - II

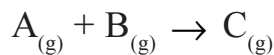
- Q7)** a) Explain the selectivity for a porous catalyst. [6]

- b) Derive the effectiveness factor of cylindrical catalyst pellet and explain the strong pore resistance and negligible pore resistance to the catalytic reaction with suitable sketch. [12]

OR

- Q8)** a) Explain diffusion in porous catalyst. [9]  
 b) Write a short note on mass transfer with reaction with the help of effectiveness factor in catalytic reactions. [9]

**Q9)** The following mechanism has been proposed for a catalytic reaction.



- a)  $A_{(g)} + X \rightleftharpoons A.X$   
 b)  $A.X + B_{(g)} \rightleftharpoons C.X$   
 c)  $C.X \rightleftharpoons C_{(g)} + X$

Where, X indicates an active site of the catalyst. Derive an expression for the rate of reaction if the surface reaction step is a rate controlling. [16]

OR

**Q10)** The catalytic reaction,  $A \rightarrow 4R$ , is studied in a plug flow reactor using various amounts of catalyst and 20 lit/hr of pure A feed at 3.2 atm and 117°C. The concentration of A in the effluent stream is recorded for the various run as follows:

Run	1	2	3	4	5
Catalyst used,kg	0.02	0.04	0.08	0.12	0.16
$C_A$ , out(mol/lit)	0.074	0.06	0.044	0.035	0.029

Find a rate equation for this reaction. [16]

**Q11)** Write a short note on the following. [16]

- a) Staged adiabatic reactor.  
 b) Slurry reactor

OR

**Q12)** Write a short note on the following. [16]

- a) Packed Bed reactor.  
 b) Trickle Bed reactor.



Total No. of Questions : 12]

SEAT No. :

**P1520**

[4759]-27

[Total No. of Pages : 3

**B.E. (Civil Engineering)**

**INDUSTRIAL WASTE WATER MANAGEMENT  
(2008 Course) (Semester-II) (Open Elective) (401008)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) What do you understand by physical unit processes? How these are beneficial in waste water treatment scheme. [8]
- b) Explain Electro-dialysis process for removing colloidal and dissolved solids. [8]

OR

- Q2)** a) Discuss the different chemical unit process? Explain any one in detail. [8]
- b) Explain the working of root zone cleaning system. [8]

- Q3)** a) How recycling of treated sewage is done? [8]
- b) Explain activated sludge process with neat sketch. [8]

OR

- Q4)** a) Discuss the effects of toxic chemicals on environment. Give the remedial measures to reduce these effects. [8]
- b) Explain the working principle of filtration in detail. [8]

***P.T.O.***

- Q5)** a) Explain in detail the role of ozone in COD and colour removal from waste water. [9]
- b) What is mean by activated carbon? Give its process and design parameters. [9]

OR

- Q6)** Write short note on following with neat sketch (Any Three): [18]
- a) Ultra-filtration.
- b) Nitrification and denitrification.
- c) Reverse osmosis.
- d) Moving bed bio reactor.
- e) Membrane reactor.

**SECTION-II**

- Q7)** a) What are the 3R principle? Explain its importance in environment point of view. [8]
- b) Explain the term 'Reuse of sewage in residential building'. [8]

OR

- Q8)** a) How recovery of plastic, paper and metal is carried out from municipal solid waste? [8]
- b) Explain zero discharge concepts for paper and pulp industry. [8]

- Q9)** a) Explain 3R principle for sugar cane processing. [8]
- b) Explain the recovery of metals in electroplating. [8]

OR

- Q10)**a) Explain the amount of water require for textile industry. [8]
- b) What is radioactive waste? How it cause hazard to environment? [8]

**Q11)a)** Explain the theory of adsorption. Give design specification for adsorption using BDST model. **[9]**

b) How waste water is useful for irrigation? Explain its effects on crop selection. Give its preventive measures. **[9]**

OR

**Q12)** Explain following term (Any Three): **[18]**

a) Adsorption.

b) Standards related to solid waste.

c) Green process.

d) Zero discharge concept for domestic building.

e) Necessity of treatment of industrial waste.



Total No. of Questions : 12]

SEAT No. :

P3332

[Total No. of Pages : 4

[4759]-270

B.E.(Chemical)

Chemical Engineering Design - II

(2008 Pattern)

[Time : 3 Hours]

[Max. Marks : 100

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

### SECTION - I

**Q1) a)** A reaction vessel is fitted with a plain jacket and stiffening rings for the reaction vessel with the help of following data: **[10]**

vessel shell internal diameter = 2130 mm, Jacket internal diameter = 2260mm  
Jacket length = 2500 mm, Pressure inside the reactor = 0.55 N/ mm<sup>2</sup> Jacket  
internal pressure = 0.35 N/ mm<sup>2</sup>, Temperature = 150°C, Material of  
construction - open hearth steel with allowable stress = 98N/mm<sup>2</sup>, Modulus  
of elasticity = 190kN/ mm<sup>2</sup>, Poisson's ratio = 0.30

b) Comment on selection of a jacket or a coil for a reaction vessel. **[8]**

OR

**Q2) a)** With neat sketches describe vortex and swirling and methods to avoid it. **[8]**

b) A jacketed agitated reactor consists of a vertical cylinder 1.2 m in diameter with a hemispherical base & flanged flat top. jacket is fitted to the cylindrical section only and extends to a height of 0.9 m. Spacing between the jacket & vessel wall is 75 mm. The jacket is fitted with a spiral baffle. The pitch between the spirals is 200 mm. The jacket is used to cool the reactor contents with chilled water at 10°C @ 32,500 kg/h. Exit temperature

**P.T.O.**

of water is 20°C Estimate the heat transfer coefficient at the outside wall of the reactor and pressure drop in the jacket. Density of water=998 kg/m<sup>3</sup>, viscosity of water = 1.136 mNs/m<sup>2</sup>, N<sub>pr</sub> = 7.9, k<sub>f</sub> = 0.59 w/m.k, j<sub>f</sub> = 3.2 x 10<sup>-3</sup>. [10]

- Q3) a)** Explain the downcomer back up calculations for a sieve plate column with all the equations. [10]
- b) Using van Winkle's correlation find the overall column efficiency for the following system [6]

Component	Mol fraction	u (m Ns/m <sup>2</sup> )
Propane	0.05	0.03
i - butane	0.15	0.12
n-butane	0.25	0.12
i-pentane	0.20	0.14
n-pentane	0.35	0.14

$$\alpha_{LK} = 2.0$$

**OR**

- Q4) a)** Find the column diameter of a plate column for the following specifications:[12]  
 Feed stream: 10% w/w acetone in aqueous stream, 20°C, 13000 kg/h. No. of theoretical stages 16, slope of bottom operating line = 5, slope of top operating line = 0.57, x<sub>D</sub> = 0.94 (98% w/w), x<sub>w</sub> = 50 ppm, R = 1.35, plate efficiency = 60%, plate pressure drop = 100 mm, Vapor density. At bottom = 0.72 kg/m<sup>3</sup>, liquid density at bottom = 954 kg/m<sup>3</sup>, surface tension at bottom = 57x10<sup>-3</sup> N/m, Vapor density at top = 2.05 kg/m<sup>3</sup>, liquid density at bottom = 753 kg/m<sup>3</sup>, surface tension at top = 23x10<sup>-3</sup> N/m, surface tension at bottom = 57x10<sup>-3</sup> N/m, K<sub>1 top</sub> = 0.09 and K<sub>1 Bottom</sub> = 0.075.

- b) Explain the sieve plate performance diagram [4]

- Q5) a)** Explain the characteristics and functioning of [6]

- i) Liquid distributors
- ii) Liquid redistributors

- b) Explain the estimation of packed bed height for an absorption column with all the relevant equations [10]



**OR**

- Q6) a)** Sulphur dioxide produced by combustion of sulphur in air is absorbed in water. Pure SO<sub>2</sub> is then recovered from the solution by steam stripping. The feed is 5000 kg/h of gas containing 8% w/w SO<sub>2</sub>. A 95% recovery of SO<sub>2</sub> is required. The gas is cooled to 20°C. Physical properties of gas can be taken as those for air. No. of overall gas transfer units = 8, Liquid flow rate = 29.5 kg/s. Find the diameter of column for a pressure drop of 20 mm H<sub>2</sub>O/m packing height. Data - Type of packing = Intalox saddle, Material = Ceramic, Size = 38 mm, Fp = 170m<sup>-1</sup> Gas density = 1.21 kg/m<sup>3</sup>, Liquid density = 1000 kg/m<sup>3</sup>, Liquid viscosity = 10<sup>-3</sup> N.S/m<sup>2</sup>. [10]
- b) What is the significance of mGm/Lm in the design of packed column? [6]

### **SECTION II**

- Q7) a)** Design a separator for the separation of a mixture of steam and water.[10]
- Steam : Flow rate = 2100 kg/h, Density 2.2 kg/m<sup>3</sup>
- Water : Flow rate = 1000 kg/h, Density = 930 kg/m<sup>3</sup>
- Operating pressure = 4bar.
- b) What are material hazards and process hazards? [8]

**OR**

- Q8) a)** With neat sketch give a detailed procedure for the design of decanter.[8]
- b) Write about knockout drum, role of demister pads and reflux drum. [10]
- Q9) a)** What are codes and standards and their importance in piping design? [9]
- b) Discuss about the selection of optimum pipe diameter. [7]

**OR**

- Q10)a)** Explain design of pipelines based on fluid dynamic parameter. Give details of any one case [8]
- b) With neat sketches explain the different types of flanges used in piping networks. [8]

- Q11)a)** Water is flowing through a pipeline at a rate of 1 kg/sec. The internal diameter of the pipeline is 25 mm and the length of pipeline is 2200 m. Estimate the pressure drop in the pipeline. Density of water =  $1000 \text{ kg/m}^3$ , Viscosity of water =  $0.001 \text{ N.s/m}^2$ . [8]
- b) Explain the materials used for low, normal, and high temperature service pipelines [8]

OR

- Q12)a)** Give the relevant equations for natural gas pipelines and the properties for the same. [8]
- b) 30 kg/sec of water is to be transported through a steel pipeline to a location 2 km away. The frictional pressure drop across the pipeline is  $50,000 \text{ N/m}^2$ . Find the diameter of the pipeline. Roughness of pipeline is  $4.1 \times 10^{-5}$ . Density =  $995 \text{ kg/m}^3$ , viscosity of water  $0.8 \times 10^{-3} \text{ N.s/m}^2$ . [8]



Total No. of Questions : 12]

SEAT No. :

**P1470**

**[4759]-271**

[Total No. of Pages :4

**B.E. (Chemical)**

**ENVIRONMENTAL ENGINEERING**

**(2008 Course) (Semester - I) (Elective - I) (409341)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.*

**SECTION - I**

- Q1)** a) Discuss 'The Hydrologic Cycle'. [6]
- b) Describe 'The Nitrogen Cycle' in detail. [10]

OR

- Q2)** a) Enlist at least three basic mechanisms of removing particulate matter from gas streams. [6]
- b) Explain clean development mechanisms (CDM) and Kyoto Protocol. [10]

- Q3)** a) The maximum 1 hr. CO levels in Kolkata reach 35 ppm. Calculate the equivalent concentration in terms of mass fraction (wp), and in milligrams per cubic meter at 25°C and 1 atm. [8]
- b) A 1000 mw power plant of 35% thermal efficiency is proposed. The plant burns 3% sulphur coal with a heating value of 6000 kcal/kg and emits 64,000 m<sup>3</sup>/min of flue gas. What is the concentration of SO<sub>2</sub> in the flue gas in ppm? Assume that the density of SO<sub>2</sub> is 1920 g/m<sup>3</sup>. [8]

OR

**P.T.O.**

**Q4)** A 1000mw power plant burns 10,000 metric tons of 1.5% sulphur coal per day. The flue gases are emitted into the atmosphere through a stack whose height is 200m. The diameter of the stack at the plume exit is 5m. The velocity and the temperature of the plume at the exit are 10 m/s and 120°C respectively. What is the downwind SO<sub>2</sub> concentration in the plume centerline on the ground at a distance of 5 km on a thin overcast night when the environmental lapse rate is equal to zero? Assume that the ambient air temperature is 15°C and the wind speed at the stack altitude is 6 m/s. **[16]**

**Q5)** Write a short notes on each of the following with figure. **[18]**

- a) Control of SO<sub>x</sub> in a complex fertilizer plant.
- b) Removal of hydrogen sulphide from sour gas in a petroleum industry.

OR

**Q6)** Write a short notes on each of the following with figure. **[18]**

- a) Centrifugal Scrubber.
- b) Fixed bed adsorber.

### SECTION - II

**Q7)** A large stream has a rate of reaeration  $K_2 = 0.55$  and a rate of deoxygenation  $K_1 = 0.23$  per day. The DO deficit of the mixture of stream water and waste water at the point of reference, DO is 4.0 mg/lit and the ultimate BOD of the waste  $L_u$  is 75 mg/Lit. **[16]**

Calculate:

- a) The DO deficit at a point one day distant from the point of reference.
- b) The critical deficit and the critical time.

OR

- Q8)** a) Differentiate clearly between TOC and TSS. How do you determine the TOC? **[8]**
- b) Derive Streeter - Phelps equation and explain the terms used in the equation. **[8]**

**Q9)** A municipality plan to use the water from a river for a wastewater treatment plant. Since the river water is turbid, pretreatment is necessary. A setting analysis is run on a type-1 suspension. The column is 2m deep and the result of a column test is as follows. **[18]**

Time min	0	60	80	100	130	200	240	420
Conc. mg/lit	299	188	178	167	154	112	77	26

What will be the theoretical removal efficiency in a settling basin with a loading rate of  $25 \text{ m}^3/\text{m}^2 \cdot \text{d}$  (25 m/d)?

OR

**Q10)** Ordinary municipal wastewater is to be treated by the conventional activated sludge process. The design loading is  $0.1 \text{ m}^3/\text{s}$  and  $250 \text{ mg/lit}$  BOD. The design criteria and operating values of the conventional process are as follows. **[18]**

BOD removal percent = 90

Organic loading =  $0.5 \text{ kg BOD/day per kg MLVSS}$

The target for MLSS in aeration tank =  $2000 \text{ mg/lit}$ .

Excess sludge production =  $0.5 \text{ kg sludge solids per kg BOD destroyed}$

Air flow rate =  $100 \text{ m}^3/\text{day per kg BOD/day}$

Final settling tank overflow rate =  $(30 \text{ m}^3/\text{day}) \text{ per m}^3 \text{ surface}$ .

Solids concentration in recycled sludge =  $10,000 \text{ mg/lit}$

Solids concentration in the effluent leaving the system =  $25 \text{ mg/lit}$

Calculate the following:

- a) Aeration period.
- b) Amount of solids leaving the system.
- c) Amount of BOD destroyed.
- d) Air flow requirement.
- e) Surface area of the settling tank.

**Q11)a)** Discuss in brief various treatment processes adopted for treating industrial wastewater. [6]

b) Explain the following points related to sugar industry. [10]

i) Manufacturing process and waste water generation.

ii) Characteristics of waste water and

iii) Methods of treatments.

OR

**Q12)a)** Discuss the Waste Management Hierarchy. [6]

b) Describe Incineration operation for disposal of solid waste in detail. (Diagram is necessary). [10]

EEE

Total No. of Questions : 12]

SEAT No. :

**P2018**

**[4759] -272**

[Total No. of Pages : 3

**B.E. (Chemical Engg.)**  
**MEMBRANE TECHNOLOGY**  
**( 2008 Course) (Elective - I) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer- books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain the importance of separation operation in chemical manufacturing processes. **[8]**
- b) Classify membrane separation processes and state their advantages over conventional separation processes. **[8]**

OR

- Q2) a)** Classify membranes based on homogeneity, transport mechanism, nature of material, electric charge, morphology. **[8]**
- b) State materials used for preparation of membranes and state characteristics of each. **[8]**

- Q3)** Explain use of following polymeric materials used for membranes. **[16]**
- a) Linear or branched chain polymers
  - b) Copolymers (random, block, graft type.)
  - c) Cross-linked type.
- (Give suitable applications)

OR

**P.T.O.**

- Q4)** a) Explain how polymer chain flexibility depends on the characteristics of main chain elements & side group elements. [8]
- b) Explain the importance of glass transition temperature in determining state of polymer. [8]

- Q5)** Explain the following methods for preparation of membrane- [18]
- a) Sintering
- b) Stretching
- c) Track etching
- d) Template leaching

OR

- Q6)** What are composite membranes? Explain the following methods of preparation of composite membrane- [18]
- a) Interfacial Polymerization
- b) Dip coating
- c) Plasma Polymerization

### **SECTION - II**

- Q7)** What is characterisation of process membrane? Explain following methods of characterisation of process MF membrane [16]
- a) SEM
- b) Bubble-point method
- c) Mercury intrusion porometry
- d) Permeability method.

OR

- Q8)** Explain the following methods of characterisation of UF membrane [16]
- a) Gas adsorption -desorption
- b) Thermoporometry
- c) Permporometry
- d) Liquid displacement



**Q9)** Explain the construction and working of the following membrane modules used in membrane separation processes: **[16]**

- a) Spiral-wound module
- b) Plate - and-frame module
- c) Tubular module

OR

**Q10)a)** Distinguish between surface or screen filters and depth filters used as UF/MF membranes. Explain mechanical exclusion model for surface filters and state the expression for solute rejection. **[8]**

b) Explain transport in an ion exchange membrane process such as electro dialysis. **[8]**

**Q11)a)** What is concentration polarization in membrane? Explain the following models used for polarization of membrane **[12]**

- i) Boundary layer film model
- ii) Gel layer model

b) What is membrane fouling? State the sources of fouling and remedies to reduce the effect of fouling. **[6]**

OR

**Q12)** Explain the following applications of uF process **[18]**

- a) Recovery of electrocoat paint in automobile plants.
- b) Clarification of fruit juice.
- c) Oil-Water emulsions.



Total No. of Questions : 12]

SEAT No. :

**P1471**

**[4759]-273**

[Total No. of Pages :4

**B.E. (Chemical)**

**BIOPROCESS ENGINEERING**

**(2008 Course) (Semester - I) (Elective - I) (Theory) (409341)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Use two separate answer sheets for writing the answers to the two sections.*
- 2) Draw schematics wherever necessary.*
- 3) Assume suitable data wherever necessary.*
- 4) Write the chemical reactions wherever necessary.*
- 5) Figures to the right indicate full marks.*

**SECTION - I**

**Q1)** Explain in brief:

**[16]**

- a) Lipids
- b) Proteins
- c) Eukaryotic cell
- d) Enzyme classification

OR

**Q2)** Explain the following:

**[16]**

- a) Prokaryotic cell
- b) Role of DNA in cell life cycle
- c) Protist kingdom
- d) Enzyme inhibition

**P.T.O.**

**Q3)** Explain process for manufacture of **[16]**

- a) Vinegar and
- b) Vitamin A

OR

**Q4)** Explain process for manufacture of **[16]**

- a) Penicillin and
- b) Ethanol

**Q5)** Derive Mathematical expressions with the help of Michaelis-Menten inhibition enzymatic kinetics for **[18]**

- a) Non-Competitive Inhibition and
- b) Competitive Inhibition

OR

**Q6)** An enzyme has equilibrium constant of  $4.7 \times 10^{-5}$ . If the maximum forward velocity of the preparation is  $22 \mu$  moles/(lit.min), what velocity of the reaction would be observed in the presence of  $2 \times 10^{-4}$  M substrate and  $5 \times 10^{-4}$  M of **[18]**

- a) Competitive inhibitor,
- b) Non-competitive inhibitor.

What is the degree of inhibition in these cases? Inhibitor equilibrium constant is  $3 \times 10^{-4}$ M.

### SECTION - II

**Q7)** a) Consider the following reaction sequence **[8]**



Develop a suitable rate expression for rate of formation  $V = K_s$  (ES) using equilibrium approach or quasi steady-state approach.

b) Explain immobilization of enzymes and their types. **[8]**

OR

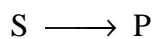
- Q8) a)** Following data were obtained from enzymatic oxidation of phenol oxidase at different phenol concentrations. [6]

S(mg/l)	10	20	30	50	60	80	90	110	130	140	150
V (mg/hrs)	5	7.5	10	12.5	13.7	15	15	12.5	9.5	7.5	5.7

What type of inhibition in this? Determine the constants  $V_m$ ,  $K_m$  and  $K_{si}$ .

Determine the oxidation rate at  $[S] = 70$  mg/lit.

- b)** Following data were recorded for the enzyme catalysed reaction. [10]



[S] (M)	$6.25 \times 10^{-6}$	$7.50 \times 10^{-5}$	$1.00 \times 10^{-4}$	$1.00 \times 10^{-3}$	$1.00 \times 10^{-2}$
V (nmoles/lit.min)	15.0	56.2	60.0	74.9	75.0

- Estimate  $V_{max}$  and  $K_m$ ,
- What would 'v' be at  $[S] = 2.50 \times 10^{-5}$  M and  $[S] = 5 \times 10^{-5}$  M?
- What would 'v' be at  $[S] = 5 \times 10^{-5}$  M if the enzyme concentration were doubled.
- 'v' in the data has been determined by measuring the concentration of product that has accumulated over 10 min period. Verify that 'v' represents true initial velocity.

- Q9)** The steady state substrate and biomass concentrations for a continuous stirred tank fermenter operated at various dilution rates are given below. Given that the fresh feed concentration is 700 mg/l, calculate the values of the Monod constants  $\mu_m$ , and  $K_s$ , the yield co-efficient Y and the endogenous respiration coefficient  $K_d$ . [16]

Dilution rate ( $hr^{-1}$ )	0.3	0.25	0.2	0.12	0.08
Substrate concentration (mg/l)	45	41	16	8	3.8
Biomass concentration (mg/l)	326	328	340	342	344

OR

**Q10)** An enzyme has a  $K_m$  of  $4.7 \times 10^{-5}$  M. If the  $V_{max}$  of the preparation is 22  $\mu\text{moles}/(\text{lit} \cdot \text{min})$ , what velocity would be observed in the presence of  $2 \times 10^{-4}$  M substrate and  $5 \times 10^{-4}$  M of **[16]**

- a) Competitive inhibitor
- b) Non-competitive inhibitor. What is the degree of inhibition in these cases?  $K_i$  is  $3 \times 10^{-4}$  M.

**Q11)** Explain the following: **[18]**

- a) Bubble column bioreactor.
- b) Ion-exchange chromatography.
- c) Monod growth kinetics.

OR

**Q12)** Explain in brief: **[18]**

- a) Techniques used for downstream processing.
- b) Effect of pH and temperature on dependence of the enzyme catalysts.
- c) Continuous sterilization of bioreactor.

*EEE*

Total No. of Questions : 12]

SEAT No. :

P4274

[Total No. of Pages : 2

[4759] - 274

B.E. (Chemical)

CORROSION ENGINEERING

(Elective - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams should be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator is allowed*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Write a note on thermodynamic aspects of corrosion. [8]  
b) Discuss the importance of design and material selection in controlling corrosion. [10]

OR

- Q2)** a) Explain the application of Nernst equation to corrosion reactions and calculation of corrosion rates. [10]  
b) What are the differences between EMF series and Galvanic Series. [8]

- Q3)** a) Explain Anodic protection technique for controlling the corrosion. [8]  
b) What is a Tafel equation and explain how it is useful for finding corrosion rates. [8]

OR

- Q4)** a) Explain Pourbaix - diagram for Fe - H<sub>2</sub>O system. [8]  
b) What are the different types of polarization and explain any one in detail. [8]

- Q5)** a) Discuss Galvanic corrosion and pitting corrosion and remedial measures for controlling the same. [12]  
b) Distinguish between wet and dry corrosion. [4]

OR

- Q6)** a) Discuss dezincification and its consequences. [4]  
b) Discuss cavitation corrosion and fretting corrosion and remedial measures

*P.T.O.*

for controlling the same. [12]

**SECTION - II**

- Q7)** a) Explain the high temperature oxidation. [7]  
b) Explain the effect of velocity, temperature and composition of media on corrosion. [9]

OR

- Q8)** a) Comment on corrosion of iron and steel in aqueous media. [8]  
b) Write a note on Pilling Bedworth ratio. [8]
- Q9)** a) Discuss various corrosion prevention techniques. [8]  
b) Explain how the modification of the materials is done by alloying. [8]

OR

- Q10)** a) What are corrosion inhibitors? Classify different types of inhibitors with examples. [8]  
b) Discuss how the nature of the metal influences the rate of corrosion. [8]
- Q11)** a) Explain chemical and mechanical methods of surface treatment coatings. [10]  
b) How the metallic surfaces are prepared by various methods before electroplating? [8]

OR

- Q12)** a) Explain cathodic protection and the principles involved in it? [10]  
b) Discuss the use of inhibitors in corrosion control? [8]



Total No. of Questions : 12]

SEAT No. :

**P2019**

**[4759]-275**

[Total No. of Pages : 2

**B.E. (Chemical)**

**CHEMICAL PROCESS SYNTHESIS**

**(2008 Course) (Semester-I) (409342) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from Section-I and three questions from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** Explain the concept of Onion Model. **[10]**

b) Write in brief different steps involved in process design. **[8]**

OR

**Q2) a)** Discuss idealized reactor model. **[9]**

b) Explain in short different parameters in choice of reactor. **[9]**

**Q3)** Explain the effect of following parameters on choice of reactor: **[16]**

a) Time.

b) Material of construction.

OR

**Q4) a)** Explain idealized reactor model for ideal batch reactor, mixed and plug flow reactor. **[10]**

b) Explain the role of temperature and catalyst in reactor performance. **[6]**

**Q5) a)** Discuss various types of dryers. **[8]**

b) Explain differential distillation with suitable example. **[8]**

OR

**P.T.O.**



- Q6)** Write notes on: [16]
- a) Adsorption.
  - b) Centrifugal separation.

**SECTION-II**

- Q7)** Explain with sketches the concept of heat integration of sequences of simple distillation column. [16]

OR

- Q8)** a) Discuss integration of refrigeration cycle. [8]  
b) Explain threshold problems in heat exchanger network. [8]

- Q9)** a) What are composite curves? How you will obtain them? [8]  
b) How a problem table algorithm is formed? [8]

OR

- Q10)** a) Explain the concept of Pinch technology. [8]  
b) Explain graphically heat recovery pinch. [8]

- Q11)** a) Explain the intensification of hazardous materials. [8]  
b) Write in brief on: [10]  
i) Toxic releases from processes.  
ii) Chemical hazards.

OR

- Q12)** Write short notes on: [18]
- a) Unconfined vapour cloud explosion.
  - b) Hazard triangle.



Total No. of Questions : 12]

SEAT No. :

**P2020**

**[4759]-276**

[Total No. of Pages : 2

**B.E. (Chemical)**

**ADVANCED MATERIALS**

**(2008 Pattern) (Semester-I) (409342) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION-I**

**Q1)** Explain the different types of steels in details. Also explain their particular usages in chemical process industries. **[16]**

OR

**Q2)** What are advanced materials? Explain with proper example and compare with the normal materials. **[16]**

**Q3)** Define polymeric materials. List out advanced polymeric material with usages in chemical industries. **[18]**

OR

**Q4)** How to prepare new polymeric materials? Discuss it with flowchart and explain what are the Engineering problems encountered during manufacturing. **[18]**

**Q5)** What is powder synthesis technique? Explain in detail. **[16]**

OR

**Q6)** Discuss on:

- a) Ceramic materials. **[8]**
- b) Microstructural design. **[8]**

**P.T.O.**

## SECTION-II

**Q7)** Write short note on composite materials. Discuss the factors affecting the properties of composite materials. [16]

OR

**Q8)** Explain reinforcing mechanism. Discuss it with proper example. [16]

**Q9)** How to prepare ceramic composite? Explain in detail with figure. [18]

OR

**Q10)** Write short note on:

- a) Crack propagation. [9]
- b) Mechanical behaviour of ceramics. [9]

**Q11)** What is carbon composite? Discuss their properties and explain fabrication method of it. [16]

OR

- Q12)** a) Explain nanomaterials with example. [8]
- b) Write down the applications of nanomaterials in chemical engineering. [8]



Total No. of Questions : 12]

SEAT No. :

**P3333**

[Total No. of Pages : 2

[4759] - 277

**B.E. (Chemical Engineering) (Semester - I)**

**POLYMER TECHNOLOGY**

**(2008 Pattern) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

**SECTION- I**

- Q1)** a) Distinguished between Thermoplastics and Thermosets polymers with examples. [12]
- b) Explain Branch polymers with two examples. [6]

OR

- Q2)** a) Explain effect of Molecular Weight and Molecular weight on the properties of polymers. [6]
- b) Explain “Cross linked polymer” with three examples. [12]

- Q3)** a) Differentiate with one example each between Bulk and Solution Polymerization. [10]
- b) Write a note on “Addition polymerization”. [6]

OR

- Q4)** a) Explain in detail with one example Suspension Polymerization Technique. [10]
- b) Write a note on Emulsion Polymerization. [6]

- Q5)** a) Explain in detail any two methods of determination of Molecular weight. [16]

***P.T.O.***

OR

- Q6)** Explain the importance of Number average, Weight average Molecular weight and polydispersity Index. Also, find the polydispersity Index of the mixture composed of 200 molecules of 100000 monomer lengths and 30 molecules of 10 monomer lengths. [16]

**SECTION- II**

- Q7)** a) Discuss in detail with the necessary equations kinetics of step growth polymerization. [8]  
b) Discuss in detail Kinetics of copolymerization. [10]

OR

- Q8)** a) Discuss the Auto acceleration effect in Free radical Polymerization.  
b) Write a note on Chain Transfer Agents. Explain with the importance of the term Ceiling temperature of free radical polymerization under equilibrium condition.
- Q9)** a) Explain the importance of polymer compounding with two examples. [6]  
b) Explain in detail with neat sketch any one molding method used for thermosets polymers. [10]

OR

- Q10)** Discuss the followings:  
Plasticizers, UV Stabilizers, Fire Retardant, Antioxidant, Filler, Colorants. [16]

- Q11)** Give technology overview for the polymerization of Styrene and Nylon 6. [16]

OR

- Q12)** a) Describe in detail the synthesis of Polyvinylchloride via suspension polymerization technique. [8]  
b) Describe with neat process sheet the reactor systems used for HDPE. [8]



Total No. of Questions : 12]

SEAT No. :

**P3720**

**[4759]-278**

[Total No. of Pages : 3

**B.E. (Chemical Engineering)**  
**PIPING DESIGN AND ENGINEERING**  
**(2008 Course) (Semester-I) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Answers to the two sections should be written in separate answer books.*

**SECTION-I**

**Q1)** a) A horizontal commercial steel pipeline 100mm in diameter and 400m long carrying gasoline at 50°C has a pressure drop of  $1.33 \times 10^5$  N/m<sup>2</sup>. Compute the flow rate when the specific gravity is 0.68. The kinematic viscosity of gasoline at 40°C is  $4.2 \times 10^{-7}$  m<sup>2</sup>/s. The equivalent sand grain roughness of pipe material is  $4.92 \times 10^{-5}$  m? **[8]**

b) Discuss the different approaches used in the calculation of total pressure drop for series and parallel piping systems? **[10]**

OR

**Q2)** a) Explain the concept of Pipe line networks and their analysis for flow in branches. **[8]**

b) Explain the different types of major and minor losses occurring in piping system. **[10]**

**Q3)** a) Explain the desirable properties of piping materials for high temperature services? **[8]**

b) State and explain the different material standards for metallic piping components. **[8]**

OR

**Q4)** a) Explain the various types of pipe fittings in detail. **[8]**

b) Discuss the various functions, properties and the selection criteria for the gasket? **[8]**

**P.T.O.**

- Q5) a)** What are the steps followed during sizing of control valve? [8]
- b) Write down the construction and the different types of globe valves employed in controlling the flow? [8]

OR

- Q6) a)** Explain the guidelines used for selecting the proper type of Rupture Disk? [8]
- b) Discuss the working principle of safety valve with the following points: [8]
- i) Lifting
- ii) Reseating

### **SECTION-II**

- Q7) a)** Discuss the significance of Churchill and Swamee-Jain equation for calculation of friction factor in Compressed-Air Piping Systems? A pipe is to be designed to carry 150 CFM free air at 100 psig and 80°F. If the pressure loss must be limited to 5 psi per 100 ft of pipe, what is the minimum pipe diameter required? [10]
- b) Explain the steps involved in the pipe sizing for steam piping. [8]

OR

- Q8) a)** A pipe is to be designed to carry 150 CFM free air at 100 psig and 80 °F. If the pressure loss must be limited to 5 psi per 100 ft of pipe, what is the minimum pipe diameter required? [8]
- b) Calculate the friction factor and transmission factor using the Colebrook-White equation for a 16-in (0.250-in wall thickness) gas pipeline at a flow rate of 100 MMSCFD. Flowing temperature = 80 °F, gas gravity = 0.6, viscosity = 0.000008 Ib/(ft.s), base pressure = 14.73 psia and base temperature = 60 °F. Assume a pipe internal roughness of 600 microinches. [10]

- Q9) a)** Which are the factors considered while locating the equipment in the plot plan? [8]
- b) Explain the concept of bill of material and Material take off exercise. [8]

OR

**Q10)a)** What are the plant lay out specifications considered by the design engineer? [8]

b) Develop the typical layout considerations for heat exchangers and pump. [8]

**Q11)a)** Which are the considerations involved in the pipe rack design? [8]

b) Discuss the different criteria's for insulation system design in piping. [8]

OR

**Q12)** Write short notes on: [16]

a) Line sizing of pneumatic conveying system.

b) Flare selection and sizing.

c) Critical and Optimum thickness of insulation.

d) Common ASTM and IS specifications for Seamless / ERW pipes.





Total No. of Questions : 12]

SEAT No. :

**P2021**

**[4759]-279**

[Total No. of Pages : 2

**B.E. (Chemical)**

**ADVANCED SEPARATION PROCESSES**  
**(2008 Course) (Semester-II) (Elective-II) (409342)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from Section-I and three questions from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) Explain the details the design of chromatography. [6]  
b) Explain in detail 'Adsorption Cycle' with neat sketches. [12]

OR

- Q2)** a) Explain the basic concept of HPLC process. [6]  
b) Give the application of chromatography in separation of enzymes and proteins. [6]  
c) Explain adsorption mechanism in separation of fluid-solid system. [6]

- Q3)** a) Give the advantages of membrane separation process over other separation technique. [8]  
b) Explain the basic types of modules used in Reverse Osmosis. [8]

OR

- Q4)** a) Calculate the osmotic pressure of a solution containing 0.10 gmol NaCl/1000g H<sub>2</sub>O at 25°C. Density of water = 997.0 kg/m<sup>3</sup>. [6]  
b) Write down the classification of the membrane process. [6]  
c) Explain the following terms: [4]  
i) Rejection.  
ii) Permeate.

**P.T.O.**

**Q5)** Discuss the following in detail

- a) Characteristics of the complexing agent used in chemical-complexation. [8]
- b) Reactive distillation process. [8]

OR

- Q6)** a) Give the solution characteristics of chemical complexation process. [8]  
b) Write short note on 'Reactive crystallization' process. [8]

**SECTION-II**

- Q7)** a) Give the flotation techniques classification on the basis of mechanism of separation and size of material separated. [9]  
b) Explain 'Collapse and drainage phenomena'. [9]

OR

**Q8)** Discuss the following:

- a) Design and development of flotation equipment. [9]
- b) Application of flotation technique. [9]

- Q9)** a) Explain the adsorption properties and applications of molecular sieve. [8]  
b) Explain Zone refining process in detail. [8]

OR

**Q10)** Write short notes on: [16]

- a) Zone Electrophoresis.
- b) Adductive Crystallization.

**Q11)** Explain the classification of unit operations based on the property difference. [16]

OR

**Q12)** Write short notes on: [16]

- a) Exchange Reaction.
- b) Ring oven technology application.



Total No. of Questions : 12]

SEAT No. :

**P2005**

[4759] - 28

[Total No. of Pages :3

**B.E. (Civil)**

**MECHANICS OF WAVES**

**(2008 Course) (Semester - II) (Open Elective)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answer to the two sections should be written in separate answer booklet.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Your answer will be valued as a whole.*
- 6) *Use of electronic pocket calculator is allowed.*
- 7) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Discuss classification of waves. [4]  
b) Discuss wave measurement in detail. [6]  
c) For a wind of corrected speed 25 m/s remaining constant over a fetch of 40 km obtain  $H_s$  and  $T_s$  values using Hasselmann technique, if [8]  
i) water is very deep  
ii) water depth is 5 m

OR

- Q2)** a) Discuss the process of wave growth. [4]  
b) Define wave. What are gravity waves and internal waves? Explain with examples. [6]  
c) A slowly moving cyclone has a forward speed of 15 m/s passing over 30° latitude. The pressure at the hurricane centre is 700 mm of Hg. Maximum wind speed occurs at 60 km from the centre. What is the wave height and period at 300 km to the right of the centre. [8]

- Q3)** a) Derive equation for water particle displacement from mean position. [8]  
b) A wave with a period 10 seconds is propagated shoreward over a uniformly sloping shelf from a depth of 300 m to 3m. Find individual wave velocity (C) and wavelength (L) corresponding to 300 m and 3m. [8]

OR

*P.T.O.*

- Q4)** a) Write short note on Stokes wave theory. [4]  
 b) What are the assumptions in linear wave theory. [4]  
 c) Derive expression for group wave velocity. Modify the formula for deep water and shallow conditions. [8]

- Q5)** a) What is long term wave height statistics? Name various distribution used to achieve the same while explaining Log-Normal distribution in detail. [6]  
 b) The annual maximum wave heights observed at Pondecherry in m are as follows; [10]  
 4, 5.23, 3.77, 5.88, 4.53, 4.59, 3.94, 3.12, 3.42, 6.96, 6.24, 4.43, 2.05, 5.23, 2.34, 1.25, 1.67, 3.45, 3.67, 2.35.

Find wave height of 50 year return period. For  $N = 20$ ,  $\bar{y}_n = 0.5236$ ,  $S_n = 1.0628$ .

OR

- Q6)** a) Enlist various theoretical wave spectra. Explain any one of them in detail. [6]  
 b) Define stationary process, ergodic process, probability density function. [5]  
 c) Define probability density function, probability distribution function. [5]

### SECTION - II

- Q7)** a) What is wave breaking? Discuss with respect to interaction with current and solitary theory. Discuss various ways of wave breaking. [8]  
 b) A beach having a 1 on 20 slope, a wave with deep water height of 3 m and a period 8 seconds travels shoreward. Assume that a refraction analysis gives refraction coefficient as  $K_r = (b_o/b)^{0.5} = 1.05$  at the point where breaking is expected to occur. Find breaker height and depth at which breaking occurs. [10]

OR

- Q8)** a) Write short note on wave set up and set down. [8]  
 b) A wave of 2.8 m height and 8 second period strikes over a beach with a slope of 1 in 35. [10]  
 i) obtain the reflected wave height  
 ii) if the same wave strikes against the concrete wall having a slope of 1 in 8 what is reflected wave height?

Reflection coefficient for surf similarity of 0.7, 0.75 and 0.8 is equal to 0.05, 0.055 and 0.06 respectively.

- Q9) a)** Draw Minikin's wave pressure diagram. State formula for total breaking force on wall and total moment about toe. [8]
- b) A wave of 1.5 m height attacks a smooth vertical wall of height 5.85 m. The depth at the structure of the toe is 3m. The net force and moment acting are 101.7 kN/m and 163.8 kNm/m respectively when wave is the crest and 17.1 kN/m and 11.8 kNm/m when wave at trough. The height of clapotis crest about bottom ( $y_c$ ) is 5.5 m and height of clapotis trough ( $y_t$ ) is 2.5 m. Calculate the reduced force and moment on the reduced wall of height 4.5 m. [8]

OR

- Q10)a)** Draw sketches for pressure distribution of non breaking wave forces when crest appears on the wall and trough appears on the wall. [8]
- b) A vertical wall 4m high is sited in sea water with depth at tow ( $d_s$ ) equal to 2.5 m. The wall is built on a bottom sloe of 1:20. The wave period is 8 sec. Find the maximum pressure, horizontal force and overturning moment about the toe of the wall for the given slope excluding the hydrostatic forces. The maximum breaker height ( $H_b$ ) is 3m. [8]

- Q11)a)** A one meter jacket leg is subjected to an attack of waves which are 4 m high, 55 m long and 7 seconds in period. Determine the maximum drag force, maximum Inertia force, Total Force at  $\theta = \pi / 4$  at a location 8 m below SWL. The water depth is 60 m. Take  $C_D = 1$ ,  $C_m = 2$ ,  $\rho = 1030$  kg/m<sup>3</sup>. Use linear theory. [6]
- b) Write in brief about calculation of wave forces using Dean's theory. [10]

OR

- Q12)a)** Derive equation for Keulegan - Carpenter number. [8]
- b) Discuss effect of roughness on  $C_D$  and  $C_M$ . [4]
- c) Write short note on wave slam. [4]



Total No. of Questions : 12]

SEAT No. :

**P1472**

**[4759] - 280**

[Total No. of Pages :2

**B.E. (Chemical Engineering)**  
**PETROLEUM REFINING**  
**( 2008 Course) (Elective - II) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate answer sheet.*
- 2) *Answer three questions from section I and three questions from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Write note on Formation and composition of petroleum. **[8]**

b) How evaluations of petroleum are done and explain true boiling point distillation.(TBP) **[10]**

OR

**Q2)** Describe the following test with procedure and significance.

a) Flash point & Fire point. **[8]**

b) ASTM distillation. **[10]**

**Q3)** Describe in details with sketch the atmospheric distillation unit (.ADU) **[16]**

OR

**Q4)** Explain operation of Pipe still heater with neat sketch and how performance of pipe still heater is evaluated? **[16]**

**Q5)** What do you understand by cracking? Explain various cracking operation used in industry? Explain FCC in detail. **[16]**

OR

**P.T.O.**

**Q6)** Explain with process flow diagram, reaction and effect of operating parameters on Reforming. [16]

**SECTION - II**

**Q7)** Describe in detail along with engineering problem in hydrodesulphurization. [18]

OR

**Q8)** a) Explain Acid refining in detail. [8]

b) Write a note on metals present in petroleum and removal of metals by hydro treatment. [10]

**Q9)** a) Why blending is needed for gasoline fraction? Explain different methods of gasoline Blending. [8]

b) Name some additives used in petroleum industry and Explain effect of these additives on product quality. [8]

OR

**Q10)**a) Explain different methods used for storage of petroleum products. [8]

b) Discuss in details transportation of petroleum products in India. [8]

**Q11)** Describe Equipments used in pollution control for petroleum refining industry. [16]

OR

**Q12)** Write in details about recent trend in distillation and catalyst used in refining operation. [16]



Total No. of Questions : 12]

SEAT No. :

P2022

[4759]-281

[Total No. of Pages : 3

**B.E. (Chemical Engineering)**  
**PROCESS MODELING & SIMULATION**  
**(2008 Course) (Semester-II) (409351)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any 3 questions from each section.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6) Assume suitable data if necessary.

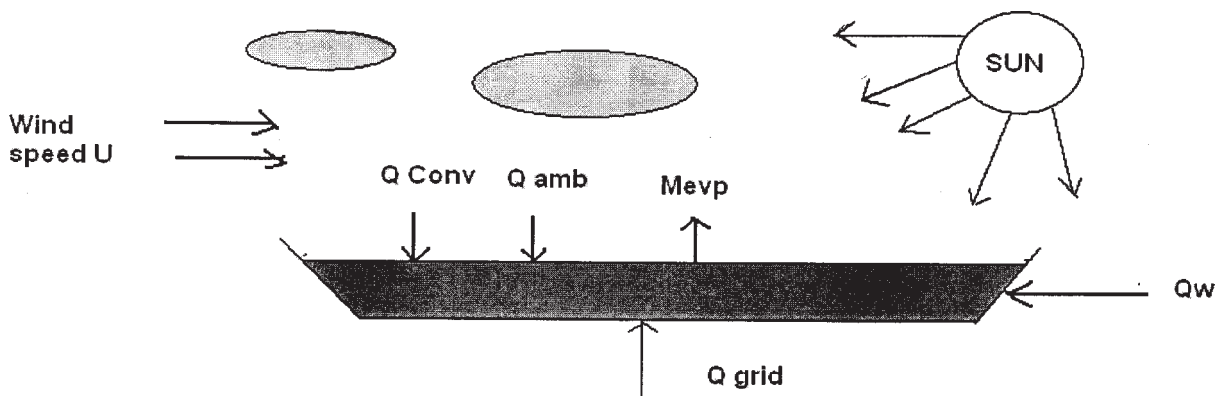
**SECTION-I**

- Q1)** a) Draw the flow chart of a systematic approach to process modeling. Also show the interrelations between the flow chart stages. [8]
- b) Provide a classification of the major categories of equations in process model. What are the subclasses in each major category. [8]

OR

- Q2)** a) Define process model. What points should be considered to form the model? [8]
- b) Give the classification of model. What is the difference between Lumped and Distributed parameter model? Explain with suitable examples. [8]

- Q3)** The following diagram shows the scenario of an evaporating pool of a volatile liquid. [18]



**P.T.O.**



This is typical of an accident spill from storage facility. In this case the liquid is unsymmetric dimethyl hydrazine, a component of rocket fuel. Develop the problem description if we are interested in the dynamics of pool evaporation under the influence of different environmental conditions. You should consider the key issues of:

- a) The modeling definition.
- b) The principle mechanism.
- c) The key assumptions.
- d) The principle balance volume of the system.
- e) The convective flows in the system.
- f) The key data that might be needed.

OR

**Q4)** Write component continuity equations describing the CSTR with your notations. **[18]**

- a) Simultaneous reactions-first order, isothermal  $A \xrightarrow{k_1} B \quad A \xrightarrow{k_2} C$ .
- b) Reversible first order isothermal  $A \xrightleftharpoons[k_2]{k_1} B$ .

**Q5)** Write the total mass balance, component mass balance for three-isothermal constant hold-up CSTRs in series. Assume suitable kinetics. **[16]**

OR

**Q6)** Develop a mathematical model for single effect evaporator. Write assumptions. Draw a figure. **[16]**

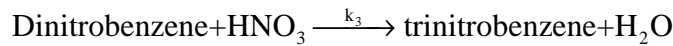
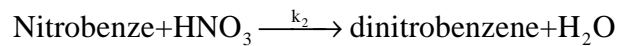
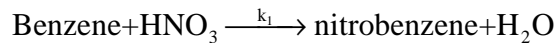
### SECTION-II

**Q7)** Develop a model for absorption column. **[16]**

OR

**Q8)** Develop a model for continuous binary distillation column. **[16]**

**Q9)** Benzene is nitrated in an isothermal CSTR in three sequential irreversible reactions. **[18]**



Assuming each reaction is linearly dependent on the concentrations of each reactant, derive a dynamic mathematical model of the system. There are two feed streams, one pure benzene and one concentrated nitric acid (98 wt%). Assume constant densities and complete miscibility.

OR

**Q10)** Develop a model for Bioreactor. **[18]**

**Q11)** What is Process Simulation? Explain any simulator with a proper example. **[16]**

OR

**Q12)** A component material balance around a chemical reactor yields the following Steady state equation

$$0 = \frac{F}{V} C_{in} - \frac{F}{V} C - KC^3$$

where  $\frac{F}{V} = 0.1 \text{ min}^{-1}$ ,  $C_{in} = 1.0 \text{ Kg mol/m}^3$ ,  $K = 0.05 \text{ m}^6/\text{Kg mol}^2 \cdot \text{min}$ .

- a) How many steady state solutions are there?
- b) Write two different direct substitution methods and assess the convergence of each. **[16]**



Total No. of Questions : 12]

SEAT No. :

P4282

[Total No. of Pages : 4

[4759] - 282

B.E. (Chemical Engg.)

**PROCESS ENGINEERING COSTING & PLANT DESIGN  
(2008 Pattern)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Write a model specification sheet for Sieve tray distillation column. [9]  
b) Explain the following factors considered for plant design with the help of example:  
i) Material of construction [9]  
ii) Selection of Equipment  
iii) Safety considerations

OR

- Q2)** a) Illustrate Material and Energy balance. Develop the rate equation for batch and flow reactor. [9]  
b) Explain significance of laboratory data and pilot plant data in process development. [9]
- Q3)** a) Draw and explain tree diagram showing cash flow for an industrial operation. [8]  
b) The original investment for an asset was Rs. 10,000 and the asset was assumed to have a service life of 12 years with Rs. 2,000 salvage value at the end of the service life. After the asset has been in use for 5 years, the remaining service life and final salvage value are reestimated at 10 years and Rs. 1,000 respectively. Under these conditions, what is the depreciation cost during the sixth year of the total life if straight line depreciation is used? [8]

**P.T.O.**

OR

- Q4)** a) Explain Total Product Cost with equations. [8]  
b) Write note on i) Breakeven point ii) Cost Indices [8]

**Q5)** The annual direct production costs for a plant operating at 70% capacity are Rs. 2, 80, 000/-. While the sum of the annual fixed charges, overhead costs, and general expenses is Rs. 2, 00, 000/-. What is the break-even point in units of production per year if total annual sales are Rs. 5, 60, 000/- and the product sells at Rs. 40/- per unit? What were the annual gross earnings and net profit for this plant at 100% capacity if corporate income taxes required a 15% tax on the first Rs. 50,000/- of annual gross earning, 25% on annual gross earning of Rs. 50,000/- to Rs. 75,000/-, 34% on annual gross earnings above Rs. 75, 000/- and 5% on gross earnings from Rs. 1, 00, 000/- to Rs. 3, 35, 000/-? [16]

OR

- Q6)** a) A glass reactor has been designed for the use in a chemical process. A standard type of heat exchanger with a negligible scrap value costs Rs. 4000 and will have a useful life of 6 years. Another proposed glass reactor of equivalent design capacity costs Rs. 6800 but will have a useful life of 10 years and a scrap value of Rs. 800. Assuming an effective compound interest rate of 8% per year, determine which glass reactor is cheaper by comparing the capitalized costs. [8]  
b) Explain in short different methods for estimating capital investment. [8]

## SECTION II

- Q7)** a) Explain optimum conditions in cyclic and semicyclic operation. [8]  
b) Explain La-Grange multiplier method and minimize the following objective function that. [8]

is subject to single equality constraints:

$$\text{minimize } f(x) = 4x_1^2 + 5x_2^2$$

$$\text{subject to } 2x_1 + 3x_2 = 6$$

OR

- Q8)** a) Write an explanatory note on Pinch Technology. [8]  
b) Explain the factors involved in techno-economic feasibility report. [8]

- Q9) a)** Explain graphical and analytical procedure for optimization with two or more variables. [8]
- b) The following equation shows the effect of the variable x and y on the total cost for a particular operation: [8]

$$C_T = 2.33x + \frac{11900}{xy} + 1.86 + 10$$

Determine the value of x and y will give the least total cost.

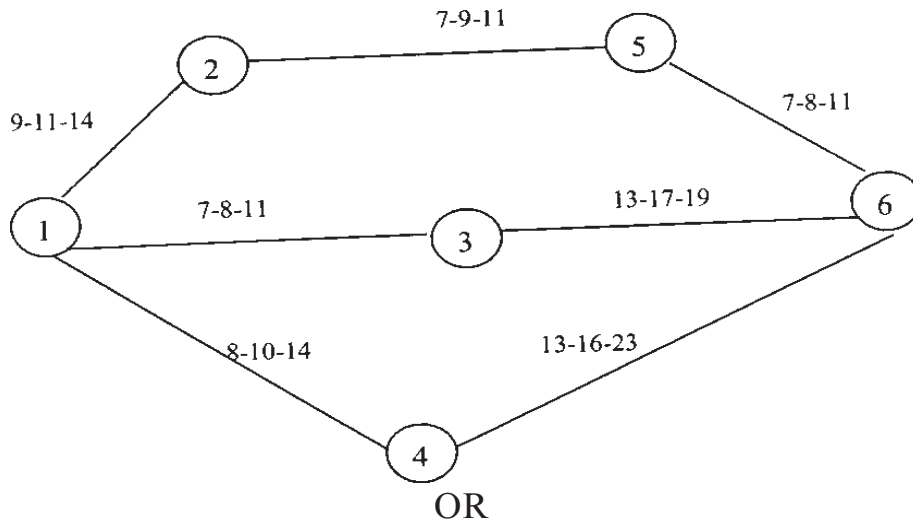
OR

- Q10)a)** Explain Sensitivity and response analysis. [8]
- b) An organic chemical is being produced by a batch operation in which no product is obtained until the batch is finished. Each cycle consist of the operating time necessary to complete the reaction plus an additional time of 1.4h required for discharging and charging. The operating time per cycle is equal is equal to  $1.5P_b^{0.25}$  h, where  $P_b$  is the kilogram of product produced per batch. The operating cost during the discharge-charge period are Rs 15 per hour. The annual fixed cost  $C_F$  for the equipment vary with the size of the batch in the following manner:

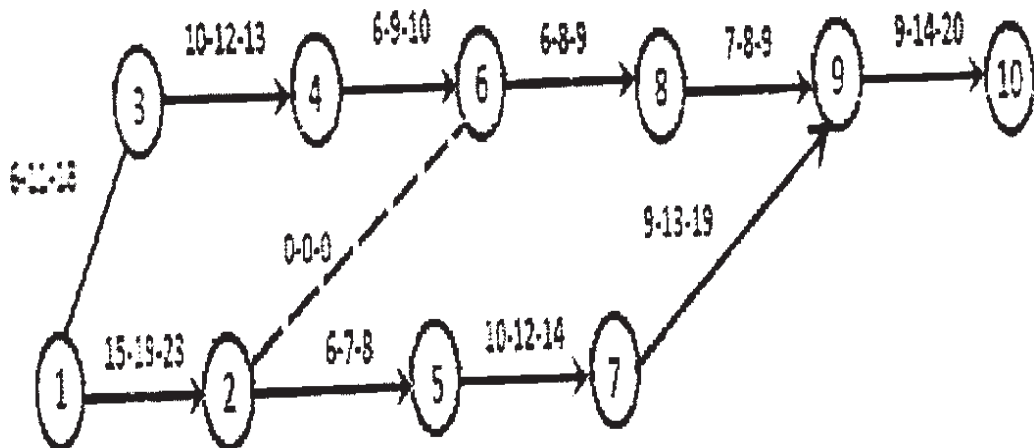
$$C_F = 340P_b^{0.8} \text{Rs/yr}$$

Inventory and storage charge may be neglected. If necessary, the plant can be operated 24 days/yr. The annual production is  $10^6$  kg of product. At this capacity, raw material and miscellaneous costs, other than those already mentioned, amount to Rs 260,000 per year. Determine the cycle time for condition of minimum total cost per year. [8]

- Q11)a)** Define CPM and PERT. Give difference between CPM & PERT with examples. [9]
- b) Following network diagram shows the three time estimates for various activities and find the path considering: [9]
- i) Optimistic time (a)
  - ii) Pessimistic time (b)
  - iii) Critical path using PERT



- Q12)a)** Name the factors involved in plant location & explain plant layout with help of diagram. [9]
- b) Determine the expected time and variance for each activity in the network shown below. [9]



Total No. of Questions : 12]

SEAT No. :

**P3334**

[4759] - 283

[Total No. of Pages : 2

**B.E. (Chemical Engg.) (Semester - II)**

**ARTIFICIAL INTELLIGENCE IN CHEMICAL ENGINEERING**

**(2008 Pattern) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

**Q1)** Shown below are some chemical engineering problems that are suitable for computer-aided solutions. Answer whether we should use artificial intelligence or a conventional programming to solve each problem. **[16]**

- a) Assessing yield and quality trends from a chemical reactor, for the purpose of recommending shutdown for a catalyst change.
- b) Determining the fluid velocity in a fluid-flow problem.

OR

**Q2)** With definition, describe Artificial intelligence. Also explain Prolog as AI language.

**Q3)** AI is to be applied for designing a Heat Exchange Network. Draw neat sketch indicating steps in design. **[16]**

OR

**Q4)** CSTR in series for second order reactions lead to multifold calculations. Develop pedagogy using AI to simplify the system.

**P.T.O.**

**Q5)** Note the algorithm implied by the Expert System tools. **[18]**

OR

**Q6)** What is Object-Oriented Programming? How is Structuring an Object-Oriented Program performed?

**SECTION - II**

**Q7)** Semantic Network for a Flash vessel is to be designed. Develop and note the network steps along with neat diagram. **[18]**

OR

**Q8)** Differentiate among rule based and frame-based system in AI.

**Q9)** AND-OR Strategies for AI are to be applied for Absorber and Desorber network systems. With sketch, explain the applications in details. **[16]**

OR

**Q10)** With applications, write in details on Model Predictive Controller.

**Q11)** Enlist and explain with numerical methods involved, various expert system tools. **[16]**

OR

**Q12)** With neat diagram, write in details on the use of expert system in Fermentation process.





Total No. of Questions : 12]

SEAT No. :

**P1473**

**[4759]-284**

[Total No. of Pages : 3

**B.E. (Chemical)**

**ENERGY CONSERVATION IN CHEMICAL  
PROCESS INDUSTRIES**

**(2008 Pattern) (Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Assume suitable data wherever necessary.*
- 2) *Figures to the right indicate gives full marks.*

**SECTION-I**

- Q1)** a) Explain the scope of Energy Conservation and Energy Efficiency. State its benefits towards Industry, Nation and Globe. [10]
- b) State first and Second Law of Thermodynamics. [2]
- c) Write a short note on Missing Data. [6]

OR

- Q2)** a) Explain the role, responsibilities and Duties of Energy Manager to be assigned under the Energy Conservation Act 2001. [10]
- b) Define the following terms with the example of each: [6]
- i) Primary and secondary energy.
  - ii) Commercial and non-commercial energy.
  - iii) Renewable and non-renewable energy.
- c) Enlist different units for Energy. Convert 1 Hp into Watts. [2]

- Q3)** a) Discuss the functions of Insulation in detail. [6]
- b) What are the ways of reduction of steam usage? [4]
- c) Cogeneration-A boon to process industry. Explain its importance. [6]

OR

**P.T.O.**

- Q4)** a) Enlist three basic types of steam traps. Explain any one in detail. [8]  
b) Define energy audit as per the energy conservation Act 2001. Explain detailed energy audit methodology. [8]

- Q5)** a) Draw a neat sketch of Jacketed Agitated Vessel. Briefly explain energy conservation Opportunities for the same. [8]  
b) State the advantages of air preheating in combustion chamber. [5]  
c) State different ways to reduce available energy (Work) losses. [3]

OR

- Q6)** a) State the practical applications for the use of thermodynamic analysis to improve energy efficiency. [8]  
b) Explain how thermodynamic analysis is useful in saving energy in heat exchangers. [8]

### **SECTION-II**

- Q7)** a) State briefly the methods of process synthesis. Explain importance of Heat Exchange Network (HEN) in a process industry. [8]  
b) Enlist the checklist for the potential energy conservation opportunities in falling film evaporators and distillation columns. [8]

OR

- Q8)** a) Enlist the checklist for energy conservation in lighting system. [8]  
b) What is pinch technology? Explain concept with neat diagram alongwith its advantages in energy conservation. [8]

- Q9)** a) The contract demand of a plant is 1000 kVA. The minimum billing demand is 75% of the contract demand. The basic tariff is as follows: [6]

Demand Charges : Rs. 180 per kVA/month

Unit charges : Rs. 3.75 for the first one lakh units/month

: Rs. 4.25 above one lakh units/month

Fuel surcharge	:	Rs. 0.20 per unit/month
Service Tax	:	Rs. 0.25 per unit/month
Meter rent	:	Rs. 975/month.

The energy consumption is 3,15,000 units and the maximum demand recorded is 600 kVA. Calculate the cost of monthly electricity consumption.

- b) Explain Energy Audit and energy Monitoring. [6]
- c) Write short note on importance of good housekeeping. [4]

OR

- Q10)a)** Explain the model role of equipment manufacturer in the development and future prospects for a process industries. [8]
- b) Explain fouling factor. How it affects on performance in Heat exchangers? Explain with suitable example. [8]

- Q11)a)** Write Short Notes on: [12]
- i) Process Design for Energy Conservation.
- ii) Energy Savings in good house keeping.
- iii) List any three energy loss components in chemical plant.
- b) What are the important precautions to be addressed while designing a Distillery. [6]

OR

- Q12)a)** What are the important technical feasibility parameters that a energy engineer should consider during the analysis of energy conservation opportunities in a process designated industries. [8]
- b) Explain the importance of automation in chemical industries and its effect on energy Conservation. [10]

Total No. of Questions : 12]

SEAT No. :

**P1474**

**[4759]-285**

[Total No. of Pages : 3

**B.E. (Chemical)**

**CHEMICAL PROCESS SAFETY**  
**(2008 Course) (Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section-I and 3 questions from section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION-I**

- Q1)** a) Explain in detail Dose versus Response curves. **[8]**  
b) Discuss the importance of safety in chemical process industry. **[8]**

OR

- Q2)** Define and explain Hazard, Toxicity, Threshold limit value, safety, Accident and Flammability with appropriate examples. **[16]**

- Q3)** a) How will you evaluate worker's exposures to volatile toxicants by monitoring? **[8]**  
b) Discuss various legislations on safety control presently applicable in chemical process plants. **[8]**

OR

- Q4)** a) Determine the TLV for a uniform mixture of dusts containing the following particles: **[8]**

Types of dust	Concentration (wt %)	TLV (mppcf)
Nonasbestiform talc	70	20
Quartz	30	2.7

**P.T.O.**

- b) State typical projects involving industrial hygiene. Describe identification in industrial hygiene project. [8]

**Q5)** a) What is a fire triangle? What are the various methods to prevent fire and explosion. [9]

- b) Explain flammability characteristics of liquids and vapors. [9]

OR

**Q6)** a) Define Ignition, Autoignition temperature, Fire point and Flash Point. [9]

- b) Explain in detail about Unconfined Vapor Cloud Explosion. (UVCE). [9]

### **SECTION-II**

**Q7)** a) Discuss how flammable and toxic chemicals are stored and handled. [8]

- b) Explain working of ventilation and sprinkler systems for preventing fires and explosions. [8]

OR

**Q8)** a) Discuss in brief about explosion proof equipments and instruments. [8]

- b) Explain the various safety devices used for relieving pressure. [8]

**Q9)** a) Write a short note on Event trees and fault trees. [8]

- b) Discuss process hazard checklists in detail. [8]

OR

**Q10)**a) Explain the concept of HAZOP study and state guide words used for the HAZOP procedure. [8]

- b) Discuss types of safety reviews and concept of risk assessment. [8]

**Q11)** Write short notes on:

**[18]**

- a) Role of computers in safety.
- b) Hazard models and risk data.
- c) Objectives and benefits of safety audit.

OR

**Q12)** Explain the following:

**[18]**

- a) Risk management routines.
- b) Safety versus production.
- c) Tackling disasters.



Total No. of Questions : 12]

SEAT No. :

**P4633**

[Total No. of Pages : 2

[4759] - 286

**B.E. (Chemical) (Semester - II)**

**FOOD TECHNOLOGY**

**(2008 Pattern) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain reasons of low development of food processing in India. [8]  
b) Explain how taste can be characterized using suitable diagram. [8]

OR

- Q2)** a) Discuss the amount of food processing in various areas in India as compared to world. [8]  
b) Discuss role of technologies in food processing. [8]

- Q3)** a) With neat sketch explain working of size sorting machine. [9]  
b) Discuss importance of size reduction in food processing. [8]

OR

- Q4)** a) Explain novel grain storages with neat sketches and compare them with old storage methods. [9]  
b) Which micro-organisms are responsible for degradation of food. What are the preventive measures taken to reduce the contamination? [8]

- Q5)** a) Explain UHT pasteurization technique and state its advantages over conventional methods. [9]  
b) Discuss chemical methods of sterilization. Which chemicals are used? [8]

***P.T.O.***

OR

- Q6)** a) Compare various oil extraction techniques. [9]  
b) Discuss with neat diagram expression technique of oil extraction from oil seeds. [8]

**SECTION - II**

- Q7)** a) Discuss process of manufacture of Jam with emphasis on role of pectin. [8]  
b) Explain various preservatives used in pickle manufacture and their action. [8]

OR

- Q8)** a) Discuss manufacture of jellies with process flow diagram. [6]  
b) With neat flow sheet explain ice-cream manufacturing process. [10]

- Q9)** a) Explain various size reducing equipments and the principle involved. [9]  
b) Explain importance of grinding in bread making. [8]

OR

- Q10)** a) With example explain flavored milk manufacturing and challenges? [9]  
b) Discuss the dryer used in the manufacture of milk powder. [8]

- Q11)** a) Explain with example enrobing method. Give advantages of this in food manufacture. [9]  
b) Discuss temper evident containers and there importance in food industry. [8]

OR

- Q12)** a) What is aseptic packaging? State its importance. [9]  
b) Explain enrobing technique and give examples of its applications in food industry. [8]





Total No. of Questions : 12]

SEAT No. :

**P4703**

**[4759] - 287**

[Total No. of Pages :2

**B.E. (Chemical)**

**STANDARDIZATION AND QUALITY ASSURANCE IN  
CHEMICAL PROCESS INDUSTRY**

**(New) (2008 Pattern) (Semester - II) (Elective - IV)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from Section I and II.*
- 2) *Answers to the two Sections should be written in seperate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** State and explain the various objectives for standardization of equipment and materials. [9]

b) Explain material consumption. Elaborate various policies to regulate material consumption. [9]

OR

**Q2) a)** Explain the various standards for financial returns. [9]

b) Explain Qualitative and Quantitative standards of Chemical Process Industries. [9]

**Q3) a)** Write an explanatory note on types of standards used in chemical process industry. [8]

b) Explain the formation and functions of BIS (Bureau of Indian Standards). [8]

OR

**Q4) a)** Explain the following standards: [8]

i) ISI mark

ii) Agmark

b) State the various functions of Statistical Quality Control (SQC). [8]

**P.T.O.**

- Q5)** a) Elaborate on idealized model for national standard system. [8]  
b) Write an explanatory note on Zero Defects. [8]

OR

- Q6)** a) State the various functions of equipment inspector. [8]  
b) Enlist and explain the control charts. [8]

**SECTION - II**

- Q7)** a) Explain the importance of Total Quality Management (TQM). [9]  
b) What is Quality Circle (QC)? Explain the functions of QC. [9]

OR

- Q8)** a) What is Quality Control? Explain Statistical quality control in manufacturing industry. [9]  
b) Explain in detail the advantages and disadvantages of Quality Control. [9]

- Q9)** Explain with example the various standards followed in fabricating a heat exchanger for process industry. [16]

OR

- Q10)** Write notes on following concepts. [16]  
a) Sampling  
b) Zero defects

- Q11)** a) Explain in detail the modern trends in standardisation. [8]  
b) Explain ISO. Elaborate on importance of ISO certification in global market. [8]

OR

- Q12)** Write notes on: [16]  
a) ISO 14000 series.  
b) ISO 9000 series.  
c) Six sigma.  
d) HSE management System.



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :3

**P1475**

**[4759] - 288**

**B.E. (Chemical)**

**CATALYSIS**

**(2008 Course) (Elective -IV) (Semester - II) (409350)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from section I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Give the characteristics of catalysis. **[8]**

b) Explain the mechanism of homogenous catalysis with an example. **[8]**

OR

**Q2) a)** Explain the mechanism of heterogenous catalysis with an example. **[8]**

b) Explain mass transfer in the catalysis. **[8]**

**Q3) a)** Explain the Langmuir adsorption isotherm with assumption. **[8]**

b) Give the classification of the catalysis in detail. **[8]**

OR

**Q4) a)** Explain the mechanism of adsorption and its isotherm in detail. **[8]**

b) Explain the mercury-helium method for the determination of void volume and solid density of the catalyst. **[8]**

**P.T.O.**

**Q5)** A small experimental packed bed reactor ( $W = 1\text{ kg}$ ) using very large recycle of product stream gives the following kinetic data: [18]

$A \rightarrow R$	$C_A, \text{ mol/m}^3$ -	1	2	3	6	9
$C_{A_0} = 10 \text{ mol/m}^3$	$v_0, \text{ lit/hr}$ -	5	20	65	133	540

Find the amount of the catalyst needed for 75% conversion for a flow rate of 1000 mol. A/hr of a  $C_{A_0} = 8 \text{ mol/m}^3$  feed stream.

- i) in a packed bed reactor with no recycle
- ii) in a packed bed reactor with very high recycle

OR

**Q6)** A solid catalysed reaction  $A \rightarrow 4R$  is conducted at 3.2 atm and  $117^\circ\text{C}$  in a PFR containing 10 gm of catalyst and using a feed consisting of the partially converted product at 20 lit/hr of pure unreacted 'A'. The result are as follows:

$C_{A, \text{ in}}$	-	0.1	0.08	0.06	0.04
$C_{A, \text{ out}}$	-	0.084	0.07	0.055	0.038

Find the rate equation for this reaction. [18]

### SECTION - II

- Q7)** a) Explain the steps involved in preparation of the catalyst. [8]  
 b) Explain pore volume distribution in detail. [8]

OR

- Q8)** a) Explain the BET method in detail. [8]  
 b) Explain the deactivation of the catalysis. [8]

**Q9)** Write short note on the following. [16]

- a) ZSM - 5
- b) Industrial application of the molecular sieves.

OR

**Q10)** Write short notes on the following. **[16]**

- a) Explain the frame structure of the Zeolites
- b) Industrial application of the zeolites

**Q11)**a) Derive the M-M kinetic equation. **[9]**

- b) Explain the special features of M-M equation. **[9]**

OR

**Q12)**a) Give the kinetics of competitive inhibition of enzyme reaction. **[9]**

- b) Explain the enzyme and microbial fermentation in detail. **[9]**



Total No. of Questions : 12]

SEAT No. :

**P3721**

**[4759] - 289**

[Total No. of Pages :3

**B.E.**

**CHEMICAL ENGINEERING**

**Nanotechnology**

**(2008 Course) (Semester - II) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections must be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION - I**

**Q1) a)** Discuss the different synthesis methods for carbon based nanomaterials? **[8]**

b) Explain the different types of carbon nanotubes and graphene nanomaterials along with their physical properties and applications? **[8]**

OR

**Q2) a)** Discuss the molecular modeling technique for nanomaterials? **[8]**

b) Write a short note on different types of functionalization for carbon nanotubes? **[8]**

**Q3) a)** Differentiate between Laser ablation and chemical vapor deposition? **[8]**

b) Explain why MBE is one of best method as compared to other methods, with its advantages? **[10]**

OR

**P.T.O.**

- Q4)** a) State the merits & demerits of solution-based nano-fabrication techniques? [8]
- b) Explain the concept of epitaxy and self assembly used for synthesis of polymer nanocomposites? [10]

- Q5)** a) Explain with neat sketch principle and operation of Atomic force microscope? [8]
- b) Compare the specimen preparation needed in TEM and SEM and also comment on HRTEM? [8]

OR

- Q6)** a) Explain principle and operation of Scanning Probe microscopes? [8]
- b) Discuss in detail Bragg's law of diffraction and Scherrer expression in X-ray diffraction? [8]

## **SECTION - II**

- Q7)** a) Write short notes on extrinsic semiconductors and intrinsic semiconductors? [10]
- b) Explain how quantum cryptography is used for secure data communication? [8]

OR

- Q8)** a) Explain Heisenberg uncertainty principle? [8]
- b) What is effective masses of charge carriers in semiconductor. Derive expression for it? [10]

- Q9)** a) Explain various methods for measuring surface tension? [8]
- b) Explain experimental procedure for finding out contact angles. Explain with neat sketch? [8]

OR

- Q10)**a) Discuss the concept of self assembly and catalysis in nano colloids?[8]  
b) Explain in detail about nanostructured photocatalysis? [8]

- Q11)**a) Discuss different nanocoatings? Explain its applications and benefits?[8]  
b) Explain how nanostructure mediated drug delivery helps for treatment of various diseases? [8]

OR

**Q12)**Write short notes on: [16]

- a) Nanomachines & nanodevices
- b) Biological applications of nanoparticles
- c) Nanohydrogel
- d) Health hazards of nanomaterials.





Total No. of Questions : 12]

SEAT No. :

**P3682**

**[4759] - 29**

[Total No. of Pages :4

**B.E. (Civil)**

**FERROCEMENT TECHNOLOGY**  
**(2008 Course) (Semester - II) (Open Elective)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer from Section I answer Q.1 or Q.2, Q.3 or Q.4, Q5. or Q.6 and from Section II answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams should be drawn wherever necessary.*
- 5) *If necessary, assume suitable data and indicate clearly.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION - I**

- Q1)** a) Explain in brief “Ferrocement as a material of construction”. [6]  
b) What are different properties and specifications of raw materials used for Ferrocement Technology? [6]  
c) Write a note on “Forming of Ferrocement structures”. [6]

OR

- Q2)** a) Advantages and Disadvantages of ferrocement over RCC structures.[6]  
b) Explain the concept of “Ferrocement” with respect to following points:  
[3×4 = 12]  
i) Definition  
ii) Classification of ferrocement  
iii) Typical characteristics  
iv) their Applications

- Q3)** a) Explain the effect of shrinkage and creep on ferrocement units. [6]

**P.T.O.**

- b) Explain the standardizing method of constructing ferrocement structures with the help of following points. **[2×5 = 10]**
- i) Planning the work
  - ii) tying of wire meshes
  - iii) mortaring & curing
  - iv) maintenance
  - v) Protective surface treatments given to the same.

OR

- Q4)** a) Explain the role of form and shape of fabricating skeleton to increase the strength parameter of ferrocement structures. **[8]**
- b) Explain the causes and preventive measures for damage to the ferrocement structures. **[8]**

- Q5)** a) Explain the special design considerations for ferrocement structures. Also explain the conventional design methods like working stress, load factor, applied to ferrocement. **[8]**
- b) Draw the neat sketches of various structural shapes like stiffened plates, arch faced walls, stiffened cavity walls and hollow floors and beams & also give the comparative study. **[8]**

OR

- Q6)** a) Draw the neat sketches of various structural forms like 'T', 'U', '+', 'L' & Also give the comparative study of behavior forms in respect of strength and design parameters with ferrocement technology. **[10]**
- b) Enlist and explain properties of ferrocement structures under static and dynamic loading conditions. **[6]**

## SECTION - II

- Q7)** a) Explain in detail the ferrocement building component you seen with reference to following: material of construction, analysis and design principles, process of construction, quality control and maintenance. **[9]**

- b) Explain the design and construction of houses with following ferrocement building accessories: cavity walls, hollow floors, hollow beams, staircases and other building accessories. [9]

OR

- Q8)** a) Explain the special characteristics of ferrocement to resist shock affected during earthquakes. [6]
- b) Write a note on “Design and Construction of quake proof structures”. [6]
- c) Enlist and explain factors governing cost and value of ferrocement in building constructions. Also compare cost of ferrocement structures with conventional structures. [6]

- Q9)** a) Compare all parameters of ferrocement counterforth retaining wall with reference to conventional counterforth retaining wall. [8]
- b) What is ferrocement? Enlist the different applications of ferrocement in hydraulic structures and explain any one in detail. [8]

OR

- Q10)** a) Explain the use of ferrocement in water retaining structures along with layered form used for water proofing, lining and surface coating. [8]
- b) Explain method of fabrication and casting of containers for storing granular materials & counterforth retaining wall. [8]

- Q11)** a) Write a note on: “Joints in Ferrocement precast elements”. [6]
- b) Explicate role of ferrocement technology in construction of modern space structures like shells, pyramids, domes etc. [6]
- c) What is the need of ferrocement technology in different types of building components in today’s world? [4]

OR

**Q12)a)** Explain in detail the industrial precast ferrocement elements you seen with:[8]

- i) Raw materials of construction
- ii) analysis and design principles
- iii) manufacturing process
- iv) Testing methodology and quality control

b) Which are different precast ferrocement products you seen yet? Explain design and fabrication of ferrocement precast walling and flooring panels in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P1476

[4759] - 290

[Total No. of Pages :3

B.E. (Chemical)

FUEL CELL TECHNOLOGY

(2008 Course) (Semester - II) (Elective - IV) (Term - II) (Theory) (409350)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Use two separate answer sheets for writing the answers to the two sections.
- 2) Draw schematics wherever necessary.
- 3) Assume suitable data wherever necessary.
- 4) Write the chemical reactions wherever necessary.
- 5) Figures to the right indicate full marks.

**SECTION - I**

- Q1)** a) Explain the thermodynamic steps involved in fuel cell. [9]
- b) Show that electrical work obtainable from electrochemical device is 'change in Gibbs free energy'. [9]

OR

- Q2)** Explain the working principle of AFC, PAFC and MCFC. Draw neat sketches. [18]

- Q3)** Gibbs free energy for the formation of water vapor is  $-52.63 \text{ cal/mole}$  at STP condition. In the typical SOFC, pure hydrogen is fed at the pressure of 1.8 atm. Total pressure of gases on anodic side is observed to be 2.6 atm. Air is supplied at 1.8 atm. The cell is operated at  $1000^\circ\text{C}$ . Assuming the activities of components proportional to their partial pressures, calculate [16]

- i) Standard open circuit potential.
- ii) Open circuit potential at the operating conditions.

Faraday's constant is  $96487 \text{ J/V. mol}$ .

OR

P.T.O.

**Q4)** Derive Nernst equation for calculating open circuit potential of SOFC using air as an oxidizer for the following conditions: [16]

- a) Pure Methanol as a fuel
- b) Pure Hydrogen as a fuel
- c) Methanol and H<sub>2</sub> in the proportion of 20:80 % each as a fuel.

