

Total No. of Questions : 12]

SEAT No. :

P3503

[4959]-1

[Total No. of Pages : 5

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2008 Course) (Semester - I) (401001)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt 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) *Figures to the right indicates full marks.*
- 3) *Draw neat figures wherever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of scientific calculators is allowed.*

SECTION - I

- Q1) a)** Explain the significance of maximum and minimum velocities to be generated in sewer. Give any suitable equation for calculating self-cleansing velocity in sewer. **[8]**
- b) Give the physical, chemical and biological characteristics of domestic sewage from urban area. **[8]**

OR

- Q2) a)** Specify the qualities of a good material for constructing sewers. Judging from these requirements, discuss the suitability of : **[8]**
- i) Bricks
 - ii) Cement concrete
 - iii) Stone ware for sewers.
- b) Calculate the velocity of flow and corresponding discharge in a sewer of circular section having diameter equal to 1m, laid at a gradient of 1 in 500. The sewer runs at 0.6 depth. Use Manning's formula taking $n = 0.012$. **[8]**

P.T.O.

Q3) a) Discuss the following zones of a stream which is undergoing self-purification. [8]

- i) Zone of degradation
- ii) Zone of active decomposition
- iii) Zone of recovery
- iv) Zone of clear water

b) Draw plan and c/s of a circular PST. Label all parts. [8]

OR

Q4) a) Explain the basic difference in working of grit chamber and PST. [8]

b) Design a grit chamber for the following data: [8]

- i) Flow = 1500 m³ per day.
- ii) Settling velocity of particle 0.016 to 0.022 m/s.
- iii) Flow through velocity 0.3 m/s.

Q5) a) What is meant by activated sludge process? What are the advantages and disadvantages? [9]

b) What do you understand by trickling filter? Explain in detail with a neat sketch and biological processes involved in it. [9]

OR

Q6) a) Explain terms with respect to activated sludge process [8]

- i) HRT
- ii) SRT
- iii) MCRT
- iv) F/M ratio

- b) Design high rate single stage TF for population of 5000 persons. [10]
- i) Domestic sewage at 150 lpcd having 200 mg/l BOD.
 - ii) Industrial waste water at 0.25 MLD per day having 600 mg/l BOD.

Assume

- 1) BOD in primary clarifier = 35%.
- 2) Permissible organic loading of filter = 8000 kg/hect-m/day.
- 3) Recirculation ratio = 1.
- 4) Permissible surface loading = 160 ML/hect/day.

SECTION - II

- Q7)** a) Explain with a neat sketch, the working principle of a facultative stabilisation pond. [8]
- b) Design a facultative stabilisation pond for the following data: [8]
- i) Population to be served = 15000
 - ii) Sewage flow = 150 lpcd.
 - iii) Location = 22° N.
 - iv) Elevation = 900 M above MSL.
 - v) Mean Temp in January 26° C max, 10° C min.
 - vi) Influent BOD₅ = 225 mg/l.
 - vii) BOD reduction desired = 90%
 - viii) BOD removal rate constant at 20° C = 0.1 per day.
- If the effluent from the pond is to be used for irrigation, indicate whether any modification would be necessary.

OR

- Q8)** a) Explain advantages and disadvantages of a mechanically aerated lagoon. **[8]**
b) Explain with neat sketch, the constructional features of root zone cleaning system. **[8]**

- Q9)** a) Explain with neat sketch : working of 2-stage digester. Explain empirical formulae used to find the volume of the 2-stage digester. **[8]**
b) Explain with a neat sketch UASBR. **[8]**

OR

- Q10)**a) Explain with a neat sketch the pathway of anaerobic digestion. **[4]**
b) Explain with a neat sketch the working of a soak pit for the disposal of effluents from a septic tank. **[6]**
c) Design a septic tank for a hostel with following data: **[6]**
i) No. of users = 175
ii) Peak discharge = 210 lpm
iii) Desludging period = 1 year

Percolation rate = 20 min/cm for designing the dispersion trench.

- Q11)**a) Explain with neat sketch equalization and proportioning as applicable to Industrial Waste water Treatment. **[6]**
b) Explain with a neat sketch importance of neutralization as applicable to Industrial Wastewater Treatment. **[6]**
c) Draw a typical flow sheet for treating Dairy Waste. **[6]**

OR

Q12)a) Draw the flow diagram for treatment of industrial effluents from following industries **[8]**

i) Paper and pulp mill.

ii) Sugar industry.

b) Give in tabular form the characteristics of combined effluent from a sugar industry. **[5]**

c) Draw a typical flow sheet for treating automobile industry. **[5]**



Total No. of Questions : 12]

SEAT No. :

P3300

[Total No. of Pages : 3

[4959]-10

B.E. (Civil) (Semester - I)

HYDROINFORMATICS (Elective - 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) Compare numerical modeling and soft computing modeling in Hydroinformatics. [6]
- b) Enlist the basic scientific disciplines of hydro informatics and explain important aspects of each on which hydro informatics is based. [6]
- c) What are components of Hydroinformatics systems? Explain in detail different hardware and software components of Hydroinformatics systems. [6]

OR

- Q2)** a) 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]
- b) Discuss about design of hydro informatics system for information regarding availability of ground water in a particular area. [6]
- c) Explain the scope of internet and web based modeling in water resources engineering. [6]

P.T.O.

- Q3)** a) Name different software used in Hydroinformatics. Explain any one of them in detail. [8]
- b) 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]

OR

- Q4)** a) You have to design a graphical user interface for flood forecasting system, explain the front end and back end parameters. [8]
- b) A multi - criterion decision support systems is to be designed to collect information regarding availability of water resources viz. surface water, ground water etc. in a district, frame various alternative schemes. [8]

- Q5)** a) Discuss design of simulation model for water release from a dam with respect to objective, scope, basic formulae used, underlying solution procedure, simulation technique used. [8]
- b) Discuss design of simulation model for household sewage collection system giving details of objective, scope, basic formulae used, underlying solution procedure, simulation technique used. [8]

OR

- Q6)** a) Discuss any commercial simulation model for two dimensional flow modeling. [8]
- b) Differentiate between physics based modeling and data driven modeling. Give examples of each. [8]

SECTION - II

- Q7)** a) Write detail note on back propagation and conjugate gradient algorithm. [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]

OR

- Q8)** a) Define epoch, epoch size, error function. [6]
b) Define a transfer function. Discuss various types of transfer functions. [6]
c) Define normalization in Artificial neural network. What is the importance of normalization? What are typical ranges of normalization? [6]

- Q9)** a) Why Genetic Algorithm is used as an optimizing function? Can it be used to train a neural network? How? [8]
b) What are Genetic operators? Explain any two of them in details. [8]

OR

- Q10)** a) Explain different techniques of evolutionary computing? Discuss any one of them in detail. [8]
b) What is real coded Genetic Algorithm? How it differs from standard Genetic Algorithm? [8]

- Q11)** a) What is the importance of 'fitness function' in Genetic Algorithm and explain the operation, reproduction, cross over and mutation of Genetic Algorithm. [8]
b) Explain any four applications of Artificial Neural Networks in Water Resources Engineering. [8]

OR

- Q12)** a) Write the working principle of Genetic Algorithm and enlist various applications of Genetic Algorithm in Water Resources Engineering. [8]
b) Discuss limitations of ANN with respect to data requirement, magnitude of data, selection of architecture and lack of physical concept. [8]



Total No. of Questions : 12]

SEAT No. :

P3366

[4959]-100

[Total No. of Pages : 3

B.E.(E&TC)

OPTICAL FIBER COMMUNICATION

(2008 Pattern) (Semester-II)

Time :3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 form section I and Q.7 or Q.8,Q.9 or Q.10,Q.11 or Q.12 form section II*
- 2) *Answers to the two sections should be writtern 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)** State the advantages and limitations of optical fiber communication system. **[6]**
- b) A step index fiber in air has a core refractive index 1.45 and core diameter 60μ m. Numerical aperture of the fiber is 0.16. Calculate. **[12]**
- i) cladding refractive index
 - ii) normalized frequency for the fiber when light at a wavelength of 0.9μ m is transmitted
 - iii) critical angle
 - iv) acceptance angle
 - v) number of guided modes propagating in fiber
 - vi) fraction of power residing in the cladding if the totla optical power in the fiber is 1m W

OR

- Q2) a)** A manufacturer wishes to make a silica core step index fiber with $V=75$ and a numerical aperture $NA=0.3$ to be used at 820nm . If $n_1=1.458$ what should be the core size and cladding index be? **[8]**
- b) Explain multimode step index and multimode graded index fibers. **[6]**

P.T.O.

- c) With a neat diagram describe briefly optical fiber cable structure. [4]
- Q3)** a) Describe linear scattering loss in optical fibers with regard to:
- Rayleigh scattering
 - Mie scattering. [8]
- b) A continuous 40km long optical fiber link has a loss of 0.4db/km?
- What is the minimum optical power level that must be launched into the fiber to maintain an optical power level of $2\mu\text{W}$ at the receiving end?
 - What is the required input power if the fiber has a loss of 0.6db/km? [8]

OR

- Q4)** a) The material dispersion in an optical fiber defined by $\left| \frac{d^2 n_1}{d\lambda^2} \right|$ is $4.0 \times 10^{-2} \mu\text{m}^{-2}$. Estimate the pulse broadening per kilometer due to material dispersion within the fiber when it is illuminated with an LED source with peak wavelength of $0.9\mu\text{m}$ and an rms spectral width of 45nm. [8]
- b) What is dispersion? Explain material dispersion. [8]
- Q5)** a) What is fiber splice? List different splicing techniques. Explain in brief fusion splicing. [8]
- b) A DH InGaAsP LED emitting at a peak wavelength of 1310nm has radiative and nonradiative recombination times of 30 and 90ns respectively. The drive current is 40mA. [8]
- Find the internal quantum efficiency
 - Find the internal power level.

OR

- Q6)** a) State and explain the requirements of a good optical source. [8]
- b) A GaAlAs laser diode has a $500\mu\text{m}$ cavity length which has an effective absorption coefficient of 10cm^{-1} . For uncoated facets the reflectivities are 0.32 at each end. What is the optical gain at lasing threshold? If the internal quantum efficiency is 0.65 what is the external quantum efficiency? [8]

SECTION-II

- Q7)** a) Explain the working of avalanche photodetector with a neat diagram. [8]
b) The following measurements were taken for an APD. Calculate the multiplication factor for the device.

Received optical power at $1.35\mu\text{m} = 0.2 \mu\text{W}$

Corresponding output photocurrent(after avalanche gain)= $4.9\mu\text{A}$

Quantum efficiency at $1.35 \mu\text{m} = 40\%$ [10]

OR

- Q8)** a) Write a short note on receiver noise. [8]
b) Discuss the three main amplifier configurations currently adopted for optical fiber communication. Comment on their relative merits and drawbacks. [10]

- Q9)** a) Write a short note on multichannel amplitude modulation. [8]
b) Explain rise time budget in optical fiber communication system. [8]

OR

- Q10)** a) Describe the system considerations in establishing point to point optical fiber link. [8]
b) A 1550 nm single mode digital fiber optic link needs to operate at 622Mb/s over 90km without amplifiers. A single mode InGaAsP laser launches an average optical power of 13 dBm 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 an InGaAs APD with a sensitivity of -39dBm. Excess noise penalties are predicted to be 1.5dB. Set up an optical power budget for this link and find the system margin. [8]

- Q11)** a) Write a short note on optical amplifier. [8]
b) An InGaAsP optical amplifier has an active area width $5\mu\text{m}$, active area thickness $0.5 \mu\text{m}$ and amplifier length $200\mu\text{m}$. If 100mA bias current is applied, find the pumping rate. [8]

OR

- Q12)** Write short notes on (any two): [16]
a) WDM components.
b) Operation of EDFA amplifier
c) WDM couplers/splitters
d) WDM technique



Total No. of Questions : 12]

SEAT No. :

P3367

[Total No. of Pages : 3

[4959]-101

B.E. (E & TC)

SOFT COMPUTING

(2008 Course) (404189) (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) *Assume suitable data, if necessary.*
- 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) Write note on (any three)

[18]

- a) Characteristics of neuro fuzzy and soft computing
- b) Hybrid learning in ANFIS
- c) Artificial neural network application in biomedical engineering
- d) Soft computing and its advantages

OR

Q2) a) Consider fuzzy relations:

[10]

$$R = \begin{matrix} & y1 & y2 \\ \begin{matrix} x1 \\ x2 \end{matrix} & \begin{bmatrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix} \end{matrix}, \quad S = \begin{matrix} & z1 & z2 & z3 \\ \begin{matrix} y1 \\ y2 \end{matrix} & \begin{bmatrix} 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{bmatrix} \end{matrix}$$

Find the Relation $T = R \circ S$ using max-min and max-product composition.

- b) What is a fuzzy set? Explain the operations on fuzzy sets, Union, Intersection and Complement in detail. **[8]**

P.T.O.

- Q3)** a) What is de-fuzzification? Explain any two defuzzification methods in detail. [8]
- b) Explain the concept of Composite linguistic variables and the use of concentration and dilation operations. [8]

OR

- Q4)** a) Explain the Mamdani type fuzzy logic controller. [8]
- b) What is a fuzzy reasoning? Discuss in detail fuzzy reasoning for: [8]
- i) Multiple rules with multiple antecedents
- ii) Single rule with multiple antecedents

- Q5)** a) What is a fuzzy membership function. Explain any one fuzzy membership function in detail with its transfer characteristic. [6]
- b) Write short note on: [10]
- i) Sugeno fuzzy inference model.
- ii) Synthesis and validation of fuzzy controller.

OR

- Q6)** a) What is a fuzzy logic controller? Explain with suitable example. [8]
- b) Explain the Mamdani Type fuzzy logic controller. [8]

SECTION - II

- Q7)** a) Compare and contrast the biological neurons with an artificial Neuron model. [8]
- b) Using Mc-Culloch pitts neuron model, implement logic OR function. [8]

OR

- Q8)** a) Define activation function, weight, threshold and bias with example. [8]
b) Explain Supervised learning, Unsupervised learning with suitable examples. [8]

- Q9)** a) Explain the architecture training algorithm of single layer perceptron network? What is basic limitation of a perceptron network? [8]
b) Explain the architecture of multilayer perceptron network? Compare MLP with RBF. [8]

OR

- Q10)** a) Explain backpropagation algorithm for MLP with neat signal flow graph. [8]
b) Describe self organizing Feature map with architecture and algorithm. [8]

- Q11)** a) Explain the application of neural network in Image processing. [8]
b) Explain the concept of Adaptive network based Fuzzy Inference system (ANFIS) with architecture. [10]

OR

- Q12)** Write short note on (Any Three) [18]
a) Use of ANN in process control.
b) Applications of artificial neural network.
c) Advantages of ANFIS over FIS.
d) Generaliability of ANN.



Total No. of Questions : 12]

SEAT No. :

P3368

[4959]-102

[Total No. of Pages : 3

B.E. (E & TC)

b : SPEECH PROCESSING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right side indicate full marks.*

SECTION - I

- Q1) a)** Explain the following classes of speech signal with suitable examples. **[8]**
- i) Affricates
 - ii) Fricative
 - iii) Semivowels
 - iv) Diphthongs
- b) Explain in detail with suitable example the LTI and LTV model of speech production. **[8]**
- c) What is the difference between nasal and vowels? **[2]**

OR

- Q2) a)** Classify the stops based on place of articulation and manner of articulation. What is the difference between production of /p/and/b/? How it is reflected in acoustic waveforms of/p/and/b/? **[8]**
- b) An AMDF function of a pitch measurement has minimum value at $n = 45$. If the sampling rate of the speech segment is 8000 sam/sec., compute the pitch frequency. Compare autocorrelation and AMDF for computation of pitch period. **[8]**
- c) Explain the classification of vowels /i :, a and u:/based on F_1 vs F_2 plot. **[2]**

P.T.O.

- Q3)** a) Explain the Covariance method for computing Linear Predictor Coefficients. [8]
- b) What is prediction error filter? Derive normal equation and state the assumption for its derivation. [8]

OR

- Q4)** a) Compare MFCC with PLP coefficients. [8]
- b) What are the different criteria on which selection of prediction order is based. [8]

- Q5)** a) Write short note on short time speech analysis. Comment on window duration and window shift size. [8]
- b) Write a note on Mel scale and bark scale. How these scales are useful in speech recognition applications. Explain w.r.t. speech perception. [8]

OR

- Q6)** a) What is the filter bank approach related to speech processing? Explain in detail. [8]
- b) How pitch is detected in cepstral domain? Elaborate with the help of Block diagram. [8]

SECTION - II

- Q7)** a) Explain spectral subtraction method with block diagram. [9]
- b) Explain Wiener filter. How it is used for echo cancellation. [9]

OR

- Q8)** a) What is speech enhancement and explain different speech enhancement techniques in detail. [9]
- b) Explain with suitable example the use of comb filter in speech enhancement. [9]

- Q9) a)** Explain with block schematic continuous digit recognition system. [8]
- b) What is HMM. Explain how it is used for speech recognition? Explain the basic problems for HMMs. [8]

OR

- Q10)a)** State the condition on which optimization of DTW depends. Explain in detail. [8]
- b) Define the elements of HMM and explain how the model generates observation sequences. What are the parameters are estimated while HMM training? [8]
- Q11)a)** Explain with block diagram text-to-speech synthesis system. [8]
- b) Explain Unit Selection synthesis related to concatenative synthesis. [8]

OR

- Q12)a)** With the help of block schematic explain LPC-based speech synthesizer. [8]
- b) Explain speaker recognition system in brief. What are the features used for speaker recognition and what is the importance of these features.[8]



Total No. of Questions : 12]

SEAT No. :

P3369

[4959]-103

[Total No. of Pages : 3

B.E. (E & TC)

**c - TELEVISION AND VIDEO ENGINEERING
(2008 Course) (Elective - III) (Semester - II) (404189)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Assume suitable data if necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) State Grassmans law and explain how luminance & color difference signals are developed from camera output. **[10]**
- b) Define following terms- **[8]**
- i) Hue
 - ii) Saturation
 - iii) Brightness
 - iv) Kell factor

OR

- Q2)** a) Explain Vertical and Horizontal resolutions. **[6]**
- b) What is interlaced scanning and why it is used inTV? **[6]**
- c) Explain significance of chromaticity diagram. **[6]**

- Q3)** a) Explain how TV pattern generator and Wobbuloscope are helpful in TV alignment and fault finding. **[8]**
- b) Draw a neat block diagram of PAL encoder & explain functions of each block. **[8]**

OR

P.T.O.

- Q4)** a) Draw a neat diagram of color TV receiver & explain function of each block. [8]
b) Compare NTSC and SECAM color TV standards. [8]

- Q5)** a) Compare analog TV and Digital TV [8]
b) State the Features of following video compression techniques.
i) MPEG - 2
ii) MPEG - 4 [8]

OR

- Q6)** a) Discuss the different digital TV recording techniques. [8]
b) With the help of block diagram explain DCT based image encoding (JPEG) - Encoder & Decoder. [8]

SECTION - II

- Q7)** a) State the main features of HDTV. [4]
b) With suitable diagram explain CATV system. [4]
c) Discuss a Live TV coverage plan for international cricket. [10]

OR

- Q8)** a) What do you mean by Direct to Home service? Name the service providers in India. [6]
b) Explain CCTV system in detail. [6]
c) What is set Top Box? Why it is required? Explain its block diagram and working. [6]

- Q9)** a) What are features of IPTV explain in detail the architecture. [8]
b) Explain video intercom system using neat block diagram. [8]

OR

- Q10)a)** Write a note on ipod. [8]
b) What is video projector? What are different projection technologies?[8]

- Q11)a)** Compare LED, LCD & Plasma display devices. [8]
b) States the important specifications of DVD player. Draw a neat block diagram of DVD player & explain functions of each block. [8]

OR

- Q12)a)** Explain the features of camcoder. [8]
b) Explain different Acoustical design aspects of Auditorium. Also state different Acoustical features of Auditorium. [8]



Total No. of Questions : 12]

SEAT No. :

P3370

[4959]-104

[Total No. of Pages : 3

**B.E.(Electronics & Telecommunication)
TEST AND MEASUREMENT SYSTEMS
(2008 Course) (Semester-II) (Elective-III)(404189)**

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)** Explain digital data acquisition system with help of block diagram. [8]
- b) Discuss the following terms: [8]
- i) Sensitivity
 - ii) Linearity
 - iii) Accuracy
 - iv) Resolution

OR

- Q2) a)** A set of voltage measurement by five observers is recorded as 340m volts, 350m volts, 400m volts and 380m volts. Calculate [8]
- i) Arithmetic mean
 - ii) Average deviation
 - iii) Variance
 - iv) Standard deviation
- b) What are standards of the measurement, also explain the IEEE standards. [8]
- Q3) a)** Draw and explain, [10]
- i) Ramp-type DVM and
 - ii) Successive-approximation DVM.

P.T.O.

- b) Explain the method of True RMS measurement with the help of neat diagram. [8]

OR

- Q4)** a) What is the significance of Q- factor? Discuss the basic Q meter. [8]
b) What is the need of RF vector voltmeter? Explain the working with its block diagram. [10]

- Q5)** a) Discuss in details of digital storage oscilloscope. [8]
b) Explain the different types of CRO probes. What are the advantages of active probe. [8]

OR

- Q6)** a) The rise time measure on 100 MHz DSO is 19 nano seconds, find actual rise time of the signal. [8]
b) Explain the triggering controls used in analog and digital oscilloscope. What are the special trigger settings available only in digital oscilloscope. [8]

SECTION-II

- Q7)** a) Explain in details of heterodyne wave analyzer. [8]
b) Discuss FFT analyzer in detail. [8]

OR

- Q8)** a) Discuss the different capabilities of MSO. [8]
b) Elaborate the different trigger capabilities of logic analyzer that differentiate it from other equipments. [8]

- Q9)** a) Draw and explain the block diagram of an Arbitrary Waveform Generator(AWG). [8]
b) Draw and explain the block diagram of Direct Digital Synthesizer(DDS).What is meant by vertical resolution. [10]

OR

- Q10)**a) List and compare different solid state microwave signal sources. [8]
b) Explain in detail Network analyzer and state its application. [10]

- Q11)** a) Write a note on, features of LABVIEW. [8]
b) Discuss in details of Virtual instruments and its components. [8]

OR

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



Total No. of Questions :12]

SEAT No. :

P3371

[4959]-105

[Total No. of Pages :3

B.E. (E & TC)

a: ARTIFICIAL INTELLIGENCE

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

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 indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** What is Artificial Intelligence? Mention some of the applications that fall within the scope of AI. **[6]**
- b) Explain Utility based agent using pseudo code. **[10]**

OR

- Q2) a)** Explain “Simple Reflex based agent” with the help of schematic diagram or pseudo code. **[8]**
- b) Solve the problem of simple robot of moving a desk from one room to other with two things on its using means-end analysis. The operators available are PUSH, CARRY, WALK, PICKUP, PUTDOWN, PLACE. **[8]**
- Q3) a)** Compare depth first search (DFS) and breadth first search (BFS). **[8]**
- b) Draw the search tree for tic-tac-toe. **[8]**

OR

P.T.O.

- Q4)** a) Explain Hill Climbing algorithm with pseudo code. [8]
b) Compare different search strategies w.r.t. time complexity, space complexity, optimality and completeness. [8]
- Q5)** a) What is Knowledge Representation using propositional logic? Compare propositional and predicate Logic. [9]
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) State the rules and steps for converting a given well predicate logic statements to clausal form. [8]
b) Represent the following sentences by First order logic calculus. [10]
i) Some dogs bark.
ii) All dogs have four legs.
iii) All barking dogs are irritating.
iv) No dogs purr.
v) Fathers are male parents with children.
vi) Students are people who are enrolled in courses.

SECTION-II

- Q7)** Write short note on: [18]
a) Conceptual dependency.
b) Knowledge representation using frames.
c) Explanation based learning.

OR

- Q8)** a) What is artificial neural network? [9]
 b) Compare reinforcement learning and statistical learning. [9]
- Q9)** a) What is perception? Discuss techniques used in solving perceptual problems. [8]
 b) What is difference between expert system and traditional system? Comment on the advantages and disadvantages of expert system. [8]

OR

- Q10)**a) Explain the typical architecture of Expert System. [8]
 b) What are trihedral and nontrihedral figures with example? [8]
- Q11)**a) What is NLP? Explain all the five phases of NLP. [8]
 b) Parse each of the sentences using top-down and bottom-up approach. [8]
 i) Mary watered the plants.
 ii) The brown dog ate the bone.

OR

- Q12)**a) Solve the problem “the boy hit the little boy” using syntactic parsing. [8]
 $S \rightarrow NP VP$
 $NP \rightarrow THE NPI$
 $VP \rightarrow NPI$
 $ADJS \rightarrow NULLSTRING / ADJADJS$
 $VP \rightarrow V$
 $VP \rightarrow V NP$
- b) Explain how semantic interpretation is carried out in NLP. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P3372

[4959]-106

[Total No. of Pages :3

B.E. (E & TC)

AUTOMOTIVE ELECTRONICS

(2008 Course) (Elective - IV) (404190) (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) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) With neat diagram explain operation of four stroke S.I. engine. **[9]**

b) Explain basic transmission system in Automotive. **[9]**

OR

Q2) a) Explain any two hybrid designs in automotive. **[9]**

b) What is role of spark plug, H.T. coil and distributor in ignition system. **[9]**

Q3) a) Explain principle of operation for following sensors. **[8]**

i) Manifold Absolute pressure

ii) Engine speed

b) Explain with schematic diagram Engine control management system. **[8]**

OR

P.T.O.

- Q4)** a) Draw and explain how vibration sensor works in airbag. [8]
b) Explain working principle of solenoid and its role in its fuel injection system. [8]

- Q5)** a) Explain Adaptive cruise control system. [8]
b) Explain Antilock braking system. [8]

OR

- Q6)** Write short note on (any two): [16]
a) Variable Assist steering control.
b) Remote keyless entry.
c) Electronic control of spark Ignition.

SECTION-II

- Q7)** a) Explain typical requirements of microcontroller towards using Automotive. [8]
b) Explain any one application of timers & interrupts in automotive. [8]

OR

- Q8)** a) Draw and explain 8-bit PIC architecture. [8]
b) Write a C18 program to toggle only the PORT B.4 bit continuously every 50ms. Use Timer 0, 8-bit mode, 1:8 prescaler to create the delay. Assume XTAL = 10 MHz. [8]
- Q9)** a) Explain any one application of GPS & GPRS system in automotive. [8]
b) Explain advantages of CAN protocol over LIN. Also explain any one application of these protocols. [8]

OR

- Q10)** a) Explain how cortex architecture is suitable in automotive applications. **[8]**
b) What are infotainment gadgets? How most protocol satisfies the requirement for the same? **[8]**
- Q11)** a) Explain different types of wiring system in automotive. **[9]**
b) Explain diagnostics procedure and sequence in Automotive context. **[9]**

OR

- Q12)** Write short note on (any three): **[18]**
- a) Off-board Diagnostics.
 - b) Passenger comfort & security system.
 - c) Self diagnostic system.
 - d) SAE & IEEE standards.

EEE

Total No. of Questions :12]

SEAT No. :

P3373

[4959]-107

[Total No. of Pages :3

B.E. (E & TC)

c: NANOTECHNOLOGY

(2008 Course) (Semester - II) (Elective - IV) (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 should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to right indicate full marks.*

SECTION-I

Q1) a) Explain “fundamental Science behind Nanotechnology” [8]

b) Justify the statement ‘Bonds are key to nanotechnology’. [8]

OR

Q2) a) Comment on ‘Quantum Mechanics and Quantum ideas for nanotechnology’. [8]

b) Are the tools required for nanotechnology are different? If yes justify the same. [8]

Q3) a) What are the problems associated with Nonvolatile Memories? How nanotechnology plays key role in betterment of performance of these memories? [10]

b) At nano scale what are the problems of dielectric? How Novel Dielectric Materials can help to overcome this problem? [8]

OR

P.T.O.

- Q4)** a) Explain the effect of electron trapping in Novel dielectric material. [10]
b) Compare Floating Gate NVM and Nano-crystal NVM. [8]
- Q5)** a) Differentiate between nano-scale material and macro-scale materials. [8]
b) Why electromagnetic force is dominating over gravitational force in nano-sized particles? [8]

OR

- Q6)** a) Explain the properties of carbon nanotubes and its applications. [8]
b) What are the types of carbon Nanotubes? Explain in detail. [8]

SECTION-II

- Q7)** a) Explain MEMS devices used in automobile. [8]
b) Write differences between NEMS and MEMS. [8]

OR

- Q8)** a) Explain nano electromechanical system with suitable example. [8]
b) With the help of schematic representation, explain the process of molecular switch and switching of Azobenzine molecule. [8]

- Q9)** a) Explain e-beam lithography. [8]
b) Explain atomic beam lithography. [8]

OR

- Q10)** a) Role of nanotechnology in advanced computation. [8]
b) How nanotechnology can be used for communication? [8]

- Q11)** a) Explain application of nanotechnology in drug and drug delivery. [8]
- b) Discuss application of nanotechnology in following fields. [10]
- i) Sensors
 - ii) Optics

OR

- Q12)** Write short note on (any three): [18]
- a) Biomedical applications of Nano electronics.
 - b) Soft molecule electronics.
 - c) Light production and light transmission.
 - d) Energy capture.

EEE

Total No. of Questions : 12]

SEAT No. :

P5075

[Total No. of Pages : 3

[4959] - 108

B.E. (E&TC)

PLC AND INDUSTRIAL PROCESS AUTOMATION

(2008 Pattern) (Elective - IV)

Time :3. Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer all questions.*
- 2) *Figures to the right indicate full marks.*

Q1) a) Draw and explain the block diagram of process control & following terms with example. **[8]**

- i) Process variables
- ii) Set Point
- iii) Measured variable
- iv) Manipulated variable

b) Explain Foundation field bus and CAN bus. **[8]**

OR

Q2) a) Temperature indicator has a full scale range of 300 degrees c. A measurement results in a value of 120 degrees c. for the temperature. Specify the error if the accuracy is $\pm 0.1\%$ full scale. **[8]**

b) What is P&I diagram? How it is useful for a system engineer? **[8]**

Q3) a) Draw block diagram of typical SCADA systems & list components used in SCADA? **[8]**

b) What are signal transmission standards used in process control system? Which standard is most popular? **[8]**

OR

Q4) a) What is span zero circuit? Draw a typical span zero circuit to convert - 5 volts to + 5 volts in to 0 to + 5 volts. **[8]**

b) What is the need of transmitter? Explain intelligent transmitter and their features? **[8]**

P.T.O.