**Q5) a)** A current density of 15A/m<sup>2</sup> is obtained when pure hydrogen is fed to SOFC at the pressure of 1.9 atm. Total pressure of gases on anodic side is observed to be 2.7 atm. Air is supplied at 1.9 atm. The cell is operated at 900 °C. The diffusion factors for hydrogen, oxygen and water vapour are 95, 70 and 55 C/s.m<sup>2</sup>. atm respectively. Calculate concentration over potential across cathode and anode. [8]

b) Calculate fuel utilization factor, air ratio, power output and fuel efficiency of SOFC using the following data: [8]

Average current density	: 12 A/m <sup>2</sup>
Active anode surface area	: 0.5m <sup>2</sup>
Fuel flow rate	: 25 mol/h
Fuel Composition	: H <sub>2</sub> 80% and CO 20%
Air flow rate	: 25 mol/h
Output Potential	: 230 V
Lower Heating Value of fuel	: 30000 kcal/Kg

OR

**Q6)** Explain different types of overpotentials and their effect on cell potential. How are they estimated? [16]

### **SECTION - II**

**Q7) a)** Explain the advantages of internal steam reforming over external steam reforming. [9]

b) Describe working principle of Solid Oxide Fuel Cell. [9]

OR

**Q8)** Develop the comprehensive material balance for the SOFC generating 500kW power at 75% CHP efficiency and 30% theoretical excess air as an oxidizer, assuming  $V = 0.7$  V. [18]

- Q9)** a) Calculate mole fraction of defect at 107 and 1178°C. Defect energy is 85KJ/mol. Comment on the significance of results. [8]
- b) Derive the correlation to calculate defect mole fraction for pure solid at thermal equilibrium. [8]

OR

- Q10)**a) Design a tubular SOFC to generate 225 KW power from methane as a fuel. Single tube has a anodic diameter 20mm and active length of 1.8m. [8]
- b) How the limiting reforming factor (steam-to-fuel ratio) affects the utilization of hydrocarbons in SOFC? [8]

- Q11)**a) What are the recent advancements in the materials of anode and their advantages and disadvantages. [8]
- b) Differentiate between planar and tubular structure of SOFC. [8]

OR

**Q12)** Explain the working of hybrid cycle combining biomass gasification with SOFC. [16]



Total No. of Questions : 12]

SEAT No. :

**P4283**

**[4759] - 291**

[Total No. of Pages :2

**B.E. (Chemical)**

**PETROCHEMICAL ENGINEERING**

**(2008 Pattern) (Elective -IV) (Semester - II) (409350)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two Sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Discuss the importance of petrochemicals and the status of Petrochemical Industries in India. [8]
- b) Describe the basic raw material for petrochemical synthesis and their sources? [8]

OR

- Q2)** a) What are the main building blocks of petrochemical industry? Give the details of petrochemical products that are produced from benzene. [8]
- b) Describe the BTX aromatic separation process using suitable diagram.[8]

**Q3)** Describe CDU with suitable diagram? Distinguish between CDU and VDU.[16]

OR

**Q4)** Draw a flowsheet for production of Naphthene and explain the process with all specifications and process conditions. [16]

- Q5)** a) Discuss the Aromatic solvent extraction unit. Draw a suitable diagram.[8]
- b) Write in details about the various separation and purification techniques used in petrochemical industry. [10]

OR

**P.T.O.**



- Q6)** Write short notes on; **[18]**
- a) Fluid Catalytic cracking
  - b) Ziegler-Natta catalysts
  - c) Delayed coking

**SECTION -II**

- Q7)** Discuss in detail about the production of ethylene glycol and the essential Reaction steps for the same. Draw the necessary diagram. **[16]**

OR

- Q8)** Draw a schematic diagram and describe the production of terephthalic acid from p-xylene? Discuss the major engineering problems. **[16]**

- Q9)** a) Discuss polymer synthesis and monomer purification. **[8]**  
b) Explain Emulsion polymerization of styrene. **[8]**

OR

- Q10)** a) Draw a neat sketch and explain in details about production of PVC. What are the major engineering problems associated with this process? **[10]**  
b) Explain classification of different polymerization process and discuss its advantages and disadvantages. **[6]**

- Q11)** a) Explain the control of emission from steam crackers using Best Available Technique.(BAT). **[9]**  
b) Discuss about recent advances in petrochemical plants and refineries in India. **[9]**

OR

- Q12)** a) Give the brief description on safety considerations in oil refining industry? **[9]**  
b) “Power on, India on”-Write views on power generation through Petrochemical plants and justify the above statement. **[9]**



Total No. of Questions : 12]

SEAT No. :

**P3335**

[4759] - 292

[Total No. of Pages : 4

**B.E. (Chemical) (Semester - II)**  
**COMPUTER AIDED COMPUTER CONTROL**  
**Computer Aided Process Control**  
**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

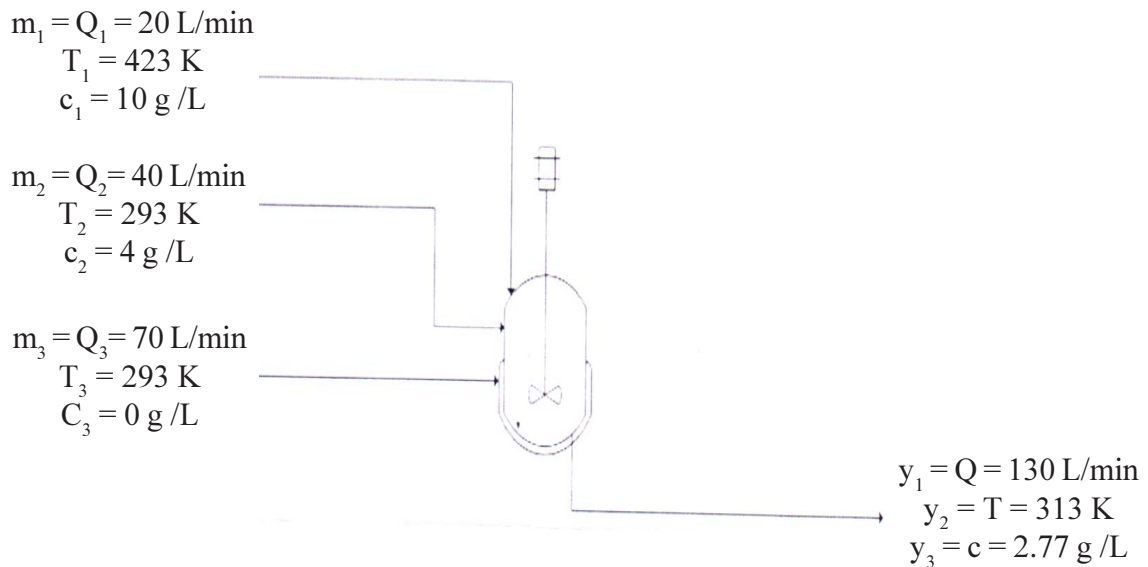
**SECTION - I**

- Q1)** a) Distinguish between DDC & DCS control systems. **[8]**
- b) State the advantages of digital control. Explain in detail the supervisory digital control. **[10]**

OR

- Q2)** Describe in detail process control architecture for the following digital systems. **[18]**
- a) Centralized control systems
  - b) Distributed Control system
- Q3)** Compute RGA and suggest pairings between o/p variables and manipulated variable for following blending (MIMO) system. **[16]**

***P.T.O.***



The equations used to model the system are :

$$y_1 = m_1 + m_2 + m_3$$

$$y_2 = \frac{T_1 m_1 + T_2 m_2 + T_3 m_3}{y_1} = \frac{T_1 m_1 + T_2 m_2 + T_3 m_3}{m_1 + m_2 + m_3}$$

$$y_3 = \frac{c_1 m_1 + c_2 m_2 + c_3 m_3}{y_1} = \frac{c_1 m_1 + c_2 m_2 + c_3 m_3}{m_1 + m_2 + m_3}$$

OR

**Q4)** What are decouplers? Draw a block diagram for implantation of de-couplers for two input-two output control system. Also derive a transfer function for de-couplers from the block diagram. [16]

**Q5) a)** Describe digital control system with the help of block diagrams. [8]

b) A sampled data system has the following transfer function [8]

$$G(s) = 1 / (s + 1)$$

If the sampling time is 1 minute and system is subjected to unit step change function. Determine the discrete time response of the system.

OR

- Q6)** a) Find the z-transformations of following functions [8]
- i)  $f(t) = 1$
  - ii)  $f(t) = e^{(-at)}$
  - iii)  $f(t) = \sin(wt)$
  - iv)  $f(t) = \cos (wt)$
- b) Describe in detail Jury's test to ascertain stability of digital control systems. [8]

**SECTION - II**

- Q7)** Describe in detail organization of general purpose computer, its interfaces, communication and data transfer techniques. [16]

OR

- Q8)** Explain in detail the elements of a commercial distributed control system network with the help of block diagram. [16]

- Q9)** a) Explain the advantages of digital control systems in the context of flexibility, speed, robustness and cost. [10]

- b) Explain the disadvantages of computer control. [6]

OR

- Q10)** Draw block diagram of PLC - architecture and describe functions of each block. [16]

**Q11)** Write short notes on the following :

**[18]**

- a) Supervisory Control
- b) Plant wide Control
- c) Neiderlinsky Index for MIMO control stability

OR

**Q12)** Write short notes on the following :

**[18]**

- a) De-coupling selection criterion
- b) Control system for adiabatic reactor
- c) Discretization of continuous signal



Total No. of Questions : 12]

SEAT No. :

**P3722**

**[4759] - 294**

[Total No. of Pages :3

**B.E. (Polymer Engineering)  
POLYMER COMPOUNDING  
( 2008 Pattern) (Semester - I) (409361)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections must be written in two separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Write short note on solid-solid mixing. [6]  
b) Write in short about rheology of filled polymers. [5]  
c) Compare scale of segregation and intensity of segregation. [5]

OR

- Q2)** a) Write in short about laminar mixing. [4]  
b) Give different mixing indices and mention the limitations of the same. [6]  
c) Write in detail about mechanism of mixing. [6]

- Q3)** a) What is a compatibilizer? Explain its role during blending with a suitable example. [8]  
b) Discuss theory and mechanism of surface modification of fillers. [8]

OR

**P.T.O.**

**Q4) a)** State the Hildebrand-Scott equation. Explain the various terms in the equation with their significance. [8]

b) State various methods of preparing clay nano composites. Explain any two in details. [8]

**Q5) a)** What is a processing aid? State its role during compounding. [7]

b) List a few antioxidants and explain their mechanism in details. [7]

c) Write in short about application of calcium carbonate as filler in compounding. Give examples. [4]

OR

**Q6) a)** List the various types of fillers. Explain the complete line for compounding of fibrous fillers. [7]

b) List the various blowing agents used. Explain the action of at least two blowing agents with reactions. [7]

c) Write in short about application of carbon black filler. Give suitable examples. [4]

## **SECTION - II**

**Q7) a)** Draw a neat flow diagram for compounding of PVC rigid or soft compound. write compounding practices and process conditions for the major equipment used in the compounding line. Discuss with reference to at least one application for rigid and soft PVC formulation. [10]

b) Write in short about reactive blending. [6]

OR

**Q8) a)** Write in short about various additives used for elastomer/rubber compounding. [8]

b) Draw a neat sketch for compounding line for cable extrusion. List all major equipment in the line. Discuss additives. [8]

- Q9)** a) Write in short about mixing using blister rings and explain the type of mixing promoted by it. [6]
- b) With a neat sketch explain any one type slotted flight mixer used on extruder. Write benefits and type of mixing resulting from such mixer. [6]
- c) Draw typical residence time distribution of a Bus Ko-Kneader and discuss significance in compounding. [6]

OR

- Q10)**a) Write with sketches about planetary gear mixers. [6]
- b) How does Bus Ko-Kneader ensure excellent wiping action? Explain with neat sketches. [6]
- c) Explain in short mixing action in pin mixers and CRD mixers. [6]

**Q11)** Write short notes on. [16]

- a) Smear heads
- b) Barrels with internal projections
- c) Cross mixing devices used in two roll mill
- d) Shear cone units

OR

- Q12)**a) Write in short about starve feeding and metering screw feeders. [6]
- b) Compare mixing action of co-rotating and counter rotating twin screw extruders. [6]
- c) Write short note on mixing action resulting in two roll mill. [4]





Total No. of Questions : 12]

SEAT No. :

**P3723**

**[4759]-295**

[Total No. of Pages : 5

**B.E. (Polymer)**

**MOLD AND DIE DESIGN-I  
(2008 Pattern) (Semester-I)**

*Time : 4 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

**SECTION-I**

**Q1)** Design a 2 cavity 2 plate mold for the component shown in figureB. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. **[35]**

OR

**Q2)** Design a 2 cavity 3 plate mold for the component shown in figureA. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. **[35]**

**Q3)** Explain the cooling of core inserts with baffles with a neat figure. **[6]**

OR

**Q4)** Explain in sleeve ejection method in details with a neat figure. **[6]**

**Q5)** With a neat labeled sketch, explain the constructional features of blown film die. **[9]**

OR

**Q6)** Write the down the step wise procedure to determine pressure drop through a blown film die. State the relevant formulae. **[9]**

**P.T.O.**

## SECTION-II

- Q7)** a) Discuss any one case hardening process in details. List the components of injection molds which can be case hardened. Explain with reasons. [9]
- b) Describe the operations of polishing, honing and lapping in details. [9]

OR

- Q8)** a) Discuss the various elements used in alloy steels. Explain the function of each element. [9]
- b) What is heat treatment of steel? Discuss in details any two methods of heat treatment. [9]

- Q9)** a) Explain any one method used to determine flatness of a surface with reference to a standard flat surface. [8]
- b) Determine actual dimensions to be provided on a shaft and hole of 82 mm size with H7/g6. Size 82 falls in the steps of diameter 80mm and 100mm. Value of tolerance for IT7 and IT6 are 16i and 10i respectively. Value of fundamental deviation of g type of shaft is  $(-25D^{0.34})$ . Take the tolerance value of unit  $i = 0.45\sqrt[3]{D} + 0.001D$ . Sketch and identify the fit type. [8]

OR

- Q10)**a) Derive an expression for pitch diameter or effective diameter of screw thread using two wire method. [8]
- b) Write short note any two: [8]
- i) Maximum and minimum clearance and interference with neat sketches.
  - ii) Various terminology associated with surface finish with neat sketches.
  - iii) Different fringe patterns observed during flatness testing using optical flat with neat with neat sketches.

**Q11)a)** Explain the constructional features of a diaphragm gate and subsurface gate with neat figures. **[8]**

b) Explain the various methods of clamping molds onto machine platen. **[8]**

OR

**Q12)a)** Explain the process for calculation of clamping tonnage, shot capacity and size of cavity inserts. **[8]**

b) Explain the design calculations for fan gate, film gate, overlap gate and rectangular edge gate. **[8]**

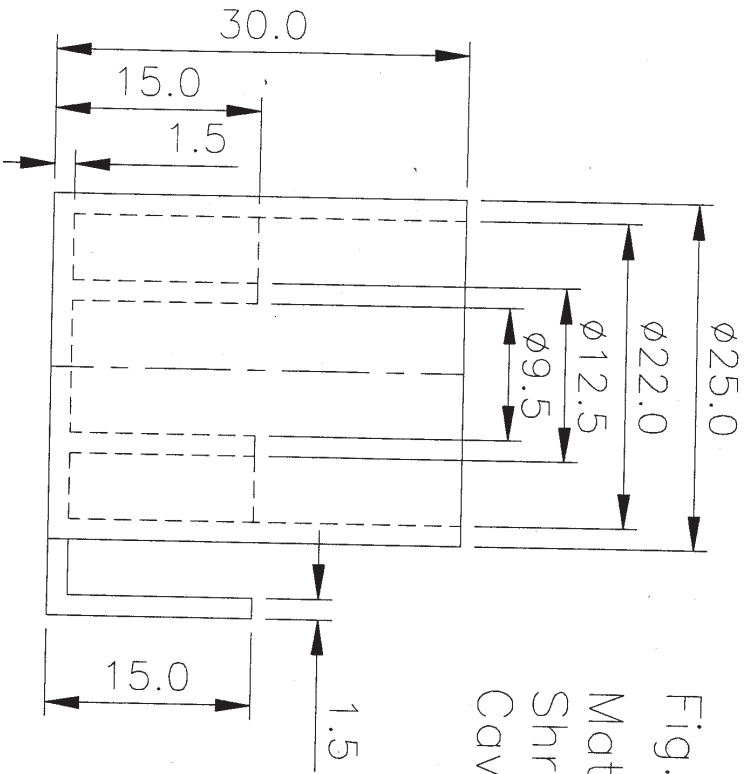
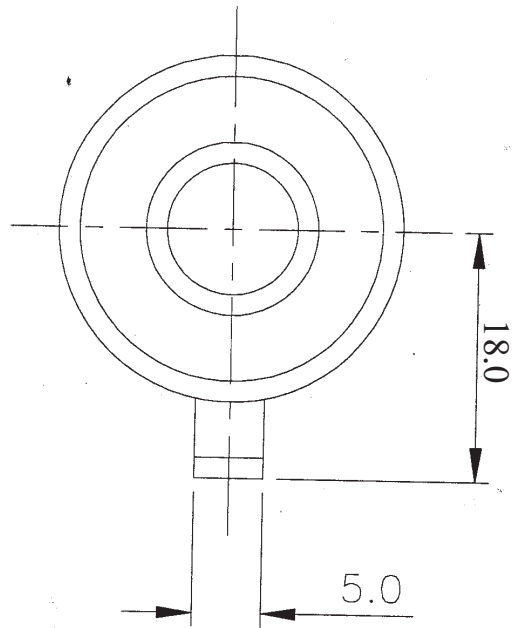


Fig. A

Material : ABS

Shrinkage: 0:5%

Cavity pressure: 400—450Kg/cm<sup>2</sup>

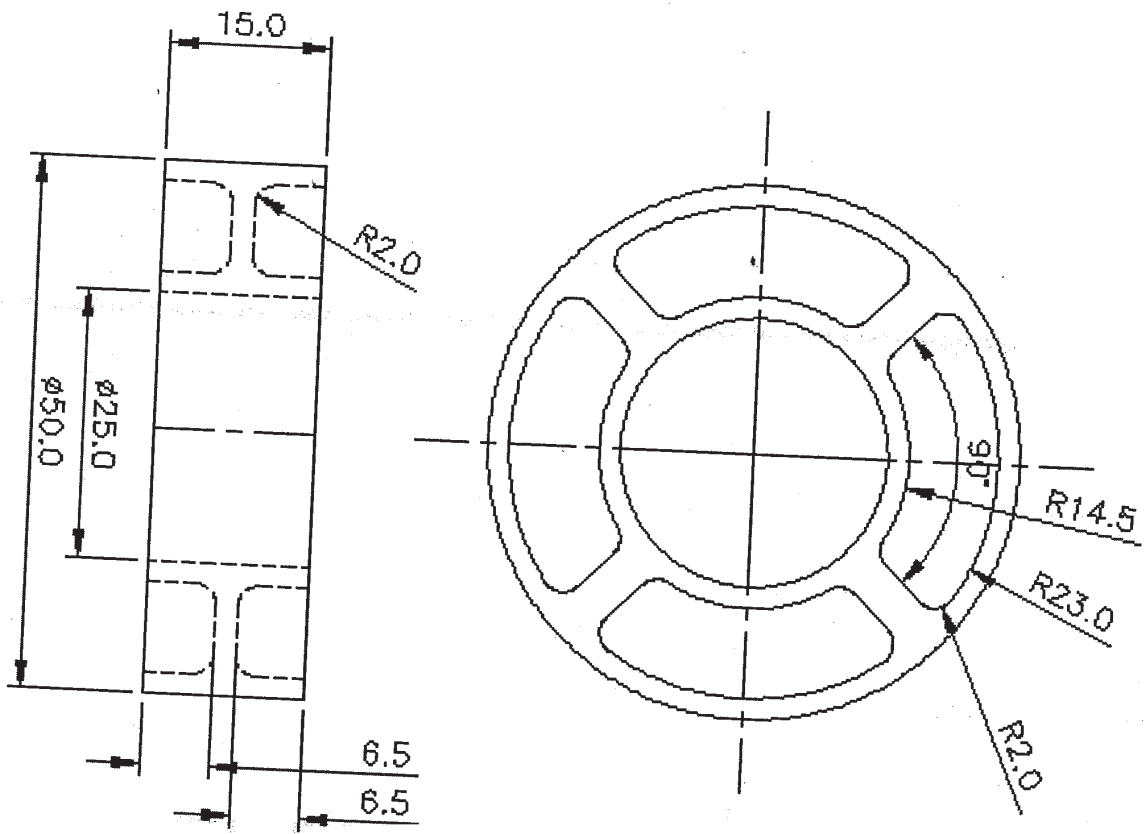


Fig. B

Material : PVC

Shrinkage: 0.5%

Cavity pressure: 300-350kg/cm<sup>2</sup>



Total No. of Questions : 12]

SEAT No. :

**P2023**

**[4759]-296**

[Total No. of Pages : 4

**B.E. (Polymer)**

**POLYMER PROCESSING OPERATIONS - II**

**(2008 Pattern) (Semester - I) (409363)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections must be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*
- 7) *Your answers will be valued as a whole.*

**SECTION - I**

- Q1)** a) What is parison programming and how is it done? **[4]**
- b) Explain the injection stretch blow molding process for manufacturing of PET bottles used for storage of mineral water. Also explain how transparency is achieved. **[8]**
- c) Explain the use of die shaping in extrusion blow molding. **[4]**

OR

- Q2)** a) Draw a neat sketch of convergent and divergent die and mandrel arrangements and discuss the relative merits of each. **[4]**
- b) Draw a bar chart for cycle time for a single station accumulator or continuous extrusion blow molding machine. explain all the operations in short. **[8]**
- c) Compare extrusion blow molding process with injection blow molding process. **[4]**

**P.T.O.**

- Q3)** a) Explain the process of drape forming and pressure forming with a neat sketch. [8]
- b) Define the following terms w.r.t. thermoforming [6]
- i) Heat reversion
  - ii) Equilibration & soaking time.
- c) Explain the significance of Biot's number in case of thermoforming. [4]

OR

- Q4)** a) Write a short note on materials used in thermoforming. [5]
- b) Discuss the different types of heating modes for thin sheet and thick sheet in case of thermoforming. [5]
- c) Discuss the following faults in thermoforming giving reasons and remedies for the same. [8]
- i) Blisters
  - ii) Whitening
  - iii) Warped parts

- Q5)** a) With the help of neat sketches explain any two types of four roll calendar arrangements. State the advantages and disadvantages of the same. [8]
- b) Draw a pressure profile through a calendar and derive an expression for maximum pressure ( $P_{\max}$ ). [8]

OR

- Q6)** a) With the help of neat sketches differentiate between the heating systems used in calendaring. [8]
- b) State the reason why roll deflection occurs in case of calendaring? Explain any two ways to overcome this problem. [8]

## SECTION - II

- Q7)** a) Discuss the effect of any two of the following on rotational moulding process control: [8]
- i) Particle size and particle size distribution.
  - ii) Mould material and
  - iii) Mould release agents.
- b) Write a note on rotational moulding of liquid polymers. [8]

OR

- Q8)** a) Discuss the theories of bubble formation and methods of elimination of bubbles in the rotational molding process. [8]
- b) State any four defects in rotational moulded articles with reasons. Give remedial measures for the defects. [8]
- Q9)** a) Discuss in short the full short water injection moulding process. [6]
- b) What are the advantages of gas injection moulding over conventional injection moulding. [6]
- c) With reference to suitable example of fast crystallising polymer, explain structure development during injection molding. [6]

OR

- Q10)**a) Explain sandwich foam injection molding process. [6]
- b) Explain the gas penetration behaviour in case of gas injection moulding. [6]
- c) Compare cavity pressure profile in gas injection moulding with conventional injection moulding. [6]



- Q11)**a) Discuss laser machining of plastics. How do the machining characteristics of plastics differ from that of metals? [8]
- b) Discuss the various methods for collection of plastic waste. [4]
- c) Discuss the process of hot stamping for decoration of plastics. [4]

OR

- Q12)**a) Explain the process of vacuum metallising adopted for metal deposition on plastic moldings. [8]
- b) Name and discuss the different techniques of surface treatment for plastics. [4]
- c) What is tertiary or chemical recycling of plastics? State the different methods of tertiary recycling. [4]

*EEE*

Total No. of Questions : 12]

SEAT No. :

P3906

[Total No. of Pages : 2

**[4759] - 297**  
**B.E. (Polymer)**  
**FIBER TECHNOLOGY**  
**(2008 Pattern)**

*Time : 3 Hours]*

*[Maximum Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

**SECTION - I**

**Q1)** a) Explain following terms : fiber, yarn, filament, denier, tenacity, and give classification of fibers. **[10]**

b) Give advantages and disadvantages of synthetic fibers over natural fibers. **[8]**

OR

**Q2)** a) Give molecular requirements of fiber forming polymers, properties and applications of synthetic and natural fibers. **[10]**

b) Briefly give introduction to various stages involved in synthetic fiber manufacturing. **[8]**

**Q3)** a) Explain melt spinning techniques used in fiber manufacture. **[8]**

b) Explain solution spinning techniques used in fiber manufacture. **[8]**

OR

**Q4)** a) Explain dry - jet wet spinning techniques used in fiber manufacture. **[8]**

b) Explain high speed spinning and its effect on morphology. **[8]**

**Q5)** a) Explain spin finish with its need, function and chemical composition. **[8]**

b) Explain stretching or drawing of fibers with significance of texturing. **[8]**

OR

**Q6)** a) Explain false twist process with diagram. **[8]**

b) Explain air Jet texturing and stuffer box texturing. **[8]**

**P.T.O.**

**SECTION - II**

- Q7)** a) Give the Structure Developed During Fiber Spinning. [8]  
b) Give Staple fiber production process with the steps involved. [10]

OR

- Q8)** a) Give need for fiber identification and methods used for identification. [10]  
b) Explain structural changes taking place during spinning, drawing and heat setting. [8]

- Q9)** a) Explain Mass coloration methods with its advantages and disadvantages. [8]  
b) Explain carrier dyeing with its advantages and disadvantages. [8]

OR

- Q10)** a) Explain high temperature dyeing and thermosol process. [8]  
b) Give types of dyes used for natural fibers and give difference between dyes and pigments. [8]

- Q11)** a) Explain Modified synthetic fibers and need of modifying synthetic fibers. [8]  
b) Give recent advances in synthetic fibers and explain nano - fibers. [8]

OR

- Q12)** a) Explain bi - component fibers. [8]  
b) Explain optical fibers. [8]



Total No. of Questions : 12]

SEAT No. :

P2024

[4759] -298

[Total No. of Pages : 6

B.E. (Polymer)

MECHANICS OF COMPOSITES

(2008 Course) (Semester -I) (Elective -I) (409364-B)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume suitable data, if necessary.

**SECTION - I**

**Q1) a)** An unidirectional lamina oriented at  $60^\circ$  has following properties: [7]

$$E_1 = 140 \text{ GPa}, E_2 = 8 \text{ GPa}, G_{12} = 5.5 \text{ GPa}, \nu_{12} = 0.3.$$

If a stress of 8MPa is applied in the y-direction and 5MPa in the x- direction, Determine the strains in local directions and global directions.

- b) Write the compliance matrix for an isotropic material in terms of engineering constants. [4]
- c) For an angle ply lamina with  $\theta = 35^\circ$ , find [7]
  - i) local strains
  - ii) global strains

given reduced transformed stiffness matrix

$$\begin{bmatrix} 0.236 & 0.682 & 0.339 \\ 0.628 & 1.904 & 0.8419 \\ 0.339 & 0.8419 & 0.5674 \end{bmatrix} \times 10^{11} \text{ Pa}$$

The applied stresses are  $\sigma_x = 3 \text{ MPa}$ ,  $\sigma_y = -4 \text{ MPa}$ ,  $\tau_{xy} = 2 \text{ MPa}$ .

OR

P.T.O.

- Q2) a)** For an orthotropic lamina under plane stress condition prove from basic principles that following equations for off axis engineering constants (global co-ordinate system) in terms of engineering constants in local coordinate system hold true. **[8]**

$$\frac{1}{G_{xy}} = 2 \left[ \frac{2}{E_1} + \frac{2}{E_2} + \frac{4\nu_{12}}{E_1} - \frac{1}{G_{12}} \right] \sin^2 \theta \cos^2 \theta + \frac{1}{G_{12}} (\sin^4 \theta + \cos^4 \theta)$$

$$\nu_{xy} = E_x \left[ \frac{\nu_{12}}{E_1} (\cos^4 \theta + \sin^4 \theta) - \left[ \frac{1}{E_1} + \frac{1}{E_2} - \frac{1}{G_{12}} \right] \sin^2 \theta \cos^2 \theta \right]$$

- b) Give stress-strain relationship for specially orthotropic materials for plane stress condition. **[6]**
- c) Write expressions for calculating transformed reduced stiffness matrix  $[\bar{Q}]$  and transformed reduced compliance matrix  $[\bar{S}]$  from reduced stiffness matrix  $[Q]$  and reduced compliance matrix  $[S]$ . **[4]**

- Q3) a)** A lamina has following engineering properties: **[8]**

$$E_1 = 140 \text{ GPa}, E_2 = 10 \text{ GPa}, G_{12} = 5 \text{ GPa}, \nu_{12} = 0.3.$$

The failure strengths in local co-ordinate system are given below where subscripts “t” represents tensile and “c” represents compressive. “S” represents shear strength in local co-ordinate system.

$$X_t = 1200 \text{ MPa}, Y_t = 100 \text{ MPa}, X_c = 700 \text{ MPa}, Y_c = 300 \text{ MPa}, \text{ and } S = 100 \text{ MPa}.$$

Find failure by maximum stress and also by maximum strain theory.

- b) Show that failure strength in an off-axis tension test using Tsai-wu theory for unidirectional lamina can be shown to reduce to the quadratic equation of the form  $A\sigma_\theta^2 + B\sigma_\theta + C = 0$ .

Here  $\sigma_\theta$  is failure strength in off- axis tension test i.e.  $\sigma_{xx} = \sigma_\theta$  at failure. **[8]**

OR

- Q4)** a) Explain the Hoffman's failure theory in details. [8]
- b) Explain the limitations of maximum stress and maximum strain theory. [8]
- Q5)** a) Derive an expression for prediction of transverse modulus  $E_2$  using mechanics of materials approach. [8]
- b) Prove the rule of mixtures for the major Poisson's ratio  $\nu_{12}$ . [8]

OR

- Q6)** a) 'A high strength composite has the following properties:  $E_1 = 150$  GPa,  $E_2 = 10$  GPa,  $G_{12} = 5$  GPa,  $\nu_{12} = 0.3$ . Determine the transformed reduced stiffness matrix for the lamina with ply angle  $30^\circ$ . [8]
- b) Discuss the Halpin-Tsai equations in details. [8]

### SECTION - II

- Q7)** a) For a  $[0/60]_s$  laminate with the following lamina properties, Calculate [A], [B] and [D] matrix for the laminate. Also, calculate the moduli for the laminate in the global X-Y directions and the strains in the laminate if stress of  $\sigma_x = 8$  MPa and  $\sigma_y = -10$  MPa is applied. Assume the thickness of each lamina to be 1 mm.

$$E_1 = 120 \text{ GPa}, E_2 = 7.5 \text{ GPa}, G_{12} = 5.5 \text{ GPa}, \nu_{12} = 0.38. \quad [14]$$

- b) Discuss quasi-isotropic laminates. [4]

OR

- Q8)** a) Write down the [A], [B] and [D] matrices for a single layer specially orthotropic laminate in terms of engineering constants and anisotropic laminates. How will they differ from that of a single layer isotropic laminates? [7]

- b) Calculate the elements of [A], [B] and [D] matrix for a single layer specially orthotropic laminate having thickness “t” in terms of engineering constants. [7]
- c) For the following laminates, mention their type and state which elements of [A], [B] and [D] of the following laminates will be zero: [4]
- i) [20/-45/-20/45]
- ii) [ $\alpha / -\alpha / \alpha / -\alpha / \alpha$ ]
- iii) [ $\alpha / -\alpha / -\alpha / \alpha$ ]
- iv) [ $\alpha / -\alpha / \alpha / -\alpha$ ]

- Q9) a)** For a simply supported specially orthotropic beam with length 120mm, width 28 mm and depth 7.5mm, carrying a uniformly distributed load of 12N/m, obtain the deflection if the lay up is symmetric. [9]

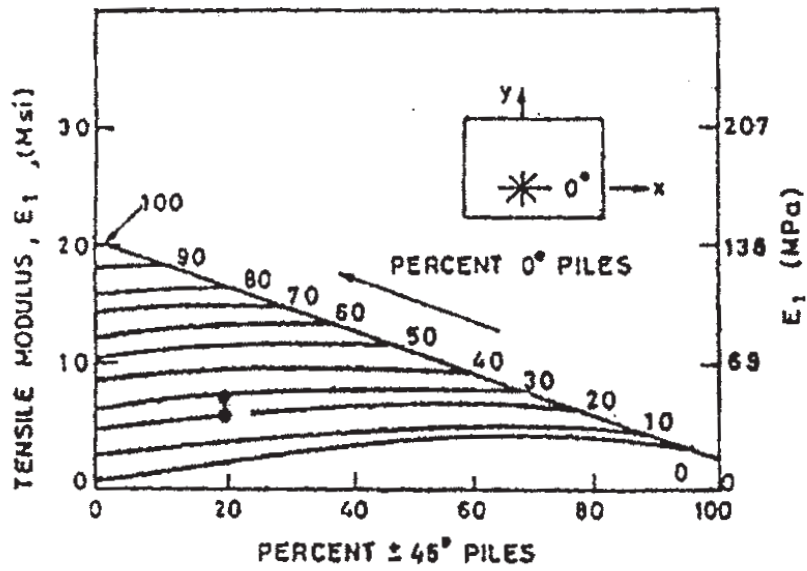
The D matrix for the beam  $D = \begin{bmatrix} 1250 & 38 & 0 \\ 38 & 300 & 0 \\ 0 & 0 & 60 \end{bmatrix}$ .

- b) Discuss the different types of adhesive and bolted joints for composites. [7]

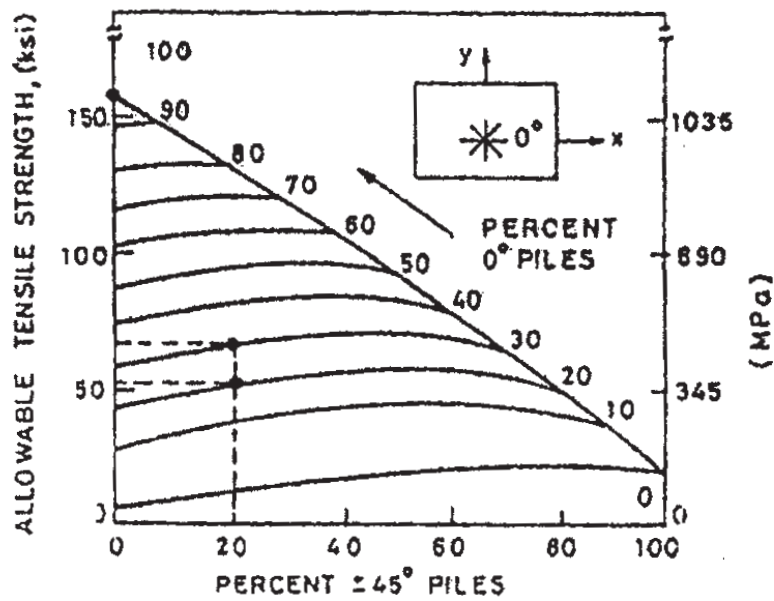
OR

- Q10)a)** Determine the number of  $0^\circ$ ,  $90^\circ$ ,  $+45^\circ$  orientation in a  $[0/90/+45]_s$  laminate that meets the following criteria: [7]
- i) Minimum strength in the axial  $0^\circ$  direction = 340 MPa
- ii) Minimum modulus in the axial  $0^\circ$  direction = 65 MPa

Total laminate thickness is 3mm. refer to figure 1.



Carpet plot for stiffness



Carpet plot for strength

Figure 1: Carpet plots

- b) Derive equilibrium equations in terms of displacements for a transversely loaded specially orthotropic laminated plate. [9]



- Q11)a)** List all the compression tests used for composites. Explain any one in details. [8]
- b) Explain the ultrasonic test for flaw detection in composites. [8]

OR

- Q12)a)** Explain the off-axis test to obtain in-plane shear properties for composites. [8]
- b) Give average strength and variance formulae for two parameter Weibull distribution. [4]
- c) Explain the set up for three point bending test. [4]



Total No. of Questions : 12]

SEAT No. :

**P3336**

**[4759] - 299**

[Total No. of Pages : 3

**B.E. (Polymer Engineering) (Semester - I)**  
**POLYMER REACTION ENGINEERING**  
**(2008 Pattern) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Numbers to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

**SECTION - I**

- Q1)** a) Discuss in brief polymerization processes by using reactant preparation, polymerization and separation. **[12]**
- b) Discuss in detail any four quantities commonly used for the Characterization of Polymers. **[6]**

OR

- Q2)** a) Explain the different parameters used for designing of polymerization reactor. **[6]**
- b) Find the Number average, weight average Molecular weight and polydispersity Index of the given mixture which is composed of 1 molecule of 10,000 monomer lengths and 19 molecules of 20,000 monomer lengths and 25 molecules of 2000 monomer lengths. Discuss the importance of molecular weight and Molecular weight distribution of polymer. Explain the distinctive features of Polymer Reaction Engineering. **[12]**
- Q3)** a) Discuss in detail all technical conclusions from Free Radical Kinetics Studies. **[6]**
- b) Derive the necessary relationship obtained in giving Molecular weight distribution in CSTR for free radical type polymerization. **[10]**

OR

**P.T.O.**



OR

**Q10)a)** Describe the Three Stages of Emulsion Polymerization needed to understand the kinetics. [10]

b) Write a note on types of Coordination Catalyst. [6]

**Q11)a)** Discuss the control of emulsion polymerization reactor. [8]

b) Explain the role of process instrumentation in control of polymerization reactors. [8]

OR

**Q12)a)** Write a note on Extruder Reactors. [8]

b) Discuss the choice between batch and continuous reactor for polymerization process. [8]



Total No. of Questions : 8]

SEAT No. :

**P1506**

[4759] - 3

[Total No. of Pages : 4

**B.E. (Civil)**

**STRUCTURAL DESIGN - III**

**( 2008 Course) (Semester -I)**

*Time : 4 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, from Section - I.*
- 2) *Answer Q.5 or Q.6, Q.7 or Q.8, from Section - II.*
- 3) *Answers to the two sections should be written in separate answer- books.*
- 4) *Figures to the right indicate full marks.*
- 5) *IS 1343, IS 456, IS 3370 are allowed.*
- 6) *Assume suitable data wherever necessary and mentioned it clearly.*

**SECTION - I**

- Q1) a)** Explain the various losses in Prestressed Concrete. **[8]**
- b) A Post tensioned prestressed Concrete beam section has top flange 500×150mm, web 200×800 mm and bottom flange 400 ×300mm is simply supported over an effective span of 16 meter. The beam is prestressed with 6 no's of 12/5 Freyssinet parabolic cables ( $F_y = 1650$  MPa) with their C.G. 100mm from extreme bottom fiber, stressed one at a time from only one end, Calculate total loss of prestress at the age of 100 days if  $K = 0.0026/m$  length of cable, slip of anchorage = 2mm,  $C_c = 1.8$ ,  $E_s = 2 \times 10^5$  MPa, Concrete grade M40, Creep and relaxation = 2% of initial prestress. **[17]**

OR

- Q2) a)** Explain Stress Concept and Load balancing concept. **[8]**
- b) An unsymmetrical prestressed concrete section has top flange 500×200mm, bottom flange 400mm×300mm, and web 200mm×800mm, it is supported over a span of 15m carries super imposed load of 13KN/m, the effective prestressing force is 1000KN located at 100mm from soffit of the section at mid span, cable profile is parabolic and concentric at support. Calculate extreme fiber stresses in concrete at mid span at initial and final stage. Take loss ratio as 0.85 and unit weight of concrete as 25KN/m<sup>3</sup>. **[17]**

**P.T.O.**

**Q3)** Design a Post tensioned Prestressed concrete beam using I- section for flexure to carry a live load of 15KN/m over a simply supported span of 17m with M 45 grade of concrete and Freyssinet cables of 12/5 ( $f_y = 1750$  MPa) or 12/7 ( $f_y = 1500$  MPa), Design the End block also. Draw sketches showing details of cable profile, end block reinforcement Check for fiber stresses in concrete and deflection is must . [25]

OR

- Q4)** a) Explain any one method of post tensioning with neat sketches. [5]
- b) A post tensioned prestressed concrete Two-way slab of 7m × 8m with discontinuous edge to support imposed load of 4KN/m<sup>2</sup> using S3 strands each having cross sectional area 100mm<sup>2</sup> and  $f_y = 1900$  MPa check the safety of the slab at collapse and deflection at service load. Use M45 grade of concrete. [20]

### SECTION - II

**Q5)** Fig (1) shows an intermediate frame of multistoried building the frames are spaced at 4m centre to centre analyze the rigid jointed frame taking live load as 3.5KN/m<sup>2</sup> and dead load as 3KN/m<sup>2</sup> for panel AB and BC respectively. The self weight of beam AB is taken as 4KN/m and for BC as 3.0 KN/m. The relative stiffness of all members is same. Use Portal method for horizontal load and Proper Substitute frame for vertical loading. Design the Beam ABC for combined effect of horizontal and vertical loading using 15% redistribution of moments for vertical load moments. Use M20 and Fe415. [25]

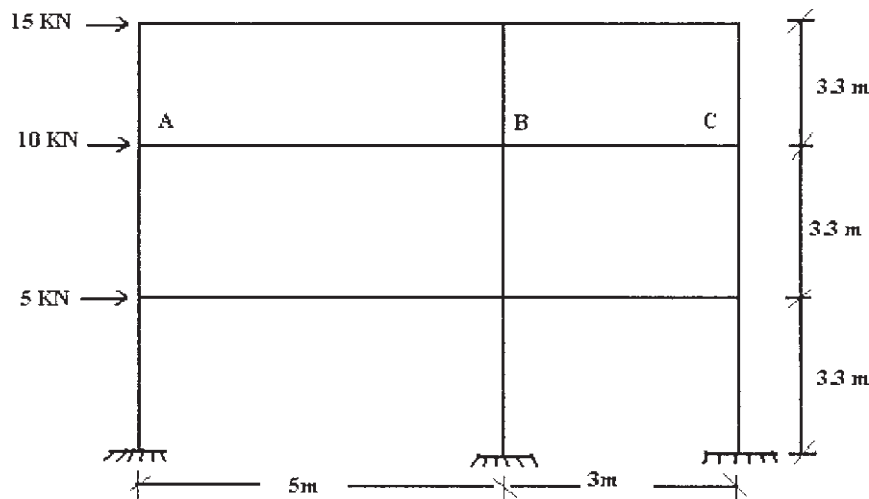


Fig. 1

OR

- Q6) a)** Explain in detail Cantilever Method of analysis. [7]
- b)** Analyze the rigid jointed frame as shown in fig (2) by Cantilever Method for lateral loads. Flexural rigidity of all members is same. Analyze beam GHI using proper substitute frame method if it is subjected to vertical ultimate dead load and live load of intensities 15KN/m and 18KN/m on Span GH and 18KN/m and 22KN/m on HI respectively. The Horizontal forces are as shown in figure. Calculate maximum span moment for GH and Support moment at H. Design Beam GHI for combined effect of horizontal and vertical loading using 10% redistribution of moments for vertical loading. Use M25 and Fe 415. [18]

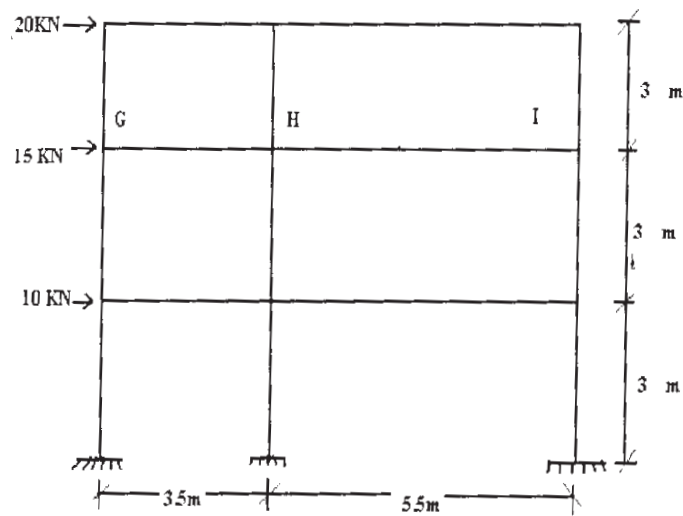


Fig 2

- Q7) a)** State the Necessity of Combined footing and mentioned situations where it is to be provided. [5]
- b)** Design a Rectangular water tank resting on ground of 3.0 lack Liter capacity, open at top, the joint between wall and base slab is rigid, taking L/B ratio as 1.75 the safe bearing capacity of supporting strata is 200KN/m<sup>2</sup>, Design the wall and bottom slab of the tank. Draw details of reinforcement, use approximate method. [20]

OR

**Q8)** Design a T-Shape Cantilever retaining wall with following data

**[25]**

- a) Height of soil to be retained above base = 4.5m
- b) Unit weight of Soil = 17 KN/m<sup>3</sup>
- c) Angle of repose = 32°
- d) SBC of Soil = 200KN/m<sup>2</sup>
- e) Coeff. of friction between base & soil = 0.45
- f) Material - M25 & Fe -500
- g) Leveled Backfill

Show all necessary stability checks & details of reinforcement in stem, heel & toe.





Total No. of Questions : 12]

SEAT No. :

**P4627**

[4759] - 30

[Total No. of Pages :2

**B.E. (Civil)**

**PLUMBING ENGINEERING**

**(Open Elective) (Semester - II) (2008 Course) (401008)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two Sections should be written in separate answer books.*
- 2) *Answer three questions from section I and three questions from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Describe the role of Plumbing Contractor while executing plumbing work in plumbing system engineering. [7]
- b) Write a note on Green Plumbing. State the norms of water quality as per CPCB. [11]

OR

- Q2)** a) Describe the role of Plumbing Consultant while executing plumbing work in plumbing system engineering. [7]
- b) State various codes available for plumbing. What are prohibited fittings? How coordination with other agencies play important role in execution of plumbing work. [11]

- Q3)** a) State various plumbing tools. Explain any three plumbing tools with neat sketch. [7]
- b) Define HDPE, CPVC, PEX MDPE, GI Pipes, stainless steel pipes, copper pipes, PPR and Rigid PVC pipes. [9]

OR

***P.T.O.***

- Q4)** a) State various pipe jointing methods. Explain any three methods. [7]  
b) What are standard plumbing fixtures explain any three with neat sketch. [9]

- Q5)** a) What is grease trap and how does it work, Explain with neat sketch. [8]  
b) What is grease interceptor and how does it work. Explain with neat sketch. [8]

OR

- Q6)** a) What are the reasons for broken plumbing trap seals. [8]  
b) What is Venting. Explain wet venting with neat sketch. [8]

### **SECTION - II**

- Q7)** a) Explain the procedure for laying sewer pipes also state standard slope for 100mm, 150mm, 200mm, 250mm for a velocity of 0.75 m/s. [9]  
b) Explain Hydraulic test, air test and smoke test for sewer line. [9]

OR

- Q8)** a) Explain types of residential drainage system. What is DFU? [9]  
b) Why inspection chambers are necessary and how sewer line is vented. What is the purpose of sewer trap. [9]

- Q9)** a) Explain the design steps of Rain water harvesting system and explain RWH design problem with suitable example. [8]  
b) State four types of solar collectors and explain any two. [8]

OR

- Q10)** a) What is active and passive solar heating system? Explain advantages and disadvantages of both. [12]  
b) Draw a neat sketch of RWH System and explain filtration and storage in detail. [4]

- Q11)** a) Explain Installation of Ultra 250, 315, 355 and 450 Nu-Drain with sketch. [8]  
b) State general design principles for high rise building plumbing. [8]

OR

- Q12)** a) Explain the necessity of nahani trap, gully trap, manhole, soak pit, grease trap and septic tank. Draw a neat labeled sketch of manhole in sewer line. [8]  
b) State design issues for tall buildings plumbing. [8]

Total No. of Questions : 12]

SEAT No. :

P3907

[Total No. of Pages : 6

[4759] - 300

**B.E. (Polymer Engineering)**

**PRODUCTION PLANNING AND CONTROL (Backlog)**

**(Elective - II) (Semester - I) (2008 Pattern)**

*Time : 3 Hours]*

*[Maximum Marks : 100*

*Instructions to the candidates:*

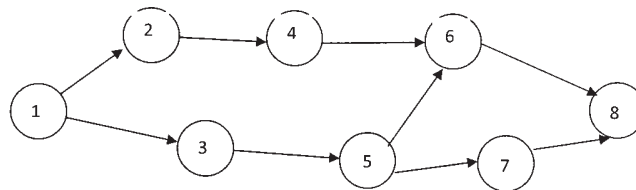
- 1) *Answers to Section - I and Section - II should be written on separate answer book.*
- 2) *Solve 3 questions from Section - I and 3 questions from Section - II.*
- 3) *Neat diagrams should be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION - I**

- Q1) a)** Using graphical method, for each machine find the job which should be done first. Calculate the total time required to complete both jobs. [8]

Job 1	Sequence of Machines	A	B	C	D	E
		3	2	4	6	3
Job 2	Sequence of Machines	C	A	D	E	B
		5	3	2	1	1

- b) For the network shown, activity times are given below. Find the variance.[8]

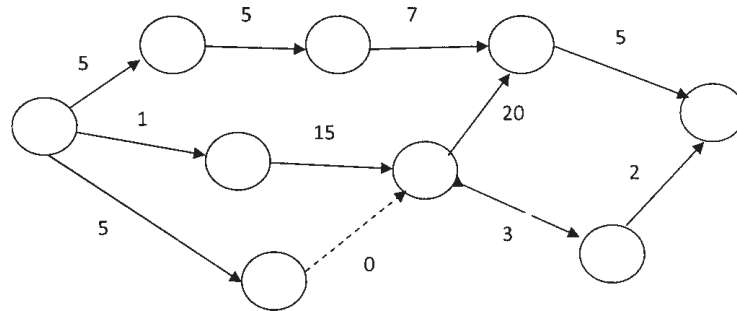


Activity time	Optimistic	Pessimistic	Most likely
1 – 2	10	15	11
1 – 3	15	20	17
2 – 4	5	8	7
3 – 4	5	8	6
3 – 5	3	5	4
4 – 6	10	15	8
5 – 7	5	7	6
6 – 8	4	6	5
7 – 8	10	15	12

**P.T.O.**

OR

- Q2) a)** Number the nodes using Fulkerson's rule and find critical path. Activity time/durations are indicated on the network. [8]



- b) Write a short note on Resource leveling in PERT/CPM. [8]

- Q3) a)** The probability distribution of monthly sales of a certain item is as follows

Monthly sales, D	0	1	2	3	4	5	6
Probability	0.02	0.05	0.30	0.27	0.20	0.10	0.06

The cost of inventory is Rs. 10 per unit per month. The current policy is to maintain a stock of four items at the beginning of each month. Assuming that the cost of shortage is proportional to both time and quantity short, obtain the imputed cost of shortage of one time for one time unit. [8]

- b) A manufacturing company requires a component at the annual average rate of 1000 units. Placing an order costs Rs. 480 and has a 5 day lead time. Inventory holding cost is estimated at Rs. 15 per unit/year. The plant operates 250 days/year. It is assumed that daily demand is normally distributed with an average of 4 units with a standard deviation of 1.2 units. Suggest an inventory policy to control the inventory item based on 95 percent service level. [8]

OR

- Q4) a)** The production department for a company requires 3,600 kg of raw material for manufacturing a particular item per year. It has been estimated that the cost of placing an order is Rs. 36 and the cost of carrying inventory is 25 percent of the investment in the inventories. The price is Rs. 10 per kg. the purchase manager wishes to determine an ordering policy for raw material. [8]

- b) Write as short note on ABC analysis. [8]

- Q5) a)** Write advantages of statistical quality control [5]
- b) For a polymer casting product number of air bubbles were inspected by random selection. The number of air bubbles (Defects) is given below. Draw control chart and draw conclusion. [7]

Sample order	Defects	Sample order	Defects
1	4	8	5
2	5	9	3
3	6	10	6
4	2	11	2
5	1	12	3
6	3	13	2
7	4	14	1

- c) Explain the role of acceptance sampling. [6]

OR

- Q6) a)** Explain the use of C - chart and R - chart. [6]
- b) Explain step by step double sampling. [6]
- c) Write in short about operating characteristics (OC) curve. [6]

**SECTION - II**

- Q7) a)** Three auditors of the firm are required to execute three projects. The project requirements in hours i.e. billing amount in Rs./hour is given below. Solve this unbalanced transportation problem. [8]

Auditor	Project			Availability
	I	II	III	
1	1200	1500	1900	160
2	1400	1300	1200	160
3	1600	1400	1500	160
Requirement	130	140	160	-

- b) In the modification of a plant layout of a factory four new machines M1, M2, M3 and M4 are to be installed in a machine shop. There are five vacant places A, B, C, D and E available. Due to limited space, machine M2 cannot be placed at C and M3 cannot be placed at A. The cost of locating a machine at a place (in hundred rupees) is given below. Find the optimal assignment schedule. [8]

Machine	Location				
	A	B	C	D	E
M1	9	11	15	10	11
M2	12	9	-	10	9
M3	-	11	14	11	7
M4	14	8	12	7	8

OR

- Q8) a) A manufacturer wants to ship 22 loads of his product as shown below. The matrix gives the kilometers from sources of supply to the destinations. [8]

		Destination					
		D1	D2	D3	D4	D5	Supply
Source	S1	5	8	6	6	3	8
	S2	4	7	7	6	5	5
	S3	8	4	6	6	4	9
	Demand	4	4	5	4	8	25 / 22

Shipping cost is Rs. 10 per load per km. What shipping schedule should be used to minimize total transportation cost?

- b) Find the optimal assignment for the assignment problem with cost matrix given below – [8]

	I	II	III	IV
A	5	6	1	8
B	7	9	2	6
C	6	4	5	7
D	5	7	7	6

- Q9)** a) Two typists have similar job profile of typing letters dictated by manager. If the letters to be typed arrive randomly (following Poisson distribution) at a rate of 3 nos. /hr for each typist and each one can type 4 letters/hr (following Exponential distribution) – [9]
- 1) What is the expected waiting time for a letter (time before work is started on a letter) assuming that each typist does its own work?
  - 2) Suppose that 2 typists are 'pooled' i.e. letters are sent to two typist together and are typed by whoever is free, in order of arrival. What is the expected time for a letter under this arrangement?
- b) On an average 96 patients per 24 hour day require the service of an emergency clinic. Also on average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average servicing time of 10 minutes and that each minute of decrease in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by clinic to decrease the average size of the queue from  $1\frac{1}{2}$  patients to  $\frac{1}{2}$  patient. [9]

OR

- Q10)** a) Workers come to tool store room to receive special tools (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed in Poisson distribution. The average service time of the tool room attendant is 40 seconds. [9]

Determine –

- i) average queue length
- ii) average length of non-empty queues
- iii) average number of workers in the system including worker being attended
- iv) average waiting time of an arrival (worker) who waits
- v) mean waiting time of an arrival
- vi) the type of policy to established. Assume the charges of a skilled worker Rs. 4 per hour and that of store room attendant Rs. 0.75 per hour.

b) Mortality rate of an electronic component in a device is as given below-

Period	Age of failure	Probability of failure
1	0 – 200	0.1
2	201 – 400	0.26
3	401 – 600	0.35
4	601 – 800	0.22
5	801 – 1000	0.01

Cost of replacement is Rs. 15 per component. Group replacement is possible at fixed interval in night shift. Replacement of individual component which fails in service is Rs. 60 per component. How frequently should the components be replaced? [9]

Q11) a) Solve the following game by linear programming. [8]

	B1	B2	B3	Row min.
A1	3	-1	-3	-3
A2	-2	4	-1	-2
A3	-5	-6	2	-6
Column max.	3	4	2	

b) For any  $2 \times 2$  two person zero sum game without saddle point, having payoff matrix for player A as given below, find the optimal mixed strategies and the value of the game [8]

		Player B	
		B1	B2
Player A	A1	a11	a12
	A2	a21	a22

OR

Q12) a) In a game of matching coins, player A wins Rs. 2 if there are two heads, wins nothing if there are two tails loses Rs. 1 when there are one head and one tail. Determine the payoff and matrix, best strategies for each player and the value of game A. [8]

b) Write a short note on [8]

- i) Decision free analysis
- ii) Decision making with utilities.





Total No. of Questions : 12]

SEAT No. :

**P4275**

[Total No. of Pages : 2

**[4759] - 301**

**B.E. (Polymer Engineering) (Semester - I)  
SURFACE COATINGS AND ADHESIVES (BACKLOG)  
(2008 Pattern) (Elective- II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to Section - I and Section - II should be written on separate answer book.*
- 2) *Solve 3 questions from Section - I and 3 questions from Section - II.*
- 3) *Neat diagrams should be drawn whenever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION - I**

- Q1)** a) Explain the terms - Paint, Varnish, Enamel, Liquor. [6]  
b) Write as short note on classification of oils used in surface coatings. [5]  
c) Briefly discuss various fillers and extenders used in coating applications. [7]

OR

- Q2)** a) With suitable examples explain the role of anti-settling agents and corrosion inhibitors in surface coating. [6]  
b) With flow diagram explain various stages involved in paint manufacture. [6]  
c) Comment on chemical properties of oils used in surface coatings. [6]

- Q3)** a) Briefly discuss about Emulsion paints. [8]  
b) Write short note on Use of Epoxy resins and Silicone resins for coating applications. [8]

OR

- Q4)** a) Write a short note on Water based paints. [6]  
b) Compare between surface coatings based on natural polymers and synthetic polymers. [6]  
c) Briefly discuss about rubber based coatings. [4]

**P.T.O.**

- Q5)** a) What are quality control measures taken in paint industry? Explain w.r.t. viscosity, gloss, mechanical properties, colour retention. [8]  
b) Comment on factors affecting physical, chemical and mechanical properties of paint films. [8]

OR

- Q6)** a) Explain the terms - spreading time, spreading capacity, wet capacity, dry hiding characteristics. [8]  
b) Comment on factors affecting viscosity of coating formulation. [4]  
c) Explain the concept of Newtonian and Non-Newtonian behaviour. [4]

**SECTION - II**

- Q7)** a) Discuss merits and demerits of adhesive joint. [9]  
b) Explain in detail the Adhesive selection process. [9]

OR

- Q8)** a) Explain in detail Wettability theory of adhesion. [9]  
b) Comment on significance of surface energy in adhesion. [9]

- Q9)** a) Write a short note on Structural and Non-structural adhesives. [8]  
b) Discuss various ingredients of adhesive formulation alongwith their functions. [8]

OR

- Q10)**a) Write a short note on Starch and Natural Gum Resins based adhesives. [8]  
b) Discuss in detail Silicones based elastomeric adhesives. [8]

- Q11)**a) Write a short note on Mechanical testing of adhesive joint. [8]  
b) Briefly discuss about cohesive and adhesive failure. Comment on their significance. [8]

OR

- Q12)**a) Explain how surface characteristics affect adhesive joint. [8]  
b) Write a short note on Corona treatment used for polymeric films. [8]



Total No. of Questions : 12]

SEAT No. :

P3908

[Total No. of Pages : 3

[4759] - 302

**B.E. (Polymer Engineering)**  
**PACKAGING TECHNOLOGY**  
**(Elective - II) (Semester - I) (2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer to Section - I and Section - II should be written on separate answer book.*
- 2) *Solve 3 questions from Section - I and 3 questions from Section - II.*
- 3) *Neat diagrams should be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION - I**

- Q1)** a) Enlist characteristics of packaging. [8]  
b) What are various non - polymeric materials used for packaging? Explain any one. [8]

OR

- Q2)** a) Briefly comment on essential functions of packaging. [8]  
b) Comment on polymers as packaging materials. Give suitable examples. [8]
- Q3)** a) Comment on significance of life cycle assessment. [5]  
b) Briefly explain child resistant packaging. [4]  
c) Explain in detail following methods of inspection. [9]  
i) Basic photo electric sensor.  
ii) Laser sensors and scanning sensor.

OR

- Q4)** a) Explain in detail following methods of inspection. [9]  
i) Machine vision system.  
ii) Tracing, packing and tracking.  
b) Write a short note on “Reduce - Reuse - Recycle” technology. [9]

**P.T.O.**

- Q5)** a) Explain the concept of Modified Atmosphere Packaging (MAP) and Controlled Atmosphere Packaging (CAP) [8]
- b) For a 150g packet of peanuts packed in PVDC film, the allowable oxygen gain is 20 ppm. The thickness of the film is 30  $\mu\text{m}$  while surface area is 200  $\text{cm}^2$  with permeability constant (P) is 30  $\text{cm}^3 \mu\text{m}/\text{m}^2\text{d. atm}$  at the storage temperature. What will be the shelf life of peanuts? Assume that there is no oxygen initially inside the package. [8]

OR

- Q6)** a) A multilayer film used for milk pouch was made up of 50  $\mu\text{m}$  HDPE and 75  $\mu\text{m}$  LDPE. Calculate overall permeability constant for oxygen if the oxygen permeability constants are  $4.0 \times 10^4 \text{ cm}^3 \text{ mm}/\text{m}^2\text{d. atm}$  and  $5.0 \times 10^4 \text{ cm}^3 \mu\text{m}/\text{m}^2\text{d. atm}$  for HDPE and LDPE respectively. [8]
- b) Briefly explain Gas Permeation and Sorption/Diffusion interactions observed in packing. [8]

### SECTION - II

- Q7)** a) Explain the how tear strength of packaging material is tested. [8]
- b) Explain the concept of barrier properties and their relevance in packaging. [10]

OR

- Q8)** a) Enlist various mechanical properties useful for packaging application. Comment on their importance. [10]
- b) Write a short note on biological properties of packaging materials. [8]

- Q9)** a) Explain in detail the methods to find out sulphate and chloride contents of packaging materials. [8]
- b) How sizing of the packaging is carried out? [4]
- c) Explain the concept of microbes - sensitivity. [4]

OR

- Q10)** a) Comment on thermal properties important for packaging applications. [8]
- b) Enlist various chemical properties to be considered for packing material. Explain any one in brief. [8]

- Q11)** a) Enlist types of crown - corking. Explain any one in detail. [8]  
b) What are the various stages of bottle filling lines? Explain these briefly.[8]

OR

- Q12)** a) Write a short note on bio - based and biodegradable packaging materials.[8]  
b) Enlist at least 3 natural as well as synthetic packaging materials. Give their applications. [8]



Total No. of Questions : 12]

SEAT No. :

**P3724**

**[4759]-303**

[Total No. of Pages : 5

**B.E. (Polymer)**

**PRODUCT DESIGN AND POLYMER TESTING**

**(2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Write a note on concurrent engineering approach in product design. [6]
- b) A simply supported square beam with width and depth of 25 mm is made of nylon. The beam is loaded at the centre with 150 N force. The length of the beam is 120 mm. Find the stress in the beam and deflection after 100 hours if the maximum strain should not exceed 2%. Refer to figure 1. [6]
- c) What are creep curves and isometric curves? [4]

OR

- Q2)** a) Explain pseudoelastic design method for plastic product design. [6]
- b) Determine the suitable thickness and hoop and axial strain in a cylindrical tank if the mean diameter of the tank is 750 mm. The tank is subjected to an internal pressure of 0.36 MPa. The maximum strain should not exceed 1.5% in 5000 hours. Refer to figure 1. [6]
- c) List the various steps used in plastic product design. Explain the end use analysis step in details. [4]

**P.T.O.**

- Q3)** a) Discuss the method of high frequency dielectric welding. [6]
- b) Write a short note on self tapping screws. [4]
- c) Discuss failure modes of plastics in pin bearing test. [6]
- Q4)** a) Discuss the method of ultrasonic welding and induction of plastics. [8]
- b) A thermoplastic elastomer sleeve is to be press fitted on a solid bobbin made of polycarbonate. The outside diameter of the solid circular bobbin is 100 mm and width is 25 mm. The sleeve thickness 5 mm. The modulus of polycarbonate is 2.6 GPa and modulus of elastomeric sleeve is 100 MPa. Assume Poisson's ratio of both the sleeve and bobbin to be 0.3. The assembly is to be shrink fitted with initial contact pressure of 2 kg/cm<sup>2</sup>. Calculate the radial interference required to be given. If the same sleeve with the same interference is to be fitted on a solid steel bobbin of same dimensions, what would be shrink fit stress? Take steel Poisson's ratio as 0.3 and elastic modulus as 210 kN/mm<sup>2</sup>. [8]
- Q5)** a) Explain high strain rate tensile test method to co-relate the impact properties. Explain also co-relation with toughness. [6]
- b) Write in short about primary creep, secondary creep and tertiary creep. [6]
- c) Explain any ASTM test method used to evaluate compressive properties of polymers. Draw a neat sketch of the fixture. [6]
- OR
- Q6)** a) Explain the test method used for evaluating coefficient of linear thermal expansion. [6]
- b) Define vicat softening point, heat distortion temperature and fatigue resistance. [6]
- c) Explain various methods used for measuring strain and elongation on a tensile testing machine. Discuss its limitations with respect to accuracy. [6]

## SECTION - II

- Q7)** a) Give examples wherein permeability needs to be checked. What are the factors that affect permeability? [5]
- b) Define specific gravity and density. Explain the method of determination of specific gravity for product form as well as for powders. [8]
- c) Explain when water absorption test is required with few examples with the test procedure. Also how is it different to moisture analysis test. [5]

OR

- Q8)** a) What is the importance of nondestructive testing? Explain pulse echo method with proper diagram. [8]
- b) Explain the term burst strength and mention the products for which it is tested. [5]
- c) Give few applications of rigid and flexible foam and explain the significance of resilience value as well as water absorption value for foams. [5]
- Q9)** a) What are the different ways to make polymers conductive? Give few applications where polymers are required to be conductive. [4]
- b) What is meant by photoelastic properties and what information can one get using this property. [5]
- c) Explain refractive index and what information does it provide. Give the working of Abbes refractometer with the diagram. [7]

OR

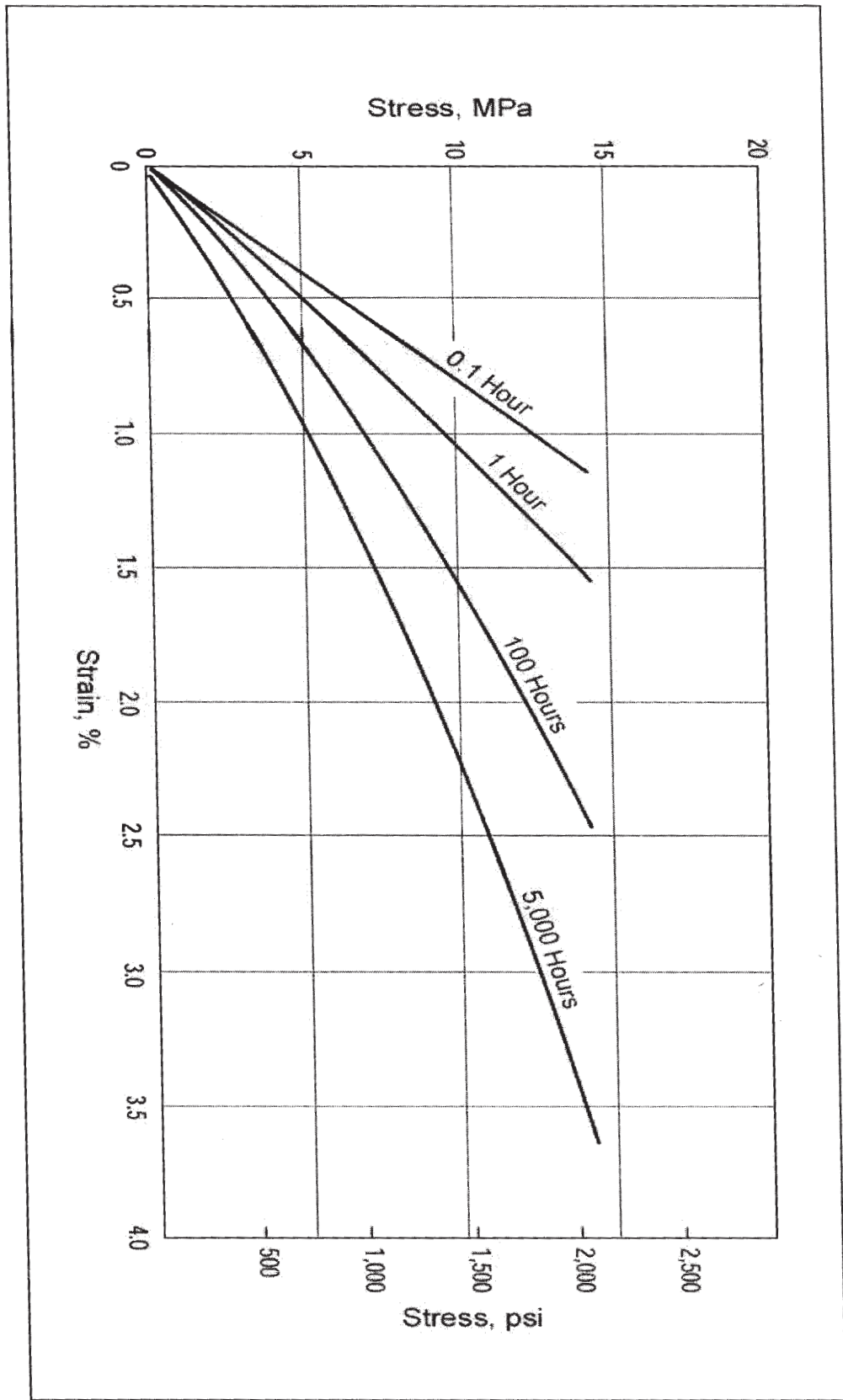
- Q10)**a) Explain what is the significance of volume and surface resistivity. Give the procedure used by ASTM to find both. [5]
- b) Explain the terms EMI Sheilding and dissipation factor. [5]
- c) Explain how haze is found out and give working details of the equipment used to find percentage haze. [6]



- Q11)**a) Explain for which all applications is it necessary to do the chemical testing and what is the role of molecular structure towards chemical resistance. Explain the test procedure for stain resistance of polymers. **[6]**
- b) What is meant by weathering resistance and list down the major environmental factors that lead to environmental degradation. **[5]**
- c) Explain the procedure for oxygen index test procedure and when it need to be carried out. **[5]**

OR

- Q12)**a) Give the test procedure for accelerated outdoor weathering and mention for which applications this test is required. **[6]**
- b) Explain morphologically what leads to failure due to ESCR. **[5]**
- c) Explain the procedure carried out to check resistance of plastics to fungi and bacterial growth. **[5]**



CCC

Total No. of Questions : 12]

SEAT No. :

**P3725**

**[4759]-304**

[Total No. of Pages : 7

**B.E. (Polymer)**

**MOLD AND DIE DESIGN-II**

**(2008 Course) (Semester-II)**

*Time : 4 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1) a)** Sketch any 2 products which can be ejected using the following mechanisms: **[5]**
- i) Withdrawing rotating core.
  - ii) Axially fixed rotating core.
- b) With the help of neat sketch, explain how loose threaded cores are used for ejection of internally threaded components for small production run. **[8]**
- c) With a neat sketch through the mold cross-section, explain the working of an axially fixed rotating core used in ejection of threaded components. **[5]**

OR

- Q2) a)** With a neat sketch, explain the rotating cavity design for unscrewing threaded components. **[6]**
- b) With neat sketch, discuss the various systems used for actuating the rotation of threaded cores used in unscrewing molds. **[6]**
- c) Explain the ejection of threaded components using collapsible cores with neat sketches. **[6]**

***P.T.O.***

- Q3)** a) A two cavity hot runner mold has a centre distance between the nozzles as 635 mm. The value of coefficient of thermal expansion of steel is  $13 \times 10^{-6}$  mm/mm °C. The manifold block is heated from 20 °C to 230 °C. Calculate increase in dimensions between the secondary nozzles. Also, draw a cross- section of the mold that will be used showing the cavity, secondary nozzle, manifold and flow way. [6]
- b) For a 16 cavity mold, calculate the material saving per cycle if the secondary and tertiary runners are converted to hot runners. Dimensions of main runners are 8 mm diameter and 80mm length; secondary runner 6mm diameter and 85mm length and tertiary runners 3 mm diameter and 15 mm length. The material processed is PP. Refer to figure 4. [6]
- c) Discuss in details the limitations of hot runner molds. [4]

OR

- Q4)** a) With a neat sketch, explain the construction of torpedo type hot runner nozzle. [4]
- b) Discuss low voltage resistance heating and induction heating of hot runner molds. [4]
- c) Sketch a cylindrical manifold block indicating hot sprue bush, flow way and nozzle. [4]
- d) Discuss the expansion problem associated with design of hot runner manifold. [4]

- Q5)** a) Explain the factors taken into consideration while designing molds for thermoforming. [6]
- b) List the different types of compression molds. Describe any two with neat figures. [10]

OR

- Q6)** a) Write a note on designing of blow molds. [6]
- b) Explain the constructional features of transfer molds. [6]
- c) Write a note on design considerations for parison dies. [4]

## SECTION-II

**Q7)** Design a 2 cavity mold for the component shown in figure A. Draw at least two views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [30]

OR

**Q8)** Design a 2 cavity mold for the component shown in figure B. Draw at least two views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [30]

**Q9)** With a neat figure, explain the constructional features of a coat hanger sheet die. [10]

OR

**Q10)** Calculate the pressure drop along PQ and PRS through a coat hanger film die shown in figure 3. [10]

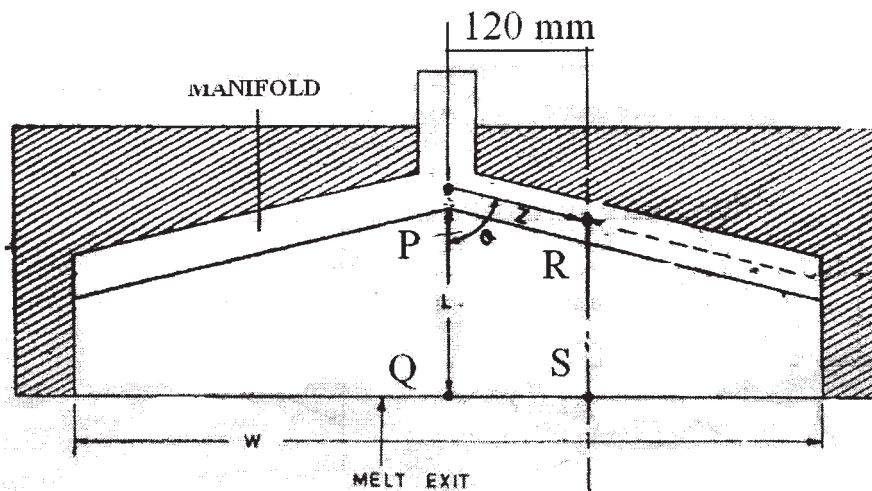


FIGURE 3

Film width is 680 mm and thickness 0.035 mm. The material obeys power law with flow behavior index,  $n = 0.33$  and  $k = 600 \text{ kg(f)s}^{0.33} / \text{m}^2$ . Melt density is 0.72 g/cc, extruder size = 75 mm, extruder output = 45 kg/hr. The manifold angle  $\theta = 55^\circ$  and  $\alpha = 3^\circ$ . Assume suitable data.

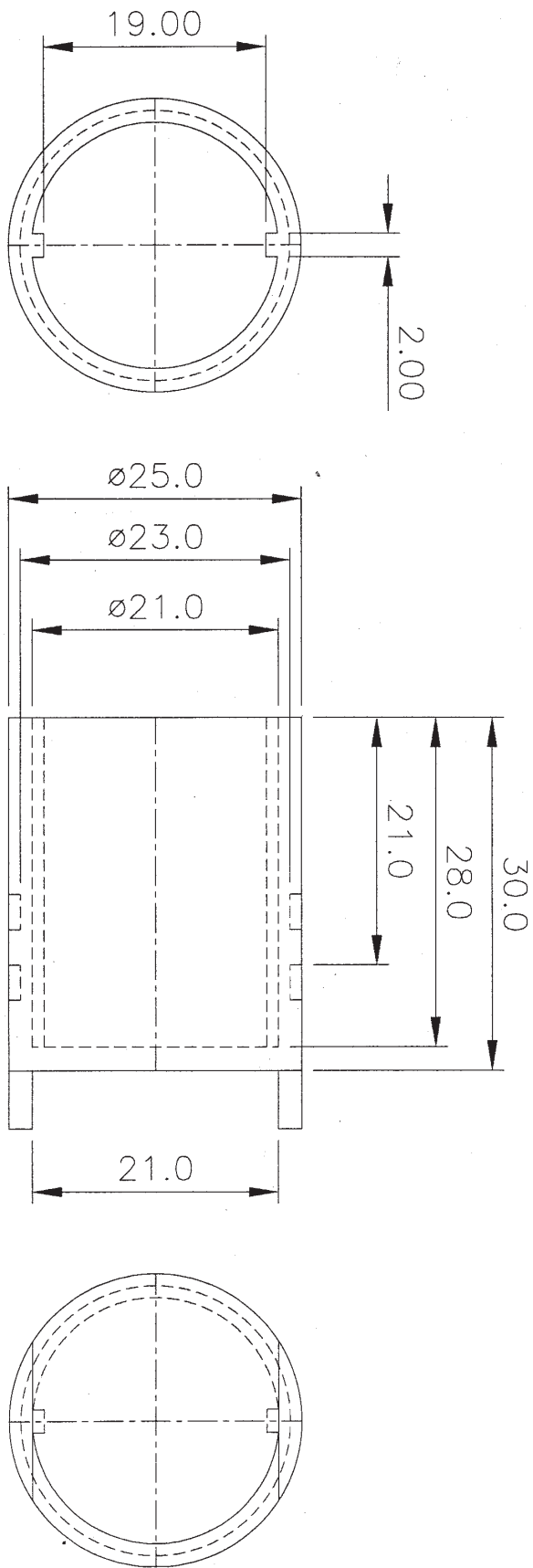
**Q11)a)** Write a detailed note on packing analysis used in simulation of injection molding process. **[6]**

b) Discuss the concept of mathematical model used in simulation software. **[4]**

OR

**Q12)**List the various three parameter and four parameter rheological models used. Explain any two in details. **[10]**

Fig. A  
 Material : PP  
 Shrinkage: 1.8%  
 Cavity pressure: 300—350kg/cm<sup>2</sup>



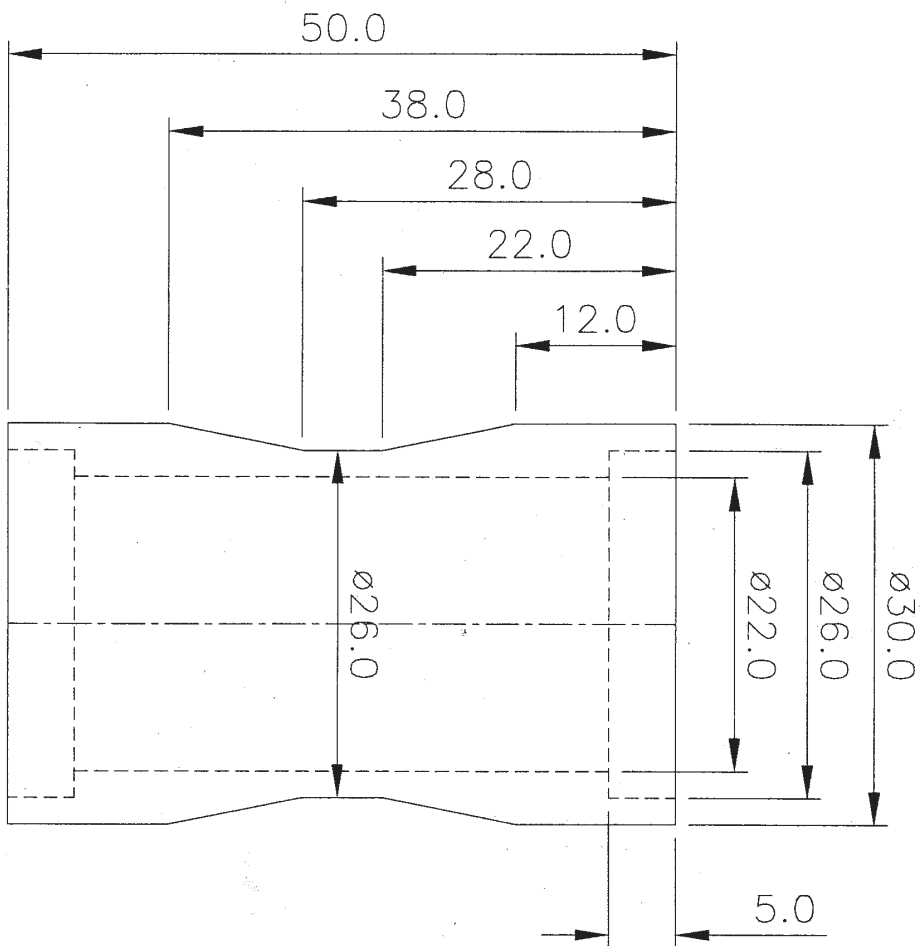


Fig. B

Material : PVC

Shrinkage: 0.5%

Cavity pressure: 300–350Kg/cm<sup>2</sup>



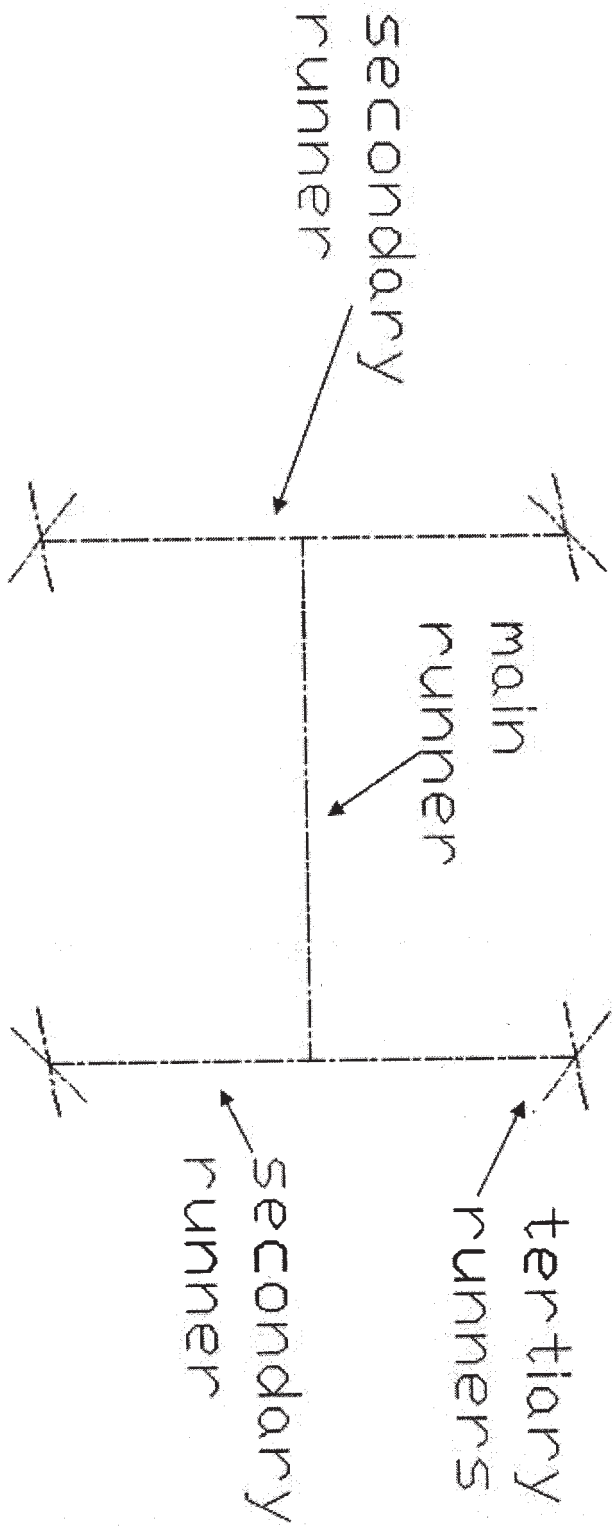


Figure 4



Total No. of Questions : 12]

SEAT No. :

**P3726**

**[4759] - 305**

[Total No. of Pages :3

**B.E. (Polymer)**

**POLYMER PHYSICS & CHARACTERISATION**

**(Semester - II) (2008 Pattern) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Your answers will be valued as a whole.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Following samples are given for FTIR. Give the difference seen in respective spectra that helps in identifying the polymer **[5]**
- |           |                        |
|-----------|------------------------|
| i) PS     | ii) PP                 |
| iii) PTFE | iv) Poly vinyl alcohol |
| v) Nylon  |                        |
- b) Explain the chart used for FTIR in detail to identify polymers. **[8]**
- c) Give the significance of ATR method along with its working. **[5]**

OR

- Q2) a)** What are the different methods of sample preparation for FTIR. **[8]**
- b) What are the different types of vibrational modes seen in FTIR. Explain with diagram. **[6]**
- c) Explain how mixtures and copolymers are identified using FTIR technique. **[4]**

- Q3) a)** Explain spin-spin coupling in  $^1\text{H}$  NMR with an example **[8]**
- b) Explain the concept of shielding and deshielding with examples. **[8]**

OR

*P.T.O.*

- Q4)** a) Explain the basic principle of NMR. With a neat sketch, explain the construction of NMR spectroscope. [8]  
b) Write a note on  $^{13}\text{C}$  NMR. [4]  
c) Enlist applications of  $^{13}\text{C}$  and  $^1\text{H}$  NMR. [4]

- Q5)** a) Explain the terms chromatography, hydrodynamic volume, radius of gyration and mean square end to end distance for polymer molecules. [6]  
b) Explain the basic principle of HPLC. List the important components of the HPLC instrument. Also, list the applications of HPLC. [6]  
c) Explain the concept of universal calibration in GPC? [4]

OR

- Q6)** a) How are X-rays generated? State Bragg's law. Explain the terms WAXS and SAXS in details. [8]  
b) Write a detailed note on the various types of detectors used in GPC. [8]

### SECTION - II

- Q7)** a) What are the 3 modes of imaging by AFM. Explain any one in detail. What kind of information is provided by AFM. [9]  
b) How does electron microscope work. How is it different that ordinary microscope. [9]

OR

- Q8)** a) Give the working of SEM and explain why coating is required? [9]  
b) Explain the terms: Lamella, and spherulite structures in polymers. [4]  
c) What information does contact angle give and how can it be measured. [5]

- Q9)** a) Give the working principle for DSC. What are the details obtained from DSC. [8]  
b) What is MDSC and what information does it provide. [4]  
c) What is the significance of isothermal scans obtained with DSC. [4]

OR

- Q10)**a) Give the working of TGA and what all information is provided by it. **[8]**
- b) Explain how DMA works and what information does it provide. **[4]**
- c) Explain glass transition and its mechanism. Why crystalline polymers do not show T<sub>g</sub>. **[4]**

- Q11)**a) What is Dielectric analysis. Explain with an example how this technique is used to understand the various transitions in polymers. **[8]**
- b) Explain the terms reflection, refraction and birefringence. **[8]**

OR

- Q12)**a) Explain the terms breakdown voltage, volume resistivity and surface resistivity. **[6]**
- b) Explain the terms molecular polarization, dipole polarization, relative permittivity. **[6]**
- c) List atleast three transparent polymers. Also state their refractive index. How is the refractive index related to relative permittivity? **[4]**



Total No. of Questions : 12]

SEAT No. :

**P3337**

**[4759] - 306**

[Total No. of Pages : 3

**B.E. (Polymer Engineering)**  
**PROCESSING OF COMPOSITES**  
**(2008 Pattern) (Elective - III (b))**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Numbers to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

**SECTION - I**

- Q1) a)** Discuss various types of reinforcements used in composites with neat sketches. Explain in detail with any two examples of natural fibers as a reinforcement material in composites. **[12]**
- b) Discuss various chemical factors that influence heat resistance of thermoplastic polymer composites required for design of high temperature applications. **[6]**

OR

- Q2) a)** Explain in detail with any two examples of Thermoplastic based composite materials. **[12]**  
Determine the maximum fiber volume fraction that can be packed in following arrangement: Assume that the fibers in a composite lamina are arranged in a square array with fiber at the corner.
- b) Calculate in-plane shear modulus of a composite made of polycarbonate reinforced with 20% of glass fiber. Take Young's modulus for fiber as 82.7 GPa and that of matrix as 2.18 GPa. Consider Poisson's ratio for fiber as 0.22 and that of matrix as 0.35. **[6]**

**P.T.O.**

- Q3)** a) Write a note on “Gel time Study for Thermoset”. [8]  
b) Write basic steps of hydro-thermoforming process. Mention the applications of spray layup and wet layup process. [8]

OR

- Q4)** a) Write a short note on Bulk Molding Compounds. [8]  
b) Explain in detail - Metal matrix composites. [8]

- Q5)** a) List the process parameters affecting Autoclave Processing. Explain the relation between Pressures, Temperature & Resin Viscosity with autoclaving time. Also discuss the flow sub-model as applied to autoclave processing. [12]  
b) What is de-bulking operation? Explain the advantages of de-bulking operation. [4]

OR

- Q6)** Explain with applicable diagrams in detail structural reaction injection moulding and Discuss resin transfer moulding in short. [16]

### **SECTION - II**

- Q7)** a) With a neat sketch, explain the pre-preg lay up during autoclave processing. Discuss the significance of each component in the layup set-up. [8]  
b) Discuss resin requirement for Pultrusion process and Explain with neat diagram in detail Pultrusion Process and its advantages and disadvantages. [8]

OR

- Q8)** a) What is the effect of pulling die resistance on Pultruded products. [8]  
b) Discuss the applications of Thermoset and Thermoplastic Pultrusion process. [8]

**Q9)** Discuss in detail the process of Filament Winding and any one process model for the same. Discuss the effect of various process parameters on filament wound products. **[16]**

OR

**Q10)a)** Discuss advantage of adhesive joints and mechanicals joints. List and discuss surface preparation guidelines for adhesive bonding. **[8]**

b) Discuss any two method used for Machining of composites. **[8]**

**Q11)** Explain classification of nano-particles and with two case studies explain in detail Polymer nanocomposites. Give different possible morphologies of carbon nano fibers. **[18]**

OR

**Q12)a)** Write in short about functionalization of carbon nano tubes and nano clay. Discuss any one method for production of carbon nano tubes. **[12]**

b) Differentiate between Polymer Nano-composites with other normal composites. **[6]**



Total No. of Questions : 12]

SEAT No. :

**P4623**

[Total No. of Pages : 3

[4759] - 307

**B.E. (Polymer Engineering) (Semester - II)**  
**SPECIALTY POLYMERS AND APPLICATIONS (Elective - III)**  
**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to Section - I and Section - II should be written on separate answer book.*
- 2) *Solve 3 questions from Section - I and 3 questions from Section - II.*
- 3) *Neat diagrams should be drawn whenever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION - I**

- Q1)** a) Explain how liquid crystalline state is different from solid and liquid state? What are rigid rod-like (RRL) molecules? Discuss about the role of RRL structure in forming liquid crystalline phase. [5]
- b) Discuss about Role of Rheology on LCP processing. [6]
- c) Briefly comment on the mobility of rigid rod-like molecules in terms of diffusivities, and their role in polymerization of RRL molecules. [5]

OR

- Q2)** a) Explain with examples why aromatic polyamides can form liquid crystalline state while aliphatic polyamides cannot. [5]
- b) Mention major industrial applications of LCPs. [5]
- c) Carry out properties comparison for thermoplastics and thermotropic LCPs. [6]
- Q3)** a) With suitable example explain in detail electrochemical route to synthesize conducting polymers. [7]
- b) Briefly comment on Use of conducting polymers in photovoltaic cells. [5]
- c) What do understand by intrinsically and extrinsically conducting polymers? Give appropriate examples. [4]

**P.T.O**



OR

- Q4)** a) Explain how band gap concept plays a role in defining the material as electrical insulator, semi-conductor or conductor. [6]
- b) Comment on relevance of doping process in conducting polymers. [4]
- c) Explain the terms - Thermochromism, Solvatochromism, Electrochromism. [6]
- Q5)** a) With suitable examples and schematic thermogram explain how thermogravimetric analysis technique can be used to determine thermal stability of polymers. [6]
- b) Enlist factors affecting polymerization of polyimides. Explain poly(amid-acid) route to synthesize it. [8]
- c) Define the terms Ablative Plastics and Ablative Coating. Mention the polymers used in High density and Low density ablators. [4]

OR

- Q6)** a) Comment on the reversible and irreversible changes observed in polymers w.r.t. requirements for heat resistance. [5]
- b) Briefly comment on the material properties and characteristics affecting performance of ablative materials. [7]
- c) Discuss about various routes to increase thermal/heat stability as well as comment on the most preferred route with justification. [6]

### **SECTION - II**

- Q7)** a) Discuss in detail Polymeric membranes used in Reverse Osmosis process. [6]
- b) Discuss about the usage of p-and n-types of photoresist polymers in pattern making by lithography technique. Draw schematic diagrams. [6]
- c) Briefly explain casting process to manufacture membranes. [4]

OR

- Q8)** a) Explain the concept of photolithography and photoresist polymers. [5]
- b) Write a short note on Mass transfer modes in Membranes. [6]
- c) Briefly discuss about Polymers as Coating additives. [5]

- Q9)** a) Briefly comment on need of biopolymers. Give suitable examples. [6]  
b) Write a short note on Testing of Biodegradable polymers. [7]  
c) Justify why polypropylene can be used in medical applications. [3]

OR

- Q10)** a) Briefly explain the classification of biodegradable polymer. [5]  
b) What are biocatalysts? Briefly discuss about usage of polymers in biocatalyst field. [5]  
c) Explain the working principle of controlled drug delivery. [6]

- Q11)** a) Enlist various properties as well as merits and demerits of polymer concrete. [7]  
b) Write a short note on polymers used in aerospace applications. [6]  
c) Explain the working principle of optical fibers. Enlist polymers used for these applications. [5]

OR

- Q12)** a) Enlist various ingredients present in polymer concrete. Comment on their function. [7]  
b) Discuss about usage of polymers in agriculture w.r.t. control release applications. [6]  
c) Alongwith specific applications enlist polymers used in cosmetics. [5]



Total No. of Questions : 12]

SEAT No. :

P3338

[Total No. of Pages :3

[4759]-309

**B.E. (Polymer Engineering) (Semester - II)**

**Rubber Technology**

**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answer 3 questions from Section I and 3 questions from Section II.*
- 3) *Answer to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*
- 7) *Use of logarithmic tables slide rule, mollier charts electronic pocket calculator and steam tables is allowed.*

**SECTION - I**

- Q1)** a) Discuss the kinetic theory of rubber elasticity. [6]
- b) Discuss the following terms w.r.t rubbers [6]
- i) rebound resilience
  - ii) Storage hardening
  - iii) Strain crystallization
- c) Comment on the structural requirements for any material to behave as a rubber. [6]

OR

- Q2)** a) Write short notes on any one of the following rubbers. [6]
- i) Nitrile rubber
  - ii) SBR
  - iii) Silicone rubber.
- b) With the help of a neat flow diagram explain the different steps in the raw rubber technology or latex technology. [6]
- c) Comment on the thermodynamic Theory of rubber elasticity. [6]

**P.T.O.**

- Q3)** a) Discuss the various steps involved in Making Rubber-to-metal assemblies. What are the reasons for bonding rubber-to-metals. State applications where rubber-to-metal assemblies are used? [8]
- b) Discuss any two of the following additives w.r.t need for their addition, mechanism of functioning and two examples of the same: [8]
- i) Fillers
  - ii) Antioxidants
  - iii) Tackifiers

OR

- Q4)** a) Discuss the three basic methods of mixing rubbers in an internal mixer. [8]
- b) With a neat sketch discuss any two mixing machineries used in & rubber industry. [8]
- Q5)** a) What is vulcanisation? With a neat sketch describe the rheometer curve for vulcanisation. [8]
- b) Write chemical reactions showing vulcanisation of: [8]
- i) Neoprene rubber
  - ii) Silicone rubber
  - iii) Polyisoprene

OR

- Q6)** a) Discuss "sulphur" and "sulphur donors" as vulcanisation systems used with rubbers. [6]
- b) Discuss the various factors that affect vulcanisation. [4]
- c) How are the following properties affected by vulcanisation.
- i) Rebound resilience
  - ii) hardness
  - iii) Swelling
  - iv) Ageing
  - v) Low temperature properties and
  - vi) Compression set

**SECTION -II**

- Q7)** a) Write a short note on injection molding of rubbers. [9]  
b) Discuss all the downstream equipments used in a calendaring line for manufacture of a rubber sheet. [9]

OR

- Q8)** a) Discuss the process of compression molding as used with rubbers. name some products of rubber made by compression molding. [9]  
b) Discuss the various calendar designs stating advantages and disadvantages of each type. [9]

- Q9)** a) Discuss the different components of a type stating the function of each component. [8]  
b) State the three main classes of cellular rubber and differentiate between them. [8]

OR

- Q10)**a) Draw a neat sketch showing the various constructional elements of a cable. State the function of each element. Also discuss with a flow chart the steps in the manufacture of a cable. [8]  
b) Discuss the various steps involved in the manufacture of a rubber glove. State the rubbers used in the manufacture of gloves. [8]

- Q11)**a) Discuss the various tests carried out on unvulcanised rubbers. [8]  
b) Comment on the various ways used to prepare rubber test specimens.[8]

OR

- Q12)**a) Discuss the test procedure for compression set in compression and intension with help of a figure draw test state specimens giving dimensions for the same state one application where this test would be carried out. [8]  
b) Give one application where the test of abrasion needs to be carried out. Also discuss the test procedure in detail. [8]



Total No. of Questions : 12]

SEAT No. :

**P3683**

**[4759] - 30A**

[Total No. of Pages :3

**B.E. (Civil)**

**GREEN BUILDING TECHNOLOGY  
(2008 Course) (Semester - II) (Open Elective)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from section I and Section II.*
- 2) *Figures to the right indicate full marks.*
- 3) *Your answers will be valued as a whole.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain and discuss sustainable site selection criteria. [7]
- b) Discuss the uses of following [3+3+3]
- i) Building layout plan
  - ii) Solar Energy
  - iii) Fresnel Lens

OR

- Q2)** a) Differentiate between direct and indirect lighting. [6]
- b) What is solar concentrator? Discuss. [4]
- c) Why the ventilation is necessary? Explain how natural ventilation utilized. [6]

- Q3)** a) Compare the active and passive architecture. [6]
- b) Explain the concept of Embodied Energy. [5]
- c) Give the selection criteria for material of surface treatment. [6]

OR

**P.T.O.**

**Q4)** a) Explain hybrid system of active and passive refrigeration and air conditioning. [9]

b) Explain the Energy audit of Building in detail. [8]

**Q5)** a) Discuss the Green rating of Building. [8]

b) What you understand by environmental clearance of buildings? Discuss. [9]

OR

**Q6)** a) Discuss the improvement for thermal comfort. [6]

b) Give note on followings [4+3+4]

i) LEED Criteria

ii) USGBC

iii) Carbon credit.

### **SECTION - II**

**Q7)** a) Explain water efficient landscaping. [6]

b) Explain any one method with suitable sketch for bore well recharging. [6]

c) Discuss the minimization of water use. [5]

OR

**Q8)** a) Give the note on following. [3+4+4]

i) Smart water taps

ii) Anaerobic filters

iii) Ion exchanger

b) Discuss about advanced biogas plant. [6]

- Q9) a)** Explain what is indoor environmental quality. [8]
- b) Discuss how the quality of indoor environment is maintained? [9]

OR

- Q10)a)** Differential the following. [4+3]
- i) Adhesives and Sealants
- ii) Paints and Coatings
- b) Discuss the uses of following [4+3+3]
- i) Composite Wood
- ii) Bamboo
- iii) Jute

- Q11)a)** How the recycling of building materials is beneficial? Discuss. [8]
- b) Discuss the Life cycle analysis in brief. [8]

OR

- Q12)a)** Explain the following. [3+3+3]
- i) Operation Phase
- ii) Construction Phase
- iii) Use of Foudry sand
- b) Explain in details about Construction waste management. [7]





Total No. of Questions : 12]

SEAT No. :

P3339

[Total No. of Pages :4

[4759]-310

**B.E. (Polymer Engineering) (Semester - II)**

**Ploymer Thermodynamics and Blends**

**(C) - (Elective - IV)**

**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

**SECTION -I**

- Q1)** a) Explain the terms intensive properties, extensive properties, internal energy and reversible process examples. [8]
- b) Describe first law of thermodynamics and State Limitations of the first law of thermodynamics. [8]

OR

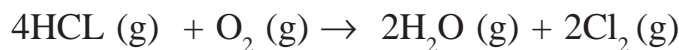
- Q2)** a) Explain in detail Entropy term and state the second law of thermodynamics. [8]
- b) Water flows over a wall 30 meter in height. Take 1 kg of water as the system and assume that it does not exchange any energy with its surroundings. What is the optential energy of water at the top of the wall? What is the kinetic enegy just before it strikes the bottom? [4]
- c) One mole of gas in a closed system undergoes a four-step thermodynamic cycle. Use the data given in the following table to determine numerical values for the missing quantities, [4]

**P.T.O.**

Step	Delta U/J	Q/J	W/J
1-2	-200	?	-6000
2-3	?	-3800	?
3-4	?	-800	300
4-1	4700	?	?
12341	?	?	-1400

- Q3) a)** Explain the terms heat capacity, heat capacity at constant volume and heat capacity at constant pressure. [9]

Calculate the standard heat of reaction at 298° C for the following reaction:



The standard heat of formation for HCl (g) = -92.307 kJ and H<sub>2</sub>O (g) is -241.818 kJ.

- b) Explain the importance of Molecular weight parameter with necessary diagram on the miscibility of polymer blend systems. [9]

OR

- Q4) a)** Explain Gibbs phase rule in details. [6]

How many degrees of freedom does each of the following system have?

- i) Liquid water in equilibrium with its vapour
  - ii) Liquid water in equilibrium with its vapour and nitrogen.
  - iii) A liquid solution of alcohol and water in equilibrium with its vapour.
- b) Explain the thermodynamic conditions for LCST, UCST with neat diagrams. [12]

- Q5)** a) Write a note on "Thermodynamic Quality of solvent to a Polymer".[8]  
b) Explain method for determination of the Interaction Parameters. [8]

OR

- Q6)** Explain in detail and derive 'Flory Huggins equation for polymer blends'. [16]

**SECTION - II**

- Q7)** a) Discuss the merits and Demerits of the following Polymeric modifier:[8]  
i) Polycarbonate (PC)  
ii) Acrylonitrile butadiene styrene (ABS)  
iii) Polyethylene Terephthalate (PET)  
b) Discuss the following terms with suitable examples: [10]  
Ease of Processing, Economy, Enhanced Property, Ecology via Polymer Blend technology.

OR

- Q8)** a) Explain different Polymeric Modifiers used to improve the following properties such as Impact Strength, Chemical Resistance, heat Deflection Temperature, Flame Resistance. [10]  
b) Explain any two methods of preparation of Polymer Blends with suitable example. [8]
- Q9)** a) Discuss the importance of Maleated Polymers in Polymer Blend Technology. [8]  
b) Discuss Equilibrium Morphology and phase inversion concept in polymer Blends. [8]

OR

**Q10)a)** Discuss any two methods of Compatibilization with suitable examples. [8]

b) Explain any two methods of characterization (Thermal and Microscopic) of polymer Blends. [8]

**Q11)a)** Explain Miscible and Immiscible Polymer Blends by using appropriate Rheological Models. [8]

b) Write a note on any one Commercial polymer blend involving PP polymer. [8]

OR

**Q12)a)** Discuss any two examples of interpenetrating Polymer Network based on Polyurethane (PU) and also discuss effect of dispersed and Bicontinuous Morphological development in IPN. [16]



Total No. of Questions : 12]

SEAT No. :

**P1477**

**[4759]-312**

[Total No. of Pages : 4

**B.E. (Instrumentation & Control)  
PROCESS INSTRUMENTATION  
(2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain in brief Dead time or transport delay processes. Also discuss the effect of P action on Dead time dominant processes. **[8]**
- b) Define Capacitance. Discuss with suitable example effects of large capacitance. **[8]**

OR

- Q2)** Clarify the following terms: **[16]**
- a) Proportional Element.
  - b) Degrees of freedom.
  - c) Interacting and Non-interacting processes.
  - d) Process Lag.

- Q3)** a) Explain in brief: **[8]**
- i) Loop Gain
  - ii) Transmitter gain
  - iii) Valve gain
  - iv) Process gain

**P.T.O.**

- b) What is the need of analyzing process control loops? With the help of necessary diagrams and equations explain the procedure to test a typical pressure control loop. [10]

OR

- Q4)** a) Apply Scaling & find out normalized (Scaled) equation for distillation column, following data is available: [10]

- i) Internal reflux rate( $L_i$ ) = 0 to 15000 GPM.
- ii) External reflux rate( $L$ ) = 0 to 10000 GPM.
- iii) Temperature of overhead vapors( $T_o$ ): 150-250 °F.
- iv) External reflux temperature( $T_r$ ): 125-225 °F.
- v)  $\Delta T$  max: 50 °F.
- vi)  $C_p$ : 0.65 BTU/lb °F.
- vii)  $\Delta H$ : 250 BTU/hr

Equation for distillation column is  $\frac{L_i}{L} = \left[ 1 + \frac{C_p}{\Delta H} (T_o - T_r) \right]$ .

- b) Compare SLPC and MLPC. [8]

- Q5)** a) Draw a schematic of feedback control system and describe the necessary components of feedback control system. [8]

- b) Discuss in brief three goals to evaluate the control performance. [8]

OR

- Q6)** a) What do you mean by Fine Tuning? Explain with suitable example. [8]

- b) Explain in brief purpose of Correlations for Tuning constants. [8]

## SECTION - II

- Q7)** a) Explain Selective Control with suitable application. [8]
- b) List different types of Non Linear Elements. Explain detail any one. [8]

OR

- Q8)** a) Explain with neat block diagram cascade control system? Comment on tuning of cascade controller. [8]
- b) Explain the working of a feed forward control with suitable application. [8]
- Q9)** a) Discuss in brief influence of interaction on multivariable system behavior. [8]
- b) Explain in brief procedure for calculating Relative Gain Array for 2 x 2 systems. List important properties of RGA. [10]

OR

- Q10)**a) In In-line blending of two streams outlet flow  $F$  and composition  $x$  are to be controlled. The available manipulated variables are the inlet flows  $F_1$  &  $F_2$ . The process is linear and instantaneous. Data for above process is as below. [10]
- i) Composition of  $F_1$  is  $x_1 = 0.8$
  - ii) Composition of  $F_2$  is  $x_2 = 0.2$
  - iii) Composition of  $F$  is  $x = 0.6$
  - iv) Product  $F = 200$  mol/hr.
- Apply steady state mass balance and calculate the RGA, How would you pair the input-output variables for this process? Why.
- b) Explain necessity of decoupling control with the help of suitable example [8]

**Q11)a)** Explain with suitable block diagram “Internal Model Control”. Also enlist design steps for FOPDT process. [8]

b) Explain with suitable block schematic Model Predictive Controller. [8]

OR

**Q12)** Write short notes on any two: [16]

- a) DMC
- b) Fuzzy sets and Fuzzy rules.
- c) Artificial Neural Network.
- d) Self Tuning Controller.

EEE



**B.E. (Instrumentation & Control)**  
**DIGITAL CONTROL**  
**( 2008 Course) (Semester - I)**

*Time : 3 Hours]*

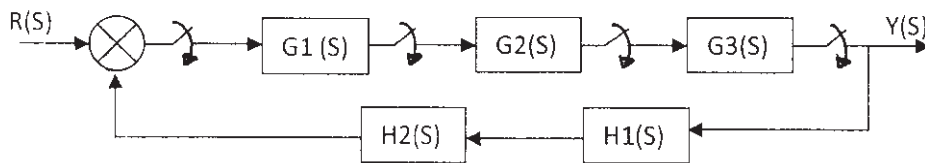
*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and three questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

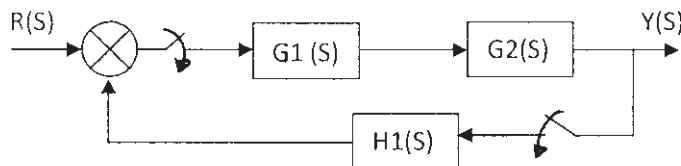
**Q1) a)** Obtain the Pulse Transfer function for the system shown below **[8]**



b) Derive the transfer function of ZOH. **[10]**

OR

**Q2) a)** Obtain the Pulse Transfer Function for the system shown below **[8]**



b) Describe the block diagram of discrete time control system and indicate the nature of output signal after every block. **[10]**

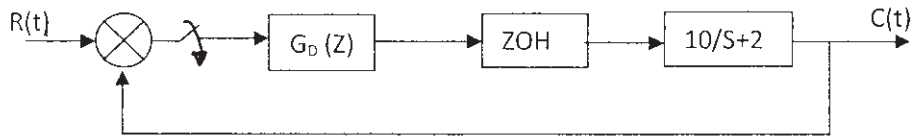
**Q3) a)** Explain the block diagram of velocity form of digital PID controller and derive the expression of velocity form of a digital PID controller. **[8]**

**P.T.O.**

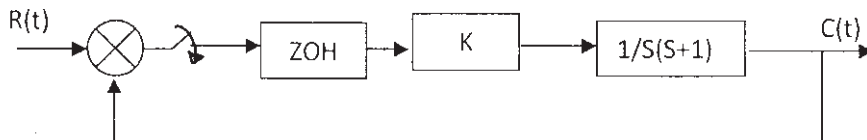
b) Compare velocity form and positional form of digital PID controller. [8]

OR

**Q4)** Design a Deadbeat Controller for the system shown below, assume  $T = 1$  sec, for step I/P. [16]



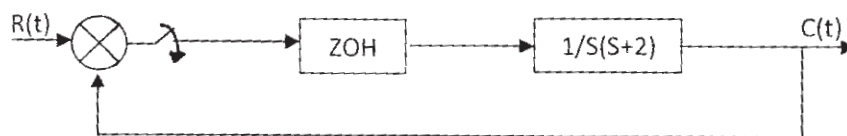
**Q5) a)** Find out the range of 'K' for which the system below is stable by Jury's stability test. Assume  $T = 1$  sec. [12]



b) Explain with the help of diagram the stability of the system in the Z-plane. [4]

OR

**Q6)** Find the stability of the system by Jury's stability test and comment on the stability of the system by bilinear transformation. Assume  $T = 1$  sec. [16]



### SECTION - II

**Q7) a)** Derive the expression of pulse transfer function from state space model. Where state space model is given by the following equations. [8]

$$X(K+1) = G X(K) + H U(K)$$

$$Y(K) = C X(K) + D U(K)$$

b) Diagonalise the following matrix by similarity transformation. [8]

$$A = \begin{bmatrix} -4 & 1 & 0 \\ 0 & -3 & 1 \\ 0 & 0 & -2 \end{bmatrix}$$

OR

**Q8)** State space model is given by the following equations

$$X(K+1) = G X(K) + H U(K)$$

$$Y(K) = C X(K)$$

$$\text{Where } G = \begin{bmatrix} -9 & 1 & 0 \\ -26 & 0 & 1 \\ -24 & 0 & 0 \end{bmatrix} \quad H = \begin{bmatrix} 2 \\ 5 \\ 0 \end{bmatrix} \quad C = [1 \quad 2 \quad -1]$$

Find  $\hat{G}$ ,  $\hat{H}$  and  $\hat{C}$  by similarity transformation. [16]

**Q9) a)** Obtain the pulse transfer function of the following discrete time state equations. [12]

$$\begin{bmatrix} X_1(K+1) \\ X_2(K+1) \end{bmatrix} = \begin{bmatrix} 1 & 0.4323 \\ 0 & 0.1353 \end{bmatrix} \begin{bmatrix} X_1(K) \\ X_2(K) \end{bmatrix} + \begin{bmatrix} 0.2823 \\ 0.4323 \end{bmatrix} U(K)$$

$$Y(K) = [1 \quad 0] \begin{bmatrix} X_1(K) \\ X_2(K) \end{bmatrix}$$

b) Define State Observer and explain the types of state observers in short. [4]

OR

**Q10)a)** Find the state model of the transfer function shown below by direct form and find whether the given system is controllable and observable. [10]

$$TF = \frac{Z^{-1}(1+0.8Z^{-1})}{1+1.3Z^{-1}+0.4Z^{-2}}$$

b) Define: [6]

- i) Controllability
- ii) Observability

**Q11)** Consider the discrete time control system defined by the following equation [18]

$$X(K+1) = G X(K) + H U(K)$$

$$G = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \quad H = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \quad X(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

Determine the optimal control sequence 'U(K)' that will minimize the following performance index. Find  $J_{\min}$ .

$$J = 0.5 X^*(8) S X(8) + 0.5 \sum_{k=0}^7 [X^*(K) Q X(K) + U^*(K) R U(K)]$$

Where

$$Q = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}; R = 1; S = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

OR

**Q12)a)** Consider a discrete time control system [12]

$$X(K+1) = 0.4590 X(K) + 0.8821 U(K)$$

$$X(0) = 1 \text{ ----- initial condition}$$

Determine optimal control law to minimize the following performance index. Find  $J_{\min}$ .

$$J = 0.5 [X(9)]^2 + 0.5 \sum_{K=0}^8 [X^2(K) + U^2(K)].$$

b) Write a short note on Optimal Control. [6]



Total No. of Questions : 12]

SEAT No. :

**P1479**

**[4759] - 314**

[Total No. of Pages : 3

**B.E. (Instrumentation and Control)**  
**PROJECT ENGINEERING AND MANAGEMENT**  
**( 2008 Course) (Semester - I) (406263)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve Q.1 or Q.2,Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1) a)** What is organizational structure? Draw an organizational structure for any manufacturing firm. **[8]**
- b) Write a short note on the various agencies involved in instrumentation type of projects and their interaction involved in Project statement. **[8]**

OR

- Q2) a)** Explain Interdepartmental, Interorganisational and Multi agency interaction involved in Project and their co ordination Project statement. **[8]**
- b) What is project management? Explain role of project manager. **[8]**

- Q3) a)** What are PERT and CPM methods. In R &D types of project which method is preferred? **[8]**
- b) What is project planning and scheduling? Write the factors affecting it. **[8]**

OR

- Q4) a)** Write a short note on project management software MS Project. **[8]**
- b) What are the various project life cycle phases. Explain one phase in detail. **[8]**

**P.T.O.**

- Q5) a)** Prepare Technical specification sheet in s-20 format (any two). [10]
- i) PLC
  - ii) Turbine flowmeter
  - iii) Pressure Guage
- b) Explain what is P& I diagram. Draw the P & I diagram for boiler with [8]
- i) Three element level control
  - ii) Fuel air ratio control
  - iii) Steam temperature control.

OR

- Q6) a)** What is material balance sheet. Explain with example. [9]
- b) What are the various standards used in instrumentation project. Explain in detail. [9]

### **SECTION - II**

- Q7) a)** What is Plant layouts and General arrangement drawing. Write its importance. [8]
- b) Draw installation sketch of thermowell. [8]

OR

- Q8) a)** List different types of cables and write their specifications. [8]
- b) What is loop wiring diagram? Draw a loop wiring diagram of level control loop. [8]

- Q9) a)** What is purchase order. Explain with example. [6]
- b) What is commissioning? Explain in detail. What are the various documents required during commissioning? [8]
- c) What is tendering? [2]

OR

- Q10)a)** What is final bid package? Explain in detail. [8]
- b) What are the procurement activities involved in project? Explain step by step. [8]

- Q11)a)** Prepare inquiry, quotation, Purchase order and inspection report for a control panel (for a process three element drum level control). [12]
- b) Write a short note on breakfront control panel. [6]

OR

- Q12)a)** What is FAT, SAT and CAT? Prepare a FAT for a control panel (for a process three element drum level control). [10]
- b) Write a short note on consoles. [8]



Total No. of Questions : 12]

SEAT No. :

**P1480**

**[4759]-315**

[Total No. of Pages : 3

**B.E. (Instrumentation & Control)**

**BIOMEDICAL INSTRUMENTATION**

**(2008 Course) (Semester - I) (Elective - I) (406264)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain electrode offset potential? How effect of electrode offset potential is overcome. Explain the various properties that bio-electrode should possesses. **[8]**
- b) Define bio electrode. Name various types of basic bio electrodes used for bioelectric potential measurements. Explain the necessity of microelectrode, micropipette electrode. **[8]**

OR

- Q2)** a) Why silver-silver chloride electrode is suitable in biomedical applications. **[6]**
- b) What is a half cell potential? Draw and explain electrical equivalent circuit of electrode jelly and Tissue. **[8]**
- c) What are the important of use of electrolytic jelly at the skin - electrode interface? **[2]**

**P.T.O.**



- Q3)** a) Explain in detail the pumping action of the heart and the genesis of ECG waveform. [8]
- b) Discuss the various ECG leads configuration in detail. [8]

OR

- Q4)** a) List out various bioelectric preamplifiers. Explain chopper amplifier in detail. [10]
- b) Draw and explain Heart Rate meter. [6]
- Q5)** a) Enlist two important techniques used in sphygmomanometer BP measurement. Explain the same method of BP measurement along with its advantages and disadvantages. [10]
- b) List out various methods used for cardiac output measurement. Explain indicator dilution method with dilution curve. [8]

OR

- Q6)** a) Explain electromagnetic blood flow measurement with neat diagram. [8]
- b) Discuss Doppler shift Ultrasonic blood flow measurement along with neat diagram. [8]
- c) List out the microphones used in phonocardiograph. [2]

## **SECTION - II**

- Q7)** a) What is EEG? Enlist various illness and diseases for which EEG is effectively used. Explain the EEG montage system. [10]
- b) Explain the various types of EEG electrodes. [6]

OR

- Q8)** a) Draw and explain various parts of Brain stem. [8]
- b) Draw and explain the structure of neuron. [6]
- c) Define efferent and afferent nerves? [2]

- Q9) a)** Enlist various ophthalmic instruments & briefly explain instrument used for measurement of IOP. [10]
- b) Explain the various vision errors in human vision system and also explain the way of elimination of the same. [4]
- c) Suggest suitable devices that are used to recover the percentage losses in EAR or EYE, if some residual capacity has been remain with these organs. [2]

OR

- Q10)a)** Define a “Hearing threshold”. Explain the speech audiometer and pure tone audiometer. [10]
- b) What are three main sections of Human auditory system? Explain the impedance matching in human hearing phenomenon. [6]
- Q11)a)** Explain Wedge Spiro meter for respiratory measurement. Explain the following terms with respect to respiratory measurement. [10]
- i) RV
- ii) ERV
- iii) TLC
- iv) TV
- b) Why inspired and expired gas analysis is of great importance. Draw and explain Thermal conductivity analyzer. [8]

OR

- Q12)a)** Define the followings: [10]
- i) Gross shock,
- ii) Let go current,
- iii) Lung Compliance,
- iv) Micro current shock,
- v) Hold on current.
- b) Explain the various methods of accident prevention in medical equipments. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

**P2025**

**[4759] - 316**

[Total No. of Pages :3

**B.E. (Instrumentation & Control)**  
**LASER APPLICATIONS IN INSTRUMENTATION**  
**( 2008 Course) (Semester -I) (Elective -I) (406264)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic pocket Calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Calculate the ratio of rates of spontaneous and stimulated emissions for a tungsten filament lamp operating at temperature of 2030K with average frequency to be  $5.5 \times 10^{14}$  Hz. **[5]**
- b) Estimate the relative populations of two energy levels such that a transition from the higher to the lower will give visible radiations of 570nm at room temperature (T = 300K). **[5]**
- c) What are the properties of Laser? **[6]**

OR

- Q2)** a) Write a short note on the process of absorption, spontaneous and stimulated emissions of radiation. **[8]**
- b) Discuss the significance of Einstein relations in emissions of radiation. **[8]**
- Q3)** a) Explain the construction and working of any gas laser. **[8]**
- b) Classify the laser products for safety standards? **[4]**

**P.T.O.**

- c) Calculate the threshold pumping power of a laser for critical population inversion of  $9 \times 10^{21}/\text{m}^3$  and spontaneous life time of  $300 \mu\text{s}$ . The upper level is at energy of  $1.5\text{eV}$ . [6]

OR

- Q4)** a) What are different laser system components? Explain each in short. [12]  
b) Estimate the efficiency of a GaAs laser operating well above threshold. The refractive index of material is 3.5 and laser cavity length is 0.1mm. The loss coefficient is 600 per meter length and the internal quantum efficiency is 0.8. [6]

- Q5)** a) Classify the basic optical interferometers? [8]  
b) Describe subjective and objective speckles in detail. [8]

OR

- Q6)** a) Describe the electronic speckle pattern interferometer (ESPI) for displacement measurement. [8]  
b) Describe the speckle in single point interferometers. [8]

### SECTION - II

- Q7)** a) Explain the performance parameters of Laser Velocimeter. [8]  
b) Differentiate between time domain and frequency domain processing of the Doppler signal? [8]

OR

- Q8)** a) Explain the time domain processing of Doppler signal in detail. [8]  
b) Discuss the performance parameters of operation of laser velocimeter? [8]

- Q9)** a) Write short note on Sagnac effect. [8]  
b) Describe the all fiber FOG configuration. [8]

OR

- Q10)** a) Write short note on Ring Laser Gyroscope. [8]  
b) Explain in detail the Fiber Optic Gyroscope. [8]

**Q11)a)** A thin strip of the hologram undergoing stress parallel to the x-axis is illuminated by a He-Ne laser. The fringes are localized in a plane having slope of 1.5 per unit length in x-direction and the fringe spacing is found to be 1mm. Hence find the strain. **[8]**

b) Explain the any one applications of holographic interferometer that you know. **[10]**

OR

**Q12)** Write a short notes on.

a) Holographic Interferometer. **[9]**

b) Applications of holographic interferometer. **[9]**



Total No. of Questions : 12]

SEAT No. :

P3727

[4759] - 317

[Total No. of Pages :4

**B.E. (Instrumentation and Control Engineering)**  
**ADVANCED CONTROL SYSTEMS**  
**( 2008 Pattern) (Semester - I) (Elective - I) (406264)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Assume suitable data, if necessary.*
- 3) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1) a)** Explain in brief different types of nonlinearities. **[6]**

b) Obtain the range of K for which the system shown in figure is stable. **[12]**

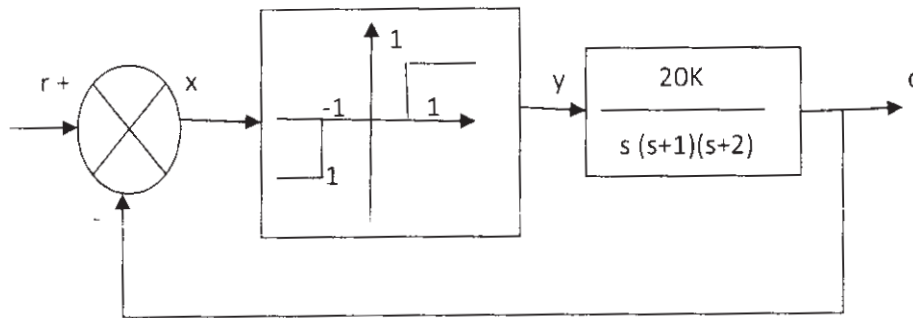


Figure: Q.1b.

OR

**Q2) a)** What are the characteristics of phase plane method. **[6]**

b) Define Singular points. Find out the nature of second order system for singular point. **[12]**

$$\ddot{x} + 0.5\dot{x} + 3x + x^2 = 0.$$

**P.T.O.**

- Q3)** a) A second order system represented by  $\dot{x} = Ax$  where  $A = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix}$  by using Lyapunov's direct method, determine the stability of the system. **[10]**
- b) Explain in brief Popov's method and its extensions. **[6]**

OR

- Q4)** a) A second order system represented by  $\dot{x} = Ax$  where  $A = \begin{bmatrix} -1 & -2 \\ 1 & -4 \end{bmatrix}$  by using Lyapunov's direct method, determine the stability of the system. Write the Liapunov function  $v(x)$ . **[10]**
- b) Explain in brief frequency stability criteria. **[6]**

- Q5)** a) Explain in detail classification of Model Reference adaptive Control System. **[8]**
- b) Explain with neat diagram of Direct model reference adaptive controller. **[8]**

OR

- Q6)** a) Explain in detail Discrete time MRAC systems. **[8]**
- b) Explain in detail stability and converges studies of MRAC systems. **[8]**

### **SECTION - II**

- Q7)** a) Explain with neat diagram of Implicit self tuning regulators. **[6]**
- b) In the self-tuning regulator following input output data has been obtained from the real plant. **[12]**

Time (t)	Input data u(t)	Output data y(t)
1	2.0	0.0
2	2.5	5.0
3	3.0	-1.5
4	2.0	3.0
5	1.5	2.0

Use any regression to fit a model with the structure  
 $y(t) + ay(t-1) = bu(t-1) + e(t)$  where  $e(t)$  is error signal.

OR

**Q8) a)** Explain the design of STR using Minimum variance method. [9]

b) Explain in detail LQG self tuning regulator. [9]

**Q9) a)** Explain in detail adaptive control technique for control of dryer control. [8]

b) Explain in detail the general purpose adaptive regulator. [8]

OR

**Q10) a)** Explain in detail adaptive control technique for temperature control in CSTR system. [8]

b) Explain in detail adaptive control technique for Rolling mill. [8]

**Q11)** Obtain the control law that minimize the performance index [16]

$$J = \int_0^{\infty} (x_1^2 + u^2) dt$$

for the system given below: 
$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Explain in brief State Regulator Problems.

OR



**Q12)** Obtain the control law that minimize the performance index

**[16]**

$$J = \int_0^{\infty} (x_1^2 + u^2) dt$$

For the system given below: 
$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Explain in brief Matrix Riccati Equations.



Total No. of Questions : 12]

SEAT No. :

**P1481**

**[4759]-318**

[Total No. of Pages : 3

**B.E. (Instrumentation & Control)**

**BUILDING AUTOMATION - I**

**(2008 Course) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figure to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain Fire Alarm Control Panel (FACP) with neat sketch. [8]
- b) What is Two wire & four wire Smoke Detector, Explain four wire smoke detector with neat sketch. [10]

OR

- Q2)** a) Explain SLC Communication Protocol. [8]
- b) Classify & explain fire based on the substance that is fuel for the fire.[10]
- Q3)** a) Explain Fire Alarm System Loops with neat sketch. [8]
- b) Explain Fire Sprinkler system with neat sketch. [8]

OR

**P.T.O.**

**Q4) a)** List & explain fire Resistant Cable & Their Requirement. [8]

b) Explain Cause & effect matrix with sketch. [8]

**Q5) a)** Explain detector spacing guideline as per NFPA - 72 standard. [8]

b) With a neat sketch explain categorization of fire alarm system as per BS 5839 standard. [8]

OR

**Q6) a)** Explain Heat detector spacing guideline as per NFPA - 72 standard. [8]

b) Describe Power supply for FAS System. [8]

### **SECTION - II**

**Q7) a)** Explain basic Biometric Process with sketch. [8]

b) Explain Various Attacks on Biometric System. [8]

OR

**Q8) a)** Explain Intelligent Access control system with neat sketch. [8]

b) Explain Standalone & Network System (Biometric) with neat sketch. [8]

**Q9) a)** List Various Types of CCTV, explain CCTV Control room and Control Room activities. [10]

b) Explain DVM with sketch. [8]

OR

- Q10)a)** Explain Field of View (FOV) with suitable example. [10]
- b) Compare Television standard with respect to following point. [8]
- i) No. of scanning lines
  - ii) No. Frames
  - iii) Field frequency
  - iv) Vertical-to-Horizontal ratio

- Q11)a)** Write a notes on Digital Signature. [8]
- b) Explain PIDS with neat sketch. [8]

OR

- Q12)a)** List various application of PIDS, explain any one application of PIDS. [8]
- b) Explain with neat sketch NIDS. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

**P1482**

**[4759] - 319**

[Total No. of Pages :3

**B.E. (Instrumentation & Control Engg.)**  
**ENVIRONMENTAL INSTRUMENTATION**  
**( 2008 Course) (Semester - I) (Elective-II) (406265)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain the need of Instrumentation & control for environment. [8]  
b) Explain how sensors are used in environmental Analysis & monitoring purpose. [8]

OR

- Q2)** a) Explain in short. [8]  
i) Flame ionization detector  
ii) Ultraviolet analyzers  
b) Compare portable & stationary analytical instrument with their types and advantages.(min 8 points). [8]

- Q3)** a) Discuss water quality standards for raw & treated water. [8]  
b) Explain conductivity analyzers and their applications in water quality parameterization. [10]

OR

- Q4)** a) Explain Opacity monitors. [6]

**P.T.O.**

- b) What are various sources of water? Enlist & discuss in brief about water quality parameter.(any 3) [12]

**Q5) a)** What is flotation? Explain flotation in water treatment. [8]

- b) Explain what is difference between coagulation and sedimentation? Briefly discuss about automatic waste water sampling? [8]

OR

**Q6) a)** Explain instrumentation in assessment of Soil and Ground water pollution. [8]

- b) Discuss on design criteria of settling tank. [8]

## SECTION - II

**Q7) a)** With a neat sketch of automatic wastewater sampling system, explain sample intake, transport and delivery subsystem. [10]

- b) Give the general guidelines for choosing optimum sampling locations.[8]

OR

**Q8) a)** What is the concept of waste water monitoring? Discuss in brief about automatic waste water sampling. [8]

- b) Draw and explain primary, secondary and tertiary treatment of waste water. [10]

**Q9) a)** Write a note on air pollution from thermal power plant in detail. [8]

- b) Define air sampling. What are the different air sampling methods? Explain any one in detail. [8]

OR

**Q10)a)** Enlist various analytical methods used in air pollution study. Explain any one in detail. [8]

b) With the sketch explain the working principle for electrostatic precipitator. [8]

**Q11)a)** Compare between open channel and non open channel flow measurement. [8]

b) Explain in detail about measurement of ambient air quality. [8]

OR

**Q12)a)** Write a note on rain water harvesting and its necessity. State and explain its various methods. [10]

b) Explain open channel waste water flow measurement. [6]



Total No. of Questions : 12]

SEAT No. :

**P1521**

**[4759] - 31A**

[Total No. of Pages :4

**B.E. (Mechanical)**

**CAD/CAM & AUTOMATION**

**( 2008 Course) (Semester - I) (402041)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1)** a) What is Open GL? Explain its use in Software Customization. [6]
- b) A triangle ABC with vertices A (2, 2), B (6, 2) and C(4, 6) is rotated about point C in counter clock wise direction by 35°. Then it is scaled by factor 2.5 in X & Y directions and translated by 3 units in X and 5 units in Y directions. Find the final position of triangle. [12]

OR

- Q2)** a) Explain in detail Orthographic Transformations and Isometric Transformations from the prospective of Computer Aided Design. [12]
- b) Explain the concept of Rotational Mapping. [6]
- Q3)** a) Explain the parametric modeling of Ellipse with neat sketch. [8]
- b) Describe the parametric modeling for Ruled Surface. [8]

OR

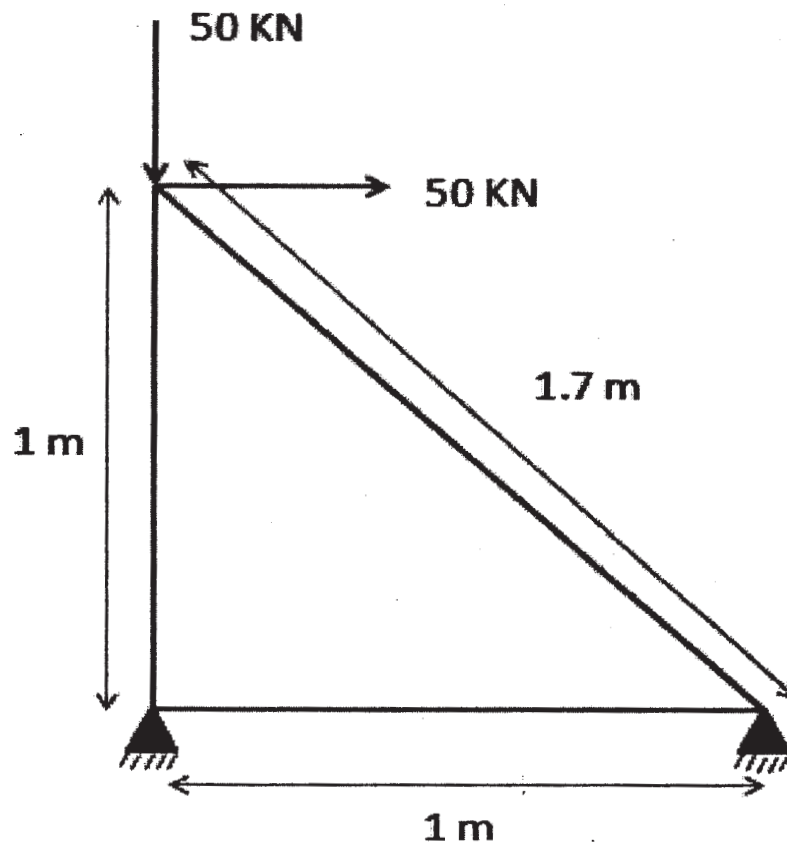
- Q4)** a) Enlist and explain various properties of Solid Models. [8]
- b) What is Boundary Representation? Explain the Basic Building Blocks for Boundary Representation. [8]

**P.T.O.**



**Q5) a)** Explain the concept of shape functions for one Dimensional Elements. **[4]**

b) A three bar steel [ $E = 200 \times 10^3 \text{ N/mm}^2$ ] is subjected to horizontal and vertical force of 50 KN as shown below. The cross sectional area for each element is  $200 \text{ mm}^2$ . Using finite element method, find the nodal displacements and stresses and reaction forces at supports. **[12]**



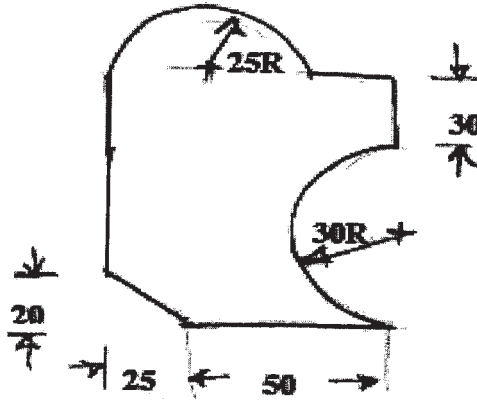
OR

**Q6) a)** Explain different properties of Stiffness Matrix. **[4]**

b) A stepped metallic bar with circular cross section consists of two segments. The first segment is of 250mm length and cross sectional area is  $200 \text{ mm}^2$ . The second has length of 300mm and cross sectional area is  $140 \text{ mm}^2$ . If one end of Bigger section is fixed and tensile force of 500KN is applied on opposite end of smaller one, find Nodal Displacements, Elemental Stresses and support reactions.  $E = 200 \text{ Gpa}$ . **[12]**

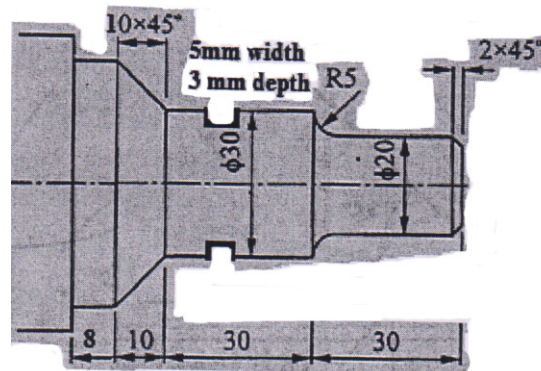
## SECTION - II

- Q7) a)** Explain Motion Control Modes used in NC machines. [8]
- b) Write NC part Program to generate the profile as shown in figure below using milling machine. Assume suitable machining data for feed and speed etc. The thickness of the plate is 12mm. All dimensions are in mm. [10]



OR

- Q8) a)** Explain the functions of adaptive control system. [8]
- b) Write NC part Program to generate the profile as shown in figure below. Assume suitable machining data for feed and speed etc. All dimensions are in mm. [10]



- Q9) a)** Compare Programmable and Flexible Automation Systems. [6]
- b) How does computer aided process planning differs from traditional process planning. Elaborate. [4]
- c) Explain the factors to be considered during Robot Gripper Design. [6]

OR

- Q10)**a) Explain briefly various work part transfer mechanisms. [6]  
b) Explain the functions of shop floor control system. [6]  
c) Explain concept of Automated Storage / Retrieval Systems. [4]

- Q11)**a) Explain industrial applications of the robots in material handling. [8]  
b) Classify robots according to robot work volume and explain cylindrical & Spherical coordinate robots in detail. [8]

OR

- Q12)**a) What are End Effectors? Explain any two types of grippers in detail. [8]  
b) Discuss lead through programming method with its advantages and disadvantages. [8]



Total No. of Questions : 12]

SEAT No. :

**P1522**

[4759] -32

[Total No. of Pages : 6

**B.E. (Mechanical/Mech. SW)  
DYNAMICS OF MACHINERY  
(2008 Course) (Semester -I) (402042)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule and electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain clearly the terms static and dynamic balancing. **[4]**
- b) A shaft carries four masses A,B,C and D which are placed in parallel planes perpendicular to the longitudinal axis. The unbalanced masses at planes B and C are 3.6kg and 2.5kg respectively and both are assumed to be concentrated at a radius of 25mm while the masses in planes A and D are both at radius of 40mm. The angle between the planes B and C is  $100^\circ$  and that between B and A is  $190^\circ$ , both angles being measured in counter clockwise direction from the plane B. the planes containing A and B are 250mm apart and those containing B and C are 500mm. If the shaft is to be completely balanced, determine: **[12]**
- i) Masses at the planes A and D
  - ii) The distance between the planes C and D
  - iii) The angular position of mass D

OR

- Q2) a)** What do you mean by balancing machine? Explain any one type of static balancing machine. **[6]**

**P.T.O.**

- b) A three cylinder radial engine has axes at  $120^\circ$  to one another and their connecting rods are coupled to a single common crank. The stroke length is 100mm and length of each connecting rod is 150mm. If the mass of reciprocating parts per cylinder is 1 kg, determine the primary and secondary force of the engine running at 2400 rpm. [10]

**Q3) a)** With neat sketches explain underdamped, over damped and critically damped systems. [3]

- b) A vibrating system is defined by the following parameters: [5]

$$m = 3 \text{ kg}, k = 100 \text{ N/m}, c = 3 \text{ N-s/m}$$

Determine:

- i) The damping factor
  - ii) The natural frequency of damped vibration
  - iii) Logarithmic decrement
  - iv) The ratio of two consecutive amplitudes
  - v) The number of cycles after which the original amplitude is reduced to 20%.
- c) For the system shown in Fig. No. 01, find the equation of motion and also determine its natural frequency. [8]

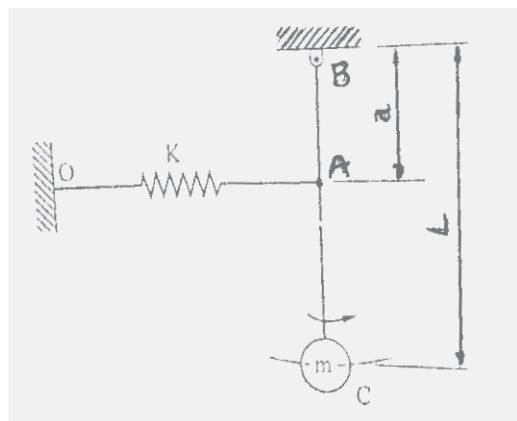


Fig no: 01

OR

**Q4) a)** What is logarithmic decrement? Derive an expression for the same. [6]

- b) A homogeneous solid cylinder of mass 'm' is linked by a spring of constant 'k' N/m. If it rolls without slipping, show that frequency of oscillation is  $\sqrt{\frac{2k}{3m}}$  rad/s [5]

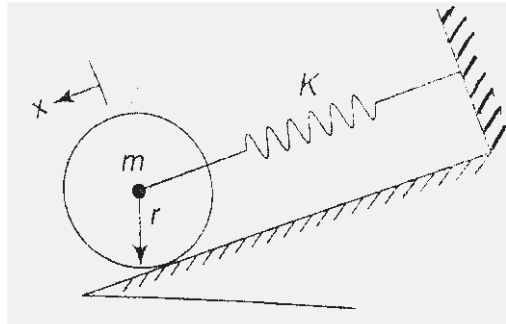


Fig no: 02

- c) An under damped shock absorber is to be designed for an automobile. It is required that initial amplitude to be reduced to  $1/16^{\text{th}}$  in one cycle. The mass of the automobile is 200kg and damped period of vibration is 1 sec. Find necessary stiffness and damping constants of shock absorbers. [5]

**Q5) a)** The damped frequency of a system as obtained from a free vibration test is 10.5Hz. During the forced vibration test with constant excitation force on the same system, the peak frequency of vibration is found to be at 9.5Hz. Find the damping factor of the system and its natural frequency. [4]

b) Neatly plot the frequency response curves and draw any four conclusions from the same. [6]

c) A system having rotating unbalance has total mass of 25kg. The unbalanced mass of 1kg rotates with a radius 0.04m. It has been observed that at a speed of 1000rpm, the system and eccentric mass have a phase difference of  $90^\circ$  and the corresponding amplitude is 0.015m. Find out: [8]

- i) Natural frequency of the system
- ii) Damping factor
- iii) Amplitude at 1500 rpm
- iv) Phase angle at 1500 rpm

OR

**Q6) a)** A vehicle has a mass 490kg and the total spring constant of its suspension system is 58,800 N/m. The profile of the road may be approximated to a sine wave of amplitude 40mm and wavelength 4m, as shown in fig no 03. Determine: [9]

- i) Critical speed of the vehicle
- ii) The amplitude of the steady state motion of the mass when the vehicle is driven at critical speed and  $\xi = 0.5$ .
- iii) The amplitude of steady state motion of mass when the vehicle is driven at 57 km/hr and damping factor = 0.5.

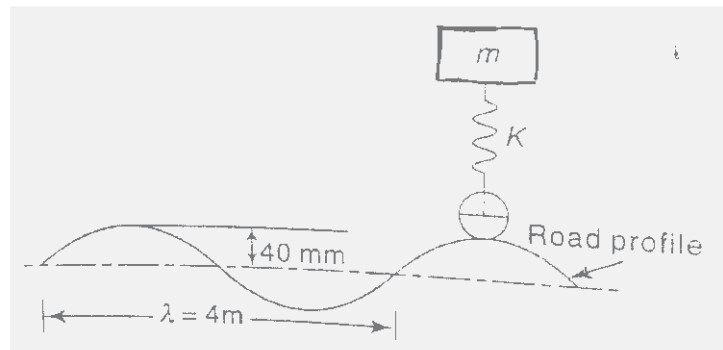


Fig no: 03

- b) Explain the following terms. [9]
- i) Vibration isolation
  - ii) Force transmissibility
  - iii) Motion transmissibility

### SECTION - II

**Q7) a)** Explain the concept of torsionally equivalent shaft. [6]

- b) Derive the differential equations of motion for the system shown in figure no.04. It is given that  $m_1 = 20\text{Kg}$ ,  $m_2 = 35\text{Kg}$  and  $k = 3000\text{N/m}$ . Determine [12]

- i) The natural frequencies
- ii) Amplitude ratio for the two mode
- iii) Principal mode shape.

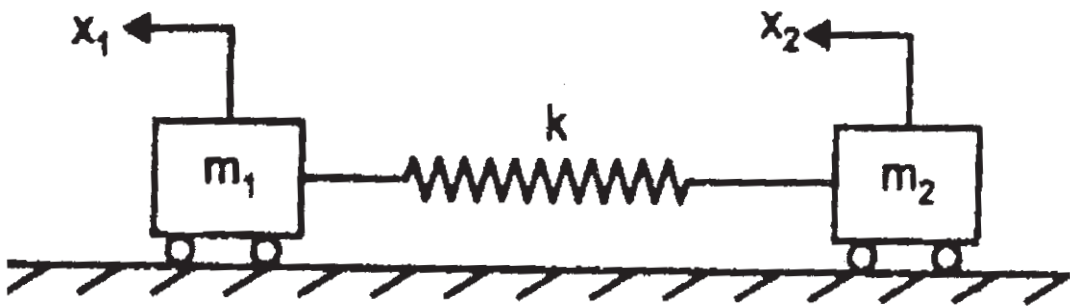


Figure No: 04

OR

- Q8)** a) What do you mean by whirling of shaft? Derive the expression for deflection vertical shaft with a single rotor without damping. [6]
- b) Two equal masses of weight 400N each and radius of gyration 40cm are keyed to the opposite ends of shaft 60cm long. The shaft is 7.5cm diameter for the first 25cm of its length, 12.5cm diameter for the next 10cm and 8.5cm diameter for the remaining of its length as shown in figure no. 05. Find the natural frequency of the torsionally vibration of the system and position of node. Assume  $0.84 \times 10^{11} \text{ N/m}^2$ . [12]

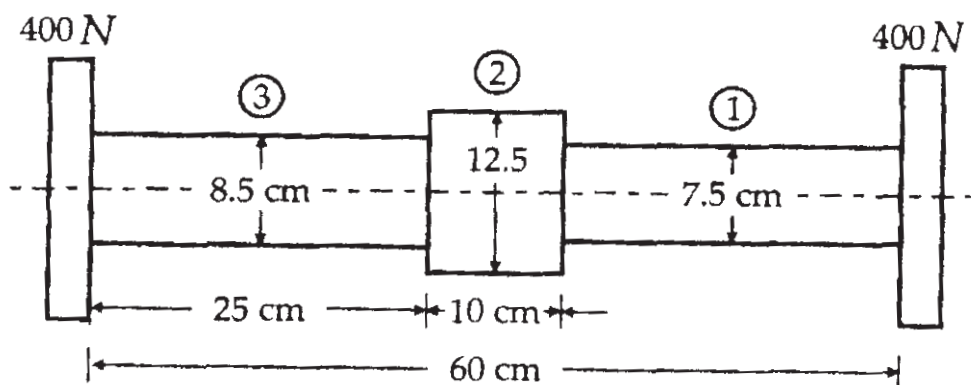


figure no:05

- Q9)** a) Explain human hearing mechanism with sketch. [4]
- b) Explain the term sound reflection, Absorption, and Transmission. [6]
- c) What do you understand by sound enclosure? Describe two types of sound enclosure. [6]

OR



- Q10)**a) Explain the working of microphone. [4]
- b) Define sound field. Explain the various types of sound field in the vicinity of some sources. [6]
- c) A mechanism working in machine shop is operating having there sound pressure levels as 95dB, 90dB, 92dB, 88dB and 83dB respectively. Determine total sound level when [6]
- i) All mechanism are ON
- ii) Machine 2 and 3 are turned OFF.

- Q11)**a) Explain general vibration measurement process with neat sketch. [8]
- b) What do you understand by the time domain and frequency domain? How are they useful in predicting vibration failures? [8]

OR

**Q12)** Write short notes on the following.

- a) Piezo electric accelerometer. [5]
- b) Vibration exciter. [6]
- c) FFT analyzer. [5]



Total No. of Questions : 12]

SEAT No. :

**P2026**

**[4759]-320**

[Total No. of Pages : 3

**B.E. (Instrumentation & Control)**

**b-NANO INSTRUMENTATION**

**(2008 Course) (Semester-I) (406265) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

**SECTION-I**

- Q1)** a) Explain the energy sub-bands and density of states in [6]
- i) Quantum well and
  - ii) Quantum wire
- b) Explain the ballistic transport of electrons in a medium? State the characteristic parameters on which the electron transport depends at the Nanoscale. [6]
- c) Describe CVD and PVD techniques for the synthesis of Nano material. [6]

OR

- Q2)** a) What is Nano lithography? Explain photolithography Process with diagram. [6]
- b) Explain various properties and applications of Nano materials. [6]
- c) What is Top-down and Bottom-up approach for synthesis of Nano materials? Describe self-assembly techniques with diagrams. [6]
- Q3)** a) Give the principle and working of an AFM with diagram and its different modes of operation. [8]
- b) Explain the principle, working of a STM in detail with suitable diagram and its modes of operation. [8]

OR

**P.T.O.**

**Q4) a)** In an AFM, describe different types of interatomic forces involved and its modes of operations with diagram. [8]

b) Give the principles, working of an SNOM with suitable diagram and its advantages. [8]

**Q5) a)** What are different types of CNT's? Explain the structure, properties and the terms viz. chiral vector, chiral angle that leads to the nature of CNT's. [8]

b) Describe CNT based Field emission device compare the field emission based using CNT vs. metallic electron emitting tips. [8]

OR

**Q6) a)** Explain the principle, working of a CNT based transistor device with a suitable diagram. [8]

b) What are the important features that makes CNT as good microwave absorbing material? Based on CNT array explains RF Filter. [8]

### SECTION-II

**Q7) a)** Describe in detail the terms such as spin polarization, magnetic moment, spin injection, spin relaxation and spin detection involved in the spintronic devices. [8]

b) Describe the GMR effect with a suitable diagram and spin valve device. [8]

OR

**Q8) a)** Explain the structure, working of a spin Transistor with a suitable diagram. Give its advantages over conventional transistor. [8]

b) Describe spin-based computing in a Quantum Computer in detail. Give its advantage over conventional computer. [8]

**Q9) a)** What is FET? Explain the MOSFET transistor's structure, working with a suitable diagram. Give the effect of scaling down. [8]

b) Describe the Resonant Tunneling Diode and Transistor with its structure and operation. [8]

OR

- Q10)** a) Describe single electron resonant tunneling by using a circuit having a quantum dot coupled to source and drain leads. Explain the phenomenon of coulomb blockade. [8]
- b) Describe in detail about any mesoscopic device working at room temperature along with a suitable diagram. [8]

**Q11)** Write short notes on the following:

- a) Nano mechanical Sensors. [6]
- b) Electron field emitting devices. [6]
- c) Chemically driven Nano actuators. [6]

OR

**Q12)** Write short notes on the following:

- a) CNT based optical Antenna. [6]
- b) CNT based optical waveguide. [6]
- c) UV Nano wire photo detector. [6]



Total No. of Questions : 12]

SEAT No. :

**P1483**

**[4759] - 321**

[Total No. of Pages :3

**B.E. (Instrumentation & Control Engg.)**  
**ADVANCED DIGITAL SIGNAL PROCESSING**  
**( 2008 Course) (Semester - I) (Elective - II) (406265)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

- Q1) a)** Determine the z-transform of the following operations: **[8]**
- i) Decimation by a factor D.
  - ii) Interpolation by a factor I.
- b) Explain the sampling rate conversion by a rational factor I/D. **[8]**

OR

**Q2)** Write short notes on:

- a) Subband coding of speech signals. **[8]**
- b) Polyphase filter structures **[8]**

- Q3) a)** An AR(3) process is characterized by the prediction coefficients,  
 $a_3(1) = -1.5, a_3(2) = 1.5, a_3(3) = -1/2$   
Determine the reflection coefficients. **[8]**

**P.T.O.**

- b) Show that the forward prediction coefficients and backward prediction coefficients are in reverse order. [8]

OR

- Q4)** a) Determine the reflection coefficients of the lattice filter corresponding to the FIR filter described by the system function. [8]

$$H(z) = A_2(z) = 1 + 2z^{-1} + \frac{1}{3}z^{-2}.$$

- b) Explain the Levinson-Durbin algorithm in detail. [8]

- Q5)** a) Explain the averaging periodograms method for estimation of power spectra. [9]

- b) Determine and sketch the periodogram of the following sequence: [9]

$$x(n) = \{2, 3, 5, 1\}$$

Use DFT.

OR

- Q6)** Write short notes on:

- a) Bartlett method of power spectrum estimation. [6]

- b) Welch method of power spectrum estimation. [6]

- c) Parametric methods of power spectrum estimation. [6]

### SECTION - II

- Q7)** a) Explain the concept of adaptive filter with the help of neat diagram. List out the applications of adaptive filters. [9]

- b) Explain the least-mean-square (LMS) algorithm for optimization of the FIR filter coefficients as an estimation problem based on the minimization of mean-square error. [9]

OR

- Q8)** a) Explain the process of recursive computation for filter coefficients in recursive least square (RLS) algorithm. [9]
- b) List out the applications of adaptive filters. Explain any one in detail. [9]

- Q9)** a) State the salient features of TMS320C6713. [8]
- b) Compare the general purpose processor and Digital Signal Processor in detail. [8]

OR

- Q10)**a) Explain the Harvard architecture of Digital Signal Processor in detail with diagram. [8]
- b) Write an assembly program to compute the output of the FIR filter to an input sequence using on-board units of Digital Signal Processor. [8]

- Q11)**a) State the advantages of Short-Time Fourier Transform over Fourier Transform. Explain the steps in computation of Short-Time Fourier Transform. [8]
- b) State the properties of FT, STFT and CWT. [8]

OR

- Q12)**a) Explain the steps in computation of windowed Fourier transform. Explain the concept of time and frequency localization. [8]
- b) Write short note on “Wavelet Transform”. [8]



Total No. of Questions : 12]

SEAT No. :

**P1484**

**[4759] - 322**

[Total No. of Pages :3

**B.E. (Instrumentation & Control)**  
**AUTOMOBILE INSTRUMENTATION**  
**( 2008 Course) (Sem. - I) (Elective -II) (406265)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) What are the current trends in Automobile. **[6]**
- b) Explain the various open loop & closed loop components of Engine management system. **[10]**

OR

- Q2)** a) Explain in detail the Vehicle motion control. **[10]**
- b) Explain the role of electronics in Automobile. **[6]**

- Q3)** a) What are the types of solid state Ignition system? Explain the Electronic spark timing control system with neat diagram. **[10]**
- b) Explain the principle of Carburetor control system. **[6]**

OR

- Q4)** a) What is multiport or point fuel Injection system in regards with automobile engine operation? Explain it with neat block diagram. **[10]**
- b) State the advantages & Disadvantages of Electronic Ignition system. **[6]**

**P.T.O.**



- Q5) a)** Write a short note on Idle speed control with a neat diagram. [6]
- b) Define the following terms with respect to engine's performance: [12]
- i) Power,
  - ii) BSFC
  - iii) Volumetric Efficiency
  - iv) Thermal Efficiency

OR

- Q6) a)** Write short note on Exhaust Emission Control system. [6]
- b) Explain the following modes of Engine Control: [12]
- i) Engine Cranking
  - ii) Engine warm-up
  - iii) Open Loop
  - iv) Closed Loop

**SECTION - II**

- Q7) a)** What is ESP? Explain its operation. [8]
- b) Write short note on Cruise Control System. [8]

OR

- Q8) a)** Explain the Principle of Electronic Braking. [8]
- b) Explain in detail the Electronic Power Steering. [8]

- Q9) a)** Explain the brief principle control circuit components & characteristics of any two of them in brief. [8]
- b) Write short note on control system for Automotive control locking system. [8]

OR

**Q10)a)** Instrumentation involved in Electronically controlled doors & windows. [8]

b) Write short note on Control system for Antitheft Technology. [8]

**Q11)a)** Explain in brief the Air Conditioning system in Automobiles. [9]

b) Explain in brief Ergonomics & Safety aspects in automobile w.r. to Lightning system components. [9]

OR

**Q12)** Write short note on: [18]

a) Automatic gear control system.

b) Steering Control Techniques

c) Emission standards.



**B.E. (Instrumentation & Control)**  
**PROCESS DYNAMICS & CONTROL**  
**( 2008 Pattern) (Semester - II)**

Time : 3 Hours]

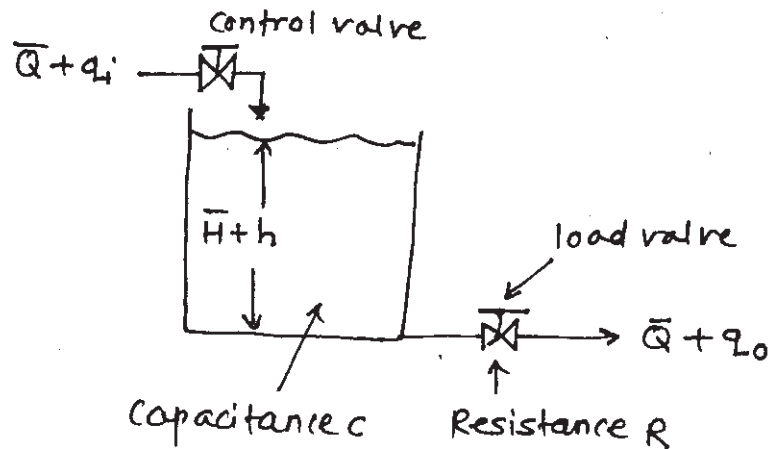
[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.
- 2) Answer three questions from each section.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right side indicate full marks.
- 5) Use of Calculator is allowed.
- 6) Assume suitable data if necessary.

**SECTION - I**

Q1) a) Derive mathematical model of following liquid level system. [10]



Where,

 $\bar{Q}$  = steady state flow rate  $m^3/sec$  $q_i$  = small deviation of inflow rate from steady-state value,  $m^3/sec$  $q_o$  = small deviation of outflow rate from steady-state value,  $m^3/sec$  $\bar{H}$  = Steady-state head, m $h$  = small deviation of head from it's steady-state value, m.

b) Explain dynamic behaviour of first -order system. [6]

OR

P.T.O.

- Q2)** a) Explain different process control objectives with suitable examples. [8]  
b) Explain dynamic behaviour of pure second-order system for over damped case. [8]

- Q3)** a) Draw & explain steam-heated exchanger. List dynamics associated with it. [10]  
b) Explain resonance effect of heat exchanger. [6]

OR

- Q4)** a) Explain heat exchanger responses for load change at constant steam temperature. [12]  
b) Explain measurement lag in heat exchanger. [4]

- Q5)** a) Explain Boiler dynamics & also explain various safety interlocks. [12]  
b) Explain with neat sketch feed forward control of boiler steam pressure. [6]

OR

- Q6)** a) Explain 1-element, 2-element & 3-element boiler drum level control with suitable sketches. [12]  
b) Explain shrink & swell effect in case of boiler drum. Also explain Inverse-response phenomena. [6]

### **SECTION - II**

- Q7)** a) Explain Reactor time constant with neat sketch & also explain 4 interacting time lags. [9]  
b) Explain once-through cooling of chemical reactors. [9]

OR

- Q8) a)** Explain Batch production management. [9]
- b) Explain cascade control scheme in order to control reactor temperature. [9]

- Q9) a)** Explain distillation column equipments in detail with neat sketches. [12]
- b) Write steady-state material & energy balance equations for distillation column system. [4]

OR

- Q10)a)** Explain control of Bottom composition of distillation column unit. [8]
- b) Explain concentration lag, liquid flow rate lag & vapor flow rate lag in case of distillation column system. [8]

- Q11)a)** List different types of pumps. Explain metering pumps characteristics. Explain net positive suction head (NPSH). [8]
- b) Write a short note on 'waste water treatment plant' with design aspects. [8]

OR

- Q12)a)** Explain the phenomena of surge. Explain centrifugal compressor with it's characteristics. [8]
- b) Draw characteristics of centrifugal pump. Draw & explain flow control scheme in centrifugal pump. [8]



Total No. of Questions : 12]

SEAT No. :

**P1486**

**[4759]-324**

[Total No. of Pages : 2

**B.E. (Instrumentation & Control)**  
**INDUSTRIAL AUTOMATION**  
**(2008 Course) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) With the help of block diagram explain the different stages involved in the development of automation projects. [8]
- b) With example explain the term control system audit and its advantages. [8]

OR

- Q2)** a) List and explain the benefits of automation in a plant. [8]
- b) Compare the PLC and DCS on the basis of performance criteria. [8]

OR

- Q3)** a) Explain OSI/ISO reference model in communication system and layers used in "Industrial Ethernet". [10]
- b) Explain four basic function blocks in Foundation Fieldbus. [8]

OR

- Q4)** a) Explain Foundation Fieldbus system as against traditional 4-20 mA system. [10]
- b) Write short note on communication standards RS232 and RS 485. [8]

OR

- Q5)** a) Explain the PLC Programming methods as per IEC-61131-3. [8]
- b) Explain basic principle and working of CNC machine. [8]

***P.T.O.***

**Q6) a)** Write a program to control level loop using PID in PLC system with ladder programming language. Write the details of each instruction that you have used in your program. [8]

b) With the help of any example explain G-Code in CNC Machine. [8]

### SECTION-II

**Q7) a)** Explain different I/O function blocks available in any DCS System. [10]

b) Write the general specifications of a DCS system. [8]

OR

**Q8) a)** Write a program using FBD programming method for any cascade control loop. Write the different steps involved in the configuration of function blocks. [10]

b) With the help of block diagram explain the architecture of DCS from any make. [8]

**Q9) a)** Explain the role of DCS in data management system. [8]

b) Write short note on third party interfaces in automation. [8]

OR

**Q10) a)** Explain in brief alarm management system in DCS. [8]

b) Explain security and user access management in DCS. [8]

**Q11) a)** Explain Safety life cycle system. [8]

b) Explain the importance of Process Hazard Analysis (PHA). [8]

OR

**Q12) a)** Write short note on Safety Instrumented System (SIS). [8]

b) Write on applications of safety system. [8]



Total No. of Questions : 12]

SEAT No. :

**P1487**

**[4759]-325**

[Total No. of Pages : 2

**B.E. (Instrumentation & Control)**  
**ADVANCED BIOMEDICAL INSTRUMENTATION**  
**(406269) (2008 Course)(Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *figures to the right indicate full marks.*
- 3) *Use of logarithmic tables, electronic pocket calculator is allowed.*
- 4) *Assume suitable data,if necessary.*

- Q1)** a) What is a Demand Pacemaker. Explain its working with the help of a diagram. Discuss its advantages and disadvantages. [9]
- b) Explain the principle of Cardioverter and its working with the help of block diagram. [7]

OR

- Q2)** a) State True or False and Explain: [9]
- i) Precise and accurate drug dosage control is not possible using Drug Delivery systems.
  - ii) Passive plate in ESU should have small surface area.
  - iii) Instruments in ICU should have visual as well as audio indication.
- b) What are the different types of oxygenators used in Heart Lung Machine. Explain any one of them in detail with the help of a diagram. [7]

- Q3)** a) Draw and explain working of Coulter type blood cell counter. Mention different problems associated with the system. [8]
- b) Describe the Health Level 7 (HL7) protocol used in Telemedicine. [8]

OR

- Q4)** a) With a neat diagram explain time division multiplexing type telemetry. [8]
- b) Write a short note on Electrophoresis [8]

**P.T.O.**



- Q5)** a) Explain the principle of generation of X-rays. [6]  
b) Describe four generations of gantries used in CT scanner. [12]

OR

- Q6)** a) Discuss the need of image intensifier in Fluoroscopy. Explain its working with a neat diagram. [8]  
b) Define Housenfield number? Specify its value for different body organs. How it is used in Image reconstruction. [10]

- Q7)** a) Explain A and B modes of ultrasound. Describe any one application of A mode. [8]

- b) Elaborate on construction and working of Rectilinear Scanner. [8]

OR

- Q8)** a) State and explain advantages and limitations of MRI. [8]

- b) Write a short note on positron Emission Tomography. [8]

- Q9)** a) Describe applications of lasers in Dermatology. [8]

- b) Write a shortnote on Ultrasound Diathermy [8]

OR

- Q10)**a) Describe different types of lasers used in Biomedical applications. [8]

- b) Write a shortnote on Microwave Diathermy. [8]

- Q11)**a) What are different front panel indicators provided in haemodialysis machine. Also mention different interlock conditions. [10]

- b) Describe various types of wheelchairs. [8]

OR

- Q12)**a) Define orthrotic & prosthetic devices. Give suitable examples for each. [8]

- b) Draw and explain the setup used for Lithotripsy. [10]



Total No. of Questions : 12]

SEAT No. :

**P1488**

**[4759] - 326**

[Total No. of Pages :2

**B.E. (Instrumentation and Control)  
FIBER OPTIC INSTRUMENTATION**

**(Semester - II) (406269) (2008 Course) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Explain following terms with respect to optical fibers with neat ray diagram: **[9]**

- i) Total internal reflection
- ii) Numerical aperture
- iii) Acceptance angle

b) Explain the different types of optical fibers. **[9]**

OR

**Q2) a)** Explain how the optical fibers are classified. **[9]**

b) Explain the following concepts in optical fiber transmission: **[9]**

- i) Evanescent field
- ii) Goos-Haenchen shift
- iii) Mode coupling

**Q3)** What are the various losses during optical fiber transmission? Explain in detail. **[16]**

OR

**Q4)** Explain the principle and operation in OTDR with neat diagram. **[16]**

**P.T.O.**

- Q5) a)** Compare P-I-N diode with avalanche photodiode. [8]  
b) Describe the construction of LED. [8]

OR

- Q6)** Describe what is meant by the fusion splicing of optical fibers. Discuss the advantages and drawbacks of this jointing technique. Describe in detail a common technique for achieving a butt jointed fiber connector. [16]

**SECTION - II**

- Q7)** Explain Intensity Modulated Optical Sensors with neat diagram. Describe various techniques of sensing which is based on intensity modulation. Encoding based position sensors. [16]

OR

- Q8) a)** What are the advantages and drawbacks of Optical Fiber Sensors? [8]  
b) Explain encoding based position sensors. [8]

- Q9)** Write short notes on: [16]  
a) Distributed optical fiber sensing.  
b) Fiber grating technology.