- Q5)** a) What is linearization of a sensor? Explain various methods of Linearization. [9]
b) Explain the following terms related to process instrumentation. [9]
i) Accuracy
ii) Resolution
iii) Repeatability

OR

- Q6)** a) Discuss PID algorithm for Digital implementation. [9]
b) Explain different controller tuning methods. [9]

SECTION - II

- Q7)** a) Explain principle and various type as of flow control Valves explain with their flow characteristics? Explain the function of pneumatic Actuator with failsafe operation. [8]
b) Draw and explain electric and hydraulic actuators. [8]

OR

- Q8)** a) Which types of DC motors are used as electrical actuators? How servo motor is different from conventional motor? [8]
b) What is VFD related to electrical actuators? Draw diagram and explain.[8]

- Q9)** a) Explain the various parts of PLC? Draw the block diagram of I/O cards of PLC? Explain various network topologies used for networking of PLCs? [8]
b) Draw the ladder diagram for the bottle filling plant. [8]

OR

- Q10)**a) Draw diagram with automatic sensing elements for water level control of an overhead tank and ground level tank. Write the different water level conditions in both the tank and draw the ladder diagram for the same.[8]
b) Draw a ladder diagram for a two motor system. After start Motor 1 runs for 15 minutes. After 15 minutes motor 1 goes off and motor 2 starts. Motor 2 runs for 45 minutes. After that motor 2 stops and motor 1 starts and the cycle repeats. [8]

- Q11)**a) Explain ANN based controllers in detail. [9]
b) What is fuzzy logic? Explain different Fuzzy controllers. [9]
- Q12)**a) Write a short note on statistical process control. [9]
b) Write down the important six specifications of a PLC. [9]



Total No. of Questions : 12]

SEAT No. :

P4926

[Total No. of Pages : 4

[4959]-109

B.E. (E. & TC) (Open Elective - IV(e))

**ADVANCED SATELLITE SYSTEMS AND APPLICATIONS
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 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) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Define the three laws given by Kepler to describe the motion of artificial satellites around earth. Support the definitions with relevant mathematical expressions. **[8]**
- b) Calculate the Azimuth & Elevation angles to a geosynchronous satellite. The details of the earth station and the satellite are as follows: Earth station latitude and longitude are 52° N and 0° . Satellite longitude (sub-satellite point) is 66° E **[8]**

OR

- Q2)** a) Compare LEO, MEO and GEO Satellite w.r.t. orbital height, velocity, orbital period and applications. **[8]**
- b) Define and explain the following terms with reference to the satellite orbits: **[4]**
- i) Apogee and perigee
 - ii) Ascending and descending nodes
 - iii) Eccentricity
 - iv) Inclination
- c) An antenna designed for tracking application produces a pencil like beam with both azimuth and elevation beam widths equal to 0.5° each. Determine the gain of the antenna in dB. Also determine the antenna aperture, if the operating frequency is 6 GHz. **[4]**

P.T.O.

- Q3) a)** Explain briefly the concept of Carlson Bandwidth for FM modulation. A standard NTSC signal has a baseband video bandwidth of 4.2 MHz and is transmitted over the satellite link in an RF bandwidth of 30 MHz using frequency modulation and standard pre-emphasis and de-emphasis. At the receiving earth station the C/N ratio in clear air conditions is 15 dB. Calculate the baseband S/N ratio for the video signal. Assume a de-emphasis improvement of 9 dB and a subjective improvement factor of 8 dB in the baseband signal to noise ration. **[10]**
- b)** Explain with a neat diagram following concepts in information transmission on satellite channel using frequency modulation **[8]**
- i) Psophometric SNR improvement factor.
 - ii) Pre-Emphasis-De-emphasis improvement factor.
 - iii) FM threshold effect in Satellite receiver and its significance in system design.

OR

- Q4) a)** Explain double conversion transponder for 14/11 GHz band. Support your answer with suitable diagram and specify frequencies of local oscillators and IF amplifiers. **[8]**
- b)** With the help of neat diagram explain the basis of using Raised Cosine signal shaping for reducing ISI in digital satellite communications. Enumerate the tradeoff between possible ISI reduction and maximum bit rate which may be achieved on the above channel. **[10]**
- Q5) a)** Derive step by step, the power received by an earth station P_r , from a satellite transmitter in terms of P_t - Power transmitted, G_r , G_t - Gain of transmitting & receiving antenna, respectively, losses associated with transmitting & receiving antenna & attenuation in atmosphere. **[8]**
- b)** A transponder of a Ku-band satellite has a linear gain of 127 dB and a nominal output power at saturation of 5 W. The satellite's 14 GHz receiving antenna has a gain of 26 dB on axis.
Calculate the power output of an uplink transmitter that gives an output power of 1 W from the satellite transponder at a frequency of 14.45 GHz when the earth station antenna has a gain of 50 dB and there is a 1.5 dB loss in the waveguide run between the transmitter and antenna. Assume that the atmosphere introduces a loss of 0.5 dB under clear sky conditions and that the earth station is located on the -2 dB contour of the satellite's receiving antenna. If the rain in the path causes attenuation of 7 dB for 0.01% of the year, what output power rating is required for the transmitter to guarantee that a 1 W output can be obtained from the satellite transponder for 99.99% of the year if uplink power control is used? **[8]**

OR

- Q6)** a) Explain the following terms and hence explain their significance in satellite communication. [8]
- i) G/T Ratio for the Earth station.
 - ii) Antenna Noise Temperature for the Earth station antenna
- b) Consider that the satellite communication receiver operating at 4 GHz has the following gains and noise temperatures:
 $T_{in} = 25 \text{ K}$, $T_{RF} = 50 \text{ K}$, $T_{IF} = 1000 \text{ K}$, $T_m = 500 \text{ K}$ $G_{RF} = 23 \text{ dB}$, $G_{IF} = 30 \text{ dB}$
Calculate the system Noise temperature assuming that the mixer has a gain $G_m = 0 \text{ dB}$. Recalculate the system noise temperature when the mixer has a 10 dB loss. How can the noise Temperature of the receiver be minimized when the mixer has a loss of 10 dB? [8]

SECTION - II

- Q7)** a) A SCPC-FM satellite link has an RF channel bandwidth of 45 kHz and a baseband maximum frequency of 3.4 kHz. De-emphasis provides a subjective improvement in baseband S/N ratio of 7 dB. Calculate the baseband 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 6 dB, what is the link margin for this system? [8]
- b) What is the necessity of Multiple Access Techniques? Explain TDMA frame structure and its design parameters in details. [8]

OR

- Q8)** a) Compare FDMA & CDMA techniques used in satellite communication system with respect to their parameters and performance characteristics. [8]
- b) Write a short note on Digital Direct Broadcast Satellite. [8]

- Q9)** a) Explain why BPSK or QPSK modulation techniques are more suitable compared to QAM modulation in digital satellite communication system when working with Geosynchronous satellites. [8]
- b) A satellite link achieves a C/N ratio in the receiver under clear air conditions of 14.0 dB (14.0 dB = power ratio of 25). The receiver has a RRC filter with a noise bandwidth of 1.0 MHz and a roll-off factor of 0.3, with ideal correlation detection BPSK and QPSK demodulators. What are the bit rate, symbol rate, occupied (absolute) bandwidth of the link, and BER when link is operated: [10]
- With BPSK modulation and
 - With QPSK modulation?

OR

- Q10)a)** With reference to VSAT earth station engineering, discuss [8]
- Antennas and their mechanisms.
 - Transmitters and Receivers.
- b) A TDMA network of five earth stations shares a single transponder equally. The frame duration is 2.0 ms, the preamble time per station is 20 μ s, and guard bands of 5 μ s are used between bursts. Transmission bursts are QPSK at 30 Mbaud. Calculate the number of 64 kbps voice channels that each TDMA earth station can transmit. If the earth stations send data rather than digital speech, what is the transmission rate of each earth station in Mbps?
- What is the efficiency of TDMA system expressed as Efficiency = 100% x Message bits sent/maximum possible number of bits that could be sent? [8]

- Q11)a)** Draw and explain the block diagram of signal generation in GPS satellite. [8]
- b) Write a short note on any one of the following satellite applications [8]
- Remote Sensing
 - Resources Mapping

OR

- Q12)a)** Draw and explain the block diagram of simplified GPS receiver. [8]
- b) Write a short note on the following satellite applications. [8]
- Data Acquisition Systems
 - Weather Forecasting



Total No. of Questions : 12]

SEAT No. :

P3301

[Total No. of Pages : 4

[4959]-11

B.E. (Civil)

C : TQM and MIS in Civil Engineering (Elective - II)
(2008 Pattern)

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 Questions 7 or 8, 9 or 10, 11 or 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 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) Discuss any 9 factors which affect the quality of concrete used in RCC work. [9]
- b) Explain with examples, why globalization in general and entry of multinational companies in the Indian construction market in particular are forcing Indian firms to re-define their quality policy. [9]

OR

- Q2)** a) Explain contributions from Deming, Juran and Crosby in the domain of quality with appropriate examples. [9]
- b) Recently, in Maharashtra in a particular city, many floors of existing buildings collapsed. What were the reasons? How these can be prevented? Explain. [9]

- Q3)** a) Differentiate with examples between [8]
- i) Quality control and quality assurance.
 - ii) TQC and TQM

P.T.O.

- b) Enlist any 4 ISO principles of 9001 series and explain their application in the context of a construction organisation constructing roads. [8]

OR

- Q4)** a) What is TQM? How is it different from other methods? What are its advantages? [8]

- b) Explain with practical examples how the 8 principles of ISO : 9001 enable the organisation to improve its construction processes, which otherwise would not happen. [8]

- Q5)** a) What is Kaizen? How Kaizen concept is useful in TQM applied to construction sector. Explain with examples. [8]

- b) Determine 6 Sigma level based on the following data. [8]

Sr.No.	Length of PQC(M) Cast	Defective Length with cracks, distresses (M)
1	200	nil
2	150	nil
3	300	75
4	400	25
5	500	35
6	150	10
7	250	nil
8	350	25
9	425	30
10	175	nil

OR

- Q6)** a) Explain following defects with examples : [6]

- i) Rework
- ii) Scrap
- iii) Backlogs

- b) Explain PDCA cycle application in formwork activity. [4]

- c) Explain pre-requisites for achieving success in TQM programs. [6]

SECTION - II

- Q7)** a) With any practical example explain the 3 basic interacting components of a dynamic system. [8]
- b) Define MIS. Explain why MIS is necessary. Discuss limitations and pluspoints of an MIS developed for a contractor's organisation bidding for road projects. [10]

OR

- Q8)** a) With practical examples explain basic foundation concepts of information systems and information technologies used in civil engineering. [8]
- b) Develop a decision support system for a government client executing buildings for economically weaker sections of society through a contract system. [10]
- Q9)** a) Explain use of an MIS in the operational management of a consultant's organisation, working as client's representative on a road project (expressway). [8]
- b) "PRRT software is a boom to the total quality management". Justify the above statement by explaining salient features of the above software. [8]

OR

- Q10)** a) Define "e-business". Discuss achievement of the following objectives based on a flow diagram. [9]
- i) Promotion of enterprise internal stakeholder communication, coordination, collaboration.
 - ii) Implementing e-commerce systems with external customers and suppliers.
 - iii) Re-engineering of internal processes.
- b) Explain relationship between operational management and an MIS with the help of practical examples. [7]

- Q11)** a) As a project manager of a building construction project you are required to integrate various internal departments, external customers, other stakeholders such as suppliers of various resources, financiers etc in a real time online communication, for increasing the effectiveness of working. Is there any software which helps you to do so? Is it an MIS? Why? What are its capabilities and how is it useful to you? Explain with examples. [10]
- b) Discuss development processes and information technologies as inputs to the information systems, with examples from construction projects for each. [6]

OR

- Q12)** a) Explain the type of information necessary to develop an MIS for a construction organisation constructing a bungalow, in order to minimize its inventories and increase the turnover. [8]
- b) What are expert systems? How are they used on building projects? How are they developed. [8]



Total No. of Questions : 12]

SEAT No. :

P3374

[4959]-112

[Total No. of Pages : 3

B.E. (Electronics)
ELECTRONICS SYSTEM DESIGN
(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Three questions from each section, Q1 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 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 the different stages of electronic product design indicating importance of each stage. **[8]**
- b) What is ergonomics? State the objectives of ergonomics. **[4]**
- c) Explain the different schemes to improve the overall reliability of electronic product. **[6]**

OR

- Q2)** a) Explain bath tub curve with neat sketch. **[8]**
- b) State the criterion for selection of frequency bands. **[4]**
- c) With suitable example explain how the reliability of system is estimated. **[6]**

- Q3)** a) Discuss the various factors affecting choice of an op-amps in signal conditioning applications. **[8]**
- b) Explain the important specifications while choosing ADC with suitable example. **[8]**

OR

P.T.O.

- Q4)** a) State the important parameters to be considered while selecting DAC. [8]
b) State the important characteristics of instrumentation amplifier. Sketch the noise model of an amplifier. [8]

- Q5)** a) Explain the important factors while selecting microcontroller with suitable example. [8]
b) Discuss the interface of LCD with microcontroller with neat diagram. [8]

OR

- Q6)** a) Explain the different schemes of LED interfacing with the microcontroller. [8]
b) Compare: [8]
i) RISC with CISC.
ii) I²C with SPI.

SECTION - II

- Q7)** a) State the goals of software design. [4]
b) Explain the different phases of software design with the help of neat block diagram. [8]
c) Enlist the important features of flowchart. [6]

OR

- Q8)** a) Explain in detail the process of developing software for a microcontroller-based system using a combination of low a high level language. [8]
b) Explain the features of simulators. [4]
c) Explain the different types of constructs used in structure programming with neat diagram. [6]

- Q9)** a) Explain the PCB design rules for mixed signal circuits. [8]
b) What is shielding? Discuss the different types of shielding with neat diagram. [8]

OR

- Q10)**a) What is noise? Explain the different noise reduction techniques with neat diagrams. [8]
b) Define signal integrity. State & explain different factors affecting signal integrity. [8]

- Q11)**a) Enlist the capabilities of DSO & MSO. [6]
b) Explain the importance of operating point analysis & with suitable diagram of two stage amplifier how it is carried out. [8]
c) Compare simulation with prototyping. [2]

OR

- Q12)**a) Explain the importance of environmental testing. Briefly explain the different temperature tests carried out on product. [8]
b) State the capabilities of logic analyzer. [2]
c) With the help of suitable diagram explain EMI/EMC testing carried out on product. [6]



Total No. of Questions :12]

SEAT No. :

P3375

[Total No. of Pages :3

[4959]-113

B.E. (Electronics)

VLSI Design

(2008 Course) (Semester -I) (404202)

Time : 3 Hours

[Max. Marks :100]

Instructions to candidates:

- 1) *Answer 03 questions from section I and 03 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.*
- 6) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION -I

- Q1)** a) Explain CMOS inverter and also show the voltage transfer curve with all the region of operation of NMOS and PMOS. [7]
- b) Explain the following. [9]
- i) Hot electron effect.
 - ii) Body effect.
 - iii) Velocity saturation.

OR

- Q2)** a) Draw 8:1 MUX using transmission gate and compare the same with conventional diagram of MUX. [8]
- b) Differentiate between Static and dynamic power dissipation considering any one digital circuit. [8]
- Q3)** a) Enlist all the memories used in CMOS technology. [8]
- b) Differentiate between SRAM and DRAM and show how both memories are different from each other. [8]

OR

P.T.O.

- Q4)** a) With the help of diagram explain single bit SRAM. [8]
b) Explain the role of memories in PLDs. [8]

- Q5)** a) Explain all the modeling styles used in VHDL design considering the example of 4:1 MUX. [9]
b) Differentiate the following. [9]
i) Synthesizable and non synthesizable test benches.
ii) Function and procedure.
iii) Moore and Mealey machine.

OR

- Q6)** a) Write a VHDL code for Moore machine and Mealey machine and Comment on the result which detects the sequence 1010. [12]
b) Define metastability. How it can be reduced? [6]

SECTION -II

- Q7)** a) Explain the role of PLDs in DSP processor. [8]
b) Draw the block diagram of FPGA and explain CLBs in detail. [8]

OR

- Q8)** a) Enlist and explain all the types of PLDs. [8]
b) With the help of block diagram explain CPLD and also explain how it is different from other PLDs. [8]

- Q9)** a) Define controllability and predictability. How these two factors are contributing in testability. [8]
b) Explain stuck at 1 and stuck at 0 faults. [8]

OR

- Q10)**a) Explain the architecture of JTAG showing all the required signals. [8]
b) Differentiate partial and full scanning giving suitable example. [8]
- Q11)**a) Enlist all the signal integrity issues and also give the methods to avoid the problem of EMI. [9]
b) What are the different methods of clock distribution technique. [9]

OR

- Q12)** Explain the following (Any three). [18]
- a) Clock skew.
 - b) Clock jitter.
 - c) EMC techniques.
 - d) H- tree.
 - e) Power optimization techniques.



Total No. of Questions : 12]

SEAT No. :

P3376

[4959]-114

[Total No. of Pages : 2

**B.E. (Electronics Engineering)
EMBEDDED SYSTEMS
(2008 Course) (Semester - I) (404203)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three (03) questions from each section.*
- 2) *Answers to the two sections must be written in separate books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to right side indicate full marks.*
- 5) *Assume Suitable data whenever necessary.*

SECTION - I

- Q1)** a) What are the design metrics of an embedded system? [8]
b) Explain Blue tooth communication protocol in detail. [10]

OR

- Q2)** a) Describe 'Round Robin with Interrupt' software architecture. [8]
b) Explain Zigbee communication protocol in detail. [10]

- Q3)** a) What are the types of processors? What are the specifications of processor used for its selection for any application? Give suitable example. [10]
b) Related to interrupt, Define following terms. [6]
i) Interrupt Priority
ii) Interrupt Latency
iii) Pending Interrupt

OR

- Q4)** a) What are major design rules used to design RISC architecture? [10]
b) What are memory selection parameters/specifications used in different applications? [6]

P.T.O.

- Q5)** a) Describe data flow model of ARM processor. [8]
b) Compare ARM mode with Thumb mode. [8]

OR

- Q6)** a) Describe registers used in ARM 7 processor in different operating modes?[10]
b) Describe role of CPSR & SPSR register in detail? [6]

SECTION - II

- Q7)** a) Describe 4×4 matrix keyboard interface. Give its implementation using embedded C? [8]
b) Describe 16×1 LCD interface. Give its implementation using embedded C? [8]

OR

- Q8)** a) Describe on chip ADC interface of LPC 2148 and its operating modes.[8]
b) Describe on chip PWM interface of LPC 2148 and its operating modes.[8]

- Q9)** a) What are the various scheduling algorithms used in different applications?[12]
b) What are the features of μ Cos - II? [6]

OR

- Q10)**a) What are major reasons for dead - lock situation? Give suitable example.[10]
b) Draw and explain state diagram. [8]

- Q11)**a) Describe Priority Inversion problem & its solution. [8]
b) What services are supported by μ Cos- II to handle interrupts? [8]

OR

- Q12)**a) What are the mechanisms used to generate time delays in RTOS? [8]
b) Describe digital camera as an embedded system. [8]



Total No. of Questions :12]

SEAT No. :

P3377

[4959]-115

[Total No. of Pages :3

B.E. (Electronics)

**a: ADVANCED MEASUREMENT SYSTEMS
(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 books.*
- 2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION-I

- Q1) a)** What is signal integrity? How to ensure signal integrity in case of RF CMOS circuits? **[8]**
- b) With the help of block schematic explain arbitrary waveform generator and give its typical application. **[8]**

OR

- Q2) a)** How DPO differs from DSO? Give typical application of DPO. **[8]**
- b) What is need of MSO? List important specifications of MSO and give typical application of MSO. **[8]**
- Q3) a)** List and elaborate at least eight parameters to consider while selecting DSO. **[8]**
- b) Give typical specifications of Logic Analyzer. Explain how it can be used in fault finding in microcontroller circuits. **[10]**

OR

P.T.O.

- Q4) a)** With respect to DSO explain the terms **[10]**
- i) Math functions
 - ii) FFT
 - iii) Roll mode
 - iv) Zoom mode
 - v) Glitch mode
- b) With the help of functional block diagram explain working of RF swept super heterodyne spectrum analyzer? **[8]**

- Q5) a)** What is role of Electronic measurements for Electronic Central Unit [ECU] in an Automotive system? **[8]**
- b) Explain need and use of RF modules and Ethernet in Embedded systems? **[8]**

OR

- Q6) a)** Explain interfacing techniques for: **[8]**
- i) 16X2 Graphic LCD
 - ii) Alphanumeric Touch Screen
- b) Explain USB and CAN bus standards required in embedded systems? **[8]**

SECTION-II

- Q7) a)** Explain in detail the EMI/EMC test set up for conducted and radiated interference measurement? **[8]**
- b) Draw a scheme for microwave power measurement using microwave power bridge circuit with barraters and explain the method? **[8]**

OR

- Q8) a)** Draw and elaborate the fundamental test setup for Advanced Radar System. **[8]**
- b) What are different attenuation measurement techniques used in microwave network? Explain the schemes? **[8]**

Q9) a) Explain the concept of virtual instrumentation and its benefits in test and measurements? [8]

b) Explain the terms GPIB and SCPI of virtual instrumentation? [8]

OR

Q10)a) Elaborate in detail application of the virtual instrumentation for the distortion analyzer. [8]

b) Explain the desired features of software used for virtual instruments?[8]

Q11)a) Discuss the errors encountered in measurement of frequency/time period digitally? How to minimize these errors? [10]

b) Explain the data logger in detail with its typical application? [8]

OR

Q12)a) Explain the concept of ADC. List various types of ADCs with important specifications and explain any one in detail? [10]

b) Explain the different automations in digital equipments; namely auto polarity, auto ranging and auto zeroing? [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P4900

[Total No. of Pages : 3

[4959]-116
B.E. (Electronics)
ADVANCE POWER ELECTRONICS
(2008 Course)

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) Draw a neat circuit diagram and relevant waveforms of a single phase series full converter. **[10]**
- b) Why power factor of a controlled converter is never unity even for a resistive load? **[8]**

OR

- Q2)** a) Explain how unwanted harmonics are eliminated in a 12 pulse converter? **[8]**
- b) Draw a circuit diagram of 3 phase IGBT based PWM rectifier and explain the advantages. **[10]**

- Q3)** a) Draw equivalent circuit diagram of a separately excited DC motor. State the equations that govern the operation of the motor. Explain the field weakening operation. **[8]**
- b) Draw a circuit diagram and waveforms of a Cyclo converter to reduce the incoming frequency by a factor of four. **[8]**

OR

- Q4)** a) Why V/f method of induction motor speed control is very popular? **[8]**
- b) Draw circuit diagram and explain operation of ZCS converter. **[8]**

P.T.O.

- Q5)** a) Draw circuit diagram of a three level multilevel inverter and explain the device selection criteria. [8]
- b) Explain the third harmonic injection modulation method to improve THD of inverter output. [8]

OR

- Q6)** a) Why PLL drive improves the speed regulation of a drive? [8]
- b) Explain microcontroller based DC motor drive. [8]

SECTION - II

- Q7)** a) Compare linear power supply, SMPS and resonant converter power supply. [6]
- b) Explain an application where Low Drop out regulator is essential. [6]
- c) Explain the concept of soft switching. [6]

OR

- Q8)** a) With relevant diagram explain traction motor drive. [8]
- b) What are parallel redundant power supplies? How load is shared in these supplies? [10]

- Q9)** a) What is power quality? Explain the different line disturbances and their mitigation techniques. [8]
- b) Why Bi-Directional converter is essential for a wind energy system? [8]

OR

- Q10)** a) What are the advantages and applications of HVDC system? [8]
- b) Draw schematic circuit of solar PV operated battery assisted DC motor drive? [8]

Q11)a) What are synchronous rectifiers? Explain in detail. **[8]**

b) Explain Fuzzy logic based wind generation system. **[8]**

OR

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

a) Z source inverters

b) Cascaded H bridge multilevel inverters

c) Energy Audit

d) Flexible AC transmission



Total No. of Questions :12]

SEAT No. :

P3378

[4959]-117

[Total No. of Pages :3

B.E. (Electronics)

c:BIOMEDICAL INSTRUMENTATION

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

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 different type of electrodes for measurement of Bio signal with their properties and material used for the same. **[10]**
- b) Explain with suitable diagram action potential, resting potential, depolarization and repolarization of a cell. **[8]**

OR

- Q2)** a) Discuss Ten most important factors to be considered in the design of medical instrument. **[10]**
- b) Describe temperature sensor used in medical application. **[8]**
- Q3)** a) Draw and explain 10-20 electrode system for EEG recording. **[8]**
- b) Explain in detail working of brain and function of spinal cord. **[8]**

OR

- Q4)** a) Name different type of EMG. Explain the procedure to perform EMG with help of diagram. **[8]**
- b) Explain various types of EEG electrodes. **[8]**

P.T.O.

- Q5) a)** Explain the cardio vascular system with neat sketch. [8]
- b) Write short note on stress test system. [8]

OR

- Q6) a)** Explain the Einthoven triangle concept with necessary diagram. [8]
- b) What is the effect of artifacts on ECG reading? Explain block diagram of typical ECG machine. [8]

SECTION-II

- Q7) a)** Give salient feature of electromagnetic blood flow meter. [8]
- b) What is systolic and diastolic pressure? Explain non invasive blood pressure measurement system. [8]

OR

- Q8) a)** Classify pacemaker on the basis of pacing mode. Explain any one in detail. [8]
- b) Explain the working of DC defibrillator with circuit diagram and waveform. [8]
- Q9) a)** Explain in detail dialysis system. [8]
- b) What are the different elements included in the Blood Cell Test? Explain the Automatic optical method for measurement of RBC's & WBC's. [8]

OR

- Q10) a)** Write advantages and disadvantages of Electronic Stethoscope. [8]
- b) Explain with block diagram central monitoring system. [8]

Q11)a) What is CT scan? Compare MRI and CT Scan. **[10]**

b) Explain in detail the application of LASER in medical application. **[8]**

OR

Q12)Write short note (any Three): **[18]**

- a) X-ray machine.
- b) Oximeter.
- c) Flame photometer.
- d) Amalgamator.

EEE

Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 2

P4905

[4959] - 117-A

B.E. (Electronics)

MECHATRONICS

(2008 Pattern) (Elective - I(d)) (Semester - 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.*
- 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) Explain in detail different mechanical components bearings, bushings, brakes and clutches. [8]
- b) Explain the role of Mechatronics system and also in detail design approach for mechatronics system. [8]
- Q2)** a) Write short note on chains and sprockets. [8]
- b) Explain the modelling procedure of Mechatronics System. [8]
- Q3)** a) Write a short note on common structures of mechatronics system. [8]
- b) What is modelling and Explain simple dynamic models in detail. [8]
- Q4)** a) Define actuator and explain different actuators in detail. [8]
- b) Write short note on DC motors and servo motors. [8]

P.T.O.

- Q5)** a) Explain selection criteria, principle of operation and specifications for force measurement. [10]
b) Write short note on DC brushless motors and DC brushed motors. [8]
- Q6)** a) Explain vector drives and drive system load calculation in detail. [10]
b) Write a short note on Programmable electro hydraulic valves and 4-quadrant servo drives. [8]

SECTION - II

- Q7)** a) Explain role of controls in mechatronics system. [8]
b) Explain in detail the mobile robot design. [8]
- Q8)** a) What are special requirements of Mechatronics that differentiate from classic systems and control design? [8]
b) What is integrated modelling? Explain the design of a simple servo system. [8]
- Q9)** a) Explain architecture of PLC with neat block diagram. [8]
b) Explain different types of communication and data flow control. [8]
- Q10)** a) Explain UART in detail. [8]
b) Write short note on Error handling and serial interface standards. [8]
- Q11)** a) Design and explain data logger for a milk filling plant having conveyer based filling and sealing system. [10]
b) Explain in details signal conditioning unit. [8]
- Q12)** a) Draw and explain working of copying machine. [10]
b) Describe in detail multichannel data logger. [8]



Total No. of Questions : 12]

SEAT No. :

P3379

[4959]-118

[Total No. of Pages : 3

B.E. (Electronics)

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section - I and 3 questions from Section -II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagram must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1) 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]**

OR

- Q2) a)** Discuss Flynn's & Handler's classification of parallel computer in detail. **[12]**
- b) Explain the Amdahl's law for speedup performance. **[6]**
- Q3) a)** Explain various types of data hazards observed in pipeline processor. How those hazards could be detected and resolved. **[8]**
- b) Compare between: **[8]**
- i) Static and dynamic pipeline
 - ii) Unifunctional and multifunctional pipeline.

OR

P.T.O.

Q4) a) Explain the Internal Forwarding Techniques. [6]

b) Consider the following pipeline reservation table

clock cycles →	1	2	3	4	5	6	7
States ↓							
S1	X		X				X
S2				X		X	
S3			X		X		

[10]

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

ii) Draw the state transition diagram.

iii) List all simple cycles and greedy cycles.

iv) For a pipeline clock period $\tau=20\text{ns}$. Determine maximum throughput of the pipeline.

Q5) a) What are vector processors? Discuss two different architectural configurations of vector processor. [12]

b) Explain pipeline chaining. [4]

OR

Q6) a) State the characteristics of CRAY - 1 computer system. Draw and explain the computation section of CRAY - 1 vector processor. [12]

b) Explain any two types of vector instructions. [4]

SECTION - II

Q7) a) Explain matrix multiplication on SIMD architecture. [10]

b) Explain the cube interconnection network and hypercube interconnection network. [8]

OR

Q8) a) Explain the algorithm to compute fast Fourier Transform for SIMD architecture. [10]

b) Explain static and dynamic network topologies used in interconnection networks with proper examples. [8]

Q9) a) Explain cache coherency and bus snooping. [8]

b) Explain loosely and tightly coupled multiprocessor system with example. [8]

OR

Q10)a) Explain in detail chip multiprocessing. [8]

b) Give a typical architecture for MPP. Explain in detail. [8]

Q11)a) Discuss in brief latency hiding techniques. [8]

b) Explain Data parallel programming. [8]

OR

Q12)a) Write short note on [8]

i) Synchronous message passing

ii) Asynchronous message passing

b) Explain use of following primitives w.r.t. parallel programming. [8]

i) Send ();

ii) Receive ();

iii) Fork ();

iv) Join ();

x x x

Total No. of Questions : 12]

SEAT No. :

P3380

[4959]-119

[Total No. of Pages : 3

B.E. (Electronics)

ENTREPRENEURSHIP & BUSINESS PLANNING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to 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 whenever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Assume suitable data if necessary.*

SECTION - I

Q1) a) Explain the role of government in market economy? **[9]**

b) Explain in detail-the concept of business plan. **[9]**

OR

Q2) a) Explain the demand and supply curve in a market economy. Also example of the equilibrium price. **[6]**

b) What are the basic rules to be followed in writing the business letter?**[6]**

c) Write short note on different entrepreneur skills. **[6]**

Q3) a) Explain the process of own Franchise and start a business. **[6]**

b) What are the different advantages and disadvantages of partnership firm. **[6]**

c) What is the role of government in entrepreneurial development? **[4]**

OR

P.T.O.