OR

- Q10)** Explain Fiber grating technology and Fiber Bragg grating interrogations. [16]

- Q11)** Explain how silicon laser amplifier and integrated optics are used in fiber optic sensing in detail. [18]

OR

- Q12)** Write short notes on: [18]  
a) Directional coupler.  
b) Beam splitter.  
c) Integrated optics.



Total No. of Questions : 12]

SEAT No. :

**P3728**

**[4759] - 327**

[Total No. of Pages :4

**B.E. (Instrumentation)**

**PROCESS MODELING AND OPTIMIZATION**

**(2008 Pattern) (Elective - III) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of Logarithmic tables, electronic Pocket calculator and steam table is allowed.*
- 6) *Your answer will be valued as a whole.*
- 7) *Assume suitable data if necessary.*

**SECTION - I**

- Q1) a)** Find the coefficients of the relation for a temperature sensor and temperature given by equation  $R = mT + C$  using following data: [12]

Temperature (Deg. Centigrade)	20	30	40	50	60	70	80	90
Resistance (Ohm)	108	111	116	120	123	127	131	135

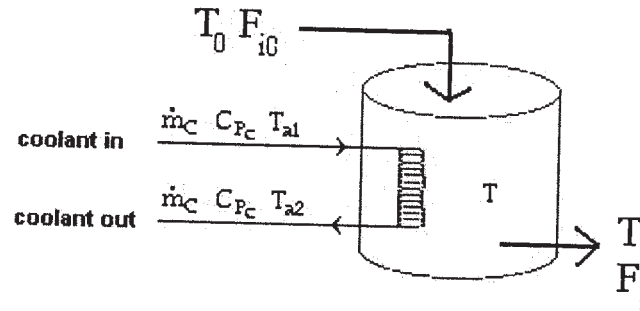
- b) State the various laws of conservation used in process modeling. [6]

OR

- Q2) a)** Derive model for liquid flowing through pipe assuming plug-flow conditions. [10]
- b) Explain Lagrange Interpolation method for fitting of experimental data in to equation. [8]
- Q3) a)** Derive the steady state mathematical model for series of tanks with variable holdups. [8]

*P.T.O.*

- b) Derive the model for a tank for mass balance and energy balance. [8]



OR

- Q4)** a) Develop mathematical model for Ideal binary distillation column having 8 trays. [8]

- b) Derive mathematical model for Non Isothermal CSTR. [8]

- Q5)** a) Explain the direct sine wave identification method to obtain the model of process. [8]

- b) Explain pulse testing method and its advantages over other method. [8]

OR

- Q6)** a) Explain ATV identification method to obtain system model. [8]

- b) Explain the method of identification used for nonlinear system. [8]

## SECTION - II

- Q7)** a) Calculate RGA, Niderlinski Index and Morari Resilyncy Index and give your comment on result for [8]

$$\begin{bmatrix} \frac{54}{(10s+2)(2s+1)^2} & \frac{-12}{(14s+1)(2s+1)^2} \\ \frac{4}{(12s+1)(2s+1)^2} & \frac{-20}{(40s+1)(2s+1)^2} \end{bmatrix}$$

- b) Explain the following terms: [8]

- i) Niderlinski Index
- ii) Resilyncy Index

OR

**Q8) a)** Explain how Nyquist plot can be used for analysis of multivariable system. **[8]**

b) Discuss any one method to the determination robustness of multivariable system. **[8]**

**Q9) a)** Determine whether following functions are convex or concave. **[9]**

i)  $f(x) = 2x_1^2 - 6x_1 x_2 + 4x_2^2$

ii)  $f(x) = x_1^2 + x_2^2 + x_3^2$

iii)  $f(x) = x_1 + 4x_2 + 8$

b) Explain quadratic approximation's interpretation for objective function. **[9]**

OR

**Q10)a)** Discuss the necessary and sufficient condition for minimum and maximum of the function. **[9]**

b) Determine whether the following matrix is positive definite, positive semidefinite, negative definite, negative semidefinite. Show all calculations. **[9]**

i)  $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 4 & 1 & 0 \end{bmatrix}$

ii)  $A = \begin{bmatrix} 1 & 1 & 2 \\ -4 & 2 & 1 \\ 1 & 1 & -5 \end{bmatrix}$

iii)  $A = \begin{bmatrix} 3 & 4 & 3 \\ -2 & 1 & 1 \\ 5 & 1 & 10 \end{bmatrix}$

**Q11)a)** Explain scanning and bracketing procedures for optimization. **[8]**

b) Explain Steepest decent method. **[8]**

OR

**Q12)a)** Minimize  $f(x_1, x_2) = 1/(x_1 x_1^2)$  subject to  $h(x_1, x_2) = x_1^2 + x_2^2 - a = 0$ . **[8]**

b) Write Short note on quasi Newton Method. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P1489**

**[4759] - 328**

[Total No. of Pages :2

**B.E. (Instrumentation and Control)**

**BUILDING AUTOMATION - II**

**(Elective - III) (406269) (2008 Course) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain various specifications on Psychometric chart. [10]  
b) Differentiate heat intensity and heat quantity. [8]

OR

- Q2)** a) Explain different factors affecting to Human comfort. Explain latent heat loss. [10]  
b) Explain with neat sketch Air Conditioning Process. [8]

- Q3)** a) Explain Mixed Air Handler Unit. [8]  
b) Describe different types of boilers for HVAC. [8]

OR

- Q4)** a) Explain two-pipe steam distribution system for steam heating. [8]  
b) Describe various steam traps of steam system. [8]

- Q5)** a) Describe the functions of DDC with respect to HVAC. [8]  
b) Explain operating and application software of DDC for HVAC. [8]

OR

**P.T.O.**



- Q6)** a) Discuss advantages and disadvantages of DDC for HVAC. [8]  
b) Explain multiloop controller DDC. [8]

**SECTION - II**

- Q7)** a) Describe the elements of BACnet. [8]  
b) Describe motor control center with block diagram. [8]

OR

- Q8)** a) What are the objectives and services of BACnet? [8]  
b) Explain MODBUS protocol. [8]

- Q9)** a) Explain importance of Energy management in building automation. [8]  
b) Explain green building concept with examples. [8]

OR

- Q10)**a) Draw various ASHARE symbols. [8]  
b) Explain the lighting control. [8]

- Q11)**a) Explain features and benefits of IBMS. [10]  
b) Write a short notes on BMS Verticals. [8]

OR

- Q12)**a) Explain the verticals of BMS for: [10]  
i) Healthcare  
ii) Industrial  
iii) Commercial complex  
iv) Education  
v) Hotels  
b) What are the necessities of IBMS? [8]



Total No. of Questions : 12]

SEAT No. :

**P1490**

**[4759]-329**

[Total No. of Pages : 2

**B.E. (Instrumentation Engineering)  
INSTRUMENTATION IN AGRICULTURE  
(2008 Pattern) (Semester-II) (Elective-IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

**Q1) a)** Explain the necessity of Instrumentation in Agriculture engineering. [8]

b) Explain the concept of fine wire thermocouple. [8]

OR

**Q2) a)** Explain the various Hygrometers. [8]

b) Explain the concept of Mohr's circle of stress. [8]

**Q3) a)** Explain the instrumentation for Dairy plant. [9]

b) Explain the instrumentation for Batch process. [9]

OR

**Q4) a)** Explain the flow diagram of juice extraction process. [9]

b) Explain the flow diagram of Batch process. [9]

**Q5) a)** Write a note on Micro irrigation system. Give the advantages with compare to other methods. [10]

b) Explain the necessity of Irrigation system in agriculture. [6]

OR

**P.T.O.**

- Q6)** a) Explain concept of Irrigation scheduling and Irrigation efficiencies. [8]  
b) Explain soil moisture measurement methods: [8]  
i) Resistance based method.  
ii) Voltage based method.

**SECTION-II**

- Q7)** a) Explain irrigation control management of up stream & down stream control system. [8]  
b) Explain the role of PLC and SCADA in packing industry. [8]

OR

- Q8)** a) Explain instrumentation for green house control. [8]  
b) Explain humidity, wind speed, ventilation system for green house. [8]

- Q9)** a) Explain implementation of hydraulic control circuit use in harvesters cotton pickers. [8]  
b) Explain implementation of pneumatic control circuit use in tractor. [8]

OR

- Q10)**a) Explain selection criteria for pump in detail. Explain installation of pump. [8]  
b) Explain characteristics of Pump. [8]

**Q11)** Write short notes on:

- a) Agrometrological instrumentation weather stations. [9]  
b) Electromagnetic radiations & UV bio sensor methods in agriculture. [9]

OR

- Q12)**a) Explain Soil water content measurement using TDR. [9]  
b) Explain the concept of surface flux measurement and ground water recharge. [9]



Total No. of Questions : 12]

SEAT No. :

**P1523**

[4759] - 33

[Total No. of Pages : 3

**B.E. (Mech.)**

**INDUSTRIAL FLUID POWER**

**( 2008 Course) (Semester - I) (402043)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from section I and 3 question from section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat figures must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain the applications of Hydraulic system. [8]  
b) Explain different types of filters used in Hydraulic system. [8]

OR

- Q2)** a) Explain different types of contaminations & their control in Hydraulic system. [8]  
b) Write a short note on “Types of seals”. [8]

- Q3)** a) Describe with neat sketch the construction and working of “Bent Axis Pump”. [8]  
b) Explain with neat sketch working of a “Radial piston pump”. [8]

OR

- Q4)** a) Explain with neat sketch working of a “Bladder type Accumulator”. [8]  
b) Write a short note on “Pressure Intensifiers”. [8]

**P.T.O.**

- Q5) a)** Compare advantages and disadvantages of Meter-In, Meter-Out & Bleed off ckt. [10]
- b) Explain with neat sketch working of “Unloading valve”. [8]

OR

- Q6) Write short note on (Any Three).** [18]
- a) Pressure compensated flow control valve
- b) Pressure sequence valve
- c) Counter balance valve
- d) Pilot operated check valve

### **SECTION - II**

- Q7) a)** Write a short note on “Cylinder Mountings”. [8]
- b) Explain with neat sketch working of “vane motor”. [8]

OR

- Q8) a)** Explain with neat sketch working of “Fail Safe Circuit”. [8]
- b) Explain with neat sketch working of “Motor Braking Circuit”. [8]

- Q9) a)** Draw circuits to show applications of [12]
- i) Shuttle valve
- ii) Twin pressure valve
- iii) Quick Exhaust valve
- iv) Time Delay valve
- b) Write a short note on “FRL” unit for a pneumatic system. [4]

OR

- Q10) a)** Write a short note on “Airdryers” used in pneumatic system with sketches. [10]
- b) Explain in detail selection criteria for compressors. [6]

**Q11)a)** What are the steps involved in designing of a Hydraulic & pneumatic system. Explain in details. **[10]**

b) Write a short note on “Trouble” shooting & maintenance of a Hydraulic and pneumatic systems”. **[8]**

OR

**Q12)a)** Draw and Explain a Typical “sequencing circuit” in Details. **[9]**

b) Draw & Explain a Typical “synchronization circuit” in Details. **[9]**



Total No. of Questions : 12]

SEAT No. :

**P2027**

**[4759] - 330**

[Total No. of Pages :2

**B.E. (Instrumentation and Control)**

**MICRO ELECTRO MECHANICAL SYSTEM**

**(2008 Course) (Elective - IV) (406270) (Semester - II)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) Compare any 8 points MEMS technology over Macro Technology. [8]  
b) Explain importance of MEMS sensors and MEMS actuator with suitable examples. [8]

OR

- Q2)** a) What are the applications of MEMS in Automotive field & Bio MEMS. [8]  
b) Explain with neat diagram Micro-mirror. [8]

- Q3)** a) Explain working principle of portable blood analyzer with neat diagram. [8]  
b) Write key definition for proof mass, suspension, parallel plate capacitance, quality factor related to silicon capacitive sensor. [8]

OR

- Q4)** a) Define: [8]  
i) Conductivity  
ii) Adsorption  
iii) Desorption  
iv) Combustion for Conductometric Gas Sensor.  
b) Explain working principle of comb drive with neat diagram. [8]

- Q5)** a) Write key process involved in Lithography. [9]  
b) What are the process-steps used in the fabrication of micro system? [9]

OR

*P.T.O.*

- Q6)** Explain following micromachining Technique with neat diagram. [18]
- a) Thermal oxidation for silicon
  - b) Sputtering for deposition

**SECTION - II**

- Q7)** a) In an axial tensile test on 15 mm diameter bar of gauge length 200 mm, the load of proportionality limit is found to be 25 KN & corresponding change in length and diameter are 0.25 mm & 0.00625 mm respectively. Determine modulus of elasticity Poissons ratio and % volume change. [8]
- b) Define Hook's Law, tensile stress, compressive stress, Normal stress. [8]

OR

- Q8)** a) Explain 'Castigliano's First Theorem & Second Theorem. [8]
- b) Explain with neat sketch transversely deformable element A Beam. [8]

- Q9)** a) List various fields of engineering where finite element method can be implemented. [8]
- b) Give significance of numerical methods for solution of equations. [8]

OR

- Q10)**a) Compare Finite element Method to Analytical Method. [8]
- b) Explain with algorithm finite element procedure. [8]

- Q11)**a) Explain working of PNP & NPN transistors with neat diagrams. [9]
- b) Explain with neat sketch out put characteristic of BJT. [9]

OR

- Q12)**a) Explain with circuit diagrams & write formula for output voltage of [9]
- i) Integrator
  - ii) Differentiator
  - iii) Phase detector
- b) Explain spring mass damper system with neat diagram. [9]





Total No. of Questions : 12]

SEAT No. :

**P3729**

**[4759] - 331**

[Total No. of Pages :3

**B.E. (Instrumentation & Control)  
DIGITAL IMAGE PROCESSING  
(2008 Course) (Semester - II) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*
- 5) *Use of electronic pocket calculator is allowed.*

**SECTION - I**

**Q1)** a) Explain in detail the fundamental steps involved in digital image processing. [8]

b) Explain the role of digitizer in DIP. [8]

OR

**Q2)** a) Distinguish between camera and scanner. [8]

b) Explain the hardware used in digital image processing. Explain each block separately. [8]

**Q3)** a) Write a short note on visual perception. [8]

b) Explain in detail the different components of image acquisition. [8]

OR

**Q4)** a) What is image sensing? Explain with the help of neat diagram. [8]

b) Write a short note on sampling and quantization. [8]

**P.T.O.**

- Q5) a)** State and explain the properties of 2-D DFT. [9]
- b) Explain the term separability used DFT and DCT. [9]

OR

- Q6)** Write a short note: [18]
- a) Short Time Fourier Transform.
- b) Discrete Cosine Transform.
- c) Radon Transform

### **SECTION - II**

- Q7) a)** Explain with one example the necessity of image enhancement. [8]
- b) Explain in detail the histogram equalization. [8]

OR

- Q8)** Write short note on: [16]
- a) Homomorphic filtering.
- b) Image averaging

- Q9)** Write short note on: [16]
- a) Degradation model.
- b) Least mean square filter

OR

- Q10)a)** Explain the concept of image restoration. [8]
- b) Explain briefly the inverse filtering for image restoration. [8]

**Q11)**a) Enlist the methods how discontinuities are detected. Explain any one in detail. **[10]**

b) Explain the concept of region based segmentation. **[8]**

OR

**Q12)**Write short notes on: **[18]**

a) Thresholding.

b) Canny operator

c) Regional descriptors



Total No. of Questions : 10]

SEAT No. :

**P2028**

**[4759]-333**

[Total No. of Pages : 2

**B.E. (Biotechnology)**

**BIOSEPARATION-II**

**(2008 Course) (Semester-I) (415463)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from section-I and three questions from section-II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1)** What is the role and importance of downstream processing in biotechnological processes? **[16]**

OR

**Q2)** Describe in detail "Protein purification strategy". **[16]**

**Q3)** Write Beer-Lambert's Law. Describe instrumentation of Uv-Visible Spectrophotometer. **[16]**

OR

**Q4)** Explain Spectrofluorometry with the following points- **[16]**

- a) Principle
- b) Instrumentation
- c) Applications
- d) Case studies

**Q5)** Explain Principles, retention, procedures, materials and applications of Gel Filtration Chromatography in detail. **[18]**

OR

**Q6)** Explain Principles, retention, procedures, materials and applications of Affinity Chromatography in detail. **[18]**

***P.T.O.***

## SECTION-II

**Q7)** Explain Gas Chromatography instrumentation with following points :Pumps, degasser, mixer, guard column, column and detectors, Chromatograms. **[16]**

OR

**Q8)** Explain High Performance Liquid Chromatography Instrumentation with following points :Pumps, degasser, mixer, guard column, column and detectors, Chromatograms. **[16]**

**Q9)** Write short notes (Any 2) (8 marks each): **[16]**

- a) Supercritical Fluid Extraction.
- b) Precipitation.
- c) Aqueous Two Phase Extraction.
- d) Hyphenated Techniques.

**Q10)** Write and explain strategies for downstream processing of following products (Any 2) (9 marks each): **[18]**

- a) Beer.
- b) Citric Acid.
- c) Butanol.
- d) Microbial Polysaccharides.



Total No. of Questions : 12]

SEAT No. :

**P2029**

**[4759]-334**

[Total No. of Pages : 4

**B.E. (Biotechnology)**

**INSTRUMENTATION AND PROCESS CONTROL**

**(2008 Course) (Semester-I) (415464)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) Describe in brief principle, construction and working of electromagnetic flow meter. **[8]**
- b) With the help of neat sketch, explain the principle and working of Radiation Pyrometer. **[8]**

OR

- Q2)** Explain in brief working principle of following instruments **[16]**
- a) McLeod pressure gauge.
  - b) Optical Pyrometer.
  - c) Bimetallic Thermometer.
  - d) Thermocouple.

- Q3)** a) A liquid level system has a cross sectional area of 5 m<sup>2</sup>. The valve characteristics are  $q = 10\sqrt{h}$ . Calculate the time constant for this system when the average operating level is 2 meter and 5 meter. **[5]**
- b) A thermometer having a time constant of 15 seconds is at a steady state temperature of 97°C. At time  $t = 0$ , the thermometer is placed in a temperature bath maintained at 120°C. Determine the time needed for the thermometer to read 100°C. **[5]**
- c) With the help of neat sketch explain the characteristic response of first order system to a sine input. **[6]**

OR

**P.T.O.**

- Q4)** a) Derive the response of typical first order system to a step input of magnitude M. Also explain the characteristics of the response obtained. [5]
- b) A thermometer follows first order dynamics with time constant of 12 seconds. It is placed in temperature bath at 100°C and is allowed to reach steady state. It is suddenly transferred to another bath at 150°C at time  $t = 0$  and is left there for 12 seconds. It is then returned to the original bath at 100°C. Calculate reading of the thermometer at  $t = 6$  seconds and  $t = 24$  seconds. [7]
- c) Write a short note on See beck effect. [4]
- Q5)** a) Derive the transfer function for a two tank interacting system. [8]
- b) A step change of magnitude 4 is introduced in to a system having the transfer function [10]

$$\frac{Y(S)}{X(S)} = \frac{10}{(S^2 + 1.6S + 4)}$$

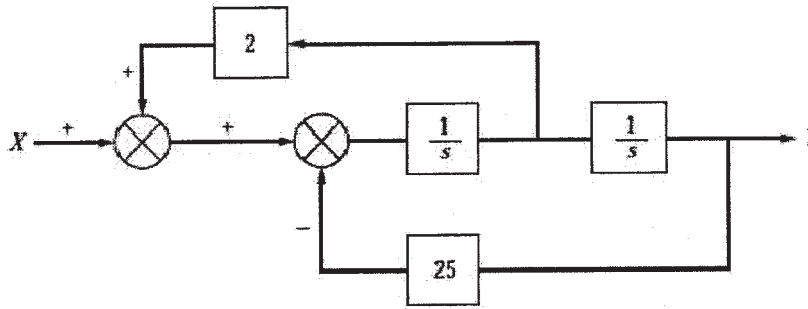
Determine

- i) Percent Overshoot.
- ii) Maximum value of Y(t).
- iii) Rise Time.
- iv) Ultimate value of Y(t).
- v) Ultimate value of Y(t).

OR

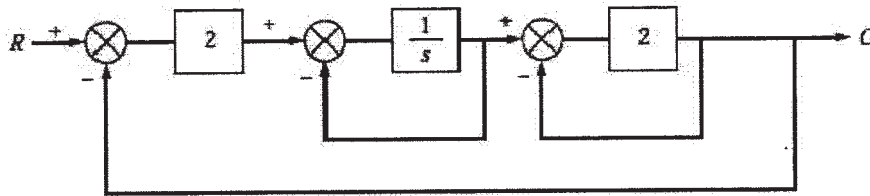
- Q6)** a) With the help of neat sketch explain the following terms with the help of second order system. [8]
- i) Overshoot.
  - ii) Decay Ratio.
  - iii) Period of oscillation.
  - iv) Response Time.
  - v) Rise Time
- b) What is transportation lag? Derive the transfer function for transportation lag. [5]
- c) How does the response of interacting and non interacting system vary from that single tank system? Why? [5]

- Q7)** a) With the help of a block diagram of a control system, derive the transfer function for a Regulator problem. [8]
- b) Differentiate between: [4]
- Positive and Negative feedback.
  - Servo and Regulator Problem.
- c) For the control system shown below, determine the transfer function  $Y(S) / X(S)$ . [6]



OR

- Q8)** a) For the control system shown below, determine the transfer function  $C(S) / R(S)$ . [6]



- b) With the help of neat sketch explain control actions of different types of controllers. [6]
- c) Explain in brief how a feedback system works? [6]
- Q9)** a) Draw the Bode Plot for the following system [8]

$$G(s) = \frac{6}{(0.1s + 1)(10s + 1)}$$

- b) Write a note on Open loop tuning method. [8]

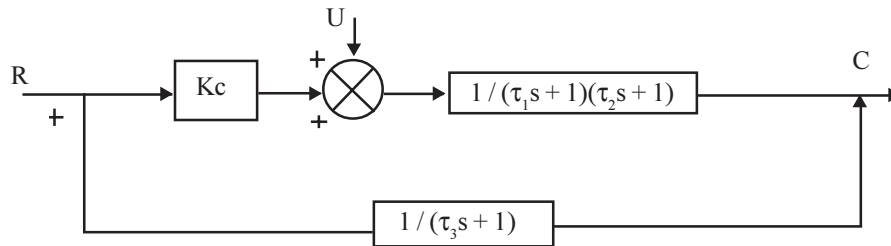
OR



**Q10)a)** Draw the Root locus for the following system **[8]**

$$G(s) = \frac{K}{S(S^2 + 2S + 2)}$$

b) Using  $\tau_1 = 1$ ,  $\tau_2 = (1/2)$  and  $\tau_3 = (1/3)$ , determine the values of  $K_c$  for which the control system shown below is stable. For which value of  $K_c$  the system is on the verge of instability. Also determine the roots of characteristics equation. **[8]**



**Q11)a)** Explain in detail what cascade control is? Support your answer with example. **[8]**

b) Write short note on: **[8]**

- i) Foam control in fermenter.
- ii) Fuzzy Logic.

OR

**Q12)** Write short note on: **[16]**

- a) Split Range Control.
- b) Ratio Control System.
- c) Override Control System.
- d) Auctioneering control system.



Total No. of Questions : 12]

SEAT No. :

P3340

[Total No. of Pages : 4

[4759]-335

**FINAL YEAR B.E (BIOTECHNOLOGY)**

**BIOPROCESS EQUIPMENT DESIGN**

**(2008 PATTERN)**

**(Semester - I)**

*[Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q 1 or 2, Q 3 or 4, Q 5 or 6 from section I and Q 7 or 8, Q 9 or 10, Q 11 or 12, from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION I**

**Q1)** Explain any two types of theories of elastic failure?

**[16]**

**OR**

**Q2)** a) Define the following ;

**[10]**

- i) Polar moment of Inertia
- ii) Stress
- iii) Modulus of Elasticity
- iv) Ductility

b) Explain the general procedure for process equipment design.

**[6]**

**P.T.O.**

**Q3) a)** Discuss the design of plain head, shallow head and hemispherical head with neat sketches. **[12]**

b) A vessel having 1.50 m outside diameter is to operate at a pressure of 6 Kg/cm<sup>2</sup>. The permissible stress of the material used for fabrication is 1020 Kg/cm<sup>2</sup>. Welded joint efficiency is 80%. Calculate the thickness required for a cylindrical vessel and Spherical vessel? Which vessel should be selected for operation? Operating pressure is 5Kg/cm<sup>2</sup>. **[6]**

**OR**

**Q4) a)** The inside diameter of cylinder is 20 cm and subjected to an internal pressure of 650 kg/cm<sup>2</sup>. Allowable tensile stress of the material is 1500 Kg/cm<sup>2</sup>. What should be the minimum thickness of the vessel? **[10]**

b) A high pressure vessel is to be operated at 110 MN/m<sup>2</sup> The inside diameter of vessel is 30 cm. Steel having yield stress 455 MN/m<sup>2</sup> is selected for fabrication. Estimate the wall thickness required by maximum shear stress theory with a factor of safety 1. **[8]**

**Q5) a)** Calculate the power required for mixing 5000L with specific gravity 0.8 and viscosity 90 cp in an agitated tank. Pitched blade turbine impeller at 90 rpm is used. Diameter of tank is 20 m and the ratio of tank diameter to agitator diameter is 0.45. The power number and Reynolds number relationship data is: **[10]**

$N_{Re}$	<b>1000</b>	<b>2000</b>	<b>3000</b>	<b>4000</b>
$N_p$	<b>1.1</b>	<b>1.2</b>	<b>1.3</b>	<b>1.4</b>

b) Write short note on power curves in agitation. **[6]**

**OR**

**Q6) a)** Explain with neat sketch the different types of agitators? **[8]**

b) Discuss various flow patterns in agitated vessels. **[8]**

## SECTION II

- Q7)** a) Describe the procedure for design of shell and tube heat exchanger. [9]  
b) Discuss about Codes and Standards and various types of heat exchanger. [9]

**OR**

- Q8)** 12000 kg/hr of water available at 93°C is to be cooled to 50°C in a shell and tube heat exchanger. This heat is to be utilized for preheating of water from 15°C to 45°C, Cold water is to be circulated through the tubes, while hot water on shell side. Tubes of inside diameter 20 mm are to be used and the maximum velocity through the tubes should not be more than 0.5 m/sec. Due to space limitations the tube length is to be restricted to 3.2m. Overall heat transfer coefficient for the heat exchanger is 1450 w/m<sup>2</sup>K. Fouling resistance and metal wall resistance may be neglected. Suggest a suitable design for the shell and tube heat exchanger. [18]

- Q9)** a) Explain design variables in distillation. [8]  
b) Explain the optimum sieve plate performance diagram. [8]

**OR**

- Q10)** a) Discuss about AIChE method used in distillation column design. [8]  
b) Define Murphree plate, Overall plate (column) efficiency. [8]

- Q11)** a) Explain high performance thin layer chromatography and state their advantages. [10]  
b) Write short note on: Filter integrating testing. [6]

**OR**

**Q12)a) Discuss on:**

**[16]**

- i) TFF system
- ii) Commissioning and validation of filter
- iii) Partition chromatography



Total No. of Questions : 12]

SEAT No. :

**P1491**

**[4759]-336**

[Total No. of Pages : 2

**B.E. (Biotechnology)**

**a : ENVIRONMENTAL BIOTECHNOLOGY  
(2008 Pattern) (Semester-I) (415461) (Elective-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn whenever necessary.*

**SECTION-I**

**Q1)** Briefly explain the different processes involved in waste water treatment. Add a note on biological treatment of waste water. **[18]**

OR

**Q2)** Discuss the following in details (9 marks each): **[18]**

- a) Chemical oxygen demand.
- b) Biological oxygen demand.

**Q3)** With the help of neat labeled diagram explain the trickling filters in detail and add a note on its advantages and disadvantages. **[16]**

OR

**Q4)** Answer the following (8 marks each): **[16]**

- a) Fluidized reactor and its disadvantages.
- b) Activated sludge system and its advantages.

**Q5)** Describe the biological treatment of industrial waste water. Add a note on various pollutants present in waste water. **[16]**

OR

**Q6)** Explain manufacturing process, sources of waste and its treatment methods for the following industries: **[16]**

- a) Textile industry.
- b) Biopharma industry.

**P.T.O.**

## SECTION-II

**Q7)** Explain the following types of particulate collectors used in industry: [18]

- a) Different sources of air pollution.
- b) Classification of air pollutants.
- c) Effect of air pollution on human health.

OR

**Q8)** Write short notes on the following (9 marks each): [18]

- a) Measurement of air pollution.
- b) Different types of air sampling.

**Q9)** Answer the following: [16]

- a) Hazardous waste management.
- b) Waste minimization techniques.

OR

**Q10)** Discuss the following in details. [16]

- a) Biomedical and hospital waste management.
- b) Municipal solid waste management.

**Q11)** Describe the following (8 marks each): [16]

- a) Role of biotechnology in pollution abatement.
- b) Degradation of Xenobiotic compounds.

OR

**Q12)** Write short notes on (4 marks each): [16]

- a) Phytoremediation.
- b) Bioremediation.
- c) Oxidation ditches.
- d) Eutrophication.



Total No. of Questions : 12]

SEAT No. :

**P1492**

**[4759]-338**

[Total No. of Pages : 2

**B.E. (Biotechnology)**

**c : BIO-THERAPEUTICS TECHNOLOGY  
(2008 Pattern) (Semester-I) (415461) (Elective-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Both sections compulsory.*
- 2) *Draw diagrams wherever necessary.*
- 3) *Maximum marks for each question is given in brackets.*

**SECTION-I**

**Q1)** Give overview of the pharmaceutical and biopharmaceutical industry. Giving examples describe the terms Traditional pharmaceutical product, Biologic and Biopharmaceutical. **[18]**

OR

**Q2)** Give overview of drug development process for biopharmaceuticals. **[18]**

**Q3)** Describe in detail choice of vectors for mammalian, insect and bacterial expression system. **[16]**

OR

**Q4)** With the help of example explain the process of developing recombinant protein. **[16]**

**Q5)** Give schematic outline of hybridoma technique for production of MAb and give 5 examples of approved Monoclonal antibodies available in market. **[16]**

OR

**Q6)** With the help of diagram discuss “hybridoma technique” and give three examples of monoclonal antibodies with their therapeutic applications. **[16]**

***P.T.O.***



## **SECTION-II**

**Q7)** Explain with the help of flow chart Clean rooms design and flow of operations. **[16]**

OR

**Q8)** Attempt Any Two (8 marks each):

- a) Master and working cell Bank. **[8]**
- b) Water for injection. **[8]**
- c) Analysis of final biopharmaceutical product. **[8]**

**Q9)** Write short notes on Any Two (8 marks each): **[16]**

- a) Advanced drug delivery systems.
- b) Physical and chemical stability.
- c) Types of formulations.
- d) Pegylation.

**Q10)** Write notes on Any Two of following (9 marks each): **[18]**

- a) Randomized Clinical Trial.
- b) Patents in Biopharma.
- c) Regulatory requirements for Biotech product development.
- d) Transgenic plants.



Total No. of Questions : 12]

SEAT No. :

**P3730**

**[4759]-339**

[Total No. of Pages : 3

**B.E. (Biotechnology)**

**BIOENERGY AND RENEWABLE RESOURCES**

**(Elective-II) (2008 Course) (Semester-I) (415462)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4,Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Answer to the two sections should be written in separate answer books.*

**SECTION-I**

**Q1) Define and describe: [18]**

- a) Energy intensity
- b) Energy-GDP elasticity
- c) Fuel cell

OR

**Q2) Enlist the various non conventional energy sources. Mention the advantages of same. Describe in detail any two of them. [18]**

**Q3) Enlist the various methods of tidal power generation. Explain any two in detail. [16]**

OR

**Q4) Wind at 1 standard atmospheric pressure and 15°C has velocity of 15m/s calculate: [16]**

- a) The total power density in the wind stream.
- b) The total power.
- c) The torque and axial thrust.

Given: turbine diameter = 120m, turbine operating speed = 40 rpm at maximum efficiency. Propeller type wind turbine is considered. For air the value of gas constant  $R = 0.287 \text{ kJ/kg K}$ .

***P.T.O.***

**Q5) Write short note on:** **[16]**

- a) Principle of solar photovoltaic power generation.
- b) Applications of solar energy.
- c) Advantages of photovoltaic solar energy.
- d) Disadvantages of photovoltaic solar energy.

OR

**Q6) Write in detail about:** **[16]**

- a) Passive solar space heating system.
- b) Solar distillation.
- c) Various methods of producing hydrogen from solar energy.
- d) Domestic and industrial applications of solar energy.

**SECTION-II**

**Q7) Write a short note on:** **[18]**

- a) Feed stock for biodiesel.
- b) Photobioreactor.
- c) Transesterification process.

OR

**Q8) Answer the following:** **[18]**

- a) Depict the flow chart for biodiesel production from vegetable oil and describe it in detail.
- b) Describe in detail about advantages of microalgae as feed stock for biofuel.

**Q9) Answer the following:** **[16]**

- a) Describe the concept of bio refinery and its economics.
- b) Describe the ethanol production from lignocellulosic material.

OR

**Q10) Answer the following: [16]**

- a) Describe the challenges encountered during ethanol production from lignocellulose.
- b) Describe the different methods for removal of butanol from the broth.

**Q11) Explain in detail about: [16]**

- a) Advantages and disadvantages of plug flow biogas digester.
- b) Continuous and batch type biogas plant.

OR

**Q12) Answer the following: [16]**

- a) Describe the factors affecting the performance of biogas system.
- b) Define biodigester. Explain the advantages and disadvantages of fixed film biodigester with neat sketch.



Total No. of Questions : 12]

SEAT No. :

**P1524**

**[4759]-34**

[Total No. of Pages : 4

**B.E. (Mechanical Engineering)**  
**ENERGY AUDIT AND MANAGEMENT**  
**(2008 Course) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Discuss aspects of energy policy and strategy in energy conservation system. **[8]**
- b) Explain indian Energy Scenario and draw Pi-chart. **[8]**

OR

- Q2) a)** Write short notes on: **[8]**
- i) Commercial energy and non-commercial energy.
  - ii) Renewable and non-renewable energy.
- b) Explain energy consumption pattern of Indian and global industry. **[8]**
- Q3) a)** What are energy conservation opportunities in refrigeration and HVAC systems? **[8]**
- b) Explain following instruments used for energy audit with their application **[8]**
- i) Water flow meter
  - ii) Electrical measuring instruments

OR

**P.T.O.**

**Q4) a)** Define energy management and state the objectives of energy management. Also explain need of energy audit. [8]

b) How to conduct a detailed energy audit? [8]

**Q5) a)** Define and explain following: [10]

i) Net present value (NPV)

ii) Internal rate of return (IRR)

b) A company borrows Rs. 30,00,000 to finance a new boiler installation. If the interest rate is 12% per annum and the repayment period is 6 years. Calculate the value of total repayment and monthly repayment value for [8]

i) Simple interest

ii) compound interest

OR

**Q6) a)** Explain following financial analysis methods. [10]

i) Simple payback period

ii) Profitability index

b) What is sensitivity and risk analysis? Explain factors affecting sensitivity and risk analysis. [8]

### **SECTION - II**

**Q7) a)** Explain advantages and disadvantages of direct and indirect methods used for calculating boiler efficiency. [8]

b) Explain energy saving measures for DG sets. [8]

OR

**Q8) a)** Explain energy saving opportunities in cooling tower [8]

b) in the leakage test in a process industry, following results were observed [8]

Compressor capacity ( $\text{m}^3/\text{minute}$ ) = 40

Cut in pressure,  $\text{kg}/\text{cm}^2$  (g) = 5.8

Cut out pressure,  $\text{kg}/\text{cm}^2$ (g) = 8.5

Load kW drawn = 190 kW

Unload kW drawn = 60 kW

Average 'Load' time, T = 2.5 minutes

Average 'Unload' time, t = 12.5 minutes.

Calculate:

i) Leakage quantity/min and leakage quantity/day

ii) Specific power for compressed air generation

iii) Energy loss due to leakages/day

**Q9) a)** What are different types of motors? Explain in detail the energy efficiency improvement in electric motors. [8]

b) What are different types of lamps used in lighting systems? Write their features and applications. [8]

OR

**Q10)a)** Describe the factors included in tariff structure of electricity billing. [8]

b) Explain the following basic terms in lighting system: incandescent lamps, luminaire, reflector lamps and gas discharge lamps. [8]

**Q11)a)** Explain the following waste heat recovery devices **[10]**

i) Recuperators

ii) Regenerators

b) What is cogeneration? Explain technical options for cogeneration. **[8]**

OR

**Q12)** Write short note on: **[18]**

a) Indirect benefits of waste heat recovery.

b) Carbon credits.

c) Heat wheels.

*EEE*



Total No. of Questions : 12]

SEAT No. :

**P2030**

**[4759]-340**

[Total No. of Pages : 2

**B.E.**

**BIOTECHNOLOGY**

**Biomaterials**

**(2008 Pattern) (Semester-I) (415462) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn whenever necessary.*

**SECTION-I**

**Q1)** What are hydro gels? Explain the different types of hydro gels and their importance for the application in biomaterials. **[18]**

OR

**Q2)** What are Biodegradable polymers. Explain how the step wise degradation occurs. Add a note on different degradation mechanisms. **[18]**

**Q3)** Write a short notes on the following: **[16]**

- a) Medical textiles.
- b) Cardiovascular implants.

OR

**Q4)** Explain the preparation, properties and biomedical applications of any two natural polysaccharides. **[16]**

**Q5)** Explain the properties and functions (8 marks each): **[16]**

- a) Polylactic acid.
- b) Ceramics.

OR

***P.T.O.***

**Q6)** Answer the following in details: [16]

- a) Mechanical properties of Biomaterials.
- b) Factors influencing the rate of Bioerosion.

**SECTION-II**

**Q7)** Write short notes on: [16]

- a) Production and purification of L-Homophenylalanine.
- b) Different types of Membrane bioreactor.

OR

**Q8)** What are Biocatalysts? Enlist the applications of Biocatalysts. Add a short note on Polyhydroxyalkanoate. [16]

**Q9)** Discuss the following (8 marks each): [16]

- a) Any two bioerodable polymers.
- b) Biocompatibility and host response.

OR

**Q10)** Write short notes on (4 marks each): [16]

- a) Smart polymers.
- b) Biodegradable plastic.
- c) Nanomaterials.
- d) Biocompatibility.

**Q11)** Explain in details the applications of biomaterials in the following fields: [18]

- a) Medicine
- b) Dentistry
- c) Biology

OR

**Q12)** Enlist the different type of biomaterials which can be used in the orthopedic implants. Explain any two in details. [18]



Total No. of Questions : 12]

SEAT No. :

**P1493**

**[4759]-341**

[Total No. of Pages : 2

**B.E. (Biotechnology)**

**STEM CELLS AND REGENERATIVE MEDICINES**

**(2008 Course) (Semester-I) (415462) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is allowed.*

**Q1)** Answer the following (9 marks each): **[18]**

- a) Briefly explain the advantages and disadvantages of adult stem cells and embryonic stem cells.
- b) Define the following with examples:  
Pluripotent cells, Multipotent cells, Totipotent cells.

OR

**Q2)** Answer the following (9 marks each): **[18]**

What are Haematopoietic stem cells? Explain the differentiation of HSCs in details. Describe briefly the general properties of Stem cells.

**Q3)** Enlist the different techniques used in stem cell biology. Describe any two in detail. **[16]**

OR

**Q4)** Explain with the help of example gene knock-out and knock-in studies. Add a short note on Stem cell growth and differentiation factors. **[16]**

**Q5)** With the help of neat labeled diagram explain the isolation and culture of embryonic stem cells. **[16]**

OR

**P.T.O.**

**Q6)** Discuss the following: [16]

- a) induced pluripotent stem cells.
- b) neural stem cells.

**Q7)** Briefly explain the application of different stem cell types for different degenerative diseases including gene therapy. [16]

OR

**Q8)** Discuss the following: [16]

- a) Guidelines for stem cells research and therapy in India.
- b) Banking or distribution of hESCs.

**Q9)** Describe the causes, symptoms, diagnosis and treatment for any one of the degenerative disease. Add a note on difficulties to develop stem cell based novel therapies for many serious disease and injuries. [18]

OR

**Q10)** Describe the following: [18]

- a) Retinal replacement therapy.
- b) DNA sequencing methods.

**Q11)** Explain with the help of flow chart the process of sub culturing the cells. Add a short note on adherent cell culture. [16]

OR

**Q12)** Write short notes on the following: [16]

- a) Lineage - tracing technique.
- b) Confocal Microscopy.
- c) Limitations of stem cells therapy.
- d) Tissue engineering scaffold.



Total No. of Questions : 12]

SEAT No. :

**P2031**

**[4759]-342**

[Total No. of Pages : 02

**B.E (Biotechnology)**

**BIOPROCESS MODELLING AND SIMULATION**

**(415469) (2008 course) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12*
- 2) *Neat diagrams must be drawn wherever necessary .*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary*

**SECTION-I**

- Q1)** a) Define mathematical modelling. What are its principles of formulation? [8]
- b) Write short notes on deterministic and stochastic models with suitable examples. [8]

OR

- Q2)** a) Write short notes on Equation of state and chemical equilibrium. [8]
- b) Give detailed notes on Segregated models with a suitable example. [8]

- Q3)** Define equation of motion. What are the various components involved in it? An incompressible liquid pumped at a volumetric flow rate of " $F_0$ ". The height of the liquid in the vertical cylindrical tank is " $h$ ". The output flow rate is " $F$ ". Let the length of exit line be " $L$ " and its cross sectional area " $A_p$ ". The tank has a cross sectional area " $A_T$ ", the velocity of the liquid from the tank is " $v$ ". Write total continuity and momentum balance. [16]

OR

- Q4)** a) Give a detailed classification of mathematical modelling. [8]
- b) Explain in detail the step wise procedure adopted for the development of a complete mathematical model. [8]

- Q5)** Write short notes on dependent and independent variables in a mathematical model. How are these variables interpreted? Explain with suitable example. [18]

OR

**P.T.O.**

**Q6)** Give a comparison for the following processes: [18]

- i) Rigid and stochastic models
- ii) Static and Dynamic models

**SECTION-II**

**Q7)** Give detailed notes on the following: [16]

- i) Chemostats
- ii) Stirred tank reactors

OR

**Q8)** Derive suitable modelling equations and discuss in short the following:[16]

- i) Substrate utilization Kinetics
- ii) Substrate limited growth in chemostats

**Q9)** What are suspended growth reactors? What are its applications? Model a suspended growth reactor for a waste water treatment system with proper assumptions accompanied by a neat sketch. [16]

OR

**Q10)** Explain in brief various types of aerobic tower bioreactors used in Biotech industries with neat sketches. List out the applications and advantages of the same. [16]

**Q11)** Write short notes on distillation systems. Model a Multicomponent Distillation Column with proper assumptions and neat sketch. Prove that the system is critically specified. [18]

OR

**Q12)** Give a short explanation of Batch reactors used in biotech industries. Model a batch reactor and prove that the degrees of freedom are zero. [18]



Total No. of Questions : 12]

SEAT No. :

**P3341**

[Total No. of Pages : 3

[4759] - 343

**B. E. (Biotechnology) (Semester - II)**

**PLANT ENGINEERING AND PROJECT COSTING**

**(2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Answer Q. 1 or 2, Q. 3 or 4, Q. 5 or 6 from Section - I and Q. 7 or 8, Q. 9 or 10, Q. 11 or 12 from Section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Discuss the importance of process flow diagram in plant design. [9]  
b) Describe the different types of process designs. [9]

OR

- Q2)** a) Explain in details various factors consider in techno economic feasibility study. [9]  
b) Discuss the process design aspects. [9]

- Q3)** a) Explain in detail the factors affecting process selection. [8]  
b) A project Engineer would like to choose a plant location for Absolute alcohol manufacturing unit. Please help him during selection of proper site, giving justification. [8]

OR

- Q4)** What are the factors affecting plant location and layout? Explain in detail. [16]

- Q5)** a) Write short note on colour code of pipeline carrying utilities. [8]  
b) Write different steps of process piping design. [8]

**P.T.O.**

OR

- Q6)** a) Write short note on commercially available material for thermal insulation of piping. [8]  
b) Explain the concept of water hammering in process design. [8]

**SECTION - II**

- Q7)** a) Distinguish between CPM and PERT technique. [9]  
b) What are taxes? Explain the purpose of taxes. [9]

OR

- Q8)** a) A company manufacturing plant and equipment for biotechnology processing industry is quoting a tender. The delivery date is fixed. The project manager has listed down the activities in project as under : [10]

Sr. No.	Activity	Immediate Precedence Activity	Activity time in week
1	A	-	3
2	B	-	4
3	C	A	5
4	D	A	6
5	E	C	7
6	F	D	8
7	G	B	9
8	H	E,F,G	3

Develop the network. Calculate time estimates. Identify the critical path.

- b) Comments on project engineering and planning. [8]

- Q9)** List the various mathematical methods for profitability evaluation and explain any one of them in brief. [16]

OR

- Q10)** a) Explain the concept of pay out period. [6]  
b) Explain the concept of cash flow for an overall industrial operation with diagram. [10]



**Q11)** What are the various methods for the determination of depreciation? Explain any two. **[16]**

OR

**Q12) a)** What is depreciation? Discuss about Purpose of Depreciation as a Cost. **[8]**

b) Write short note on salvage value. **[8]**

( ) ( ) ( ) ( )

Total No. of Questions : 12]

SEAT No. :

**P2032**

**[4759] - 344**

[Total No. of Pages :2

**B.E. (Biotechnology)**  
**FOOD BIOTECHNOLOGY**  
**(Elective - III) (2008 Course) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION - I**

**Q1)** What is food spoilage? What are the intrinsic and extrinsic factors affecting spoilage in foods? Explain in detail. **[16]**

OR

**Q2)** Write a short note on biotechnology in relation to food industry. **[16]**

**Q3)** What are food additives? Explain their applications in food processing and preservation. **[18]**

OR

**Q4)** Explain the following processes in detail: **[18]**

- a) UHT treatment
- b) Microwave processing

**Q5)** Explain the design and working of: **[16]**

- a) Freezer
- b) Refrigerator

OR

**P.T.O.**

- Q6)** a) What is thermal death kinetics of micro-organisms? Explain in brief the following: [8]
- i) Thermal Death Time
  - ii) D value
  - iii) Z value
- b) Pooled raw milk at the processing plant has bacterial population of  $4 \times 10^5$ /mL. It is to be processed at 79°C for 21 seconds. The average D value at 65°C for the mixed population is 7 min. The Z value is 7°C. How many organisms will be left after pasteurization? What time would be required at 65°C to accomplish the same degree of lethality? [8]

**SECTION - II**

**Q7)** Write a note on microbial production of oils and fats. [16]

OR

**Q8)** Explain in brief use of solid state bioprocessing for functional food ingredients. [16]

**Q9)** How various enzymes are used in different food industries? Explain the applications of enzymes in cereal and beverage industry. [18]

OR

**Q10)** Explain the use of enzymes in beer mashing and chill proofing. [18]

**Q11)** What is food industrial waste? Explain in brief the solid waste treatment methods used in food industries. [16]

OR

**Q12)** Explain in brief the following treatments: [16]

- a) Activated sludge process.
- b) Anaerobic processes for treatment of food waste.



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :3

**P3731**

**[4759] - 346**

**B.E. (Biotechnology)**

**INTRODUCTION TO SYSTEMS BIOLOGY**

**(415467) (2008 Pattern) (Semester - II) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Answer to the two sections should be written in separate answer books.*

**SECTION - I**

**Q1) Describe in detail about: [18]**

- a) Molecular hierarchy with example.
- b) Various components of system biology.
- c) Bottom up and top down approach in systems biology.

OR

**Q2) What is Human Genome Project? What were the goals of HGP? What are the pros and cons of HGP? Enlist the different phases involved in it. In what ways did the Human Genome Project impact biology. [18]**

**Q3) Answer the following: [16]**

- a) Applications of structural genomics in biotechnology.
- b) Define next generation sequencing and describe it in detail.

OR

**Q4) Describe in detail about: [16]**

- a) Capillary electrophoresis.
- b) Shot gun sequencing method.

**P.T.O.**

**Q5)** Write short note on: [16]

- a) miRNA
- b) Microarray
- c) Transcriptomics

OR

**Q6)** Describe in detail about: [16]

- a) Affimatrix microarray.
- b) Various applications of microarrays

### **SECTION - II**

**Q7)** What is epigenetics? Explain different epigenetic mechanisms for regulation of gene expression and organization. [18]

OR

**Q8)** Describe in detail about: [18]

- a) Role of epigenetics in autoimmune diseases and diabetes.
- b) Enlist disorders with epigenetic etiology and describe in detail about cancer epigenetics.

**Q9)** Answer the following: [16]

- a) Cytochrome P450 enzyme
- b) Enlist the major components of Pharmacokinetics. Describe any two components in detail.

OR

**Q10)** Differentiate between: [16]

- a) Pharmacokinetics and Pharmacodynamics.
- b) Phase I and Phase II reaction

**Q11)** Answer the following:

**[16]**

- a) Describe the chromatographic separation techniques used in metabolomics.
- b) Describe the detection techniques used in NMR and MS.

OR

**Q12)** Explain in detail about principle, Instrumentation, working and applications of mass spectrometry.

**[16]**



Total No. of Questions : 11]

SEAT No. :

**P2033**

**[4759] - 348**

[Total No. of Pages :2

**B.E. (Biotechnology)**

**IPR, BIOETHICS AND REGULATIONS**

**(Semester - II) (2008 Course) (Elective - IV) (415468)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from Section I and three questions from Section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Define Ethics. Write informed consent process for biomedical research involving human participants. **[8]**

b) What is IEC (Institutional Ethics Committee)? What are the basic responsibilities of IEC explain. **[8]**

OR

**Q2)** What is ICMR? How it functions? Which different ethical aspects are regularized under this organization? Explain Briefly. **[16]**

**Q3)** Define Bioethics. Explain with case studies ethics in rDNA Technology and Food Biotechnology. **[16]**

OR

**Q4)** Discuss Moral righteous and moral wrongness of action. Through some light on ethics in Agricultural Biotechnology. **[16]**

**Q5)** Define Patents. What are US Patent acts mention with years? Explain International Patenting Procedure in detail. **[18]**

OR

**P.T.O.**

**Q6)** What are Indian Patent acts mention with years? Explain Indian Patenting Procedure in detail. **[18]**

**SECTION - II**

**Q7)** Write short notes on: (Any 2) (8M each): **[16]**

- a) Trademarks
- b) Copyright
- c) Trade Secret
- d) Industrial Design

**Q8)** a) What are Regularity requirements for Biotechnology? Explain Briefly. **[8]**

b) What are current GMP's? Describe in detail. **[8]**

OR

**Q9)** What do you mean by DCGI? Explain its role in Biotechnology. **[16]**

**Q10)** What is Clinical Research? What are the steps involved in clinical research. Also write short note on clinical data management. **[18]**

OR

**Q11)** Write short notes on: **[18]**

- a) Import and Export of Products.
- b) Quality control requirements of Biotechnology Products.





Total No. of Questions : 12]

SEAT No. :

P3342

[Total No. of Pages :3

[4759]-349

**B.E. (Biotechnology) (Semester - II)**  
**INDUSTRIAL ORGANISATION AND MANAGEMENT**  
**(2008 Pattern) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q. 1 or 2, Q. 3 or 4, Q. 5 or 6 from section I and Q. 7 or 8, Q. 9 or 10, Q.11 or 12 from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*

**SECTION -I**

- Q1)** a) Distinguish between partnership and joint stock company. [6]  
b) State and explain the formation and functions of joint stock company. [6]  
c) Write the advantages and disadvantages of joint stock company. [6]

OR

- Q2)** Write a note on : [18]  
a) Authority and responsibility  
b) Scientific management  
c) Management by objective

- Q3)** a) What are incentives? Explain different types of incentives. [8]  
b) Define recruitment. Discuss various sources of recruitment. [8]

OR

- Q4)** a) Write a note on performance appraisal. [8]  
b) Distinguish between job evaluation and merit rating. [8]

**P.T.O.**

- Q5)** a) Explain the following: [8]  
i) Inventory carrying cost  
ii) Ordering cost  
b) What is safety stock? Why are safety stocks necessary? [8]

OR

- Q6)** a) Differentiate between Inspection and Quality control. [8]  
b) Define store keeping. State requirements of successful store keeping. [8]

**SECTION - II**

- Q7)** a) Explain aims, function and benefits of advertisement. [9]  
b) Define market research. What are the different methods of market research? [9]

OR

- Q8)** a) Explain the importance of marketing management for growth of industrial organization. [9]  
b) Give importance of sales forecasting with example. [9]

- Q9)** a) Write a note on : [8]  
i) VAT  
ii) MOD VAT  
b) Write an explanatory note on patents. [8]

OR

*Q10*)a) Discuss about Total Quality Management. [8]

b) Explain necessity and advantages of ISO. [8]

*Q11*)a) Explain in detail the concept of Contract Act. [8]

b) What is the safety provisions mentioned in factories Act. [8]

OR

*Q12*)Discuss on: [16]

a) The Provisions in MRTP Act

b) the term wages



Total No. of Questions : 12]

SEAT No. :

**P1525**

**[4759]-35**

[Total No. of Pages : 3

**B.E. (Mechanical)**

**PRODUCT DESIGN AND DEVELOPMENT**

**(2008 Course) (Semester - I) (Elective - I) (402044B)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer for each section be written in separate answer sheets.*
- 2) *Attempt Q1 or Q2, Q3 or Q4, and Q5 or Q6 from section -I.*
- 3) *Attempt Q7 or Q8, Q9 or Q10, and Q11 or Q12 from section -II.*
- 4) *Figure to the right indicate marks.*
- 5) *Draw figures wherever necessary.*
- 6) *Assume suitable data, if required.*

**SECTION - I**

- Q1)** a) Explain design by evolution and design by Innovation with examples. [8]
- b) State rapid prototyping methods. Explain any one method of RP. [8]

OR

- Q2)** a) Explain Concurrent Design. Give example. [8]
- b) Explain product verification and product validation. [8]
- Q3)** a) Explain S-Curve. [8]
- b) Explain customer need gathering methods. [8]

OR

- Q4)** a) What is the use of Mission statement and Technical Questioning. Explain Mission statement with example. [8]
- b) State and explain various types of customer needs. [8]

**P.T.O.**

- Q5) a)** Explain Morphological Analysis. [9]  
b) Explain FMEA. [9]

OR

- Q6) a)** What is concept Generation? Explain Concept Generation process. [9]  
b) What is subtract and operate procedure? Explain the steps involved in subtract and operate procedure? [9]

**SECTION - II**

- Q7) a)** What is product tear down process? Explain the steps involved in product tear down process. [8]  
b) What is benchmarking? Explain steps involved in bench marking. [8]

OR

- Q8) a)** Explain Force flow Diagram? Draw force flow diagram for any one application. [8]  
b) What is product Architecture? Explain Function based Modularity. [8]

- Q9) a)** Explain any two guide lines for design for Assembly. [8]  
b) Explain the components of life cycle assessment. [8]

OR

- Q10)a)** Explain Design for manufacturing. [8]  
b) Explain the design for environment. [8]

**Q11)a)** Explain the components of PLM. [9]

b) Explain product data and product work flow. [9]

OR

**Q12)** Write short note on:

a) Emergence of PLM. [6]

b) Link between product data and product work flow. [6]

c) Product data Management. [6]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1494**

**[4759]-350**

[Total No. of Pages : 5

**B.E. (Automobile)**

**AUTOMOTIVE REFRIGERATION & AIR CONDITIONING**

**(2008 Pattern) (Semester - I) (416488)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data, if necessary.*
- 5) *All questions are compulsory.*

**SECTION - I**

- Q1)** a) Define C.O.P. and derive an expression for C.O.P. of Bell coleman cycle. **[8]**
- b) A Carnot refrigerator requires 1.3 kW per ton of refrigeration to maintain a temperature of - 40°C - Determine, **[8]**
- i) COP of the refrigerator.
  - ii) The temperature at which the heat is rejected.
  - iii) The amount of heat rejected in kJ/min.
  - iv) COP, if the cycle is used as a heat pump.

OR

- Q2)** a) Explain vapour compression refrigerator. Also draw p-h, T-S diagram. **[8]**
- b) A refrigeration plant of 100 tons capacity uses R-22 as Refrigeration. The condensing and evaporating pressures are 11.82 bar and 1.64 bar. The refrigerant enters the condenser dry saturated state and it leaves the condenser, sub cooled by 10°C. Actual COP is 70% of the theoretical. Find **[8]**
- i) Theoretical and actual COP
  - ii) Mass flow rate in kg/s
  - iii) Compressor power
- Take following properties of R-22.

**P.T.O.**

P(bar)	T <sub>s</sub> (°C)	h <sub>f</sub> (kJ/kg)	h <sub>g</sub> (kJ/kg-K)	S <sub>f</sub> (kJ/kg-K)	S <sub>g</sub> (kJ/kg-K)
1.64	-30	116.1	393.1	0.8698	1.803
11.82	+30	236.7	414.5	1.125	1.712

C<sub>p</sub> (vapor) = 0.55 kJ/kg-K

C<sub>p</sub> (liquid) = 1.19 kJ/kg-K

- Q3)** a) Explain four important thermodynamic, and two important physical and chemical requirement of refrigerants. [8]
- b) Explain secondary refrigerants. [4]
- c) Explain ideal properties to be possessed by refrigerant oils. [4]

OR

- Q4)** a) What are different types of evaporators used in refrigeration & air conditioning system? With neat sketch, explain the working of flooded evaporator. [8]
- b) Describe accumulators, receiver drivers used in refrigeration system. [8]

- Q5)** a) Write a note on: [6]
- i) Classification of ducts.
  - ii) Duct. materials.
  - iii) Cold storage.
- b) Explain vehicle operation modes and cool-down performance. [6]
- c) What factors are responsible for the spoilage of the food and vegetable products. [6]

OR



- Q6) a)** Write a short note on: [12]
- i) Air filters.
  - ii) Blower fans.
  - iii) Temperature control systems.

- b) Write a short note on comfort conditions [6]

**SECTION - II**

- Q7) a)** Define and explain following terms. [8]
- i) Specific humidity.
  - ii) Relative humidity.
  - iii) Dalton's law of partial pressure.
  - iv) Degree of saturation.

- b) The DBT of atmospheric air is 21°C and DPT is 15°C. The atmospheric pressure of air is 749.5 mm of Hg. Find following [8]

- i)  $P_v$
- ii) Specific humidity
- iii) Relative humidity
- iv) Enthalpy
- v) Specific volume of air

OR

- Q8) a)** Explain [8]
- i) ADP
  - ii) Sensible heat factor
  - iii) Bypass factor
  - iv) Adiabatic humidification of air.

- b) 50 m<sup>3</sup> of air at 30°C and 60% R.H. is cooled to 22°C DBT maintaining its specific humidity constant. [8]

Find the followings.

- i) Heat removed from the air.
- ii) R.H. of the cooled air.
- iii) Wet-bulb temperature of the cooled air.

Assume air pressure is 1.033 bar.

- Q9)** a) What is the effect of air conditioning load on Automobile Engine. [6]
- b) An air conditioned space is maintained at 26°C DBT 50% RH when the outdoor conditions are 35°C DBT and 28°C WBT. The space has a sensible heat gain of 17.6kW and the air to the space is supplied at a condition of 8°C saturated. Determine [12]
- i) The mass and volume flow rate of the air supplied.
  - ii) Latent heat load in the room.
  - iii) The cooling load of the refrigerator plant if 15% of total mass of air supplied to the space is fresh air and the remaining air is recirculated.

OR

- Q10)**a) Explain following terms. [6]
- i) GSHF
  - ii) ESHF
  - iii) RSHF
- b) An air - conditioning room is maintained at 27°C DBT and 50% R.H. when ambient conditions are 40°C DBT and 27°C WBT. The room sensible heat gain is 14kW. The air enters the conditioned hall at 7°C DBT and saturated. Determine
- i) Volume of moist air supplied to the space in M<sup>3</sup>/min.
  - ii) Latent heat gain in the room in kW.
  - iii) Cooling load of the air - washer in kW if 30% of the air supplied to the room is fresh air and remaining 70% is recirculated. [12]

**Q11)** Write short note on:

**[16]**

- a) Temperature measurement.
- b) Leak detection test explain any one.
- c) Initial vehicle inspection.
- d) Refrigerant recovery.

OR

**Q12)** Explain following:

**[16]**

- a) Refrigerant charging.
- b) Odour Removal.
- c) Retrofitting.
- d) Removing and relating of compressor components.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1495**

**[4759] -351**

[Total No. of Pages : 3

**B.E. (Automobile Engg.)**  
**MACHINE AND VEHICLE DYNAMICS**  
**( 2008 Course) (Semester - I) (416489)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and three questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** A four cylinder in-line engine running at 2000 rpm is having crank and connecting rod length of 60mm and 240mm respectively. The mass of reciprocating parts of each cylinder is 2kg. The cylinders are spaced 160mm apart and the cranks appear at 90° interval in an end view. If the firing order of the engine is 1-4-2-3, determine: **[16]**

- a) The unbalanced primary and secondary forces.
- b) The unbalanced primary and secondary couples.

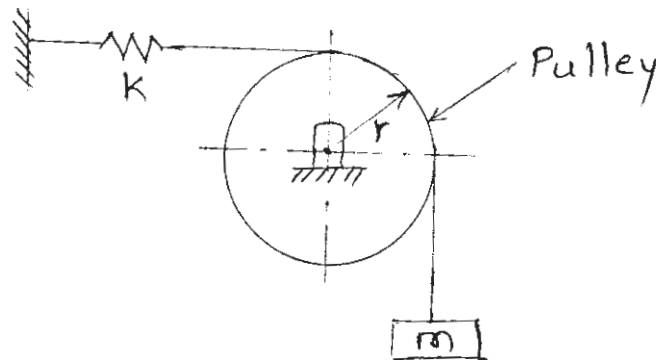
OR

**Q2)** a) Write a short note on Dynamic Balancing Machine. **[6]**

b) The axes of the three cylinder air compressor are at 120° to one another and their connecting rods are coupled to a single crank. The length of each connecting rod is 240mm and the stroke is 160mm. The reciprocating parts have a mass of 2.4 kg per cylinder. Determine the primary and secondary forces, if the engine runs at 2000rpm. **[10]**

**P.T.O.**

**Q3) a)** Find the natural frequency of the system shown in fig. [8]



b) What are the types of Damping? Explain any two in brief. [8]

OR

**Q4) a)** Explain the term 'Critical Damping coefficient'. [4]

b) A spring-mass-dashpot system consist of spring of stiffness  $400\text{N/m}$  and the mass of  $4\text{kg}$ . The mass is displaced  $20\text{mm}$  beyond the equilibrium position and released. Find the equation of motion of the mass, if the damping coefficient of the dashpot is, [12]

i)  $160\text{ N-s/m}$

ii)  $80\text{ N-s/m}$

**Q5) a)** Discuss in brief Magnification factor. [4]

b) A machine part of a mass  $2\text{kg}$  vibrates in a viscous medium. Determine the damping coefficient. when a harmonic exciting force of  $25\text{N}$  results in a resonant amplitude of  $12.5\text{mm}$  with a period of  $0.20\text{ sec}$ . If the system is excited by a harmonic force of frequency  $4\text{ cycles/sec}$  determine the percentage increase in the amplitude of forced vibration, when the damper is removed. [14]

OR

**Q6) a)** An electric motor is supported on a spring and dashpot. The spring has a stiffness  $5000\text{ N/m}$  and dashpot offers a resistance of  $300\text{N}$  at  $2.5\text{m/s}$ . The unbalanced mass of  $1.5\text{kg}$  rotates at  $50\text{mm}$  radius and total mass of electric motor is  $50\text{kg}$  if the motor runs at  $340\text{ r.p.m}$ , determine: [14]

i) The damping factor

ii) The phase angle

iii) The amplitude of steady-state vibrations

iv) The resonance speed

- v) The amplitude at resonance
  - vi) The resultant force exerted by spring and dashpot on the motor.
- b) Explain in brief force transmissibility. [4]

**SECTION - II**

- Q7)** a) Write a brief note on 'Ground effect produced due to aerodynamics'. [8]  
b) What are the co-ordinate systems used in vehicle dynamics. [8]

OR

- Q8)** a) How to modify car profile for minimum drag? [8]  
b) With the free body diagram of accelerating vehicle explain the terms, [8]  
i) Acceleration  
ii) Maximum transferable tractive effort.

- Q9)** a) What will be the ride performance criteria for luxury car? [8]  
b) Explain in brief with Diagram [8]  
i) active-semiactive suspension  
ii) Pitching of vehicle

OR

- Q10)** a) Write a short note on modal analysis of vehicle. [8]  
b) What is the role of vibration absorber & isolation in ride mode? [8]

- Q11)** a) 'Effect of vehicle braking on vehicle handling is important parameter while discussing handling performance'. Why? [6]  
b) How tyre will made impact on handling? [6]  
c) Write a short note on 'steady state handling'. [6]

OR

- Q12)** Explain following terms in breif. [18]  
a) Low speed cornering  
b) Tyre wear pattern  
c) Constant radius testing.



Total No. of Questions : 12]

SEAT No. :

**P1496**

**[4759] - 352**

[Total No. of Pages : 4

**B.E. (Automobile Engineering)  
AUTOMOBILE SYSTEM DESIGN  
( 2008 Course) (Semester - I) (416490)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain the aesthetic and ergonomics considerations in design. [6]  
b) Explain about adequate and optimum design. [6]  
c) Write short note on mechanical reliability. [6]

OR

- Q2)** a) Explain the Johnson's method of optimum design. [8]  
b) Explain the role of natural tolerances in design. [4]  
c) Explain the procedure of design optimization of mechanical element. [6]

- Q3)** a) What causes the clutch to slip? [4]  
b) What are the design requirements of a clutch? [4]  
c) A friction clutch is required to transmit 33.12 KW at 2000rpm. It is to be of single plate disc type with both sides of the plate effective, the pressure being applied axially by means of springs and limited to 68700Pa. If the outer diameter of the plate is to be 0.305m, find the inner diameter of the clutch ring and the total force exerted by the springs. Assume the wear to be uniform and coefficient of friction 0.3. [8]

OR

**P.T.O.**

- Q4)** a) Why multi-plate clutch is preferred in two wheelers? [4]
- b) Why is centrifugal clutch more suitable for heavy duty application? [4]
- c) A centrifugal clutch is to transmit 14.72KW at 900rpm. The shoes are four in numbers. The speed at which the engagement begins is  $3/4^{\text{th}}$  of the running speed. The inside radius of the pulley rim is 140mm and the centre of gravity of the shoe lies at 120mm from the center of the spider. The shoes are lined with Ferrodo for which the coefficient of friction may be taken as 0.25. Determine weight of the shoe and size of the shoes if angle sustained by the shoes, at the center of the spider is  $60^{\circ}$  and the pressure exerted on the shoes is 98100Pa. [8]

- Q5)** a) What is the purpose of gearing system in a vehicle? [4]
- b) A four speed gear box is to be constructed for providing the ratios of 1,1.46,2.28 and 3.93 to 1 as nearly as possible. The diametral pitch of each gear is 3.25mm and the smallest pinion is to have at least 15 teeth. Determine the suitable number of teeth of the different gears. What is then the distance between the main and lay shaft. [12]

OR

- Q6)** a) Explain the selection of bearing in gearboxes. [6]
- b) The maximum gear ratio of an engine 75mm bore and 100mm stroke is 4. The pitch diameter of the constantly meshing gear is 75% of the piston stroke. If the module is 4.25mm, calculate the size and number of teeth of gears for a three speed gear box. Calculate the face width of the constantly meshing gear using the modified Lewis formula. The engine torque is 910Kgf-cm, value of constant in the Lewis formula is 0.7 and the allowable stress is 900Kgf/cm<sup>2</sup>. [10]

### SECTION - II

- Q7)** a) Why is tubular section propeller shaft normally used? [4]
- b) What is the function of the propeller shaft and drive shaft? [6]



- c) An engine develops 29.5KW at 2000 rpm when the torque developed is maximum. The bottom gear ratio is 3:1 and back axle reduction is 4.5:1. The load on each driving axle is 7357.5N When the car is fully loaded. Diameter of road wheel over the tyres is 0.71m and the coefficient of adhesion between tyre and road is 0.6. If the permissible shear stress in the material of the shaft is not allowed to exceed 220725000Pa, find the diameter of the axle shaft. [6]

OR

- Q8) a)** Explain the general design procedure of front axle. [10]

- b) A car has one of its rear wheels jacked up of the ground. With top gear engaged, the engine is turned by hand and it is found to make 11 turns while the jacked up wheel turns 4 times. With first gear engaged, 19 turns of the engine correspond to 2 turns of the road wheel. Assuming direct drive through the gear box in top drive, calculate the rear axle ratio and the first gear ratio of the gear box. [6]

- Q9) a)** How does the expanding mechanism of shoes affect the total braking torque? [4]

- b) What are the components of hydraulic braking system? Explain their functions. [6]

- c) The disc brake pads operate at a mean radius of 0.14m. The force applied to each pad is 4450N and the coefficient of friction between each pad and disc is 0.35. When the disc rotates at 500 rpm, calculate [6]

- i) The frictional torque acting on the disc
- ii) The work done per minute by this torque
- iii) The heat energy generated per second.

OR

- Q10)a)** What happens if coefficient of friction in the brake lining material becomes extremely high? [4]

- b) Write short note on [12]

- i) Braking efficiency
- ii) Stopping distance
- iii) Brake fade

- Q11)**a) On what factors does the stiffness of a leaf spring depend? [4]
- b) How does the failure of leaf spring occur? [4]
- c) A vehicle spring of semi-elliptical type has leaves of 75mm width and 10mm thickness and effective length 900mm. If the stress is not to exceed 220725000Pa when the spring is loaded to 4905N, estimate the required number of leaves and the deflection under this condition. If the spring is just flat under load, what is the initial radius? Take  $E = 196.2 \times 10^9$  Pa. [10]

OR

- Q12)**a) Discuss the following. [6]
- i) Over-steer
- ii) Stiff steering
- b) Explain the design considerations of steering system. [6]
- c) How are steering gear ratio and number of turns determined? [6]



Total No. of Questions : 10]

SEAT No. :

**P1497**

**[4759]-353**

[Total No. of Pages : 2

**B.E. (Automobile)**

**AUTOMOTIVE AERODYNAMICS AND STYLING**

**(2008 Pattern) (Semester-I) (416491) (Elective-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) Derive continuity equation of fluid flow. [6]  
b) Explain following terms in brief: [12]  
i) Laminar & turbulent flow.  
ii) Compressible & incompressible flow.  
iii) Lift & drag.

OR

- Q2)** a) Write a brief note on 'performance under various back pressure'. [6]  
b) Explain following terms in brief: [12]  
i) Stream line & streak line.  
ii) Convective & local acceleration.  
iii) Classification of drag.

- Q3)** a) Write a short note on tip effect. [6]  
b) Describe flow around circular & Aerofoil body. [10]

OR

- Q4)** a) How lift on aerofoil will be developed? [6]  
b) Write all characteristics of swept wings & 'camber and aspect' ratio of wing. [10]

***P.T.O.***

- Q5)** Write in brief about: [16]
- a) Resistance to vehicle motion.
  - b) Down force.
  - c) Optimization of car body for low drag.
  - d) Pressure areas around car body.

**SECTION-II**

- Q6)** a) How 'CFD' will improve shape of vehicle? [6]
- b) What is the effect of fastners used for vehicle. [6]
- c) How dirt accumulation on vehicle will reduced? [6]

OR

- Q7)** Explain following terms in brief: [18]
- a) Front & rear windshield angles.
  - b) Origin of forces & moments on vehicle.
  - c) Fast back, hatch back & square back dust flow pattern at rear.

- Q8)** a) Write any two flow visualization techniques in brief. [8]
- b) How velocity will be measured in wind tunnel? [8]

OR

- Q9)** a) How climatic wind tunnels are different from normal wind tunnels? [8]
- b) Write a brief note on measuring devices used in wind tunnel. [8]

- Q10)** Write a short note on any four from following: [16]
- a) Front grill shapes.
  - b) Vehicle color codes.
  - c) Headlight shapes.
  - d) Specific brand emage.
  - e) Asthetics of vehicle design.



Total No. of Questions : 12]

SEAT No. :

**P1498**

**[4759]-354**

[Total No. of Pages : 4

**B.E. (Automobile)**

**CAD-CAM & AUTOMATION**

**(2008 Pattern) (Semester-I) (416491) (Elective-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1) a)** What is open GL? Explain its use. **[4]**
- b) A triangle is defined by the vertices A(1, 2, 4) B(4, 3, 5) and C(5, 8, 3). The three orthographic views are to be projected. Write transformation matrices and hence determine coordinates of front, top & right hand side view. **[12]**

OR

- Q2) a)** A triangle with vertices A(8, 0) B(12, 0) and C(12, 3) has undergone reflection about line  $y = x$  find the concatenated matrix and then find new coordinates of  $\Delta ABC$  using the transformation matrix. **[10]**
- b) Derive concatenated transformation matrix for reflection with respect to a line. **[6]**

- Q3) a)** Write parametric equation of circle with center at a point (5, 5, 0) and with radius 05 units. Calculate coordinates of the four quadrant points of the circle. **[8]**
- b) A line is represented by end points P(5, 7, 2) & Q(-4, 6, 3). If 'u' at P and Q is 0 and 1 respectively, determine its length. Also find out the coordinates of points represented by  $u = 0.4$ ,  $u = -0.25$  and  $u = 1.5$ . **[10]**

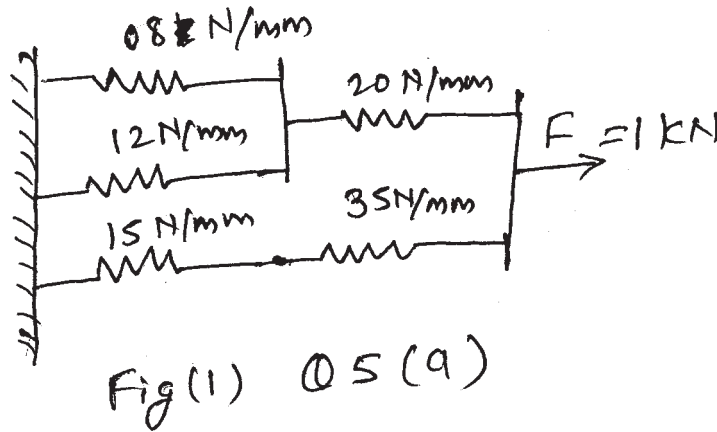
OR

**P.T.O.**

Q4) a) Differentiate between analytical and synthetic curves. Give two examples of each. [9]

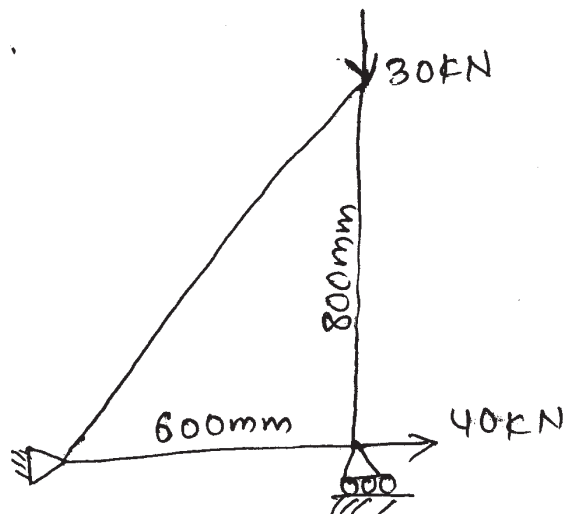
b) Differentiate between Hermite Bicubic surface and coons surface. [9]

Q5) a) Find the deflection of each spring shown in fig. [8]



b) A three bar truss is shown in fig. The cross sectional area of each element is  $50 \text{ mm}^2$ .  $E = 2 \times 10^5 \text{ N/mm}^2$ . Determine: [8]

- i) The element stiffness matrix.
- ii) Global stiffness matrix.
- iii) Nodal displacement.
- iv) Stresses in each element.
- v) Reaction forces.



OR  
2

**Q6)** A three bar equilateral triangular truss has the three members of length 1m each. The bottom supports are 1 and 2 while the top joint is 3. Support at end 1 is fixed while that at 2 is roller. Vertical force of 250 N is acting at point 3 along with horizontal force of 350 N (towards roller support 2)  $E = 2 \times 10^5$  N/mm<sup>2</sup>. The cross sectional area of each element is 600 mm<sup>2</sup>. Determine:

[16]

- The element stiffness matrix.
- Global stiffness matrix.
- Nodal displacement.
- Stresses in each element.
- Reaction forces.

### SECTION-II

**Q7) a)** Explain with neat sketch coordinate system for Lathe and drilling CNC machines. [6]

- Write CNC part program for roughing and finishing of the turning component as shown in fig below by using canned cycle. Raw material size is  $\phi 50\text{mm} \times 50\text{mm}$ . Assume suitable for feed speed and depth of cut for mild steel material. [12]

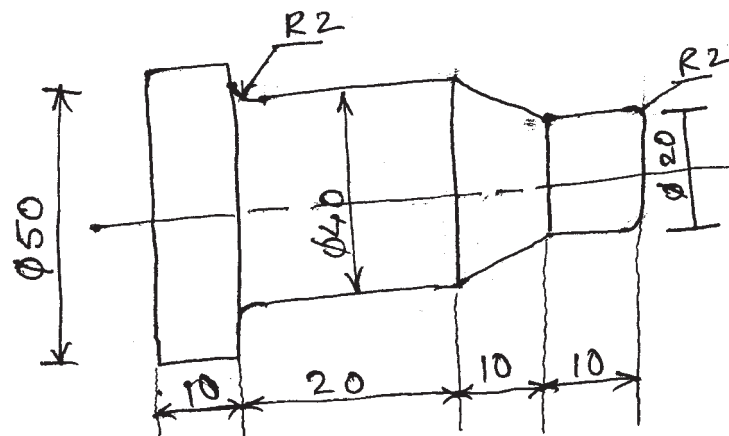


Fig 7 (b)

OR

- Q8)** a) Explain four important features of CNC machines over NC machines. [6]  
b) Explain Direct Numerical Control Machine with block diagram. [6]  
c) Compare absolute and incremental method of programming. [6]

- Q9)** a) Write short note on automated guided vehicles. [8]  
b) Explain ASRS system with sketch. [8]

OR

- Q10)**a) Write short note on machining center with its features. [8]  
b) Write short notes on group technology and FMS. [8]

- Q11)**a) Explain the application of robot in ARC welding operation. [6]  
b) Classify drives used for robot joint motions. [4]  
c) Explain vacuum gripper. [6]

OR

- Q12)**a) Explain different joints of robots with fig. [8]  
b) Name the different grippers used in material handling by robots with one application of each. Explain the working of magnetic gripper with sketch. [8]





Total No. of Questions : 11]

SEAT No. :

**P2034**

**[4759] - 355**

[Total No. of Pages :4

**B.E. (Automobile)  
AUTOMOTIVE NVH**

**( 2008 Course) (Semester - I) (Elective -I) (416491 D)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Q.5 should be compulsory.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1) a)** Explain role of noise, vibration and harshness in automobile. **[6]**
- b) Derive an expression for frequency equation incase of two degree of freedom, undamped free vibration. **[10]**

OR

- Q2) a)** Discuss the sources of vibration and noise in automobile. **[8]**
- b) Explain the physiological effect of noise and vibration. **[8]**

- Q3) a)** Write a note on. **[6]**
- i) Mathematical model
  - ii) Torsional vibration and linear vibration.
- b) Derive an expression for single degree of freedom simple harmonic excitation with graphical method. **[10]**

OR

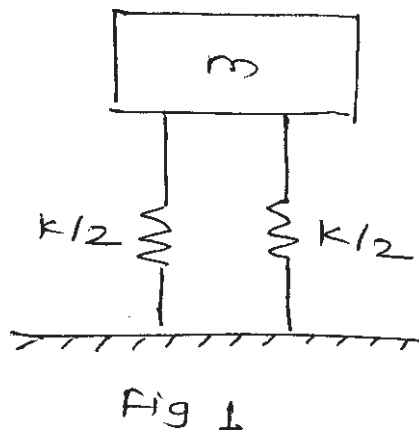
**P.T.O.**

**Q4) a)** Derive an expression for single degree of freedom under damped systems. Write an expression for (over damped, critically damped and under damped). [10]

- b) i) Write a note on co-ordinate coupling.  
ii) Explain generalized co-ordinates.

[6]

**Q5) a)** Derive the equation of transmissibility ratio for isolation using spring as shown in fig.1. [10]



- b) Write a note on (any two). [8]
- i) Vibration isolation  
ii) Dry friction damping  
iii) Vibration absorber

### SECTION - II

**Q6) a)** Explain the weighting networks. [6]

b) Derive the relation for sound pressure intensity and power level. [10]

OR

- Q7) a)** Write a note on (any two). **[10]**
- i) Octave band analysis.
  - ii) Summation of pure tones.
  - iii) Spherical wave propagation
- b) What is difference between structure borne sound and air borne sound?**[6]**

- Q8) a)** Describe ISO standard for noise level measurement of vehicle in stationary position. **[8]**
- b) Explain noise measurement instruments. Enlist types of microphones.**[8]**

OR

- Q9) a)** Describe ISO standard for noise level measurement of vehicle in running position. **[8]**
- b) List different method of noise control and explain them in detail. **[8]**

- Q10) a)** Explain methods of control of noise of **[12]**
- i) Transmission noise
  - ii) Intake and exhaust noise
  - iii) Brake noise
  - iv) Aerodynamic noise
- b) How we can apply noise control methods. **[6]**
- i) At the source
  - ii) Along the path
  - iii) At the receiver

OR

**Q11)a) Write a note on [12]**

i) Isolation

ii) Damping

iii) Balancing

**b) Define and explain [6]**

i) Acoustic intensity

ii) Sound power



Total No. of Questions : 11]

SEAT No. :

**P2035**

**[4759]-357**

[Total No. of Pages : 2

**B.E. (Automobile)**

**VEHICLE SAFETY**

**(2008 Pattern) (Semester-I) (Elective-II) (416492 B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Question No. 11 is compulsory.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*

**SECTION-I**

**Q1) a)** Discuss role of safety systems in automotive. Enlist the various safety systems used in Automobile. **[8]**

b) What are ergonomics considerations required at the time of safety system design. **[8]**

OR

**Q2) a)** Explain in details characteristics of vehicle structure. **[8]**

b) What are the recent trend in automotive safety nowadays? Discuss in details. **[8]**

**Q3) a)** Enlist the impact test and explain any two types of impact test. **[8]**

b) Write a short note: **[8]**

i) Crash testing.

ii) Crash worthiness.

OR

**Q4) a)** What is mean by movable barrier test? Give its significance. **[8]**

b) Write a short note: **[8]**

i) Crumple zone.

ii) Rollover impact test.

**P.T.O.**

- Q5)** a) Explain in brief ergonomics with respect to driver controls. [8]  
b) Enlist different types of dummies and explain each in brief. [10]

OR

- Q6)** a) What is the necessity of ergonomics in automobile? Justify your answer. [8]  
b) What are the types of sensors used for impact test? Explain in details. [10]

**SECTION-II**

- Q7)** a) Draw the layout of airbag system and explain its working. [8]  
b) Write a short note on: [8]  
i) Head restraint system and seat anchorage.  
ii) Seat belts and its types.

OR

- Q8)** a) Compare active safety and passive safety. [8]  
b) Explain different type of energy absorbing system used in vehicle. [8]

- Q9)** a) What are the requirements of reverse lamp and fog lamp? Justify it. [8]  
b) Discuss recent trends in automotive lighting system. [8]

OR

- Q10)** a) Explain with the help of neat sketch sealed beam type head lamp with its advantages. [8]  
b) Enlist different type of head lamp & explain any two of them in brief. [8]

**Q11)** Write a short note (Any Three): [18]

- a) Safety consideration according to CMVR.  
b) Safety Glasses.  
c) Types of Mirrors.  
d) Recent trends in traffic system.



Total No. of Questions : 12]

SEAT No. :

**P1499**

**[4759]-358**

[Total No. of Pages : 3

**B.E. (Automobile)**

**OFF ROAD VEHICLES**

**(2008 Course) (Semester-I) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION-I**

- Q1)** a) Write down the classification of off road vehicles in brief. [9]
- b) Explain in detail the requirements of different off road vehicles according to the application. [9]

OR

- Q2)** a) Draw the neat sketch of construction layout of any one off road vehicle & explain it in brief. [9]
- b) Write down the specification of any one off road vehicle & explain how to decide the capacity according application. [9]

- Q3)** a) Explain the working principles involved in mobile cranes with strut and cantilever jibs, with neat sketch. [8]
- b) Explain the difference in load capacities technology for low, heavy and medium tractors. [8]

OR

- Q4)** a) Explain the factors affecting the working efficiency of the heavy load tractors. [8]
- b) Give explanation about running gear & operation equipment in an air brake system. [8]

***P.T.O.***

- Q5) a)** What is the use of the shovel bucket? Specify the CNC operation involved in that? [8]
- b) Explain the working principle & operation of medium & heavy graders. [8]

OR

- Q6) a)** What is the use of show removal, drag showel, hoe and explain the excavators are classified? Mention its major types. [8]
- b) What is the use of vibrating components? What is the relationship between dampers & vibration. [8]

### SECTION-II

- Q7) a)** Explain the oil tankers surveillance vehicle and why the ‘ambulance’ written in reverse order on front side of the ambulance. [8]
- b) Explain the factors affecting the working efficiency of the heavy load tractors. [8]

OR

- Q8) a)** Mention the basic principle of scissors like trucks: mention two applications of that. [8]
- b) Explain the design of body & forces in role over. [8]

- Q9) a)** What is meant by angle dozers, where it is used? [9]
- b) Explain safety features for damper. [9]

OR

- Q10)a)** Explain in brief safe warning system for damper. [9]
- b) Explain in detail the design aspects of dumper body. [9]

- Q11)a)** Explain in detain soil-vehicle mechanics. [8]
- b) What are the different characteristics of soils & explain it in detail. [8]

OR



**Q12)a)** Explain the following terms with example **[8]**

i) Nominal Ground pressure.

ii) Mean maximum pressure.

b) Explain Traction performance & factors affecting on traction performance.

**[8]**



Total No. of Questions : 12]

SEAT No. :

**P1500**

**[4759]-359**

[Total No. of Pages : 2

**B.E. (Automobile)**

**AUXILIARY ENGINE SYSTEMS**

**(2008 Course) (Semester-I) (416492) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION-I**

- Q1)** a) What is mean by supercharging? Explain dynamic supercharging in detail. [8]
- b) Explain with neat sketch, Exhaust gas turbocharging. [8]

OR

- Q2)** a) Explain the effects of supercharging on the air consumption and power output from the engine and explain in detail. The types and characteristics of compressors used in supercharger. [8]
- b) Explain gas exchange process in case of supercharging. [8]

- Q3)** a) What is pulse turbo charging? Explain it with neat diagram. [8]
- b) What are the different applications of exhaust gas turbocharger? [8]

OR

- Q4)** a) Explain positive displacement mechanical supercharger. [8]
- b) What is the difference between supercharger and turbocharger? Explain any one type of turbocharger in detail. [8]

- Q5)** a) What is the purpose of cooling the charge air? Explain its effects on engine performance. [10]
- b) Explain in detail the effects of turbocharger on the engine performance. [8]

OR

**P.T.O.**

- Q6)** a) Differentiate mechanical supercharger and exhaust supercharger with at least eight points. [8]
- b) What are the different aspects of turbocharging in case of passenger cars with gasoline engines. [10]

**SECTION-II**

- Q7)** a) Enlist the advantages of constant pressure turbocharging over the pulse turbocharging. [10]
- b) Explain altitude derating in details. [8]

OR

- Q8)** a) What are effects of supercharging on exhaust emissions of diesel and petrol engines? [10]
- b) Explain torque characteristics of engine with exhaust turbocharger. [8]

- Q9)** a) Explain complex supercharger. [8]
- b) Explain bearing system in case of exhaust gas turbocharger. [8]

OR

- Q10)**a) What are the different types of materials used for manufacturing the turbine of the supercharger. [8]
- b) With the help of compression graph explain the various aspects related with compressor and its impeller. [8]

- Q11)**a) Explain Exhaust gas recirculation and its significance in reduction of vehicle emissions. [8]
- b) What are the desired properties of engine coolants. [8]

OR

- Q12)**a) Which are the different aspects related with the designing of cooling air fan. [8]
- b) Write different aspects of design of Radiator. [8]



Total No. of Questions : 12]

SEAT No. :

**P2006**

**[4759] -36**

[Total No. of Pages : 4

**B.E. (Mechanical)**

**DESIGN OF PUMPS, BLOWERS AND COMPRESSORS**

**( 2008 Course) (Sem. -I) (Elective - I) (402044(C))**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, and electronic pocket calculator and steam tables are allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain the following terms. **[8]**
- i) Flow Machines
  - ii) Turbines
  - iii) Pumps
  - iv) Compressible Flow Machines.
- b) A turbo blower develops 750mm W.G. at a speed of 1480 rpm and a flow rate of 38m<sup>3</sup>/s. It is desired to build a small model which develops the same head at a higher speed (2490rpm) and low discharge. Determine the specific speed and the flow rate through the model. **[8]**

OR

- Q2) a)** Explain the performance characteristics of pumps, compressors, fans and blowers. **[10]**
- b) Write equations of energy transfer between fluid and rotor. **[6]**

**P.T.O.**

- Q3) a)** The impeller of a centrifugal pump has 1.4m outside diameter. It is used to lift 1800 liters of water per second against a head of 10m. Its Vanes make an angle of  $45^\circ$  with the direction of motion at outlet and runs at 400 rpm. If the radial velocity of flow at outlet is 3.5m/s, find the manometric efficiency. Also find the power required if the overall efficiency is 82%. **[8]**
- b) Explain various efficiencies of centrifugal pump. **[8]**

OR

- Q4) a)** Explain various types of characteristic curves usually prepared for centrifugal pumps. **[8]**
- b) What is NPSH? Derive the expression of the same. Find the height from the water surface at which a centrifugal pump may be installed in the following case to avoid cavitation: Atmospheric pressure = 1.01 bar; vapour pressure = 0.022 bar; losses in suction pipe = 1.42m; effective head of pump = 49m; and cavitation factor = 0.115. **[8]**

- Q5) a)** Explain the following terms. **[8]**
- i) Static Suction Head
  - ii) Static Discharge Head
  - iii) Total Static Head
- b) Explain the design procedure of centrifugal pump. **[10]**

OR

- Q6) a)** Explain various forms of corrosion occurred in hydraulic machines. **[8]**
- b) A centrifugal pump running at 1450 rpm has the characteristic as given below: **[10]**

Discharge (Lit/sec)	11.3	16.9	22.6	28.3	34	39.6	45.2
Head (m)	25.8	25	24.1	23.2	21.4	18.9	15.8
Efficiency %	65	70	73	74	72	69	62

Draw the operating characteristic of the pump and determine its specific speed. The pump lifts water against a static head of 12m through a long pipeline in which the loss of head in meters, due to friction is given by the expression,  $h_f = 0.012 Q^2$ , where Q is the discharge in liters/sec. The minor losses in the pipe may be neglected. Determine the power required to drive the pump.

### SECTION - II

- Q7)** a) Explain different criterias for selection of compressors, fans and Blowers. [8]
- b) Write a short note on “Applications of Blowers and fans”. [8]

OR

- Q8)** a) Explain in details functions of Airfoil & discuss the characteristic curves of airfoils. [8]
- b) How does dust erosion of centrifugal impeller occurs? What is its effect on the performance? [8]

- Q9)** a) State design considerations and empirical relations used to determine various for design parameters. [8]
- b) What is surging? What are its effect? What is stalling? How it is developed? [8]

OR

- Q10)** a) Write a short note on “Design procedure for selection and optimization of Blowers”. [8]
- b) Write a short note on “Design of Impeller and casing dimensions in Aerodynamic Design”. [8]

**Q11)a)** What is the work done factor for an Axial compressor stage? How does it vary with the number of stages? [8]

b) Explain briefly what is the purpose of Inlet guide vanes and inducer blades. Why is the radial-tipped impeller most widely used in centrifugal compressor stages? [10]

OR

**Q12)a)** Prove the following relation for isentropic flow in a radial-tipped impeller: [10]

$(\psi = 1)$ ;

$$(P_{rw}) = 1 + \left( \frac{u_2^2}{C_p \cdot T_{01}} \right) \frac{\gamma}{\gamma - 1}; \text{ with usual notations.}$$

b) What is “ship factor”? What are its effects on the flow and the pressure ratio in the stage? [8]



Total No. of Questions : 12]

SEAT No. :

**P1501**

**[4759] - 360**

[Total No. of Pages :3

**B.E. (Automobile)**

**ALTERNATIVE FUELS AND EMISSION CONTROLS**

**( 2008 Patern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume Suitable data, if necessary.*
- 6) *All questions are compulsory.*

**SECTION - I**

- Q1)** a) Compare Diesel and Gasoline fuel with their properties. [6]  
b) What is enthalpy of formation & Enthalpy of combustion? [10]

OR

- Q2)** a) Why additives are used? What are the additives for SI and CI engines. [6]  
b) Enlist any five alternative fuels and write their properties. [10]

- Q3)** a) What are the different synthetic fuels used in vehicle? Explain its effect on engine performance. [6]  
b) Differentiate between CNG and LPG fuels. [6]  
c) Write a note on ethanol as a fuel for IC Engine. [6]

OR

- Q4)** a) What are the bio-diesets? Give its general properties. [6]

**P.T.O.**



- b) Write a note on Alcohol as fuel for CI Engine. [6]  
c) Explain properties of hydrogen fuel & give its advantages over conventional fuels. [6]

- Q5)** a) Explain use of synthatic fuel in an Automobile Engines. [8]  
b) Explain Dimethyl Ether as alternative fuel. [8]

OR

- Q6)** a) Discuss syngas in details. [8]  
b) Write production, properties, storage and handling,dispensing, advantages and disadvantages of GTL. [8]

## **SECTION - II**

- Q7)** a) Write a note on catalyst used in catalytic converter. [4]  
b) How will you reduce the NO<sub>x</sub>. emission in SI engine? [4]  
c) Explain Emission formation in SI Engine. [8]

OR

- Q8)** a) What is positive crank case ventilation system for UBHC emission reduction. [6]  
b) Write effect of design and operating variable in SI engine emission. [10]

- Q9)** Explain effect of design and operating parameters on CI engine Emission. [16]

OR

- Q10)**a) Discuss exhaust gas recirculation system of CI Engine. [8]  
b) Write measurement & test procedure for NDIR analyzers. [8]

**Q11) Write a note on:-**

**[18]**

- a) Emission Effect on health.
- b) Emission inventory.
- c) Ambient air quality monitoring.

OR

**Q12)a) What are emission norms explain in details.**

**[9]**

- b) List the negative effect of CO Emission on human health, what is treatment to CO intoxication person? **[9]**



Total No. of Questions : 11]

SEAT No. :

**P1502**

**[4759] - 361**

[Total No. of Pages :3

**B.E. (Automobile Engineering)**  
**VEHICLE PERFORMANCE & TESTING**  
**(2008 Pattern) (Semester - II)**

*Time :3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer -books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain steering as a vehicular system with one suitable example. [8]  
b) How EGR system improves vehicle performance? Explain with neat sketch? [8]

OR

- Q2)** a) Explain any 4 vehicle performance parameters briefly. [8]  
b) Explain the 2 types of catalytic converters with neat sketch. [8]

- Q3)** a) Discuss in brief about “use of torque converter in Automated vehicle”. [8]  
b) What is the impact of differential & final drive unit on vehicle performance. [8]

OR

- Q4)** a) Explain the procedure for testing of clutch. [6]  
b) Explain the characteristics of clutch and compare 4 types of Automotive clutches. [10]

**P.T.O.**

**Q5)** Write a short note on following. **[18]**

- a) Free acceleration test
- b) Coast down test
- c) Passer by Noise test

OR

**Q6)** a) Explain wheel alignment & balancing test with neat sketch. **[10]**

- b) Describe the different types of test tracks used for testing of cross country vehicles. **[8]**

**SECTION- II**

**Q7)** a) Write a short note on **[10]**

- i) Roll over protection system
- ii) Electronic stability program

- b) Describe particulate traps with its function. **[6]**

OR

**Q8)** Explain the following occupant safety systems in brief. **[16]**

- a) Collapsible steering
- b) Air bags
- c) GPS
- d) Seat Belt

**Q9)** a) Explain crash testing dummies with hybrid III family. **[10]**

- b) Explain Braking distance test. **[6]**

OR

**Q10)** Explain the following briefly

**[16]**

- a) Pole crash testing
- b) Side impact testing
- c) Vehicle to vehicle impact
- d) Sensor mounting.

**Q11)** Explain (Any 3) briefly.

**[18]**

- a) Endurance test
- b) Engine Noise & vibration
- c) Sensor types & selection parameters
- d) Battery testing using Hydrometer
- e) Model test & full scale



Total No. of Questions : 12]

SEAT No. :

**P3732**

**[4759] - 362**

[Total No. of Pages :3

**B.E. (Automobile)**

**HYDRAULICS AND PNEUMATICS**

**(416497) (2008 Course) (Semester - II) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagram must be drawn wherever necessary.*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Draw a neat sketch of hydraulic system and explain different components used in hydraulic system. Write the advantages and applications of hydraulic system. **[8]**
- b) Explain with example Pascal's Law. **[4]**
- c) What are requirements of good hydraulic fluid? **[4]**

OR

- Q2)** a) What is hose lines connector, draw correct installation of hoses. **[4]**
- b) Explain difference between flared fitting and compression fittings. **[4]**
- c) Explain hydraulic filter, and filter locations with sketches. **[8]**

- Q3)** a) Explain with a neat sketch the working of vane pump and balanced vane pump, state its applications. **[8]**
- b) Gear pump has gear dimensions as follows, outside gear diameter = 95mm, inside gear diameter = 65mm, gear width = 30mm, The pump was tested to determine its mechanical and volumetric efficiency, followings are the test result. Actual flow rates = 217 liters per minute, rated pressure = 70 bar, speed = 2200 r.p.m., input motor torque = 165N.m. **[8]**

OR

**P.T.O.**

- Q4)** a) Explain with neat sketch spring loaded and Bladder type of accumulator and state their applications. [8]  
b) Explain fluid reservoir with neat sketch. [4]  
c) Explain Swash plate axial piston pump. [4]

- Q5)** a) Explain pressure control valve with neat sketch and write its applications. [8]  
b) Explain: [10]  
i) 4/3 direction control valve  
ii) temperature compensated flow control valve.

OR

- Q6)** a) Explain: [10]  
i) Sequence valve  
ii) Servo valves  
b) Draw symbols of [8]  
i) quick acting coupling  
ii) cylinder with cushioning  
iii) variable throttle valve  
iv) hydraulic motor with two directional flow  
v) weight loaded accumulator  
vi) pilot operated pressure relief valve  
vii) flow meter  
viii) heater with liquid heating medium

**SECTION - II**

- Q7)** a) Explain: [10]  
i) Gear type hydraulic motor  
iii) Piston type hydraulic motor  
b) Write classification of linear actuators and explain telescopic cylinder and tandem cylinder. [8]

OR

- Q8) a)** Explain with a neat sketch the working of synchronization circuits. [10]  
b) Explain with neat sketch meter-in circuit. [8]

- Q9) a)** Explain the construction and working of air filter used in pneumatic circuits. [8]  
b) Explain: [8]  
i) Shuttle valve  
ii) Quick exhaust valve

OR

- Q10)a)** Draw neat sketch of radial air motor and explain its working. [8]  
b) Draw neat sketch and explain working of any two vacuum pumps. [8]

**Q11)** Develop and explain the operation of a hydraulic circuit for sequential operation of two hydraulic cylinders are required as follows. [16]

- a) cylinder 'A' extends  
b) cylinder 'B' extends  
c) cylinder 'B' retracts  
d) cylinder 'A' retracts

Using 4/3 direction control valve.

OR

- Q12)a)** Draw a hydraulic circuit for grinding machine. [6]  
b) An actuator forward speed is controlled by meter in circuit. The pressure settings of relief valve is 50 bar and pump discharge = 30 liters per minute. The cylinder has to carry a load of 3600N during forward motion. The area of piston is 15cm<sup>2</sup> and rod area = 8cm<sup>2</sup>, the flow control valve is set to allow only 10 liters per minute. Calculate the power input to motor, forward speed and return speed and efficiency of the circuit.  
Consider mechanical efficiency = 85%. [10]





Total No. of Questions : 12]

SEAT No. :

**P1503**

**[4759]-364**

[Total No. of Pages : 2

**B.E. (Part-II) (Automobile)**

**TRANSPORT MANAGEMENT AND MOTOR INDUSTRY**

**(2008 Course) (Semester-II) (Elective-IV) (416498)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION-I**

**Q1) a)** Define the following terms. **[8]**

Motor vehicle, Axle weight, certificate of registration, Driving license, Permit, Goods Carriage, Life insurance, Road tax.

b) State the different offences and penalties. **[8]**

OR

**Q2) a)** State the procedures for obtaining a learner license and a permanent license. **[8]**

b) What is the necessary to register a motor vehicle? **[4]**

c) Who are exempted from the permit? **[4]**

**Q3) a)** State and explain the objectives and features of tax. **[8]**

b) Explain the different kinds of tax. **[8]**

OR

**Q4) a)** Explain onetime tax. **[6]**

b) Explain the procedure for refund of tax. **[6]**

c) Write down the effect of nonpayment of tax. **[4]**

**P.T.O.**

- Q5)** a) Explain the different types of insurances. [10]  
b) In case of accident what are the duties to be performed by the driver? [8]

OR

- Q6)** a) Write short note on Motor Accident Claim Tribunal. [8]  
b) Explain the loss assessment of accident vehicle. [6]  
c) Who are exempted from insurance? [4]

**SECTION-II**

- Q7)** a) State the advantages of Road transportation. [8]  
b) State the different types of organization. Explain any one of them. [8]

OR

- Q8)** a) Explain the factors to be considered while scheduling bus transport operation. [8]  
b) Draw the general layout of vehicles bus depot and explain. [8]

- Q9)** a) State the factors which affects the performance of goods transportation system. [8]  
b) Mention the different speed limits under the motor vehicle act. [8]

OR

- Q10)**a) Explain the Management information system in goods transport operation. [8]  
b) Explain the procedure of storage and transportation of petroleum products. [8]

- Q11)**a) Explain Traffic navigation system. [10]  
b) Explain Global positioning system. [8]

OR

**Q12)** Write short note on:

- a) Basic concept of GPS. [9]  
b) Time keeping in Navigation. [9]



Total No. of Questions : 12]

SEAT No. :

**P1526**

[4759]-37

[Total No. of Pages : 4

**B.E. (Mechanical)**

**TRIBOLOGY**

**(2008 Pattern) (Semester - I) (Elective - I) (402044D)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Section I: Q1 or Q2, Q3 or Q4, Q5 or Q6 Section II: Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data wherever necessary.*

**SECTION - I**

- Q1)** a) What is tribology? What is the importance of Tribology in Machine Design? [6]
- b) Explain Redwood viscometer used to measure viscosity of lubricating oil. [6]
- c) A lubricating oil has a specific gravity of 0.86 and it gives 170 SUS for a viscosity measurement. Calculate the viscosity in CP. [4]

OR

- Q2)** a) What are the functions of additives for lubricating oil? Elaborate your answer by mentioning any three examples. [6]
- b) State and explain Newton's law of viscous flow. What is absolute viscosity? [6]
- c) Explain any four important desirable properties of bearing materials. [4]
- Q3)** a) Explain any eight factors affecting wear rate. [8]
- b) Explain briefly any two friction measurement methods. [8]

OR

**P.T.O.**

**Q4) a)** Explain Archard's wear theory. What are the assumptions made for this? [8]

b) Using modified adhesion theory of friction, show that the coefficient of friction due to adhesion is  $fa = \frac{k}{[\infty (1-k^2)]^{1/2}}$ . [8]

**Q5) a)** Derive Reynold's one dimensional equation for flow of viscous fluid. [12]

b) What are tilting pad thrust bearings. Explain the hydrodynamic action in fixed pad thrust bearing. [6]

OR

**Q6)** The following data is given for 360° hydrodynamic bearing. (Refer Table 1) [18]

Radical Load = 9 KN

Journal speed = 2185 rpm

l/d ratio = 1

Permissible average bearing Pressure = 2.5 N/mm<sup>2</sup>

Viscosity of lubricant = 155 SUS

Specific gravity of lubricant = 0.86

Specific heat of lubricant = 2.09 KJ/Kg°K

Calculate:

- a) Length of bearing
- b) Diameter of journal
- c) Coefficient of friction
- d) Power lost in friction
- e) Total flow rate in l/min
- f) Side leakage in l/min
- g) Minimum oil film thickness
- h) The temperature rise

Table:1

$l/d$	$h_0/C$	$\epsilon$	S	$(r/c)f$	$Q/rcnsl$	$Q_s/Q$	$P_{max}/P$
1.0000	0.0000	1.0000	0.0000	0.0000	0.0000	1.000	0.000
	0.0300	0.9700	0.00474	0.5140	4.8200	0.973	6.579
	0.1000	0.9000	0.0188	1.0500	4.7400	0.919	4.048
	0.2000	0.8000	0.0466	1.7000	4.6200	0.842	3.195
	0.4000	0.6000	0.1210	3.2200	4.3300	0.680	2.409
	0.6000	0.4000	0.2640	5.7900	3.9900	0.497	2.066
	0.8000	0.2000	0.6310	12.8000	3.5900	0.280	1.890
	0.9000	0.1000	1.3300	26.4000	3.3700	0.150	1.852
	1.0000	0.0000	$\infty$	$\infty$	3.1420	0.000	0.000

### SECTION - II

- Q7)** a) What are the advantages of hydrostatic step bearings? Draw a sketch indicating various elements of this bearing. [6]
- b) Derive the equation for quantity of oil flow through a rectangular slot. [10]

OR

- Q8)** a) Derive following equation for oil flow rate Q for a hydrostatic conical thrust bearing for a shaft having outside diameter Do (radius Ro) and recess diameter Di (radius Ri): [10]

$$Q = \frac{\pi h^3 p_i \sin \alpha}{6\mu \log_e \left( \frac{R_o}{R_i} \right)}$$

- b) Explain squeeze film lubrication with examples.. [6]

- Q9)** a) List down any three bearing materials, their composition, and special property possessed by each one of them and their typical applications. **[8]**
- b) What are self lubricated bearings? Explain the process involved. **[5]**
- c) Write short notes on gas lubricated bearings. **[5]**

OR

- Q10)**a) What is electro-hydrodynamic lubrication? Explain the phenomenon. What is the assumption made for solving the Reynold's equation for EHL application. **[8]**
- b) What are Lined bearings? Explain the process involved and the advantages. **[6]**
- c) What are the requirements of lubrication used for **[4]**
- i) Deep drawing operation.
- ii) Machine bed guide-ways.

- Q11)**a) Explain the importance of Surface Engineering in tribological design. **[6]**
- b) Explain with sketches, any two methods used for corrosion resistance. **[10]**

OR

- Q12)**a) Explain the general characteristics of superficial layers obtained by Machining, strengthening and weakening of superficial layers. **[8]**
- b) With suitable sketches, write short notes on: **[8]**
- i) Electroplating.
- ii) Crystallizing coating.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1527**

**[4759]-38**

[Total No. of Pages : 3

**B.E. (Mechanical Engineering)  
AUTOMOBILE ENGINEERING  
(2008 Course) (Semester-I) (402045 A) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1)** a) Explain classification of automobile with the help of examples and give specification of any one petrol car of your choice. [8]

b) Explain with neat sketch layout of a four wheel drive. [8]

OR

**Q2)** a) Explain front engine front wheel drive vehicle with neat sketch. Write its advantages and disadvantages over the other layouts. [8]

b) State different types of vehicle bodies and explain any one in detail. [8]

**Q3)** a) Explain with neat sketch construction and working of multi-plate clutch. [8]

b) Explain fluid coupling with neat sketch. [8]

OR

**Q4)** a) Explain working of sliding mesh gear box with neat sketch. Also state its advantages and disadvantages. [8]

b) Draw a neat sketch of typical differential unit in the back axle of vehicle and explain its working. [8]

**P.T.O.**

- Q5)** a) Enumerate different types of steering gears. Explain with neat sketch construction and working of power steering unit. [10]
- b) How are the tyres classified and rated. [8]

OR

- Q6)** a) Define front end geometry for steering including castor, camber, steering axis inclination, toe and scrub radius. [10]
- b) Describe various types of stub axles with the help of suitable diagram and state merits and demerits of each of them. [8]

**SECTION-II**

- Q7)** a) Explain in detail the function and construction of a leaf spring with neat sketch. [8]
- b) Explain ABS (Antilock Braking System) in detail. Also state its advantages over hydraulic brake system. [10]

OR

- Q8)** a) Explain the independent front suspension arrangement with the help of neat sketch. State advantages of it. [10]
- b) Explain with neat sketch the working of hydraulic brakes. [8]

- Q9)** a) Sketch and describe the components and operation of a battery used in automobile. [8]
- b) Explain with lay out lighting system of any typical car. [8]

OR

**Q10)** Write short notes on Any Four: [16]

- a) Vehicle charging system.
- b) Dash board instruments.
- c) Electronic stability control.
- d) Sensors and actuators.
- e) Preventive maintenance of vehicle.



**Q11)** Write short notes on Any Four:

**[16]**

- a) Seat belts.
- b) Ergonomic consideration for vehicle.
- c) Vehicle performance curve.
- d) Vehicle interior.
- e) Air bags.

OR

**Q12)a)** Explain in details Active safety and Passive safety.

**[6]**

- b) A passenger car 13348.56 N. The rolling resistance may be assumed as 44.78 N of vehicle weight. The air resistance is given by  $0.00018 AV^2$  where A is frontal area and V is car speed. The frontal area of the vehicle is  $2.324 \text{ m}^2$  and car speed is 48.54 km/hr. **[10]**
  - i) Determine the power required to propel the vehicle on level road.
  - ii) If the tractive effort available at the wheel is 1860.27, find the maximum gradient which the vehicle can climb.



Total No. of Questions : 12]

SEAT No. :

**P3884**

[Total No. of Pages : 3

**[4759] - 39**

**B.E. (Mechanical) (Semester - I)**

**MACHINE TOOL DESIGN**

**(2008 Pattern) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Answer to the questions should be written on separate books.*
- 3) *Draw neat diagram wherever necessary.*
- 4) *Assume suitable data if required.*

- Q1)** a) Explain why cis used for calculating speed? Show value of geometric progression. Lies between 1 and 2. [8]
- b) Discuss the designs features of feed gear box with Norton drive. [8]
- c) Write a Short note on selection of best Ray diagram. [4]

OR

- Q2)** a) Design a six-speed gear box for a machine tool having a minimum speed 60rpm, G.P ratio = 1.55, speed of motor =1500 rpm. Draw the best possible Structural diagram, ray diagram, speed chart and gear layout. [14]
- b) Discuss the selection of motor for the drive, [6]

- Q3)** a) What are the functions of machine tool structures? Show the different types of cross sections used for machine tool beds and columns. [8]
- b) Discuss bed materials along with required properties. [7]

OR

- Q4)** a) What the design criteria for beds? How these are applied to for welded and cast beds. [8]
- b) Why stiffness is important consideration in machine tool structure? How Stiffness is improved explain with figures. [7]

**P.T.O.**

**Q5) a)** Discuss briefly the merits and demerits of Recirculating power screw in comparison to conventional lead screw .state its specific field of uses and application. [7]

b) Discuss the design consideration in guideways. [8]

OR

**Q6) a)** Estimate the total error in pitch of a lead screw working on sliding friction and show that it could be expressed as [10]

$$\Delta_1 \Delta_1 \left( 1 + \frac{P^2}{2\eta D^2} \right) \text{ Where}$$

A - Cross section area, D - Effective diameter,  $\eta$  - Efficiency

b) Write a note on aerostatic slide ways. [5]

**Q7) a)** Describe the various elements of a spindle unit used in a drilling machine Draw the neat sketch of the arrangement. [7]

b) Explain optimum spacing of support in spindle for good rigidity. [8]  
 $\Delta_1 = QP / AE$  Q- Axial load, P-Pitch,

c) State and explain the functions of machine tool spindle. What are the desirable Features of spindle units. [5]

OR

**Q8) a)** Explain the design consideration of machine tool spindle. [8]

b) Explain different methods for preloading of ball bearing. [6]

c) Describe the different types of bearing employed in machine tools. Give the Importance of each. [6]

**Q9) a)** Explain how electrical braking system is used for control in machine tool. [8]

b) Compare hydraulic control system with mechanical control system with Reference to performance, cost, and reliability considerations. [7]

OR

**Q10)**a) What do you understand by regenerative chatter in machine tool? State its causes and effects. [8]

b) How vibrations of boring bar are damped. [7]

**Q11)**a) Explain how and where a retrofitting is done in an old lathe machine tool. [8]

b) Differentiate stepped and stepless drive and explain Epicyclic stepless drive. [7]

OR

**Q12)**Write a short note on following : [15]

a) Layout of machine tool by matrices

b) Feedback devices used in CNC

c) For flat disc drive, derive the equation for frictional torque



Total No. of Questions : 10]

SEAT No. :

**P1507**

[4759]-4

[Total No. of Pages : 3

**B.E. (Civil)**

**STRUCTURAL DESIGN OF BRIDGES**

**(2008 Course) (Semester-I) (Elective-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4 from section-I.*
- 2) *Answer Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10 from section-II.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *I.S. 456, I.S. 800, I.S. 1343, IRC-21, IRC 83 and steel tables are allowed.*
- 5) *Assume suitable data wherever necessary.*
- 6) *Use of non programmable calculator is allowed.*

**SECTION-I**

- Q1)** a) Explain the loads considered in the design of highway bridges. [9]
- b) Classify bridges on the basis of material of construction and forms of superstructure. [8]
- c) Explain Pigeaud's method for the analysis of slabs. [8]

OR

- Q2)** Explain Courbon's theory for determining the load carried by
- a) Longitudinal girders. [9]
- b) Classify I.R.C loadings, explain IRC class AA tracked and wheel loading with neat sketches. [8]
- c) Explain various types of bearings used in R.C.C bridges. [8]

- Q3)** Design an Interior pannel of R.C.C. T-beam deck slab bridge for two lane highway with following data. [25]

- a) Clear width of Roadway = 7.5m
- b) Span of the bridge = 30m
- c) Footpath on either side = 1.2m
- d) Spacing of longitudinal girders = 3.3m c/c
- e) Average thickness of wearing coat = 80 mm

**P.T.O.**

- f) Spacing of cross girders = 3.0m c/c
- g) Live load as per IRC class AA tracked vehicle
- h) Material - M 30 and Fe 500
- i) Adopt  $M_1 = 0.055$  and  $M_2 = 0.021$

OR

**Q4)** For the R.C. T-beam deck slab bridge given in Que. (3), design the intermediate post tensioned prestressed girder. Use M 45 grade of concrete and high tension strands of 7 ply 15.2 mm diameter having an ultimate tensile strength of 1600 N/mm<sup>2</sup> use Fe 415 steel for supplementary reinforcement. Consider loss ratio 0.85, sketch the cable profile for the girder. **[25]**

### SECTION-II

- Q5)** a) Classify railway steel bridges according to load carrying capacity and floor location with their sketches. **[8]**
- b) Explain in brief equivalent uniformly distributed load. **[5]**
- c) Describe Hudson's formula. **[3]**

OR

- Q6)** a) Explain in brief, the various types of forces acting on the railway steel bridges. **[8]**
- b) Explain in brief, dynamic effect and impact for the design of railway truss steel bridges. **[5]**
- c) Explain different components of plate girder steel bridge with neat sketch. **[3]**

**Q7)** Design an elastomeric pad bearing for a T-beam deck slab bridge on a national highway with following data. **[18]**

- a) Reaction on bearing - live load of 700 kN and dead load of 300 kN.
- b) Longitudinal frictional force on bearing - 45 kN.
- c) Effective span of girder = 21m.
- d) Estimated rotation at bearing = 0.0025 radians.
- e) Estimated shear strain =  $5 \times 10^{-4}$ .
- f) Grade of concrete for T-beam and bed block = M 30.

OR

**Q8)** The pratt truss through type railway bridge shown in fig (1) has the following details. [18]

- a) Weight of stock rail = 0.60 kN/m
- b) Weight of check rail = 0.40 kN/m
- c) Timber steeper of six - 0.25m × 0.25m × 2.5m @ 0.45 m c/c
- d) Unit weight of timber = 7.5 kN/m<sup>3</sup>
- e) Spacing of truss = 6.0m c/c
- f) The bridge support a EUDL = 2950 kN

Design the member  $U_3U_4$  and  $U_3L_4$

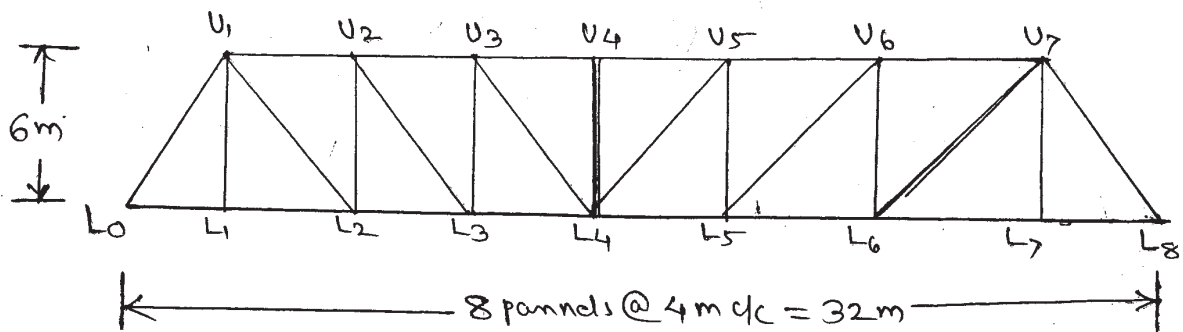


fig 0) Que - 8.

**Q9)** For the Pratt truss through type railway bridge given in Que (8) design the top and bottom lateral bracing with the given data. The rails are 800mm above the C.G. of bottom chord. The chord members are 500 mm deep and 500 mm wide. The end post are 500 mm deep and 500 mm wide. The web members are 500 mm deep and 240 mm wide. [16]

OR

**Q10)** Design a Rocker bearing for 32m span truss girder railway bridge with following data.

The reaction due to D.L, L.L, and I.L is 1700 kN. The verticle reaction due to over turning effect of wind at each end of the girder is 140 kN. The lateral load due to wind effect at each bearing is 70 kN. The tractive force and breaking force are 981 kN and 686 kN respectively. [16]



Total No. of Questions : 12]

SEAT No. :

**P1528**

**[4759]-40**

[Total No. of Pages : 5

**B.E. (Mechanical)**

**QUANTITATIVE & DECISION MAKING TECHNIQUE**

**(2008 Course) (Semester-I) (402045 C) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All the questions are compulsory.*
- 2) *Two separate answer books are used for section-I and section-II.*
- 3) *Figures to right indicate full marks.*
- 4) *Use of non programmable calculator is permitted.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** Define and explain scope of Operation Research. **[6]**

b) Find the Game Value of following problem. **[10]**

Player B

	B1	B2	B3	B4
A1	-5	16	13	15
A2	20	-5	60	-70
A3	-5	9	12	10
A4	20	2	50	-80

Player A

OR

**Q2) a)** Explain: **[6]**

- i) Minimax and Maximin Principle.
- ii) Dominance Rule.

b) Explain steps in Decision making. **[4]**

c) Solve following Game problem with Dominance Rule. **[6]**

Player B

	B1	B2	B3
A1	12	-8	-2
A2	6	7	3
A3	-10	-6	2

Player A

**P.T.O.**



- Q3) a)** Explain Hungarian method of solving assignment problem. [6]
- b) Five different machines can do any of five required components with different machining time resulting from each assignment as shown in table below. Find out minimum machining time possible through optimum assignment. [10]

		Machine				
		1	2	3	4	5
Component	A	160	130	175	190	200
	B	135	120	130	160	175
	C	140	110	155	170	185
	D	50	50	80	80	110
	E	55	35	70	80	105

OR

- Q4) a)** Explain Least cost method of allocation for transportation problem. [6]
- b) A company has factories at F1, F2 and F3 that supply products to warehouses at W1, W2 and W3. The weekly production of factories is 200, 160 and 90 units respectively and the weekly demand of warehouses is 180, 120 and 150 units respectively. The unit shipping costs in rupees is below. [10]

	W1	W2	W3
F1	16	20	12
F2	14	8	18
F3	26	24	16

Solve and optimize the solution by suitable method.

- Q5) a)** Define following terms of Linear Programming. [6]
- Basic Solution.
  - Feasible Solution.
  - Artificial Variables.

- b) Solve LPP by suitable method [12]

$$Z = 40x_1 + 35x_2$$

subjected to  $2x_1 + 3x_2 \leq 60$

$$4x_1 + 3x_2 \leq 96$$

$$x_1, x_2 \geq 0$$

OR

- Q6)** Solve following problem by big M method. [18]

$$Z = 600x_1 + 500x_2$$

subjected to  $2x_1 + x_2 \geq 80$

$$x_1 + 2x_2 \geq 60$$

$$x_1, x_2 \geq 0$$

### SECTION-II

- Q7) a)** Explain with suitable example Monte-Carlo Simulation. [6]

- b) A hardware store produces and sells hardware items. Information on the items is given below. [10]

Expected Annual Sales = 8000 units

Ordering Cost = Rs. 180 per order

Holding Cost = 10% of the average inventory value

The item can be purchased according following discounted rates with respect to lot size

Lot Size	Unit price
1-999	Rs. 22.00
1000-1499	Rs. 20.00
1500-1999	Rs. 19.00
2000 & above	Rs. 18.50

OR

- Q8) a)** Discuss any one Inventory control Models. **[4]**
- b) A tailor specializes in ladies dresses. The number of customer approaches the tailor appear to be Poisson distributed with a mean of 6 customers per hour. The tailor attends the customers on a first come first served basis and the customers wait if the need be. The tailor can attend the customers at an average rate of 10 customers per hour with the service time exponentially distributed. Find- **[12]**
- i) The probability of the number of arrivals from 0 to 5 in 15 minute interval and 30 minute interval.
  - ii) The utilization parameter.
  - iii) The probability that the queuing system is idle.
  - iv) The average time that the tailor is free on a 10 hour working day.
  - v) The probability associated with the number of customers from 0 to 5 are in the queue.
- Q9) a)** Explain Payback period method of Investment analysis. **[8]**
- b) With the following data. **[8]**
- Fixed Cost = Rs. 40,000/-
- Variable Cost = Rs. 2/unit
- Selling Price = Rs. 10/unit
- Calculate
- i) Breakeven point in unit and Rs.
  - ii) Profit when sales is Rs. = 1,00,000/-
  - iii) Sales when it is desirable to earn profit of Rs. 30,000/-
- OR
- Q10)a)** Discuss various replacement analysis models. **[8]**
- b) A manufacturer have machine A having price 2500/- It's maintenance cost is Rs. 400/- for first five years and then increase by Rs. 100 further per year. Scrap value of machine is negligible. Money value is 10% per year. When the machine should be replaced. **[8]**

**Q11)a)** Describe Fulkerson's rule used in network analysis and discuss cost aspects and crashing of network. **[6]**

b) Information on the activities required for a project is as follows. Find critical path, TF, FF, IF. **[12]**

Activity	1-2	1-3	1-4	2-5	3-5	3-6	3-7	4-6	5-7	6-8	7-8
NT	2	7	8	3	6	10	4	6	2	5	6

OR

**Q12)a)** Write difference between PERT and CPM. **[6]**

b) A small project is composed of scrap activities whose time estimates are listed below. **[12]**

Activities		To	Tm	Tp
I	J			
1	2	3	6	15
1	6	2	5	14
2	3	6	12	30
2	4	2	5	8
3	5	5	11	17
4	6	3	6	15
6	7	3	9	27
5	8	1	4	7
7	8	4	19	28

- i) Draw network diagram
- ii) Calculate the length and variance of the critical path
- iii) What is the approximate probability that the job on critical path will be completed in 41 days?



Total No. of Questions : 12]

SEAT No. :

**P1529**

**[4759] - 41**

[Total No. of Pages :5

**B.E. (Mechanical)**  
**POWER PLANT ENGINEERING**  
**( 2008 Course) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain the factors considered for site the selection of a power station.[6]
- b) Discuss the status of power generation by the nonconventional sources in India. What is the role of government in this sector? [6]
- c) A power generating unit of 15MW capacity takes the following load [6]
- i) Domestic consumers with maximum demand of 8MW at a load factor of 25%.
  - ii) Cottage industry demand of maximum load of 4MW with a load factor of 45%.
  - iii) Corporation with street light load with maximum demand of 1MW with 30% load factor.

What is the overall cost of energy per kWh for each type of customers? The capital cost of the plant is Rs 9000/kW and running cost is Rs 40,000,000 per year. Take annual interest rate and depreciation on capital cost as 12%.

OR

**P.T.O.**

- Q2)** a) What is carbon credit? Explain with suitable examples. [6]  
b) Explain the principle of economic scheduling of power plants. [6]  
c) Find the monthly bill and unit cost for a consumer using the Hopkinon demand rate with the following data. [6]

- i) Maximum demand: 14kW  
ii) Energy consumption per month: 2400kWh  
iii) Demand rate: 0-6kW = Rs 200/kW

$$7-12\text{kW} = \text{Rs } 160/\text{kW}$$

$$6-18\text{kW} = \text{Rs } 140/\text{kW}$$

- iv) Energy rates: First 100kWh = Rs 2.0/kWh  
101-500 kWh = Rs 1.6/kWh  
501-2000kWh = Rs 1.2/kWh  
Over 2000 kWh = Rs 1.0/kWh.

What is the lower possible bill for a month and the unit energy cost for the given energy consumption?

- Q3)** a) Explain the merits and demerits of pulverized coal firing. [4]  
b) How cogeneration is achieved using back pressure turbines and pass out turbines? [6]  
c) In a thermal power plant steam is condensed in a surface condenser at 14000 kg/hr and the leakage is 6 kg/hr. The vacuum near the suction pump is 69cm of Hg and the temperature is 35°C. The air and the condensate are removed by a wet air pump. Find the capacity and the dimensions of the pump if  $N = 120$  rpm,  $L/D$  is 1.2 and the pump is single acting. Take barometric pressure as 760mm of Hg. [6]

OR

- Q4)** a) Explain processes of the coal beneficiation and coal desulphurization. [6]  
b) What is a dry cooling tower? When it is recommended? What are the different types of dry cooling tower? [4]

- c) In a cogeneration plant steam is generated at 50 bars and 500°C and expanded thro' an isentropic turbine to a condenser pressure of 0.05 bars. The heating load is supplied by extracting steam from turbine at 3 bar which is condensed in a process heater to saturated liquid at 3 bar and then pumped back to boiler. The power load on the sytem is 6MW and the heating load is 1.2MW. Show the process on TS diagram and find [6]
- steam generation capacity of boiler in TPH
  - heat transfer to water in the boiler in kW
  - rate of cooling water flow across the condenser if the temperature rise of the water is 5°C. Neglect the pump work.

- Q5)** a) With a suitable diagram explain the schematic layout of a hydro power plant. [5]
- b) Discuss the performance characteristics of a gas turbine power plant. [5]
- c) Compare the steam, hydro and gas power plant on the basis of site, initial cost, fuel cost, maintenance cost, cooling water requirement. [6]

OR

- Q6)** a) Explain the following terms [6]
- Hydrograph
  - Spillways
  - Surge tank
  - Draft tubes
  - Pumped storage plant
  - Specific speed.
- b) What is free piston engine? Discuss the relative merits and demerits. [4]

- c) In an open cycle gas turbine power plant compressor is driven by the high pressure turbine. Power is produced by low pressure turbine. The exhaust gases are passed through the regenerator. Using the following data determine the air flow rate for 2MW power produced and thermal efficiency of the plant. [6]

Data:

- i) isentropic efficiency of compressor and turbines: 88%
- ii) Compressor inlet conditions: 27°C and 1 bar
- iii) Pressure ratio:7
- iv) Regenerator effectiveness: 0.8
- v) Maximum temperature in the cycle: 900°C

Assume air flow rate to be equal to the gas flow rate, specific heat for air and gases as 1.005 and 1.128kJ/kgK,  $\gamma$  for air and gases as 1.4 and 1.34 respectively.

## SECTION - II

- Q7)** a) Draw a neat diagram of CANDU type of reactor and give it's advantages and disadvantages over other types of reactors. [8]
- b) Draw a typical layout of Diesel Power Station and Explain. [8]

OR

- Q8)** a) What different Moderators are used in practice? What different properties make them as suitable Moderators? [8]
- b) Why the starting of Diesel Plant is more difficult? What different methods are used for starting Diesel Engine? Which method is common and why? [8]
- Q9)** a) What is the function of bus bar? Draw different types of Bus bar arrangements and discuss the relative merits and Demerits. [8]



- b) Explain single basin and double basin tidal power plant with neat diagrams. [8]

OR

**Q10)a)** What are different types of switch gear installations? Discuss their relative merits and demerits. [8]

- b) Explain the working of a fuel cell and list out its advantages over other nonconventional systems of power generation. [8]

**Q11)a)** What are the different methods presently adopted in the world to reduce the harmful Greenhouse Effect? [9]

- b) Explain the different methods adopted to control Nuclear Pollution. [9]

OR

**Q12)a)** Write short notes on the following points: [9]

- i) Acid rain
- ii) Thermal Pollution
- iii) SMOG

- b) What are different methods used to control SO<sub>2</sub> in the flue gases? Explain any two. [9]



Total No. of Questions : 12]

SEAT No. :

**P1530**

**[4759] - 42**

[Total No. of Pages :5

**B.E. (Mechanical Engineering)  
MECHANICAL SYSTEM DESIGN  
(2008 Pattern) (Semester - II)**

*Time : 4 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two Sections should be written in separate answer books.*
- 2) *Answer three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Using neat sketches where required, describe and derive the expressions for the principal stresses in a thin cylindrical pressure vessel with no joints subjected to internal pressure and explain which among them will be the design criterion for determining wall thickness. **[8]**
- b) Determine the inside diameter of shell and the crown radius of the torispherical heads if the thickness of the shell and the torispherical heads of a cylindrical pressure vessel are 12mm and 16mm respectively. The vessel operating at 2.0 MPa pressure is entirely made of 270N/mm<sup>2</sup> yield strength material with weld joint efficiency 0.7 and corrosion allowance of 2mm. **[10]**

OR

- Q2)** a) Using neat sketches where required, describe and derive the expressions for the principal stresses in a thick cylindrical pressure vessel with no joints subjected to internal pressure. **[8]**
- b) The maximum tensile stress induced in a pressure cylinder consisting of an inner cylinder of 300mm ID and 400mm OD is 100N/mm<sup>2</sup>. The vessel is jacketed by outer cylinder of 500mm OD. Calculate the shrinkage pressure and the difference between the inner cylinder OD and the jacket ID before assembly assuming  $E = 210\text{kN/mm}^2$ . **[10]**

**P.T.O.**

**Q3) a)** Explain with neat sketches procedure for design of center crankshaft at top dead center position. [6]

b) Design an exhaust valve for a horizontal diesel engine using following data: [10]

Cylinder bore = 350mm

Length of stroke = 400 mm

Engine speed = 600 rpm

Maximum gas pressure = 4.0 N/mm<sup>2</sup>

Seat Angle = 45°

Mean velocity of gas through port ( $v_p$ ) = 50 m/s

For steel valve,  $k = 0.42$ ,  $\sigma_b = 50$  N/mm<sup>2</sup>

Determine:

- i) Diameter of valve port
- ii) Diameter of valve head
- iii) Thickness of valve head
- iv) Diameter of valve stem
- v) Maximum lift of valve

OR

**Q4)** Following data is given for a single cylinder four stroke diesel engine: [16]

Cylinder bore = 100mm

Length of stroke = 125 mm

Speed = 2000 rpm

Brake mean effective pressure = 0.65MPa

Maximum gas pressure = 5 MPa

Fuel consumption = 0.25 kg per BP per h

Higher calorific value of fuel = 42,000 kJ/kg

Assume that piston transmits 5% of total heat developed in cylinder. Permissible stress of piston material is 37.5 N/mm<sup>2</sup> ( $k = 46.6 \text{ W/m}^{\circ}\text{C}$ ). Temperature difference between center and the edge of piston head is 220°C.

- i) Calculate thickness of piston head by strength consideration
- ii) Calculate thickness of piston head by thermal consideration
- iii) Decide on the criteria that decides piston head thickness
- iv) Decide if ribs are required
- v) If yes, calculate number and thickness of piston ribs
- vi) Decide whether a cup is required at the top of piston head
- vii) If yes, calculate radius of cup.

**Q5) a)** Explain Johnson's method of optimum design in detail. **[6]**

- b) An exhaust valve mechanism helical coiled spring is initially compressed with a preload of 500N and the valve lift is 40mm. Design the spring with modulus of rigidity 90GPa and Wahl's shear stress factor as 1.14 such that the torsional shear stress in spring will not exceed 700 MPa. The spring would weigh minimum with the condition  $P_{\max} = 2P_{\min}$  and have the outside diameter fixed at 60mm when optimized. **[10]**

OR

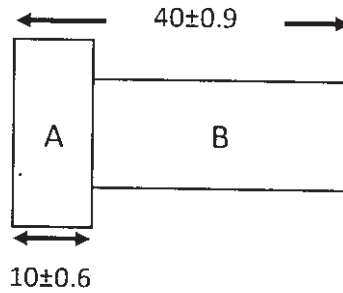
**Q6) a)** Explain methodologies of optimum and adequate Design in detail with suitable examples. **[6]**

- b) Design a tensile bar of 200 mm length to carry 5 kN tensile load that would cost the least among the following candidate materials: **[10]**

Material	Density (kg/m <sup>3</sup> )	Cost (Rs/N weight)	$S_{yt}$ (MPa)
Steel	7500	16	130
Al alloy	3000	32	50
Ti alloy	4800	480	90
Mg alloy	2100	32	20

**SECTION- II**

- Q7) a)** Describe design considerations in controls using neat sketches. [8]
- b) Two components A and B are assembled with the overall dimension  $40 \pm 0.9$  mm as shown in Fig-1. Specify dimensions for component B if the overall dimension as well as individual component dimensions are normally distributed and natural tolerances are equal to design tolerances. [8]



OR

- Q8) a)** Describe the design principles in welding using neat sketches. [8]
- b) The diameters in a sample of 100 bolts are normally distributed with 10.5mm mean and 0.02 mm standard deviation. Determine the specified tolerances if the process is centered and only 95 bolts are accepted. Draw a neat figure and use Area under the normal curve from 0 to Z as, [8]

Z	0	1	2	3	4	5	6	7	8	9
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767

- Q9) a)** Organize in a tabulated form comparison between different gear box design progressions. [5]
- b) Describe the basic considerations in design of drives. [5]
- c) Draw the structure diagram and gear box arrangement for following equations of a six speed gear box: [6]
- i)  $z = 2(1) 3(2)$ ,
  - ii)  $z = 2(3) 3(1)$ ,
  - iii)  $z = 3(1) 2(3)$ ,
  - iv)  $z = 3(2) 2(1)$ .

OR

**Q10)** A two stage, nine speed gear box is connected to a motor running at 720 rpm through a belt drive. The gear box is to have a minimum speed of 31.5 rpm and a maximum speed of 500 rpm. Using standard spindle speeds, [16]

- a) Draw the structure and speed diagram
- b) Draw the gear box layout
- c) Determine the number of teeth on each gear
- d) Draw percentage deviation diagram and check if design is within permissible limits.
- e) Select diameter of pulleys for belt drive based on R20 series with diameter beginning from 80mm.

**Q11)a)** Describe in detail belt conveyers and their types using neat sketches. [6]

b) Describe in detail using neat sketches loading and unloading methods in conveyer systems. [6]

c) A horizontal belt conveyor transports material of mass density  $1200 \text{ kg/m}^3$ . The surcharge factor for the flat belt drive is 0.16 and the belt width is 650mm. Determine the capacity of the conveyor if the belt speed is 1.75m/s and the effective width  $b$ (in meters) of the material carried by the belt safely is given by the equation:  $b = 0.9B - 0.05$ ; where  $B$  is the belt width in meters. [6]

OR

**Q12)a)** Explain the basic principles in selection of material handling equipment. [5]

b) Describe different types of idlers and their characteristics using neat sketches. [5]

c) Design a belt conveyor to carry material at the rate of  $30 \times 10^3 \text{ kg/hr}$  with the following details. Bulk density of material is  $800 \text{ kg/m}^3$ , angle of bulk material surcharge is  $15^\circ$ , belt speed is 10 km/hr, belt has 4 plies, material factor  $k_1$  for plies is 2.0, belt tension and arc of contact factor  $k_2$  is 63. Determine: [8]

i) Suitable belt width

ii) Drive pulley diameter and length



Total No. of Questions : 12]

SEAT No. :

**P1531**

**[4759] - 43**

[Total No. of Pages :3

**B.E. (Mechanical/Sandwich)**  
**COMPUTATIONAL FLUID DYNAMICS**  
**(Semester - II) (2008 Pattern) (402049)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables, Mollier charts, electronic calculator is allowed.*
- 6) *Your answer will be valued as a whole.*
- 7) *Assume Suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Derive mass conservation equation using any flow model. [12]  
b) Explain how numbers of equations (of the flow field variables) to the no. of unknowns to solve Navier-Stokes equations are not sufficient. Justify your approach to resolve this. [4]

OR

- Q2)** a) Give examples of industrial manufacturing and gas turbine industry analyses using CFD concepts for application development. [8]  
b) Mention the significance of two types of forces to derive the momentum equation. [8]

- Q3)** a) Derive finite difference quotient for  $\frac{\partial u}{\partial x}$  and  $\frac{\partial u}{\partial y}$  over a grid having running index i, j in X and Y direction respectively. [10]  
b) Given the function  $f(x) = 0.25 X^2$ ; find the first derivative of f at  $x = 2$ ; using forward and backward differencing of order  $(\Delta x)$ . Use a step size of  $\Delta x = 0.1$  [8]

OR

*P.T.O.*

**Q4) a)** Derive the first derivative and second derivative of the temperature by finite difference representation of a heat transfer considering general internal node. [10]

b) Differentiate two properties of partial differential equations: elliptic, hyperbolic, parabolic. [8]

**Q5) a)** Differentiate grid: [6]

i) Structured vs Unstructured

ii) C and H type grid

b) A large plate of thickness  $L = 4\text{cm}$  and thermal conductivity  $k = 28\text{ W/m}^\circ\text{C}$  in which heat is generated uniformly at a constant rate of  $5000\text{ kW/cu.m}$ . One side of the plate is maintained at zero degree centigrade by iced water while other side is subjected to convection to an environment at  $T = 30^\circ\text{C}$  with a heat transfer co-efficient of  $h = 45\text{ W/sq.m.}^\circ\text{C}$ . as shown in the figure 1. Consider 3 equally spaced nodes, two at boundaries and one in the middle. Calculate the nodal steady state temperature of the plate by finite difference method. [10]

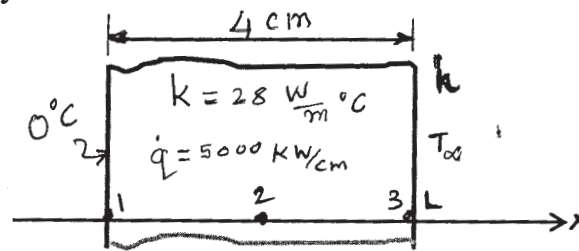


Figure : 1 Q.5(b)

OR

**Q6) a)** Classify & Derive differential equation of the 1D heat transfer by conduction. [6]

b) Calculate the temperature at points 1, 2, 3 and 4 using numerical method.

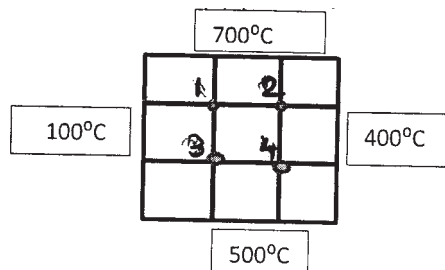


Figure Q.6(b)

Consider the square plate having thermal constants  $h = 10\text{ W/sq.m.}^\circ\text{C}$  and  $k = 10\text{ W/m}$ . The left face is maintained at  $100^\circ\text{C}$  and the top face at  $700^\circ\text{C}$ , while the right face at  $400^\circ\text{C}$  and the bottom face at  $500^\circ\text{C}$ . [10]



## SECTION - II

**Q7)** For a long thin aluminium rod, 10 cm long having values  $k' = 0.49$  cal/sec. cm. °C. Take equal node distance of 2 cm and time step of 0.1 sec. At time instant zero, the temperature of the rod is zero, and boundary conditions are fixed for all times at  $T(0) = 100^\circ\text{C}$  and  $T(10) = 50^\circ\text{C}$ . Note that the material properties are  $C = 0.2174$  cal/g. °C and density  $\rho = 2.7\text{g/cc.}$ , Note  $k = k' / (\rho(\Delta t)C)$ ; and  $\lambda = k[\Delta(t)] / (\Delta x)^2$  find nodal temperatures for two time steps 0.1 sec and 0.2 sec using explicit finite difference method. [18]

OR

- Q8)** a) Distinguish the explicit and implicit finite difference approach. [10]  
b) How does time step affect stability, explain with suitable example. [8]

**Q9)** Describe the following types of grids: [16]

- a) Structured and unstructured.
- b) Staggered and unstaggered grid.
- c) Boundary fitted grid.
- d) C type and H type.

OR

- Q10)** a) List all the steps of SIMPLE algorithm. [8]  
b) State the boundary conditions applied in the pressure correction method. [8]

- Q11)** a) List various computer graphic techniques used in CFD and describe two in detail. [8]  
b) Justify the need of Pressure correction method. [8]

OR

**Q12)** Write short notes on any two: [16]

- a) Lax wendroff method.
- b) MacCormack method.
- c) Crank Nicholson technique.
- d) Grid independence truncation error.



Total No. of Questions : 12]

SEAT No. :

**P1532**

**[4759] - 44**

[Total No. of Pages :5

**B.E. (Mechanical)**

**FINITE ELEMENT METHODS**

**(Elective - III) (2008 Pattern) (402049) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

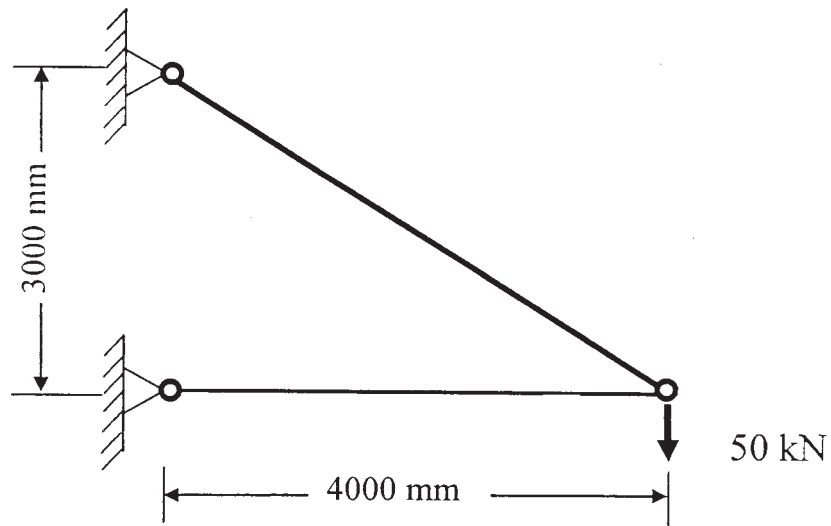
**SECTION - I**

- Q1)** a) Explain in details difference between Finite Element Method and Finite Difference Method. **[8]**
- b) Explain the principal of Minimum potential energy used in deriving element stiffness matrix and equations. **[8]**

OR

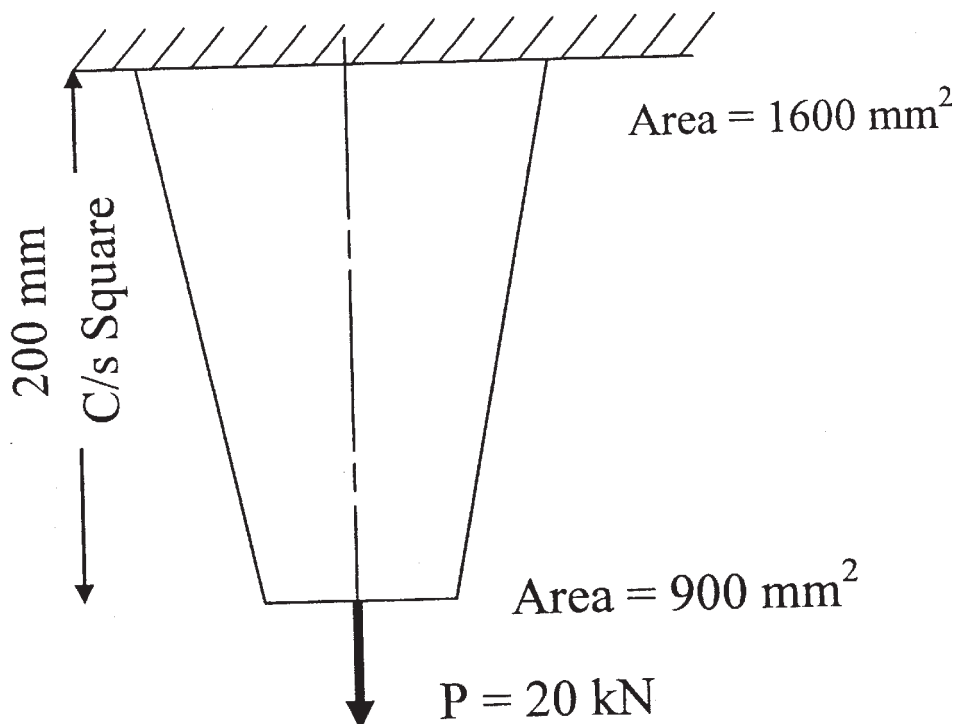
- Q2)** a) Explain the following terms: (any two) **[8]**
- i) Elimination approach
  - ii) Penalty Approach
  - iii) Rayleigh-Ritz Method
  - iv) Von-Mises stress
- b) Describe in details the concept of Cholesky's decomposition, the banded skyline solutions to solve simultaneous equations. **[8]**
- Q3)** a) Explain assembly of global stiffness matrix for the banded and skyline solutions. **[6]**
- b) A two member truss is as shown in fig. the cross sectional area of each member is  $200 \text{ mm}^2$  and modulus of elasticity is 210 GPa. Determine the deflection, reactions and stresses in each of the members. Explain. **[12]**

***P.T.O.***



OR

- Q4)** a) Explain solution of 2-Dimensional problems using Constant Strain Triangle (CST). [6]
- b) Find the stresses and reaction at the support by modeling following system in two finite elements. Assume Modulus of Elasticity ( $E$ ) = 210 GPa. [12]



Q5) Evaluate using 2 point Gaussians quadrature method.

[16]

a) 
$$I = \int_{-1}^1 \left[ x^2 + \frac{1}{1+x} \right] dx$$

b) 
$$I = \int_{-1}^1 \left[ x + \cos \frac{\pi x}{2} \right] dx$$

OR

Q6) a) Differentiate between higher order elements and refined mesh. [8]

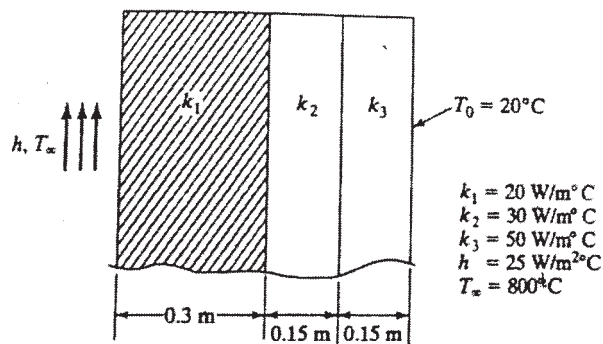
b) Explain following terms: [8]

- i) Isoparametric elements
- ii) Subparametric elements
- iii) Superparametric elements
- iv) Patch test

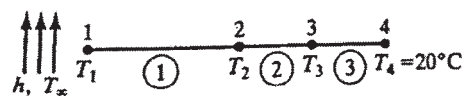
**SECTION - II**

Q7) a) Explain various steps involved in solution of 1D heat transfer problem using Finite Element Method. [8]

b) A composite wall consists of three materials as shown in fig. The outer temperature is  $T_0 = 20^\circ\text{C}$ . Convection heat transfer takes place from inner surface of the wall with  $T_\infty = 800^\circ\text{C}$  and  $h = 25 \text{ W/m}^2\text{C}$ . Determine the temperature distribution in the wall. [10]



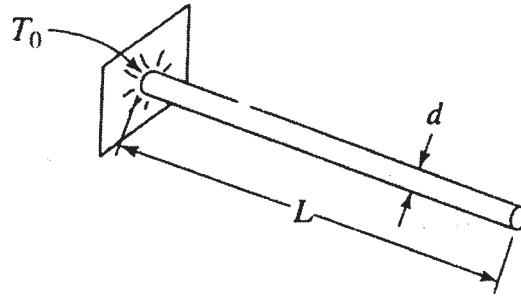
(a)



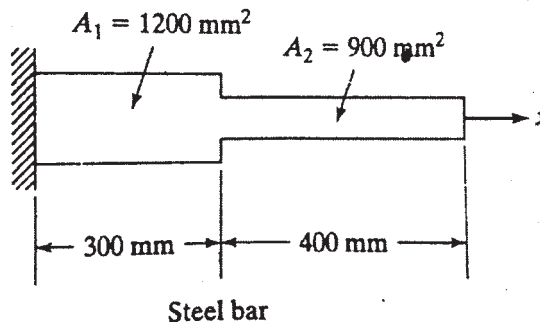
(b)

OR

- Q8)** A circular fin of 40mm diameter ( $d$ ) is fixed to a base maintained at  $50^\circ\text{C}$  ( $T_0$ ) as shown in fig. the fin is insulated on the surface except end face which is exposed to air at  $25^\circ\text{C}$ . The length of the pin is 1000mm ( $L$ ), the fin is made of metal with thermal conductivity of  $37\text{W/mK}$ . If the convection heat coefficient with air is  $15\text{W/m}^2\text{K}$ . Find the temperature distribution at 250, 500, 750 and 1000mm from base. [18]



- Q9)** a) Explain lumped mass matrix and consistent mass matrix with suitable example. [6]  
 b) Find un-damped natural frequencies of longitudinal vibration of the stepped bar as shown fig. using consistent mass matrix. [10]



Assume Modulus of Elasticity  $E = 210\text{ GPa}$  and Density ( $\rho$ ) =  $7800\text{ kg/m}^3$   
 OR

- Q10)** Determine the eigen values and natural frequencies of a system whose stiffness and mass matrices are given as below: [16]

$$[K] = \frac{2AE}{L} \begin{bmatrix} 3 & -1 \\ -1 & 1 \end{bmatrix}$$

$$[M] = \frac{\rho AE}{12} \begin{bmatrix} 6 & 1 \\ 1 & 2 \end{bmatrix}$$

Assume  $L = 250\text{ mm}$ ,  $A = 200\text{ mm}^2$ ,  $E = 210\text{ GPa}$  and  $\rho = 7800\text{ kg/m}^3$ .

- Q11)** a) Explain process of mesh generation. Comment on free meshing and mapped meshing. [8]
- b) Write various steps involved to solve 1D heat transfer problem using Finite Element Method. [8]

OR

**Q12)** Write short notes on (any four): [16]

- a) FEA packages.
- b) Quality checks in meshing.
- c) Modal analysis.
- d) Equation solvers in FEA.
- e) Boundary conditions.
- f) Equation assembly.



Total No. of Questions : 12]

SEAT No. :

**P1533**

**[4759] - 45**

[Total No. of Pages :4

**B.E. (Mechanical)**

**ROBOTICS**

**(2008 Course) (402049C) (Part - II) (Elective - III) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

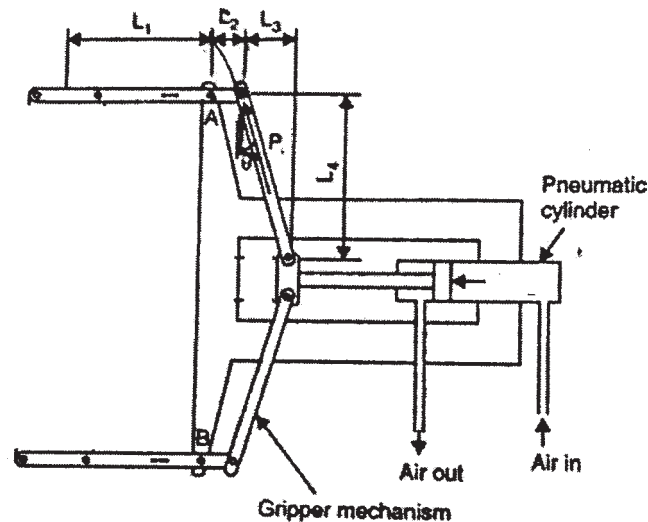
**SECTION - I**

- Q1) a)** What are various types of reference frames attached to a robotic structure? Explain with example. **[4]**
- b) Define a robot and with a neat sketch explain anatomy of robot. **[6]**
- c) Define repeatability, resolution and accuracy. **[6]**

OR

- Q2) a)** Enumerate the factors that contribute to the limitation of spatial resolution. **[4]**
- b) A Cartesian robot has a slide with a total range of 1.2m and it is desired that it will have a control resolution of 0.46 cm on this axis. Determine the bit storage capacity which the control memory must possess to accommodate this level of precision. **[6]**
- c) Explain cost effectiveness of using robots in industries with an illustration. **[6]**
- Q3) a)** The mechanical gripper uses friction to grasp a part weighing 25N. The co-efficient of friction between the part and the gripper pad is 0.3. The gripper is accelerating down with an acceleration of  $9.81\text{m/s}^2$ . The diameter of piston of pneumatic cylinder is 65 mm. Assume factor of safety as 1.5 and lengths  $L_1$ ,  $L_2$ ,  $L_3$  and  $L_4$  as 60mm, 40mm, 15mm and 45mm respectively. Calculate: **[8]**
- i) The gripping force to retain the part,
  - ii) Actuation force required to achieve this gripping force.