- Q4)** a) Explain the types of Bank loans. What are some of the reasons due to which a bank rejects the loan proposal? [4]
- b) Write a short note on markup price and markdown price with suitable example. [4]
- c) Define Business plan? Discuss a typical business plan with a case study. [8]

- Q5)** a) What is the importance of advertising? Explain different types of advertisements. [8]
- b) Is entrepreneurship right for you? Explain how you will decide it. [8]

OR

- Q6)** a) Explain in brief the type of insurance you can purchase for your business. [6]
- b) What is inventory? What are different types of inventory? [6]
- c) What are the basic options of channels distribution. [4]

SECTION - II

- Q7)** a) Categorize business risk. Identify security precautions to protect your business from different types of theft. [8]
- b) Explain the different types of insurance you may need for your business. [6]
- c) How do you determine the staffing needs of your business? [4]

OR

- Q8)** a) Explain the concept of primary data. Discuss the various steps of primary market Research. [6]
- b) Distinguish between demand based pricing and competition based pricing. [6]
- c) Write a short note on inventory tracking. [6]

- Q9)** a) What is the role of computer technology and Internet in business? [6]
b) What are some ways you can improve your cash flow. [4]
c) State and explain the various leadership qualities. [6]

OR

- Q10)**a) Explain in brief the regulations that promote competition. [8]
b) Write a short note on use of internet in business. [4]
c) Explain in brief ethics of Business management. [4]

- Q11)**a) What are green business opportunities, explain in the context of Environmental Threat and Opportunity Profile (ETOP). [8]
b) Explain business idea with an example. [8]

OR

Q12) Write short notes on:

- a) Benefits & risks involved when competing globally? [6]
b) Explain different business ideas for a start up business. [6]
c) Business ethics. [4]

x x x

Total No. of Questions :12]

SEAT No. :

P3938

[Total No. of Pages :4

[4959] - 12

B. E. (Civil)

EARTHQUAKE ENGINEERING

(2008 Course) (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 to the right, indicate full marks.*
- 4) *IS 456, IS 1893, IS 13920 are allowed in the examination.*
- 5) *Neat diagrams should be drawn where ever necessary.*
- 6) *If necessary, assume suitable data and indicate clearly.*
- 7) *Use of electronic pocket calculator is allowed.*

SECTION - I

- Q1)** a) What are the causes of an earthquake? Explain with neat sketches the Elastic Rebound Theory? [6]
- b) Classify and describe with suitable sketches, different types of waves generated by an earthquake? [4]
- c) Explain philosophy behind earthquake resistant design of structures? Describe the difference between magnitude and intensity of an earthquake? [6]

OR

- Q2)** a) Explain with examples, the lessons learnt from past earthquakes? [8]
- b) Explain the interior of the earth with neat sketches? Classify the earthquakes based on different parameters? [8]

P.T.O.

- Q3) a)** What are different types of vibrations? Define natural frequency, Natural time period, Natural circular frequency and Damping ratio. [8]
- b) Explain with examples, Over damped system, critically Damped system and Under damped system giving example of each for free but damped SDOF. [8]

OR

- Q4)** For the two degree freedom system shown in Figure 4.1, obtain natural frequencies and amplitude ratios. Assume $K = 20\text{kN/m}$. [16]

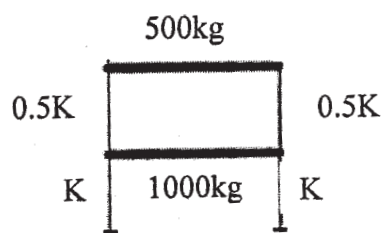


Figure 4.1

- Q5)** Determine the design eccentricity in Y-direction for a three storey building as shown in Figure 5.1. The total seismic weight /floor= 450kN . The column size = $400\text{mm} \times 600\text{mm}$. Assume grade of concrete = M25. [18]

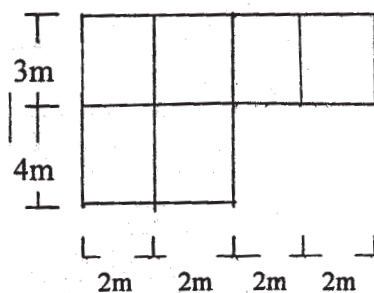


Figure 5.1

OR

Q6) Determine lateral forces at different storey levels for a plan of four storey school building as shown in Figure 6.1. Assume D.L. = 5kN/m^2 , L.L. = 4kN/m^2 on each floor and 1.5kN/m^2 on roof. Assume floor height 4m for ground and 3m for remaining storey with soil type hard and seismic zone III. [18]

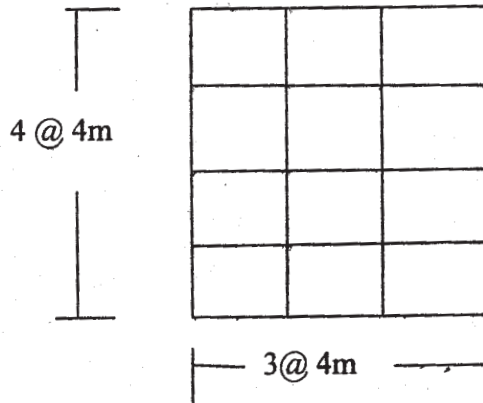


Figure 6.1

SECTION - II

- Q7)** a) What is the necessity of ductile detailing? Explain with neat sketches the detailing for Beam-Column joint as per IS 13920 (1993). [9]
- b) Explain the effects and various methods to reduce the effects of liquefaction of soil? [9]

OR

- Q8)** a) Define the shear wall and its classification? Describe the structural behavior of shear wall? [9]
- b) What is Base Isolation? Explain energy dissipation devices to improve earthquake resistance of buildings? [9]

- Q9)** a) What is strengthening and retrofitting? Explain in brief the techniques for retrofitting of RCC build constructions? [8]
- b) Explain the terms active and passive control system? What are different types of steel frames used in earthquake prone areas? [8]

OR

Q10)a) Explain Tuned Mass Dampers? [8]

b) Explain various techniques for local retrofitting of RC buildings? Give reasons for poor performance of masonry buildings? [8]

Q11)a) Differentiate between retrofitting and strengthening? What are techniques for retrofitting of RC buildings? [8]

b) A 400 mm × 600 mm column is reinforced with 14 nos. of 16mm dia. Bars. It is supported on an isolated footing. The load coming on footing is 1600kN and a moment 30kN.m. The SBC is 150kN/m². Using M25 grade of concrete and steel grade Fe500, design footing and sketch the details. [8]

OR

Q12) Write notes on- [16]

- a) Factors Controlling liquefaction.
- b) Irregularities in buildings
- c) Response spectrum analysis
- d) Load Resisting systems as per IS13920



Total No. of Questions : 12]

SEAT No. :

P3381

[4959]-120

[Total No. of Pages : 3

B.E. (Electronics)

SYSTEM ON CHIP (SOC)

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) Answer any 3 questions from each section.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagram must be drawn whenever necessary.*
- 4) Figures to the right side indicate full marks.*

SECTION - I

Q1) a) Explain the concept of MEMS with an example in detail. **[8]**

b) What are the various issues in scaling of a design. **[8]**

OR

Q2) a) With a flow diagram explain the micromachining processes. **[8]**

b) What is the importance of pressure sensor and actuator in a typical MEMS. Explain with a case study. **[8]**

Q3) a) Explain in detail the various sliding control of MEMS. **[8]**

b) What are the various digital controls of MEMS. **[8]**

OR

P.T.O.

Q4) a) How do the choice of material for MEMS plays a role in design of a typical MEMS. [8]

b) Write short note on Gallium Arsenide and silicon with respect to micromachining characteristics [8]

Q5) a) Write a short note on various biological transducers. [9]

b) Explain the basic concept of electrophoresis. [9]

OR

Q6) a) Explain the working principle of molecule based biosensors. [9]

b) Write a short note on thermal transducers, explain with a case study.[9]

SECTION - II

Q7) a) How the design flow of SOC differs from that of VLSI design. [8]

b) What are the various compilation techniques associated with core architecture design. [8]

OR

Q8) a) Explain in detail the concept of microsystem technology. [8]

b) Elaborate the various applications of microsystem technology. [8]

Q9) a) What is testability? Why it is important in ASIC design. [8]

b) If the lithographic process is not done properly, How it will affect the design process. [8]

OR

Q10)a) What do you mean by behavioral synthesis explain in detail. [8]

b) What is photolithography. Explain it's importance in the ASIC micromachining process. [8]

Q11)a) What is Boundary scan? When it is carried out in a design explain with an example. [9]

b) Explain the concept of testability? When it is carried out in a design. [9]

OR

Q12)a) Write short note on microsystem packaging. [9]

b) What are the various strategies in embedded core based SOC. [9]

x x x

Total No. of Questions : 12]

SEAT No. :

P3382

[4959]-122

[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 Q1 or Q2, Q3 or Q4, Q5 or Q6 from section- I.*
- 2) *Attempt Q7 or Q8, Q9 or Q10, Q11 or Q12 from section- II.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn whenever necessary.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain types of networks. [6]
b) Give applications of Bus, Star, Mesh, Ring topologies. [4]
c) Briefly discuss the working of Frame relay. [6]

OR

- Q2)** a) Enlist layers of OSI model with their functions. [6]
b) What are the types of services? Explain. [6]
c) Discuss advantages and disadvantages of computer networks. [4]
- Q3)** a) What is PING? When is it used? [4]
b) Explain the working of SMTP and SNMP with diagram. [8]
c) What is a Socket? What are the types of Socket? [4]

OR

- Q4)** a) How is TELNET implemented? [6]
b) Compare FTP and TFTP. [4]
c) What is HTML? Where is HTML used? Write a program displaying a slogan using HTML. [6]

P.T.O.

- Q5)** a) With diagram explain connection establishment and release at transport layer. [6]
b) Explain - Quality of Service, Traffic shaping, Buffering, Jitter control. [8]
c) What are the principles of congestion control? [4]

OR

- Q6)** a) Explain ARP, RARP, ICMP, IGMP. [8]
b) What are the issues at Network layer? [4]
c) Explain any two routing algorithms. [6]

SECTION-II

- Q7)** a) Explain functions of Datalink layer. [6]
b) Explain Stop-n-Wait protocol. [6]
c) Explain with diagram types of Ethernet. [6]

OR

- Q8)** a) Explain HDLC & PPP Protocol. [6]
b) Explain network components- Hubs, Repeaters, Bridges, Switches, Routers, Gateways. [12]

- Q9)** a) What are the types of Transmission Media? Explain the in detail one Transmission media. [8]
b) A channel has a B.W. of 5KHz and signal to noise ratio power ratio is 63. Determine the Bandwidth Needed if the S/N power ratio is reduced to 31. [4]
c) Explain SONET. [4]

OR

- Q10)** a) Explain circuit switching with diagram and example. [8]
b) Describe the structure of Packet switch. [4]
c) Explain physical layer of 802.11 LAN. [4]

- Q11)** a) What is Cryptography? Explain a Public key algorithm. [6]
b) Write a short note on Network simulation. [6]
c) What is a Hash function? [4]

OR

- Q12)** a) What is network tester used for? [4]
b) How is internet accessed through Dialup modem? [6]
c) Explain X-802.5 security architecture. [6]



Total No. of Questions : 12]

SEAT No. :

P3383

[4959]-123

[Total No. of Pages : 3

B.E.(Electronics)

PROCESS AUTOMATION

(2008 Course) (404208)(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 whenever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

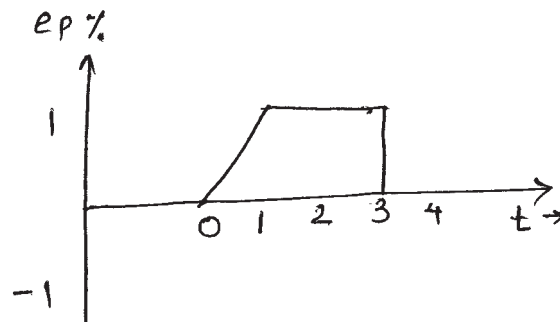
- Q1) a)** Explain the following measures of control system quality. **[8]**
- i) Over damped response
 - ii) Under damped response
 - iii) Critically damped response
 - iv) Quarter amplitude criteria
 - v) Minimum area criteria
- b) A sensor outputs a voltage ranging from $-2.4V$ to $-1.1V$. For interface to analog to digital converter, this needs to be 0 to 5V. Develop the required signal conditioning. **[8]**

OR

- Q2) a)** Explain with suitable example process control block diagram. **[8]**
- b) Suppose the temperature range 20 to $120^{\circ}C$ is linearly represented by the standard current range of 4-20 mA. What current will result from $66^{\circ}C$. What temperature does 6.5mA represent? **[8]**
- Q3) a)** Justify the statement- adding an integral action to the proportional action eliminates offset error. State the equation for a proportional integral controller. Draw a circuit diagram for a 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 $P_i(0) = 20\%$. [10]



OR

- Q4)** a) What do you mean by process loop tuning? Enlist different tuning methods and explain any one method in detail [8]
 b) A proportional derivative controller has a 0.4 to 2.0 V input measurement range and 0 to 5V output, $K_p = 5\%$ and $K_d=0.08\%$ per(%/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 different types of control valve noise [8]
 b) An equal percentage valve has a rangeability of 32. If the maximum flow rate is $100\text{m}^3/\text{hr}$ find the flow at 2/3, and 4/5 open settings. [8]

OR

- Q6)** a) Explain the terms flashing and cavitation with respect to control valves. [8]
 b) An equal percentage valve has a maximum flow of $100\text{cm}^3/\text{s}$ and a minimum of $4 \text{ cm}^3/\text{s}$. If the full travel is 3 cm, find the flow at a 2cm opening. [8]

SECTION-II

- Q7)** a) Enlist both measurable and unmeasurable disturbances in the heat exchanger process. 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 control scheme suitable for improving combustion efficiency in a boiler. [8]

b) Explain with block diagram the concept of model predictive control.[8]

Q9) a) Explain control scheme to control tops product composition in a distillation column [10]

b) Draw and explain P & I diagram for surge control in air compressor.[8]

OR

Q10)a) Draw and explain P&I diagrams for cascade control of multiple effect evaporoator [10]

b) Explain with neat diagram architecture of robot controller. [8]

Q11) Write notes on

a) Role of alarm annunciator in ensuring plant safety [8]

b) Strip chart recorder [8]

OR

Q12) a) Explain with block diagram distributed control system. [8]

b) Explain with neat diagram working principle of a flow totalizer. [8]



Total No. of Questions : 12]

SEAT No. :

P3384

[4959]-124

[Total No. of Pages : 3

**B.E.(Electronics Engineering)
a- AUDIO AND VIDEO ENGINEERING
(2008 Pattern) (Elective-III)(Semester-II)**

Time :3Hours]

[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 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) What do you understand by interlaced scanning. How interlaced scanning reduces flicker & conserves band width. **[6]**
- b) Explain the following with reference to TV: **[8]**
- i) Brightness or Luminance
 - ii) Hue or Tint
 - iii) Saturation
 - iv) Colour Burst
 - v) Kell factor
 - iv) Chromaticity Diagram
- c) State the scanning line sequence details for 625 line TV system as per CCIR-B standard. **[4]**

OR

- Q2)** a) Draw a neat sketch of composite video signal. Indicate the numerical values for different timing for various pulses used in CCIR-B standards. **[6]**
- b) Give construction and operation of LED TV screen and TFT displays used for TV. **[6]**
- c) Describe principle of a colour chroma with the help of suitable diagram **[6]**

P.T.O.

- Q3)** a) Draw and explain the Block diagram and working principle of pattern generator. How does it help in TV alignment & fault finding? [8]
- b) Draw & Explain the Block diagram of PAL encoder. Also explain how colour signals are modulated with suitable diagram. [8]

OR

- Q4)** a) Give advantages and disadvantages of NTSC, PAL and SECAM TV system. [6]
- b) Explain why (G-Y) is not transmitted in a colour TV transmission? [4]
- c) Draw and explain Block diagram of field strength meter. [6]

- Q5)** a) What is MAC encoding? Draw and explain MAC DTV Transmitter and Receiver. [11]
- b) Compare performance of Interlace and progressive scanning used in digital TV. [5]

OR

- Q6)** Write short note on the following: [4×4]
- a) Analog TV vs Digital TV
- b) MPEG-2
- c) DTV recording system
- d) Video compression

SECTION-II

- Q7)** a) Draw and explain the Block Diagram of HDTV Transmitter and Receiver. [12]
- b) Explain the digital broad casting case study on Football match with suitable diagram. [6]

OR

- Q8)** Write short note on the following: [3×6]
- a) Satellite TV.
- b) DTH
- c) CCTV

- Q9)** a) Explain CD recording and reproduction with the help of Block Diagram. [8]
b) Explain MP3 Audio compression format. [4]
c) Define Phase Delay and 'Acoustic feedback' for PA system. [4]

OR

- Q10)** a) With the help of neat Block diagram, explain Blue-Ray DVD player. [8]
b) Enlist and explain the audio compression ITU- T standard. [8]

- Q11)** a) What are the requirements of a good Auditorium for pleasant listening? Give the features of acoustical design of an Auditorium. [8]
b) Explain working principle of a chordless microphone PA system. State the types of modulation technique used in this system. [8]

OR

- Q12)** a) Explain concept of Reverberation and Echo. Mention typical Reverberation periods. [8]
b) Explain special types of speakers with suitable diagram. [8]



Total No. of Questions : 12]

SEAT No. :

P3385

[4959]-125

[Total No. of Pages : 2

B.E.(Electronics)

b: IMAGE PROCESSING & MACHINE VISION

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

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right the indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) With the help of neat diagram explain various steps in image processing. **[10]**
- b) With reference to relation between pixel explain. **[8]**
- i) 4 connectivity
 - ii) 8 connectivity
 - iii) Mixed Connectivity

OR

- Q2)** a) Explain how sampling and quantization is used in an image. **[10]**
- b) Briefly explain the following: **[8]**
- i) Brightness Adaptation
 - ii) Simultaneous contrast
- Q3)** a) With the help of examples explain different arithmetic operations. **[8]**
- b) What are the important properties of Gaussian Filter? Explain. **[8]**

OR

- Q4)** a) With the help of masks explain Mean Filter and Median Filter. **[8]**
- b) Explain Low pass Filter in frequency domain. **[8]**
- Q5)** a) What is the significance of region growing and merging? **[8]**
- b) Explain how Fourier Descriptors help in defining boundaries. **[8]**

OR

P.T.O.

- Q6)** a) Give the difference between canny edge detection and pyramid edge detection. [8]
b) With the help of example explain how chain codes help in edge detection. [8]

SECTION-II

- Q7)** a) Explain image compression using JPEG? [10]
b) In transform based image compression discuss the effect of subimage size on [8]
i) Compression Performance
ii) Computational complexity

OR

- Q8)** a) What is the advantage of Variable Length Coding explain with example. [8]
b) Explain how Hough Transform is used for edge Linking. [10]
Q9) a) What is the significance of moments and how are they used to represent images? [8]
b) Explain how histogram is used to represent regions. [8]

OR

- Q10)** a) What are the different shape features? Explain with example. [8]
b) What are texture Features? Give their significance. [8]
Q11) a) What is the difference between statistical and syntactical pattern Recognition. [8]
b) Explain Graph Matching Techniques. [8]

OR

- Q12)** a) With the help of a diagram explain single Perspective Camera. [8]
b) Explain scene reconstruction from multiple views. [8]



Total No. of Questions : 12]

SEAT No. :

P4927

[Total No. of Pages : 3

[4959]-126

B.E. (Electronics)

(C) : OPTICAL AND MICROWAVE COMMUNICATION

(Semester -II)(Elective - III)

(2008 Pattern)

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 Q7 or Q8, 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 basic block diagram of optical fiber communication system in detail. [8]
- b) Describe different types of fibers and their characteristic in detail. [8]

OR

- Q2)** a) Compare the following terms. [8]
- i) Step index fiber and Graded index fiber
 - ii) Pin photodiode and Avalanche photodiode
- b) Explain in detail the different types of modulators. [8]

- Q3)** a) What is dispersion? Explain material dispersion in detail. [8]
- b) A multimode graded index fiber exhibits total pulse broadening of 0.1 μ sec over a distance of 12km. Calculate i) The maximum possible bandwidth of the link assuming no intersymbol interference ii) The pulse broadening per unit length iii) The bandwidth length product of fiber. [8]

P.T.O.

OR

- Q4)** a) Explain the concept of Wavelength Division Multiplexing along with neat diagram. State the key features of the same. [8]
b) Explain the concept of self phase modulation of SONET/SDH optical network. [8]

- Q5)** a) Explain interferometric method of measurement of length in detail. [8]
b) Describe in short the measurement techniques of current, voltage and liquid level. [6]
c) Write a short note on medical applications of lasers [4]

OR

- Q6)** a) Write short notes on the following. [12]
i) Removal of tumours of vocal cords
ii) Brain Surgery
iii) Laser instruments for surgery
b) Describe the laser heating, welding and trimming of material. [6]

SECTION - II

- Q7)** a) Explain the following terms: [6]
i) Cut off wavelength
ii) Guide wavelength
iii) Group velocity
iv) Phase velocity.
b) State and explain the properties of S parameter. [6]
c) Write an [S] matrix of a magic -Tee. Describe any one application in detail. [4]

OR

- Q8)** a) Explain the construction and working of an isolator in detail. [6]
b) State and explain the performance parameters of directional coupler. [6]
c) For the directional coupler the incident power is 400 mwatts. Calculate the power in the main arm and auxillary arm. The coupling factor is 13 dB. [4]

- Q9)** a) A reflex klystron operates at the peak mode of $n = 2$ with $V_0 = 280\text{V}$, $I_0 = 22\text{mA}$ and a signal voltage $V_1 = 30\text{V}$. Determine: [8]
- i) The input power
 - ii) The output power
 - iii) Efficiency
- b) Enlist the different types of magnetron. Explain how mode jumping is avoided in magnetron. [6]
- c) Differentiate between Klystron and TWT. [4]

OR

- Q10)** a) Explain the construction and working of reflex klystron in detail. [8]
- b) Explain how oscillations are sustained in cavity magnetron. Assume π mode of oscillations. [6]
- c) Explain how helical TWT achieves amplification. [4]

- Q11)** a) Explain the principle of operation, IV characteristic of microwave tunnel diode. [8]
- b) Explain terrestrial and satellite based microwave communication system in detail. [8]

OR

- Q12)** Write short notes on the following along with applications. [16]
- a) Varactor diode
 - b) Microwave transistor
 - c) Schottky diode
 - d) PIN diode



Total No. of Questions : 12]

SEAT No. :

P5076

[Total No. of Pages : 3

[4959]-127
B.E. (Electronics)
(A) ADVANCED COMMUNICATION SYSTEM
(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 books.*
- 2) *Answer three questions from section - I and three question from section II*
- 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) Describe frequency reuse concept in cellular networks and state formula for N (cells per cluster). **[6]**
- b) Discuss How Cell splitting and frequency reuse in mobile communication enhances spectral efficiency. **[6]**
- c) Write note on Cell sectorization. **[6]**

OR

- Q2)** a) State and describe formula for mobile radio propagation between fixed stations. **[6]**
- b) How CCIR can be calculated in mobile environment? **[6]**
- c) Explain Delay spread and coherence bandwidth. **[6]**
- Q3)** a) With the help of suitable example describe various interferences occurred in reception of signal. **[8]**
- b) Describe the following w.r.t. mobile communication. **[8]**
- i) Underlay - overlay
 - ii) Handoffs & dropped calls.

P.T.O.

OR

- Q4)** a) Derive free space path loss formula for wireless communication. [8]
b) Describe various types of mobile antennas. [8]

- Q5)** a) Describe the various mechanisms to increase the traffic capacity. [8]
b) With neat block diagram, describe GSM architecture in detail. [8]

OR

- Q6)** a) Describe Diversity concept to enhance signal to noise ratio. [8]
b) With the help of suitable diagram, explain macro cells & microcell to enhance the capacity. [8]

SECTION - II

- Q7)** a) Compare LEO, MEO and GEO Satellites. [8]
b) Derive the relationship to find out period of the satellite's orbit. [8]

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

- Q9)** a) A SCPC-FM satellite link has an RF channel bandwidth of 45 kHz and a base band maximum frequency of 4 kHz. De-emphasis provides a subjective improvement in base band S/N ratio of 7 dB. Calculate the base band S/N ratio for the voice channel for a receiver C/N ratio of 14 dB. If the FM demodulator has an FM threshold at 6dB, what is the link margin for this system? [8]
b) Explain how TV signal transmitted in satellite broadcasting? [8]

OR

Q10)a) Define and explain the following terms with reference to the FM techniques. [8]

- i) Signal to Noise Ratio
- ii) Pre-emphasis & De-emphasis

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) Explain following terms w.r.t. VSAT (Any Three) [18]

- i) Signal Format.
- ii) MF - TDMA Scheme.
- iii) Protocols used in VSAT network.
- iv) Atmospheric Losses.

OR

Q12)a) Explain various configuration of antenna used in VSAT system. [9]

b) Compare and contrast between FDMA, TDMA and CDMA systems.[9]



Total No. of Questions :12]

SEAT No. :

P3386

[4959]-128

[Total No. of Pages : 3

B.E. (Electronics)

**AUTOMOTIVE ELECTRONICS SYSTEMS
(2008 Course) (Elective - IV) (Semester-II) (404210)**

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 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 neat diagram explain Four stroke operation of diesel Engine. [10]
- b) Explain transmission system in automotive. [8]

OR

- Q2) a)** Write a short note on following: [10]
- i) Steering system.
 - ii) Power train.
- b) What is AFR (stoichiometric ratio)? Explain how engine efficiency can be altered by controlling AFR of a petrol engine. [8]

- Q3) a)** Explain how below parameters are measured in automotive. [8]
- i) Mass Air Flow.
 - ii) Engine Speed.

P.T.O.

- b) How crank shaft position is detected for fuel ignition. [8]

OR

Q4) a) Explain working principle of solenoid & How it is used in fuel injection system. [8]

- b) Explain characteristics and limitations of a sensor to use within the automotive context. [8]

Q5) a) With the help of diagram explain how electronics is use to control spark in ignition system. [8]

- b) Explain in brief how steerability is possible after braking in ABS. [8]

OR

Q6) a) How Automotive Cruise Control (ACC) is implemented? What are practical problems in it? [8]

- b) Explain with block schematic operation of engine management system. [8]

SECTION-II

Q7) a) How timer/counters, PWM, WDT and interrupts of a general purpose microcontroller can be used in Automotive application. [10]

- b) Explain selection criteria for using controller in automotive system. [8]

OR

Q8) a) List various 8/16 bit processors that are used for ECU in automotive Vehicle. Describe architecture of any one in detail. [10]

- b) Explain the tool-chain for developing and Embedded 'C' program. [8]

Q9) a) Explain how FlexRay is it suitable for Data communication in Automotive Electronics? [8]

b) Compare MOST & LIN Protocol. [8]

OR

Q10)a) Why CAN is called Real time protocol? Explain its importance in automotive industry. [8]

b) What is Bluetooth and explain its role in automotive communication systems. [8]

Q11)a) Explain ON board diagnostic system in automotive. [8]

b) Explain emission control standards in automotive. [8]

OR

Q12)a) Enlist the various comfort & safety features incorporated in modern Automotive systems. [8]

b) What is Off-Board diagnostics? What are its advantages? [8]



Total No. of Questions :12]

SEAT No. :

P3387

[4959]-129

[Total No. of Pages : 3

**B.E. (Electronics)
c-ARTIFICIAL INTELLEGENCE
(2008 Pattern) (Elective - IV) (404210)**

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 book.*
- 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 is Agent? Explain structure of an agent. [8]
b) Explain detail characteristics of problem. What are different functionalities of an agent? [8]

OR

- Q2)** a) Use toy problem to illustrate various problem solving methods. [8]
b) List the characteristics of intelligent agents. [8]

- Q3)** a) Compare depth first search (DFS) and breadth first search (BFS). [8]
b) What do you mean by environment? Enlist the types of environment. [8]

OR

- Q4)** a) Apply the constraint satisfaction to solve following crypt arithmetic problem to assign single digit number from 0 to 9 each alphabet SEND + MORE = MONEY. [8]
b) Explain Hill Climbing algorithm with pseudo code. [8]

P.T.O.

- Q5) a)** Consider the following sentences & translates the sentences into formulas in predicate logic & clause form. **[10]**
- i) John likes all kind of food.
 - ii) Chicken is food.
 - iii) Apples are food.
 - iv) Anything any one eats & isn't killed by is food.
 - v) Bill eats peanuts and is still alive.
 - vi) Sue eats anything Bill eats.
- b) Explain resolution process in predicate logic. **[8]**

OR

- Q6) a)** Write short note on conceptual dependancy and frames. **[8]**
- b) What do you mean by semantic network and explain with suitable example. **[10]**

SECTION-II

- Q7) a)** Explain forms and types of learning. **[8]**
- b) Explain Rote learning and learning by Anology. **[8]**

OR

- Q8) a)** Explain non linear planning with example. **[8]**
- b) Write note on Learning methods and TWEAK algorithm. **[8]**

- Q9) a)** Give two typical applications of Artificial Neural Network. **[8]**
- b) Explain Waltz's algorithm with an example. **[8]**

OR

Q10)a) Draw the functional elements of expert system and explain functionality of each of them? [8]

b) Discuss in detail all the phases of Natural Language Processing. [8]

Q11)a) Explain in detail how does prolog qualify itself as an Artificial Intelligence Language? [10]

b) Draw the multilevel ANN for specifying EX-OR function of Digital gate and explain. [8]

OR

Q12)a) Define probabilistic language processing and explain its models. [10]

b) Draw and explain typical Expert system architecture. [8]



Total No. of Questions : 12]

SEAT No. :

P3302

[Total No. of Pages : 3

[4959]-13

B.E. (Civil) (Semester - I)

ADVANCED CONCRETE TECHNOLOGY (Theory)

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *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 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) *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) *Electronic pocket calculator is permitted.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain workability as a quality measure of green concrete. On which factors workability of concrete depends? [5]
- b) Explain slump cone test for determining workability. [5]
- c) Explain the dry procedure of manufacturing of cement along with flow chart for the same. [8]

OR

- Q2)** a) Explain the effect of flaky and elongated particles on the properties of concrete. [5]
- b) Explain aggregate alkali reaction. [5]
- c) Explain aggregate crushing value test of aggregate including sample preparation and test procedure. [8]

- Q3)** a) Explain aerated concrete. Explain any one way for the manufacture of it. [6]

P.T.O.