**P.T.O.**



- b) Discuss desirable engineering features of sensors and transducers. [4]
- c) What are various important parameters considered for selecting a sensor? [6]

OR

- Q4)**
- a) Discuss in detail comparison between absolute and incremental coding. [6]
  - b) Derive with usual notations, the expression for force exerted by the mechanical grippers in robotics. [6]
  - c) Explain characteristics and uses of vacuum grippers. [6]

- Q5)**
- a) Compare three basic types of drives enlisting their merits and demerits. [6]
  - b) Explain with schematic diagram operating principle of a stepper motor used in robotics. [6]
  - c) What are the assumptions made in designing control of a single joint in robots? [4]

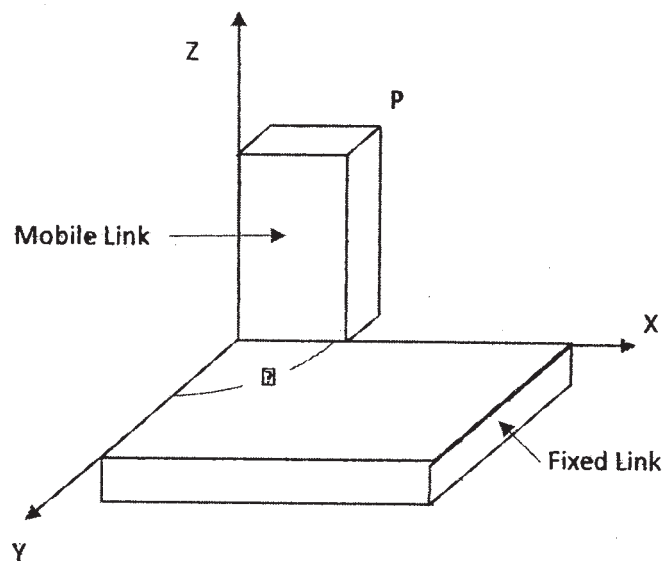
OR

- Q6)**
- a) Write and explain general block diagram of robot control system. [4]
  - b) Write short note on: Control law of partitioning. [6]
  - c) What are general considerations in trajectory planning? [6]



## SECTION - II

- Q7) a)** Write a short note on: **[10]**
- i) Direct and inverse kinematics.
  - ii) D-H Convention.
- b) A single axis robot with a fixed base and a mobile link is as shown in fig. Suppose the mobile frame has a point  $P_m$  given by  $(2, 2, 8)^T$ . Find the coordinates of the point  $P_f$  with respect to base frame when  $\theta_1 = 180^\circ$  and  $\theta_2 = 0^\circ$ . **[8]**



OR

- Q8) a)** The coordinate of a point  $P_{abc} = (5, 4, 3)^T$  in the body coordinate frame OABC is rotated  $300^\circ$  about OZ-axis. Determine the coordinates of the vector  $P_{xyz}$  with respect to base reference coordinate frame. **[6]**
- b) Discuss Lagrange-Euler formulations for a robotic manipulator. **[6]**
- c) Explain the use of inverse transformation matrix in robotic application. **[6]**
- Q9) a)** Write a note on: (Any two) **[8]**
- i) Object recognition technique
  - ii) Image acquisition
  - iii) Image processing techniques

- b) Discuss the programming methods used in robots mentioning their specific field of application. [4]
- c) What are the image devices used in robot lighting techniques? [4]

OR

- Q10)**
- a) What are key stages in image processing? Explain any one in brief. [4]
  - b) Write a short notes on: [8]
    - i) Motion interpolation
    - ii) Branching capabilities
  - c) With the help of block diagram, explain the functions of a robotic vision system and devices used in the same. [4]

- Q11)**
- a) What is Artificial intelligence? What are the characteristics of AI systems? [6]
  - b) What are the advantages of simulation? Explain in brief. [4]
  - c) Briefly discuss the practical application domains where robotic technology is most likely to be used in future? [6]

OR

- Q12)**
- a) What are various components of Artificial intelligence? [6]
  - b) Discuss in detail the main challenges for the future of intelligent robotics. [6]
  - c) What are the disadvantages of simulation? Explain in brief. [4]



Total No. of Questions : 12]

SEAT No. :

**P1534**

[4759] - 46

[Total No. of Pages :4

**B.E. (Mechanical)**

**ADVANCED AIR-CONDITIONING & REFRIGERATION**

**(Elective - III) (2008 Pattern) (402049) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer-books.*
- 3) *Draw Diagrams wherever necessary.*
- 4) *Use of scientific calculator is allowed.*
- 5) *Assume suitable data wherever necessary.*

**SECTION - I**

- Q1)** a) Explain vortex tube transcritical refrigeration cycle. [8]  
b) What is dry ice? Explain with schematic diagram ammonia - CO<sub>2</sub> cascade refrigeration cycle. [10]

OR

- Q2)** a) Write a short note on "Secondary Refrigerant". [6]  
b) Write a short note on: [12]  
i) Vapor defrosting  
ii) HP/LP receivers  
iii) reverse cycle defrosting

- Q3)** a) Explain the principle of operation of cooling tower with psychometric chart. [6]  
b) Explain the procedure of estimating length and pressure drop of capillary tube. [10]

OR

- Q4)** a) Design a condenser for a 150kW refrigeration system using R-717. The condenser temperature is 313K and the condensate is subcooled by 10K. Enthalpies at the beginning & end of compression are 1320 kJ/kg and 1530 kJ/kg. The refrigerant flow rate is 0.1 kg/s. The economic water velocity is 1.5 m/s and is related with the overall HTC (on outer dia).  $1/U = 0.13 + 0.5/V^{0.8}$ . (kW/m<sup>2</sup>K).  
Pipe diameters are  $d_i = 15$  mm and  $d_o = 20$ mm and pipe lengths not to exceed 3000mm. The water temperature rise is 5 K with inlet temperature 303 K. Obtain the number of tubes & passes. [10]  
b) Discuss the types of compressors with applications. [6]

**P.T.O.**

- Q5) a)** Describe the methods of controlling IAQ. List the pollutants & contaminants present in the air with source. [8]
- b) Discuss various types of following: [8]
- i) Float switches
  - ii) safety valves
  - iii) level controller.

OR

- Q6) a)** Discuss the main characteristics of filter. [8]
- b) Explain the construction working of externally compensated regulating valve. [8]

### **SECTION - II**

- Q7) a)** A 25 cm brick wall with plaster on both sides exposed to the periodic temperature and incident radiant variation on an hourly basis between 7am and 6pm is given in the table. Determine the average and peak load on the air conditioner maintaining the room at 23°C per unit area of the wall. Also determine the heat gain at 5 pm and time of peak load. Use time lag & decrement method. [12]

Absorptivity of surface,  $a = 0.8$

Thermal conductivity of plaster,  $k = 0.14 \text{ W/mK}$

Thickness of plaster material = 3 mm

Thermal conductivity,  $k = 1.5 \text{ W/mK}$

Outside wall coefficient,  $h_o = 23 \text{ W/m}^2\text{K}$

Inside wall coefficient,  $h_i = 7 \text{ W/m}^2\text{K}$

Average sol-air temperature ( $T_{em}$ ) = 44.14°C

Time lag = 5hrs; Decrement factor = 0.455

Time	7 am	8 am	9 am	10 am	11 am	12 noon	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm
T <sub>o</sub> (°C)	29	31.5	33.5	35.5	37	38.5	39.5	40.5	41.5	39.5	39	38
I (W/m <sup>2</sup> )	186	390	640	814	954	1000	960	825	645	385	190	47

- b) Discuss inside design conditions of followings; [6]
- Cold storage.
  - Industrial air conditioning.
  - Comfort air conditioning.

OR

- Q8)** a) Write a short note on: [6]
- Sol-air temperature
  - Air Spaces
- b) Explain the purpose and scope of ECBC. [6]
- c) State the conditions for calculating ETD and also state the corrections applied for calculating ETD. [6]

- Q9)** a) Discuss the HVAC design criteria for IT centres. [8]
- b) Draw and explain liquid-to-liquid heat pump circuit. [8]

OR

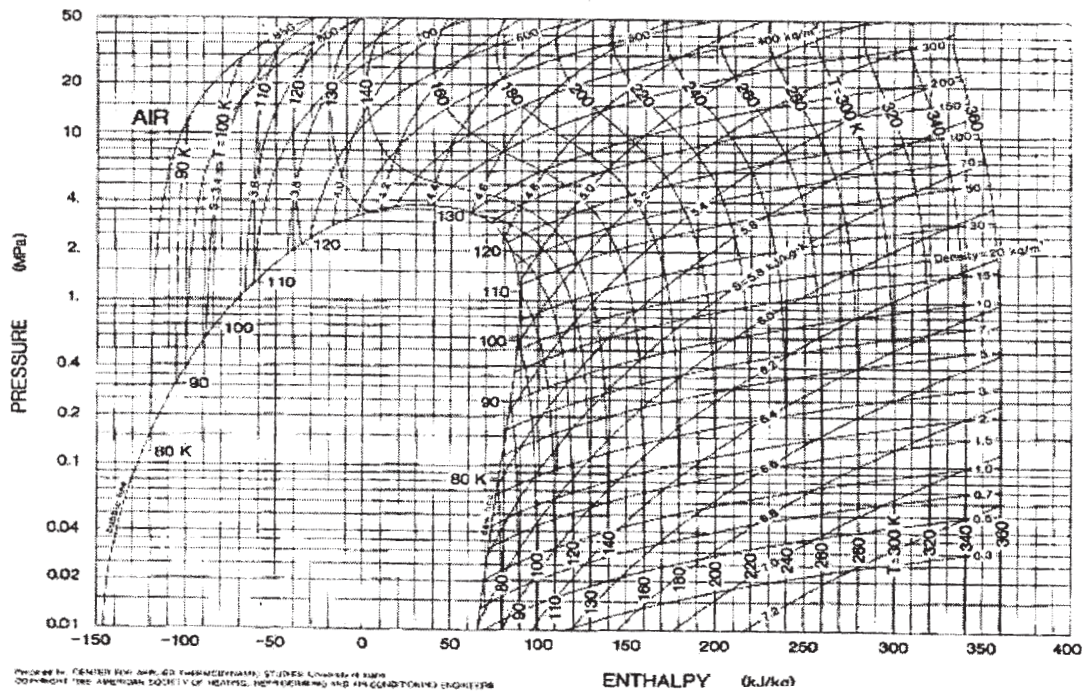
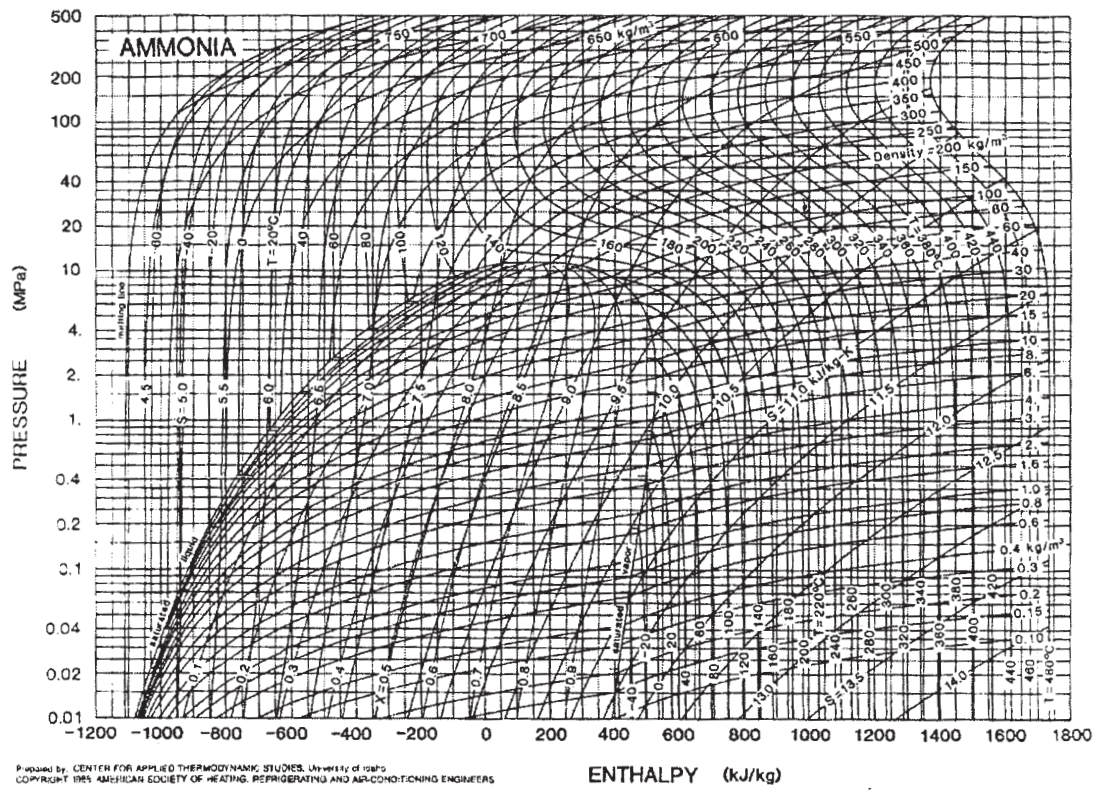
- Q10)** a) What is clean room? How do clean rooms HVAC different from a normal comfort air conditioned space. [8]
- b) Draw and explain air-to-air heat pump circuits: -Fixed refrigerant circuit. [8]

- Q11)** a) List out the limitations of VCS for the production of low temperatures. [6]
- b) Discuss various applications of cryogenics. [10]

OR

- Q12)** a) Discuss specific types of insulations used for low temperature applications? [6]
- b) 1 kg of air at 30°C and 1 bar compressed isothermally to 20 MPa in a compressor in a Linde cycle. The make-up nitrogen is supplied to the system at 30°C and 1 bar. Determine the yield of liquid and temperature of air before throttling. Draw the schematic diagram with T-s and p-h diagram. Use p-h chart of nitrogen. [10]





Total No. of Questions : 12]

SEAT No. :

**P1535**

[4759]-47

[Total No. of Pages : 3

**B.E. (Mechanical)**

**INDUSTRIAL HEAT TRANSFER EQUIPMENTS  
(2008 Course) (Semester-II) (Elective-IV) (402050 A)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers 3 questions from section-I and 3 questions from section-II.*
- 2) *Answers to two sections should be written in separate answer-books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Your answers will be valued as whole.*
- 6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) What is the difference between longitudinally finned inner tube heat exchanger and multi tube hairpin heat exchanger. Illustrate the difference by Diagrams. **[9]**
- b) Explain with the diagrams the arrangements of double pipe heat exchangers when they are arranged in series and in parallel. **[9]**

OR

- Q2)** In a shell - and - tube feed water heater, cold water at 15°C flowing at the rate of 180 kg/h is preheated to 90°C by flue gases from 150°C flowing at the rate of 900 kg/h. The water flows inside the copper tubes ( $d_i = 25\text{mm}$ ,  $D_o = 32\text{mm}$ ) having thermal conductivity  $k_w = 381 \text{ W/m K}$ . The heat transfer coefficients on gas and water sides are 120 and 1200  $\text{W/m}^2\text{K}$ . respectively. The fouling factor on the water side is  $0.002\text{m}^2 \text{ K/W}$ . Determine the flue gas outlet temperature, the overall heat transfer coefficient based on the outside tube diameter, and the true mean temperature difference for heat transfer. Consider specific heats  $C_p$  for flue gases and water as 1.05 and 4.19  $\text{J/G.K}$ . respectively and the total tube outside surface area as  $5 \text{ m}^2$ . There are no fins inside or outside the tubes and there is no fouling on the gas side. **[18]**

**P.T.O.**

- Q3)** a) Explain the major parts of a shell and tube heat exchanger with a neat diagram. [8]
- b) Explain the detail steps in Kern's method for finding the shell side heat transfer coefficient and pressure drop. [8]

OR

- Q4)** Explain in details the shell side pressure drop calculations computed with Bell-Delaware method. Provide diagrams to show the difference between entrance, internal and window drops. [16]

- Q5)** a) What are the characteristics of compact heat exchangers. [8]
- b) What are the salient features of plate fin heat exchanger (PFHE)? [8]

OR

- Q6)** a) What are different forms of individually finned tubes? [8]
- b) "Brazed aluminum PFHE are an obvious choice for cryogenic applications" - comment. [8]

### **SECTION-II**

- Q7)** a) Define and describe direct contact type condenser. [5]
- b) Explain Horizontal in tube condenser with figure. [5]
- c) What is Evaporative condenser? Explain with figure. [6]

OR

- Q8)** a) Explain vertical shell side condenser. [5]
- b) What is impingement plate? Why it is used? Explain one example with figure. [5]
- c) Draw sketch and explain in brief Spiral condenser. [6]

- Q9)** a) Explain Direct-contact or Open Evaporative cooling tower in brief. [8]
- b) How cooling tower is to be maintained in good working condition. [8]

OR



- Q10)a)** The cooling used in a power plant consists of 10 big fans. The quantity of cooling water circulated through tower is 100Kg per minute and it is cooled from 35°C to 30°C. The atmosphere conditions are 35°C DBT and 25°C WBT. The air leaves tower at 30°C and 90% RH. Find capacity of each fan in cubic meter per minute. [8]
- b) Enlist factors to be considered during selection of pump for cooling tower. [8]
- Q11)a)** Explain with the help of neat sketch the construction and working of Heat pipe. [10]
- b) Write a short note on: [8]
- i) Working fluids used in heat pipes.
  - ii) Wick structure used in heat pipes.

OR

- Q12)a)** State advantages of forced electronic cooling. [6]
- b) Explain liquid cooled PCB. State its advantages and disadvantages. [6]
- c) State use of different materials for better cooling in cabinets. [6]



Total No. of Questions : 12]

SEAT No. :

**P1536**

**[4759]-48**

[Total No. of Pages : 3

**B.E. (Mechanical)**

**MANAGEMENT INFORMATION SYSTEM**

**(2008 Course) (Semester-II) (Elective-IV) (402050 (B))**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*
- 6) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*

**SECTION-I**

- Q1)** a) Define MIS. Explain various characteristics of MIS in details. [8]
- b) "Information is blood and MIS is heart of any business activity". Explain MIS with the same. [8]

OR

- Q2)** a) Explain Decision Support system and its essential characteristics in details. [8]
- b) What is an organization? Explain the basic model of an organization structure. [8]

- Q3)** a) What is Decision? Explain in details behavioral decision making. [8]
- b) Explain factors, configuration and components in GDSS. [8]

OR

- Q4)** a) Explain Herbert Simon model of decision making. [8]
- b) Explain spiral SDLC model. [8]

***P.T.O.***

- Q5)** a) Draw a E-R diagram for an Educational Institute. Consider the following entities and their attributes. [6]
- i) Student.
  - ii) Class.
  - iii) Files.
  - iv) Professor.
- b) Write a note on data mining. [6]
- c) Explain ESS with architecture. [6]

OR

- Q6)** a) What are the components of DBMS? Explain Distributed DBMS. [6]
- b) Explain classical, Administrative model in Decision making models. [6]
- c) Explain DFD for on line examination system of engineering students. [6]

## SECTION-II

- Q7)** a) Write a short note on Quality management in software organization. [4]
- b) Write a short note on modern software design techniques. [10]
- c) What are software standards? [2]

OR

- Q8)** a) What is software matrix? Explain software models in short. [4]
- b) Write a note on object oriented design of UML. [10]
- c) What is software verification? [2]

- Q9)** a) Describe different tools of security management. [8]
- b) Write a short note on: [8]
- i) Software review.
  - ii) Software piracy.

OR

- Q10)**a) Explain briefly Black box testing and white box testing. [10]  
b) Write a short note on: [6]  
i) Software standards.  
ii) Inspection in software.

- Q11)**a) Explain MIS with material and marketing management. [10]  
b) Write applications of MIS in financial management. [8]

OR

- Q12)** Write short note on: [18]  
a) 360 degree feedback.  
b) E-Enterprise management.  
c) MIS in supply chain management.



Total No. of Questions : 12]

SEAT No. :

**P3684**

**[4759] - 49**

[Total No. of Pages :5

**B.E. (Mechanical)**

**RELIABILITY ENGINEERING**

**(2008 Course) (Elective - IV(C)) (Semester -II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections must be written on separate answer sheets.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary and mention it.*

**SECTION - I**

- Q1) a)** State and explain the quality and reliability assurance rules. (Any 4). **[8]**
- b) Define MTTF and MTBF. In the life-testing of 100 specimens of a particular device, the number of failures during each time interval of 25 hours is shown in following table. Estimate the MTTF for these specimens. **[8]**

Time Interval Hours	Number of failures during interval
$T \leq 1000$	0
$1000 < T \leq 1025$	15
$1025 < T \leq 1050$	50
$1050 < T \leq 1075$	20
$1075 < T \leq 1100$	15

OR

**P.T.O.**

**Q2) a)** Gear pumps of 500 numbers were tested and the failure data obtained is tabulated as given below. Find the failure density and hazard rate. [10]

Time Interval	0-10	10-20	20-30	30-40	40-50
No. of components failed	123	67	85	25	20

b) Explain safety, Failure rate and product liability with example. [6]

**Q3) a)** Calculate the reliability of the system shown in Fig.1 using conditional probability method. [8]

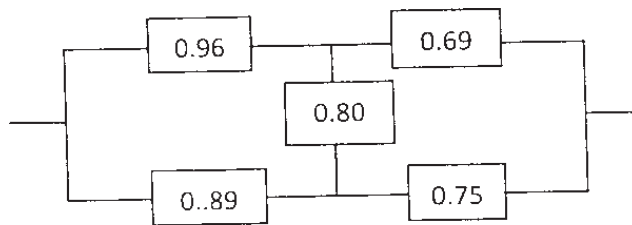


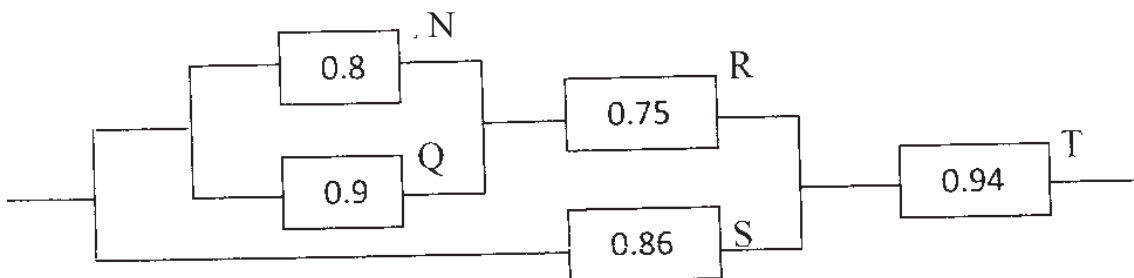
Fig.1

b) What is redundancy? Explain how the element redundancy is superior to unit redundancy with an example. [8]

OR

**Q4) a)** Name the different distributions and explain their selection criteria. [8]

b) Find the system reliability for the configuration of the system given below. [8]



- Q5) a)** A system consisting of 6 sub-systems has a reliability goal of 0.98 for period of 20 hours operation. Compute the minimum acceptable failure rate, allocated reliability goal for each sub-system using AGREE method of allocation and system reliability. **[10]**

Sub-system	Number of modules	Operating Time	Importance Factor
1	35	20	1.0
2	70	18	0.98
3	45	20	1.0
4	55	16	0.95
5	40	14	0.93
6	80	20	1.0

- b) Explain Minimum Effort method with the help of an example. **[8]**

OR

- Q6) a)** A system reliability requirement is 0.96 and has mission time of 40 hrs. It has four subsystems with failure rates of 0.004, 0.002, 0.003 and 0.006 respectively. Find the reliability of each subsystem to achieve the required system reliability. Use ARINC apportionment technique. **[10]**

- b) Explain the need of reliability allocation. Discuss the equal apportionment technique with its advantages and limitations. **[8]**

## SECTION - II

- Q7) a)** A machine is to be designed for an operating time of 500 hours and reliability of 0.95. The inherent availability value for the operating period has to be 0.98. Estimate mean time between failure & mean time to repair. If the reliability requirement increases to 0.98 and MTTR remains same, what will be the changes in estimated values of MTBF and Inherent availability? **[8]**

- b) Define and explain reliability, availability and maintainability. **[8]**

OR

**Q8) a)** Discuss about preventive & breakdown maintenance. State advantages and limitations of each type. [6]

b) For the particular system the following data is collected at a plant: [6]

Mean time between failure: 86 hrs

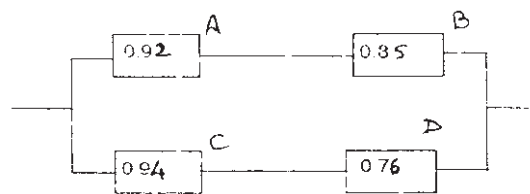
Mean time to repair: 32 hrs

Administrative logistics time: 118% of MTTR

Calculate operational & inherent availability of the plant.

c) Define and explain MTBF and MTTR. [4]

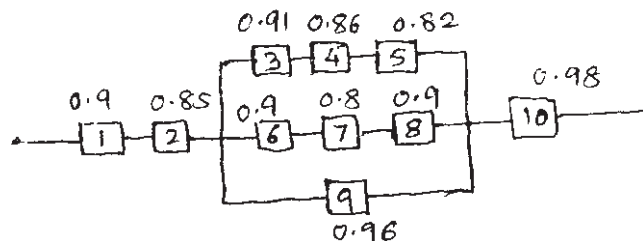
**Q9) a)** For the given block diagram construct Fault Tree Diagram & using that find out the reliability of the system. If reliabilities of B and D are changed to 0.9, what will be the new reliability of the system? Write the minimal cut sets. [9]



b) Explain the steps involved in carrying out FMECA with an example. Explain the significance of RPN. [9]

OR

**Q10)a)** A special purpose machine is represented by the block diagram as shown below. Construct a fault tree diagram for the system and calculate the reliability of the system. [10]



b) Explain minimal tie set & minimal cut set method for finding reliability with an example and compare results. [8]



**Q11)a)** State and explain in brief the different methods for reliability testing. [6]

b) A welded component has the mean strength & standard deviation of  $460\text{N/mm}^2$  &  $35\text{N/mm}^2$  respectively. The stress induced in the component because of applied load has a mean value of  $400\text{N/mm}^2$  with standard deviation  $12\text{N/mm}^2$ . Assuming that shear strength & the induced stresses are independent & normally distributed, find out the probability of survival of the component. If the applied load increases to  $415\text{N/mm}^2$  with increase in standard deviation to  $13\text{N/mm}^2$ , discuss its effect on probability of survival of the component. Refer the statistical data given below. [10]

Z	1.2	1.3	1.4	1.5	1.6	1.7	1.8
$\phi(z)$	0.8849	0.9032	0.9192	0.9331	0.9452	0.9550	0.9640

OR

**Q12)a)** Write a note on HASS. [6]

b) The following data refers to a certain test of equipment [10]

Failure No.	1	2	3	4	5	6	7	8
Mean time to failure (hrs.)	34	21	16	43	29	38	25	65

Find out the reliability of the equipment by

- i) Mean Method &
- ii) Median Method & compare the two by plotting.



Total No. of Questions : 12]

SEAT No. :

**P1508**

**[4759]-5**

[Total No. of Pages : 6

**B.E. (Civil)**

**SYSTEM APPROACH IN CIVIL ENGINEERING**

**(2008 Course) (Elective-I) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

**SECTION-I**

**Q1) a) Use Graphical method to solve following LP Problem [6]**

$$\text{Minimize } Z = 3x_1 + 2x_2$$

$$\text{Subject to constraints } 5x_1 + x_2 \geq 10$$

$$x_1 + x_2 \geq 6$$

$$x_1 + 4x_2 \geq 12$$

$$x_1, x_2 \geq 0$$

**b) Use Two Phase method to solve following LP Problem [12]**

$$\text{Minimize } Z = x_1 + x_2$$

$$\text{Subject to constraints } 2x_1 + x_2 \geq 4$$

$$x_1 + 7x_2 \geq 7$$

$$x_1, x_2 \geq 0$$

OR

**P.T.O.**

**Q2) a)** Use Big-M method to solve the following LP Problem **[12]**

$$\text{Minimize } Z = 5x_1 + 3x_2$$

$$\text{Subject to constraints } 2x_1 + 4x_2 \leq 12$$

$$2x_1 + 2x_2 = 6$$

$$5x_1 + 2x_2 \geq 10$$

$$x_1, x_2 \geq 0$$

b) Explain in brief various models used in System Approach? **[6]**

**Q3) a)** A company has factories at  $F_1, F_2, F_3$  which supply to warehouses at  $W_1, W_2, W_3$ . Weekly factory capacities are 200, 160 & 90 units resp. Weekly warehouse requirement are 180, 120 & 150 units resp. Unit shipping cost are as follows: **[12]**

Warehouse

		W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	Supply
Factory	F <sub>1</sub>	16	20	12	200
	F <sub>2</sub>	14	8	18	160
	F <sub>3</sub>	26	24	16	90
	Demand	180	120	150	450

Determine the optimal distribution for this company to minimize total shipping cost? (Use Modi's Method)

b) Explain procedure in detail Hungarian method to solve assignment problem. **[4]**

OR

- Q4) a)** Six wagons A, B, C, D, E & F are available at six stations  $S_1, S_2, S_3, S_4, S_5, S_6$ . Mileages between various stations are given below: [12]

Wagon	Station					
	$S_1$	$S_2$	$S_3$	$S_4$	$S_5$	$S_6$
A	30	33	28	20	26	30
B	60	30	27	26	25	21
C	70	40	50	65	18	17
D	16	17	20	30	110	19
E	28	29	38	27	70	80
F	19	20	30	40	50	65

How should the wagons be transported so as to minimize the total mileage covered?

- b) What do you mean by assignment model? Write down its applications. [4]

- Q5) a)** It is proposed to develop Hydropower by building dams across 3 possible river Sites. Total financial available is 8 Money units. The return functions for each of Possible investment are given below. The available resource is to be allocated Optimally to these developments. Using DP determine maximum return and give Allocation to various sites. [12]

Resource allocated	Return from site		
	1	2	3
0	0	0	0
2	12	14	30
4	75	55	50
6	91	70	70
8	98	80	75

- b) What is dynamic programming? State Bellman's Principle of optimality? [4]

OR  
3

**Q6) a)** Give procedure adopted in analysis of Dynamic Programming Problems. **[4]**

b) A Project Management Consultant has offers From 3 different clients for his services, each client is willing to employ a consultant for as many days as he is prepared to give for the fees shown in following table. How many days should the consultant devote to each client to maximize his income per week if the consultant works for 5 days a week. **[12]**

No. of days	Clients		
	Client-1	Client-2	Client-3
0	0	0	0
1	1	1.25	1.5
2	2.5	2.5	3
3	4	3.75	4
4	5.25	5	5.5
5	6	6.25	6.5

### SECTION-II

**Q7) a)** Using Lagrange's Multiplier Method solve **[9]**

$$\text{Minimize } f(x) = \frac{18}{x_1 x_2}$$

$$\text{Subject to } x_1^2 + x_2^2 = 9$$

b) Using Newton's Modified method **[9]**

$$\text{minimize } f(x) = 2x_1^2 + 2x_1x_2 + 2x_2^2 - 4x_1 - 6x_2$$

$$\text{Taking } x^0 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

OR

**Q8) a)** Using steepest gradient method solve **[9]**

$$\text{Minimize } Z = (x_1 - x_2)^2 + 2(x_2 - 1)^2$$

$$\text{Starting } x^0 = \begin{bmatrix} 2 \\ -1 \end{bmatrix}$$

b) Using Fibonacci method solve

$$\text{Minimize } Z = x^3 - 108x \text{ in the range } (0, 10) \text{ with an accuracy } 0.1\%. \quad \mathbf{[9]}$$

**Q9) a)** Write a short note on - Queuing Model. **[4]**

b) Solve the following sequencing problem involving 3 machine n-jobs & no passing, to obtain the sequence of jobs to be processed so as to minimize the total time lapsed. Determine the total elapsed time and idle hours of machines, if any. Tabulate results indicating schedule of processing of all job. **[12]**

Jobs	Time in Hours		
	Machine A	Machine B	Machine C
1	6	5	9
2	7	7	11
3	3	8	8
4	4	5	9
5	5	6	12
6	10	4	9
7	16	7	10
8	12	3	11

OR

**Q10)a)** A sample of 200 arrivals of customers in Supermarket is according to the following distribution **[12]**

Time between arrivals in Min	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5
Frequency	4	12	22	48	38	28	22	12	8	4	2

The Time taken for service follow the distribution

Time in Min	0.5	1	1.5	2	2.5	3	3.5	4
Frequency	12	18	38	60	32	16	14	10

Estimate the average % waiting time and idle time of customer by simulation for next 10 arrivals.

Use following random numbers

Arrivals	09	73	25	33	76	53	01	35	86	34
Service	54	20	48	05	64	89	47	42	96	24

- b) Write applications of following [4]
- Simulation.
  - Queuing Theory.

**Q11)a)** Solve the following game by method of Dominance. [10]

Player B

PlayerA	3	5	4	9	6
	5	6	3	7	8
	8	7	9	8	7
	4	4	8	5	3

- b) Write short note on Replacement Model. [6]

OR

**Q12)a)** Purchase price of a machine is Rs. 60000. The installation charges amount to Rs. 12400 & it's scrap value is only Rs. 3400. The maintenance cost in various years is given below. [10]

Year	1	2	3	4	5	6	7	8
Maintenance cost	1000	2500	3500	4500	7500	9500	14500	16500

After how many years should the machine is replaced? Assume that the machine replacement can be done only at the year ends?

- b) Explain Two-Person zero sum Game. Distinguish between pure strategy & Mixed strategy? [6]



Total No. of Questions : 12]

SEAT No. :

**P1537**

**[4759]-50**

[Total No. of Pages : 3

**B.E. (Mechanical)**

**CRYOGENICS ENGINEERING**

**(2008 Course) (Semester-II) (Open Elective) (402050)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answer for the two sections should be written in separate answer book.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of pocket calculator & different gas charts as applicable is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) Define cryogenics. State important applications of Cryogenics. [6]
- b) What are the important landmarks in the field of Cryogenics? [6]
- c) What are permanent gases? State boiling points for the gases viz. Helium, Hydrogen, Nitrogen, Oxygen. [6]

OR

- Q2)** a) Explain with neat sketch Super-fluidity phenomena observed in case of liquid Helium. [6]
- b) Explain effect of cryogenic temperature on thermal properties of material. [6]
- c) Explain the effect of Cryogenic temperature on mechanical strength of materials. [6]
- Q3)** a) Explain ideal liquefaction system and different parameters used to define the system performance. [6]
- b) Draw Simple Linde Hampson system and label all the components. [4]
- c) Explain inversion curve with neat diagram. What is maximum inversion temperature. [6]

OR

**P.T.O.**



- Q4)** a) Why Pre cooling is necessary in case of Precooled Linde Hampson system. [6]  
b) Compare Isenthalpic and Isentropic expansion methods employed for cooling. [6]  
c) Discuss how Cryogenic liquefaction system is different from Cryogenic refrigeration system. [4]

- Q5)** a) State importance of regenerator effectiveness in Stirling cycle refrigerator. [8]  
b) Explain with neat sketch Philips Refrigerator. [8]

OR

- Q6)** a) What are the different techniques employed for separating of gases. [8]  
b) Explain Gifford McMahon Refrigerator with neat sketch. [8]

### **SECTION-II**

- Q7)** a) State various insulations used in Cryogenics in increasing order of performance. Explain any one of them. [6]  
b) Explain with neat sketch principle of rectification column. [10]

OR

- Q8)** a) Explain the theoretical plate calculations using McCabe-Thiele technique. [8]  
b) Compare Cryogenic separation with other gas separating methods. [8]

- Q9)** a) Discuss various methods used to drain liquid from Dewar vessel. [9]  
b) Explain construction of Dewar vessel with neat sketch stating function of each component. [9]

OR

- Q10)**a) Discuss the role of Vacuum in Cryogenic. [6]  
b) What are the different safety devices installed on a Dewar vessel. [12]

- Q11)**a) Explain the Meissner effect and state its applications. [6]
- b) What are the different present day applications of Cryogenics in the medical field. [6]
- c) What are the different applications of Cryogenics in the field of Space Technology. [4]

OR

- Q12)**a) Explain any two of following present day applications of Cryogenics in the field of [8]
- i) Food preservation.
- ii) High Energy Physics.
- iii) Gas industry.
- b) Explain the cryogenics principle used in recycling of automobiles tyres. [8]



Total No. of Questions : 12]

SEAT No. :

**P3733**

**[4759] - 501**

[Total No. of Pages :3

**B.E. (Mechanical Engineering)**  
**GAS TURBINES AND JET PROPULSION**  
**(2003 Course) (Semester - I) (402044)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables, Mollier charts, electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain with sketches the operation of converging-diverging nozzle under varying pressure ratios. **[10]**
- b) Define the following terms: **[6]**
- i) Mach Number
  - ii) Mach Line
  - iii) Mach Angle
  - iv) Mach Cone

OR

- Q2)** a) Air is flowing through a converging nozzle. At a particular point within the nozzle, the pressure P1 is 3.5 bar, temperature T1 is 556K, the velocity V1 is 180 m/s. Consider air to be ideal gas. Find the stagnation pressure, temperature, density. **[8]**
- b) Derive Rankine-Hugoniot equation  $V_1 V_2 = a^{*2}$  with usual notations for normal shock. **[8]**

**P.T.O.**

- Q3)** a) Compare centrifugal and action flow compressors, in detail. [8]
- b) A centrifugal compressor delivers  $12\text{m}^3$  of free air while running at 10000 rpm. The air is compressed from 1 bar,  $20^\circ\text{C}$  to 4 bar with an isentropic efficiency of 80%. Blades are radial at outlet of the impeller and the flow velocity is 60 m/s which is constant throughout. The ratio of outer and inner radii of the impeller is 2 and slip factor is 0.9. The blade area coefficient at the inlet is 0.9. [10]

Determine:

- i) Temperature of the air discharged and
- ii) Theoretical power required.

OR

**Q4)** Write Short Notes on: [18]

- a) Work input factor & Work done factor for axial flow compressors.
- b) Surging & Choking.
- c) Materials used in compressors.

- Q5)** a) Find the condition for maximum efficiency of the Brayton Cycle. What do you understand by the maximum and optimum pressure ratio? [10]
- b) Compare gas turbines with steam turbine and I.C.Engines. [6]

OR

**Q6)** Write notes on: [16]

- a) Brayton Cycle Component Efficiencies
- b) Improvements in Brayton Cycle
- c) Working of Semiclosed Cycle

## **SECTION - II**

- Q7)** a) Explain the terms “loading coefficient” and “flow coefficient” in gas turbines. [6]
- b) Derive an expression for maximum utilization factor of a 50% reaction stage of a reaction turbine. [12]

OR

- Q8)** a) Explain Close cycle & open cycle gas turbines. [6]  
b) Write a note on Energy Flow Diagram for stage of an impulse turbine. [6]  
c) What is compounding of impulse gas turbines? Explain any one method. [6]

- Q9)** Write notes on: [16]  
a) Use of ceramics in gas turbines  
b) Blade cooling of gas turbines  
c) Combustion chambers in gas turbines

OR

- Q10)** Write notes on: [16]  
a) Fuels used in gas turbines  
b) Flame tube cooling  
c) Pollution from gas turbines  
d) Primary & secondary air for gas turbines

- Q11)a)** A jet plane having 2 jets flies at a speed of 800 km/hr at an altitude where the density of air is  $0.15\text{kg/m}^3$ . The propulsive efficiency is 55%, the drag on the plane is 6.5KN. Calculate [12]  
i) Diameter of jets  
ii) Fuel consumption in kg/thrust kw-hour  
iii) air-fuel ratio of the engines.

The overall efficiency of the plant is 16% & C.V. of fuel is 4.8MJ per kg.

- b) Classify jet propulsion systems. [4]

OR

- Q12)a)** Explain the working of Ram jet and Pulse jet with a neat sketch. [12]  
b) Write a note on Rocket Propellants. [4]



Total No. of Questions : 12]

SEAT No. :

P4722

[Total No. of Pages : 3

[4759]-502

B.E. (Mechanical)

ALTERNATIVE ENERGY SOURCES

(2003 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 5) Assume suitable data, if necessary.

**SECTION - I**

- Q1)** a) Define with a neat sketch i) Zenith angle ii) Solar azimuth angle iii) Surface azimuth angle . [9]
- b) What is Solar Constant? Discuss the reasons for variation in receiving solar energy on earth. [9]

OR

- Q2)** a) Discuss the need for using alternative energy sources. Comment on its advantages and limitations in the national context. [9]
- b) Determine the local solar time and declination at a location 23°15'N, longitude 77°30'E at 12.30'IST on June 19. Equation of time correction given from standard chart is (-1'01"). [9]
- Q3)** a) Explain the working principle of FPC. Discuss the selection of materials for different components. [8]
- b) Explain the standard testing procedure of liquid FPC and explain its performance curves. [8]

**P.T.O.**

OR

- Q4)** a) Discuss the spectral distribution of extra-terrestrial solar radiation graphically. What are the limitations of solar energy utilization. [8]  
b) Explain the construction and working of Solar pyrheliometer with the help of a neat diagram. [8]

- Q5)** a) Describe passive solar heating/cooling of residential buildings. [8]  
b) Explain with a neat sketch any one type of solar still. [8]

OR

- Q6)** a) Sketch and explain the construction and working of forced circulation dryer. [8]  
b) Define aperture, concentration ratio and acceptance angle for concentrating collectors, stating the significance. [8]

### **SECTION - II**

- Q7)** a) Explain the layout and working of a solar thermal power plant. [8]  
b) Discuss the sizing and selection of micro hydel plants. [8]

OR

- Q8)** a) Explain the mechanism of direct conversion of solar energy into electricity. Explain its merits and demerits with reference to various applications. [8]  
b) Explain the principle of harnessing Tidal Power. State its limitations. [8]

- Q9)** a) Explain closed cycle OTEC plant. [8]  
b) Describe any one type of Fuel Cell, stating its difference from storage battery. [8]

OR

**Q10)** a) Discuss the potential of wind power in India. Describe the important considerations before installation of a wind turbine. [8]

b) Write explanatory note on liquid dominated geothermal power plant. [8]

**Q11)** a) Discuss the factors affecting performance of bio-gas plant. [8]

b) What is a Gasifier? Explain updraft and down draft type with neat sketches. [10]

OR

**Q12)** a) Explain the required modifications in I.C. engines for using bio fuels. [8]

b) Discuss the significance of bio gas in rural India. [10]





Total No. of Questions : 12]

SEAT No. :

**P4634**

**[4759]-503**

[Total No. of Pages : 3

**B.E. (E & TC)**

**VOICE NETWORKS**

**(2003 Course) (Semester - I) (404215)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from section - I and three questions from section - II.*
- 2) *Attempt not more than six questions of which at least three questions must be from each section.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Discuss the significance of redundancy in Stored Program Control Electronics switching systems. How to attain the same in various configurations in switching systems? [ 6]
- b) Distinguish between single stage and multistage networks over at least four points. [4]
- c) Explain in detail various Subscriber loop signaling systems used in Telephone switching. [8]

OR

- Q2)** a) Compare the common control and direct control. [4]
- b) With a neat diagram explain the principles of circuit switched and packet switched network. [8]
- c) Calculate the availability of dual processor system for a period of 10 years if its MTBF is 2400 hours and MTTR is 5 hours. [6]

**P.T.O.**

- Q3)** a) What is blocking probability? With the definition explain the “Erlang C” formula for the blocking probability. [8]
- b) A call processor in an exchange requires 100 ms to service a complete call. What is BHCA rating for the processor? If the exchange is capable of carrying 800 E of traffic, what is the call completion rate? Assume an average call holding time of three minutes. [8]

OR

- Q4)** a) Explain Grade of service and Unavailability terms in details. [8]
- b) State and explain various measurement units used s traffic engineering. [8]
- Q5)** a) Explain in detail B & D channel in ISDN. [8]
- b) Discuss in detail the devices used in order to provide ISDN services. [8]

OR

- Q6)** a) What are the services supported by ISDN. Explain them with the help of diagram. [8]
- b) Explain in detail architecture of ISDN and its objectives. [8]

### **SECTION - II**

- Q7)** a) Explain in detail the data services used in GSM systems. [8]
- b) Describe in detail different techniques in GSM to enhance spectral efficiency. [8]

OR

- Q8)** a) Differentiate between different technologies used in cellular networks. [8]
- b) Draw the architecture of GSM network and explain its functional blocks. [8]

- Q9) a)** Write short note on Walsh codes. [8]
- b) Explain in detail why CDMA has better security than GSM? [8]

OR

- Q10)a)** Compare IS-95 and CDMA-2000 system in detail. [8]
- b) Describe various logical channels in CDMA with their significance. [8]

- Q11)a)** Explain the generation and detection of DTMF in detail. [10]
- b) Discuss the Real time protocols used in VoIP. [8]

OR

- Q12)a)** Explain the MEGACO/H.248 Protocol. [8]
- b) What is VoIP? Explain any two applications of VoIP in detail. [10]

*EEE*

Total No. of Questions : 12]

**P4592**

SEAT No. :

[Total No. of Pages :4

[4759] - 504

**B.E. (E&TC)**

**OPTICAL AND MICROWAVE COMMUNICATION**

**( 2003 Course) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answer to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data , if necessary.*

**SECTION-I**

- Q1)** a) The sensitivity of a photo diode is  $0.65 \text{ A/W}$  and its saturation power is  $2 \text{ m W}$ . Calculate the photocurrent if the received power is i)  $1 \text{ m W}$  ii)  $2 \text{ m W}$  iii)  $3 \text{ m W}$ . Also calculate How many photons per second emanate from a laser diode radiating at  $1300 \text{ nm}$  if its power is  $1 \text{ m W}$ . **[9]**
- b) i) Explain the construction & working of APD with the help of neat diagram. **[6]**
- ii) What are the advantages and the drawbacks of fiber optic communications and satellite communications? **[3]**

OR

- Q2)** a) i) Draw the structure of PIN photodiode & explain its operation in brief. Plot the responsivity curve as a function of wavelength for PIN constructed of silicon. **[6]**
- ii) The sensitivity of a photo diode is  $0.65 \text{ A/W}$  and its saturation power is  $2 \text{ m W}$ . Calculate the photocurrent if the received power is 1)  $1 \text{ m W}$  2)  $2 \text{ m W}$  3)  $3 \text{ m W}$  **[3]**
- b) i) What are the advantages of semiconductor injection laser over other semiconductor sources that may used for optical communications? **[6]**
- ii) A single mode fiber has following parameters: numerical aperture is  $0.125$  and relative refractive index is  $0.36\%$ . Calculate the refractive index of the core. **[3]**

***P.T.O.***

- Q3) a)** List three major causes of attenuation in an optical fiber and explain their mechanisms. [8]
- b) Compare MMSIF, SMSIF, MMGIF with reference to the pulse broadening due to internal dispersion. Also comments on the bandwidth length for these three fibers. [8]

OR

- Q4) a)** Explain bending losses in optical fiber. [8]
- b) Compute the pulse spread caused by chromatic dispersion if a fiber has a zero-dispersion wavelength at 1312 nm, a zero-dispersion slope of 0.090 ps/nm<sup>2</sup>.km, a length of 100km, and operates at 1310 nm. The laser diodes spectral width is 1 nm. [8]

- Q5) a)** Explain Operating principle of WDM. [8]
- b) A fiber link includes five splices at 0.02 dB/splice , four connectors at 0.2 dB/connector, transmitter power of -10 dBm, and receiver sensitivity of -30 dBm. Perform power budget analysis and compute the length of the link that would be allowed if a single mode fiber cable with attenuation of 0.3 dB/km is used and the required power margin is 3 dB? [8]

OR

- Q6) a)** State and explain the system requirements in detail for point-to-point optical fiber links. [8]
- b) State the principle of operation of semiconductor optical amplifier (SOA). Compare SOA performance with doped fiber amplifiers. [8]

## SECTION-II

- Q7)** a) Explain the working of ferrite isolator with a neat diagram. [6]  
b) Differentiate between TM & TE mode in rectangular waveguide. [6]  
c) Draw a neat diagram of a co-axial to waveguide transition and explain its principle of working. [6]

OR

- Q8)** a) Explain directional coupler. Define: [6]  
i) Coupling coefficient  
ii) Directivity  
iii) Isolation loss  
b) Write the S-matrix of an N-port network and state how to determine a specific element  $S_{ij}$  of the [S] matrix. [6]  
c) Define scattering matrix & state its properties for a reciprocal & lossless network. [6]

- Q9)** a) Explain the working principle of reflex klystron. State its applications. [8]  
b) The parameters of two cavity klystron amplifier are  $V_o$  is 1500V,  $I_o$  is 50mA, F is 10GHz, Gap spacing in each cavity (d) is 2mm, spacing between Two cavities(L) is 4cm and effective shunt resistance if each cavity is  $40k\Omega$ .  
i) Find input microwave voltage in order to generate maximum output voltage.  
ii) Determine the voltage gain.  
iii) Calculate the efficiency of the amplifier. [8]

OR

- Q10)** a) Explain the principle of working of operation, VI characteristics and equivalent circuit of microwave tunnel diode. [8]  
b) How is bunching achieved in cavity magnetron? Explain the phase focusing effect. [8]

**Q11) a)** Compare klystron and TWT. A helical TWT has diameter of 2 mm with 50 turns per cm.

Calculate:

- i) Axial phase velocity
  - ii) The anode voltage at which the TWT can be operated for useful gain. **[8]**
- b) What is varactor diode? Give its construction, working principle and explain its application. **[8]**

OR

**Q12) a)** Explain with the help of block diagram the working of wireless microwave link for long distance communication. **[8]**

- b) List various operating modes of Gunn diode. Find the natural frequency and critical voltage for a GaAs Gunn diode which has an active region length of  $10\ \mu\text{m}$ . If the electron drift velocity and the critical electric field is  $10^5\ \text{m/s}$  and  $3\ \text{kV/cm}$ . **[8]**



Total No. of Questions : 12]

SEAT No. :

**P3734**

**[4759] - 505**

[Total No. of Pages :3

**B.E. (E & TC)**

**SYSTEM PROGRAMMING AND OPERATING SYSTEM**

**(2003 Course) (Semester - II) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section -I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section -II.*
- 2) *Answers to the two sections should be written in separate answer book.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicates full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Enlist and explain the phases of Compiler in brief. **[10]**
- b) Explain different development tools of language processing activities. **[8]**

OR

- Q2) a)** Explain the following terms: **[8]**
- i) System Programming
  - ii) Operating System
  - iii) Linker and Loader
  - iv) Assemblers
- b) What is Compiler? What are the features of Compiler and explain how compiler works? **[10]**

- Q3) a)** Define MACRO? Explain all the features provided by MACRO Facility. **[8]**
- b) Explain the data structures used in pass-I and Pass-II of an Assembler. **[8]**

OR

**P.T.O.**



**Q4) a)** What is forward referencing? Explain how forward referencing is handled in single pass assembler? [8]

b) Explain how the MACRO call can be handled inside the MACRO definition? [8]

**Q5) a)** What is the function of loader and linker in operating system? Explain Direct Linking Loader. [8]

b) What is Program relocation? Explain reloadable code with suitable example and data structure. [8]

OR

**Q6) a)** What are the basic functions of the loader? Explain data structures used for design of loaders. [8]

b) Explain the working of the Dynamic Linking Loader. [8]

## **SECTION - II**

**Q7) a)** What are the different functions of OS? Explain different types of OS. [8]

b) What is process? Explain how semaphore is used for process synchronization. [8]

OR

**Q8) a)** Explain Banker's algorithm. How does deadlock detection take place? [8]

b) Compare FCFS, Round robin, Shortest job first (Preemptive), Shortest job first (Non preemptive) on the basis of following characteristics: [8]

i) Selection Function

ii) Decision Mode

iii) Response time

iv) Effect on processes

**Q9) a)** Describe how address translation takes place with the help of neat diagrams in: [8]

i) Paging

ii) Segmentation

b) Differentiate the contiguous and non-contiguous memory allocation. [4]

c) Explain in short the following terms: [6]

i) Compaction

ii) Thrashing

OR

**Q10)a)** What are different file operations and how the file is protected? [8]

b) Explain three file allocation methods. [6]

c) Explain virtual memory using paging. [4]

**Q11)a)** Based on what criterion I/O devices are classified? How I/O time of record is calculated? Explain Magnetic Tape and Magnetic Disk in short. [8]

b) Explain mechanism and policies in file system and IOCS layers. Explain steps involved in I/O Operations. [8]

OR

**Q12)** Write short note on: [16]

a) IOCS Layers

b) I/O Devices

c) Driver for parallel port

d) Advanced I/O Programming



Total No. of Questions : 12]

**P4635**

SEAT No. :

[Total No. of Pages :4

[4759] - 506

**B.E. (Civil)**

**FOUNDATION ENGINEERING**

**( 2003 Course) (Semester-II)(Theory)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answers to the two Sections must be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data ,if necessary.*

**SECTION-I**

- Q1)** a) Explain why density index is a significant parameter in foundation Engineering. **[4]**
- b) How is the number and depth of exploratory holes determined? **[5]**
- c) What are penetration methods of investigations? Are they reliable in all soils? **[5]**
- d) What are the factors that influence SPT data? **[4]**

OR

- Q2)** a) What are the objectives of soil investigation? **[6]**
- b) State various types of soil samplers.What is area ratio? State its significance. **[6]**
- c) What is meant by geophysical methods of soil exploration? Explain any one of them with neat sketch. **[6]**

**P.T.O.**

- Q3)** a) Distinguish between elastic settlement and consolidation settlement and explain how they are estimated? [6]  
b) What is “active zone” in soil? Explain it with reference to the pressure bulb concept? [6]  
c) Define preconsolidation pressure & explain how it is determined. [4]

OR

- Q4)** a) With a neat sketch explain laboratory consolidation test and list the various consolidation parameters of soil obtained from test data. [8]  
b) Explain, with neat sketch, square root of time fitting method to find coefficient of consolidation. [4]  
c) Define the terms normal consolidation, over consolidation & under consolidation pressure in detail. [4]

- Q5)** a) What are the basic characteristics of failure mechanisms in general shear and local shear failure. Explain with neat sketch. [6]  
b) Explain how water table and depth influence bearing capacity. [5]  
c) Explain the concept of floating foundation with a neat sketch. [5]

OR

- Q6)** a) Describe a plate load test as carried out in the field with a neat sketch of experimental Set up. [6]  
b) Explain how SPT test data is used to find bearing capacity of cohesion less soil. [5]  
c) Explain the concept of floating foundation with a neat sketch. [5]

## SECTION-II

- Q7)** a) Explain in detail with sketches fivefold classification of piles foundation. [6]  
b) Explain with a sketch the concept of negative skin friction & state how you would determine the same in non-cohesive soil. [6]  
c) A group of 16 piles of 50 cm diameter is arranged with a center to center spacing of 1.0m. the piles are 9m long & are embedded in soft clay with cohesion 30 kN/m<sup>2</sup>. Bearing resistance may be neglected for the piles, Adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. [6]

OR

- Q8)** a) What is caisson disease ? Mention what precautions should be taken to avoid caisson disease. [6]
- b) Explain with sketches the following difficulties met during sinking of well. [6]
- i) Sand blow
  - ii) Rectification of tilt.
- c) Enlist five important component parts of open caisson & explain with sketches design considerations involved in them. [6]

- Q9)** a) Compare in tabular form cantilever & anchored sheet piles on five different points. [5]
- b) Draw in cross-section of braced excavation indicating component parts.State forces & design principles involved. [5]
- c) Derive an expression for depth of embedment of cantilever pile by making simplified assumptions. [6]

OR

- Q10)** a) With reference to Black cotton soil explain: [6]
- i) Free swell index.
  - ii) Differential free swell index.
  - iii) Swelling potential.
- b) Explain the construction procedure for under-reamed piles. [6]
- c) Enlist typical characteristics of Black cotton soils & give their approximate values. [4]

**Q11)** Write detailed notes on any four of following with sketches. [4×4]

- a) Liquefaction.
- b) Factors affecting ground motion.
- c) Types of Earthquake.
- d) Geotextile in drains.
- e) Requirements reinforced soil mechanism.

OR

**Q12)** Write detailed notes on any four of following with sketches if required. **[4×4]**

- a) Hazards of mitigation.
- b) Seismic waves.
- c) Types of Geosynthetics.
- d) Geotextiles in foundations.
- e) Geotextiles in embankment.



Total No. of Questions : 12]

SEAT No. :

**P3735**

**[4759] - 507**

[Total No. of Pages :3

**B.E. (Production)**

**MATERIALS AND FINANCIAL MANAGEMENT**

**(2003 Course) (Semester - II) (411087)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain the importance of materials management function from Return on Investment point of view. State its objectives. [8]
- b) Explain the following methods of selective inventory control. [8]
- i) A-B-C Analysis
  - ii) V-E-D Analysis

OR

- Q2)** a) Derive equation for an economic order quantity (EOQ) when replenishment is Instantaneous. [8]
- b) Explain Two-Bin system. Explain the importance of Safety Stock in case of uncertainty in demand and lead time Illustrate. [8]
- Q3)** a) Explain SCM. Explain different drivers in Supply chain Management. [8]
- b) Explain Echeloned and direct structured logistic system. [8]

OR

**P.T.O.**

**Q4) a)** Explain the importance of Transportation in logistic management. What are the different modes of transportation? Explain any two in brief. [8]

b) Explain following terms of warehouse management. [8]

i) Consolidations

ii) Cross Docking

iii) Break Bulk

iv) Stock Pilling

**Q5) a)** Explain in brief the importance of Value Analysis in Purchasing. [9]

b) Explain Import Cycle with flow chart. [9]

OR

**Q6) a)** Explain Purchasing procedure in detail. Enlist various documents required for Importing. [9]

b) Explain mechanical and thermal system to disposal off the waste. [9]

## **SECTION - II**

**Q7) a)** Define working capital. Why it is required? Explain various sources of finance. [8]

b) What is importance of Ratio Analysis? Explain the importance of following ratios. [8]

i) Quick Ratio

ii) Inventory Turnover Ratio

iii) Debt-Equity Ratio

OR



**Q8) a)** Distinguish between 'Profit maximization' and 'Wealth maximization' objectives of the firm. [8]

b) Explain functions of finance management. Explain the difference between finance and accounting relating to the treatment of funds and decision making. [8]

**Q9) a)** What is labour turnover? Explain various methods to measure labour turnover. What are the causes and costs associated with labour turnover? [8]

b) Define depreciation. Explain any two methods of depreciation. [8]

OR

**Q10) a)** What are the requirements of good wage payment system? State to what extent Halsey and Rowan plans fulfil the above requirements. [8]

b) Explain the methods of material costing? Explain any two methods with applications of it. [8]

**Q11) a)** Define Marginal Costing. State the applications and limitations of Marginal Costing. [6]

b) Define overheads and explain Primary apportionment and Secondary apportionment. [12]

OR

**Q12) a)** Define and explain the concept of standard cost and standard costing. [6]

b) Explain different factors to be considered in capital budgeting. Briefly explain the following. [12]

i) Payback Period

ii) IRR

iii) Net Present Value



Total No. of Questions : 12]

SEAT No. :

**P3736**

**[4759] - 508**

[Total No. of Pages :3

**B.E. (I.T.)**

**SYSTEM OPERATIONS AND MAINTENANCE**

**(2003 Course) (Semester - II) (Theory)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) List the strategic benefits of advanced support system. [8]  
b) Explain service delivery cycle with a neat diagram and briefly discuss industrial issues involved in service delivery cycle with application. [10]

OR

- Q2)** a) List the key function of following support process. [10]  
i) Customer care and billing process  
ii) Order processing and provisioning process.  
b) With a suitable diagram explain principal business process and their key functions. [8]

- Q3)** a) Discuss the typical services, applications and benefits of voice over IP. [8]  
b) Discuss differentiation of market segments. [8]

OR

- Q4)** a) Explain multiprotocol label switching with a operational example. [8]  
b) Explain the concept of 'Local number portability'. [8]

**P.T.O.**

**Q5) a)** Explain the different functions of sales process with suitable block diagram. [8]

b) What is IP billing? What are the different problems and solutions in internet billing. [8]

OR

**Q6) a)** Explain the customer care concept. [8]

b) What is micro payment? Explain with generic architecture. [8]

### **SECTION - II**

**Q7) a)** What is ISDN? Explain. [10]

b) Compare and contrast X.25 usage. [8]

OR

**Q8) a)** Define service provisioning process. Explain the different types of implementing the same. [10]

b) What is the significance of periodic security audit for telecommunication service provider. [8]

**Q9) a)** Explain complete framework for support system. [8]

b) List the goals of telecommunications service providers with middleware. [8]

OR

**Q10) a)** Explain issues related to network operational management. [8]

b) Write note on “customer service order processing” in telecoms. [8]

- Q11)a)** Write a job profile of typical network operation manager. **[8]**
- b) List the importance of documentation and management tools in customer care and billing process.

Comment on the same using B2B or B2C application. **[8]**

OR

- Q12)a)** What is SLA? List some service dependent and service independent metrics for the same. **[8]**
- b) Explain the issues related to building team, job profile and job responsibility. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P3737**

**[4759] - 509**

[Total No. of Pages :2

**B.E. (Computer Engineering)**  
**SOFTWARE TESTING AND QUALITY ASSURANCE**  
**(2003 Course) (Semester -II) (Elective - II) (410450)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer - book.*
- 2) *From section I answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6).*
- 3) *From section II answer (Q7 or Q8) and (Q9 or Q10) and (Q11 or Q12).*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain representation theory of Measurement. [10]  
b) Explain Objectives of software Measurement. [8]

OR

- Q2)** a) Explain CMM levels in details. [8]  
b) Explain how to apply the frame work in software quality measurement.[10]

- Q3)** a) Write a note on following [8]  
i) Functionality  
ii) Complexity  
b) Explain Modularity and Information flow attributes. [8]

OR

- Q4)** a) Explain what is good data, how to store and Extract data. [8]  
b) Explain Object oriented Metrics. [8]

**P.T.O.**

- Q5)** a) Explain Incremental testing strategy. [10]  
b) Enlist difference between Black box and White box testing. [6]

OR

- Q6)** a) What is defect, Defect classes and Defect Repository. [6]  
b) What Goal-Question -Metric Model. [10]

## SECTION - II

- Q7)** Write short note on [18]  
a) Usability Testing  
b) Ad-hoc Testing  
c) Regression Testing

OR

- Q8)** Write short note on [18]  
a) Execution and Reporting  
b) Specification Based Testing  
c) Performance testing

- Q9)** a) Write in details about Ishikawa's Basic tools. [8]  
b) Define Quality, Quality control and assurance and cost of quality. [8]

OR

- Q10)** a) Explain effects of ISO quality model on software quality. [8]  
b) Explain software Audit and its significance. [8]

- Q11)** a) Explain role of support Analysis. [8]  
b) Explain Challenges and best practices in Problem reporting. [8]

OR

- Q12)** a) Explain Logistic and Tooling in Problem reporting. [7]  
b) Explain problem Resolution. [9]



Total No. of Questions : 12]

SEAT No. :

**P3685**

**[4759] - 51**

[Total No. of Pages :2

**B.E. (Mechanical)**  
**PRODUCT LIFE CYCLE MANAGEMENT**  
**(2008 Course) (Open Elective)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** Explain the concept of Product Life Cycle Management in detail. Discuss the emergence of PLM. **[18]**

OR

**Q2)** Discuss Corporate challenges in implementing PLM. Elaborate importance of PLM from Product Development Prospective. **[18]**

**Q3) a)** Discuss Plan, Build, Support & dispose in PLM life cycle model in detail. **[8]**

b) Discuss the concept of Engineering Data Management. **[8]**

OR

**Q4)** What do you mean by Singularity, Cohesion and Traceability? Explain any two threads of PLM. **[16]**

**Q5)** Why internal drivers are demanding PLM? Discuss all the internal drivers in detail. **[16]**

OR

**P.T.O.**

**Q6)** Discuss in detail external drivers demanding implementation of PLM. Elaborate their significance. [16]

**SECTION - II**

**Q7) a)** Discuss various characteristics of PLM Systems in detail. [9]

b) Discuss in brief System Architecture required for PLM System. [9]

OR

**Q8) a)** Explain with suitable example Product information data model. [9]

b) State and elaborate various reasons to deploy PLM systems. [9]

**Q9) a)** What is Product data and Product Workflow? Explain the Key management issues involved in. [8]

b) Explain the concept of Change management and Configuration management in PLM. [8]

OR

**Q10)** What is PLM strategy? Discuss in detail various facets of PLM strategy such as Strategy Identification and implementation. [16]

**Q11)** Explain in detail the role of Human resources in PLM. [16]

OR

**Q12)** Elaborate phases of product life cycle and corresponding technologies to be implemented. [16]





Total No. of Questions : 12]

SEAT No. :

**P1361**

**[4759]-52**

[Total No. of Pages : 3

**B.E. (Mechanical)**

**INDUSTRIALAUTOMATION (Open Elective)**

**(2008 Course) (Semester - II) (Elective - IV) (402050D)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answer any three questions from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator is allowed.*
- 6) Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain evolution and benefit of automation? [10]
- b) Discuss the various types of automation? [8]

OR

- Q2)** a) What is automation? Write its application in industries? [10]
- b) Explain introduction to automation tools? [8]
- Q3)** a) What is PLC Write in detail review of PLC block diagram? [8]
- b) Explain in detail PLC component? [8]

OR

**P.T.O.**

- Q4)** a) Explain in detail various function blocks? [8]  
b) Why there is need of DCS? [8]

- Q5)** a) Write in detail development of manufacturing system? [8]  
b) Explain in detail AGV? [8]

OR

- Q6)** a) What is FMS? Explain it in details? [8]  
b) Explain in detail CIM? [8]

**SECTION - II**

- Q7)** a) What is SCADA? Write its features and configuration? [10]  
b) Explain in detail HMI? [8]

OR

- Q8)** a) Write in detail Database management? [10]  
b) Explain the need of historical Database management? [8]

- Q9)** a) What is design for manufacturing? Write its steps in detail? [8]  
b) Explain in detail DFE method and its application. [8]

OR

- Q10)**a) What is concept of drives? Explain its types in detail? [8]  
b) Explain in detail BLDC and their control? [8]

**Q11)a)** Write short notes on: [8]

i) Material Transfer.

ii) Concept Machine loading and unloading.

b) Write in detail RCC. [8]

OR

**Q12)a)** Distinguish between NC and CNC. [8]

b) What is importance of Assembly automation? [8]

*EEE*



- Q2) a)** Explain force analysis for a worm gear drive. **[6]**
- b) A double start worm made of case hardened alloy steel 16Ni80Cr60 ( $S_{ut}=700\text{N/mm}^2$ ) is to mesh with worm gear to be made of phosphor bronze ( $S_{ut}=240\text{N/mm}^2$ ). The gear pair is required to transmit 5kW power from an electric motor running at 1500rpm to a machining running at 75 rpm. The service factor is 1.25, while the factor of safety required is 2.0. The face width of worm gear is 0.73 times the pitch circle diameter of worm. The worm gear factor is  $0.685 \text{ N/mm}^2$ , while the diametrical quotient is 10. The normal pressure angle is  $14.5^\circ$ . If the coefficient of friction between worm and worm gear teeth is 0.03, design the gear pair and find the power lost. Would you recommend a fan for the gear box? Assume the permissible temperature rise is  $50^\circ\text{C}$ . **[12]**

Use following data:

- Lewis form factor --  $Y = 0.39 - \frac{2.15}{Z_G}$
- Velocity factor,  $C_v = \frac{6}{6 + V_G}$
- Area of housing,  $A = 1.14 \times 10^{-4} \times (a)^3 \text{ m}^2$ , where a = centre distance in mm.

- Q3) a)** Define pressure vessel and explain general design considerations for the design of unfired pressure vessel. **[8]**
- b) A high pressure vessel is to be operated at  $150 \text{ N/mm}^2$ . The inside diameter of the vessel is 30 cm. Vessel is fabricated from high tensile steel having permissible tensile stress  $500 \text{ N/mm}^2$ . Determine the wall thickness on the basis of the maximum tangential stress at inner surface. **[8]**

OR

- Q4) a)** Derive the expression for the thickness of thick cylinder subjected to internal pressure on the basis of maximum shear stress theory. **[8]**
- b) A hydraulic cylinder with closed ends is subjected to an internal pressure of 15 MPa. The inner and outer diameters of the cylinder are 240 mm and 300 mm respectively. The cylinder is made of Cast Iron FG300. Determine the factor of safety in the design. If the cylinder pressure is increased by 25%, what will be the factor of safety? **[8]**

- Q5)** a) Write short note on Mechanical reliability. [5]
- b) What is the role of factor of safety in design consideration of machine element. [6]
- c) What is the role of Ergonomics in the design of product. [5]

OR

- Q6)** a) Write short note on design for assembly and design for Machining. [8]
- b) Enlist the basic types of product forms. Explain in details with proper examples. [8]

**SECTION - II**

- Q7)** a) What do you understand by conveying equipment? With the aid of a neat labelled sketch explain various components of Belt conveyor system. [8]
- b) A flat horizontal belt conveyor is used for transporting crushed rock having a mass density of  $2 \text{ t/m}^3$ . The belt is 800 mm wide and has a speed of 1.75 m/s. Determine the capacity of conveyor in t/hr. [8]

OR

- Q8)** a) State the important properties to be considered in the design of material handling equipment for unit loads. [4]
- b) State for what applications the following material handling equipment are used. Justify your answer with sketch. [8]
- i) Fork lift truck
  - ii) Jib crane
  - iii) Belt conveyor
  - iv) Roller conveyor
- c) Explain conveyor belt sag in belt conveyors. State equations for carrying and return idlers. [4]

**Q9) a)** Discuss the advantages and disadvantages of finite element method over conventional methods. [6]

b) Solve for the displacements and the reaction force at node 1 as shown in figure 2, if  $k_1 = 4 \text{ N/mm}$ ,  $k_2 = 6 \text{ N/mm}$ ,  $k_3 = 3 \text{ N/mm}$ ,  $F_2 = -30 \text{ N}$ ,  $F_3 = 0$ ,  $F_4 = 50 \text{ N}$  using minimum potential energy approach. [10]

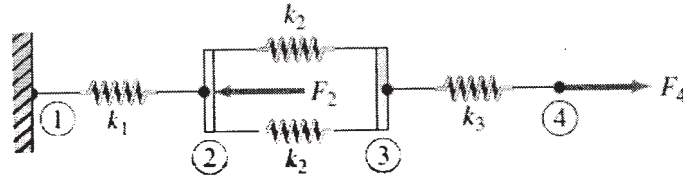


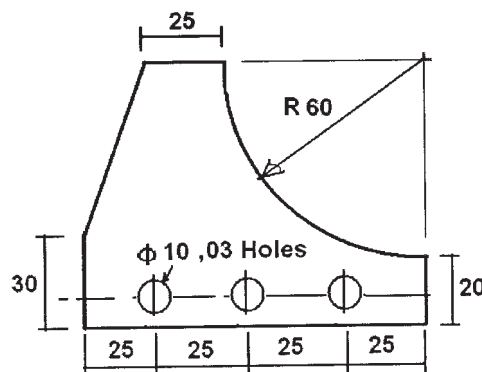
Figure.2

OR

**Q10)a)** Explain two advantages of triangular elements over other elements. [6]

b) A CST element is defined by nodes at I (30, 40), J (140, 70), and K (80, 140) and the displacements at these nodes are (0.1, 0.5), (0.6, 0.5) and (0.4, 0.3) respectively. Determine the displacement the natural coordinates and the shape function at point P (77, 96) within the element. [10]

**Q11)a)** Write a CNC part program to machine the profile and drill the holes as shown in figure, assume suitable data for feed and speed. Use peck drill canned cycle for drilling operations. Also use cutter radius compensation (right). Take thickness of plate: 20mm. [12]



b) Explain FMS. Describe the various layouts used in FMS. [6]

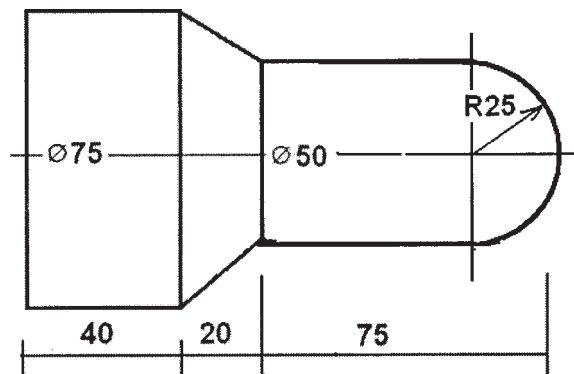
OR

**Q12)a)** Classify CNC machines based on the:

**[6]**

- i) Motion type
- ii) Control loops
- iii) Number of axes

b) Write a CNC part program to turn a MS bar of size and shape as shown in following figure. Use canned cycles only for both rough turning and finish cut. **[12]**



All dimensions are in mm

Assume feed rate,  $F = 0.5\text{mm/rev.}$  and spindle speed,  $S = 200\text{ RPM.}$

*EEE*



Total No. of Questions : 12]

SEAT No. :

**P1363**

**[4759] - 55**

[Total No. of Pages : 3

**B.E. (Mechanical Sandwich)**  
**INDUSTRIAL HYDRAULICS & PNEUMATICS**  
**( 2008 Pattern) (Semester - I) (402062)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from section - I and 3 questions from section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) List the applications of fluid power in agriculture and aviation industries. [6]
- b) Differentiate bet<sup>n</sup> hydrostatic and hydrodynamic system. [6]
- c) Give the comparison bet<sup>n</sup> hydraulic, pneumatic and Mechanical systems. [6]

OR

- Q2)** a) Discuss the factors to be considered in the selection of hydraulic fluids. [6]
- b) What are the various sources of contamination? Explain in brief. [6]
- c) State the criteria for selection of sealing devices. Also give the various sealing materials available. [6]
- Q3)** a) A pump has a displacement volume of 100cm<sup>3</sup>. It delivers 0.0015m<sup>3</sup>/sec at 1000 rpm and 70 bars. If the prime mover input is 120 N.m - [6]
- i) What is the overall efficiency
  - ii) What the theoretical torque req. to operate the pump.

**P.T.O.**

- b) i) Gear pump is a fixed displacement pump. How?  
ii) What are the main types of pumps used in fluid power system.

[6]

- c) Define volumetric efficiency, shaft power, mechanical efficiency and overall efficiency of positive displacement pump. [4]

OR

- Q4)** a) What is the selection criteria of hydraulic power unit, hydraulic pump, filler motor, reservoir necessary pipings, heat exchanger etc. [6]

- b) Sketch any two types of return line filters and explain their working. [6]

- c) Differentiate bet<sup>n</sup> tubes, hoses and pipes used in fluid power systems. [4]

- Q5)** a) Draw a neat sketch of a typical 4 way two position direction control valve. Explain its working in short? [6]

- b) Draw a neat sketch and explain working of a typical pressure and temp. compensated flow control valve. [10]

OR

- Q6)** a) How the accumulator act as a emergency power source in a basic hydraulic circuit? Explain with neat sketch? [6]

- b) A gas charged accumulator supplies energy to a system with 6.7 litre of oil within the pressure range of 150 bar to 110 bar. The accumulator has the pre charge pressure of 85 bar. What should be the size of the accumulator, if the oil is to be supplied [10]

- i) in about 5 seconds and

- ii) in about 5 minutes time

## **SECTION - II**

- Q7)** a) What is the effect of increasing motor's displacement on speed & torque? What is the effect of decreasing the displacement on speed and torque? [8]

- b) A Hydraulic motor has a displacement of  $180\text{cm}^3$  and operates with a pressure of 200 bar at a speed of 1000 RPM. The input discharge to the motor is 3.26 lps. If the motor is developing a torque of 498 N.m at the output shaft, find [8]
- Volumetric efficiency
  - Mechanical efficiency
  - Overall efficiency
  - The power output of the motor.

OR

- Q8)** a) Explain Regenerative ckt and comment on velocity at the time of extension and retraction, when Area of piston is equal to twice the area of the rod. [10]
- b) Write a short note on “cylinder mountings”. [6]

- Q9)** a) Compare characteristics of Hydraulic and pneumatic systems. [6]
- b) Explain with a neat sketch working of “AND” valve with typical applications (any two). [10]

OR

- Q10)** a) Explain with neat sketch the working of “Time Delay valve” with a typical application. [8]
- b) Explain with a neat sketch the working of “OR” valve with typical one application at least. [8]

- Q11)** a) Describe with neat sketch working of “F.R.L.” unit. [6]
- b) Draw typical “sequencing” and “synchronization” circuits and explain their working. [12]

OR

- Q12)** a) Draw and Explain “Two Hand safety circuit” used in pneumatics. [10]
- b) What is the manufacturer’s catalogue. How it helps to a System Designer. [8]



Total No. of Questions : 12]

SEAT No. :

**P1364**

**[4759]-56**

[Total No. of Pages : 6

**B.E. (Mechanical Sandwich)**

**REFRIGERATION AND AIR CONDITIONING**

**(2008 Pattern) (Semester - I) (Elective - II) (402063A)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary and mention it clearly.*
- 6) *Use of logarithmic tables, slide rule, mollier charts, non programmable electronic pocket calculator is allowed.*

**SECTION - I**

- Q1) a)** Explain the working of steam jet refrigeration with neat schematic. [8]
- b) An air refrigeration used for food storage provides 25 TR. The temperature of air entering the compressor is 7 °C and the temperature at the exit of the cooler 27°C. Find COP and power per TR required by the compressor.

The quantity of air circulated in the system is 3000 kg/h. The compression and expansion both follows the law  $pv^{1.2} = \text{constant}$ . Take  $C_p = 1 \text{ kJ/kgK}$  and  $\gamma = 1.4$ . [8]

OR

- Q2) a)** Define Figure of Merit related to thermoelectric refrigeration system. Explain its effect on COP of the system. [6]

**P.T.O.**

- b) A simple evaporative air refrigeration system is used for an aeroplane to take 20 TR load. The ambient air conditions are 20°C and 0.9 bar. The ambient air is rammed isentropically to a pressure of 1 bar. The air leaves the main compressor at pressure 3.5 bar is first cooled in the heat exchanger having effectiveness of 0.6 and then in the evaporator where its temperature is reduced by 5°C. The air from the evaporator is passed through the cooling turbine and then it is supplied to the cabin to be maintained at 25°C and 1.05 bar. If the internal efficiency of the compressor is 80% and that of turbine is 75%, determine [10]

- i) Mass of air bled off the main compressor
- ii) Compressor power required
- iii) COP of the system.

- Q3)** a) Discuss the desirable properties of refrigerants. [8]
- b) What are the alternative refrigerants to HCFC's? Discuss their advantages and limitations. [8]

OR

- Q4)** a) Explain: ODP, GWP, and TEWI. [8]
- b) Discuss the design consideration in refrigerant piping design. [8]
- Q5)** a) Explain the practical single effect Li-Br vapour absorption refrigeration system. [10]
- b) A single compressor system using R-12 as refrigerant has three evaporators of cooling capacity 10 TR, 20 TR and 30 TR. The temperature in all evaporator is to be maintained at - 10°C. The vapours leaving each evaporator are to be dry and saturated. Condensing temperature is 40°C and subcooling is 10°C. Assume isentropic compression in compressor. Find power required to drive the compressor and COP of the system. [8]

OR

- Q6)** a) With neat schematic explain the cascade refrigeration system. Draw the cycle on T-s and p-h chart. [8]
- b) In vapour absorption refrigeration system, heating, cooling and refrigeration takes place at temperature of 80°C, 30°C, and 0°C. find the maximum COP of the system. [10]

Derive the expression you use.

### SECTION - II

- Q7)** a) Explain the followings: [8]
- i) Relative humidity.
  - ii) Humidity Ratio.
  - iii) Wet bulb temperature.
  - iv) Degree of saturation.
- b) Draw the neat schematic of automobile air conditioning system. How it differs from the residential air conditioning system? [8]

OR

- Q8)** a) 200 cmm of air at 12°C DBT and 50% RH is supplied to an air conditioned hall. The required conditions are 18°C DBT and 60% RH. Determine sensible and latent heat removed from air per minute and SHF for the system. [6]
- b) With neat schematic explain all air single and dual duct air conditioning systems. [10]
- Q9)** a) Derive the expression for the equivalent diameter of circular duct corresponding to rectangular duct of sides a and b for the same pressure loss per unit length, when: [8]
- i) the quantity of air passing through the ducts is same.
  - ii) the velocity of the air flowing through the ducts is same.
- b) With neat diagram explain the working of thermostatic expansion valve. [8]

OR

**Q10)a)** A rectangular duct with cross section 500 mm x 350 mm carries 75 cmm of air having density 1.2 kg/m<sup>3</sup>. Determine the equivalent diameter of circular duct if [8]

i) The quantity of air carried in both the ducts is same.

ii) The velocity of the air flowing through the ducts is same.

Also find the pressure loss per 100 m length of duct if friction factor  $f$  is 0.01.

b) Explain the working principle of thermostat and humidistat. [8]

**Q11)a)** Discuss the various methods for food preservation. [9]

b) With neat sketch, explain the working of Claude liquefaction system for hydrogen. [9]

OR

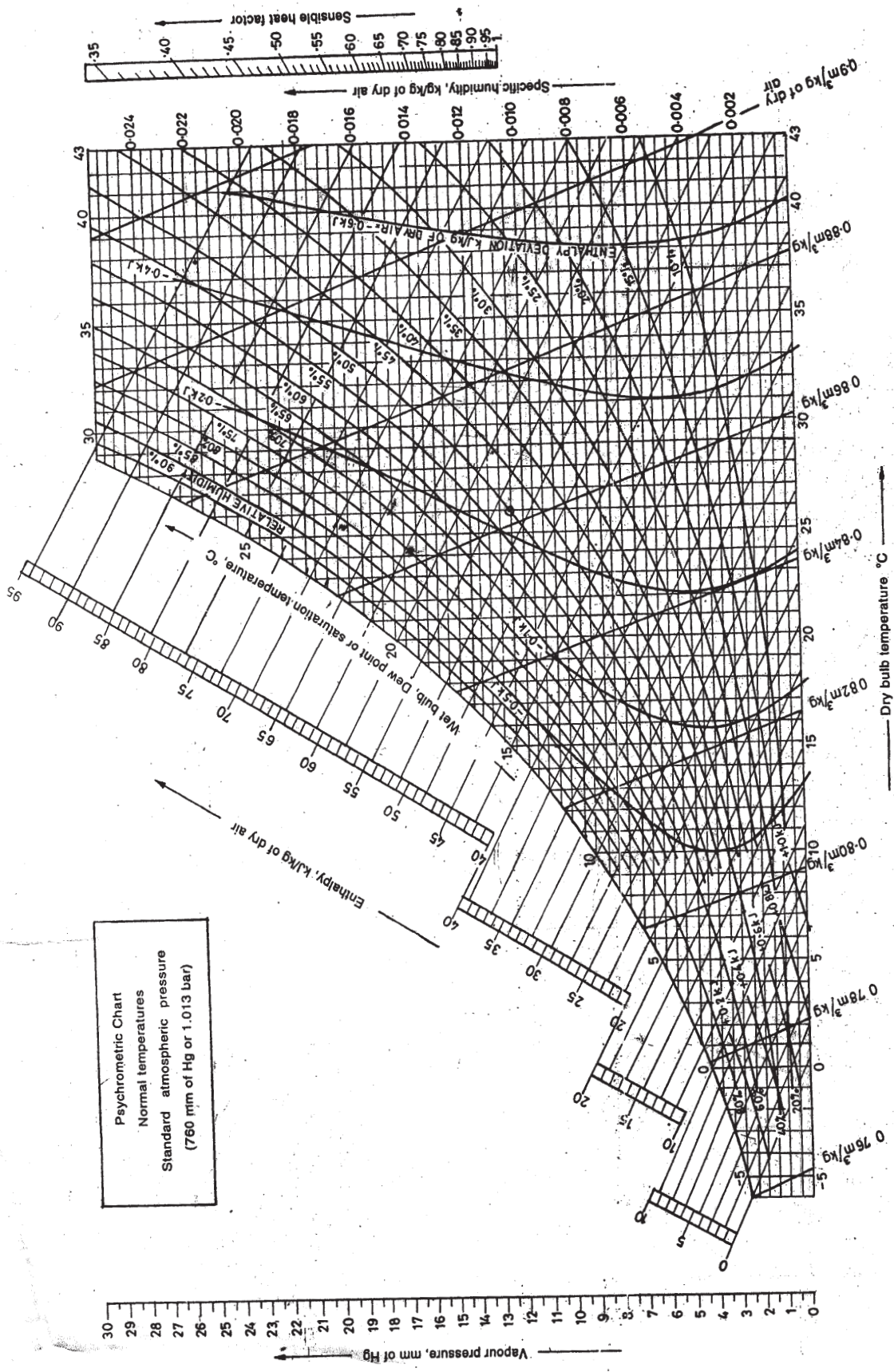
**Q12)a)** With neat schematic explain the working of Linde system. [8]

b) Write short note on: [10]

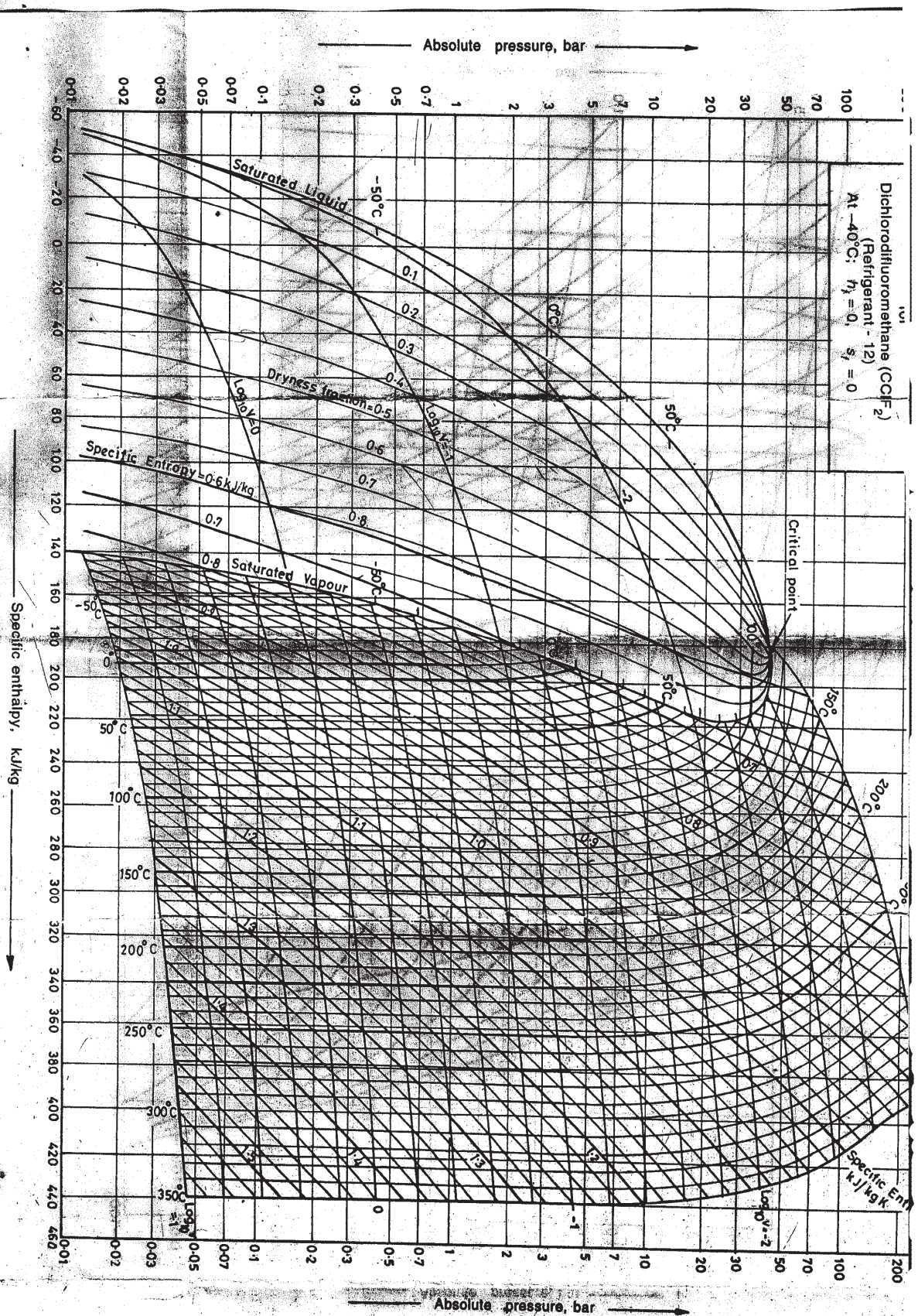
i) Transport refrigeration.

ii) Marine refrigeration.









EEE

Total No. of Questions : 12]

SEAT No. :

**P1365**

[4759]-57

[Total No. of Pages : 4

**B.E. (Mechanical Sandwich)**  
**COMPUTATIONAL FLUID DYNAMICS**  
**(2008 Course) (Semester - I) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Obtain the momentum equation for infinitesimally small fluid element fixed at a point in the fluid. **[10]**
- b) Discuss methods used to solve the group of equations formed by CFD. **[6]**

OR

- Q2)** a) Explain the physical meaning of term substantial derivative. **[8]**
- b) Discuss any two engineering problems which depend on CFD technique for solution. **[8]**
- Q3)** a) Explain what is **[12]**
- i) Difference equation
  - ii) Consistent equation.
  - iii) Forward difference

**P.T.O.**

- iv) Rearward difference.
- v) Central difference.
- vi) Order of the difference equation.

- b) Obtain finite difference quotient for  $\frac{\partial^2 u}{\partial x \partial y}$  over a grid having running index  $i, j$  in  $x$  &  $y$  direction respectively. [6]

OR

- Q4)** a) Derive the following finite difference approximation for applications in two dimensional fluid flow at point  $(i, j)$  [10]

$$\frac{\partial^4 y}{\partial x^2} = \frac{y_{i-2,j} - 4y_{i-1,j} + 6y_{i,j} - 4y_{i+1,j} + y_{i+2,j}}{(\Delta x)^4} + O(\Delta x)^2$$

- b) Explain what is [8]
- i) Stability of an equation.
  - ii) Truncation Error.
  - iii) Round off error.
  - iv) Numerical error.

- Q5)** a) Explain the types of grids used in discretizing the domain in CFD applications. [8]

- b) Discuss about Structured and Unstructured grids used in meshing for CFD application. [8]

OR

- Q6)** Give solution algorithm for thermally developing fluid flow inside a 2D channel. [16]

## SECTION - II

**Q7)** Using the Lax-Wendroff Scheme solve for the first step solution of the inviscid Burger's equation  $\frac{\partial u}{\partial t} + \frac{\partial F}{\partial x} = 0$  where  $F = F(u)$  and  $F = u^2/2$  with the initial condition  $u(x,0) = \sqrt{x}$ ,  $0 \leq x \leq 1$  and boundary condition  $u(0, t) = 0$  for all time. Compare with the exact solution  $u(x,t) = \frac{1}{2}(-t + \sqrt{t^2 + 4x})$ . Take  $\Delta x = 0.2$  and  $\Delta t = 0.1$ . **[16]**

OR

**Q8)** Explain the ADI technique using a model equation and comment on benefits of the techniques. **[16]**

**Q9)** Explain the concept of Staggered Grid and give flowchart for SIMPLE algorithm. **[16]**

OR

**Q10)a)** For one dimensional transient heat conduction, formulate the finite difference expression **[8]**

i) Explicit form

ii) Crank Nicholson (Semi Implicit) form

b) Give advantages and limitations of finite volume method. **[8]**

**Q11)a)** Describe the models of flow used to analyze the flow and discuss types of equations generated by these models. **[8]**

b) Solve following Tridigonal Matrix system using Thomas algorithm. **[10]**

$$\begin{bmatrix} 2.25 & -1 & 0 & 0 \\ -1 & 2.25 & -1 & 0 \\ 0 & -1 & 2.25 & -1 \\ 0 & 0 & -2 & 2.25 \end{bmatrix} = \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

OR

**Q12)** Write short note on any three of the following:

**[18]**

- a) Artificial viscosity in numerical analysis.
- b) Methods to speed up convergence.
- c) Applications of CFD in aerospace field.
- d) Thomas algorithm (TDMA).
- e) MAC formulations.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1366**

**[4759]-58**

[Total No. of Pages : 5

**B.E. (Mechanical Sandwich)  
FINITE ELEMENT METHOD**

**(2008 Pattern) (Semester - I) (Elective - II) (402063-c)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*
- 6) *Additional data sheet is attached for the reference.*

**SECTION - I**

- Q1)** a) Explain the concept of plane stress and plane strain in bi-axial state of stress. Give two example of each of these state of stress. **[4]**
- b) State and explain the principle of virtual work. **[4]**
- c) Explain the following methods of analysis. **[8]**
- i) Finite volume method.
  - ii) Finite Difference Method.
  - iii) Finite element method.

OR

- Q2)** a) Determine the displacements of nodes 1 and 2 in the spring system shown in fig. 1. Use minimum of potential energy principle. **[8]**

**P.T.O.**



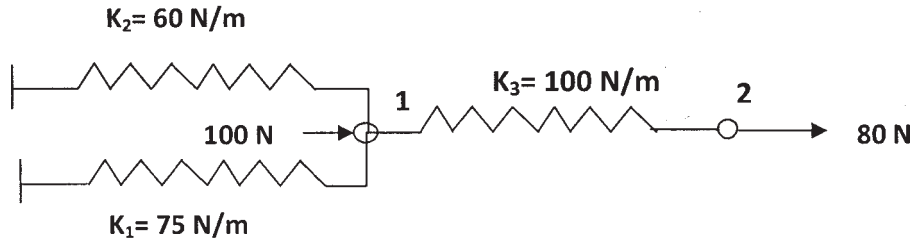


Fig.1.

- b) What is FEM error? Explain various types of errors in FEM. [4]
- c) Explain the principle of Rayleigh-Ritz Method. [4]
- Q3) a) Explain the following terms in brief: [6]
- i) Penalty approach
  - ii) Characteristics of Global Stiffness matrix
- b) Determine the nodal Displacement, element stresses and support reactions of the axially loaded bar as shown in Fig.2. Take  $E=200$  GPa and  $P=30$  KN at node 2. [10]

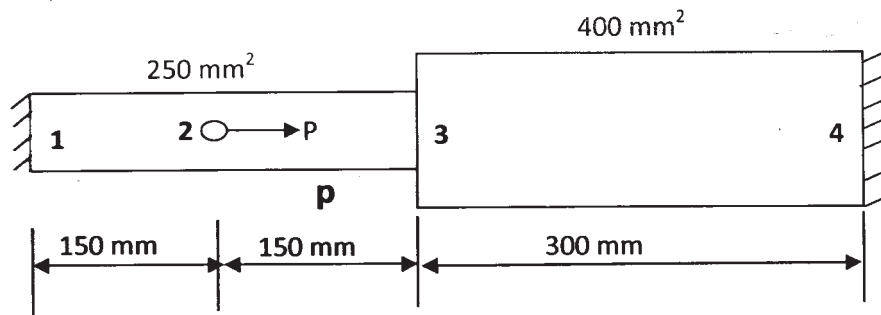


Fig.2.

OR

- Q4) a) What is the significance of shape function? Obtain the shape functions, in terms of natural coordinates, for the two - noded 1 - D element. [6]

- b) For the truss element, write an equation for element stiffness matrix in global coordinate system and element stress equation. Find the element stiffness matrix for the two bar truss as shown in Fig. 3. Also find the stress in element 1.

Take,  $P = 100 \text{ N}$ ,  $L = 100 \text{ mm}$ ,  $A = 5 \text{ mm}^2$  and  $E = 200 \text{ GPa}$  [10]

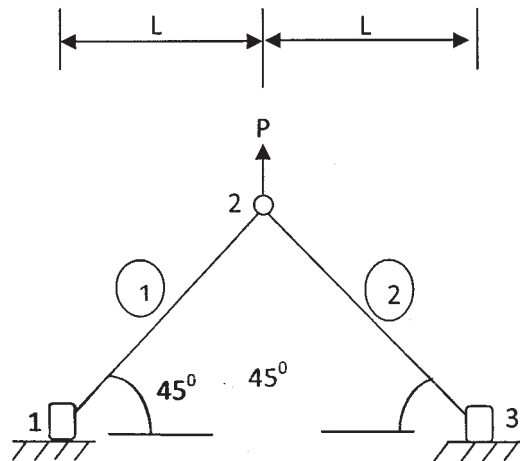


Fig.3

- Q5) a)** Determine the shape functions for a constant strain triangular (CST) element in terms of natural coordinate systems. [8]
- b) The coordinate of the three nodes for triangular element are 1 (1.5,2), 2 (7, 3.5) and 3 (4, 7) respectively. The coordinate of the internal point P is (3.85, 4.8). Evaluate the shape functions  $N_1$ ,  $N_2$  and  $N_3$  for point P. If temperatures at nodes 1, 2, 3 are  $250^\circ\text{C}$ ,  $150^\circ\text{C}$  and  $100^\circ\text{C}$  respectively, determine the temperature at point P. [10]

OR

- Q6) a)** Draw a four noded quadrilateral element both in natural coordinates and Cartesian coordinates for a quadrilateral plate with following data. [10]

Vertices	Cartesian coordinates (mm)	Displacement (mm)
1	10,20	0.4
2	20,20	0.5
3	20,50	0.6
4	10,50	0.7



The point 'S' within the element has Cartesian coordinates (15, 35) for this point 'S', Determine

- i) The Nodal coordinates
  - ii) The shape functions
  - iii) The displacements
- b) What is an isoperimetric element? Explain with suitable example. [6]
- c) Draw a eight noded quadrilateral in Cartesian and natural coordinates.[2]

### SECTION - II

**Q7)** a) A beam of length 10m, fixed at one end and supported by a roller at other end carries a 20 KN concentrated load at the centre of the span. By taking the modulus of 200 Gpa and moment of inertia as  $24 \times 10^{-6} \text{ m}^4$ , determine [12]

- i) Stiffness matrices
  - ii) Deflection under load
  - iii) Shear force and bending moment at mid span
  - iv) Reactions at supports
- b) Explain the type of coordinate systems used in FEA. [4]

OR

**Q8)** a) Explain Beam Stiffness Matrix based on Timoshenko beam theory. [8]

- b) Assemble the stiffness matrix for the member of plane frame shown in fig. 4., if it is oriented at angle  $30^\circ$  to the x axis. Take  $E=200 \text{ GPa}$ ,  $I = 4 \times 10^{-6} \text{ m}^4$  and  $A = 4 \times 10^{-3} \text{ m}^2$  and length of frame member  $L = 5\text{m}$ . [8]

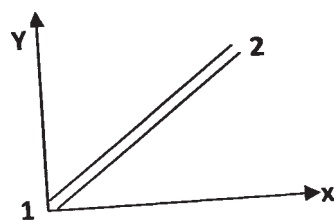


Fig.4

**Q9) a)** State and explain governing equation for 1 Dimensional heat flow. [8]

b) Prove that stress developed for 1 D linear element would be [8]

$$\sigma = E(Bq - \alpha\Delta T).$$

Where  $\alpha$ - coefficient of thermal expansion

And  $\Delta T$  = change in temperature.

OR

**Q10)a)** An insulated circular fin has cross sectional area  $A = 0.1 \text{ m}^2$  and length  $L = 0.4\text{m}$ . The left end has a constant temperature of  $100^\circ\text{C}$ . A positive heat flux of  $q = 5000 \text{ W/mm}^2$  acts on the right end. Let  $K_{xx} = 6 \text{ W / (m}^\circ\text{C)}$ . Determine the temperature at  $L/4, L/2, 3L/4$  and  $L$ . [10]

b) Write a short note on 2D element used for Heat transfer problem. [6]

**Q11)a)** What is non linearity? Explain different types of non linearities. [6]

b) State the difference between Static, Dynamic and fatigue analysis. [6]

c) Write a short note on NVH analysis. Also compare FEM and BEM (Boundary element method). [6]

OR

**Q12)a)** Explain Fatigue and the different approaches in fatigue analysis. [6]

b) What is modal analysis? What are the mode shapes? [6]

c) Explain preprocessing and Postprocessing in commercial FEA software. [6]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1367**

**[4759]-59**

[Total No. of Pages : 3

**B.E. (Mechanical Sandwich)  
AUTOMOBILE ENGINEERING  
(2008 Course) (Semester-I) (402064 A) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if, necessary.*

**SECTION-I**

- Q1) a)** Explain the following terms: **[9]**
- i) Air resistance.
  - ii) Rolling resistance.
  - iii) Grade resistance.
- b) Explain various sections used for side members and cross members of chassis frame. **[7]**

OR

- Q2) a)** Explain with neat sketch the construction of frameless body. **[7]**
- b) Explain the characteristics of following layouts: **[9]**
- i) Front engine front drive.
  - ii) Front engine rear drive.
  - iii) Rear engine rear drive.

- Q3) a)** With the help of suitable diagram describe the construction features of diaphragm spring type clutch. Discuss its advantages and disadvantages relative to the clutch employing helical spring. **[8]**
- b) Explain with neat sketch the working of a constant mesh gear box. **[8]**

OR

**P.T.O.**

- Q4)** a) Explain with neat sketch semi-floating rear axle. [8]  
b) State various advantages of using rear engine layout for long buses. [4]  
c) Describe the operation of non-slip or limited slip differential used in automobile. [4]

- Q5)** a) Explain with neat sketch: Castor, Camber and King pin inclination. [6]  
b) Explain with neat sketch the working of shock absorber. [6]  
c) Explain the advantages and disadvantages of independent suspension. [6]

OR

- Q6)** a) Sketch a recirculating ball type steering gear and explain its working. [6]  
b) Explain with neat sketch the working of power steering. [6]  
c) What are the requirements of automobile air conditioning system and how they are achieved? [6]

### **SECTION-II**

- Q7)** a) Explain the importance of vehicle maintenance. What are different kinds of maintenance required for car? [8]  
b) What do you understand by servicing of brake system? Prepare the check point list for servicing of brake system. [8]

OR

- Q8)** a) Prepare maintenance schedule plan for three cylinder petrol engine of an automobile of your choice. [8]  
b) Describe what maintenance is required to steering system? Explain with neat sketch various lubrication points needed for steering linkages. [8]

- Q9)** a) Explain construction and details of an automobile seat. What are the various parts of it? Explain with neat sketch. [8]  
b) What is the role of safety in automobile? Explain various safety systems incorporated in modern days automobile. [8]

OR

- Q10)**a) Explain in details the importance of ergonomics in automobile safety. [8]
- b) Write short note on: [8]
- i) Air Bags for passenger safety.
  - ii) Head lamp assembly.

- Q11)**a) Explain with neat sketch construction and working of Electronics Antilock braking system used in automobile. [8]
- b) List the various types of actuators used in electronic control system of vehicle. Explain any two actuators. [10]

OR

- Q12)** Write short note on Any Three: [18]
- a) Electronic Control Unit (ECU).
  - b) Use of Sensors in automobiles.
  - c) Component of engine management system.
  - d) New technology in automotive lighting.



Total No. of Questions : 12]

SEAT No. :

**P1509**

**[4759]-6**

[Total No. of Pages : 3

**B.E. (Civil)**

**AIR POLLUTION AND CONTROL**  
**(2008 Pattern) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate answer -books.*
- 3) *Your answers will be valued as a whole.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** Discuss the followings:

- a) Metrological parameters. [6]
- b) Scales of Metrology. [5]
- c) Plume Behavior. [6]

OR

- Q2)** a) How ground level concentration can be measured? Explain in brief. [9]
- b) Calculate effective stack height from following data: [8]
- i) Physical stack is 203 m tall
  - ii) Inside Diameter 1.07 m
  - iii) Wind velocity is 3.56 m/s

**P.T.O.**

- iv) Air temperature is 13°C
- v) Barometric pressure is 1000 millibars
- vi) Stack gas velocity is 9.14 m/s
- vii) Stack gas temperature is 149°C

- Q3)** a) What is Air pollution survey? Discuss. [8]
- b) What is sampling of gases? How it is carried? [8]

OR

- Q4)** a) What are the methods available in air sample analysis? Explain any one in details. [8]
- b) Discuss Air Quality Monitoring. [8]
- Q5)** a) How you can modify the indoor air quality? Explain in brief. [8]
- b) What air pollutant? Give its sources and effects. [9]

OR

- Q6)** a) What are the sources of odor? How odor can be measured? [8]
- b) Enlist the controlling methods for odor. Explain any one in detail. [9]

### **SECTION - II**

- Q7)** a) Give note on air pollution control by [10]
- i) Process Modification
  - ii) Change of Raw Material.
- b) List out the types of control equipments. Explain settling chamber to remove minimum size of the particle. [7]

OR

- Q8)** a) A fabric filter is to be constructed using bags that are 0.3 m in diameter and 6.0m long. The bag house is to receive 10 m<sup>3</sup>/sec of air, and the appropriate filtering velocity has been determined to be 2.0 m/min. Determine the number of bags required for a continuously cleaned operation. [10]
- b) Discuss about Wet scrubber. [7]
- Q9)** a) What is land use planning? Discuss. [8]
- b) Give a note on economics of air pollution control. [8]

OR

- Q10)**a) Discuss Air (Prevention and Control) Pollution Act 1981 with recent amendment. [8]
- b) What are the emission standards in India for mobile and stationary sources? Discuss. [8]
- Q11)**a) Who are the regulatory agencies and their role to obtain environmental clearance for project? [9]
- b) How the public hearing and role of general public is importance in environmental clearance? [8]

OR

- Q12)**a) In what way water resource project impact on environment? Discuss.[9]
- b) Explain in details Environmental management plan. [8]

EEE



Total No. of Questions : 6]

SEAT No. :

**P1368**

**[4759]-60**

[Total No. of Pages : 4

**B.E. (Mechanical Sandwich)  
OPERATION RESEARCH  
(2008 Course) (Semester-I) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer sheet.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Use of non programmable calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** What are various phases of solving OR problem. **[6]**

b) Maximize  $Z = 3x_1 + 2x_2 + 5x_3$  **[12]**

Subject to  $x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460,$

$x_1 + 4x_2 \leq 420$

$x_1, x_2, x_3 \geq 0$

OR

**Q1) Solve by big M method** **[18]**

Maximize  $Z = x_1 + 2x_2 + 3x_3 - x_4$

Subject to  $x_1 + 2x_2 + 3x_3 = 15$

$2x_1 + x_2 + 5x_3 = 20$

$x_1 + 2x_2 + x_3 + x_4 = 10$

$x_1, x_2, x_3, x_4 \geq 0$

**Q2) a)** Write LP form of assignment problem. **[3]**

b) For 'n' size square assignment problem. **[2]**

How many constraints are involved in it's LP form and what type?

**P.T.O.**

- c) A company has factories at  $F_1$ ,  $F_2$  and  $F_3$  that supply products to warehouses at  $W_1$ ,  $W_2$  and  $W_3$ . The weekly production of factories is 200, 160 and 90 units respectively and the weekly demand of warehouses is 180, 120 and 150 units respectively. The unit shipping costs in rupees is below. [11]

	$W_1$	$W_2$	$W_3$
$F_1$	16	20	12
$F_2$	14	8	18
$F_3$	26	24	16

Solve and optimize the solution by suitable method.

OR

- Q2) a)** A sales man want to visit cities A, B, C, D and E. He does not want to visit any city twice before completing his tour of all the cities and wishes to return to the point of starting the journey. Cost of going from one city to another in rupees is given below table. Find least cost route.

	A	B	C	D	E
A	0	2	5	7	1
B	6	0	3	8	2
C	8	7	0	4	7
D	12	4	6	0	5
E	1	3	2	8	0

- b) Solve and optimize following transportation problem to supply good from Sources to Destinations. The table below gives transportation cost and total supply and demand from each source and destination.

	Destination-I	Destination-II	Destination-III	Destination-IV	Supply ↓
Source-I	2	3	11	7	6
Source-II	1	0	6	1	1
Source-III	5	8	15	9	10
Demand →	7	5	3	2	

[16]

**Q3)** Write short note (Any Three):

[16]

- a) ABC analysis.
- b) Non linear programming problems.
- c) Dynamic Programming.
- d) Inventory related cost.
- e) Probabilistic Inventory model.
- f) Cutting plane algorithm in integer programming.

**SECTION-II**

**Q4)** a) Explain:

[8]

- i) Minimax and Maximin Principle.
- ii) Dominance Rule.

b) Solve following Game problem with Dominance Rule.

[8]

Player B

	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
A <sub>1</sub>	12	-8	-2
A <sub>2</sub>	6	7	3
A <sub>3</sub>	-10	-6	2

Player A

OR

**Q4)** a) Discuss various replacement analysis models.

[8]

b) A manufacturer have machine A having price 2500/- It's maintenance cost is Rs. 400/- for first five years and then increase by Rs. 100 further per year. Scrap value of machine is negligible. Money value is 10% per year. When the machine should be replaced.

[8]

**Q5)** a) Find the sequence that minimizes the total time required for performing the following jobs on three machines in order ABC. Processing time in minute is given below.

[10]

Jobs →	I	II	III	IV	V	VI	VII
Machine A	3	8	7	4	9	8	7
Machine B	4	3	2	5	1	4	3
Machine C	6	7	5	11	5	6	12

- b) Mention any four optimality criteria for sequencing problem. [6]

OR

- Q5)** a) Assume a single channel service system of a library in a school. On an average 10 students visit per hour and book issue rate is 14 students/hour.

Determine:

- i) Probability of librarian being idle. [2]  
 ii) Probability that at least 4 students in the system. [3]  
 iii) Expected time that student is in queue. [3]
- b) What is simulation? Describe its advantages in solving the problems. Give its limitations with suitable example. [8]

- Q6)** A project has following data with duration in days

	1-2	1-3	2-4	3-4	3-5	4-5
Optimistic Time in Days	2	9	5	2	6	8
Most likely Time in Days	5	12	14	5	6	17
Pessimistic Time in Days	14	15	17	8	12	20

- a) Draw the network, find expected duration and critical path. [6]  
 b) Find out floats for activity 1-3 [3]  
 c) What is the probability that project will get complete in 30 days. [3]  
 d) Differentiate between PERT and CPM. [6]

OR

- Q6)** a) Write short note on Gantt chart in Project Management. [5]  
 b) Define 3 types of floats. [3]  
 c) State the Fulkerson's rules for drawing the network with suitable example. [5]  
 d) Discuss the probability considerations in PERT. [5]



Total No. of Questions : 12]

SEAT No. :

**P1369**

**[4759]-61**

[Total No. of Pages : 3

**B.E. (Mechanical Sandwich)**

**ROBOTICS**

**(2008 Course) (Elective-III) (402064 C) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** Explain the robot anatomy with suitable sketch. **[8]**

b) Describe various characteristics used to specify Industrial Robot. **[8]**

OR

**Q2) a)** Explain the different types of joints used in robots. **[8]**

b) Explain the term “Compliance” in terms of robot. Explain types of compliance. **[8]**

**Q3) a)** What are the different considerations used in the design of the gripper? **[8]**

b) State various types of sensors in robot. Explain capacitive and ultrasonic sensors. **[8]**

OR

**Q4) a)** Explain with neat sketch, range sensor used in robot. **[8]**

b) Classify the different types of grippers used in Industrial robots. Describe vacuum type of gripper in detail. **[8]**

***P.T.O.***

- Q5)** a) Explain the Modeling and control of a single joint in robot. [8]  
b) Write short notes on gear motor and piston motor. [10]

OR

- Q6)** a) Explain with neat sketch, different types of controllers used in robot. [8]  
b) Classify in details, the different types of drives used in Industrial robots. [10]

### SECTION-II

- Q7)** a) A camera locates an object by the matrix. [10]

$$\begin{bmatrix} 0 & -1 & 0 & 50 \\ 1 & 0 & 0 & -75 \\ 0 & 0 & 1 & 20 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

The camera is then translated by 15 units along z-axis of the object, then rotated about its own x-axis by  $-90^\circ$ . Determine the new rotation between camera and object.

- b) Explain Denavit-Hartenberg parameters with a suitable example and sketches. [8]

OR

- Q8)** a) Explain geometric approach and algebraic approach for inverse kinematic solutions. [10]  
b) Explain Newton-Euler dynamic formulation. [8]

- Q9)** a) What is a vision system? How can vision system be classified? [8]  
b) Explain WAIT, DELAY and SIGNAL commands with suitable examples. [8]

OR

- Q10)a)** Explain: [8]
- i) Image processing techniques,
  - ii) Edge detection.
- b) Discuss various interpolation schemes. [8]

- Q11)a)** Define Artificial intelligence. Explain the areas of particular importance of AI. [8]
- b) Discuss tools and techniques for simulation. [8]

OR

- Q12)a)** Define simulation and explain need of simulation. [8]
- b) Explain maintenance and safety aspects of robots. [8]



Total No. of Questions : 12]

SEAT No. :

**P1370**

[4759]-62

[Total No. of Pages : 4

**B.E. (Mechanical Sandwich)**

**COSTING AND COST CONTROL**

**(2008 Course) (Semester - II) (Elective - IV) (402066)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer- books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) State the objectives and importance of cost accountings. [8]  
b) State limitations of financial accounting? [8]

OR

- Q2)** a) Difference between financial Accountings & cost Accounting. [8]  
b) Discuss the essential of good cost Accounting system? [8]
- Q3)** a) Explain the detail various parameters used for classification of costs?[8]  
b) Explain the different methods of costing used in manufacturing Industries. [8]

OR

- Q4)** a) Define and explain in details the following with suitable examples. [8]  
i) Manufacturing overheads.  
ii) Indirect labour cost.  
iii) Sales and distribution overhead.

**P.T.O.**



- b) i) Differentiate between Direct expenses & Indirect expenses.
- ii) What are the characteristics of direct expenses. [8]

**Q5) a)** In a factory working six days in a week and eight hours each day, a worker is paid at the rate of Rs. 100 / day basic plus DA @ 120% of basic. He is allowed to take 30 minutes off during his hours shifts for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to: [10]

Job X 15 hrs

Job Y 12 hrs

Job Z 13 hrs

The time not booked was wasted while waiting for a Job. In cost accounting how would you allocate the wages of the worker for the week.

- b) State the method of allocation of administration overhead to cost centers or products. [8]

OR

**Q6)** A company has three production departments ( $M_1$ ,  $M_2$  and  $A_1$ ) and three service department, one of which Engineering services departments servicing the  $M_1$  &  $M_2$  only. [18]

The relevant information is as follows:

Production dept.	Product X	Product Y
$M_1$	10 Machine hrs	6 Machine hours
$M_2$	4 Machine hrs	14 Machine hours
$A_1$	14 direct labour hours	18 Direct labour hours

Dept. ignoring the appointment of service department cost among service departments.

- a) Calculate suitable overhead absorption rate for the productions.
- b) Calculate the overheads to absorbed by two products X and Y.

**SECTION - II**

- Q7)** a) What are the methods of apportioning joint costs explain any one brief. [8]
- b) Discuss the treatment of By-product cost in cost-accounting. [8]

OR

- Q8)** a) A coke manufacturing company produces the followings products by usings 5,000 tonnes of local @ Rs.15/ tone into a common process coke 3,500  
Tar 1,200 tonnes  
Sulphate of Ammonia 52 tonnes  
Benzol 48 tonnes  
Apportion the joint cost amongst the product on the basis of the physical unit method. [8]
- b) Find out the cost of joint products A & B using contribution margin method from the following data:  
Sales: Product A : 100 kg @ Rs. 60 per kg  
Product B : 120 kg @ Rs. 30 per kg.  
Joint cost  
Marginal cost Rs. 4,400  
Fixed cost Rs. 3900 [8]

- Q9)** a) A company has fixed cost of Rs. 90,000 sales Rs. 30,000 and profit Rs. 60,000 required [8]
- i) Sales volume if in the next period the company suffered a loss of Rs. 30,000/-
  - ii) What is the margin of safety for a profit of Rs. 90,000/-
- b) Explain & illustrate cash break -even chart. [8]

OR

**Q10)a)** Explain following in brief: [8]

- i) Marginal costing
- ii) Absorption costing

b) A company produces single product which sells for Rs. 20 per unit Variable cost is Rs. 15 per unit & fixed overhead for the year is Rs. 6,30,000. [8]

Required

- i) Calculate sales value needed to earn a profit of 10% on sales.
- ii) Calculate sales price per unit to bring BEP down to 1,20,000 units.
- iii) Calculate margin of safety sales if profit is Rs. 60,000.

**Q11)a)** State basis of standard costing. [9]

b) State need for a standard costs. [9]

OR

**Q12)** Write a short note on (any two): [18]

- a) Types of standards in standard costing.
- b) Techniques of Marginal costing.
- c) Controllable & uncontrollable Variances.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P3885**

[Total No. of Pages : 3

**[4759] - 63**

**B.E. (Mechanical Sandwich)**

**MACHINE TOOL DESIGN**

**(2008 Pattern) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt one Question of each unit from Section-I and Section-II.*
- 2) *Answer to the questions should be written on separate books.*
- 3) *Draw neat diagram wherever necessary.*
- 4) *Assume suitable data if required.*

**SECTION - I**

**UNIT - I**

- Q1)** a) Design a six-speed gear box for a machine tool having a minimum speed 60 rpm ,G.P ratio = 1.55, speed of motor = 1500 rpm.Draw the best possible Structural diagram, ray diagram, speed chart and gear layout.[14]
- b) Discuss the selection of motor for the drive. [6]

OR

- Q2)** a) Explain why cis used for calculating speed? Show value of geometric progression.lies between 1 and 2. [8]
- b) Discuss the designs features of feed gear box with Norton drive [8]
- c) Write a Short note on selection of best Ray diagram. [4]

**UNIT - II**

- Q3)** a) What the design criteria for beds? How these are applied to for welded and cast beds. [8]
- b) Why stiffness is important consideration in machine tool structure? How stiffness is improved explain with figures . [7]

**P.T.O.**

OR

- Q4)** a) What are the functions of machine tool structures? Show the different types of cross sections used for machine tool beds and columns. [8]  
b) Discuss bed materials along with required properties. [7]

**UNIT - III**

- Q5)** a) Estimate the total error in pitch of a lead screw working on sliding friction and show that it could be expressed as. [10]

$$\Delta_1 \left( 1 + \frac{P^2}{2\eta D^2} \right) \text{ where } \Delta_1 = QP / AE \text{ Q- Axial load, P-Pitch,}$$

A - Cross section area, D - Effective diameter,  $\eta$  - Efficiency

- b) Write a note on aerostatic slide ways. [5]

OR

- Q6)** a) Discuss briefly the merits and demerits of Recirculating power screw in comparison to conventional lead screw. State its specific field of uses and application. [7]  
b) Discuss the design consideration in guideways. [8]

**SECTION -II**

**UNIT - IV**

- Q7)** a) Explain the design consideration of machine tool spindle. [8]  
b) Explain different methods for preloading of ball bearing. [6]  
c) Describe the different types of bearing employed in machine tools. Give the importance of each. [6]

OR

- Q8)** a) Describe the various elements of a spindle unit used in a drilling machine. Draw the neat sketch of the arrangement. [7]  
b) Explain optimum spacing of support in spindle for good rigidity. [8]  
c) State and explain the functions of machine tool spindle. What are the desirable features of spindle units. [5]

## UNIT - V

- Q9)** a) What do you understand by regenerative chatter in machine tool? State its causes and effects. [8]
- b) How vibrations of boring bar are damped. [7]

OR

- Q10)**a) Explain how electrical braking system is used for control in machine tool. [8]
- b) Compare hydraulic control system with mechanical control system with reference to performance, cost ,reliability considerations. [7]

## UNIT - VI

**Q11)** Write a short note on following : [15]

- a) Layout of machine tool by matrices
- b) Feed back devices used in CNC
- c) For flat disc drive ,derive the equation for frictional torque

OR

- Q12)**a) Explain how and where a retrofitting is done in a old lathe machine tool.[8]
- b) Differentiate stepped and stepless drive and explain Epicyclic stepless drive. [7]



Total No. of Questions : 12]

SEAT No. :

**P3886**

[Total No. of Pages : 3

**[4759] - 64**

**B.E. (Mechanical Sandwich)**

**(C) : ENERGY MANAGEMENT AND INDUSTRIAL POLLUTION  
(Self Study) (2008 Pattern)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All questions compulsory.*
- 2) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1) a)** Explain current energy scenario in India. Describe the need for renewable energy. **[9]**

b) Discuss different aspects of Energy Policy and strategy in Energy conservation systems. **[9]**

OR

**Q2) a)** What are the ways of power factor improvement? Explain in detail. **[9]**

b) Write short notes on : **[9]**

i) Variable speed drive

ii) Energy efficient motors

**Q3) a)** Write in brief the methodology to carry out detailed energy audit. **[8]**

b) What are the different methods of financial analysis? Explain any one method with suitable example. **[8]**

OR

**Q4) a)** What is the time value of money and net present value? **[8]**

b) Write short notes on : **[8]**

i) Sankey diagram

ii) Fuel and energy substitution

**P.T.O.**

- Q5)** a) Explain the opportunities for improving energy efficiency in boilers. [8]  
b) Discuss energy conservation opportunities in steam distribution systems. [8]

OR

- Q6)** a) What are the energy conservation opportunities in compressed air distribution system? [8]  
b) Write short notes on : [8]  
i) Economic thickness of insulation  
ii) Insulating materials and refractories

**SECTION -II**

- Q7)** a) Describe Energy and Environment. [6]  
b) Write a note on efforts taken to control global environmental issues. [12]

OR

- Q8)** a) Discuss the concept of Emission Trading and Clean Development Mechanism. [10]  
b) Write short notes on : [8]  
i) Fossil fuel related pollutants  
ii) Industrial pollution emissions

- Q9)** a) What are the major sources of water pollution? Explain the various ways of waste water treatment? [8]  
b) What are the major sources of air pollution? Discuss various air pollution control methods. [8]

OR

- Q10)**a) Write short notes on : [8]  
i) Noise pollution  
ii) Thermal pollution  
b) Write a short note on air pollution laws and standards. [8]



- Q11)**a) Discuss different waste minimization techniques? [8]  
b) What are the main components of solid waste management? [8]

OR

- Q12)**a) What do you mean by sustainable development? What are the objectives of Environmental Impact Assessment (ETA). [8]  
b) Write short notes on : [8]  
i) Cogeneration for pollution control  
ii) Incineration



Total No. of Questions : 12]

SEAT No. :

**P1371**

**[4759]-65**

[Total No. of Pages : 3

**B.E. (Electrical)**

**PLC AND SCADA APPLICATION**

**(2008 Course) (Semester - I) (403141)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

**SECTION - I**

**Q1) a)** Explain in detail block diagram of PLC. **[9]**

b) Define Programmable Logic Controller and enlist important applications of the same. **[9]**

OR

**Q2) a)** State and explain advantages and disadvantages of PLC in detail. **[10]**

b) What are the selection criteria for PLC. **[8]**

**Q3) a)** Explain rules for proper construction of PLC ladder diagram. **[8]**

b) Develop the ladder diagram for the following truth table. **[8]**

Inputs - I1, I2

Outputs - Q1, Q2

I1	I2	Q1	Q2
0	0	0	0
0	1	1	0
1	0	0	1
1	1	0	0

OR

**P.T.O.**

- Q4)** a) Explain T-ON timer. [8]  
b) Explain electromagnetic relay as an ON/OFF output devices. [8]
- Q5)** a) Write a short note on PID controller. [8]  
b) State 'Adjust and Observe' method of PID tuning. [8]

OR

- Q6)** a) What are the different parameters which are affecting the speed of DC motor. [8]  
b) Explain speed control of AC motor. [8]

**SECTION - II**

- Q7)** a) Define and explain with block diagram parts of SCADA. [8]  
b) State advantages, disadvantages and applications of SCADA system. [8]

OR

- Q8)** a) Explain SCADA desirable properties. [8]  
b) Explain SCADA data transfer through PLC. [8]
- Q9)** a) Explain SCADA system architectures in detail. [8]  
b) Explain with block diagram use of SCADA in water purification system. [8]

OR

- Q10)** a) Write short note on Intelligent Electronic Devices (IED). [8]  
b) Explain with block diagram use of SCADA in chemical plant. [8]

- Q11)a)** Draw and explain seven layers of OSI model and their functions. [9]
- b) Explain Control Net, Device Net, Ethernet/IP. [9]

OR

- Q12)a)** Draw and explain IEC 61850 layered architecture. [9]
- b) Write note on security Implications of the SCADA protocols. [9]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1372**

**[4759] - 66**

[Total No. of Pages : 3

**B.E. (Electrical)**

**POWER SYSTEM OPERATION & CONTROL**

**( 2008 Course) (Semester - I) (403142)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain the use of equal area criteria for stability study in case of sudden change in mechanical input of synchronous generator. [8]
- b) Explain the difference between clearing angle and critical clearing angle, clearing time and critical clearing time. [8]

OR

- Q2)** a) Differentiate between the steady state stability, transient state stability and dynamic state stability with reference to basic concept, limits, item of study. [8]
- b) Explain the point by point method in detail for the solution of swing equation. [8]

- Q3)** a) Explain the effect of variation in excitation of the synchronous machine on the reactive power management. [8]
- b) Why the reactive power compensation is required in the power system. [8]

OR

- Q4)** a) Draw the loading capability curve of a generator and explain in detail the important considerations while drawing it. [8]
- b) Explain the concept of sub-synchronous resonance. [8]

**P.T.O.**

- Q5) a)** What is the FACTS technology and explain about it's application to power system. [8]
- b) Explain the principle of operation, circuit diagram and application of [10]
- i) Unified Power Flow Controller (UPFC)
  - ii) Static Synchronous Series compensation (SSSC)

OR

- Q6) a)** Explain how the evolution in FACTS technology has taken place. [8]
- b) Write a short note on [10]
- i) STATCOM
  - ii) SVC

### SECTION - II

- Q7) a)** Explain with block diagram and frequency responses, the load frequency control of single area case, with the proportional plus integral control action. Explain the Area Control Error (ACE). [10]
- b) Explain the effect of following constraints on generation control [8]
- i) Generator rate constraint
  - ii) Speed governor dead band

OR

- Q8) a)** With neat block diagram and response, explain two area load frequency control. Also explain the concept of Area Control Error (ACE). [10]
- b) Explain following concepts with reference to automatic generation control; [8]
- i) Free governor mode operation
  - ii) Droop characteristic of speed governor system

- Q9) a)** Define unit commitment and explain the necessity of it. Explain the objective function of Unit commitment and various constraints applied. [8]
- b) State various methods of unit commitment. Explain the recursive function used in dynamic programming method of unit commitment. State the advantages of dynamic programming method. [8]

OR

- Q10)** a) Explain with mathematical formulation, the economic load dispatch with transmission loss and including equality constraint of meeting load. Explain penalty function. **[10]**
- b) Explain the cost curve of thermal generator. **[6]**

- Q11)** Compare following types of power interchange mechanisms **[16]**
- a) Energy banking
  - b) Capacity interchange
  - c) Diversity interchange

OR

- Q12)** Explain the conditions applied suitable for following mode of power transaction. **[16]**
- a) Emergency power interchange
  - b) Inadvertent power exchange
  - c) Power pool



Total No. of Questions : 12]

SEAT No. :

P1373

[4759] - 67

[Total No. of Pages :4

**B.E. (Electrical)**  
**CONTROL SYSTEM - II**  
**( 2008 Course) (Semester - I) (403145)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any one question from each pair of questions: Q.1 & Q.2, Q.3 & Q.4, Q.5 & Q.6, Q.7 & Q.8, Q.9 & Q.10, Q.11 & Q.12.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*

**SECTION - I**

**Q1) a)** Draw electrical circuit & derive transfer function of Lag compensation network. [6]

b) A unity feedback system has an open loop transfer function,

$G(s) = \frac{10}{s(1+s)}$  Design a suitable Lead compensator so that phase margin is  $50^\circ$  and  $K_v = 20/\text{sec}$ . [12]

OR

**Q2) a)** Compare Lead and Lag compensator. [6]

b) A unity feedback system has an open loop transfer function,

$G(s) = \frac{K}{s(1+2s)}$  Design a suitable Lag compensator so that phase margin is  $40^\circ$  and steady state error for ramp input is 0.2. [12]

**Q3) a)** Consider a linear time invariant system represented by  $\dot{X} = AX + Bu$ . Show that its non homogeneous solution is

$$X(t) = \phi(t)x(0) + \int_0^t \phi(t-\tau)B V(\tau)d\tau . \quad [8]$$

*P.T.O.*



- b) Determine the state transition matrix for the system having  $A = \begin{bmatrix} -2 & 1 \\ 2 & -3 \end{bmatrix}$   
 & find out homogeneous response if the initial conditions are  $X(0) = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ .  
 [8]

OR

- Q4)** a) Define state transition matrix. Explain any two methods of computing STM. [8]

- b) Find STM for  $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$  using Cayley-Hamilton theorem. [8]

- Q5)** a) Explain the effect of pole zero cancellation on the controllability & observability with suitable example. [8]

- b) A system is described by  $\dot{X} = \begin{bmatrix} 0 & 1 \\ -12 & -7 \end{bmatrix}x + \begin{bmatrix} 1 \\ 1 \end{bmatrix}u$   $Y = [1 \quad -1]x$ . Verify Duality theorem. [8]

OR

- Q6)** An observable system is described by

- $\dot{X} = \begin{bmatrix} 1 & 2 & 0 \\ 3 & -1 & 1 \\ 0 & 2 & 0 \end{bmatrix}x + \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix}u$ ;  $Y = [0 \quad 0 \quad 1]x$ . Design a state observer by any two methods so that eigen values are at  $-4$ ;  $-3+j1$ ;  $-3-j1$ . [16]

## SECTION - II

**Q7) a)** Explain PID controller with its characteristics, applications and its effect on system performance. [8]

b) Design a PID controller for  $G(s) = \frac{1}{s(s+4)(s+3)}$  and get values of  $K_p$ ,  $T_i$  &  $T_d$ . [8]

OR

**Q8) a)** Explain Ziegler Nichols rules for tuning of PID controller. [6]

b) A unity feedback system has open loop transfer function,  $G(s) = \frac{100}{(s+1)(s+2)(s+5)}$ , Design a PI controller in frequency domain so that phase margin of system is  $60^\circ$  at frequency of 0.5 rad/sec. [10]

**Q9) a)** In describing function analysis, how the stability of non linear system is determined? Explain with figure of  $-1/KN$  locus and  $G(jw)$  locus. [8]

b) Derive describing function of Saturation nonlinearity. [8]

OR

**Q10) a)** Explain Precisely the terms; Asynchronous quenching, Frequency entrainment and nonlinear spring mass system. [8]

b) In a unity feedback system an ideal relay with output equal to  $\pm 1$  unit is connected in cascade with  $G(s) = \frac{50}{s(s+1)(s+2)}$ . Determine the amplitude and frequency of the limit cycle if it exists by Describing function method. [8]

**Q11)a)** Discuss different types of singular points that occur in the phase plane method. [6]

b) A linear second order system is described by eq<sup>n</sup>

$\ddot{e} + 2\xi\omega_n\dot{e} + \omega_n^2e = 0$ , where  $\xi = 0.15$ ,  $\omega_n = 1$  rad/sec,  $e(0) = 1.5$  and  $\dot{e}(0) = 0$ . Construct the phase trajectory, using method of isoclines. [12]

OR

**Q12)a)** Show that the following quadratic form is positive definite by Sylvester's criterion. [6]

$$V(x) = 8X_1^2 + X_2^2 + 4X_3^2 + 2X_1X_2 - 4X_1X_3 - 2X_2X_3$$

b) Explain the terms: [6]

i) Stability

ii) Asymptotic stability and

iii) Asymptotic stability in large

c) Explain Liapunov's second method and Liapunov's stability theorem. [6]



Total No. of Questions : 12]

SEAT No. :

**P3686**

**[4759] - 68**

[Total No. of Pages :3

**B.E. (Electrical)**

**ROBOTICS AND AUTOMATION**  
**( 2008 Course) (Elective -I) (Semester -I) (403143)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*

**SECTION - I**

- Q1) a)** What is automation? Explain types of automation with neat sketch. **[8]**
- b) Explain the following terms. **[8]**
- i) Work envelop
  - ii) DOF

OR

- Q2) a)** Explain different methods for point to point motion conversion. **[8]**
- b) Explain the following terms- **[8]**
- i) Spatial resolution
  - ii) Compliance

OR

- Q3) a)** Explain different types of electrical drives used in robots and their selection criteria. **[8]**
- b) Explain different types of end effectors used in robot manipulator. **[8]**

**P.T.O.**

- Q4)** a) With the help of a neat diagram, explain [8]  
i) Cartesian Robot  
ii) SCARA Robot  
b) Explain various actuators needed in robot design with their selection criteria. [8]

**Q5)** The coordinates of the point 'P' on the body are given by  $\{2,2,2\}^T$ . The point is rotated about z axis by  $60^\circ$  and then about x axis by  $30^\circ$  and then y axis by  $90^\circ$ . Find the final coordinates of the point 'P' w.r.t. the fixed frame.

Continue the travel of final point 'P' in x direction by 5 unit. [10+8]

OR

- Q6)** a) Write a short note on Euler angle systems used in Robotics. [9]  
b) Explain the concept of hand matrix with the effect of pre and post multiplication by basic homogeneous matrix. [9]

### SECTION - II

- Q7)** a) Explain rules for establishing coordinate frames at different joints for D-H representation. [9]  
b) Explain concept of geometric approach in inverse kinematics. [9]

OR

- Q8)** a) Explain Geometric Method and Direct Method for solution of inverse kinematics. [9]  
b) Draw a neat diagram of 'PUMA Robot' explaining the degrees of freedom. Also show all the coordinate frames attached to the robot. [9]

- Q9)** a) Explain Lagrangian analysis in robot dynamics. [8]  
b) Explain manipulator Jacobean, Inverse Jacobean and singularities in Jacobean analysis in short. [8]

OR

- Q10)a)** Explain Joint Position Control for robot motion. **[8]**
- b) Explain need of robot motion study for robot engineer. **[8]**

- Q11)a)** Write a note on robot specific languages. **[8]**
- b) Explain how a robot can be used for welding application. **[8]**

OR

- Q12)a)** Write a note on- **[8]**
- i) Teach Pendant
- ii) Online and Offline programming
- b) Explain ‘Spray Painting Robot’ with details of selection criteria, selection of drives and actuators, methods of control and peripheral devices used. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P1374**

**[4759]-69**

[Total No. of Pages : 3

**B.E. (Electrical)**

**b: POWER QUALITY**

**(2008 Course) (Semester - I) (Elective - I) (403143)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *In section- I, attempt Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6. In section - II, attempt Q7 or Q 8, Q 9 or Q 10, Q 11 or Q 12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Explain various electromagnetic phenomena as per IEEE 1159 standard with its different characteristics. **[10]**
- b) Explain various symptoms of poor power quality. **[8]**

OR

- Q2)** a) Explain various definitions of power quality with reference to each stake holders. **[10]**
- b) Why power quality is an important issue in recent years? Explain why grounding concept is important in power quality. **[8]**
- Q3)** a) Explain principal of regulating the voltage and impact of reactive power management? **[8]**
- b) What are the various causes of voltage flicker? Explain their effects on power system equipments? **[8]**

OR

**P.T.O.**

- Q4)** a) Explain the various RMS voltage variations with reference to IEEE 1159 standard such as short and long duration variations, overvoltage, undervoltage, sags and swells. [8]
- b) Explain the following terms related with voltage flicker [8]
- i) Short term ( $P_{st}$ ) and
- ii) Long term ( $P_{lt}$ ) voltage flicker and various means to reduce it.
- Q5)** a) Explain voltage sag characteristics such as magnitude, duration, phase angle jump and missing voltage. [8]
- b) Differentiate between voltage sag and interruptions. Explain how consumers are getting affected economically due to voltage sag. [8]

OR

- Q6)** a) Explain utility and end user mitigation measures for voltage sag. [8]
- b) Explain the influence of fault location and fault level on voltage sags. [8]

### SECTION - II

- Q7)** a) Define harmonics, inter-harmonics and sub-harmonics. What are the causes of harmonics? [8]
- b) Explain series and parallel harmonics resonances. What are its consequences? [10]

OR

- Q8)** a) What is harmonic filtering? Explain active and passive filters. [8]
- b) Explain step by step procedure for harmonic analysis. [10]
- Q9)** a) Define transients? Explain various sources of transient overvoltages. [8]
- b) Explain basic principle of over voltage protection. Explain various devices used for over voltage protection. [8]

OR



- Q10)a)** Explain capacitor switching transients and its mitigation methods. [8]  
b) Explain in detail effects of oscillatory and impulsive transients on power system operation. [8]

- Q11)a)** What is the need of power quality measurement? Explain reactive and proactive approach in power quality monitoring. [8]  
b) Explain procedure for selection of monitoring equipments and use of various equipments required for power quality monitoring. [8]

OR

- Q12)a)** Explain various power quality monitoring objectives and requirements. [8]  
b) Explain selection procedure of transducers for power quality monitoring. [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1510**

[4759]-7

[Total No. of Pages : 3

**B.E. (Civil)**

**ARCHITECTURE AND TOWN PLANNING**

**(2008 Pattern) (Semester - I) (Elective - I) (401004)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Use separate answer sheets for Section I and II.*
- 2) *Assume suitable data if necessary.*
- 3) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*

**SECTION - I**

- Q1) a)** What is the difference between the vision of a town planner and an architect while development of town? [9]
- b) Write a short note on garden styles: modern and historical. [8]

OR

- Q2) a)** Explain in detail different elements of design and mention the effectivity of the same on architectural composition giving suitable examples. [9]
- b) How and why water body conservation and creation is responsible for the development of an area; explain with suitable example. [8]
- Q3) a)** Explain the importance of the prevailing building byelaws for enriching the spaces and hence to arrive at a beautiful "Built Environment", within the town. [9]
- b) Explain the differences between URBAN DESIGN & URBAN RENEWAL with appropriate examples. [8]

OR

**P.T.O.**

**Q4) a)** What is the need of the concept “Built Environment”, in development of megacities. [8]

b) Enlist the parameters on which Quality of Life is based and establish the relation of the same with Urban Renewal proposal. [9]

**Q5) a)** Write a short note on: Advantages and usage of sustainable materials. [8]

b) What aspects contribute for designating a building as a “Green Building”? [8]

OR

**Q6) a)** Enlist different sustainable technologies and explain the advantages and usage of sustainable technologies. [8]

b) Write a short note on any “Green build case study”. [8]

### **SECTION - II**

**Q7) a)** Explain about the contribution of different town planners. [9]

b) Write short notes on: town planning schemes and garden city with appropriate examples. [8]

OR

**Q8) a)** Explain various theories of developments (ribbon, sector etc) with the help of suitable sketch. [9]

b) Explain the concept new towns; giving suitable example. [8]

**Q9) a)** Explain various levels of Planning and which is the common thread between them as regards execution is concerned. [9]

b) Explain with neat sketches various junctions in road network and elaborate importance of traffic management. [8]

OR

**Q10)a)** Elaborate different types of surveys and the importance of the same while finalizing DP Proposal when you are working as a planner. [9]

b) Explain various urban road objectives and importance of traffic planning. [8]

**Q11)a)** Write a short note on: SEZ, giving its status in India. [8]

b) Elaborate applicability of modern tools for [8]

i) Land Use Analysis

ii) Traffic management.

OR

**Q12)a)** Write short notes on [8]

i) LA Act

ii) MHADA

b) Elaborate applicability of modern tools for [8]

i) Disaster management

ii) Landscape planning

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1375**

**[4759]-70**

[Total No. of Pages : 3

**B.E. (Electrical)**

**ILLUMINATION ENGINEERING**

**(2008 Course) (Semester - I) (Elective - I) (403143)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain the structure of eye with suitable diagram. **[10]**
- b) A small light with uniform intensity in all directions is mounted at a height of 10 m above a horizontal surface. 2 points A and B both lie on the surface with A directly beneath the source. How far is B from A if illumination at B is only  $1/10^{\text{th}}$  as of A? **[8]**

OR

- Q2) a)** Explain relative spectral sensitivity of eye. Hence comment on the vision of the eye wrt different ranges of the wavelength. **[6]**
- b) What are the characteristics of eye performance? **[6]**
- c) A lamp with a reflector is mounted 12 m above the centre of a circular area of 24 meters diameter. If the combination of the lamp and reflector gives a uniform CP of 1000 over the circular area, determine the maximum and minimum illumination produced on the area. **[6]**

**P.T.O.**

- Q3)** a) Give the constructional details of Induction lamp with suitable diagram. [8]
- b) Explain the construction and working of high pressure mercury vapour lamp. [8]

OR

- Q4)** a) Explain the construction and working of low pressure sodium vapour lamp. [8]
- b) Write a short note on CFL. [8]
- Q5)** a) Compare electromagnetic and electronic ballast in lamp circuit. [8]
- b) Explain the importance of reflectors and diffusers for lamp circuit. [8]

OR

- Q6)** a) Explain the types of lighting fixtures according to photometric usage. [8]
- b) Give Ingress protection code. [8]

### **SECTION - II**

- Q7)** a) Explain salient features for the design of a lighting scheme of a Industry. [8]
- b) What are the different types of lighting installations? Explain all the types in detail with appropriate examples. [8]

OR

- Q8)** a) Explain design scheme for Hospital. Give the lux levels for the different sections of the Hospital. [8]
- b) What is a polar curve? Explain in detail the types of polar curves. [8]

- Q9) a)** Explain life cycle costing and payback calculation with examples. [8]
- b) Explain design procedure of indoor lighting using Lumen method. [8]

OR

- Q10)a)** Write a short note on Isolux diagram. [8]
- b) Explain design procedure for flood lighting with appropriate formulas required for calculations. [8]
- Q11)a)** Explain pre-design considerations for emergency lighting with different connections of battery. [10]
- b) Elaborate the components of optical fibre, advantages and disadvantages along with applications. [8]

OR

- Q12)a)** Give the detailed information on energy management in lighting. [9]
- b) Explain photovoltaic lighting with suitable diagram. [9]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1376**

[4759]-71

[Total No. of Pages : 4

**B.E. (Electrical)**

**PROJECT MANAGEMENT**

**(2008 pattern) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

**Q1) a)** Explain various types of project appraisals. How is project appraisal carried out? **[8]**

b) Explain need of Project Management. State all its characteristics. **[9]**

OR

**Q2) a)** Explain various phases of project life cycle. **[8]**

b) Explain different types of Project Organization. State their characteristics. **[9]**

**Q3)** Project is faced with evaluation of two alternatives A and B. The company cost of capital is 14%. Use Net present value, profitability index and payback period methods to arrive at a suitable decision. **[16]**

Immediate

Cash inflows

cash out flows (in Rs. lacs.)

(in Rs. lacs) at the end of

Iyr IIyr IIIyr IVyr Vyr

Project A 40

- 10 15 20 15

Project B 50

10 15 15 20 15

OR

**P.T.O.**



**Q4) a)** What costs are associated with a project and how are they estimated? How will you carry out the financial evaluation of a project? [8]

b) What is the importance of Project selection? Explain the probable causes of project failure. [8]

**Q5) a)** Explain Resource allocation What is the significance of Project Scheduling? Explain the concept of crashing. [8]

b) Write short notes on: [8]

i) PERT

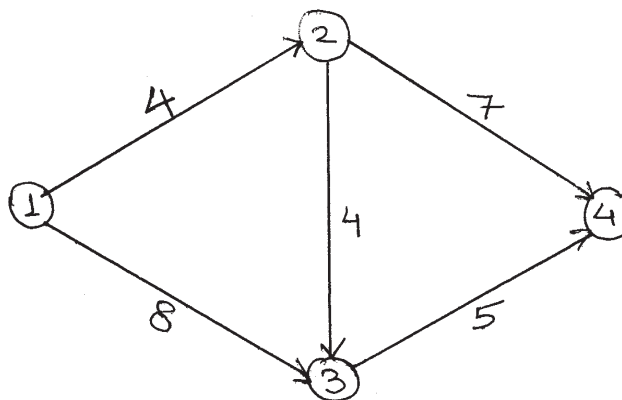
ii) CPM

OR

**Q6)** The following data pertains to the network given below. It is desired to compress the project to the least possible duration day by day and estimate the extra cost. [16]

i-j	Normal Time(days)	Crash Time(days)	Cost slope (Rs. per day)
1-2	4	2	400
1-3	8	6	300
2-3	4	2	100
2-4	7	4	100
3-4	5	2	200

Network



- Q7)** a) What are the elements of budgets? How to take care of them in planning stage? [8]
- b) State all the importance of Cost Estimating? What are the probable factors for cost escalation? [9]

OR

- Q8)** a) What are different cost factors? Define direct cost, indirect cost & prime cost. [9]
- b) Write short notes on: [8]
- i) Project cost accounting systems.
- ii) Cost estimating process.

- Q9)** a) Explain the Project Quality Management. State the processes of project quality management. [9]
- b) Explain in detail the techniques of quality assurance and control. [8]

OR

- Q10)**a) Explain short notes on: [9]
- i) International project Management.
- ii) Quality planning.
- b) What are the different methods for maintaining the quality of procured items? Describe in detail. [8]

- Q11)**a) The expected cash inflows from a project and their probability are as under. [9]

Expected cash inflow (Rs.)	Probability
25,000	0.25
30,000	0.40
42,000	0.20
12,000	0.15

The cash inflow acceptable for the project sponsor is Rs. 28,000. What is the certainty equivalent coefficient?

- b) The expected cash inflows of a project are estimated as under. [8]

Year	Cash inflow (Rs.)
1	1,00,000
2	3,00,000
3	3,50,000
4	2,50,000
5	2,00,000

The initial investments required for the project is Rs. 8,00,000/-. The risk adjusted discount rate is 12%. Evaluate as to whether the project proposal is worth while.

OR

- Q12)a)** Write short notes on: [8]

- i) Capital Asset pricing model.
- ii) Portfolio risks.

- b) Write short notes on: [9]

- i) Diversible and Non diversible risks.
- ii) Correlation coefficient.

EEE

Total No. of Questions : 12]

SEAT No. :

**P1377**

**[4759] - 72**

[Total No. of Pages :3

**B.E. (Electrical)**

**RESTRUCTURING & DEREGULATION**

**( 2008 Course) (Semester - I) (Elective - II) (403144)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) Why the reformation has taken place in electrical power system? [6]  
b) What are various challenges before Indian Power Sector? [6]  
c) Explain functions of PFC. [6]

OR

- Q2)** a) Explain functions of Ministry of power. [6]  
b) Explain the working of Indian Energy Exchange for day ahead market. [6]  
c) Explain functions of CEA. [6]

- Q3)** a) Explain any two methods to asses the financial feasibility of any project. [8]  
b) Explain the desirable characteristics of tariff of electricity. [8]

OR

- Q4)** Explain in brief. [16]  
a) Capital cost  
b) Depreciation  
c) Debt & Equity  
d) Marginal Cost

**P.T.O.**

- Q5) a)** What are the regulation externalities? [8]
- b) Explain the role of Central Electricity Regulatory Commission and State Electricity Regulatory Commission. [8]

OR

- Q6)** Explain following methods of regulations: [16]
- a) Incentive regulation.
- b) Rate of return regulation.
- c) Benchmarking Regulation.

**SECTION - II**

- Q7) a)** Explain electricity reforms of Orissa and Maharashtra. [8]
- b) Explain in detail “The California Crisis”. [8]

OR

- Q8) a)** Explain the electricity reforms of: [8]
- i) Nordic pool
- ii) United Kingdom
- b) Write a short note on the following electricity trading models based on industrial structure: [8]
- i) Pool and bilateral Trades
- ii) Multilateral trades.

- Q9)** a) Explain in detail decentralized trading model. [9]
- b) What is trading of electricity market? What are the rules that govern the electricity markets? [9]

OR

**Q10)** Write short note the following electricity trading models: [18]

- a) Integrated
- b) Wheeling
- c) Decentralised

- Q11)**a) What are the functions of Load Dispatch Center (LDC). [8]
- b) Explain the three parts of availability based tariff, how they are implemented. [8]

OR

- Q12)**a) Explain the key features of Indian Grid Code and also explain transmission congestion issues. [8]
- b) Explain the concept of open access and transmission rights. [8]



Total No. of Questions : 12]

SEAT No. :

**P3687**

[4759]-73

[Total No. of Pages : 3

**B.E. (Electrical)**

**EMBEDDED SYSTEM**

**(2008 Course) (Semester-I) (Elective-II) (403144)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of logarithmic tables, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) What is an Embedded System and explain the different categories of embedded system? Give example of each category. [8]
- b) Differentiate between General purpose operating system and Embedded systems. Explain the design process in embedded system with waterfall model. [8]

OR

- Q2)** a) Explain RISC and CISC processors with examples and explain the characteristics and features of ARM7 processor. [8]
- b) What is digital signal processor? Explain the architecture of any DSP processor with block diagram. [8]

- Q3)** a) Explain the various types of ADC. Also describe the sample and hold circuit with diagram. [9]
- b) Write a note on any motion sensor along with application. [9]

OR

- Q4)** a) With the help of a diagram explain the interfacing of  $4 \times 4$  matrix keypad to microcontroller. [6]
- b) Describe a strain gauge and its interfacing with micro controller through ADC. [6]
- c) Explain working of Temperature sensor with diagram. [6]

***P.T.O.***

- Q5)** a) What are solenoids and relays? Explain microprocessor interfacing to Solenoids-Relay with diagram. [6]  
b) What is LED ripple and how is the LED ripple prevented. [6]  
c) What is DACs and specialized DACs? [4]

OR

- Q6)** a) What are the different types of stepper motors? Explain bipolar versus unipolar operation of stepper motors. [6]  
b) Explain stepper motor drive ICs (L62D1 & LM18200). [4]  
c) Explain BLDC motor and how it can be driven. [6]

### SECTION-II

- Q7)** a) Explain Inter-processor communication and synchronization of process, tasks and threads. [8]  
b) What is interrupt latency? Interrupt recovery time? [6]  
c) What is device driver and explain device drivers for embedded devices. [4]

OR

- Q8)** a) Explain in detail following scheduling algorithms [10]  
i) First in first out.  
ii) Round robin.  
iii) Round robin with priority.  
iv) Shortest job first.  
v) Non-preemptive multitasking.  
vi) Preemptive multitasking.  
b) Explain the concept of semaphores with example. [4]  
c) What is difference between mailbox and message queues? What is application of each? [4]



- Q9)** a) What is a kernel? Explain architecture of kernel. [8]  
b) Explain ISR, pipes and events. [8]

OR

- Q10)** a) Explain the task scheduler and its function. [6]  
b) What are differences between General purpose operating systems and RTOS? [6]  
c) Explain the features of Vxworks. [4]

- Q11)** a) Give a case study of an embedded system for a smart card. [10]  
b) What are the special features needed for embedded software in a smart card? [6]

OR

- Q12)** a) Explain Digital camera with functional block diagram. [10]  
b) Design a control system for a prototype aircraft attitude control. [6]



Total No. of Questions : 12]

SEAT No. :

**P3688**

[4759]-74

[Total No. of Pages : 3

**B.E. (Electrical)**

**EXTRA HIGH VOLTAGE TRANSMISSION**

**(2008 Course) (Semester-I) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** State the reasons for requirement of transmission lines. Write expression for power handling capacity of three phase ehv ac line in terms of voltage and line parameters. Derive expression for line current, total power loss and % power loss in terms of line parameters. **[10]**

b) Write note on different types of winds causing vibrations/oscillations of conductors of transmission lines. **[6]**

OR

**Q2) a)** Derive travelling wave equations caused due to disturbance on transmission line. Also derive solution for travelling wave equations. **[10]**

b) A line 300 km long is charged with step input of 1000 kv and is open circuited at the receiving end. At the receiving end find reflected and resultant voltage. **[6]**

**Q3) a)** State what is meant by bundled conductors and explain how it is different from composite conductors. Derive expression for GMR of bundled conductors of 'n' sub-conductors in terms of bundle radius 'R'. **[10]**

b) Derive expression for flux linkage matrix and inductance matrix in terms of Maxwell's coefficient matrix. **[6]**

OR

**P.T.O.**

**Q4) a)** For three phase ehv line, considering the flux linkages due to sequence components of currents derive expression for zero and positive sequence components of inductances in terms of self and mutual inductances. [10]

b) Write note on advantages of bundled conductors in comparison with composite conductors. [6]

**Q5) a)** Find expression for maximum and minimum potential gradient for bundle of two subconductors. State the assumptions made in deriving this expression. [10]

b) Compare the point electric charge with the line charge. [4]

c) A point charge of  $10 \mu\text{C}$  is placed at a distance 3 meter apart from center of sphere of radius 0.5 meter. Calculate magnitude and location of point charge  $Q_2$  which will make the sphere at zero potential. [4]

OR

**Q6) a)** Given a positive charge  $Q_1$  and sphere of radius 'R' with  $Q_1$  located external to the sphere, whose center is at distance 'S' from  $Q_1$ , the sphere can be made to have zero potential on its surface if a charge of opposite polarity and magnitude  $Q_2 = \frac{Q_1 \times R}{S}$  if placed at distance  $S_2 = \frac{R^2}{S}$  from the center of given sphere towards  $Q_1$ . Prove this. [12]

b) For horizontal configuration of conductors of three phase line write "Mangolt Formula" for maximum surface voltage gradient on outer phases and on central phase. [6]

### SECTION-II

**Q7) a)** Write note on primary and secondary shock currents and their effects on human being. Also explain what is meant by threshold current and "let-go current". [10]

b) Draw the sketch of long truck parked parallel to an ehv line under it and write expression for the capacitance of the truck. [6]

OR

- Q8) a)** Draw the profile of electric field at the ground level due to ehv line and discuss the biological effects of electric field on human being, animals and plant life. [8]
- b) Explain the procedure to find elect statically induced voltage on un-energized circuit of double circuit line. [8]

- Q9) a)** State the major components of HVDC system. Draw the sketch showing their locations. Describe the function of each component. [8]
- b) Draw “Graietz Circuit” for converting three phase ac supply into dc supply. Label various parts of the circuit and derive expression for dc voltage in terms of ac voltage. [8]

OR

- Q10)a)** With neat sketch explain operation of converter as inverter in HVDC system. Explain ignition advance angle and extinction advance angle. [8]
- b) Write note on reactive power requirement of HVDC system. [8]

- Q11)a)** Write note on ideal and actual V-I characteristics of HVDC system. [10]
- b) Draw the diagram showing the voltage profile of HVDC mono-polar link. State important requirements for satisfactory operation of HVDC link. [8]

OR

- Q12)a)** State the various converters firing control system and explain any one stating its advantages and drawbacks. [10]
- b) Write note on problems associated with operation of a dc system when connected to weak ac system. State solutions to the problems. [8]



Total No. of Questions : 12]

SEAT No. :

**P1378**

**[4759] - 75**

[Total No. of Pages :2

**B.E. (Electrical Engineering)**

**d: SMART GRID**

**( 2008 Course) (Semester - I) (Elective - II) (403144)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section - I, and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable additional data if necessary.*

**SECTION - I**

- Q1)** a) High light on evolution of electric grid and the concept of Smart Grid. [10]  
b) Explain the concept of Resilient and self healing grid. [8]

OR

- Q2)** a) High light on need and functions of Smart Grid. [10]  
b) Explain National and International policies of Smart Grid. [8]

- Q3)** a) What is mean by outage management? What is present status of OMS? How it will be improved in Smart Grid? [8]  
b) Write a note on PHEV. [8]

OR

- Q4)** a) Give functions and benefits of smart meter. [8]  
b) Why Real Time Pricing should be implemented and give its development stages. [8]

**P.T.O.**

- Q5) a)** Write a note on IED. [8]  
b) Write a note on SMES. [8]

OR

- Q6) a)** Explain any two smart storage equipments. [8]  
b) Explain WAMS and give its advantages. [8]

**SECTION - II**

- Q7) a)** Describe the concept of Micro Grid, and also its need and applications. [10]  
b) Write a note on “Thin film solar cells”. [8]

OR

- Q8) a)** Explain issues of interconnection of Micro Grid. [10]  
b) Write a note on captive power plant. [8]

- Q9) a)** Highlight on web based Power Quality monitoring. [8]  
b) Describe the concept, Power Quality conditioners related to Smart Grid. [8]

OR

- Q10)a)** Describe the EMC and how it's role in Smart Grid. [8]  
b) Write a note on Power Quality Management related to Smart Grid. [8]

- Q11)a)** Highlight on role of GPS in Smart Grid. [8]  
b) Write a note on Broadband over power line. [8]

OR

- Q12)a)** Give importance of HAN in Smart Grid. [8]  
b) Explain cloud computing and its need. [8]



Total No. of Questions : 12]

SEAT No. :

**P1379**

**[4759] - 76**

[Total No. of Pages :3

**B.E. (Electrical)**  
**SWITCHGEAR & PROTECTION**  
**( 2008 Course) (Semester - II) (403147)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume Suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain arc interruption theories in case of circuit breaker. **[8]**
- b) A circuit breaker interrupts the magnetizing current a 100MVA transformer at 220kV. The magnetizing current of the transformer is 5% of the full load current. Determine the maximum voltage which may appear across the gap of the breaker when magnetizing current is interrupted at 53% of its peak value. The stray capacitance is 2500 micro farad/ph & inductance/ph is 30H. Also find the value of resistance to be used across the contacts to eliminate the restriking voltage. **[8]**

OR

- Q2) a)** Write a short note on Resistance switching in circuit breaker. **[8]**
- b) An OCB is rated as 3 phase 1500A, 2000MVA, 33kV, 3 second. Determine its breaking current, making current, STC & rated normal current . **[4]**
- c) Explain low resistance Interruption principle in case of CB. **[4]**
- Q3) a)** With neat diagram explain construction & working of Air blast circuit breaker. **[8]**

**P.T.O.**

- b) Write a short note on Auto reclosing. [8]

OR

- Q4)** a) Explain different ratings in case of HV CB's. [8]

- b) Explain various properties of SF<sub>6</sub> gas used in SF<sub>6</sub> CB. [8]

- Q5)** a) What are essential qualities of protective relaying. Explain in detail. [8]

- b) Explain the principle of simple or plain current differential relay. Explain in detail, the problems associated with it. [10]

OR

- Q6)** a) What do you mean by primary & backup protection. Explain with proper illustration. [6]

- b) With neat diagram, explain protection of parallel feeders. [6]

- c) Determine the time of operation of 5A, overcurrent relay having plug setting of 150% & TMS = 0.4. The CT ratio is 400/5 and the fault current is 6000A. At TMS = 1, the operating time at various PSM are shown below. [6]

PSM	2	4	5	8	10	20
time of operation (sec)	10	5	4	3	2.8	2.4

## SECTION - II

- Q7)** a) Compare static relays with electromechanical relays with respective, construction, working principle, advantages and limitations. [8]

- b) Sketch and explain, the Phasor Measurement Unit [PMU]. [8]

OR

- Q8)** a) With neat block diagram, explain numerical relays. State its advantages. [8]



- b) Write short notes on [8]
- i) Least square method for estimation of phasor
  - ii) Sampling theorem

- Q9)** a) Explain the phenomenon of overfluxing in the transformer and protection used against it. [8]
- b) 3-ph, 10 MVA, 11kV alternator is provided with restricted earth fault protection. The percentage of winding protected against phase to earth fault is 80%. The relay trips for 20% out of balance current. Calculate the resistance to be added in neutral to ground connection. [8]

OR

- Q10)**a) Explain the following protective schemes with reference to AC generators. [10]
- i) Loss of prime-mover
  - ii) Loss of load
  - iii) Unbalanced loading
- b) A 3-ph, 132 kV/11kV power transformer is delta-star connected. It is to be protected by differential protection. If CT on HT side have ratio 50/5. Find CT ratio on L.T. side. Draw the connection diagram for this configuration. [6]

- Q11)**a) Explain three step distance protection scheme for the protection of transmission line. Also draw the neat sketches for the same. [9]
- b) Explain the effect of arc resistance and power swing on the performance of distance relay. [9]

OR

- Q12)**a) Explain concept of distance relaying used for transmission line protection. Explain impedance, reactance and mho relay with reference to characteristics and applications. [10]
- b) Write a short notes on wide area measurement system (WAM). [8]



Total No. of Questions : 12]

SEAT No. :

**P2007**

[4759]-77

[Total No. of Pages : 4

**B.E. (Electrical)**  
**INDUSTRIAL DRIVES AND CONTROL**  
**(2008 Course) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

- Q1) a)** A drive has the following parameters  $T = 100 - 0.1 N$ , N-m where N is the speed in rpm. Load torque  $T_l = 50$ , N-m. Initially the drive is operating in steady-state. The characteristic of the torque are changed to  $- 100 - 0.1 N$ , N-m. Calculate initial and final equilibrium speeds. For given drive also calculate the time from initial speed to final speed, if  $J = 10 \text{ kgm}^2$ . **[8]**
- b) Explain nature and classification of load torques. **[8]**

OR

- Q2) a)** Explain load equalization using flywheels in electrical drives. **[8]**
- b) A motor is equipped with a flywheel to supply a load torque of 1000 Nm for 10 sec followed by a light load period of 200Nm long enough for flywheel to regain its steady state speed. It is desired to limit the motor load torque to 700 Nm. What should be moment of inertia of flywheel? Motor has inertia of  $10 \text{ kg-m}^2$ . Its no load speed is 500 rpm and slip at a torque of 500 Nm is 5%. Assume speed torque characteristic of motor to be straight line in the region of interest. **[8]**

**P.T.O.**

- Q3) a)** A 2 pole separately excited dc motor has the ratings of 220V, 100A and 750rpm. Resistance of the armature circuit is  $0.1\Omega$ . The motor has two field coils which are normally connected in parallel. It is used to drive a load whose torque is expressed as  $T_L = 500 - 0.3 N$ , N-m where N is the motor speed in rpm. **[8]**
- Calculate the motor armature current and speed when armature voltage is reduced to 100V.
  - Calculate the motor speed and current when two field coils are connected in series.
- b) Explain plugging method for braking operation of following drive **[10]**  
DC shunt motor.

OR

- Q4) a)** A 400V, star connected 3-phase 6-pole, 50Hz, induction motor has following parameters referred to stator:  $R_s = R'_r = 1\Omega$ ,  $X_s = X'_r = 2\Omega$  for regenerative braking operation of this motor determine: **[8]**
- maximum overhauling torque it can hold and range of speed for safe operation.
  - Speed at which it will hold an overhauling load with a torque of 100 N-m.
- b) Explain dynamic method for braking operation with characteristic of following drives: **[10]**
- DC shunt motor.
  - Three phase induction motor.
- Q5) a)** Explain operation of chopper controlled DC series motor drive with suitable waveforms. **[8]**
- b) A 220V, 1500 rpm, 50A separately excited DC motor has armature resistance  $0.5\Omega$  and assumes that motor is operating in continuous conduction mode. The motor is controlled by three phase fully controlled converter with source voltage of 440V, 50Hz. A star delta connected transformer is used to feed the armature so that motor terminal voltage equals rated voltage when converter firing angle is zero. **[8]**

- i) Calculate transformer turns ratio.
- ii) Determine firing angle when a motor current is 1200 rpm and rated torque.