- b) Write in detail what do you mean by light weight concrete. Name any six naturally occurring light weight aggregates. Where light weight aggregate finds its use. [10]

OR

- Q4)** a) Write a detailed note on “step by step procedure of concrete mix design”. [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 “Pulse echo method”. [6]

OR

- Q6)** a) What is the meaning of particle packing in concrete. How particle packing is effective in high density, high strength concrete and durability of concrete? [8]
b) Write notes on : [2 × 4 = 8]
i) Probe penetration
ii) Acoustic emission method

SECTION - II

- Q7)** Write notes on :
a) Factors affecting properties of FRC. [6]
b) Relative fibre matrix stiffness. [6]
c) Fibre matrix interfacial bond. [6]

OR

- Q8)** a) Write a note on self compacting concrete. [6]
b) Explain : Quality control tests to ensure good performance of polymer concrete. [6]
c) Write a note on : SIFCON. [6]

- Q9)** a) Write a note on Fibers with respect to Volume, aspect ratio and orientation of fibers. [8]
b) Explain the various properties of hardened SCC. [8]

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. :

P3388

[4959]-130

[Total No. of Pages : 3

B.E. (Electronics)

d-NANOTECHNOLOGY IN ELECTRONICS

(2008 Pattern) (Elective - IV) (Semester-II)

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 right indicates full marks.*

SECTION-I

Q1) a) Explain fundamental science behind Nanotechnology. **[9]**

b) List out the limitations of Nanotechnology with respect to semiconductor material. **[9]**

OR

Q2) Write short notes on: **[18]**

a) Nano crystal growth.

b) Dip pen Nano Lithography.

Q3) a) Which are the dielectric materials for future transistor, explain it. **[8]**

b) Write a note on Nanoscale Lithography. **[8]**

OR

Q4) a) Compare floating gate and non volatile memory based on Nano crystal growth. **[8]**

b) Draw and explain the process flow for integrating Nano crystal memory with standard CMOS technology. **[8]**

P.T.O.

- Q5)** a) Explain the properties of metal Nanostructure. [8]
b) What are the different types of carbon structure? Explain it. [8]

OR

- Q6)** a) Explain the properties of Carbon Nanotube. [8]
b) Write short notes on: [8]
i) Single wall carbon Nano tube.
ii) Multi wall.

SECTION-II

- Q7)** a) Explain Nano imprint lithography. [9]
b) Explain bimorph cantilever. [9]

OR

- Q8)** a) Explain the switching process of Azobenzene molecule with respect to molecular switches. [9]
b) Explain optical lithography. [9]

- Q9)** a) What are the different tools for fabrication of micro Nano Electronics Devices. [12]
b) List out the application of Nano electronics. [4]

OR

- Q10)** a) Explain how can we use the advances computation and communication in Nano-Electronics. [8]
b) What are the different tools for fabrication of micro Nano Electronics Devices. [8]

- Q11)a)** Write short notes on: **[8]**
- i) Photo dynamic therapy.
 - ii) Nano luminescent tags.
- b) List out & explain any two applications of Nano-electronics in Biomedical. **[8]**

OR

- Q12)a)** Write short notes on: **[8]**
- i) Biosensors.
 - ii) Electromagnetic sensors.
- b) List out applications of Nanotechnology in Optics & explain in detail. **[8]**



Total No. of Questions :12]

SEAT No. :

P3942

[Total No. of Pages :4

[4959] - 131

B. E. (Production)

MACHINE TOOL DESIGN

(2008 Course) (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) *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 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) An six speed gear box is to be designed for the minimum speed of 90 rpm and maximum speed of 1200 rpm. It is to be driven by a three-phase asynchronous motor rotating at 1500 rpm. Draw the best structural diagram, optimum ray diagram and gear box layout. **[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 ' ϕ ' lies between 1 & 2. **[8]**
- b) What are the important features of stepless regulations? List the different stepless regulation methods used in machine tools and explain any one of the method with a neat sketch. **[10]**

P.T.O.

UNIT - II

- Q3)** a) State the various systematic steps involved in designing bases and tables 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) In designing the bed of a machine tool, it is often found that the hollow rectangular cross - section is the most suitable one. Make a comprehensive evaluation of the various types of cross sections commonly used in machine tool on the basis of stress and deflection in both bending and torsion. [10]
- b) Discuss the functions of machine tool structures and their requirements with a suitable example. [6]

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) What is meant by a rigidity of a lubricated slide ways? Show that the rigidity of a hydrostatic slideways is 50% more than that of a hydrodynamic slideways. [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) Make a sketch of at least two different types of spindle ends of a machine tool and make a comparative evaluation of their characteristics and the forces acting on the spindle. [10]
- b) Analyze the load taken by the balls in a ball bearing used as a spindle support and show that due to contact deformation not more than 80% of the balls take the entire thrust. [8]

OR

- Q8)** a) Show, with neat sketches, at least two methods of preloading a ball lead screw. Also deduce an expression that the magnitude of preload is normally equal to 1/3 of the total load. [8]
- b) Show that in a sliding friction lead screw the distribution of load per tooth is non uniform. Write down an expression for efficiency of a sliding friction lead screw, assuming included angle of the thread as 2β . How will this expression be changed, in the case of a Recirculating Ball Screw? State clearly the reasons thereof. [10]

UNIT - V

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

OR

- Q10)** a) Classify the essential control systems, with particular reference to shifting of gear in a gear box. Explain the difference between: [8]
- i) Centralized control
 - ii) Selective control and
 - iii) Pre-selective control system.
- b) With neat sketches of circuit diagrams show the functioning of a thermal relay and an electrical braking system. [8]

UNIT - VI

- Q11)a)** Discuss the method of obtaining stepless speed variation of a machine tool having regulation upto 20, using epicyclic mechanism. [8]
- b) Write note on: [8]
- i) PIV drive
 - ii) Friction and ball variator

OR

- Q12)a)** Discuss the recent trends in design of special purpose machine tools.[8]
- b) What are the essential requirements in retrofitting an existing machine tool into a CNC system? [8]



Total No. of Questions :12]

SEAT No. :

P3389

[4959]-132

[Total No. of Pages :4

**B.E. (Production/Prod. Sandwich)
Manufacturing Automation
(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 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)** For a swash plate type axial piston pump: **[8]**
- i) Explain the principle of working.
 - ii) Draw neat sketch.
 - iii) Explain the characteristics, advantages, and disadvantages.
 - iv) Discuss its applications.
- b) Explain with neat sketch principle of working and application of pressure compensated flow control valve. **[8]**

OR

- Q2) a)** A hydraulic system is operating at 200 bar with pump flow 20 lpm. The input power to the pump drive is 12 kw. The pump is loaded for 70% of the operating time. The overall efficiency when it is on load is 75%. If the ambient temperature is 25°C and maximum permissible fluid temperature in the reservoir is 60°C. Calculate the suitable size of the reservoir if it is of square section of size 'a' with length '1.4a.' **[8]**

P.T.O.

- b) For a pressure compensated flow control valve: [8]
- Draw its symbol
 - Draw neat sketch showing constructional features
 - Explain principle of working
 - Applications

- Q3)** a) A hydraulic system has a circuit demand for flow 140 lpm between 5-20 sec. at 50 bar and 32 lpm between 30-50 sec. at 160 bar pressure. Design the size of accumulator and pump if the total cycle time is of 55 sec. Assume isothermal expansion and compression of gas. [10]
- b) Explain with neat sketch the sequencing circuit. [6]

OR

- Q4)** a) Explain the terms related to filter: [4]
- i) Beta rating.
 - ii) absolute ratings.
- b) Explain force controlled and stroke controlled proportional control valves. [4]
- c) Calculate the tube thickness of a hydraulic cylinder having following data: [8]
- Tensile strength of cylinder material = 5000 kgf/cm^2 .
 - Cylinder bore = 50 mm .
 - System pressure = 150 kgf/cm^2
 - Factor of safety = 2:1.

- Q5)** a) Draw the suitable pneumatic circuit using cascade system to actuate cylinder 'A', cylinder 'B' and cylinder 'C' as per following sequence: [12]
- i) Cylinder A extends.
 - ii) Cylinder B extends.
 - iii) Cylinder C extends.
 - iv) Cylinder A retracts.
 - v) Cylinder C retracts.
 - vi) Cylinder B retracts.
- b) Explain with neat sketch the working of FRL unit. [6]

OR

- Q6)** a) Explain hydro-pneumatic system. [6]
- b) A single stage air compressor running at 80 RPM, compress air from a pressure of 1 bar and temperature of 15° to a pressure of 5 bar. The clearance volume is 5% of swept volume which is 0.42m^3 . Assuming that the compression and expansion to follow the law $pV^{1.3} = \text{constant}$, determine the power required to drive the compressor. [12]

SECTION -II

- Q7)** a) What is parity flag? What is its significance? Explain with suitable example. [8]
- b) Explain with suitable example latch circuit. [8]

OR

- Q8)** a) Write a program to clear the accumulator , add 27H, subtract 45H, add 6CH,display the result at output port. [8]
- b) Explain clearly the difference between microprocessor and micro controller. [8]

- Q9)** a) Explain the performance criteria of p, p1, and PID controller. [8]
- b) Explain with suitable example use of counters in PLC. [8]

OR

- Q10)**a) How would a derivative controller with $K_D = 4\text{s}$ responds to an error that varies as $3.6 \sin (0.05t)$. [8]
- b) Draw ladder diagram to perform following operations of a washing machine: [8]
- i) Switch on the motor pump.
 - ii) Switch off the pump after 60 seconds.
 - iii) Switch on the heater for 25 seconds.
 - iv) Switch off the heater.

- Q11)**a) Explain with neat sketch revolving feeder. [9]
- b) What do you mean by Design for automated assembly? Explain with suitable example. [9]

OR

Q12) Write short notes on. [18]

- i) Flexible manufacturing system.
- ii) Types of escapements.
- iii) Types of work transfer systems.



Total No. of Questions : 12]

SEAT No. :

P3390

[4959]-133

[Total No. of Pages : 6

**B.E. (Production Engineering)
OPERATIONS RESEARCH
(2008 Course) (411083)**

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

Q1) a) A farmer has 100 acre farm. He can sell all tomatoes, lettuce or radishes and can raise the price to obtain ₹1.00 per kg for tomatoes, ₹0.75 ahead for lettuce and ₹2.00 per kg for radishes. The average yield per acre is 2000kg of tomatoes, 3000 heads of lettuce and 1000 kg of radishes. Fertilizers are available at ₹0.50 per kg and the amount required per acre is 100 kg each for tomatoes and lettuces and 50 kg of radishes. Labour required for sowing, cultivating and harvesting per acre is 5 man-days for tomatoes and radishes and 6 man-day for lettuce. A total of 400 man-days are available at ₹20000 per man-day. Formulate this problem as a linear programming model to maximize the farmer's total profit. (**Only formulate LPP. Do not solve it**) [7]

b) Solve by Simplex method:

$$\text{Maximize } Z = 3x_1 + 2x_2 + 5x_3$$

$$\text{Subject to } x_1 + 2x_2 + x_3 \leq 430$$

$$3x_1 + 2x_3 \leq 460$$

$$x_1 + 4x_2 \leq 420$$

$$x_1, x_2, x_3 \geq 0$$

[10]

OR

P.T.O.

Q2) a) Discuss ANY ONE:

i) Zero-One Programming

ii) Sensitivity Analysis

[7]

b) Solve by Dual Simplex method:

$$\text{Minimize: } Z = 20x_1 + 16x_2$$

$$x_1 + x_2 \geq 12$$

$$2x_1 + x_2 \geq 17$$

$$x_1 \geq 2.5$$

$$x_2 \geq 6$$

$$x_1, x_2 \geq 0$$

[10]

Q3) a) A company has three factories F1, F2, and F3 and goods are supplied to 4 different cities D1, D2, D3 and D4. The table shows per unit cost of transportation. The Supply capacities and demand are as shown in the table. Find the optimal solution. [10]

Factories	Consumption centers				Capacity
	D1	D2	D3	D4	
F1	13	25	12	21	18
F2	18	23	14	9	27
F3	23	15	12	16	21
Demand	14	12	23	17	

b) Discuss Reduced Matrix method of assignment model.

[6]

OR

- Q4) a)** Four operators are to be assigned one job each. The matrix represents the cost for assignments for five jobs. Find the optimal assignments. Which job is unassigned? **[10]**

Operators	Jobs				
	I	II	III	IV	V
A	4	6	10	5	6
B	7	4	-	5	4
C	-	6	9	6	2
D	9	3	7	2	3

- b) Discuss: u-v method. **[6]**

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

- b) A distance network consists of 11 nodes which are distributed as shown in following table.

A person wants to go from city 1 to city 11. Find the shortest path by DYNAMIC Programming. **[11]**

Arc	Distance	Arc	Distance	Arc	Distance	Arc	Distance
1-2	8	3-6	8	6-9	3	9-11	5
1-3	7	3-7	4	6-10	5	10-11	8
1-4	4	4-7	6	7-9	5		
1-5	2	5-7	8	7-10	1		
2-6	4	5-8	1	8-10	5		

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? [5]

SECTION - II

- Q7)** a) The fleet owner finds from his past record, that the maintenance cost per year of an auto whose purchase price is ₹60 000 is given below: Consider cost of money as 10% per year. [10]

Year	1	2	3	4	5	6	7	8
Maintenance	1000	1200	1400	1800	2300	2800	3400	4000

What is the optimum replacement plan?

- b) Discuss Minimax and Maximin rule with saddle point. [6]

OR

- Q8)** a) Discuss individual and group replacement policies. [6]
 b) Solve the game: [10]

		Player B		
		Strategies	b1	b2
Player A	a1	-6	10	11
	a2	-1	-2	-3
	a3	-1	-2	-4

- Q9) a)** Arrival rate of the customers at the baking counter follows Poisson distribution with mean 15 per hour. The service rate of the counter also follows Poisson distribution with mean of 25 per hour. Find;
- i) Probability of having zero customers in the system
 - ii) Probability of having 3 customers in the system
 - iii) Probability that customer have to spend 30 minutes in bank
 - iv) Mean customers in queue
 - v) Average waiting time in queue [10]
- b) Discuss: Inventory costs. [6]

OR

- Q10)a)** An automobile factory manufactures a particular type of gear within the factory. This gear is used in the final assembly. The particulars of the gear are: [10]

Demand rate	12000	units/day
Production rate	20000	units/day
set up cost	1000	₹/set-up
carrying cost	10	₹ per unit per year
Working days	300	per year

Find Economic Production Quantity, time between two setups, production period, annual holding cost, annual set up cost and annual total cost.

- b) Discuss minimum cost service rate. [6]

Q11)a) Network IP table is given below. **[14]**

Act	A	B	C	D	E	F	G	H	I	J	K	L	M	N
IP	-	-	-	B	A	A	B	C,D	C,D	E	E,G,H	E,G,H	I	J,K
Days	2	6	4	3	6	8	3	7	2	5	4	3	13	7

- i) Draw a network and find critical activities and critical path
 - ii) How long is the project duration?
 - iii) Tabulate Early Start Schedule(ESS) and Late start schedule times (LSS)
 - iv) Tabulate all the floats for all the activities
- b) Discuss resource leveling. **[4]**

OR

Q12)a) Network is given below with three time estimates in weeks. **[14]**

Act	A	B	C	D	E	F	G	H
IP	-	-	A	B	A	C,D	C,D,E	F
a*	1	2	6	1	1	1	1	1
b**	3	8	8	3	7	9	3	9
m***	2	2	7	2	4	5	5	2

a* – Optimistic time estimate, b** - Pessimistic time estimate,
m*** - most likely time estimate

- i) Construct the project network.
 - ii) Find the expected duration and variance of each activity?
 - iii) Find the critical path and the expected project completion time?
 - iv) Find the probability of completing the project on or before 20 weeks?
 - v) If the probability of completing the project is 0.8, find the expected project completion time?
- b) Differentiate between CPM and PERT. **[4]**

x x x

Total No. of Questions :12]

SEAT No. :

P3391

[4959]-134

[Total No. of Pages :2

B.E. (Production)

a:PLASTIC ENGINEERING

(2008 Course) (Semester -I) (411084) (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 common alloys and blends used in plastic. [8]
b) Explain classification of plastics materials. [10]

OR

- Q2)** a) Explain concept of condensation. [8]
b) Discuss basic chemistry in plastic material structure. [10]

- Q3)** a) Discuss working of plunger type injection moulding machine with suitable sketches. [8]
b) Explain how to select proper parting line in mould with suitable sketches. [8]

OR

- Q4)** a) Explain types of nozzles with suitable sketches. [8]
b) Discuss effect of processing on mechanical properties of product. [8]

P.T.O.

- Q5) a)** Explain blown film extrusion with suitable sketch. [8]
b) Explain working of single screw extruder with suitable sketch. [8]

OR

- Q6) a)** Explain working principle of vented barrel extruder. [8]
b) Discuss features of extrusion dies. [8]

SECTION - II

- Q7) a)** Explain bottle manufacturing is blow moulding with suitable sketches. [10]
b) Explain extrusion blow moulding [8]

OR

- Q8) a)** Explain stretch blow moulding with suitable sketches. [8]
b) Discuss different materials used in blow molding. [10]

- Q9) a)** List various problems observed in thermoforming,. [8]
b) Explain thermoforming by skeleton tooling with suitable sketch. [8]

OR

- Q10) a)** Explain matched metal moulding thermoforming with suitable sketches. [8]
b) Discuss plug assisted vacuum thermoforming with suitable sketch. [8]

- Q11) a)** Explain buffing and polishing operations in plastic. [10]
b) Write note on. [6]
i) Tumbling.
ii) Routing.

OR

- Q12) a)** Discuss guidelines for geometry of tool in machining of plastics in various operations. [10]
b) Explain piercing and drilling in plastic. [6]



Total No. of Questions :12]

SEAT No. :

P3392

[4959]-135

[Total No. of Pages :4

B.E. (Production)

b : INDUSTRIAL ROBOTICS

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

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) Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** Define Automation? What are the types of automation? Explain the role of robot in automation? **[8]**
- b) Explain with neat sketch six degrees of freedom associated with the robot manipulator. **[8]**

OR

- Q2) a)** Enlist the chronological development process in each Robot generation. **[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) List the steps involved in DH convention. [8]

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

i	α_{i-1}	a_{i-1}	d_{i-1}	θ_{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 w.r.t. the base.

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	α_{i-1}	a_{i-1}	d_{i-1}	θ_{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 w.r.t. the base.

Q5) a) What is Robot Gripper? Classify gripper & describe any one with neat sketch. [9]

b) What are the various considerations in gripper design and selection. [9]

OR

- Q6) a)** Explain with neat sketch: **[9]**
- i) Gear and Rack method of actuating the gripper.
 - ii) Cam-actuated gripper.
 - iii) Screw-type gripper actuation.
- b) A 10 kg rectangular block is gripped in the middle and lifted vertically at a velocity 1m/s. If it accelerates at 27.5 m/s^2 and Coefficient of friction between gripping pads and block is 0.48. Calculate the minimum force that would prevent slippage. **[9]**

SECTION-II

- Q7) a)** What is Robot sensor? Explain why there is a need of Sensor in Robot? **[8]**
- b) Explain machine vision system with the help of block diagram. **[8]**

OR

- Q8) a)** With neat sketch explain Proximity and Range Sensors used in robot. **[8]**
- b) The given data represents 8×8 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 the various programming methods used in robots. [8]
b) Explain the generations of Robot programming Language. [8]

OR

- Q10)**a) What are the different drive systems used in Industrial Robotic system? Explain anyone with its advantages and disadvantages. [8]
b) Explain 'WAIT', 'DELAY', 'SIGNAL'. 'DEPART' commands with suitable example. [8]
- Q11)**a) How is software and hardware of robot, handshaking with PC done?[9]
b) Explain RS 232C interface used in Robotics system. [9]

OR

- Q12)**a) Describe the concept of safety in robotics. [9]
b) Describe the following applications of robot stating their configurations.[9]
i) Spray painting.
ii) Machine loading and unloading.

EEE

Total No. of Questions :12]

SEAT No. :

P3506

[4959]-136

[Total No. of Pages :3

B.E. (Production Engg.)
c: POWDER METALLURGY
(2008 Course) (Semester - I) (Elective -I)

Time : 3 Hours]

[Max. Marks :100

Instructions to 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 books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION -I

- Q1)** a) Explain Hoganas process with a neat diagram. [6]
b) Explain the influence of Apparent density, compression ratio and flow rate on the behavior of powders. [6]
c) Describe the configurations of a rotating ball mill which is loaded. [6]

OR

- Q2)** a) What is the principle of Elutriation method of particle size measurement? How do we apply Stoke's law for particle size measurement? [6]
b) With the help of a neat sketch, explain the working of the vertical gas atomizer. [6]
c) Describe the commercial process for the electrodeposition of Copper along with a neat diagram and explain any 2 factors affecting the characteristics of electrodeposit. [6]

- Q3)** a) Write short note on various binder materials. Explain the property requirements of good lubricant. [8]
b) What are the means to avoid rejection due to fracturing of green compacts. [8]

OR

P.T.O.

- Q4)** a) Describe in details the phenomena of compaction. [8]
b) What care should be taken to have effective tooling design? State the various materials used for dies and punches. [8]

- Q5)** a) What are the advantages and limitations of Liquid phase sintering. [8]
b) Explain any two theories of material transport in Sintering with the help of a neat diagram. [8]

OR

- Q6)** a) Write short notes on Liquid phase sintering and Activated Sintering. [8]
b) State the different types of sintering furnaces and explain any one furnace with the help of a sketch. [8]

SECTION -II

- Q7)** a) State the advantages and disadvantages of isostatic compaction over die compaction. [8]
b) Write short notes on: [8]
i) Encapsulation.
ii) Spray Deposition

OR

- Q8)** a) Write short notes on : [8]
i) Injection moulding
ii) Roll Compacting
b) Explain the “HERF” process. [8]

- Q9)** a) Write short notes on: [8]
i) Infiltration
ii) Steam treatment
b) State the different 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) Lamp filaments.
- b) Refractory metal components.
- c) Electrical contact materials.

OR

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

- a) Filters.
- b) Diamond Impregnated cutting tools.
- c) Gears.



Total No. of Questions : 12]

SEAT No. :

P3943

[4959]-137

[Total No. of Pages : 3

B.E. (Production)

d:MICROPROCESSOR APPLICATIONS

(2008 Course) (411084) (Elective - 1) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answer question Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I & Q7 or Q8, Q9 or Q10, Q11, or Q12 from sectionII.*
- 2) *Answer to the two sections should be writte 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) Explain any four features of microcontrollers and microprocessors. [8]
b) With the help of block diagram, explain the architecture of microcontroller. [8]

OR

- Q2)** a) Give the comparison between the Harvard and Von Neumann Architecture. [8]
b) Compare RISC and CISC architecture. [8]

- Q3)** a) Explain the Flag register with diagram for 8085. [8]
b) How will the interrupt get executed in 8085, Explain with the help of example. [8]

OR

- Q4)** a) Draw and explain the architecture of 8085. [10]
b) What are different methods of I/O device interfacing? [6]

P.T.O.

- Q5)** a) Draw and explain architecture of 8051. [10]
b) Draw and explain the interrupts structure of 8051 with IVT and ISR. [8]

OR

- Q6)** a) Explain timer's and counters modes in 8051 with TMOD and TCON. [10]
b) With the help of Diagram explains the flag register of 8051. [8]

SECTION - II

- Q7)** a) What are the different addressing modes available in 8051? Explain any three in details. [8]
b) Explain following instructions of 8051. [8]
- | | |
|------------|---------|
| i) MOVC | ii) RRC |
| iii) ACALL | iv) XCH |

OR

- Q8)** a) Write a program to arrange the numbers in descending order. [8]
b) Explain the different software development tools used in assembly language programming. [8]
- Q9)** a) What do you mean by PCL? Explain its features and application with examples. [8]
b) Interface stepper motor to 8051. Explain interface signals with diagram. Write assembly language program to rotate stepper motor in clockwise direction. [8]

OR

- Q10)** a) Draw the ladder diagram for Boiler system and explain it. [8]
b) Interface 16X2 LCD to 8051. Draw interfacing diagram. Write assembly program to interface 16X2 LCD to 8051. [8]

Q11)a) Design a Speed controller system for DC motor. Suggest suitable sensors, signal conditioning and microcontroller. Draw the flowchart for the system. **[10]**

b) How Personal computer (PC) is interfaced with the 8051 microcontroller. Explain the interface with diagram. **[8]**

OR

Q12)a) Design a system for Data acquisition using 8051 microcontroller for temperature, humidity pressure and level measurement. Draw circuit diagram with suitable sensor and signal conditioning. Display the parameters on LCD. Write the Flowchart and algorithm. **[12]**

b) Explain the USB communication protocol. **[6]**

x x x

Total No. of Questions :12]

SEAT No. :

P3393

[4959]-138

[Total No. of Pages :3

**B.E. (Production Engineering)
Ergonomics and Human Factors in Engineering
(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) *Answers 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 objectives of Human Factors Engineering. [6]
b) How does work load and work efficiency have an impact on ergonomics issues. [6]
c) Explain characteristics of Human Machine systems. [6]

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) What are the important steps in collection of anthropometric data. [8]
b) Explain the importance of statistical analysis in anthropometry. [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) Write a note on muscle physiology? [8]
b) Describe the relation between heart rate and oxygen consumption. [8]

OR

- Q10)** a) What is $VO_{2\max}$. Discuss its significance with relation to HFE. [8]
b) Discuss the design of MMH task. [8]

- Q11)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

- Q12)a)** Discuss the term errors and accidents. [8]
- b) Discuss a case in which you have come across application of human factors engineering? [8]



Total No. of Questions :12]

SEAT No. :

P3944

[Total No. of Pages :3

[4959] - 139

B. E. (Production Engineering)

b - MATERIALS AND LOGISTICS MANAGEMENT

(2008 Course) (Elective - II) (Revised) (411085) (Semester - I)

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) *Solve Q1 or Q,2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q,10, & Q11 or Q12.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

SECTION - I

- Q1) a)** How to improve the value of any product? Explain with example. [9]
- b) What are the objectives of materials management? [9]

OR

- Q2) a)** Master Production Schedule is important document in Material Requirement Planning. Justify with suitable example. [9]
- b) What are the factors influencing Make of Buy decision. Explain with example. [9]

- Q3) a)** Explain Import Substitution in Indian context. [8]
- b) Explain Local Purchasing Procedure with flowchart. [8]

OR

P.T.O.

Q4) a) Vendor development and Vendor selection is important in purchasing. Justify. [8]

b) What is Vendor development? Explain any one method of vendor rating in brief. [8]

Q5) a) What is store identification? Explain KODAK system of codification briefly. [8]

b) Explain mechanical waste disposal system in detail. [8]

OR

Q6) a) Explain various causes of surplus and obsolete stock. [8]

b) Justify the role of store keeper is important in any manufacturing industry. [8]

SECTION - II

Q7) a) Explain various modes of transportation. What are the factors on which best transportation mode is selected? [8]

b) Explain in-bound logistics and out-bound logistics with example. [8]

OR

Q8) a) List the types of warehouses and explain any one in detail. [8]

b) List and explain in brief economic and service benefits of warehousing. [8]

Q9) a) Explain risks of supply chain management in any one driver in brief. [8]

b) List logistical drivers of supply chain management and explain any one in brief. [8]

OR

- Q10)** a) Define Supply Chain. Explain the importance of managing supply chain. **[8]**
- b) Explain internal performance measures of Supply Chain Management. **[8]**

- Q11)** a) Explain the costs associated with inventory control. **[9]**
- b) Derive the formula for Economic Manufacturing Quantity when replenishment is non instantaneous (Gradual). State the assumptions made. **[9]**

OR

- Q12)** a) Explain Fixed Period (P) system and Fixed Quantity (Q) system of inventory control in brief. **[9]**
- b) Explain the effects of discounts on the cost of item if the quantity purchased is increased. **[9]**



Total No. of Questions : 12]

SEAT No. :

P3303

[Total No. of Pages : 6

[4959]-14

B.E. (Civil Engineering)

QUANTITY SURVEYING CONTRACTS & TENDERS

(2008 Pattern)

Time : 4 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, 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 answer books.*
- 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.*

SECTION - I

- Q1)** a) Discuss the necessity of each of the following :
- i) Cubic content and plinth area methods of estimation. [4]
 - ii) Contingencies and centage charges. [4]
- b) Clearly explain the following :
- i) Rules (Norms) in IS 1200 of 1960. [4]
 - ii) Direct and indirect costs involved in a project. [4]

OR

- Q2)** a) Discuss the following :
- i) Preparing an approximate estimate for a proposed building. [4]
 - ii) Data required for preparing estimate for a building. [4]
- b) A Trust wants to plan and arrange for funds for a polytechnic building meant for 600 students, knowing that carpet area required per student is 1.2 m². Prepare preliminary estimate of the polytechnic using following data. Assume areas under.

P.T.O.