OR

- Q6)** a) Explain operation of three-phase fully controlled converter fed separately excited DC motor drive with suitable waveforms and derive relation between speed and firing angle. **[8]**
- b) A 230V, 1000 rpm, 100A separately excited DC motor has armature resistance  $1\Omega$  and assumes that motor is operating in continuous conduction mode. The motor is controlled by single phase fully controlled converter with source voltage of 230V, 50Hz. Calculate motor torque: **[8]**
- i) At  $\alpha = 30^\circ$  and speed 900 rpm.
  - ii) At  $\alpha = 120^\circ$  and speed  $-900$  rpm.

### SECTION-II

- Q7)** a) A delta-connected squirrel cage induction motor has following ratings and parameters **[8]**
- 400V, 50Hz, 4-pole, 1420rpm,
- $R_s = 0.35\Omega, R'_r = 0.4\Omega, X_s = 0.7\Omega, X'_r = 0.8\Omega$
- The motor is fed from a voltage source inverter. The drive is operated with a constant v/f control up to 50Hz and at rated voltage above 50Hz. Calculate:
- i) Frequency for motoring operation at 950 rpm and full load torque.
  - ii) Torque for frequency 40Hz and speed of 1100 rpm.
- b) Explain closed loop control of CSI fed induction motor drives with neat block diagram. **[8]**

OR

- Q8)** a) A 400V, 50Hz, 4-pole, 1400rpm star-connected squirrel cage induction motor is fed from a voltage source inverter. The drive is operated with a constant v/f control from 10 to 50Hz. By assuming speed-torque curve for various frequencies to be parallel lines, calculate: [8]
- Speed for frequency of 40Hz and 70% of full load torque.
  - Frequency for a speed of 900 rpm and full load torque.
  - Torque for frequency of 40Hz and speed of 1000 rpm as percentage of full load torque.
- b) With neat diagram, explain  $\frac{V}{f}$ =constant speed control method for induction motor. [8]
- Q9)** a) Explain static Scherbius based slip power recovery scheme for electrical drive. [8]
- b) What are different losses in electrical drives and also enlist energy conservation measures. [8]

OR

- Q10)**a) Explain energy conservation using static rotor resistance control in induction motor. [8]
- b) Explain components used for obtaining signals for interlocking and sequencing operations and protection. [8]
- Q11)** Write short note on: [18]
- Flux oriented vector control of induction motor.
  - Electrical Drives in Sugar Mills.
  - Electrical Drives in Paper Mills.

OR

- Q12)** Write short note on: [18]
- Commutatorless DC motor drive.
  - Electrical Drives in Traction.
  - Electrical Drives in Textile Mills.

Total No. of Questions : 12]

SEAT No. :

**P2008**

[4759] - 78

[Total No. of Pages :2

**B.E. (Electrical)**

**VLSI DESIGN**

**(Elective - III) (2008 Course) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Differentiate between combinational ckt and sequential ckt. with one example. [6]
- b) Draw state transition table, state diagram & implement the hardware ckt. diagram for 1011 sequence detector using Mealy model. [10]

OR

- Q2)** a) What do you mean by universal Gate? Implement basic gates using universal gates. [10]
- b) Implement NAND, NOR, AND gate using only 4:1 MUX. [6]

- Q3)** a) What do you mean by Assembly language, low level language & High level language? VHDL is which type of language? Differentiate between VHDL & high level language. [8]
- b) Define following terms & give its VHDL syntax. [10]
- i) Entity
  - ii) Architecture
  - iii) Component
  - iv) Configuration
  - v) Subprogram

OR

**P.T.O.**

- Q4)** a) Write VHDL code for  $1 \times 8$  Demultiplexer & Draw its ckt. diagram. [8]  
b) Draw circuit diagram & timing diagram of MOD 6 synchronous & Asynchronous counter. [10]

- Q5)** a) Write nine different values of std. logic. Also write the syntax in VHDL for  $8 \times 8$  RAM array of type std. logic vector. [8]  
b) Explain the construction of MOSFET. [8]

OR

- Q6)** a) Explain any four data types & any four data objects used in VHDL. [8]  
b) State standard device specifications of MOSFET. [8]

### **SECTION - II**

- Q7)** a) Explain configuration with its VHDL code. [8]  
b) Draw basic gates using CMOS. [8]

OR

- Q8)** a) Write a note on MOS transistor. [8]  
b) Define  $V_{OH}$ ,  $V_{IL}$ ,  $V_{OL}$ ,  $V_{IH}$  w.r.t. CMOS. [8]

- Q9)** a) Draw the Architecture of PLA & Explain its each block in detail. [8]  
b) Draw & explain Architecture of FPGA. [8]

OR

- Q10)** a) Write a note on simulation & synthesis. [8]  
b) Define Fan-in, Fan-out, FOM, Noise margin w.r.t. CMOS. [8]

- Q11)** a) Write VHDL code for 4 bit full adder. [8]  
b) Write VHDL code for  $8 \times 8$  RAM. Also draw its block diag & Explain it. [10]

OR

- Q12)** a) Draw block diagram of ALU & write VHDL code for it. [8]  
b) Write VHDL code for 4bit shift - register with parallel load & serial right shift operation. [10]



Total No. of Questions : 12]

SEAT No. :

**P1380**

[4759] - 79

[Total No. of Pages :3

**B.E. (Electrical)**

**HIGH VOLTAGE ENGINEERING**

**(Semester - II) (2008 Course) (Elective - III) (403149)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *You are advised to attempt not more than 6 questions.*
- 5) *Your answers will be valued as a whole.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** a) Explain and derive the Townsend's current growth equation in presence of primary as well as secondary process. **[8]**

b) Explain streamer theory of breakdown in gaseous dielectric material. **[8]**

OR

**Q2)** a) Explain breakdown in electronegative gases. **[8]**

b) Explain the concept of time lag for breakdown. **[8]**

**Q3)** a) Give examples of liquid and solid dielectrics used in various electrical equipments. Also state the properties of liquid as well as solid dielectric material. **[8]**

b) Write short note on any two types of breakdown phenomenon in liquid dielectrics. **[10]**

OR

**Q4)** a) Explain treeing and tracking phenomenon. Explain effect of type of voltage, magnitude of voltage, time of application of voltage and nature of surface of insulating material on occurrence of treeing and tracks. **[8]**

b) Explain thermal breakdown in solid dielectric. Also explain the concept of thermal equilibrium. State formula of heat generated under a.c. and d.c. voltage and heat dissipated. **[8]**

c) State advantages of composite dielectric material. **[2]**

**P.T.O.**



- Q5)** a) With schematic diagram, explain the occurrence of lightening. Explain the nature of overvoltage occurred due to lightening phenomenon. [6]
- b) Explain various reasons of occurrence of switching overvoltage and remedial actions to mitigate the overvoltage. [10]

OR

- Q6)** a) Define insulation coordination. Explain the statistical approach of insulation coordination. [8]
- b) What is function of lightening arrester? State various types of arresters. Explain the working of ZnO-gapless lightening arrestors. Also state the advantages and limitations of ZnO arrester. [8]

### SECTION - II

- Q7)** a) Explain generation of high frequency AC voltage with the help of Tesla coil. [8]
- b) A 10 stage Cockraft-Walten circuit has all capacitors of 0.06micro Farad. The secondary voltage of the supply transformer is 100KV at a frequency of 150Hz. If the load current is 1mA, [8]
- determine
- Voltage regulation
  - The ripple
  - The optimum number of stages for maximum output voltage
  - The optimum output voltage

OR

- Q8)** a) With a neat diagram explain principle and working of multistage impulse generator. [8]
- b) A 12-stage impulse generator has  $0.2\mu\text{F}$  capacitors. The wave front and the wave tail resistance connected are 600ohms and 4000 ohms respectively. If the load capacitor is 1000pF, find the front and tail times of the impulse wave produced. [8]

- Q9) a)** Explain any one method of measurement of DC voltage. [8]  
b) How dielectric constant is measured? Explain the method in detail. [8]

OR

- Q10)a)** Describe the method of measurement of partial discharge. [8]  
b) Explain the principle, construction and working of series peak voltmeter. [8]

- Q11)a)** What is the difference between dry and wet withstand tests? Explain with example. [6]  
b) Write down any two tests carried out on high voltage transformer. [12]

OR

- Q12)a)** Explain how planning and design of HV laboratory is done. [9]  
b) Describe small and medium size HV laboratory. [9]



Total No. of Questions : 12]

SEAT No. :

**P1511**

**[4759]-8**

[Total No. of Pages : 3

**B.E. (Civil)**

**ADVANCED GEOTECHNICAL ENGG.**  
**(2008 Pattern) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections must be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed & IS codes are not allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Discuss different soil classification systems. **[8]**

b) Explain different 'clay minerals'. **[8]**

OR

**Q2) a)** Explain the steps for using 'A-line' chart, giving sample calculations. **[8]**

b) Differentiate between 'Tetrahedral unit' & 'Octahedral unit' & explain the role of 'Montmorillonite'. **[8]**

**Q3) a)** Explain 'modified Culman's method' by drawing sample graph. **[8]**

b) Explain: **[9]**

i) AEP

ii) PEP

iii) EP at Rest

OR

**P.T.O.**

**Q4) a)** Design a gravity retaining wall, 5m high with vertical back to retain a dry sand with  $\gamma = 19\text{kN/m}^3$ ,  $\phi = 30^\circ$ . Also find the FOS against sliding assuming  $\delta' = 30^\circ$ , the wall is made up of stone masonry with  $\gamma = 23 \text{ kN/m}^3$  & top width of 1.5 m. Use Rankine's theory. [9]

b) Explain the steps for 'free earth support' method by giving sample calculations. [8]

**Q5) a)** Discuss the following: [12]

i) Geosynthetics & their functions.

ii) Properties & functional requirement of geogrids.

b) Explain 'RE wall components'. [5]

OR

**Q6) a)** Explain 'Biquet & Lee' Theory. [6]

b) Discuss 'Geosynthetics in geoenvironment. [6]

c) Explain, 'Soil Nailing' with situations applicable. [5]

## SECTION - II

**Q7)** Explain the following: [4x4=16]

a) Elastic Half space Theory.

b) Free & forced vibrations.

c) Barken's method.

d) Pauw's analysis.

OR

**Q8)** a) Discuss the design criteria for impact type machines as per IS-2974 - pt-II-1966. [8]

b) Discuss the tests for determination of 'spring constant'. [8]

**Q9)** Explain the following:

a) Compaction pile. [4]

b) Stone column. [4]

c) Vibro- floatation. [4]

d) Sand drains. [5]

OR

**Q10)**a) Explain stepwise the design of sand drains, by giving sample calculations. [9]

b) Explain the stages of inserting reinforcement in Vibro-expanded pile. [8]

**Q11)** Explain the following:

a) Rheology. [5]

b) Basic Rheological models. [6]

c) Composite Rheological models. [6]

OR

**Q12)** Discuss the following:

a) Hookean & Newtonian model. [6]

b) Secondary consolidation. [6]

c) Creep. [5]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1381**

**[4759] - 80**

[Total No. of Pages :3

**B.E. (Electrical)**

**DIGITAL SIGNAL & PROCESSING**

**(2008 Pattern) (403149) (Elective - IIC) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *From section - I answer Q1 or Q2, Q3 or Q4, Q5 or Q6. From Section - II, answer Q.7 or Q8, Q.9 or Q.10, Q.11 or Q.12*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Give the classification of signals and explain it. [6]  
b) Explain any three elementary time domain operations for discrete time systems. [6]  
c) Determine if the system described by the following input-output equations are-static or dynamic, linear or nonlinear, time-invariant or time variant, causal or non-causal. [6]  
i)  $y(n) = x(n).x(n-1)$   
ii)  $y(n) = x(n)+x(n-1)$

OR

- Q2)** a) State & Explain Sampling Theorem. [6]  
b) Explain the operation of analog to digital conversion with a neat diagram. [6]  
c) Determine the convolution sum of two sequences: [6]  
 $x(n) = \{3, 2, 1, 2\}$ ,  $h(n) = \{1, 2, 1, 2\}$

- Q3)** a) State time shifting & frequency shifting properties of Fourier Transform & prove any one of them. [6]  
b) Determine the Fourier transform of the following signals using FT properties [10]  
i)  $x(t)=x(2t-3)$   
ii)  $x(t)=\frac{d^2x(t-2)}{dt^2}$

OR

**P.T.O.**

**Q4) a)** Define Z-transform. What is meant by Region of convergence? State any four properties of ROC? [6]

b) i) Determine the Z-transform and ROC of [10]

$$x(n) = a^n u(n);$$

ii) Find the inverse Z-transform of

$$X(z) = \frac{z}{3z^2 - 4z + 1}$$

if the ROC is  $|z| > 1$

**Q5) a)** What do you mean by Ideal selective filters? Draw the frequency response characteristics of Ideal low pass & high pass filters. [6]

b) Determine & sketch the magnitude & phase response of the following system- [10]

$$x(n) = 1; \text{ for } n = -2, -1, 0, 1, 2$$

$$= 0 \text{ otherwise}$$

OR

**Q6) a)** What do you mean by Linear phase systems? Define phase & group delay. [6]

b) Find frequency response and plot magnitude and phase response for following system: [10]

$$x(n) = 1; \text{ for } n = 0, 1, 2, 3, 4$$

$$= 0; \text{ otherwise}$$

### SECTION - II

**Q7) a)** Compute circular convolution of two sequences [8]

$$x_1(n) = \{2, 1, 2, -1\} \text{ \& } x_2(n) = \{1, 2, 3, 4\} \text{ using graphical method.}$$

b) Give  $x(n) = \{1, 2, 0, 1, 3, 2, 1, 3\}$ , find  $X(K)$  using 8-point Radix - 2 DIT FFT algorithm. [10]

OR

- Q8)** a) Explain 4 point Radix - 2 DIF FFT algorithm. [6]  
 b) Obtain 4-point DFT of  $x(n) = \{0, 2, 4, 6\}$ . [6]  
 c) Obtain IDFT of  $X(K) = \{3, 2+j, 1, 2-j\}$ . [6]

- Q9)** a) Explain impulse invariance technique of IIR filter design. [8]  
 b) Design a linear phase FIR low pass filter of order 7, with cut off frequency 1rad/sec, using rectangular window. [8]

OR

- Q10)** a) Design a Chebyshev Type I IIR filter with a maximum passband attenuation of 2.5dB at  $\Omega_p = 20$  rad/sec & the stopband attenuation of 30dB at  $\Omega_s = 50$  rad/sec. [8]  
 b) Compare [8]  
 i) Analog filter & Digital filter.  
 ii) FIR filter & IIR filter.

- Q11)** a) Obtain direct form - II implementation of LTI system with transfer function

$$H(z) = \frac{1 + \frac{5}{6}z^{-1} + \frac{1}{6}z^{-2}}{1 - \frac{1}{2}z^{-1} - \frac{1}{2}z^{-2}} \quad [8]$$

- b) Write a short note on Finite Register Length effect. [8]

OR

- Q12)** a) Explain with a neat diagram cascade form realization of IIR filters. [8]  
 b) Write a short note on any one of the following applications of DSP. [8]  
 i) Harmonic analysis & measurement.  
 ii) Spectrum Analysis.





Total No. of Questions : 12]

SEAT No. :

**P3689**

**[4759] - 81**

[Total No. of Pages :2

**B.E. (Electrical Engg.)**

**ANNAND ITS APPLICATIONS IN ELECTRICAL ENGG.**

**(403149) (2008 Course) (Semester - II) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) Explain Biological inspiration with neat sketch. [6]  
b) What is need of intelligent tool required to solve complex engineering problem? [6]  
c) Explain historical development of artificial neural network. [6]

OR

- Q2)** a) Explain basic single neuron model with neat sketch and mathematical representation. [6]  
b) Explain advantages and disadvantages of neural network and fuzzy logic. [6]  
c) Explain various tools of intelligence system. [6]

- Q3)** a) What are different learning processes? [5]  
b) Explain in short Competitive learning in neural network? [5]  
c) Draw and explain sketch of hebbian learning model. [6]

OR

- Q4)** a) Explain Learning processes. [5]  
b) Explain Hebbian learning with an example. [6]  
c) Explain Boltzmann learning in detail. [5]

**P.T.O.**

- Q5)** a) Explain delta rule. [5]  
b) Explain Least - Mean square algorithm. [5]  
c) Explain perceptron architecture with neat sketch. [6]

OR

- Q6)** a) Mathematically represent perceptron rule. [5]  
b) Solve OR function using perceptron rule. [5]  
c) Explain perceptron training algorithm. [6]

**SECTION - II**

- Q7)** a) Explain MLP. [5]  
b) What is Back propagation algorithm used in neural network. [6]  
c) Explain momentum coefficient of Neural Network in detail. [6]

OR

- Q8)** a) Draw a sketch of multilayer perceptron. [5]  
b) Explain Back-propagation algorithm using three layer network. [6]  
c) Explain concept of learning rate needed in neural network. [6]

- Q9)** a) Explain RBS in short. [5]  
b) Explain in short adaptive resonance theory and its type. [6]  
c) Explain Kohonen network used in neural network. [6]

OR

- Q10)** a) What is radial basis functions? [8]  
b) Explain Hopfield networks in neural network. [9]

**Q11)** Apply neural network to generation scheduling problem with example. [16]

OR

**Q12)** Apply neural network to solve the restoration of power supply after failure in any electrical network (consider at least 4 bus system). [16]



Total No. of Questions : 12]

SEAT No. :

**P1382**

**[4759]-83**

[Total No. of Pages : 2

**B.E. (Electrical Engineering)**

**RENEWABLE ENERGY SYSTEM**

**(2008 Course) (Semester - II) (Elective -IV) (403150)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Solve Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6 from Section -I, and Q7 or Q 8, Q 9 or Q 10, Q 11 or Q 12 from Section - II .*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable additional data if necessary.*

**SECTION - I**

- Q1)** a) Describe concentrating solar power Technologies. [8]
- b) List various types of fuel cells and explain any one. [8]

OR

- Q2)** a) Explain with neat sketch Biomass for electricity generation. [8]
- b) Explain combined heat and power technology. [8]
- Q3)** a) Draw and explain wind farm layout showing the dimensions. [8]
- b) Give simple estimates of wind turbines energy. [10]

OR

- Q4)** a) Write a note on environmental impacts of wind turbines. [8]
- b) Explain change in wind pattern and forecasting the power generation based on the wind pattern. [10]

**P.T.O.**

- Q5)** a) Explain the solar spectrum. [8]  
b) Explain direct and diffused radiation and effect on power generation. [8]

OR

- Q6)** a) Write a note on “Altitude angle of the sun at solar noon”. [8]  
b) Explain with neat diagram “The Earth’s orbit and also clearly explain the important dates”. [8]

**SECTION - II**

- Q7)** a) Explain the generic photovoltaic cell and the simplest equivalent circuit for a photovoltaic cell. [8]  
b) Write a note on Ribbon silicon technologies. [8]

OR

- Q8)** a) How shading impacts on I-V curves. [8]  
b) Write a note on cast multicrystalline silicon. [8]
- Q9)** a) Explain the grid-connected PV systems and its interfacing with the utility. [10]  
b) Write a note on, PV powered water pumping system. [8]

OR

- Q10)**a) Explain the capacity factor for PV grid-connected systems and grid-connected system sizing. [10]  
b) Explain, the Bi-directional metering and list its advantages. [8]
- Q11)**a) Explain Nuclear energy power plant. [8]  
b) Explain, Impact of renewable energy sources. [8]

OR

- Q12)**a) Write a note on clean coal power plant. [8]  
b) Explain Biomechanical energy harvesting. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

**P1383**

**[4759]-84**

[Total No. of Pages :4

**B.E. (Electrical)**

**DIGITAL CONTROL SYSTEMS**

**(2008 Course) (Semester - II) (Elective -IV)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any one question from each pair of questions: Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6 , Q7 or Q 8, Q 9 or Q 10, Q 11 or Q 12.*
- 2) *Answers to the two sections must be written in separate answer books.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*

**SECTION - I**

- Q1)** a) Draw block diagram of basic digital control system & explain function of each block. **[8]**
- b) Check whether the following system is **[8]**
- i) Static or dynamic,
  - ii) Linear or Non linear,
  - iii) Time variant or time invariant,
  - iv) Causal or Non causal  $y(n) = x(2n)$ .

OR

- Q2)** a) State advantages and limitations of digital Control system. **[8]**
- b) Explain Sampling theorem. Also describe reconstruction process. **[8]**

**P.T.O.**

**Q3) a)** Give definition of Z-transform. Explain importance of ROC. [6]

b) Find the Z-transform of the sequence: [12]

i)  $X(t) = e^{-at} \sin \omega t$

ii)  $F(k) = (1/2)^k$ , for  $k = 0, 1, 2, \dots$

OR

**Q4) a)** State and prove Initial value theorem in Discrete Time Systems. [6]

b) Evaluate the inverse z-transform of: [12]

i)  $X(Z) = \frac{1}{(z-1)(z-3)}$

ii)  $X(Z) = \frac{1 - \frac{1}{2}z^{-1}}{1 - \frac{1}{4}z^{-2}}$  ;  $Z > \frac{1}{2}$  by partial fraction.

**Q5) a)** Show with proper diagrams mapping of Left half of s-plane into Z-plane. [8]

b) Examine the stability of system by Jury's test: [8]

$$F(Z) = z^4 + 3z^3 + 4z^2 + 2Z + 0.6.$$

OR

**Q6) a)** Explain the effect of sampling period on the transient response and on the stability of discrete time system. [8]

b) Write a short note on designing of Discrete time system based on root locus method. [8]

## SECTION - II

**Q7) a)** Discuss the various methods used for STM from the given state difference equation:  $X(k+1)=GX(k)+Hu(k)$ . [8]

b) Obtain STM of the following difference equation. [8]

$$X(k+1)=GX(k)+Hu(k) \text{ where } G=\begin{bmatrix} 0 & 1 \\ -0.2 & -1 \end{bmatrix}; H=\begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

OR

**Q8) a)** Explain clearly with neat diagrams, the direct, Cascade and Parallel decompositions of Discrete time Pulse Transfer function. [8]

b) By using any one method, determine the discrete time state space model for a system having pulse transfer function. [8]

$$\frac{Y(Z)}{R(Z)} = \frac{Z+0.1}{(Z-1)(Z-0.8)}$$

**Q9) a)** Discuss any one method used for evaluation of the state feed gain matrix  $K=[K_1, K_2, K_3, \dots, K_n]$ . [8]

b) Consider a system with matrices  $G=\begin{bmatrix} 0 & 1 \\ 0.16 & -1 \end{bmatrix}; H=\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ . Determine a suitable state feedback gain matrix  $K$  such that a system will have closed loop poles at  $Z = 0.5 + j0.5$  and  $Z = 0.5 - j0.5$ . [8]

OR

**Q10) a)** Explain full Order observer with proper block diagram. [8]

b) Design full order observer for the system having [8]

$$G=\begin{bmatrix} 0 & -0.16 \\ 1 & -1 \end{bmatrix}; H=\begin{bmatrix} 0 \\ 1 \end{bmatrix}; C=[0 \quad 1]$$

So that desired eigen values of observer matrix are  $Z = 0.5 + j0.5$ ,  $Z = 0.5 - j0.5$ .

**Q11)a)** Draw neat diagram of Digital temperature control scheme and explain it. [8]

b) Construct state model for following transfer function. Also obtain different canonical form for system:  $\frac{Y(Z)}{R(Z)} = \frac{Z^3 + 8Z^2 + 17Z + 8}{(Z+1)(Z+2)(Z+3)}$ . [10]

OR

**Q12)a)** Explain Stepper motor with proper block diagram. [8]

b) Construct state model for following transfer function. Also obtain different canonical form system: [10]

$$\frac{Y(Z)}{R(Z)} = \frac{Z+3}{Z^2+3Z+2}$$

EEE



Total No. of Questions : 12]

SEAT No. :

**P2009**

[4759] - 85

[Total No. of Pages :2

**B.E. (Electrical)**

**INTRODUCTION TO ELECTRICAL TRANSPORTATION SYSTEMS  
(2008 Course) (Semester - II) (Elective - IV)**

*Time : 3Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from Section I and three questions from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION - I**

- Q1)** a) What are the Drive systems used in Indian Railways? Explain how the Traction power is controlled and delivered for these Drive Systems. [8]
- b) Explain why Rail Transport is efficient and cheaper to run compared to Road Transport. [8]

OR

- Q2)** a) What are the major components for the control of electric vehicle explain with block diagram. [8]
- b) What are the different types of Electric Motors used in EV? Explain any one of them. [8]

- Q3)** a) What do you understand from the specification “Automotive Battery 12 Volt, 135 AH at 20 hour rate”. [8]
- b) What is continuous discharge current this battery can provide and for how many hours before getting fully discharged. [8]

OR

- Q4)** a) What are the precautions to be taken while Charging and Discharging a Lead acid Battery. [8]
- b) What are the different types of lithium batteries and which battery is used electrical vehicle, also give their respective chemical reaction. [8]

***P.T.O.***

- Q5)** a) Give two examples of application for each of the cases of Power conversion AC to DC, DC to DC and DC to AC. [9]  
b) Explain why high frequency power conversion is advantageous. [9]

OR

- Q6)** a) What is the recent trends to used ultracapacitor in electrical vehicle. [9]  
b) Explain three phase fully controlled rectifier for R load. [9]

### **SECTION - II**

- Q7)** a) Compare Advantages of Analog controls to Digital Controls in a Electric Car instrumentation. [8]  
b) What are CAN Bus controls and why this is preferred control system in present day design. [8]

OR

- Q8)** a) Write short note on brushless motor drive. [8]  
b) Compare mechanical steering with electric steering. [8]

- Q9)** a) Draw with Block Diagram of a typical Drive Train of an Electric Car starting from Energy source to Drive and control at Wheels. [8]  
b) What is the Power source for Electric Rail Traction. How this power is converted and controlled to provide starting Torque and high speeds. [8]

OR

- Q10)** a) Explain the various service conditions of electric drives. [8]  
b) What are different classes of duties of motor? Explain with one example each. [8]

- Q11)** a) While a Lift is descending with full load how is its speed controlled and what happens to the Potential energy. [9]  
b) What are the safety features in a Passenger Lift system and how to ensure that it is fail safe. [9]

OR

- Q12)** a) Explain regenerative braking used in elevator system. [9]  
b) What are the safety features to be considered while designing the elevator. [9]



Total No. of Questions : 12]

SEAT No. :

**P1384**

**[4759]-86**

[Total No. of Pages : 4

**B.E. (E & TC)**

**ELECTRONICS PRODUCT DESIGN**

**(2008 Pattern) (Semester - I) (Theory)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6, Q7 or Q 8, Q 9 or Q 10, Q 11 or Q 12 from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Discuss in details different stages of an electronic product development. **[12]**

b) Find MTBF & MTTF **[6]**

Stage	Components	Type	Qty	Fr x 10 <sup>-6</sup> hr
Transformer	Winding	Stepdown	01	4.4
Rectifier	Diodes	Si type	04	0.2
Filter	Capacitor	Electrolytic	02	0.3
Regulator	Capacitor	Ceramic	02	0.3
	Diode	Semiconductor	02	0.2
	Linear IC	ICLM317	02	0.6
Display	Linear	IC 7107	02	0.6
	Resistors	Carbon Camp	04	0.2

OR

**P.T.O.**

- Q2)** a) Explain the Bath tub curve. [6]
- b) Explain the following terms in context with reliability of an electronic product. [6]
- i) MTTF
  - ii) MTBF
  - iii) MTTR
  - iv) Failure rate
- c) With the help of block schematic explain in brief the factors affecting reliability of product. [6]
- Q3)** a) Compare at least four types of ADCs w.r.t. parameters missing codes, differential & integral nonlinearity, resolution & power consumption. [12]
- b) What is need of decoupling capacitor where it is located in the circuit. [4]

OR

- Q4)** a) Draw a circuit of instrumentation amplifier & explain gain equation with derivation. Explain its parameters slew rate, CMRR, bandwidth, offset. [10]
- b) Compare a least two DAC techniques with their selection criteria. [6]
- Q5)** a) What are factors affecting selection of buses & protocols in high speed electronic product. [8]
- b) Draw typical wiring diagram for each interface Rs 485, Rs 432 I2C. Also state how many maximum device can interface with these buses. [8]

OR

- Q6)** a) Explain the different requirement of interfacing touch screen. What are the different touch screen available? Explain typical interfacing technique with example. [8]
- b) What are different factors for selecting a particular micro controller for application. [8]

### SECTION - II

- Q7)** a) Mention factors affecting choice between assembly & high level language. [8]
- b) Explain different software debugging techniques. [8]

OR

- Q8)** a) Give some details of documentation practices & templates for assembly & C language? [8]
- b) Explain different approaches to develop an application software for electronic product. [8]
- Q9)** a) Explain different design considerations while designing PCB for high speed digital circuits. [10]
- b) Estimate the parasitic values for following geometrics of PCB track. [8]
- i) Resistance of 20cm long copper track with 0.8mm width on standard 35 micron copper clad laminate [Resistivity of copper  $1.72 \times 10^{-6} \Omega \cdot m$ ].
- ii) Inductance of track having width 1mm length 25cm & thickness 70 microns.

OR

- Q10)**a) State & explain the causes of losses along transmission lines. Explain circuitary required to overcome attenuation problems. [10]

- b) Explain: [8]
- i) Ground loops.
  - ii) Star grounding.
  - iii) Board level shielding.
  - iv) Guarding.

**Q11)a)** Explain selection criteria of frequency bands in various applications. Also mention reason for selecting particular band for application. [8]

- b) Write short notes on: [8]
- i) Equalizer
  - ii) Interleaver

OR

**Q12)a)** What is communication link analysis explain various sources of signal loss & noise. [8]

- b) Write a notes on EMI & EMC standards. [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1385**

[4759] - 87

[Total No. of Pages : 2

**B.E. (Electronics & Telecommunication)  
VLSI DESIGN & TECHNOLOGY  
( 2008 Course) (Semester - I) (404182)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain device parasitic and their limitation on the performance of CMOS circuits. [10]  
b) Write short note on source follower. [6]

OR

- Q2)** Explain with schematic various types of CMOS Differential Amplifiers. [16]

- Q3)** Draw Schematic and explain any three types of CMOS Inverter wrt Gain, Bandwidth and Rout. [16]

OR

- Q4)** a) What is Technology Scaling? Explain various design rule checks in terms of  $\lambda$ . [12]  
b) Write short note on Dynamic power dissipation of CMOS Inverter. [4]

- Q5)** a) Write VHDL Code for 16:1 Mux using 4:1 Mux as a component in structural style. [12]  
b) Differentiate between Function and Procedure with VHDL Coding. [6]

OR

**P.T.O.**

- Q6) a)** Draw State diagram and write VHDL code for Traffic Light Controller. [12]  
b) Define Resolution function with VHDL Code. [6]

**SECTION - II**

- Q7) a)** Explain any four important specification of FPGA. Also explain the Significance of CLB's in FPGA. [8]  
b) Explain Antifusible Generic FPGA Architecture. [8]

OR

- Q8) a)** Enlist all the types of memory used in PLD's. [8]  
b) With the help of diagram explain SRAM and antifuse FPGA. What factors are considered to make a choice between SRAM and Antifuse FPGA. [8]

- Q9) a)** Explain the significance of 'Select', 'Capture' and 'Shift' state in TAP controller. [8]  
b) Explain: [8]  
i) Partial scan and full scan  
ii) Stuck at '1 and '0' faults

OR

- Q10) a)** What is the need for testability? Explain the different electrical faults. [8]  
b) Explain Built in self Test? Differentiate between Online BIST and Offline BIST. [8]

- Q11) a)** How to achieve the EMI immune chip design? Explain the parasitic involved in routing matrix. [9]  
b) Explain the following: [9]  
i) Supply and ground bounce  
ii) Clock skew  
iii) Clock jitter

OR

- Q12) a)** What is signal integrity? Explain the important issues in SOC design. [9]  
b) Explain in brief clock distribution in detail. [9]





Total No. of Questions : 12]

SEAT No. :

**P1386**

**[4759] - 88**

[Total No. of Pages : 3

**B.E. (Electronics & Telecommunication)  
COMPUTER NETWORK  
( 2008 Course) (Semester - I) (404183)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Draw ISO-OSI model and explain in brief function of each layer. [8]  
b) Compare Coaxial Cable, Twisted pair cable and Fibre optic cables. [6]  
c) Explain in brief physical address, network address and port number.[4]

OR

- Q2)** a) Draw and explain typical cable TV system. How cable video signal and internet data can be send over the same cable. [8]  
b) What is DSL? Explain any two types of DSL. [6]  
c) Compare circuit switching and packet switching network. [4]

- Q3)** a) Explain Go Back-N ARQ and Selective Repeat ARQ protocol. [6]  
b) What is framing concept in Data Link Layer? Explain in details. [6]  
c) How does token ring LAN operate? [4]

OR

- Q4)** a) Explain the following: [6]  
i) 1-persistent CSMA  
ii) Non-persistent CSMA  
iii) P-persistent CSMA

**P.T.O.**

- b) Draw HDLC frame format. Write function of each field. [8]
- c) Compare the data rates for standard Ethernet, Fast Ethernet, Gigabit Ethernet and Ten-Gigabit Ethernet. [2]

- Q5)** a) What is VLAN? How does it work? Explain with necessary diagram. [6]
- b) What is Frame Relay? Explain the different frame formats used in frame relay. [10]

OR

- Q6)** a) Write short notes on: [6]
- i) Gateway
  - ii) Hub
  - iii) Routers
- b) Explain the functions of different layers in Bluetooth. Also explain the different types of frame formats used in Baseband Layer. [10]

## SECTION - II

- Q7)** a) What services are provided by network layer to transport layer? [6]
- b) Briefly define subnetting. How do the subnet mask differ from a default mask in classful addressing? [6]
  - c) Why is ARP request broadcast but ARP reply unicast? [4]

OR

- Q8)** a) Show the format of typical IP datagram header and explain. [6]
- b) What are different static routing algorithms? Explain any one in detail. [6]
  - c) What is DHCP? How does it work? [4]

- Q9)** a) Explain the different Quality of Service parameters. Also write about transport layer service primitives. [6]
- b) Explain connection establishment and connection releasing with respect to transport layer. [6]

- c) What are the duties of transport layer? List the services provided by transport layer to upper layers. [4]

OR

**Q10)**a) Draw TCP header. Explain function of each field. [6]

b) How congestion affects network performance? Also explain the difference between flow control and congestion control. [6]

c) What is socket address? Explain. [4]

**Q11)**a) Explain Telnet and FTP in detail with respect to server and client communication. [8]

b) What is DNS? Explain the components of DNS system. [6]

c) What is the function of SMTP and POP-3 protocols in E-mail system?[4]

OR

**Q12)**a) Distinguish between public key and private key algorithm. State the advantages of RSA algorithm. [8]

b) What are the main responsibilities of Application layer? Explain in brief. [6]

c) What is URL and what are its components? [4]



Total No. of Questions : 12]

SEAT No. :

**P1387**

**[4759]-89**

[Total No. of Pages : 3

**B.E. (E & TC)**

**DIGITAL IMAGE PROCESSING**

**(2008 Course) (Semester - I) (Elective -I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from each section.(Section-I Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6 and Section -II Q7 or Q 8, Q 9 or Q 10, Q 11 or Q 12 .*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, electronic and pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Explain the following terms w.r.t. digital image: **[10]**
- i) Pixel
  - ii) 4- connectivity
  - iii) Spatial resolution
  - iv) Euclidean distance
  - v) Gray level resolution
- b) With the help of block diagram explain the typical image processing system. **[8]**

OR

- Q2) a)** Define and explain following terms w.r.t. Digital image: **[10]**
- i) Mean
  - ii) Standard deviation
  - iii) Variance
  - iv) SNR
  - v) PSNR
- b) Explain the image sensing and acquisition techniques. **[8]**

**P.T.O.**

- Q3)** a) Explain power law (gamma) intensity transformation. Explain its advantages over log transform. [8]
- b) What is pseudo coloring? Explain pseudo coloring of Gray scale image. [8]

OR

- Q4)** a) What is histogram? Explain the histogram equalization algorithm. [8]
- b) Explain how Laplacian of Gaussian can be used for image enhancement. [8]

- Q5)** a) A 2 x 2 block of image is given as:

$$\begin{matrix} 20 & 13 \\ 20 & 01 \end{matrix}$$
 Determine its DCT coefficients. [8]

- b) What is KL Transform? Discuss its properties and applications. [8]

OR

- Q6)** a) Write a note on Haar Transform. [8]
- b) Compare DFT and DCT. State their application areas. [8]

### **SECTION - II**

- Q7)** a) Explain the lossless predictive coding with the help of encoder and decoder block diagram. [8]
- b) What are the different Redundancies found in Digital image for compression? Explain in detail. [10]

OR

- Q8)** a) What is JPEG? Explain JPEG digital image compression technique in detail. [8]
- b) Draw and explain the image compression system block diagram. [6]
- c) What is Run length coding? Explain with suitable example. [4]

- Q9) a)** Explain the chain code and B-Splines for boundary representation. [8]
- b) Explain the Morphological Image Processing with respect to (w.r.t.) Erosion, Dilation, Opening and Closing on Binary image. [8]

OR

- Q10)a)** Compare the performance of first and second derivative w.r.t. an image. Which will you prefer for detecting edges? Why? [8]
- b) With the help of suitable mask explain the following: [8]
- i) Point detection
  - ii) Line detection
  - iii) Edge detection

- Q11)a)** With the help of diagram explain the image degradation model. What is the need of degradation model? [8]
- b) Explain the algorithm for Character Recognition in image processing. [8]

OR

- Q12)a)** With the help of block diagram explain all steps for Fingerprint Identification system in image processing. [10]
- b) Explain the difference between image enhancement and restoration. List the various techniques used for image restoration. [6]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P3321**

[Total No. of Pages : 3

[4759] - 9

**B.E. (Civil Engg.) (Semester - I)**  
**MATRIX METHODS OF STRUCTURAL ANALYSIS**  
**(2008 Pattern) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION- I**

**Q1)** Write a note on (Any two) **[16]**

- a) Ill conditioned matrix
- b) Gauss Elimination Method

OR

**Q2)** a) Write a note on "Computer Algorithm & Programming aspects". **[6]**

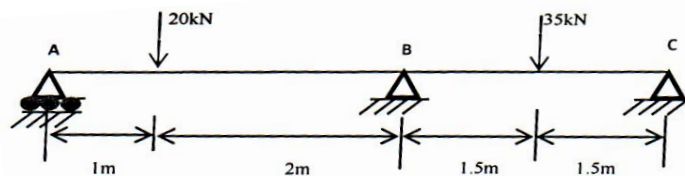
b) Solve the following equations by Gauss Elimination Method **[10]**

$$3X_1 + 2X_2 + 3X_3 = 80$$

$$X_1 - 9X_2 + 2X_3 = 1$$

$$2X_1 + 3X_2 + 6X_3 = 31$$

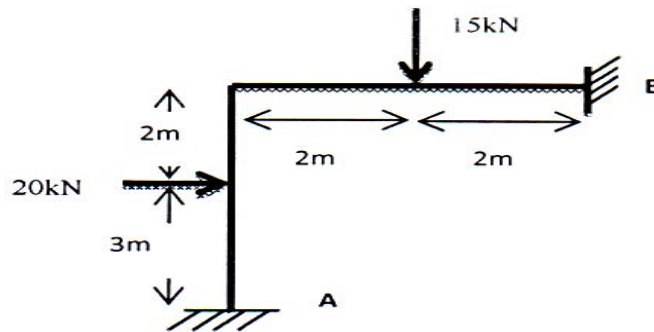
**Q3)** Analyze the beam shown below by flexibility method (EI is constant) **[18]**



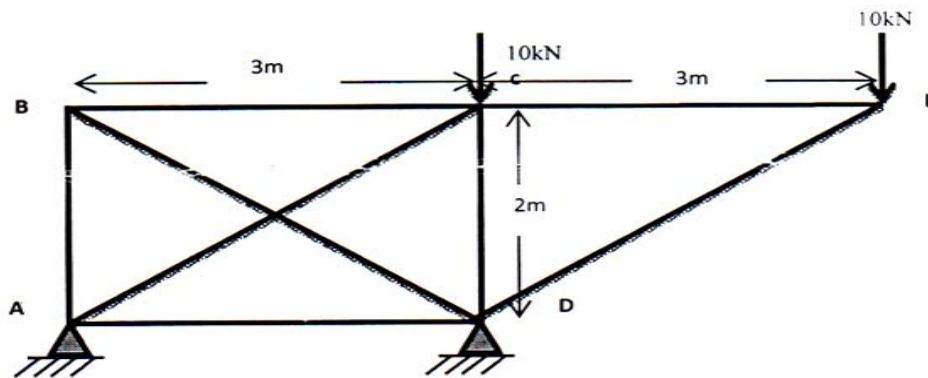
**P.T.O.**

OR

**Q4)** Analyze the portal frame using Flexibility Method (EI Constant) [18]



**Q5)** Analyze the truss by Flexibility Method (EI Constant) [18]



OR

**Q6)** Analyze the beam shown in Ex. 3 by Stiffness Method (EI is Constant) [18]

## SECTION- II

**Q7)** Write a note on

- Force Method of structural analysis
- Effective node numbering

OR

- Q8)**
- Differentiate between structure approach and member approach used in stiffness matrix method. Explain how support conditions are accounted in both approaches. [8]
  - Using first principles, establish relationship between local and global stiffness matrix of portal frame member. State clearly transformation matrix. [8]



- Q9) a)** Using proper DOFs write clearly stiffness matrix equation for a member of orthogonal grid structure. Explain various terms involved in matrix equation. [9]
- b) Explain properties and special characteristics of stiffness matrix of a structure. [9]

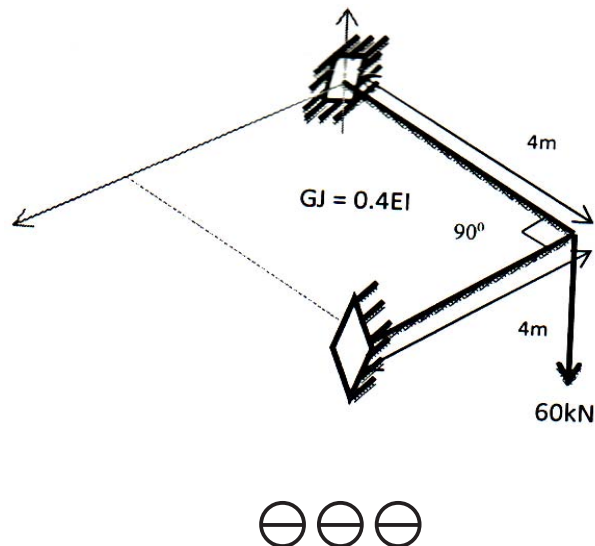
OR

**Q10)** Stating clearly DOFs/node, explain stiffness matrix for space truss member and space frame member. In which case you need transformation matrix. Explain reason. [18]

**Q11)** Using structure approach, develop only stiffness matrix of grid structure for the figure shown in Ex 12.  $GJ = 0.4EI$  and uniform for all members. [18]

OR

**Q12)** Analyze and draw BMD for grid structure as shown below by stiffness method. [18]



Total No. of Questions : 12]

SEAT No. :

**P1388**

**[4759]-90**

[Total No. of Pages : 3

**B.E. (E & TC)**

**b: EMBEDDED SYSTEM & RTOS**

**(2008 Pattern) (Semester - I) (Elective - I) (404184)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Solve Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6, Q7 or Q 8, Q 9 or Q 10, Q 11 or Q 12 .*
- 2) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 3) *Assume suitable data, if necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) Define design metric? Explain the importance of design metric for embedded system with suitable example. [10]
- b) Explain the following communication protocols with specifications. [8]
- i) GPRS
  - ii) IEEE 802.11

OR

- Q2)** a) Explain how embedded system is different from other system based on its characteristics. [10]
- b) Mention different available processors for embedded system? Explain its optimization with suitable example. [8]
- Q3)** a) Explain limitation of 8- bit & 32-bit processors with example. [8]
- b) Draw & brief the architecture of LPC 2148. [8]

OR

**P.T.O.**

- Q4)** a) Compare Arm 9 and Arm11 series of processors. [8]  
b) Draw the interfacing diagram between LPC 2148 & LCD display. Write down algorithm to display “PUNE” on LCD. [8]
- Q5)** a) Explain differences in conventional & embedded operating system. [8]  
b) What do you mean by mutual exclusion & explain mutual exclusion in details. [8]

OR

- Q6)** a) List different software architectures & explain any two in details. [8]  
b) Explain following RTOS services. [8]  
i) ISR  
ii) Semaphores

### **SECTION - II**

- Q7)** a) State features of Embedded linux. [8]  
b) Explain following tool utilities. [10]  
i) Busybox  
ii) Red boot

OR

- Q8)** a) Explain in details development tools required for linux applications with suitable example. [10]  
b) Explain the device driver with suitable example. [8]
- Q9)** a) State the features of commercial RTOS in general. [8]  
b) What is software development cycle? Explain it with suitable applications. [8]

OR

- Q10)a)** State the features of Android operating system. [8]
- b) Compare the different features of win CE & Symbian OS. [8]
- Q11)a)** Draw & explain the details blocks of digital camera as an embedded system. [8]
- b) Explain the specifications of processor, memory & I/O device required to implement of mobile phone. [8]

OR

- Q12)a)** Explain following applications in brief. [8]
- i) ECG
- ii) MTD
- b) Explain how embedded system is utilized in automotive applications.[8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1389**

**[4759]-91**

[Total No. of Pages : 3

**B.E. (E & TC)**

**INDUSTRIAL DRIVES & CONTROL**

**(2008 Course) (Semester - I) (Elective - I) (404184)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Solve Q 1 or Q 2, Q 3 or Q 4, and Q5 or Q 6 from section - I.*
- 2) *Solve Q7 or Q 8, Q 9 or Q 10, and Q 11 or Q 12 from Section - II .*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of non-programmable electronic pocket calculator is allowed.*
- 7) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) With the help of a neat circuit diagram, relevant waveforms and necessary mathematical expressions, explain the effect of source impedance on the performance of single phase full converter. **[10]**
- b) What is a DC to DC Converter? Explain the operation of buck converter with circuit diagram and waveforms. **[8]**

OR

- Q2)** a) What are dual converters? Explain with circuit diagram and waveforms, working of circulating current type of dual converter. **[10]**
- b) With the help of a neat diagram and necessary waveforms explain the operation of four quadrant chopper. Mention its applications. **[8]**
- Q3)** a) State various harmonic reduction techniques used in inverters. Explain any one efficient technique in detail. **[8]**

**P.T.O.**

- b) With the help of neat circuit diagram & waveforms, explain the operation of transistorized three phase bridge inverter with star connected balanced resistive load for 180° conduction mode. [8]

OR

**Q4)** a) Compare switch mode & resonant inverters. Mention types of resonant inverters. [6]

- b) Explain why three phase to single phase cycloconverter requires positive & negative group of phase controlled converters. Under what condition, the group works as inverter & rectifier? How the firing angles of the two converters should be controlled? [10]

**Q5)** a) Compare dynamic & regenerative braking for DC machines. Can regenerative braking be used in all cases? Justify your answer. [8]

- b) What is the need of reversible drives? Explain with neat circuit diagram & waveforms, working of reversible drive with armature voltage reversal technique using changeover contactors. [8]

OR

**Q6)** a) With the help of neat diagram explain the undervoltage protection circuit for a DC motor drive. [4]

b) What are DC motor performance parameters? Explain in brief. [4]

- c) A 230V, 800 rpm, 7A separately excited DC motor has an armature resistance 0.2  $\Omega$ . Under rated conditions, the motor is driving the load whose torque is constant and independent of speed. The speed below the rated speed are obtained with armature voltage control (with full field), and the speed above the rated speed are obtained by field control (with rated armature voltage). [8]

Determine:

- i) The motor terminal voltage when speed is 500 rpm.  
ii) The value of flux as a percentage of rated flux of the motor speed is 1100 rpm. Neglect the motor rotational losses.

## SECTION - II

- Q7) a)** A 4 pole, 1440 rpm, 3 phase induction motor is operated from a per phase voltage of 240 V, 50 Hz and driving a constant torque load. Calculate the following at  $f = 25$  Hz. Air gap flux is constant and is 4.8. [10]
- i) Supply voltage per phase
  - ii) Slip
  - iii) Slip frequency
  - iv) Percentage rotor loss
- b) With the help of an equivalent circuit explain the various performance characteristics of induction motor. [8]

OR

- Q8) a)** What is the need of AC drives? Explain with block diagram speed control techniques of 3 phase induction motor by using v/f technique. [10]
- b) Explain with the help of neat block diagram the operation of phase failure protection circuit for AC motor drives. [8]
- Q9) a)** Write a short note on synchronous motor drives. [8]
- b) Explain operation of permanent magnet stepper motor drive. Enlist the drive requirements of stepper motor. [8]

OR

- Q10)a)** Discuss the brushless DC motor drives. [8]
- b) Explain the operation of switched reluctance motor . Why is it preferred as adjustable speed drive. [8]
- Q11)a)** Discuss traction motor AC drive in detail. [6]
- b) What is power quality? State the sources of various types of power line disturbances. What measures are to be taken to prevent or nullify these disturbances? [10]

OR

- Q12)a)** Write a short note on energy audit. [6]
- b) Explain the operation of fuzzy logic-based wind generation system. [10]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P1390**

[4759]-92

[Total No. of Pages : 3

**B.E. (E & TC)**

**d: MICROWAVE COMMUNICATION AND RADAR**

**(2008 Pattern) (Semester - I) (Elective - I) (404184)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6 from Section - I and Q7 or Q 8, Q 9 or Q 10, Q 11 or Q 12 from Section - II .*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) State advantages and disadvantages of microwave. Also state its applications. **[4]**
- b) Explain following waveguide parameters. **[8]**
- i) Cutoff wavelength
  - ii) Group velocity
  - iii) Phase velocity
  - iv) Guide wavelength
- c) Compare rectangular waveguides with circular waveguides. **[6]**

OR

- Q2)** a) What is re-entrant cavity? Explain its application. **[4]**
- b) Draw different field patterns for TE mode. **[6]**
- c) A rectangular waveguide of cross-section 5cm x 2cm is used to propagates  $TM_{11}$  mode at 9 G Hz. Determine the cut-off wavelength and wave impedance. **[8]**

**P.T.O.**



- Q3)** a) Explain the working principle and construction of [6]  
i) Isolator  
ii) Circulator  
b) Explain the properties of H - plane Tee using S- matrix. [6]  
c) Explain a rat-race coupler. [4]

OR

- Q4)** a) Why is a hybrid E-H plane Tee referred to as a magic Tee. Explain various applications of magic Tee. [8]  
b) Write short notes on: [8]  
i) Microwave filters  
ii) Microwave Attenuator  
**Q5)** a) What is velocity modulation? How it is achieved in a two cavity klystron? [8]  
b) What are crossfield devices? Explain the  $\pi$  mode of oscillation in magnetron. [8]

OR

- Q6)** a) Draw the construction of TWT and explain its operation. Also list the applications of TWT. [8]  
b) Explain bunching process in klystron tube. [8]

### **SECTION - II**

- Q7)** a) Explain principle of operation, I - V characteristic & equivalent circuit of Tunnel diode. [8]  
b) With the help of two valley theorem explain the working of Gunn Diode. [8]

OR

- Q8) a)** Write a short note on: [8]
- i) PIN Diode
  - ii) Schottky barrier diode
- b) What are avalanche transit time devices? Explain the operation, construction and applications of the following devices. [8]
- i) IMPATT
  - ii) TRAPATT

- Q9) a)** Explain Network analyser in brief. [8]
- b) Explain how VSWR, impedance and frequency can be measured using slotted waveguide. [8]
- c) Draw general setup for microwave bench. [2]

OR

- Q10)a)** Explain Roberts and Von-Hippel method of dielectric constant measurement. [6]
- b) Explain the phase shift measurement using double minimum method at microwave frequency. [6]
- c) Describe the setup for the measurement of Q of a cavity resonator. [6]
- Q11)a)** Explain the following terms: [8]
- i) Blind speed
  - ii) PRF
  - iii) Mono pulse tracking
  - iv) Duplexer
- b) Explain the factors that affect the maximum range of a radar. [8]

OR

- Q12)a)** Explain the principle and working of an MTI radar. [8]
- b) With the help of block diagram explain the operation of FM-CW radar. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

**P1391**

**[4759] - 93**

[Total No. of Pages :3

**B.E. (Electronics & Telecommunications)**  
**a: ENTREPRENEURSHIP DEVELOPMENT**  
**( 2008 Course) (Semester - I) (Elective - II) (404185)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Answer three questions from each section.*

**SECTION - I**

- Q1) a)** Define Entrepreneurship. Discuss various ways to pursue entrepreneurship. [7]
- b) Explain how the state of economy of nation affects Entrepreneurs & Businesses. [9]

OR

- Q2) a)** State and discuss the qualities & skills required for an engineer in order to become an Entrepreneur. [7]
- b) State factors which govern selection of product or service while starting a new enterprise. [9]

- Q3) a)** State and explain types of business ownership. Give your opinion on the types of ownership suitable for an engineer who wants to pursue entrepreneurship. [9]
- b) Explain market and command economies? Which economic model is presently followed in India, explain in brief. [7]

OR

- Q4) a)** State and explain factors which influence costing and pricing of a product. [8]
- b) Explain legal forms of business. Explain which legal form helps better in raising finances. [8]

***P.T.O.***

- Q5)** a) What is the necessity of business plan? State and explain the contents of a business plan. [8]
- b) Explain role of market research in business success. Explain in brief steps involved in market research. [6]
- c) Explain the importance of insurance in business. [4]

OR

- Q6)** a) State and explain various ways to finance business. [7]
- b) What are the types of Business competition, how they are taken care of. [5]
- c) Discuss importance of location in Service, and Manufacturing industry. [6]

## **SECTION - II**

- Q7)** a) What is importance of human resource in business? Discuss the ways to hire staff. [9]
- b) Discuss role of proper accounting practices in business. [7]

OR

- Q8)** a) Discuss the methodologies used in managing the staff. [9]
- b) State and explain the methods used to track Inventory. [7]

- Q9)** a) Explain importance of financial management for entrepreneurs. [8]
- b) Explain how effective use of technology can help the business to improve operational efficiency. [8]

OR

- Q10)a)** Discuss the role of financial adviser. [7]
- b) State and explain the ways used to analyze financial performance of a business. [9]

- Q11)a)** Explain in detail the legal requirements to be complied with when starting a new enterprise, and in an established business. [9]
- b) What are ethical business practices? In what way businesses benefit in long term if they are followed. [9]

OR

- Q12)a)** List and explain the social responsibilities a business needs to carry out. [8]
- b) Illustrate the growth strategy an entrepreneur should formulate in order to succeed and sustain in today's highly globalised and competitive business environment. [10]



Total No. of Questions : 12]

SEAT No. :

P1392

[4759] - 94

[Total No. of Pages :4

**B.E. (Electronics & Telecommunication)**  
**JOINT TIME FREQUENCY ANALYSIS**  
**( 2008 Course) (Semester - I) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicates marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION - I**

**Q1)** Evaluate the overall impulse response and obtain the time-BW product for two systems connected in cascade. (Refer to figure 1). **[16]**

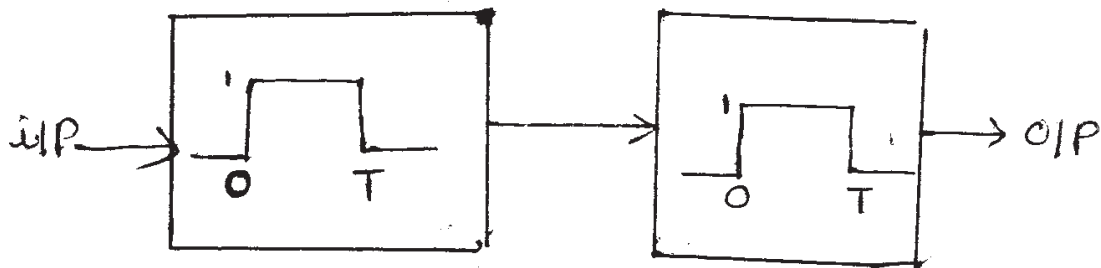


figure 1

OR

- Q2)** a) Define analytic signal. Find the analytic signal,  $A[S]$  corresponding to the signal 'S' where  $S(t)$  is real signal having the spectrum  $S(\omega)$ . **[8]**
- b) Calculate the instantaneous frequency for the sum of two sinusoids. **[8]**

**P.T.O.**

- Q3)** a) Find  $\langle \psi(2t), \psi(2t) \rangle$  where  $\psi(t)$  is the wavelet function. [4]  
 b) Find  $X(w)$  for the given signal, (Refer to figure 2). [4]

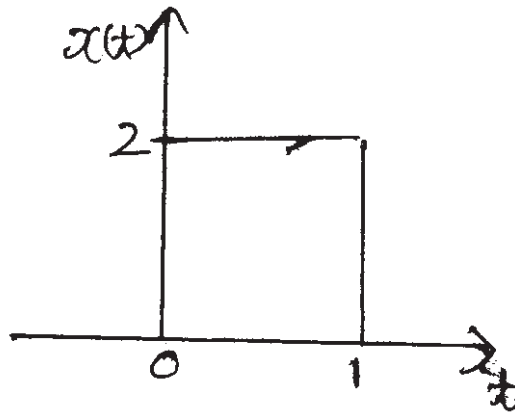


figure 2

- c) Prove that  $1/\sqrt{S_0}$  normalizes  $\psi(t)$ . [4]  
 d) Prove that  $\sum_{n \in \mathbb{Z}} g[n] = 0$  where  $g[n]$  is the impulse response of high pass analysis filters used in Haar. [4]

OR

- Q4)** a) Write down the mathematical expressions for STFT & CWT and explain the terms. Discuss the advantages & disadvantages of both the transforms. [8]  
 b) Explain the concept of nested subspaces alongwith suitable diagram and mathematical equations. [8]

- Q5)** a) Prove that the Haar Scaling function results into infinite Time-BW product. [10]

- b) What is the difference between a wave and wavelet?

Discuss the properties of wavelet function. [8]

OR

Q6) a) Refer to fig.3

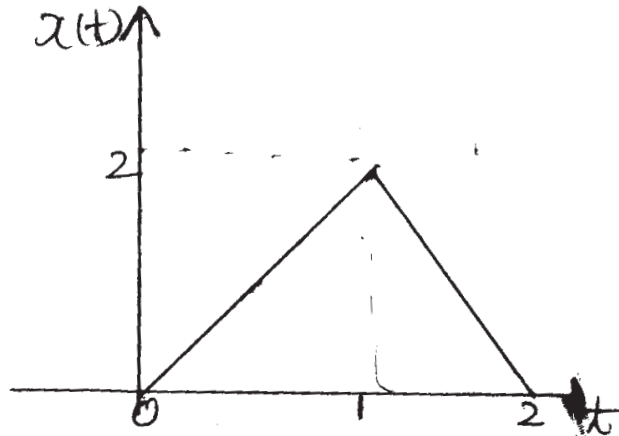


figure 3

Find out the projections of  $x(t)$  on subspaces  $V_0$  &  $V_1$ .

- b) Prove that  $V_1 = V_0 \oplus W_0$ .
- c) Sketch the projections on  $V_0$ ,  $V_1$  &  $W_0$  subspaces.

[18]

### SECTION - II

- Q7) a) What is the need for Biorthogonal scaling functions? [2]
- b) Design the Biorthogonal 5/3 filter bank for JPEG-2000. [10]
- c) Discuss the inadequacies of Haar wavelet. [6]

OR

Q8) If  $\phi(t)$  is Haar scaling  $f^n$  and

$$x(t) = 8\phi(2t) + 7\phi(2t-1) + 5\phi(2t-2) + 4\phi(2t-3) + 6\phi(2t-4) \\ + 3\phi(2t-5) + 2\phi(2t-6) + 8\phi(2t-7)$$

then project  $x(t)$  down the ladder and show that

$$V_j = V_{j-1} \oplus W_{j-1}$$

Sketch the projections of the corresponding  $V$  &  $W$  subspaces. [18]



**Q9)**  $x[n]$  is given as  $\{4,3,2,1\}$  which belongs to  $V_2$  subspace. Use lifting scheme. Decompose the signal upto  $V_0$  subspace. Show perfect reconstruction.

Clearly show all the stages with their outputs. Indicate the flows of computations. **[16]**

OR

**Q10)** Take the signal,

$$x[n] = \{1,2,3,4,4,3,2,1\} \in V_3$$

Develop the complete wavelet packet tree for  $V_0$  and calculate the coefficients alongwith the corresponding bases. Prove perfect reconstruction. **[16]**

**Q11)** Write a short note on:- (Any two). **[16]**

- a) Need for Joint Time & Frequency Analysis.
- b) Signal denoising
- c) Spectrograms & scalograms.

OR

**Q12)** Perform MRA using Haar filters of the signal given,

$x[n] = \{32,20,14,18,6,12,8,20\} \in V_3$ . Draw all the projections till '0'<sup>th</sup> subspace. Reconstruct after suppressing (making zero) coefficients in  $W_j$  subspaces and show denoising (smoothing) effect on reconstructed signal  $x_d[n]$  when compared with  $x[n]$ . **[16]**



Total No. of Questions : 12]

SEAT No. :

**P1393**

**[4759] - 95**

[Total No. of Pages :3

**B.E. (Electronics & Telecommunication)**

**MICROELECTROMECHANICALSYSTEMANDSYSTEMSONCHIP**

**( 2008 Course) (Semester - I) (Elective - II) (404185)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt 3 questions from each section.*
- 2) *Attempt from section - I: Q1 or Q2, Q.3 or Q.4, Q.5 or Q.6, and from section - II: Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*
- 5) *Figures to the right indicates marks.*

**SECTION - I**

- Q1)** a) Point out the difference between MEMS and Microsystems. [8]  
b) What are the general desirable characteristics of MEMS? [8]

OR

- Q2)** a) Draw and explain functional block diagram of MEMS. [8]  
b) Explain photolithography process in detail. [8]

- Q3)** a) Justify “Silicon- an ideal substrate material for MEMS”. [8]  
b) What is SU-8 photoresists? Write brief about it. [8]

OR

- Q4)** a) What are the silicon compound which are used in MEMS fabrication? Describe any one of them. [8]  
b) What do you mean by piezoresistance? Can we use silicon for the same? Write down mathematical expression for it. [8]

**P.T.O.**

- Q5) a)** Point out major technical issues in BioMEMS products. [9]
- b) Explain glucose monitoring and drug delivery system. [9]

OR

- Q6)** Write short note on: [18]
- a) Chemical sensors
- b) Micro accelerometers
- c) Magnetic Actuators

## **SECTION - II**

- Q7) a)** What is SOC? Write various components of SOC. [8]
- b) Draw typical architecture of SOC. [8]

OR

- Q8) a)** Point out difference between SOC and processors on chip. [8]
- b) Justify “SOC increases chip complexity”. [8]

- Q9) a)** What is the difference between wet & dry etching? [8]
- b) What are the merits and demerits of behavioural synthesis? [8]

OR

- Q10)a)** Write various layout strategies for IC design. [8]
- b) What is LEGAL? Explain LEGAL algorithm steps. [8]

- Q11)a)** Explain various packaging technologies and explain each in detail. [9]
- b) What are the issues in testing of core based systems on chip? Explain features of co-design tool. [9]

OR

- Q12)a)** Explain generic test generation procedure with flow chart. Explain embedded core based system on chip test strategies. [9]
- b) Explain the terms: [9]
- i) Defects and fault method
  - ii) Fault simulation



Total No. of Questions : 12]

SEAT No. :

**P1394**

**[4759] - 96**

[Total No. of Pages :3

**B.E. (Electronics & Telecommunication)  
MOBILE COMMUNICATION  
( 2008 Course) (Semester - I) (Elective - II) (404185)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicates full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) With neat diagram, explain the frequency reuse concept in mobile communication. State the formula for S/I in terms of co-channel reuse ratio "Q". [8]
- b) Explain any two techniques of improving coverage and capacity of cellular networks. [8]

OR

- Q2)** a) What is co-channel and Adjacent channel interference in mobile networks? Describe techniques to reduce the same. [8]
- b) Discuss evolution of mobile communication from 1G to 3G networks with their salient features. [8]

- Q3)** a) Calculate the free space path loss for a signal Transmitted at a frequency of 900MHz with the distance between Transmitter and Receiver of 1km. Calculate the same for 1850 MHz. [8]
- b) Derive an expression for power received  $P_r$  using Ground Reflection (Two-Ray) model. [10]

OR

**P.T.O.**

- Q4) a)** With a neat diagram, explain impulse response model of multipath channel in detail. [8]
- b) Describe following terms w.r.t small scale fading:- [10]
- i) Multipath propagation
  - ii) Speed of the mobile
  - iii) Speed of surrounding objects
  - iv) Transmission bandwidth of the signal.

- Q5) a)** Draw the block diagram of offset QPSK transmitter and explain function of each block. [8]
- b) Classify equalizers. Draw the block diagram of linear transversal equalizer and explain its operation. [8]

OR

- Q6) a)** What are advantages of diversity techniques in mobile communication? Explain with neat diagram any space diversity technique. [8]
- b) Draw and explain the block diagram of RAKE receiver in CDMA system. [8]

### SECTION - II

- Q7) a)** A GSM uses a frame structure where each frame consists of 8 time slots and each time slot contains 156.25 bits and data is transmitted at 270.833 kbps in the channel. Find [8]
- i) Time duration of a bit
  - ii) Time duration of a slot
  - iii) Time duration of a frame
- b) Compare FDMA, TDMA and CDMA multiple access techniques. [8]

OR

**Q8) a)** With a neat block diagram describe the operation of GSM speech encoder. [8]

b) A GSM 900MHz and 1800MHz is a popular operating dual band world wide and has a RF bandwidth of 25MHz and 75MHz respectively. How many channels these two bands separately can support. If one channel of TDMA is shared by 8 users, then find number of users supported in each band. [8]

**Q9) a)** List and describe the components of GSM model. [8]

b) Explain steps involved in a call setup from Mobile to a landline phone.[10]

OR

**Q10)a)** If a GSM time slot consist of 6 trailing bits, 8.25 guard bits, 26 training bits and 2 traffic burst of 58 bits of data, find the frame efficiency. Assume 8 users on one channel of TDMA. [8]

b) What are types of GSM logical channels. Explain each type in brief.[10]

**Q11)a)** Explain the working of following forward channels in CDMA:- [8]

i) Pilot channel

ii) Sync channel

b) Describe soft handoff mechanism in CDMA. [8]

OR

**Q12)a)** Explain need of power control and how power is controlled in CDMA.[8]

b) Describe CDMA in a DSSS environment with neat diagram. [8]



Total No. of Questions : 12]

SEAT No. :

**P1395**

**[4759] - 97**

[Total No. of Pages :3

**B.E. (Electronics & Telecommunication)  
TELECOMMUNICATION & SWITCHING SYSTEM  
( 2008 Course) (Semester - II) (404187)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume Suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Discuss the various types of switching systems. **[8]**
- b) Explain operation of Memory controlled time division switching with a neat block diagram. **[8]**

OR

- Q2) a)** Explain space division switching & time division switching. **[8]**
- b) What are the functions of switching Systems? Draw block diagram of Subscriber's line interface circuit for a digital exchange. **[8]**

- Q3) a)** Explain the terms **[8]**
- i) Erlang
  - ii) Busy Hour
  - iii) BHCR
  - iv) CCR

**P.T.O.**



- b) Derive and explain 'Erlang's lost-call formula' with necessary assumptions. [8]

OR

- Q4)** a) Explain the following in detail: [8]
- i) GOS
  - ii) Blocking Probability
  - iii) Markov Chain
- b) State and explain 'Constant' and 'Exponential' Holding time Distributions. [8]

- Q5)** a) For an ideal Grading, state and explain the 'Erlang's grading formula'. [4]
- b) Explain the Skipped Grading and Homogeneous Grading. Draw neat diagrams. [6]
- c) What are different levels of control functions in a distributed SPC? Explain operations of each level in detail. [8]

OR

- Q6)** a) Define Signaling. Write classification of signaling. [6]
- b) Design a three stage network that has 100 incoming lines and 300 outgoing trunks. Also calculate the total cross points. [6]
- c) Define and explain the terms "Availability" and "Unavailability" of a dual processor system with necessary equations. [6]

## SECTION - II

- Q7)** a) Draw and explain with block schematic for connections between two autonomously timed digital switches. What are Slips? How they are controlled? [8]

- b) Draw and explain with block diagram for interface between TDM transmission link and a digital switch using Elastic Store. [8]

OR

- Q8)** a) State and explain in detail various Signal units based on High-level Data-Link Control (HDLC) protocol. [8]
- b) What is Timing Jitter? Draw and explain block schematic diagrams for measuring Timing Jitter. [8]

- Q9)** a) Explain ISO-OSI model in detail. [8]
- b) Explain use of digital technology in Public telecommunication networks. [8]

OR

- Q10)**a) Explain the concept of Internetworking. [8]
- b) Discuss various types of services provided by ISDN. [8]

- Q11)**a) Write short note on CDMA IS-95 Technology. [6]
- b) Explain the concepts of Roaming and Handoff. [6]
- c) Explain the basic components of Cellular system. [6]

OR

- Q12)** Write short note on (any Three). [18]
- a) Cellular system topology
- b) GPRS
- c) Personal Satellite communication system
- d) GSM System Architecture



Total No. of Questions : 12]

SEAT No. :

**P1396**

**[4759] - 98**

[Total No. of Pages :5

**B.E. (E & TC)**

**OPTICAL FIBER COMMUNICATION**

**(2008 Pattern) (Semester -II)**

*Time :3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.*
- 2) *Answer to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** A typical relative refractive index difference for an optical fiber designed for long distance transmission is 1.3%. Estimate the NA and the solid acceptance angle in air for the fiber when the core index is 1.48. Further, calculate the critical angle at the core-cladding interface within the fiber. It may be assumed that the concepts of geometric optics for the fiber. **[6]**
- b) Explain the characteristics and operating ranges of the four key optical fiber link components. **[6]**
- c) Derive an expression for the acceptance angle for a skew ray which changes direction by an angle  $2\gamma$  at each reflection in a step index fiber in terms of the fiber NA and  $\gamma$ . It may be assume that ray theory holds for the fiber. **[6]**

OR

- Q2) a)** A single mode step index fiber has core and cladding refractive indices of 1.498 and 1.495 respectively. Determine the core diameter required for the fiber to permit its operation over the wavelength range 1.48 to  $1.60\mu\text{m}$ . Calculate the new fiber core diameter to enable single -mode transmission at a wavelength of  $1.30\mu\text{m}$ . **[6]**

**P.T.O.**

- b) A step index fiber in air has a numerical aperture of 0.16, a core refractive index of 1.45 and a core diameter of  $60\mu\text{m}$ . Determine the normalized frequency for the fiber when light at a wavelength of  $0.9\mu\text{m}$  is transmitted. Further, estimate the number of guided modes propagating in the fiber. [6]
- c) What requirement should be satisfied by the material chosen for fiber fabrication? According to the material used in fiber fabrication explain the types of fiber. [6]

**Q3) a)** Briefly describe linear scattering losses in optical fibers with regard to [8]

- i) Rayleigh scattering
- ii) Mie scattering

b) A 6 km optical link consists of multimode step index fiber with a core refractive index of 1.5 and a relative refractive index difference of 1%. Estimate [8]

- i) The delay difference between the slowest and fastest modes at the fiber output.
- ii) The rms pulse broadening due to intermodal dispersion on the link;
- iii) The maximum bit rate that may be obtained without substantial errors on the link assuming only intermodal dispersion;
- iv) The bandwidth length product corresponding to (iii).

OR

**Q4) a)** Describe the phenomenon of modal noise in optical fibers and suggest how it may be avoided. [8]

b) A single mode step index fiber with a core refractive index of 1.49 has a critical bending radius of 10.4 mm when illuminate with light at a wavelength of  $1.30\mu\text{m}$ . If the cut off wavelength for the fiber is  $1.15\mu\text{m}$  calculate its relative refractive index difference. [8]

**Q5) a)** The radiative and nonradiative recombination lifetimes of the minority carriers in the active region of a double-heterojunction LED are 30ns and 80ns respectively. Determine the total carrier recombination life time and the power internally generated within the device when the peak emission wavelength is  $0.87\mu\text{m}$  at a drive current of 40 mA. [8]

- b) i) State and explain the various advantages of LED in comparison with injection lasers.
- ii) Explain the conditions necessary to attain lasing action in LASERs. [8]

OR

- Q6)** a) A single mode fiber has a mode field diameter  $4.95 \mu\text{m}$ , a core refractive index  $n_1 = 1.47$ , a cladding refractive index  $n_2 = 1.465$  and a core diameter  $2a = 9 \mu\text{m}$ . Find. [8]
- i) Insertion losses of a fiber joint having a lateral offset of  $1 \mu\text{m}$ .
- ii) Loss at a joint having an angular misalignment of  $1^\circ$  at a  $1300\text{-nm}$  wavelength.
- b) Explain the various optical transmitter- LED drive circuits for analog transmission. [8]

### SECTION- II

- Q7)** a) When  $2.5 \times 10^{11}$  photons each with a wavelength of  $0.85 \mu\text{m}$  are incident on a photodiode, on average  $1 \times 10^{11}$  electrons are collected at the terminals of the device. Determine the following of the photodiode at  $0.85 \mu\text{m}$ . [6]
- i) The quantum efficiency
- ii) Responsivity
- b) Given that the following measurements were taken for an APD, calculate the multiplication factor for the device. [6]
- i) Received optical power at  $1.35 \mu\text{m}$  =  $0.2 \mu\text{W}$
- ii) Corresponding output photocurrent =  $4.9 \mu\text{A}$   
(After avalanche gain)
- iii) Quantum efficiency at  $1.35 \mu\text{m}$  =  $40\%$
- c) Explain the requirements that must be satisfied by detectors for performance and compatibility. [6]

OR

**Q8) a)** An analog optical fiber communication system requires an SNR of 40 dB at the detector with a post-detection bandwidth of 30 MHz. Calculate the minimum optical power required at the detector if it is operating at a wavelength of  $0.9\ \mu\text{m}$  with a quantum efficiency of 70%. State any assumption made. **[10]**

b) Draw and explain the block schematic of the front end of an optical receiver showing the various sources of noise. And draw the equivalent circuit of it. **[8]**

**Q9) a)** A 1550-nm single mode digital fiber optic link needs to operate at 622Mbps over 80 km without amplifiers. A single-mode InGaAsP laser launches an average optical power of 13dBm into the fiber. The fiber has a loss of 0.35dB/km and there is a splice with a loss of 0.1dB every kilometer. The coupling loss at the receiver is 0.5dB, and the receiver uses InGaAs APD with a sensitivity of -39dBm. Excess-noise penalties are predicted to be 1.5dB. Setup an optical power budget for this link and find the system margin. Represent link loss budget graphically. **[10]**

b) Explain the RF over Fiber with reference to analog link. **[6]**

OR

**Q10)a)** An optical fiber system is to be designed to operate over an 8km length without repeaters. The rise times of the chosen components are: **[8]**

Source LED	8ns
Fiber: Intermodal	6 ns/km
(Pulse broadening) intramodal	1 ns/km
Detector (p-i-n photodiode)	5ns

From system rise time considerations, estimate the maximum bit rate that may be achieved on the link when using an NRZ format.

b) Write a short note on Multichannel Modulation techniques. **[8]**

**Q11)a)** Explain the WDM with respect to the following points [8]

Overview of WDM

Operational principles of WDM

b) Explain in detail the architecture of EDFA. [8]

OR

**Q12)a)** Consider an EDFA being pumped at 980 nm with a 30 mW pump power. If the gain at 1550 nm is 20dB, then calculate: [8]

i) Maximum input power

ii) Maximum output power

b) Write a note on Applications and type of Optical Amplifier. [8]



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :3

**P2010**

**[4759] - 99**

**B.E. (E & TC)**

**SOFT COMPUTING**

**(404189) (2008 Course) (Elective - III) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any one question each among Q1 & Q2, Q3 & Q4, Q5 & Q6.*
- 2) *Answer any one question each among Q7 & Q8, Q9 & Q10, Q11 & Q12.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume Suitable data, if necessary.*

**SECTION - I**

**Q1) Write notes on (any three):** **[18]**

- a) Applications of an artificial neuron for linear regression and classification.
- b) Hard computing and soft computing.
- c) Neuro-Fuzzy and Soft Computing characteristics.
- d) Evolutionary computation.

OR

**Q2) a) What are the methods to assign membership values or functions to fuzzy variables? Explain any one method with an example.** **[8]**

b) State the properties and operations on fuzzy sets. **[10]**

**Q3) a) Explain the terms with reference to membership function with a suitable example:** **[8]**

- i) Core
- ii) Boundary
- iii) Support

**P.T.O.**



- b) Consider fuzzy relations: [8]

$$R = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \begin{bmatrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{bmatrix} \end{matrix}, S = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \begin{bmatrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{bmatrix} \end{matrix}$$

Find the relation  $T = R \circ S$  using max-min and max-product composition.

OR

- Q4)** a) Explain the Mamdani Fuzzy Inference Model with example. [8]  
b) State the assumptions in a Fuzzy Control System Design and highlight the advantages of FLC over conventional control system design approach. [8]

- Q5)** a) Explain the seven de-fuzzification techniques used in fuzzy systems. [8]  
b) Explain the concept of composite linguistic variables and the use of concentration and dilation operations. [8]

OR

- Q6)** a) Explain the TSK Fuzzy Model with a suitable example. [6]  
b) State the procedure to design a fuzzy inference system for inferring the speed of a motor in rpm (range 0 to 1000), the inputs being temperature (range 0 to 60°C) and humidity (range 0 to 100%RH). Use suitable membership functions and assume Mamdani inference. [10]

## SECTION - II

- Q7)** a) Using Mc-Culloch Pitts neuron, implement a bipolar XOR function. Assume initial weights to be [1 1]. [8]  
b) State the difference between Willshaw von der Marlsburg model and Kohonen model. [8]

OR

- Q8)** a) Explain the architecture of Radial basis function network and state the RBFN training algorithm. [8]  
b) What is the Hebb learning rule? State the modification to basic Hebb rule to address its limitation. [8]

- Q9) a)** What are the necessary requirements of an activation function? Explain any three activation functions. [8]
- b)** Explain the concept of bias and threshold in artificial neurons? [8]

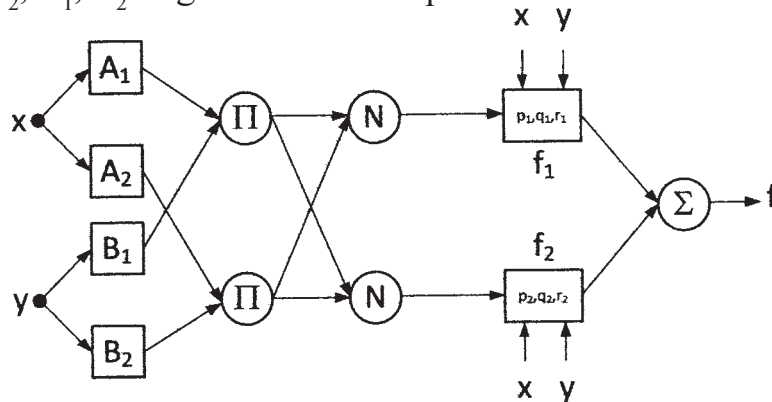
OR

**Q10)** Explain Supervised Learning, Unsupervised Learning and Reinforcement Learning with suitable examples. [16]

- Q11)a)** Explain the weight adaptation phases in a Self-Organized Feature Map network. [9]
- b)** Explain any one application of SOFM. [9]

OR

- Q12)a)** Explain the two-pass learning in an ANFIS network. [4]
- b)** Compute the output  $f$  for the ANFIS network shown in figure.xx. Assume  $A_1, A_2, B_1, B_2$  as gbell membership functions: [14]



Given:  $x = 25, y = 30$

Premise parameters			
$A_1$	$a = 50$	$b = 3$	$c = 0$
$A_2$	$a = 50$	$b = 3$	$c = 100$
$B_1$	$a = 50$	$b = 3$	$c = 0$
$B_2$	$a = 50$	$b = 3$	$c = 100$
Consequent parameters			
$f_1$	$p_1 = 0.5$	$q_1 = 1$	$r_1 = 0.2$
$f_2$	$p_2 = 0.8$	$q_2 = 0.7$	$r_2 = 0.5$