- i) verandah, wash-rooms, corridors, etc., and
- ii) walls to be 20% and 15% of plinth area respectively.
- Rate of plinth area = Rs. 3500/- per m²
- Cost of approach road, boundary wall, gates, etc. = 3% of the building cost.
- Cost of water supply, drainage, etc. = 12% of the building cost.
- Total cost of electrification = 12% of the building cost.
- Contingencies and work charged establishment are assumed as 5% and 2.5% of the total cost respectively. [8]

Q3) a) Plan and section of 2-rooms is shown in Fig.1 below. Determine quantities of :

- i) Earthwork in excavation for the Foundation. [2]
- ii) Lime Concrete in Foundation. [2]
- iii) 25 mm thick cement concrete D.P.C. [2]
- iv) 1st class brickwork (in C.M. 1:4) for the Foundation and Plinth.[4]
- v) 1st class brickwork (in C.M. 1:6) for the superstructure. [2]

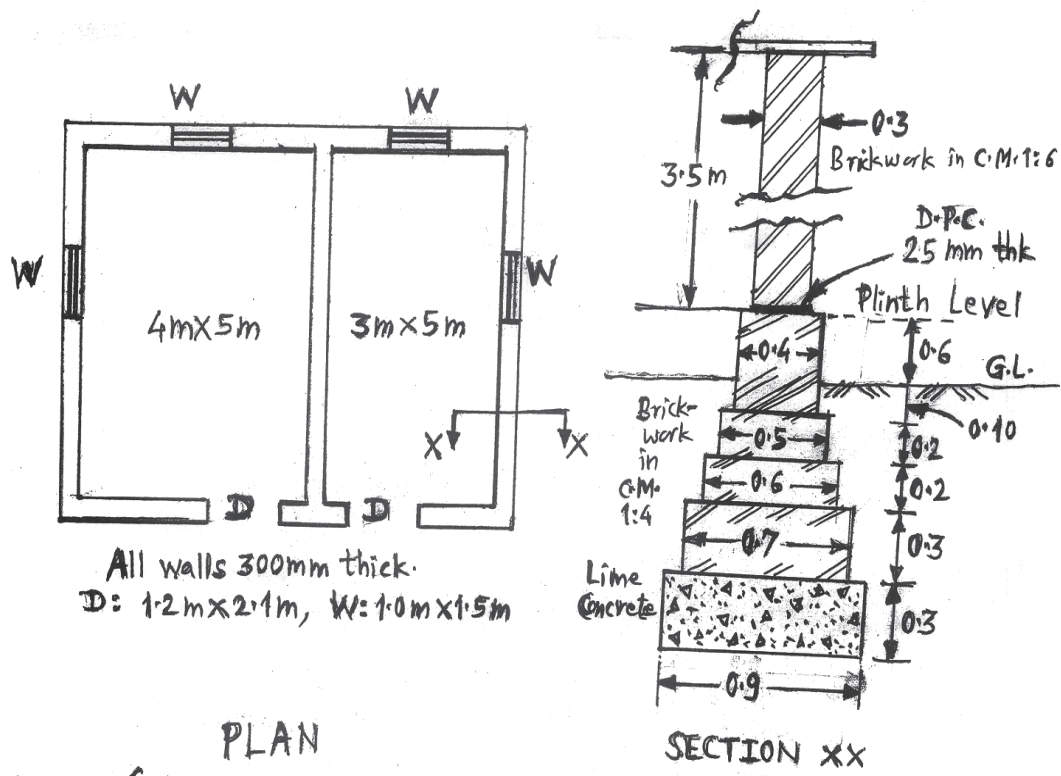


Fig-1 [Q.3(a)]

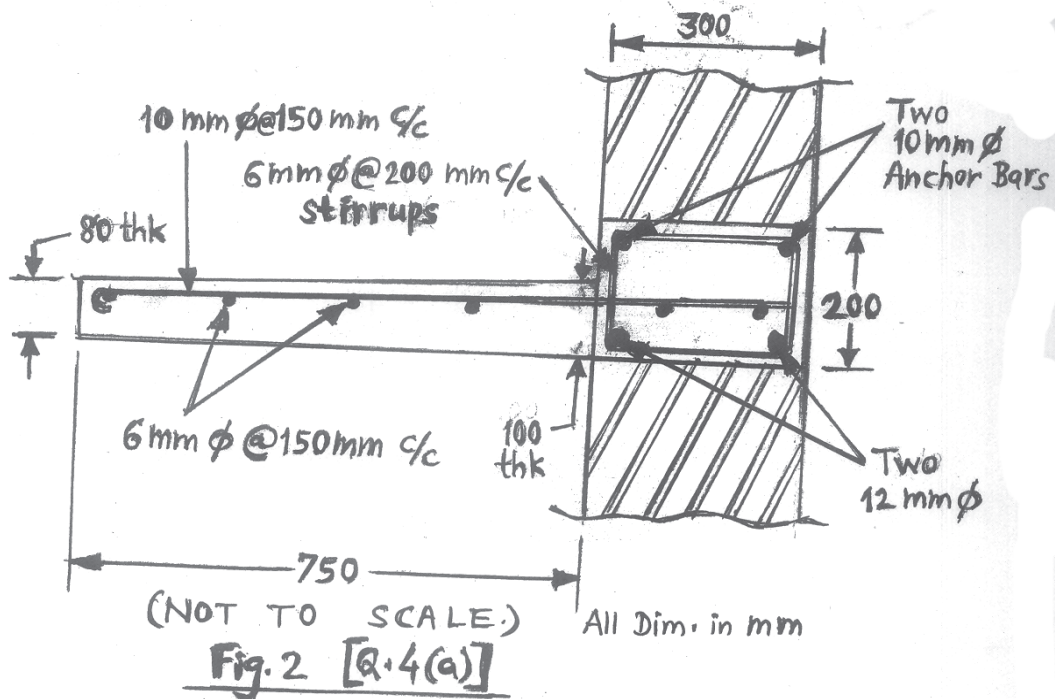
b) Explain the following terms clearly :

- i) Bar bending schedule. [3]
- ii) Deduction rules for openings to work out the item plastering. [3]

OR

Q4) a) Fig.2 shows section of R.C.C. (1:1.5:3) M20 weather shed (the height of which reduces from 100 mm at the wall to 80 mm at the free end) with lintel. Work out the quantities of the following with appropriate units:

- i) Cement concrete (volume), cement, sand and coarse aggregates. [4]
- ii) HYSD reinforcement, and [4]
- iii) MS reinforcement. [4]



b) Discuss 'long wall-short wall' method with neat sketch/sketches. [6]

Q5) a) A 200 mm thick brick wall (in C.M. 1:6) for a ground floor of a residential building has a total length of 40 m and a height of 3 m above plinth. Compute :

- i) Cement, sand and number of bricks required for the wall. [6]
- ii) Number of days required, assuming that 3 masons and 8 mazdoors (labours) are to be employed for the work. [2]

- b) What is meant by rate analysis? State its purposes. Discuss in detail the factors affecting rate analysis. [8]

OR

- Q6)** a) Write all detailed specifications for the work 'excavation for foundation'. [8]
- b) Determine quantities of cement sand, and coarse aggregate required for 80 m³ of R.C.C. (1:1.5:3) Calculate the rate per cubic meter for providing and laying R.C.C. slab (1:1.5:3) excluding the steel reinforcement and formwork. [8]

SECTION - II

- Q7)** a) Valuation of a rectangular plot of 40 m width and 380 m depth is to be done. Adopting the standard belting method, calculate the value of land. Rate of land in the adjoining areas is found to vary from Rs.50/- to Rs.70/- per m². Show the belts and their rates/values in a neat sketch. Neglect the front margin. [12]
- b) Define Depreciation. What is the necessity of calculating depreciation? State various methods used for finding depreciation. Discuss any one method in detail. [6]

OR

- Q8)** a) Determine present fair market value of a property having following details. [12]
- Plot area 800 m²
 - Built-up area 300 m²
 - Expected future life of construction is 50 years.
 - Gross annual rent from the property Rs. 70000/-
 - Present land value Rs. 1000/- per m²
 - Total outgoings are 30% of the gross annual rent.
 - Returns on the capital investment @ 8% per annum.
 - Capital redemption @ 6%
 - Rate of interest is 7% for reversionary value of land

- b) State two differences between each of the following : [6]
- i) Building Lease - Occupation Lease
 - ii) Scrap Value - Salvage Value
 - iii) Value - Price

Q9) a) State whether following statements are true or false, giving reasons. (No marks will be given if reasons are not given) [8]

- i) Highest tender must be selected for a work to ensure execution of the high standards.
 - ii) Earnest money of about 1 to 2% of the estimated cost serves as a guarantee that the contractor/bidder will not refuse the work if his/her tender is accepted.
 - iii) Chief engineer has the powers to undertake an original work with total amount of less than 10 lakh rupees.
 - iv) Works with small profit margin are completed departmentally through labours on daily wages.
- b) Discuss the following with reference to PWD methods : [8]
- i) Administrative Approval
 - ii) Scrunity of tenders

OR

Q10) a) Answer the following : [8]

- i) What is meant by a 'Tender'? State various methods of inviting tenders and explain any one method.
 - ii) What is meant by a 'Tender Notice'? State the necessary contents of a typical (standard) tender notice.
- b) Briefly explain the following : [8]
- i) PWD method of executing minor works.
 - ii) Compare original works and repair works as per PWD.

Q11) a) Discuss merits and demerits of the following : [8]

- i) Pre-qualification of contractors.
- ii) Cost plus type of contract

- b) Explain the following clearly : [8]
- i) Merits and demerits of the arbitration procedure.
 - ii) Qualifications and powers of an arbitrator.

OR

- Q12*) a) Discuss the following : [8]
- i) Process of arbitration as per Arbitration Act 1940.
 - ii) Matters that can be referred to an arbitrator.
- b) Differentiate between : [8]
- i) Liquidated Damages - Unliquidated Damages
 - ii) Item Rate Contract - Lump sum Contract



Total No. of Questions :12]

SEAT No. :

P3394

[4959]-140

[Total No. of Pages :3

B.E. (Production Engineering)
C: SIMULATION AND MODELING
(2008 Course) (Semester - I) (411085) (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 table slide rules, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

- Q1)** a) Explain basic principles of simulation modeling. [8]
b) Discuss role of statistics in simulation modeling. [8]

OR

- Q2)** a) Explain with suitable example the events and activities associated with part manufactured on shop floor. [10]
b) Discuss the advantages of simulation. [6]

- Q3)** a) Discuss the applications of simulation in inventory management . [8]
b) Define - physical, Mathematical, Static and Dynamic simulation models.[8]

OR

P.T.O.

- Q4)** a) Discuss deterministic vs. Stochastic with suitable example. [8]
 b) A confectioner sells the confectionery items. Past data of demand per week in tones with frequency is. [8]

Demand/week	0	5	10	15	20	25
Frequency	2	11	8	21	5	3

Using the following sequence of random number generates the demand for next 15 weeks. Also find out the average demand per week. Use the random numbers: 35,52,90,13,23,73,34,83,94,57,35,56,67,66,60.

- Q5)** a) Explain different methods for data collection for analysis. [10]
 b) Discuss use of random numbers in simulation with example [8]

OR

- Q6)** a) Discuss the methods for selecting families of input distributions when input data available. [10]
 b) Explain different test carried out for data analysis. [8]

SECTION - II

- Q7)** a) Discuss the inverse transformation technique to sample from the exponential distribution. [8]
 b) Explain Exponential and Weibull distribution and its properties. [8]

OR

- Q8)** a) Discuss exponential and normal distribution with application. [8]
 b) Describe termination and non terminating simulation. [8]

- Q9)** a) Discuss about a simulation of a batch manufacturing shop [9]
 b) Discuss about a simulation of a flexible manufacturing cell. [9]

OR

- Q10)** a) Discuss the factors to be considered for simulation of manufacturing system. [8]
 b) Discuss performance measures used in manufacturing systems. [10]

- Q11)a)** Explain in detail important feature of Promodel simulation software. **[8]**
b) Compare simulated factory with nonsimulated factory with certain major points. **[8]**

OR

- Q12)a)** Comments on simulation languages. **[8]**
b) Write comparison of simulation software with programming languages. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3395

[4959]-142

[Total No. of Pages : 6

B.E.(Production Engineering)

COMPUTER INTEGRATED DESIGN AND MANUFACTURING

(2008 Course) (Semester-II)

Time :3Hours]

[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 separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right in black indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) A ΔABC having coordinates A(15, 15), B (18, 12) and C (15, 20) is to be reflected about the line $y = 4x + 12$. Determine the co-ordinate of vertices for a reflected triangle. **[8]**
- b) What is invrese transformation? Obtain the inverse transformation matrices for the following operations. **[8]**
- i) Translation
 - ii) Rotation
 - iii) Scaling

OR

- Q2)** a) With suitable example explain the following concept and specify differences among them. **[8]**
- i) Wire frame model
 - ii) Surface model
 - iii) Solid model

P.T.O.

- b) A rectangle ABCD has vertices A(5, 10), B (20, 10) C (20, 20) and D(5, 20). This rectangle is to be reflected about a line P (25, 20) and Q(10, 30). Determine the new rectangle position. [8]

- Q3) a) For the two bar truss as shown in Fig.1, determine the displacements and stresses in the bars. [12]

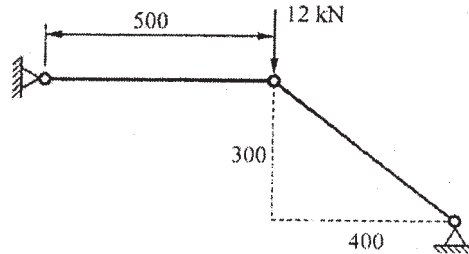


Fig. 1

For both members: $E=70 \text{ GPa}$, $\text{Area}=100\text{mm}^2$

- b) Explain the Global and Natural coordinate system in finite element analysis.[4]

OR

- Q4) a) A tapered bar is shown in Fig 2. Model the bar by considering it as made of two elements and determine the deflections. Assume the modulus of elasticity as 200 GPa. [8]

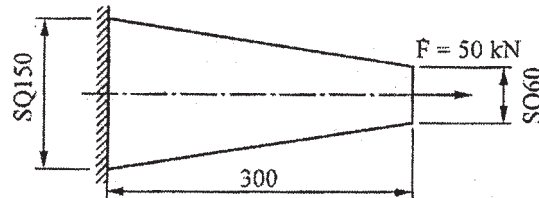


Fig. 2

- b) For the loading system as shown in Fig.3, determine the nodal displacements. Assume modulus of elasticity as $80 \times 10^3 \text{ N/mm}^2$ [8]

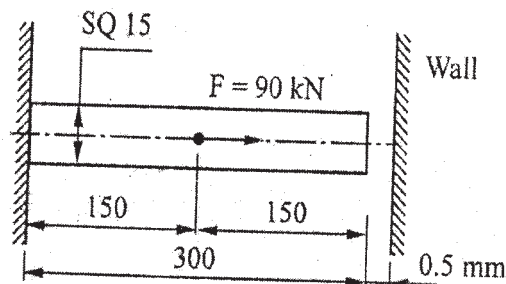


Fig. 3

- Q5) a) Write a manual part program for the component shown in Fig.4 and the tool path is shown in Fig.5. Assume the raw product as cast and the thickness of casting is 10 mm. [12]

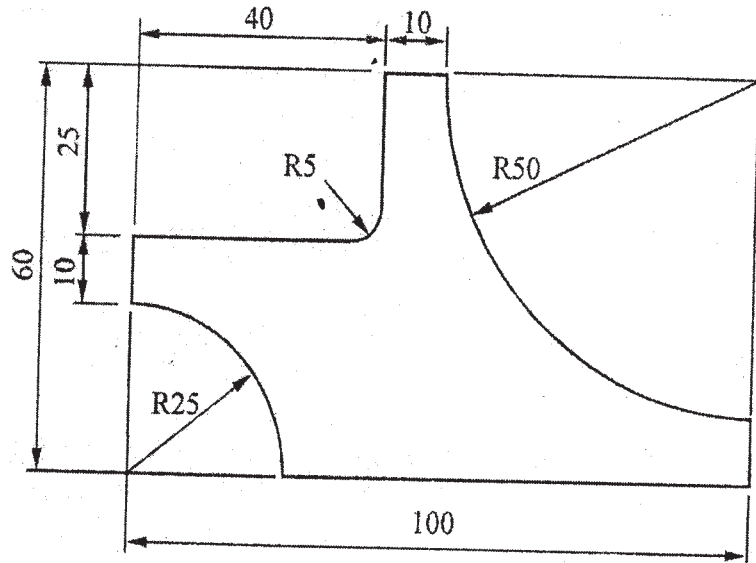


Fig. 4

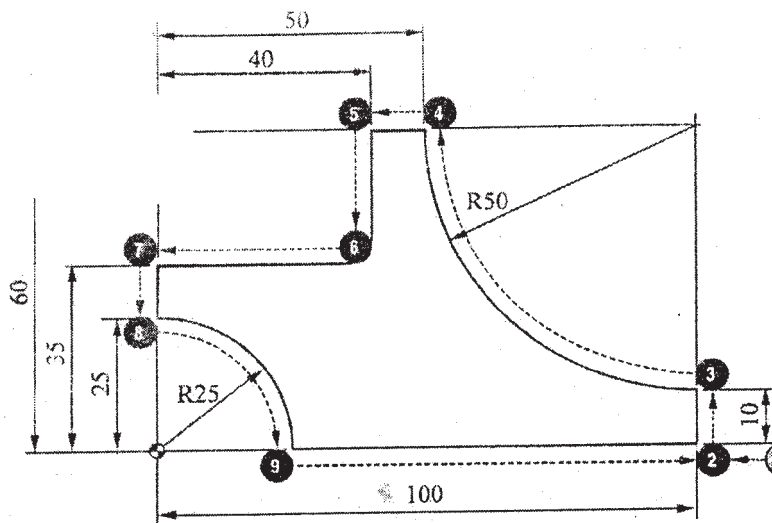


Fig. 5

- b) What is canned cycle? Explain with neat sketch canned cycles for drilling, tapping and boring. [6]

OR

- Q6) a)** Write a manual part program to finish the stepped shaft as shown in Fig.6 and the tool path is shown in Fig.7. Assume spindle speed as 400 rpm and feed rate as 0.5 mm/rev. **[12]**

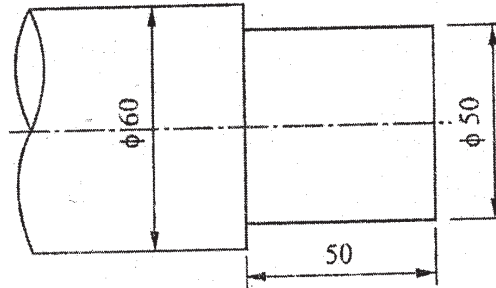


Fig. 6

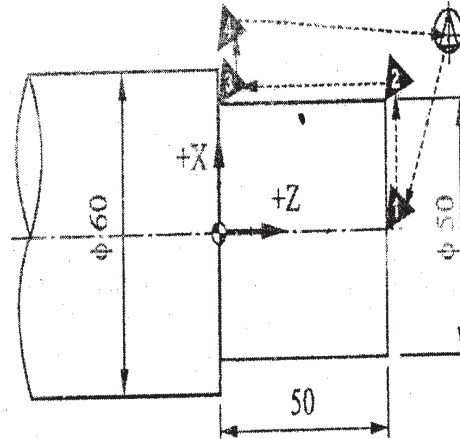


Fig. 7

- b) Explain the different methods for shifting machine zero to part zero. **[6]**

SECTION-II

- Q7) a)** What is concurrent engineering? How it differs from sequential engineering? Explain with block Diagram. **[8]**
- b) Discuss the failure Mode & Effect analysis technique of concurrent Engineering. **[8]**

OR

- Q8) a)** Discuss the Quality Function Deployment technique of concurrent Engineering. **[8]**

- b) Explain in relation to robot textual programming languages
- i) Motion Programming and
 - ii) Interlock and sensor commands [8]

Q9) a) With neat sketch explain the different flexible manufacturing system(FMS) layouts. [8]

- b) Consider the following part machine matrix. Apply Rank order clustering(ROC) Algorithm to it and identify the part families and machine groups. Also find exceptional element if any in the solution and suggest suitable methods to deal with it. [10]

Parts

Machines ↓	A	B	C	D	E	F	G	H	I
1	0	0	1	1	1	1	0	0	0
2	1	1	0	1	0	0	0	1	1
3	0	0	0	0	0	1	1	1	0
4	1	1	0	1	0	0	0	0	0
5	0	0	1	0	1	0	1	0	0
6	0	1	0	0	0	0	0	1	1
7	1	0	1	1	0	0	0	0	0
8	0	1	0	1	0	0	0	1	1

OR

Q10) a) Write short note on cellular manufacturing system. [8]

- b) Compare the following NC machine system and find out which system is more cost effective. [10]

Machine	Production Rate parts/Hr.	Maintenance cost units/month	Arrival Rate per hour	Inventory cost Unit/part/hr
I	20	100	15	1
II	25	150	20	1

- Q11)a)** Explain with neat sketch in detail the ESPRIT CIM-OSA model. [8]
- b) What is Rapid prototyping(RP)? List out different RP techniques. Write advantages of RP. [8]

OR

- Q12)a)** Explain the different levels of integration come across IBM-CIM Model. [8]
- b) What is 3D printing? Discuss the process along with its advantages and limitations. [8]



Total No. of Questions : 12]

SEAT No. :

P3396

[4959]-143

[Total No. of Pages : 3

B.E.(Production Engineering)
PROCESS PLANNING AND TOOL SELECTION
(2008 Course)(Semester-II) (411088)

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 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) Describe the routing created by process engineer. [8]
b) Define 'Tooling' and 'Equipment', list out items included in them. [8]

OR

- Q2)** a) Name several functions performed by product and process Engineer. [8]
b) What is a manufacturing system? What are the main elements in its composition? [8]
- Q3)** a) How does the shape of the part affect its processing? How many functional surfaces may be identified and protected? [8]
b) 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]

OR

- Q4)** a) Distinguish between concentricity and eccentricity. A cylindrical surface as specified being round to within ± 0.02 , It must also be concentric to its true axis within ± 0.01 . Show by diagram the maximum and minimum material conditions which could exist. [8]
b) Describe with neat sketch the difference between surface irregularities and profile? [8]

P.T.O.

- Q5)** a) Sketch and explain the use of support to control the deflection of work-pieces. [6]
b) Discuss the various systems of controlling the position of centre line. [6]
c) Discuss the causes of work - piece variations. [6]

OR

- Q6)** Write short notes on [18]
a) Rules for adding and subtracting dimensions.
b) Tolerance stack and limit stack.
c) Purpose of tolerance chart.

SECTION-II

- Q7)** a) Explain the steps involved in machine selection method with a neat flow chart. [8]
b) Give the examples of commercial tooling, Regular tooling and special tooling. What should be the order of procurement of tools? [8]

OR

- Q8)** a) What are the most influencing factors in terms of tool performance? How selection of cutting fluid will affect on tool performance in various processes? [8]
b) What kind of shapes can be produced by typical broaching tools? What are the main constraining factors on tool selection? [8]
- Q9)** a) What do you mean by major operations, critical operations, qualifying and re-qualifying operations and how to identify them? [8]
b) Discuss the role of computer aided process planning(CAPP) in modern manufacturing. Discuss the benefits of CAPP. [8]


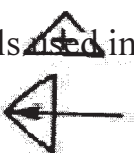




OR

- Q10)** a) Explain the difference between product critical areas and process critical areas with a sketch. [8]
b) What are the advantages and disadvantages of combining operations? [8]

- Q11)a)** What is an operation routing? Draw a sample operation route sheet and explain what information is provided in it. [6]
- b) List some of the possible uses of process picture. [6]
- c) What paperwork does the process engineer receive from product engineering? [6]

OR

Q12)a) Discuss the meaning of following symbols used in process pictures [6]

- | | |
|--|--|
| i)  | ii)  |
| iii)  | iv)  |
| v)  | vi)  |

- b) Discuss the importance of paper work used by the process engineer. [6]
- c) What information does the process picture provides? [6]



Total No. of Questions : 12]

SEAT No. :

P3397

[4959]-144

[Total No. of Pages : 3

B.E. (Production Engineering)
a : AUTOMOBILE ENGINEERING
(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 3 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 systems. [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 mean 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 if 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.



Total No. of Questions : 12]

SEAT No. :

P3398

[4959]-146

[Total No. of Pages : 2

B.E.(Production)

METAL WORKING TRIBOLOGY

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

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer questions Q1 or Q2, Q3 or Q4,Q,5 or Q6 from section-I and questions Q7or Q8,Q9 or Q10,Q11 or Q12 from section-II.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) How to evaluate contact stiffness of any joint. [6]

b) Differentiate between “Periodicity and Stationary” of a surface. [10]

OR

Q2) a) How to do characterization of any surface. [6]

b) Explain Abbot’s bearing area curve. [10]

Q3) a) Give examples of tribological contacts where friction is often proportional to normal load and where it is not? [8]

b) Derive a modified Bowden and Tabor friction equation. [10]

OR

Q4) a) Explain laws of friction with example and also gives example where friction is beneficial. [8]

b) How does the flange lubricant suppress the stick slip? [10]

Q5) a) Derive Theories of Wear. [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) Explain “erosive wear” with a desired application. [6]

SECTION-II

- Q7)** a) Explain “Dry friction” lubrication with application. [4]
b) What is the main purpose of developing synthetic oils? [4]
c) Explain with a neat sketch “liquid friction”. [8]

OR

- Q8)** a) Explain different modes of lubrication. [12]
b) What are the main properties required in lubricants? [4]

- Q9)** a) Briefly describe the principle behind hydrodynamic lubrication. [12]
b) Describe concept of “Bearing power”. [6]

OR

- Q10)**a) Derive ‘Petroff’ equation involving concentric bearing. [10]
b) Find out leakage in liters/min through a shaft of 35 mm Φ which is running concentric to sleeve of 25.3 mm Φ , 35mm length using water under pressure of 5 bars. [8]

- Q11)** a) Derive an equation for two rectangular plates approaching each other involving squeeze film operation. [10]
b) Two circular plates of 100 mm Φ approaching each other with velocity of 10.5 cm/s in liquid of $\mu = 0.035$ Pas. Find out pressure, load and time for film thickness to come down from 0.22 mm to 0.003 mm. [6]

OR

- Q12)**a) Derive squeeze film equation for rectangular plate approaching a rigid surface. [10]
b) Write short notes on: [6]
i) Rail-wheel tribology.
ii) Squeeze film lubrication.



Total No. of Questions : 12]

SEAT No. :

P3507

[4959]-148

[Total No. of Pages : 2

B.E. (Production)

**a:WORLD CLASS MANUFACTURING
(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) *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 manufacturing and business excellence? [8]

b) Explain merits and demerits of Maskell's WCM model? [8]

OR

Q2) a) Explain Hall's World Class manufacturing model. [8]

b) Discuss Gunn's WCM model. [8]

Q3) a) What is value stream mapping? [8]

b) Discuss use of bench marking WCM. [8]

OR

Q4) a) Discuss best practices of any one world class manufacturing company. [8]

b) Explain how you will eliminate wastages from manufacturing? [8]

Q5) a) Explain lean production system. [8]

b) Explain Total Productive Maintenance. [10]

OR

P.T.O.

- Q6)** Write short notes on following **[18]**
- a) PPC department from WCM
 - b) Total Quality Management
 - c) Six sigma

SECTION - II

- Q7)** a) What are various techniques are used for motivating people in WCM organization? **[8]**
- b) Write short note on “people are used as problem solver in WCM’ **[8]**

OR

- Q8)** a) Explain features of HR department of WCM organization. **[8]**
- b) Discuss need of training in WCM organization. **[8]**

- Q9)** a) Discuss POP system of performance measurement. **[8]**
- b) What are features of modern performance system? **[8]**

OR

- Q10)**a) How AMBIT tool of performance measurement used in WCM organization? **[8]**
- b) Discuss TOPP? System of WCM performance. **[8]**

- Q11)**a) How agile manufacturing is useful for WCM plants? **[8]**
- b) What is green manufacturing? Explain its importance in today’s manufacturing era. **[10]**

OR

- Q12)**a) Write note on clean manufacturing system? **[8]**
- b) Explain any one case study related to WCM? **[10]**

x x x

Total No. of Questions : 12]

SEAT No. :

P3945

[4959]-149

[Total No. of Pages : 4

**B.E. (Production Engineering)
INTELLIGENT MANUFACTURING SYSTEMS
(2008 Course) (Elective - IV) (411090) (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 side 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) Discuss the role of CAD/CAM systems in the manufacturing facility. Describe briefly the CAM cycle in a feature-based design environment. [8]

OR

- Q2)** a) Define the term “feature”. Classify the manufacturing features. What are the advantages of feature - based modeling in manufacturing applications? [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]

P.T.O.

- b) Discuss briefly on ‘Computationally Intelligent Systems’. Explain different building blocks of computationally Intelligent Systems. [8]

OR

- 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: **[8]**

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.

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) Part Scheduling.



Total No. of Questions : 12]

SEAT No. :

P3304

[Total No. of Pages : 4

[4959]-15

B.E. (Civil)

TRANSPORTATION ENGINEERING - II

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, and Q.5 or Q.6 from Section-I. Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 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 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) State comparison between First Road Development Plan and second Road Development Plan. [4]
- b) Explain in brief the concept of Saturation system. [6]
- c) Explain in brief the following : [3+3=6]
- i) Traffic Volume Survey
 - ii) Accident Studies

OR

- Q2)** a) Write a short on Origin and Destination Study. [4]
- b) What are the various objectives of preliminary survey for highway location? Explain in brief the various steps involved in conventional method of surveying. [3+3=6]
- c) Explain with a neat sketches various road patterns commonly in use. [3+3=6]

P.T.O.

- Q3)** a) Enumerate the steps for practical design of Super elevation. [6]
 b) State the various factors governing the overtaking sight distance. Find the safe overtaking sight distance for a highway having design speed of 100 Km/h. [2+4=6]
 Assume Maximum acceleration of overtaking vehicle = $0.53/\text{sec}^2$.
 c) Derive an expression for finding the Extra Widening required on Horizontal Curve. [6]

OR

- Q4)** a) Design a rate of superelevation for a horizontal highway curve of radius 450 m and design speed of 100 Km/h. [6]
 b) Write a short note on construction of WBM road. [6]
 c) Define superelevation. Discuss in brief how it is attained in the field. [1+5=6]

- Q5)** a) State the various desirable properties of aggregates used in road construction. Explain in brief the stepwise procedure of determining Water absorption of Aggregate in the laboratory. [2+4=6]
 b) Calculate the Stress at interior region of a cement concrete pavement using Westergaard's stress equation. Use the following data : [6]
 Wheel Load = 5100 Kg,
 Modulus of Elasticity of concrete = $3 \times 10^5 \text{ Kg/cm}^2$,
 Pavement thickness = 18 cm
 Poisson's ratio = 0.15,
 Modulus of Subgrade reaction = 6.0 Kg/cm^3 ,
 Radius of contact area = 15 cm
 c) Explain in brief the following : [2+2=4]
 i) Dowel bar
 ii) WMM

OR

- Q6)** a) A Two lane two way road is at present carrying a traffic of 1500 Commercial Vehicles Per Day (CVD) It is to be strengthened for growing traffic needs. The VDF has been found to be 3.0. The rate of growth of traffic is 10% per annum. The period of construction is 4.0 years. The pavement is to be designed for 20 years after construction. Calculate the cumulative standard axles to be used in design. [6]

- b) Write a short note on Joints in Concrete Pavement. [4]
c) What is softening point of Bitumen? Explain in detail the laboratory procedure of determining the softening point of Bitumen. [1+5=6]

SECTION - II

- Q7)** a) Explain in brief the following : [1½ × 4 = 6]
i) Calm Period
ii) Ground speed
iii) Air speed
iv) Runway
b) Explain the characteristics of good airport layout. Draw a neat sketch of typical airport layout of single runway. [4+2=6]
c) How Runway orientation should be done? Discuss. [4]

OR

- Q8)** a) What is Basic runway length? Explain in brief the various corrections to be applied. [6]
b) Explain the following terms : [2×3=6]
i) Apron
ii) Terminal Building
ii) Finger system
c) Explain in brief the advantages and limitation of air transportation. [2+2=4]

- Q9)** a) i) Linear Waterway
ii) Natural Waterway
iii) Permissible velocity under bridge [2×3=6]
b) Differentiate between the following : [2×3=6]
i) Temporary Bridges and Permanent bridges
ii) Through bridge and Deck bridge
iii) Viaduct and Aqueduct
c) What is scour depth? How it is measured. State and explain the formula for calculation of scour depth off an Alluvial stream when Linear waterway under the bridge is less than the Regime width. [2+2+2=6]

OR

- Q10)** a) What is mean by Afflux? How does the magnitude of afflux influence the design. [2+4=6]
- b) A bridge is proposed to be constructed across an alluvial stream carrying a discharge of 300 m³/Sec. assuming value of slit factor as 1.1, determine the maximum scour depth when the bridge consists of Two spans of 40 m each. [6]
- c) Derive an equation for Economical span of a bridge. State the assumption clearly. [4+2=6]

- Q11)** a) Define abutment. State the various types of Abutments. Also State the requirements of good Abutment. [2+2+2=6]
- b) What is Cut water and Ease Water? Why it is necessary? Sketch any two shapes of Cut water and Ease Water. [2+2+2=6]
- c) Write a short note on Types of wing walls. [6]

OR

- Q12)** a) How will you account for the following in the design of Highway Bridge. [2+2+2=6]
- i) Live Load
- ii) Buoyancy
- iii) Longitudinal force
- b) Define Bridge bearing. State the types of bearings. Why Bearings are necessary in bridges. [2+2+2=6]
- c) Explain the following with a neat sketches : [2+2+2=6]
- i) Abutment pier
- ii) Bascule Bridge
- iii) Transporter bridge



Total No. of Questions :12]

SEAT No. :

P3399

[4959]-150

[Total No. of Pages :2

B.E. (Production Engineering)
c: TOTAL QUALITY MANAGEMENT
(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) *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 various types of Quality costs. **[10]**

b) Explain concept of TQM. **[8]**

OR

Q2) a) Explain relationship between various departments of Manufacturing system for quality. **[10]**

b) Discuss different stages to develop quality in Service System. **[8]**

Q3) a) Explain concept of Taguchi Loss Function. **[8]**

b) Explain Deming's 14 Points for Management. **[8]**

OR

Q4) a) What are the ways used to review customer retention? **[8]**

b) Discuss principles of 5s in TQM. **[8]**

Q5) a) Explain meaning of House of Quality. **[8]**

b) Discuss guiding principles of TPM. **[8]**

OR

P.T.O.

- Q6)** a) Discuss Process of Benchmarking. [8]
b) Explain Ishikawa Fish bone diagram. [8]

SECTION-II

- Q7)** a) Explain various types of failures and their causes. [10]
b) Draw and explain bath - tub curve. [8]

OR

- Q8)** a) Define [10]
i) Mean time to failure (MTTF)
ii) Mean time between failure (MTBF)
iii) Availability
b) Explain various testing methods used to study performance of the products. [8]

- Q9)** a) Discuss importance of Cross-Functional Teams. [8]
b) Explain relationship between Leadership and Quality. [8]

OR

- Q10)** a) Explain meaning of Process capability. [8]
b) Discuss ethics for auditor. [8]

- Q11)** a) Discuss Benefits of ISO 14001:2004. [8]
b) Discuss reasons for seeking ISO 9000 certification. [8]

OR

- Q12)** Write short notes on the following: [16]
a) TS-16949
b) Levels in CMMI.

EEE

Total No. of Questions : 12]

SEAT No. :

P3400

[4959]-151

[Total No. of Pages : 8

**B.E. (Production - Sandwich)
OPERATION RESEARCH AND MANAGEMENT
(2008 Course) (Semester - I)**

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) *Answers to the two sections should be written in separate books.*
- 4) *Neat Diagrams must be drawn wherever necessary.*
- 5) *Figures to right indicate full marks.*
- 6) *Use of logarithmic tables, slide rule, Mollier chart, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain application of Linear programming for decision making in Production area. **[6]**

b) Maximize $Z = 3x_1 + 4x_2$

Subjected to

$$5x_1 + 4x_2 \leq 200$$

$$3x_1 + 5x_2 \leq 150$$

$$5x_1 + 4x_2 \geq 100$$

$$8x_1 + 4x_2 \geq 80$$

$$x_1, x_2 \geq 0$$

Solve the problem by graphical method.

[10]

OR

P.T.O.

- Q2) a)** An electronic company is engaged in the production of two components P_1 and P_2 that are used in TV sets. Each unit of P_1 costs the company Rs. 25 in wages and Rs. 25 in material, While each unit of P_2 costs Rs. 125 in wages and Rs. 75 in material. The company sells both products on one - period credit terms, but the companies labour and material expenses must be paid in cash. The selling price of P_1 is Rs. 150/unit and of P_2 is Rs. 350/ unit. The company can sell as many units as it can produce. Its production capacity is, however, limited by two considerations:

First, at the beginning of period 1, the company has an initial balance of Rs. 20000.

Second, the company has available in each period 4000 hours of machine time and 2800 hours of assembly time.

The production of each P_1 requires 6 hours of machine time and 4 hours of assembly time. Whereas, the production of each P_2 requires 4 hours of machine time and 6 hours of assembly time.

Formulate the problem as an L P Model so as to Maximize the total profit of the company. [6]

- b) Food X contains 6 units of vitamin A per gram and 7 units of vitamin B per gram and costs 12 paise/gm. Food Y contains 8 units of vitamin A per gram and 12 units of vitamin B per gram and costs 20 paise/gm. The daily minimum requirements of vitamin A and vitamin B is 100 units and 120 units respectively. [10]

Find the minimum cost of product mix by big M method.

- Q3) a)** Explain in brief: [6]

- i) North west corner rule,
- ii) Vogel's Approximation Method

- b) Priyanka iron and steel company 3 open heat furnaces and five rolling mills. Transportation cost (Rs. Per Quintal) for transporting steel from furnace to rolling mill is shown in table below: [10]

		Rolling Mills					
		M ₁	M ₂	M ₃	M ₄	M ₅	Capacity
Furnaces	F ₁	4	2	3	2	6	8
	F ₂	5	4	5	2	1	12
	F ₃	6	5	4	7	3	14
Requirement		4	4	6	8	8	

What is the optimal schedule?

OR

- Q4)** a) When is the solution to a transportation problem said to be “degenerative one”? How will one overcome the problem? [6]
- b) Find the feasible solution of following transportation problem using north-west corner method: [10]

		W ₁	W ₂	W ₃	W ₄	Supply
Factory	F ₁	14	25	45	5	6
	F ₂	65	25	35	55	8
	F ₃	35	3	65	15	16
Requirement		4	7	6	13	

- Q5)** a) Define Inventory, what are the different types of Inventories? Why it is important to control Inventory? [6]
- b) Find the optimal order quantity for a product for which the price breaks are as follows: [12]

Quantity	Unit Cost (Rs.)
$0 < q < 500$	Rs. 10
$500 \leq q < 750$	Rs. 9.25
$750 \leq q$	Rs. 8.75

The monthly demand for the product is 200 units, Storage cost is 2% of the unit cost and the cost of the ordering is Rs. 100.

OR
3

Q6) a) State the prerequisites for solving to a 3 machine n jobs problem under the condition to be stated. [6]

b) A book binder has one printing press, one binding machine, and manuscripts of a number of books. The times required to perform the printing and binding operation of each book are shown below: [12]

Books	1	2	3	4	5	6	7
Printing time Hours	20	90	80	20	120	15	65
Binding time Hours	25	60	75	30	90	35	50

Determine the order in which the books should be processes, so that the total time required to process all books is minimized.

SECTION - II

Q7) a) A milk plant at a city distributes its, product by trucks, loaded at the loading dock. It has its own fleet of trucks plus trucks of a private transport company. This transport company has complained that sometime its trucks have to wait in line and thus the company loses money paid for a truck and driver that is only waiting. The company has asked the milk plant management either to go in for a second loading dock or discount prices equivalent to the waiting time. The following data are available: [8]

i) Average arrival rate (all trucks) = 3 per hour.

ii) Average service rate = 4 per hour.

The transport company has provided 40% of the total number of trucks. Assuming that these rates are random according to Poisson distribution, determine

1) The probability that a truck has to wait.

2) The waiting time of a truck that waits.

3) The expected waiting time of company truck per day.

- b) Solve, by using the dominance property, the following game: [8]

		B		
		I	II	III
A	I	1	7	2
	II	6	2	7
	III	6	1	6

OR

- Q8) a) Solve the following game: [8]

		B			
		1	7	2	4
A	0	3	7	8	10
	5	2	6	6	10

- b) Customers arrive at a bank counter manned by a single cashier according to Poisson distribution with mean arrival rate 6 customer/hour. The cashier attends the customers on first come, first served basis at an average rate of 10 customers/hour with the service time exponential distribution. [8]

Find:

- i) The probability of the number of arrivals (0 through 5) during
 - 1) 15-minute interval
 - 2) 30-minute interval
- ii) The probability that the queuing system is idle.
- iii) The probability associated with the number of customers (0 through 5) in the queuing system.
- iv) The time a customer should expect to spend in the queue.
- v) The time a customer spends before leaving the bank counter.

Q9) a) Explain Simulation technique with its use in inventory control system for items having probabilities demand pattern. **[6]**

b) A bakery keeps stock of a popular brand of cake. Daily demand based on past experience is given below: **[12]**

Daily Demand	0	15	25	35	45	50
Probability	0.01	0.15	0.20	0.50	0.12	0.02

Consider the following sequence of random numbers:

48, 78, 09, 51, 77, 15, 14, 68 and 09

- i) Using the sequence, simulate the demand for the next 10 days.
- ii) Find the stock situation if the owner of the bakery decides to make 35 cakes every day.

Also estimate the daily average demand for the cakes on the basis of the simulated date.

OR

Q10)a) Define Simulation model. Distinguish between Deterministic and stochastic simulation models. **[6]**

b) Fleet cars have their costs increasing as they continue in service due to increased direct operating cost (gas and oil) and increased maintenance (repairs, tyres, batteries etc.). The initial cost is Rs. 3800 and the trade-in value drops as time passes until it reaches a constant value of Rs. 600. Given the cost of operating, maintaining and the trade-in value, determine the proper length of service before cars should be replaced. **[12]**

Years of Service	1	2	3	4	5
Years end trade-in value (Rs.)	2000	1200	800	700	600
Annual operating cost (Rs.)	1600	1900	2200	2500	2800
Annual maintenance cost (Rs.)	400	500	700	900	1100

Q11)a) Explain the reasons for incorporating dummy activities in a network diagram. In what way do these differ from the normal activities? [6]

b) A small assembly plant assembled PCs through 9 interlinked stages according to following table: [10]

Stage	Duration
From - to	Hours
1-2	2
1-3	2
1-4	1
2-5	4
3-6	8
3-7	5
4-6	3
5-8	1
6-9	5
7-8	4
8-9	3

- i) Draw a network diagram.
- ii) Tabulate earliest start, earliest finish, latest start and latest finish time for all the stages.
- iii) Find the critical path and the assembly duration.
- iv) Tabulate the total float, free float and independent float.

OR

- Q12)a)** Explain the meaning of crashing in network techniques. **[4]**
- b) How does the PERT technique help a business manager in decision making? **[4]**
- c) The activities involved in a PERT project are detailed in the following table: **[8]**

Job	Duration (days)		
	a	m	b
I - J	a	m	b
1-2	3	6	15
2-3	6	12	30
3-5	5	11	17
7-8	4	19	28
5-8	1	4	7
6-7	3	9	27
4-5	3	6	15
1-6	2	5	14
2-4	2	5	8

a = optimistic, m = most likely time and b = pessimistic time

- i) Draw a network diagram.
- ii) Find the critical path after estimating the earliest and latest event times for all nodes.
- iii) Find the probability of completing the project before 31 days.
- iv) What is the chance of project duration exceeding 40 days?
- v) What will be the effect on the current critical path if the most likely time of activity 3-5 get revised to 14 instead of 11 days given above?



Total No. of Questions :12]

SEAT No. :

P3508

[4959]-152

[Total No. of Pages :3

**B.E. (Production - Sandwich)
Mechatronics & Robotics
(2008 Course) (Semester -I) (411122)**

Time : 3 Hours

[Max. Marks :100]

Instructions to 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) Explain along example open loop system. [6]
b) Discuss the functioning of an Engine Management System and draw a block. Diagram representing the basic elements of the control system for it. [10]

OR

- Q2)** a) State and explain the signal conditioning processes. [6]
b) Discuss the following with neat sketches: [10]
i) Inverting amplifier.
ii) Summing amplifier.
iii) Integrating amplifier.

- Q3)** a) Draw the architecture of 8085 microprocessor. [6]
b) Explain Basic Structure of Microcontroller along with neat sketch. [6]
c) Write a short note on flag registrar used in 8085 microprocessor. [6]

OR

P.T.O.

- Q4)** a) Define the following Terms. [12]
- i) TTL.
 - ii) CMOS.
 - iii) Digital Logic.
 - iv) Parity method for Error Detection.
- b) How does a microcontroller differ from microprocessor. [6]

- Q5)** a) What is an Instruction set? State and explain any four commonly used Instructions that may be given to a microprocessor. [8]
- b) Write a program in assembly language to determine the maximum Temperature Obtained from a list of measured temperatures. [8]

OR

- Q6)** Explain the following along with Example. [16]
- a) Need of Interfacing.
 - b) Buffer
 - c) Polling and interrupt.
 - d) Hand Shaking.

SECTION -II

- Q7)** a) Explain the following, with the help of a ladder diagram. [8]
- i) Latching
 - ii) Sequencing.
- b) Draw a ladder diagram for switching ON a motor on pressing a Green switch and, switching OFF after 10 seconds of pressing the Red switch. [8]

OR

- Q8)** Draw the PLC logic diagram to control a process which is desired to start. Turning on the motor in 10 second after the part touches the limit switch. The Process is terminated automatically when the finish part touches the second Limit switch. An emergency switch will stop the process on time it is pressed. [16]

Q9) Compare Pneumatic, Hydraulic and Electrical Actuators Used Packing Industry For Bottle filling plant. **[16]**

OR

Q10) Explain the following. **[16]**

- a) 4/2-Seat type direction control valves.
- b) Electro hydraulic servo valves.
- c) Hydraulic power supply.
- d) Meter IN and Meter OUT Circuit.

Q11)a) Define 'Robot' and explain clearly the operational features of industrial robots. Which make them different from fixed automation? **[9]**

b) With the help of a neat diagram, explain the basic components of a typical robotic System. **[9]**

OR

Q12) Along with neat Sketch and layout explain application of Robots in following Application. **[18]**

- a) Automatic Foundry.
- b) Forming and Forging Industry.
- c) In under water welding.



Total No. of Questions : 12]

SEAT No. :

P4522

[Total No. of Pages : 3

[4959]-153

B.E. (Production) (S/W)

**Advanced Production Technology
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Figure to the right indicates full marks.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Assume suitable data if necessary.*
- 4) *Answer 3 questions from Section - I and 3 questions from Section - II.*

SECTION - I

- Q1)** a) Explain 'Machining of monolithic Parts'. [8]
b) Explain with neat sketch following terms with regards to HSM technology.[8]
i) Ultra high cutting speed.
ii) Chip formation.
iii) Flank wear of ceramic tool.

OR

- Q2)** a) Explain & draw the graph of Theoretical behavior of the resultant cutting force and its component at ultra-high cutting speed. [8]
b) Explain with neat sketch regarding with regard to hard part machining,[8]
i) Mechanism of material side how during hard turning.
ii) Typical wear types in CBN finish hard turning.

- Q3)** a) Explain with neat sketch abrasive flow finishing. [8]
b) Explain the aspect of Nonmanufacturing. [8]

OR

P.T.O.

- Q4)** Explain with neat sketch [16]
- a) Ultra precision lathe machine.
 - b) Ultra precision milling machine.
 - c) Nano precision CNC machining centre.
 - d) Ultra precision grinding machine

- Q5)** a) Describe part classification and coating technique. [6]
- b) Write a short note on “Enterprise resource planning”. [6]
- c) Explain with neat sketch “Rapid Prototyping Technique”. [6]

OR

- Q6)** a) Explain with neat sketch online in process and online post processes, offline inspection methods. [9]
- b) Explain cell design. What are the factors affecting cell design and what are the cell design criteria? [9]

SECTION - II

- Q7)** a) Explain with neat sketch various types of feeders. [8]
- b) Explain various types of automated guided vehicles with application, benefits and limitations? [8]

OR

- Q8)** a) Write short note on basic framework “Toyota production system”. [10]
- b) Describe components of FMS. [6]

- Q9)** a) The displacement of a pump operating at 1500 rpm at a pressure of 80 bar is 120 cm³ the input torque from the prime mover is 150 Nm. If it delivers 0.0025 m³/s of oil determine. [9]
- i) Overall efficiency of the pump.
 - ii) Theoretical torque required to operate through pump.
 - iii) Volumetric efficiency.
- b) Differentiate between “Hydraulic system” and “Pneumatic system”. [7]

OR

- Q10)** a) Write a short note on “two stage air compressor”. [8]
b) Explain Counter balance valve and Check valve with neat sketch. [8]
- Q11)** a) Draw and explain circuit diagram of a “regenerative circuit”. [8]
b) Write short note on design of pumps. [5]
c) Explain sequencing circuit with a neat sketch. [5]

OR

- Q12)** a) What size of accumulator is necessary to supply 4000 cm³ of fluid in a hydraulic system of maximum operating pressure of 190 bar, which drops to minimum 102 bar?
Assume Nitrogen gas precharge of accumulator as 70 bar obtain both Isothermal and Adiabatic solution. [6]
- b) A pump has a displacement of 30cm³/rcv is driven at 1680 rpm and 140 bars the volumetric efficiency is 0.85 and overall efficiency is 0.7. [6]
Calculate:
i) Pump delivery in LPM
ii) The input power at pump shaft in kw
iii) Drive torque at pump shaft
- c) Explain different types of intensifiers. [6]



Total No. of Questions : 12]

SEAT No. :

P3401

[4959]-155

[Total No. of Pages : 2

**B.E.(Production Sandwich Engineering)
AUTOMOBILE ENGINEERING
(2008 Course) (Semester-I)**

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.*

SECTION-I

- Q1)** a) List various types of frame and describe in brief the conventional frame [8]
- b) Describe the working of two stroke petrol engine with neat diagrams. [8]
- c) What do you mean by articulated vehicle? [2]

OR

- Q2)** a) Classify the vehicles on the basis of different aspects. [8]
- b) Describe the working of four stroke petrol engine with neat diagram. [8]
- c) Why is the frame narrow at the front? [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]

P.T.O.

- Q5)** a) What are the functions of the lubrication system in an automobile? [8]
b) Explain Battery ignition system. [8]

OR

- 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) What is hydraulic clutch? How does it work? [7]
c) Why is clutch pedal “free play” important? [3]

OR

- Q8)** a) With the help of neat sketch, working of synchromesh gear box. [12]
b) What is meant by double declutching? Explain? [6]
Q9) a) Sketch and explain Ackermann steering mechanism. [10]
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. [10]
b) Why disc brakes are better than drum type brakes? [6]

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]



Total No. of Questions : 12]

SEAT No. :

P3509

[4959]-156

[Total No. of Pages : 3

B.E.(Production S/W)

**C: COMPUTER INTEGRATED MANUFACTURING AND
INDUSTRIAL ROBOTICS**

(2008 Course) (Semester-I)(411124)(Elective-I)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer one questions from 1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10, 11 & 12.*
- 2) *Answer to the two sections should be writtern in separate answer books.*
- 3) *Use of calculator is allowed.*
- 4) *Figures to the right indicate full marks.*

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) Draw the OSA Esprit Model. [4]

OR

- Q2)** a) Explain the role Rapid Prototyping in CIM. [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 control system used in Robotics. [8]
- b) Derrive the equation of Kinematics using Homogeneous Transformation. [8]

OR

- Q4)** a) Explain the Principle of Denvavati - Hartenberg's convention for dynamics analysis of Joints along with suitable example. [12]
- b) Explain the concept of Spatial mechanism. [4]

P.T.O.

- Q5)** a) Explain the mechanical types of 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 conversion system. [4]

SECTION-II

- Q7)** a) Classify the various types Grippers used in Robotics. [8]
b) A 22.5kg rectangular block is gripped in the middle and lifted vertically at velocity 2 m/s. If it accelerates to this velocity at 30.5m/s^2 and the coefficient of friction between the gripping pad and block is 0.5 Calculate minimum force that would prevent slippage. [8]

OR

- Q8)** a) Explain concept finite element analysis in grippers designs for pressure Foragile. [8]
b) Explain the modular design concept in Gripper of robotics. [8]

- Q9)** What are the different types of Sensors used in Robotics? Explain along with example any two types sensors used in welding and foundry application.[16]

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 Optical vision technique use in robot Vision system [8]

Q11) a) Explain along with sketch the application Robot in the following Area.[12]

- i) Forming Industry
- ii) Bottle filling plant
- iii) In logistics

b) Explain the application of CLIMBING Robot in detail [6]

OR

Q12) Write a short note on following. [18]

- a) Interfacing of robotics with PC.
- b) Obstacles avoidance technique in robotics.
- c) VAL Languages used for programming in robot.



Total No. of Questions : 12]

SEAT No. :

P3402

[4959]-157

[Total No. of Pages : 2

**B.E.(Production-Sandwich)
d:PLASTIC ENGINEERING**

(2008 Course) (Elective-I)(Semester-I) (411124)

Time :3Hours]

[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.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Discuss concept of polymerization. **[8]**
- b) What is the role of additive in plastic? Explain various additives used in plastics. **[10]**

OR

- Q2)** a) Explain process of coloring in plastics. **[8]**
- b) Discuss common alloys and blends used in plastic. **[10]**
- Q3)** a) Explain different types of runners with suitable sketches. **[8]**
- b) Discuss various considerations in injection mould design **[8]**

OR

- Q4)** a) Explain pressure time diagram with suitable sketches. **[8]**
- b) Explain use of insert in core and cavity design with suitable sketches. **[8]**
- Q5)** a) State special features of extrusion die. **[8]**
- b) Explain Co-extrusion of films and sheets. **[8]**

OR

P.T.O.

- Q6)** a) Explain twin screw extruder with suitable sketch. [8]
b) Explain extrusion coating with suitable sketch. [8]

SECTION-II

- Q7)** a) Explain single station blow moulding with suitable sketches. [10]
b) Design design considerations in blow molding. [8]

OR

- Q8)** a) Explain rotary blow molding system with suitable sketches. [8]
b) Explain twin station blow moulding with suitable sketches. [10]
- Q9)** a) Discuss twin sheet vacuum thermoforming with suitable sketch. [8]
b) Explain vacuum forming male moulding with suitable sketches. [8]

OR

- Q10)** a) Explain drape vacuum forming with suitable sketches. [8]
b) Discuss various problems observed in thermoforming. [8]
- Q11)** a) Explain trimming and tapping in machining of plastics [10]
b) Explain [6]
i) polishing
ii) Reaming.

OR

- Q12)** a) Discuss principle considerations in machining of plastic. [10]
b) Explain milling and sawing operations in plastics. [6]



Total No. of Questions : 12]

SEAT No. :

P4928

[Total No. of Pages : 3

[4959]-159

B.E. (Production Sandwich Engineering)

(B) : MATERIALS MANAGEMENT AND LOGISTICS

(2008 Pattern) (Elective - II) (Revised)

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) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 & Q11 or Q12*
- 4) *Use of electronic pocket Calculator is allowed.*
- 5) *Assume suitable data if necessary*

SECTION - I

- Q1)** a) How to improve the value of any product? Explain with example. [9]
b) What are the objectives of materials management? [9]

OR

- Q2)** a) Master Production Schedule is important document in Material Requirement Planning. Justify with suitable example. [9]
b) What are the factors influencing Make or Buy decision. Explain with example. [9]

- Q3)** a) Explain Import Substitution in Indian context. [8]
b) Explain Local Purchasing Procedure with flowchart. [8]

OR

- Q4)** a) Vendor development and Vendor selection is important in purchasing. Justify. [8]
b) What is Vendor development? Explain any one method of vendor rating in brief. [8]

- Q5)** a) What is store identification? Explain KODAK system of codification briefly. [8]
b) Explain mechanical waste disposal system in detail. [8]

P.T.O.

OR

- Q6)** a) Explain various causes of surplus and obsolete stock. [8]
b) Justify the role of store keeper is important in any manufacturing industry. [8]

SECTION - II

- Q7)** a) Explain various modes of transportation. What are the factors on which best transportation mode is selected? [8]
b) Explain in-bound logistics and out-bound logistics with example. [8]

OR

- Q8)** a) List the types of warehouses and explain any one in detail. [8]
b) List and explain in brief economic and service benefits of warehousing. [8]

- Q9)** a) Explain, Selective inventory control is necessary in large scale industries. [8]
b) BATA industry estimates that it will sell 24000 units of the product for the forthcoming year. The ordering cost is Rs. 150 per order, and the carrying cost per unit per year is 20% of the purchase price per unit which is Rs. 50. Find [8]
i) Economic Order Quantity
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) The store of an oil engine repair shop has 10 items whose details are shown in the following table. [8]

Details of Store

Component Code	Description	Price/unit (Rs.)	Units/year
C01	Packing Thread	100	100
C02	Tower bolt	200	300
C03	Hexagonal nut	50	700
C04	Bush	300	400
C05	Coupling	500	1000
C06	Bearing (Big)	3000	30
C07	Bearing (Small)	1000	100
C08	Fuel pump	7000	500
C09	Fixture	5000	105
C10	Drill bit	60	1000

- Q11)**a) Explain the costs associated with inventory control. [9]
b) Derive the formula for Economic Manufacturing Quantity when replenishment is non instantaneous (Gradual). State the assumptions made. [9]

OR

- Q12)**a) Explain Fixed period (P) system and Fixed Quantity (Q) system of inventory control in brief. [9]
b) Explain the effects of discounts on the cost of item if the quantity purchased is increased. [9]



Total No. of Questions : 12]

SEAT No. :

P4929

[Total No. of Pages : 5

[4959]-160

B.E. (Production) (S/W)

(C) : FINANCIALMANAGEMNTANDCOSTCONTROL (Elective-II)
(2008 Pattern)

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) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10,& Q11 or Q12.
- 4) Use of electronic pocket Calculator is allowed.
- 5) Assume Suitable data if necessary.

SECTION - I

Q1) a) What is balance sheet? Show the structure of balance sheet with example. [8]

b) Explain functions of Financial Management. [8]

OR

Q2) a) What is ratio analysis? List and explain any three ratios. [8]

b) What is Profit and Loss Account? Show the structure of profit and loss account with example. [8]

Q3) a) What is Capital Budgeting? Explain its importance for any manufacturing organization with example. [10]

b) An investment proposal P requires an initial capital outlay of Rs. 2,00,000, with no salvage value, and will be depreciated on a straight line basis for tax purposes. The earnings before depreciation and taxes (EBDT) during its 5 year life are. [6]

Year	1	2	3	4	5
EBDT(Rs.)	70,000	76,000	80,000,	60,000	52,000

The corporate tax rate is 35 percent and the company evaluates its investment projects at 12 percent cost of capital. Advice the company whether the project should be accepted when there is no inflation.

OR

P.T.O.

Q4) a) List and explain any one investment appraisal method of Capital Budgeting. **[10]**

b) GEMS corporation is considering two capital expenditure proposals. Both proposals are for similar products and both are expected to operate for four years. Only one proposal can be accepted. **[6]**

The following information is available:

	Profit (Loss)	
	Proposal A (Rs.)	Proposal B (Rs.)
	46,000	46,000
Year 1	6,500	4,500
Year 2	3,500	2,500
Year 3	13,500	,500
Year 4	Loss 1,500	Profit 14,500
Estimated scrap value at the end of Year 4	4,000	4,000

Depreciation is charged on the straight line basis Problem:

Calculate the following for both proposals:

- i) The payback period to one decimal place
- ii) The average rate of return on initial investment, to one decimal place.

Q5) a) Explain in brief the concept and need of Working Capital Management. **[9]**

b) Calculate the amount of working capital requirement for SRCC Ltd. from the following information: **[9]**

	Rs.(Per Unit)
Raw materials	160
Direct labour	60
Overheads	120
Total cost	340
Profit	60
Selling price	400

Raw materials are held in stock on an average for one month. Materials are in process on an average for half-a-month. Finished goods are in stock on an average for one month. Credit allowed by suppliers is one month and credit allowed to debtors is two months. Time lag in payment of wages is 1½ weeks. Time lag in payment of overhead expenses is one month. One fourth of the sales are made on cash basis.

Cash in hand and at the bank is expected to be Rs. 50,000; and expected level of production Cash in hand and at the bank is expected to be Rs. 50,000; and expected level of production amounts to 1,04,000 units for a year of 52 weeks. You may assume that production is carried on evenly throughout the year and a time period of four weeks is equivalent to a month.

OR

- Q6)** a) What do you understand by Fund Flow Statement? How is it Prepared?[9]
b) What are the sources of working capital? Explain any two sources in detail. [9]

SECTION - II

- Q7)** a) List and Explain any one method of remuneration. [8]
b) From the following particulars, calculate total earnings of each worker under Gantt's. [8]

Task and Bonus Scheme:

Standard production per week per worker is 2000 units, piece work rate Rs. 5 per unit.

Actual production during the month: A- 1000 units

B -2000 units

C -2500 units

OR

- Q8)** a) List the methods of issuing material and explain FIFO method with example. [8]
b) The following is the summary of the receipts and issues of material in a factory during December 2015. Prepare Store Ledger according to First In First Out Method. [8]

December 2015

1. Opening balance 500 units @ Rs.25 per unit
3. Issue 70 units
4. Issue 100 units
8. Issue 80 units
13. Received from supplier 200 units @ Rs.24.50 per unit
14. Returned to store 15 units @ Rs.24 per unit
16. Issue 180 units.
20. Received from supplier 240 units @ Rs.24.75 per unit
24. Issue 304 units.
25. Received from supplier 320 units @ Rs.24.50 per unit
26. Issue 112 units
27. Returned to store 12 units @ Rs.24.50 per unit
28. Received from supplier 100 units @ Rs.25 per unit

It was revealed that on 15th there was a shortage of five units and another on 27th of 8 units.

- Q9) a)** Define budget control. What are the per-requisites for the implementation of budget control. [8]
- b) The budgeted capacity of a factory per month of 25 days was 2, 00,000 hours and the budgeted fixed overheads were 2, 40,000. The management increased the capacity by 20% in the beginning of October, 2000, the actual number of working days in that month were 23. Compute the variance that emerges. [8]

OR

- Q10)a)** Define and explain briefly the following types of variances [8]
- i) material price variance
 - ii) material usage variance
 - iii) material mixture variance
 - iv) material yield variance

- b) For producing one unit of a product, the materials standard is: **[8]**
Material X: 6 kg. @ Rs. 8 per kg., and
Material Y: 4 kg. @ Rs. 10 per kg.

In a week, 1,000 units were produced the actual consumption of materials was:

Material X: 5,900 kg. @ Rs.9 per kg., and
Material Y: 4,800 kg. @ Rs.9.50 per kg.

Compute the various variances.

Q11)a) Define and explain the concept of standard cost and standard costing. **[6]**

- b) A product is sold at a price of Rs.120 per unit and its variable cost is Rs.80 per unit.

The fixed expenses of the business are Rs.8, 000 per year. Find, (i) BEP in and units, (ii) profits made when sales are 240 units, (iii) Sales to be made to earn a net profit of Rs.5, 000 for the year. **[12]**

OR

Q12)a) Define Marginal Costing. State the applications and limitations of Marginal Costing. **[9]**

- b) Explain the concept of Joint costing with example. **[9]**



Total No. of Questions :12]

SEAT No. :

P3403

[4959]-161

[Total No. of Pages :3

**B.E. (Production S/W)
d: PRODUCT DEVELOPMENT
(2008 Pattern) (Semester - I) (Elective - II)**

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 is modern product development process? Explain the role of product development team in product development planning with reference to ISO standard. **[10]**
- b) Write short notes on: **[8]**
- i) Concurrent Design
 - ii) Quality Function Deployment

OR

- Q2) a)** Distinguish between **[8]**
- i) Product development Vs product Design.
 - ii) Product verification and production validation.
- b) What is prototyping? Explain the methods of rapid prototyping in detail. **[10]**

P.T.O.

- Q3)** a) Explain the following terms: [8]
- i) Market Segmentation
 - ii) Customer population
- b) What is Mission Statement and Technical Questioning? Explain the economic Analysis of Product. [8]

OR

- Q4)** a) Explain in short the Economic Analysis of product? How it is useful to company? [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 note on: [8]
- i) FMEA
 - ii) Functional 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)** Write short notes on: [16]
- a) Quality function deployment
 - b) FMEA
 - c) Tear down methods

OR

- Q8) a)** What is product portfolio & architecture explain with suitable example. **[8]**
- b) What is reverse engineering? Explain the advantages & disadvantages of reverse engineering. **[8]**

Q9) Explain the following terms: **[16]**

- a) Design for manufacture
- b) Design for piece part production
- c) Product testing
- d) Product validation

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 reliability concept in product development. **[10]**

OR

Q12)a) Explain in short Emergence of PLM & significance of PLM. **[10]**

- b) Write short notes on: **[8]**
- i) Reliability in product design
 - ii) Importance of customer involvement.

EEE

Total No. of Questions : 12]

SEAT No. :

P3404

[4959]-162

[Total No. of Pages : 2

**B.E.(Production Sandwich Engineering)
a: SUPPLY CHAIN MANAGEMENT
(2008Course) (Semester-II)(Elective-III)**

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) Discuss primary and secondary objectives of supply chain management **[10]**

b) Discuss the SC Macro processes in a firm. **[8]**

OR

Q2) a) Discuss the role of sourcing in supply chain and list the sourcing related metrics. **[9]**

b) Discuss the components of facilities decisions. **[9]**

Q3) a) Explain the basic approach to demand forecasting and its six step process? Discuss any three steps in brief with examples **[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 calculator from a shop in your city. **[10]**

b) How to implement aggregate planning in practice? **[6]**

Q5) a) When is 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]**

OR

P.T.O.

- Q6)** a) Explain the economies of scale to exploit fixed costs. [8]
b) Why is IT the key component of SCM? “Successful IT implementation is the outgrowth of the participation of knowledge workers”. Comment with examples. [8]

SECTION-II

- Q7)** a) Write a note on package carriers in detail. Explain with a good example. [9]
b) Write short note on facility location decisions in supply chain [9]

OR

- Q8)** a) Discuss various options available for designing of transportation network. [9]
b) Explain the use of DC in transportation network. 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. :

P3405

[4959]-163

[Total No. of Pages : 3

**B.E.(ProductionS/W)
PLANT ENGINEERING AND MAINTENANCE
(2008 Course) (Semester-II)**

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4,Q,5 or Q6 from section-I and que.no. Q7or Q8,Q9 or Q10,Q11 or Q12 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 are the consequences of insufficient maintenance? Explain. [8]
b) Briefly explain the objectives of planned preventive maintenance. [8]

OR

- Q2)** a) Write short note on: [8]
i) Training of Maintenance workforce
ii) Assessment of maintenance work
b) What are the primary and secondary functions of plant engineering? [8]

- Q3)** a) What are the advantages and disadvantages of various plant layout?[10]
b) Explain the importance of auxiliary services while finalizing the plant layout. [8]

OR

- Q4)** a) Discuss in brief main steps involved in systematic Layout planning? [8]
b) Write short notes on: [10]
i) PQRST analysis
ii) Muther's plant layout procedure

P.T.O.

- Q5)** a) Discuss the factors which need to be considered for implementation of an efficient spare parts control system. [8]
b) Explain the duties and responsibilities of a maintenance engineer. [8]

OR

- Q6)** a) Explain why it is essential to exercise planning and control of maintenance material. [8]
b) Describe following types of maintenance [8]
i) Preventive maintenance
ii) Condition based maintenance

SECTION-II

- Q7)** a) Briefly explain the concept of life cycle costing of equipment [8]
b) How can effectiveness of preventive maintenance help the maintenance department? [8]

OR

- Q8)** a) What is the scope of preventive maintenance in an organization? [8]
b) Discuss the various distribution functions used for the estimation of reliability in the performance of the maintenance function. [8]

- Q9)** a) Enumerates some short term measures which the maintenance personnel can implement to achieve energy conservation. [8]
b) Explain plant safety against the chemical hazards. [8]

OR

- Q10)** a) Explain in short the various fire prevention practices [8]
b) Briefly explain two disposal methods of solid waste. [8]

Q11) a) Specify the areas where terrotechnology practices can be applied effectively. **[10]**

b) Briefly explain the techniques which can be used for the detection of corrosion in machinery. **[8]**

OR

Q12)a) Write short notes on: **[10]**

i) Total productive maintenance

ii) RAM analysis

b) Differentiate between the spectrometric oil analysis procedure and the magnetic plug inspection system. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3406

[4959]-164

[Total No. of Pages : 2

B.E.(Production Sandwich)

**C: INDUSTRIAL RELATIONS & HUMAN RESOURCE
MANAGEMENT**

(2008Course)(Semester-II)(Elective-III) (411130)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer questions Q1 or Q2, Q3 or Q4,Q,5 or Q6 from section-I and questions Q7or Q8,Q9 or Q10,Q11 or Q12 from sectin-II.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data, if 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 idustrial 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. :

[Total No. of Pages :2

P3946

[4959] - 166

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) Reproducibility with engraving is consistent than etching. Explain [18]

OR

Explain Gravure cylinder making by electronic engraving process. [18]

Q2) Explain copper plating process of a gravure cylinder. [16]

OR

Explain the plating variables of gravure cylinder. [16]

Q3) Explain in detail Gravure machine principles. [16]

OR

Explain solvent based inks used in gravure process. [16]

P.T.O.

SECTION - II

Q4) The flow properties of ink play an important role in ink transfer. Explain. **[18]**

OR

Explain in detail doctor blade loading system of gravure press. **[18]**

Q5) Explain the impact of impression pressure on print quality. **[16]**

OR

Explain the different loading systems of an impression system. **[16]**

Q6) Explain in detail Shaftless technology for a Gravure press. **[16]**

OR

Explain the importance of Web Transport Rollers. **[16]**



Total No. of Questions :6]

SEAT No. :

P3947

[4959]-168

[Total No. of Pages :2

B.E. (Printing)

**Study of Advertising and Multimedia
(2008 Course) (Semester - I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right side indicate full marks.*

SECTION - I

- Q1)** a) Draw AIDA model and explain in greater details. [9]
- b) Write short notes on : [9]
- i) Communication model.
 - ii) Publicity.

OR

- Q1)** a) Which are the four major tools of communication other than advertising? Compare and contrast between advertising and any other two tools of communication. [9]
- b) Write short notes on: [9]
- i) Four P's of marketing.
 - ii) Any 2 type of appeals.

- Q2)** a) Explain difference between Launching and retention of product from advertising perspective.
- b) Explain product life cycle and revival of PLC with neat diagram. [16]

OR

- Q2)** Write short notes on: [16]
- i) Financial Advertising.
 - ii) Public service advertising

P.T.O.

Q3) What is market segmentation?

What are the different methods of segmentation? Explain the most effective method in details. [16]

OR

Q3) What is market research?

Explain in details salient features of market research.

Explain in details steps of the market research process. [16]

SECTION - II

Q4) Which are the different effective media used in advertising? Explain with the help of suitable case the effective application of print medium and electronic medium. [16]

OR

Q4) What is outdoor medium for advertising? What are the merits and de-merits of outdoor as a media? Explain with suitable case. [16]

Q5) Advertising should be done in terms of Campaign-Justify

How long should be a campaign? Explain the steps in campaign planning. [18]

OR

Q5) What is the significance of copy in advertisement? Explain in details the job of copywriter. [18]

Q6) What are the standard elements of print advertising? Explain in details significance and contribution of each element to make print ad. Effective. [16]

OR

Q6) Explain with a suitable case any reminder campaign. Mention the objective of the campaign, length and other details as well. [16]



Total No. of Questions : 6]

SEAT No. :

P3948

[4959]-169

[Total No. of Pages : 3

B.E. (Printing)

a:QUALITY CONTROL TECHNIQUES IN PRINTING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *All questions are compulsory.*
- 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) Explain in detail Quality Control and Cost of Quality Cost concept in detail with examples of each type of quality Cost with respect to printing industry. **[16]**

OR

List out and Explain Quality Characteristic in detail. **[16]**

Q2) Explain in detail the quality specifications for printing industry in detail with suitable examples. **[16]**

OR

For a sampling plan determine probability of acceptance of following Percentage defectives, also draw a OC Curve **[16]**

$N = 1000, n = 60, c = 1$

Sr. No	1	2	3	4	5	6
Percentage Defective	0.4%	0.8%	1%	2%	4%	6%

P.T.O.

Q3) PQR company produces dampening solution which must contain 3% of alcohol. **[18]**

The company tries to maintain the actual percentage in the range of + - 0.3. It tests 5 samples per hour. The following table shows the result of last five samples. Construct a control chart for X & R. Examine whether the process is under control.

$$A_2 = 0.5768, D_3 = 0, D_4 = 2$$

Sample No.	1	2	3	4	5
1	2.8	2.7	3.1	2.8	3.1
2	2.7	3.0	3.0	3.0	3.0
3	3.0	3.1	3.2	3.1	2.9
4	3.0	3.0	3.3	3.2	3.0
5	2.9	3.0	3.1	2.9	3.3

OR

Describe Lean manufacturing system in detail as well as computer Integrated Manufacturing system. **[18]**

SECTION - II

Q4) 10 printed samples of size 100 were studied critically for total number of defectives in it. The details of number of defectives in each sample are given below. All samples are accepted by quality control Department of the company. Construct a control chart & comment of result. **[16]**

Sample No.	1	2	3	4	5	6	7	8	9	10
No of Defectives	2	3	1	4	2	2	4	2	2	5

OR

Explain following properties related to Ink **[16]**

- | | |
|------------|-------------|
| a) Flow | b) Color |
| c) Opacity | d) Adhesion |

Q5) 10 samples each size of size 60 of offset machine blowers were tested in pressure testing. The result of the inspection are given below. **[16]**

Sample No	1	2	3	4	5	6	7	8	9	10
No of Defects	4	3	2	3	2	3	2	5	2	3

OR

Explain offset Lithography process control with help of profile creation. **[16]**

Q6) Describe World Class Manufacturing system. **[18]**

Explain in detail Job Production & Mass Production.

OR

Describe factors to be considered for press finger printing of Flexography Printing. **[18]**

x x x

Total No. of Questions : 6]

SEAT No. :

P4523

[Total No. of Pages : 2

[4959]-172

B.E. (Printing Engineering)

SECURITY PRINTING

(2008 Course) (Elective - II(a))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Black figures to the right indicate full marks.*

Q1) What is a security Printed document? Explain in details. **[18]**

OR

Describe Optical security printing in detail. **[18]**

Q2) Explain Flexography for Security Printing. **[16]**

OR

Explain image making and structure in bank note printing. **[16]**

Q3) Explain smart card concept in security printing. **[16]**

OR

Explain UV printing , properties & security applications. **[16]**

Q4) Explain CTS system and advantages. **[18]**

OR

Describe MICR system in details. **[18]**

P.T.O.

Q5) Explain IR & UV ink applications in Security Printing. [16]

OR

Explain Types of inks used for Security Printing with examples. [16]

Q6) State and explain Information security systems and applications. [16]

OR

Explain advancements in security printing features. [16]



Total No. of Questions :6]

SEAT No. :

P3949

[4959]-175

[Total No. of Pages :5

B.E. (Printing)

PRINT PRODUCTION PLANNING & CONTROL

(2008 Course) (Theory) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

Q1) Explain the classification of Production Systems in detail with suitable examples. **[16]**

OR

Explain the functions of production Planning and Control in detail with suitable examples. **[16]**

Q2) Consider a project consisting of 12 activities with following precedence relationship and durations. **[16]**

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Immediate predecessor	-	-	A	A	A	D	C	D	E,F	B,I	G,H	J,K
Duration (weeks)	2	8	2	4	9	7	11	3	4	9	5	4

- a) Draw network diagram & find the critical path.
- b) List the total float, free float and independent float for all activities.

OR

P.T.O.

The time estimates (in weeks) for the activities of a PERT network are given below. [16]

<i>Activity</i>	T_0	T_m	T_p
1-2	2	1	7
1-3	1	4	7
1-4	6	2	8
2-5	1	3	1
3-5	2	5	14
4-6	7	7	8
5-6	3	6	14

- Draw the project network and determine expected project length.
- Calculate the Std. Dev. And variance of the project.
- What is the probability that project will be completed no more than 4 weeks earlier than expected time.
- If the project due date is 21 weeks, what is the probability of not meeting the due date.

Given data: $Z = 1.33, P = 0.9082$

$Z = 0.67, P = 0.7486$

$Z = 1.28, P = 0.9$

Q3) There are seven jobs, each of which has to go through the machines A & B in the order AB. Processing time in hours are given as, [18]

Job	1	2	3	4	5	6	7
Machine A	5	12	15	6	11	11	9
Machine B	8	13	12	6	12	8	3

Determine the sequence of these jobs that will minimize the total elapsed time T. Also find T and idle time for machines A and B.

OR

There are five jobs, each of which is to be processed through three machines A, B and C in the order ABC. Processing times in hours are, [18]

Job	1	2	3	4	5
Machine A	6	8	7	5	7
Machine B	4	9	2	2	8
Machine C	7	9	5	9	11

Determine the optimum sequence for the five jobs and the minimum elapsed time. Also find the idle time for the three machines and waiting time for the jobs.

SECTION-II

Q4) A job production unit has four jobs A, B, C and D, which can be manufactured on each of the four machines. the processing cost of each job for each machine is given. How should the jobs be assigned so as to minimize the processing cost. [16]

	P	Q	R	S
A	31	25	33	25
B	21	25	23	23
C	19	22	28	24
D	38	36	32	40

OR

Solve the following Assignment problem for minimization. The costs are given below. Find all the alternate solutions, if any. [16]

	X1	X2	X3	X4	X5
A	17	29	35	20	38
B	21	37	33	17	36
C	17	25	27	19	42
D	14	31	35	21	40
E	19	30	40	29	18

Q5) Find the initial feasible solution for the following problem. The supply, demand and unit cost figures are given. [16]

	W1	W2	W3	W4		
P1	190	300	580	100	70	
P2	700	350	400	670	90	↑
P3	420	170	400	200	180	Supply
	50	80	70	140		Demand →

OR

Solve the following Transportation problem. [16]

	D1	D2	D3	D4		
S1	10	20	5	7	10	
S2	17	9	12	8	20	↑
S3	8	12	7	9	30	Supply
S4	11	7	6	9	40	
S5	8	19	5	19	50	
	60	60	20	10		Demand →

Q6) A company makes three products X, Y and Z which go through three departments Drill, Lathe and Assembly. The hours of department time required by each of the products, the hours available in each of the departments and the profit contribution of each of the products are given in the following table. [18]

Products	Time required per unit (Hours)			Profit contribution (Rs. Per Unit)
	Drill	Lathe	Assembly	
X	7	3	11	14
Y	9	5	15	15
Z	2	5	12	20
Hrs. Available	210	240	260	

The marketing department of the company indicates that the sales potential for the products X and Y is unlimited, but for Z it is not more than 70 units. Determine optimum production schedule.

OR

A company machines and drills two castings X and Y. The time required to machine and drill one casting including machine set up time is as follows, [18]

Casting	Machine Hours	Drilling Hours
X	7	10
Y	4	8

There are two lathe and three drilling machines. The working week is of 40 hours; there is no overtime and lost time. Variable costs for both the castings are Rs. 140 per unit while the total fixed costs amount to Rs. 1500 per week. The selling price of casting X is Rs. 350 per unit and that of Y is Rs. 300 per unit. There are no limitations on the number of X and Y castings that can be sold. The company wishes to maximize profits. Formulate the linear programming model for the same.

EEE

Total No. of Questions :12]

SEAT No. :

P3950

[4959]-176

[Total No. of Pages :3

B.E. (Printing)

Electronic Publishing

(2008 Course) (Semester - II) (Elective - III) (408287A)

Time : 3 Hours

[Max. Marks :100]

Instructions to candidates:

- 1) *All questions are compulsory.*
- 2) *Figures in right indicate marks.*

SECTION - I

Q1) a) Explain the following HTML tags with example and syntax. **[10]**

1. <Table>
2. <P> (Paragraph)

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 program to generate the table as shown in picture below. **[18]**

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	

P.T.O.

Q3) a) Explain JPEG, PNG and GIF file formats in detail. Compare and explain which image file format is best in web page. [10]

b) Explain design challenges in online rich text editor. [6]

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]

1. DELETE.

2. UPDATE.

3. INSERT.

b) Explain any 4 differences between XML and HTML with example. [4]

OR

Q6) 1. Create SQL database to store information of 5 students.

First table should contain Name and Roll no.

Second table should contain Address and Branch.

Third table should contain 1st term and 2nd term marks.

2. Write an SQL query for above database to display Name, Roll no, Address and 1st term marks for any one student. [16]

SECTION - II

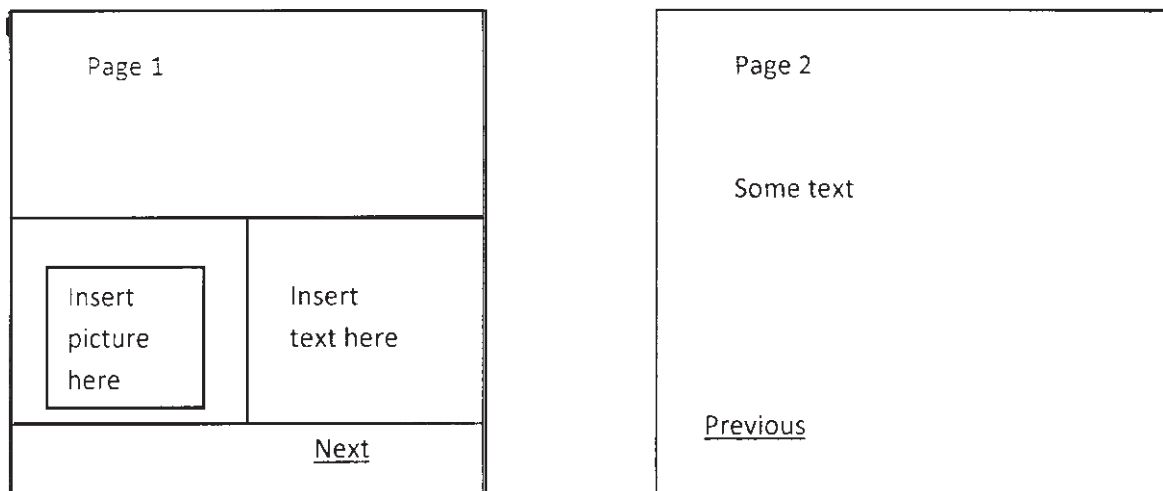
Q7) a) Explain concept of typography with example. [8]

b) Explain use of CSS in web page designing with example. Write a program to include CSS file in HTML program. [10]

OR

Q8) Explain concept of indexing. Write HTML program to design two pages shown below such that. **[18]**

- a) Next and previous shown in are hyperlinks.
- b) For page1: When click on Next button, page2 should be loaded.
- c) For page2 when click on 'Previous' button, page1 should be loaded.



Q9) a) Explain E-publication formats E-Pub, AZW, and mobi e-book text formats in detail. **[12]**

b) Explain necessity of E-publication text formats. **[4]**

OR

Q10)a) Explain any one e-commerce application. **[8]**

b) Explain use of E-publishing in the field of printing. **[8]**

Q11) Explain all steps for publishing data. **[16]**

OR

Q12)a) Explain main features of dot net like common language runtime (CLR), cross language interoperability. **[10]**

b) Explain web content management system (WCMS). **[6]**



Total No. of Questions :6]

SEAT No. :

P3951

[4959]-177

[Total No. of Pages :3

B.E. (Printing Machine Maintenance)
b : PRINTING MACHINE MAINTENANCE
(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) *All questions 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) Draw a neat diagram of the helical gear mechanism. Where is it used in the offset press? How is it maintained. [10]
- b) What are different types of compressors. [6]

OR

- Q1)** a) Draw the diagram of bevel gears. Compare spur and bevel gears. [8]
- b) Explain the purpose of belt drive used in sheet fed offset machine. Draw a neat diagram of 'V' belts . What are the advantages of this drive over other drives? How is it maintained? [8]

- Q2)** Explain in steps how to disassemble and assemble rollers in dampening unit.[16]

OR

- Q2)** Prepare a daily, weekly, monthly maintenance checklist for ink supply unit for a 2 color press [16]

- Q3)** State and explain different maintenance strategies to improve breakdown in a press. [18]

OR

P.T.O.

Q3) Explain how life of motors and electrical components can be improved. State maintenance carried out for these equipments. **[18]**

SECTION - II

Q4) a) What are the safety norms and policies to be followed by the press crew for having a safe and hazard free working environment in a gravure press. **[9]**

b) Explain the uses of the following in condition monitoring: **[9]**

i) Accelerometer.

ii) Digital ultrasonic scanner.

iii) Stroboscopes for maintenance.

OR

Q4) a) What are steps of preventive maintenance of a plate and blanket used in offset. Draw a neat sketch of the 4 ply blanket. **[10]**

b) What is the purpose of a operator's manual. State points to be considered when developing one. **[8]**

Q5) Write short notes on the following that require special maintenance needs. **[16]**

a) Bearings used in rollers.

b) Friction clutches.

c) Brakes used in reel stands.

d) Gear box.

OR

Q5) a) Define what is hazard. State any 2 physical and chemical hazards in package printing plant. **[8]**

b) State steps to eliminate these hazards. **[8]**

Q6) Explain working of a chopper folding mechanism. What is daily, weekly and monthly maintenance is required in former folders. **[16]**

OR

Q6) Explain working and construction of combination dryer in web press. Explain maintenance of the same. **[16]**



Total No. of Questions : 6]

SEAT No. :

P3952

[4959]-179

[Total No. of Pages : 2

B.E. (Printing)

a - FLEXIBLE PACKAGING

(2008 Course) (Semester - II)

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) LLDPE
- c) PC

OR

Explain the role of polyester in packaging.

Q2) Explain in detail rotogravure process for flexible packaging.

[16]

OR

Explain in detail Rotary letter press for flexible packaging.

Q3) Explain along with diagram wet lamination techniques.

[16]

OR

Explain along with diagram Cast Film Extrusion process.

P.T.O.

SECTION - II

Q4) Explain in detail stand - up pouches. **[16]**

OR

Explain in detail process of making tubes for cosmetic products.

Q5) Explain the types of closures for various applications. **[16]**

OR

Describe shrink packaging technique for a given product.

Q6) Mention the packaging technology for the following products. **[18]**

- a) Tea
- b) Juices
- c) Butter

OR

Mention deterioration factors for the following:

- a) Horticultural products
- b) Coffee
- c) Red Meat



Total No. of Questions : 6]

SEAT No. :

P3305

[Total No. of Pages : 2

[4959]-18

B.E. (Civil Engineering) (Semester - II)
ADVANCED ENGINEERING GEOLOGY WITH
ROCK MECHANICS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Neat diagrams should be drawn wherever necessary.*

SECTION - I

- Q1)** a) Comment on the feasibility of archean rocks occurring in Maharashtra State from geological point of view. [8]
- b) Regional distribution of basalt in Maharashtra State. [6]
- c) Pinching and bulging of dykes. [4]

OR

- a) What are fractures? Explain them in detail. [6]
- b) Varieties of basalts. [4]
- c) Comment on the feasibility of secondary rocks occurring in Maharashtra State from geological point of view. [8]

- Q2)** a) Engineering Significance of dykes from dam foundation point of view with relevant case histories. [8]
- b) How location of Spillway is decided on geological grounds? Discuss in detail with examples. [8]

OR

- a) What will happen if reservoir is located on laterites and jointed quartzites? Mention few case histories. [8]
- b) Engineering Significance of Tachlytic basalts. [8]

P.T.O.

Q3) What are soils? How are they formed? Explain residual and transported soils of Maharashtra State. [16]

OR

- a) Water bearing character of Deccan trap basalts. [10]
- b) Explain few methods of artificial conservation of water. [6]

SECTION - II

Q4) a) Explain various physical properties of rocks masses. [8]
b) Describe 'Q' System of Classifications of rocks in detail. [10]

OR

- a) What is R.Q.D.? How it is calculated? [8]
- b) Explain in detail Baniawski's Geomechanical Classification. [10]

Q5) a) Can we locate Pier of a bridge partly on dyke and partly on weathered basalts? Explain with examples. [8]
b) What are fractures? Discuss their feasibility from tunneling point of view. [4]
c) Occurrence of dyke during tunneling. [4]

OR

- a) How location & depth of drill holes for piers of a bridge is decided? [8]
- b) Tunneling through amygdaloidal basalts. Give suitable examples. [8]

Q6) a) Fault Zone Treatment. [4]
b) Problems with made ground in cities. [4]
c) Dam building activity in Deccan trap area. [8]

OR

- a) Foundation of ancient buildings. [4]
- b) Types of faults and recognition of them. [6]
- c) Amygdaloidal basalt as a construction material. [6]



Total No. of Questions : 12]

SEAT No. :

P3407

[4959]-181

[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) Explain the following threats: **[8]**

- i) Modification or alteration.
- ii) Masquerading.
- iii) Repudiation of origin.
- iv) Denial of service (DOS).

b) State & Prove Fermat's Theorem. **[8]**

OR

Q2) a) Explain the following terms with example. **[8]**

- i) Confusion & Diffusion.
- ii) Secret Splitting & Secret Sharing.

b) Explain Cipher Techniques: Substitution & Transposition with example. **[8]**

P.T.O.

- Q3)** a) In a public key cryptosystem using RSA, given $N = 209$ and the encryption key (E) as 23, 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) Which are the key participants in SET? How does SET protect payment information from the merchant? Explain the SET model. [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) Computer Forensics.
- b) Cyber Terrorism.
- c) Online investigative Tools.

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]



Total No. of Questions : 12]

SEAT No. :

P3408

[4959]-182

[Total No. of Pages : 4

B.E. (Information Technology)
OBJECT ORIENTED MODELING AND DESIGN
(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Differentiate between Reverse Engineering and Forward Engineering. **[4]**
- b) Explain the concept of Generalization and Association with suitable example. **[6]**
- c) What are the salient features of RUP and ? How is it different from waterfall model? **[6]**

OR

- Q2)** a) How to apply constraints in Class Diagram. Explain with suitable example. **[4]**
- b) With the help of sample class diagram, explain the following: **[8]**
- i) Interface
 - ii) Qualified association
 - iii) Multiplicity
 - iv) Role names
- c) Describe the software development life cycle of UML. **[4]**

P.T.O.

- Q3) a)** Write a short note on Behavioral Diagrams in UML. [8]
- b) Draw a class diagram for FILE MANAGEMENT SYSTEM (FMS). Make suitable additional assumptions about scope and working of your system (write down the scope too). The FMS has concepts of directories, subdirectories. FMS keeps information of directories as well as files for example file creation date, size of file, entries in directory etc. One also needs operation to move , delete, create etc. Make use of advanced notations in UML. [8]

OR

- Q4) a)** Write a short note on Extensibility Mechanism in UML Diagram. [8]
- b) Draw the Use Case diagram for Hospital Management System. Make the suitable assumptions. [8]

- Q5) a)** Draw UML Use Case diagram for Medical Insurance System using advanced notations The various participants of the same are Owner, Agents, and Claimer. The corresponding use cases for these actors are Hire Agent, Fire Agent, Pay Salary, Make Policies, Make new clients, Describe Policy to Clients, Collect Policy Checks, Check details when policy is Claimed By Claimer Check, Medical Claim Papers, Fill Form To Take Policy, Pay Policy Checks, Claim Policy, Receive Money Of Policy Etc. [8]
- b) What is the difference between association and like? Explain with example. Draw the object diagram for Library Management System. [10]

OR

- Q6) a)** Write a note on Composite Structure Diagram. [6]
- b) Does the actor always represent a human user? Justify with suitable example. [4]
- c) Draw a class diagram for Online First Year Engineering Admission System using advanced notations. Assume suitable data. [8]

SECTION - II

- Q7)** a) Differentiate between: **[8]**
- i) Sequence diagram and collaboration diagram.
 - ii) Action State and Activity State
- b) Draw the Collaboration Diagram for registering a new student at a school. **[8]**

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 modes. 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 On. Draw a state diagram for given system. **[8]**
- b) What is the purpose of timing diagram? Draw a timing diagram for a system of your choice. **[8]**
- Q9)** a) How an activity diagram differs from traditional flowchart? Draw an activity diagram using swimlanes for Purchasing Items from Shopping Mall'. Represent object flow. **[10]**
- b) Draw a Sequence diagram for 'Withdrawal of money from ATM System'. 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) Differentiate between sequential substate and concurrent substate with example. [6]
- c) Draw an Interaction Overview Diagram for a system of your choice. [6]

- Q11)a)** Draw the component diagram for Payroll Management System. [8]
- b) What is signal? How signals are modeled in UML? Explain with suitable example. [8]

OR

- Q12)a)** What do you mean by two tier and three tier architecture? Draw the deployment diagram for embedded system. [8]
- b) Explain the concept of Pattern and Frame with suitable example. [8]



Total No. of Questions :12]

SEAT No. :

P3409

[4959]-183

[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 numbers Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I.*
- 2) *Answer questions nubers Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.*
- 3) *Answer 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)** What is Alfa and Beta testing? How does it affect Acceptance criteria?**[8]**
- b) ‘V & V diagram is basis for every type of testing’? Comment on this statement. What is the role of test plans in a V & V diagram? **[8]**
- Q3) a)** What do you mean by white box testing? Explain the different test case design for white box testing. **[8]**
- b) Draw and explain software defect life cycle. **[8]**

OR

P.T.O.

Q4) a) Why mutation testing called fault is based test approach? Explain with an example. [8]

b) Explain the difference between the following: [8]

i) Test plan and test strategy.

ii) Defect severity and Defect priority.

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) Explain the following software reliability quality attributes in short: [10]
- i) Usability.
 - ii) Portability.
 - iii) Maintainability.
 - iv) Interoperability.
 - v) Correctness.
- 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) List and Explain Maturity Levels in the CMM. [8]
- b) Explanation for the PDCA cycle with reference to ISO 9000:9001. Diagram? [8]
- Q11)**a) List various levels of CMM and explain in detail the KPA's for each level. [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]

EEE

Total No. of Questions :12]

SEAT No. :

P3410

[4959]-184

[Total No. of Pages :3

B.E. (Information Technology)
a:ADVANCED DATABASE MANAGEMENT
(2008 Course) (Semester -I) (Elective - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Define Triggers. Explain any two types of trigger in detail with suitable example. **[8]**
- b) Explain different PL/SQL transaction types. **[8]**

OR

- Q2)** a) Write a PL/SQL procedure which gets the name of the employee when employee id is passed as the parameter. **[6]**
- b) Write a cursor for retrieving the records from the student table and displaying them one by one. **[8]**
- c) What do you mean by Packages. **[2]**
- Q3)** a) Define transactions. Explain ACID properties. **[8]**
- b) Explain Real time transaction systems. **[8]**

OR

P.T.O.

- Q4)** a) Describe in detail the concept of locks with examples. [8]
b) Explain the following: [8]
i) Timestamping concurrency control
ii) Optimistic concurrency control

- Q5)** a) Explain in detail Object based databases and XML. [10]
b) Write a short note on document schema. [6]
c) Describe Array in SQL. [2]

OR

- Q6)** a) Write short note on structures types and inheritance. [8]
b) Consider the following nested relational schema [10]
Std= (sname, Subjectsset setoff(Subjects), Addressset setoff(Address))
Subjects = (name, Marks), Marks = (Term 1, Term 2, Terms 3)
Address = (street City)

Answer the following:

- i) Write DTD and XML file
ii) Write a query in XPath to list all students.
iii) Find the name of all the students who live in the city 'Pune'.
iv) Find those students who failed in the subject 'Chemistry'.
v) List all student's marks in the subject 'Physics'.

SECTION-II

- Q7)** a) Write in detail about Data warehousing and it's architecture. [8]
b) Write a short note on Meta data in Data warehousing. [8]

OR

- Q8)** a) Explain Data warehousing technologies (ETL) in detail. [12]
b) Explain in detail about concept of data mart. [4]
- Q9)** a) Explain decision tree algorithm with suitable example. [12]
b) Explain in detail about extensions to SQL. [6]

OR

- Q10)**a) What do you mean by OLAP benchmarks? Explain applications and benefits. [12]
b) Write note on Bayesian classifier. [6]
- Q11)**a) Explain Security issue based on granting/revoking of privileges. [12]
b) Write note on auditing and control. [4]

OR

- Q12)** Write short note on following: [16]
- a) Object Oriented Databases.
 - b) Multi sets in SQL.
 - c) XML Applications.
 - d) Dimensionality modeling.

EEE

Total No. of Questions :12]

SEAT No. :

P3411

[4959]-185

[Total No. of Pages :3

B.E. (Information Technology)
b: ARTIFICIAL INTELLIGENCE
(2008 Course) (Semester - I) (Elective - 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) Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.*
- 3) Neat diagram must be drawn wherever necessary.*
- 4) Figures to the right indicates full marks.*
- 5) Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** What is artificial intelligence? Explain various domains of AI. [8]
- b) What is an agent? List down the characteristics of intelligent agent. [8]

OR

- Q2) a)** Explain Minimax search procedure with suitable example. [8]
- b) What is Swarm Intelligent? Explain application of swarm intelligence. [8]
- Q3) a)** What is heuristics? Explain any heuristics search method. Justify how heuristics function helps in achieving goal state. [8]
- b) Explain mini-max search algorithm for two player game. Explain how pruning help for effective searching. [8]

OR

P.T.O.

Q4) a) What is state space search? How the problems are solved using space search. Explain with suitable example. [8]

b) Solve the following cryptarithmic problems using constraint satisfaction. [8]

O L D
+O L D
+O L D

G O O D

Q5) a) What is FOPL? Explain how first order logic sentences are converted into conjunctive normal form (CNF). [6]

b) What do you understand by conceptual dependency? Give a conceptual dependency structure for the sentence “Nisha drove her car to school”. [6]

c) Elucidate components of the scripts. Identify the props, roles, and scenes in the “college going” script. [6]

OR

Q6) a) Explain the properties of internal representation. [6]

b) Describe the advantages of predicate logic over propositional logic. [6]

c) What do you mean by following with respect to converting FOP in clauses form: [6]

- o Eliminate the logical connectives ->
- o Standardize all variables
- o Skolemization

SECTION-II

Q7) a) What is object detection and recognition in computer vision? Explain with suitable example. [9]

b) What is planning? Explain the main components of a planning system. [9]

OR

Q8) a) Explain how vision is used for manipulation and navigation. Give suitable examples to justify your answer. [9]

b) Explain the concept of image formation. Briefly explain THREE Image processing operations. [9]

Q9) a) Explain the architecture of expert system? Also Explain the process of knowledge acquisition. [8]

b) Define learning? Explain learning by induction with suitable example. [8]

OR

Q10)a) Explain Hopfield Network? Draw and explain four stable states of a particular Hopfield network. [8]

b) What is reinforcement learning? What is a neural network is given no feedback for its input? [8]

Q11)a) Briefly explain the structure of a prolog program with suitable example. [8]

b) Define predicate and objects in prolog. Discuss various types of objects used in prolog. [8]

OR

Q12)a) List the similarities and differences between prolog and conventional programming languages. Justify your answers with suitable examples. [8]

b) Explain the applications of Genetic Algorithms in artificial intelligence domains. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P3412

[4959]-186

[Total No. of Pages :4

B.E. (Information Technology)

c: COMPILER DESIGN

(2008 Course) (Semester - I) (Elective - I) (414443)

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 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 $P = Q + R / 2$ where p and Q are of float type and R is of integer type. **[10]**
- b) How lexical analyses detect the errors? Explain with suitable example. **[6]**

OR

- Q2) a)** Write a LEX program to **[8]**
- i) Write a LEX program which find out factors of a given number.
 - ii) Write a LEX program to find the area of circle.
- b) Discuss the merits and demerits of a compiler and an interpreter. **[8]**

- Q3) a)** For following grammar

$S \rightarrow AaBb$

$A \rightarrow \epsilon$

$B \rightarrow \epsilon$

P.T.O.

- i) Compute first and follow sets. [6]
 - ii) Construct LL(1) parser. [4]
 - iii) Parse string "ab" with above parser. [2]
- b) Differentiate between top down and bottom up parser. [6]

OR

Q4) Show that following grammar is LR(1) but not LALR. [18]

$S \rightarrow Aa \mid bAc \mid Bc \mid bBa$

$A \rightarrow d$

$B \rightarrow d$

- Q5) a)** What are SDD? Give SDD to translate expressions into syntax tree and draw syntax tree for $a / b * 5 + c$. [8]
- b) What is Backpatching? How flow translation of Boolean expression is done using batchpatching? [8]

OR

- Q6) a)** Write a grammar for simple procedure call. Give a syntax directed translation scheme for the same. [8]
- b) Translate following assignment statement into intermediate code [8]

$A[i][j] := (B[i][j] + C[i][j]) * 10$

SECTION-II

- Q7) a)** Explain following parameter passing methods with suitable example. [8]
- i) Call by value
 - ii) Call by reference
 - iii) Call restore
 - iv) Call by name
- b) What are symbol tables? Explain in brief the different ways to organize symbol table. [8]

OR

- Q8)** a) Explain different source language issues. [8]
- b) Explain following storage allocation schemes with proper examples. [8]
- i) Stack storage allocation
 - ii) Heap storage allocation
- Q9)** a) With proper examples explain following peephole optimization techniques: [8]
- i) Elimination of Redundant Instruction.
 - ii) Elimination of Unreachable Code.
 - iii) Flow of Control Optimization.
 - iv) Algebraic Simplification.
- b) Discuss different issues in code generation phase. [10]
- OR
- Q10)**a) With proper examples explain following optimizations: [10]
- i) Constant propagation.
 - ii) Variable propagation.
 - iii) Strength reduction.
 - iv) Dead code elimination.
 - v) Common subexpression.
- b) What is DAG? Write different applications of DAG. [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) Explain exception handling in object oriented programming with example. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P3413

[4959]-187

[Total No. of Pages :3

B.E. (Information Technology)
ADVANCED OPERATING SYSTEMS
(2008 Course) (Elective -I) (d) (Semester -I)

Time : 3 Hours

[Max. Marks :100]

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, and 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) *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 following types of Operating Systems with eg. **[8]**
- i) Multitasking.
 - ii) Multiuser.
 - iii) Multiprocessing.
 - iv) Multi-threading
- b) Explain how mutual exclusion could be implemented using mailboxes. **[8]**

OR

- Q2) a)** Why multiple queues are in process scheduling? Explain multilevel queue and multilevel queue with feedback scheduling. **[8]**
- b) Explain any four UNIX commands for system administration. **[8]**
- Q3) a)** Draw and explain process state transition diagram in KMOS. **[8]**
- b) Explain interrupt management in multi tasking OS using Functional Specification. **[8]**

OR

P.T.O.

- Q4)** a) How various system lists are maintained in KMOS? Explain with diagram. [8]
b) Explain functional specification of SEND and RECEIVE. [8]
- Q5)** a) Explain various types of multiprocessor OS. [10]
b) Explain various synchronization primitives in multiprocessor OS. [8]

OR

- Q6)** Write short notes on following [Any Three] [18]
- KMOS.
 - System calls for process management.
 - Operating System Architecture.
 - Thread scheduling.

SECTION -II

- Q7)** a) Explain demand paging. [10]
b) What is a slab? Explain different components of slab allocator. [8]

OR

- Q8)** a) What is zone? What are its various types? [10]
b) Explain High Memory mapping. [8]
- Q9)** a) Explain various I/O device types. [8]
b) Show different kernel components that are affected by a block device operation with suitable diagram and explain their role. [8]

OR

- Q10)a)** Explain the elevator algorithm with eg. [8]
b) Explain the concept of I/O scheduler. [8]

- Q11)a)** Write a note on file security [8]
b) Explain Mounting and unmounting of file systems. [8]

OR

- Q12)a)** Explain any four system calls for file system. [8]
b) Explain file system Abstraction. [8]



Total No. of Questions :12]

SEAT No. :

P3414

[4959]-188

[Total No. of Pages :3

B.E. (Information Technology)

a: EMBEDDED SYSTEMS

(2008 Course) (Semester - I) (Elective - II) (414444)

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.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 is an embedded system? What are its characteristics? [8]
- b) What are the criteria for selecting microprocessors or microcontrollers for an application? [8]

OR

- Q2)** a) List commonly used microcontrollers in small, medium and large scale embedded systems. [6]
- b) What are the different components of an embedded system? [6]
- c) Differentiate between CISC and RISC. [4]
- Q3)** a) Describe the use of timers/counters and watchdog timers in an embedded system. [6]
- b) What are the techniques of power & energy management used in an embedded system? [6]
- c) What are the types of memory that can be integrated in a processor?[6]

OR

P.T.O.

- Q4)** a) How a designer selects EPROM, RAM and peripherals required for a robot arm control application? Explain. [8]
- b) What is the importance of clocking unit in embedded systems? How does it affect performance of an embedded system? [4]
- c) Explain the typical memory map for a small scale embedded application. [6]
- Q5)** a) What is the difference between serial & parallel I/O? Mention different standards used for both. [8]
- b) Describe SPI protocol in brief and the applications where it is preferred. [8]

OR

- Q6)** a) Explain data transfer mechanism in CAN protocol. Also elaborate on arbitration method used in CAN. [8]
- b) How does host recognizes the device insertion in USB protocol? Explain in detail. [8]

SECTION-II

- Q7)** a) What are the different phases of software development cycle for a typical embedded system? [8]
- b) How cross compilers are different than compilers? Give two specific instances where one has to use cross compiler. [6]
- c) When do you use high level language instead of assembly language for embedded system programming? [4]

OR

- Q8)** a) Compare Java and C++ programming and their suitability for embedded systems. [6]
- b) What are the advantages of assembly language programming when used for the development of an embedded system? Name two embedded system applications where assembly language programming is preferred. [6]
- c) With an example explain how stacks and queues are used to implement application functionality in embedded system software. [6]

- Q9) a)** What are the different characteristics of real time operating system? Give two example of RTOS. [6]
- b) With the help of neat diagram, explain cyclic 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) Define and explain interrupt latency period. What is its significance in RTOS? [4]
- c) What are pipes? Give details. [4]
- Q11)a)** Differentiate Micro C/OS-II and VxWorks 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 chocolate vending machine. [10]

OR

- Q12)a)** How tasks are managed in Micro C/OS-II? Explain in detail. [8]
- b) With help of neat diagram, explain synchronization of tasks and IPCs for smartcard application. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P3415

[4959]-189

[Total No. of Pages : 3

**B.E.(Information Technology)
MOBILE COMPUTING
(2008 Course) (Semester-I)(Elective-II)**

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) Explain any one of the following: **[8]**

- | | |
|-----------------------|----------|
| i) Cordless Telephony | ii) DECT |
| iii) PHS | iv) PACS |

b) Explain in detail the concept of frequency reuse and cells splitting. **[10]**

OR

Q2) a) What is hand off mechanism? Describe the three Handoff strategies MCHO, NCHO, MAHO. **[10]**

b) How is the registration and call delivery done in roaming? **[8]**

Q3) a) What are the major parts of an MS in GSM? Describe them. Draw and explain with diagram a GSM architecture. **[8]**

b) Compare the authentication procedures in IS- 41 and GSM. **[8]**

OR

P.T.O.

Q4) a) Explain various databases used in GSM architecture. [8]

b) Write short notes on HLR and VLR. [8]

Q5) a) Compare between fixed prepaid service and mobile prepaid service? [8]

b) Discuss any one solution for reducing the International call delivery cost. [8]

OR

Q6) a) Describe the solutions for number portability. [8]

b) Draw and explain International call setup procedure. [8]

SECTION-II

Q7) a) Compare GPRS with CDPD. What are the fundamental differences between the two services and what are the design guidelines shared by them? [8]

b) Describe distillation. Which layer of WAP implement this mechanism. [8]

OR

Q8) a) Explain in brief caching, pushing and prefetching. What is the impact of these mechanisms on billing? [8]

b) Describe in brief GPRS network modes. [8]

Q9) a) Explain important processes used in mobile IP. [8]

b) What advantages the IPv6 offer for mobility? Discuss. [8]

OR

Q10) a) Describe how the data transfers from mobile node to a defined node and vice versa. [8]

b) Explain the following routing protocol in MANET : destination sequence distance vector, dynamic source routing. [8]

- Q11)** a) Define Bluetooth. Explain Bluetooth protocol stack. [10]
b) Explain with diagram Spread Spectrum Technology. [8]

OR

Q12) Write short notes on any three:(6 marks each) [18]

- a) UMTS.
- b) Wi-Max
- c) RFID
- d) Java Card



Total No. of Questions : 12]

SEAT No. :

P4930

[Total No. of Pages : 2

[4959]-190
B.E. (IT)
MULTIMEDIA SYSTEMS
(2008 Pattern) (Elective - II(c))

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 Question 1 or Question 2, Question 3 or Question 4 and Question 5 or Question 6 from Section I.*
- 3) *Solve Question 7 or Question 8, Question 9 or Question 10 and Question 11 or Question 12 from Section II.*
- 4) *Use of non-programmable electronic calculator is allowed.*
- 5) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Elaborate any three distributed multimedia applications. **[9]**
b) With the help of a figure, elaborate ODA and OMF architecture. **[9]**

OR

- Q2)** a) Explain storage and retrieval of multimedia data in multimedia database system. **[9]**
b) Explain architecture of multimedia database system. **[9]**

- Q3)** a) Compare the following: **[8]**
i) lossy and lossless data compression techniques.
ii) intra frame and inter frame compression techniques.
b) Write the steps for Shannon-Fano algorithm for encoding any word. **[8]**

OR

- Q4)** a) Draw the block diagram for JPEG compression technique and state the purpose of each block. **[8]**
b) Elaborate the Huffman coding technique with the following example. **[8]**

P.T.O.

- Q5)** a) Explain RMF and WMA audio file formats. [6]
b) What is MIDI ? Explain MIDI messages. [6]
c) Elaborate any DPCM audio compression technique. [4]

OR

- Q6)** a) Elaborate the sound characteristics. [8]
b) Elaborate WAV File format. [8]

SECTION - II

- Q7)** a) Explain video Compact Cassette and Camcorder. [8]
b) Write short note on CCIR and CIF. [8]

OR

- Q8)** a) Explain any two video signal transmission formats. [8]
b) Write a short note on any two video file formats. [8]

- Q9)** a) Explain concept & forms of Virtual Reality. [8]
b) Explain following Virtual Reality devices. [8]
i) Hand gloves
ii) Head mounted display

OR

- Q10)**a) Explain different applications of VR. [8]
b) Elaborate on the basics of VRML. [8]

- Q11)**a) Explain Flip Book animation and Rotoscoping animation techniques. [8]
b) Write a short note on 3D-Max. [10]

OR

- Q12)**a) Explain the animation on web. [8]
b) Elaborate what is anticipation, squash and stretch with example. [10]



Total No. of Questions : 12]

SEAT No. :

P3416

[4959]-191

[Total No. of Pages : 3

**B.E.(Information Technology)
DISTRIBUTED SYSTEM
(2008Course) (Semester-II)**

Time :3Hours]

[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,Q,5 or Q6 from sectin-I and Q7or 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 a Distributed System? What are the goals of it? [9]
b) Describe various types of failures? Describe failure model in detail. [9]

OR

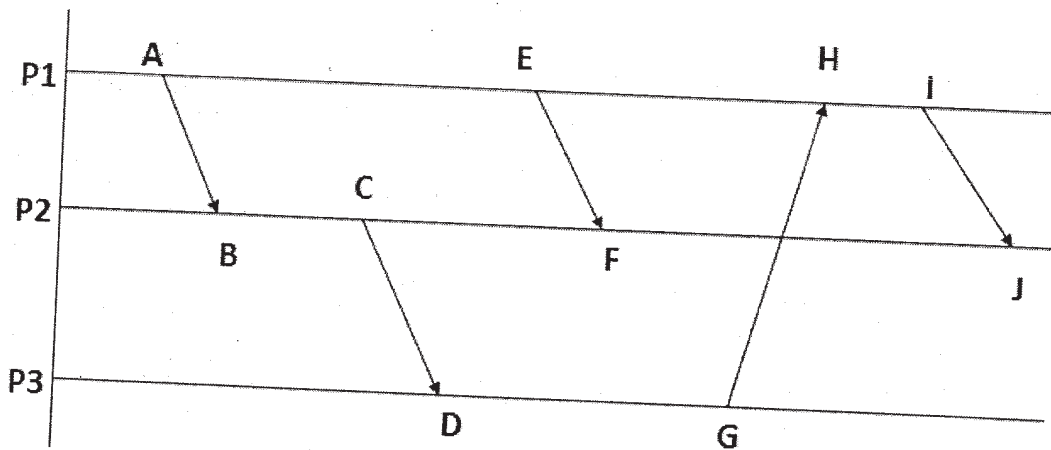
- Q2)** a) Explain following with respect to Distributed System: [10]
i) Layered Architecture
ii) Object-based Architecture.
iii) Data-centered Architecture.
iv) Event - based Architecture
b) Describe the key characteristics that are primarily responsible for the usefulness of Distributed system [8]

- Q3)** a) Define socket? What is the difference between connection-oriented socket and connection-less socket? [8]
b) Explain the issues of transparency in Distributed system. Describe various transparencies in detail. [8]

OR

P.T.O.

- Q4)** a) Compare local method invocation and remote method invocation. Explain the role of proxy and skeleton in remote method invocation in detail. [8]
 b) What is a stub? How stub are generated? Explain how the use of stub helps in making an RPC mechanism transparent. [8]
- Q5)** a) Explain network time protocol to distribute time information over Internet. [8]
 b) Solve following timing diagram with Vector Time-stamp method. [8]



OR

- Q6)** a) How happened before relationship is useful in ordering of the events. Explain it with one example. [8]
 b) What is a state? Define global state. Explain consistent cut and inconsistent cut with suitable example. [8]

SECTION-II

- Q7)** a) Explain Network File System Architecture with a diagram in detail. [8]
 b) Write a short note on [8]
 i) CODA File System
 ii) X. 500 directory service

OR

- Q8)** a) How synchronization and naming is provided in NFS? [8]
 b) What are the characteristics of a good distributed system? [8]

- Q9)** a) Suppose that two variable A and B both accidentally are located on the same page of a page-based DSM system. However, both of them are not shared. Is false sharing possible with this scenario? [8]
- b) What is replication in DSM? What are the advantages of it. [8]

OR

- Q10)**a) Explain following consistency models in detail. [8]
- i) Release consistency model
- ii) Casual consistency model
- b) Explain different approaches for replication management. [8]

- Q11)** a) What is failure masking? How replication is used to mask the failures?[8]
- b) Why commit protocols are required? Explain 2 phase Commit and 3 phase Commit Protocol with their differences. [10]

OR

- Q12)** a) What is difference between independent checking point and coordinated check pointing? [8]
- b) What is multicasting ? Explain basic multicasting? How it can be scalable? [10]



Total No. of Questions : 12]

SEAT No. :

P3417

[4959]-192

[Total No. of Pages : 3

**B.E.(Information Technology)
INFORMATION RETRIEVAL
(2008 Pattern) (414449)**

Time :3Hours]

[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) *Answer to the two sections should be writtern 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)** In your words explain what do you mean by Information Retrieval? Also explain the Information Retrieval System with the help of block diagram. **[8]**
- b) Explain in detail various paramenters used while designing any clustering algorithm. **[8]**

OR

- Q2) a)** What are different constituents of Classification methods and with proper example explain relations that exist among them **[8]**
- b) Explain Hierarchic clustering Algorithm? Comment if Hierarchic methods are suitable for document clustering? **[8]**
- Q3) a)** Explain Vector Model in detail. **[8]**
- b) Explain Ring Structure. Discuss its Advantages and Disadvantages. **[8]**

OR

- Q4) a)** What do you mean by coordination level? For the following query what If for the following Ki list the set of documents are: **[6]**

K1- list: D1, D2,D3,D4

K2-List: D1, D2

K3-List: D1,D2,D3

K4-List: D1

Then query $Q=K1 \text{ AND } K2 \text{ AND } K3$ find out the ranking

P.T.O.

- b) Explain Sequential files and their advantages and Disadvantages in detail. [6]
- c) Write note on: Suffix Array [4]
- Q5)** a) Explain the terms Precision and Recall. [8]
- Assume the following:
- A database contains 80 records on a particular topic
 - A search was conducted on that topic and 60 records were retrieved.
 - Of the 60 records retrieved, 45 were relevant.
- Calculate the precision and recall scores for the search.
- b) Explain user oriented measures with the help of venn diagram. [6]
- c) Write Note on: OPAC [4]
- OR
- Q6)** a) Discuss the architectural issues in Digital library. [8]
- b) Explain Alternative Measures in detail. [6]
- c) Write note on : TREC [4]

SECTION-II

- Q7)** a) Describe Ontology in Information Retrieval and its use? [8]
- b) What is Parallel Computing? Explain taxonomy of parallel architectures [8]
- OR
- Q8)** a) With respect to various aspects discuss MIMD architectures. [8]
- b) Define Ontology? Explain in detail reasons to develop Ontology. [8]
- Q9)** a) What is the role fo Multimedia in commerical Database Management System? [8]
- b) Discuss MULTOS in short [8]

OR

- Q10)** a) Write note on Generic Multimedia Indexing Approach(GEMINI)? [8]
b) Discuss SQL3 in short. [8]

- Q11)**a) Discuss the centralized architecture of the search engine: Enlist the drawbacks of Harvest architecture. [12]
b) What do you mean by web crawler and briefly explain the working of web crawler [6]

OR

- Q12)**a) Write short notes on: Challenges in web search. [6]
b) What is Web Usage mining. [6]
c) Explain Meta searches with example. [6]



Total No. of Questions : 12]

SEAT No. :

P3418

[4959]-193

[Total No. of Pages : 4

B.E. (Information Technology)

a:REAL TIME SYSTEMS

(2008 Course) (Semester - II) (Elective - III) (414450) (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 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) List down the types of performance measures for real-time systems. Which performance measures are the most appropriate for real-time systems? Why? **[8]**
- b) Describe in brief the effect of following in estimation of run time in a program. **[8]**
- i) Source code
 - ii) Use of cache

OR

- Q2)** a) What are the various factors that are to be considered while estimating the program run-time in RTS? Describe analysis of source code, derive lower bounds and upper bounds with suitable example. **[8]**
- b) Explain various characteristics of Real Time System. **[8]**
- i) Time constraints
 - ii) Task Criticality
 - iii) Safety and Reliability
 - iv) Embedded

P.T.O.

- Q3)** a) Explain the classification of Real Time scheduling with example. [6]
- b) Why Priority inversion mechanism is not suited for real-time applications. Write appropriate solution for this problem. [8]
- c) State the assumption made for the implementation of the Rate Monotonic Scheduling algorithm. What is the easy schedulability test for this algorithm? [4]

OR

- Q4)** a) Consider : Task 1 = (p1, e1) = (2, 0.9) [8]
- Task 2 = (p2, e2) = (5, 2.3)
- i) Find total processor utilization
- ii) Find necessary and sufficient condition
- b) How are mode change implemented when the priority ceiling protocol is used to handle the access to critical section. [6]
- c) Explain Given an algorithm to scheduling tasks that have precedence constraints. [4]

- Q5)** a) How are timestamps assigned to transaction so that serialization consistency is maintained? Explain with suitable example. [6]
- b) 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]

OR

- Q6)** a) Explain how the two phase locking approach used in pessimistic concurrency control is disadvantage to real time system. How can it be modified to overcome the problem? [10]
- b) Using example explain the different data typing features that could be useful in a real time programming language. [6]

SECTION - II

Q7) a) Explain Virtual Time Carrier Sensed Multiple Access (VTCSMA) algorithms with flow chart. **[8]**

b) Consider VTCSMA-L. Support the packets arrive according to the following table. **[10]**

Node	M	RC at Arrival	Dm	Lm
1	1	0	32	16
2	2	10	36	20
3	3	20	56	40
4	4	20	72	60

Let us assume that for each packet is $T_m = 15$, Propagation time $t = 1$.

Draw the trajectory for $n = 2$

OR

Q8) a) Write a short notes on (Any Two) **[10]**

- i) Hard Real Time Databases
- ii) Disk Scheduling Algorithms
- iii) Maintaining serialization consistency

b) Discuss the various communication medium used in real time networking. **[8]**

Q9) a) Draw the functionality block diagram of real time operating system. **[4]**

b) Explain the difference between Soft Real Time System and Hard Real Time System. **[4]**

- c) 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) Write short notes on the following mechanism present in real time operation system. [10]

- i) Time Service
 - ii) Scheduling mechanism
- b) With the help of block diagram explain the capability of RT Linux. [6]

Q11)a) How is hardware redundancy implemented through voting and consensus? Explain the working of formalized majority vote. [8]

- b) Write short notes on (Any Two) [8]
- i) Time Redundancy
 - ii) Information Redundancy
 - iii) Data Diversity

OR

Q12)a) Explain briefly fault detection method using fault and error containment. [8]

- b) Explain the Byzantines algorithm for fault tolerance with an example. Also specify the interactive consistency condition. [8]

x x x

Total No. of Questions : 12]

SEAT No. :

P3419

[4959]-194

[Total No. of Pages : 3

B.E. (Information Technology)
b:SOFTWARE ARCHITECTURE
(2008 Pattern) (Semester - II) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three Que. from Section I and three Que. 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) *Make suitable assumptions wherever relevant and appropriate.*

SECTION - I

Q1) a) Define the given term/concept and give examples. **[9]**

- i) Software architecture
- ii) Stakeholders in architecture

b) Explain in details ramifications of influences on an Architecture. **[9]**

OR

Q2) a) What are the points which makes Good Architectures? **[9]**

b) How the collaboration can be used to model the system of components and connectors. **[9]**

Q3) a) Explain and illustrate the following concepts (in context of quality attributes) with example:

- i) Quality Attribute Scenarios
- ii) Availability Scenarios **[8]**

b) Following concern in context of modifiability: “when is a change made and who makes it” **[8]**

OR

P.T.O.

Q4) a) What is Quality Attributes? Explain quality attributes of web application? [8]

b) Give scenario for Security and Testability quality attribute. [8]

Q5) a) What can a Facade pattern do for us,. Illustrate with an example. [8]

b) Describe Abstract Factory pattern with respect to intent, application and solution. [8]

OR

Q6) a) Write a short note on Model View Controller (MVC) and its application? [8]

b) With structure explain Singleton pattern. Give examples of the same.[8]

SECTION - II

Q7) a) Compare Different architecture styles. [9]

b) Write short note on following: [9]

i) Coupling in XML.

ii) Loose coupling.

OR

Q8) a) Explain three tier architecture with reference to different layers. [9]

b) Explain concept of: [9]

i) Structure of XML

ii) Addressing quality attributes through multi tier architecture.

Q9) a) What do you understand by the three types of EJB beans, Explain with Examples [8]

i) Entity Beans

ii) Message Beans

iii) Session Bean

iv) Use of EJB in three-tier architecture.

b) Draw a neat J2EE architecture diagram showing different technologies from SUN like (JDBC, JMS) What is the advantage of J2EE architecture? [8]

OR

Q10)a) Explain Web Server in detail with example. [8]

b) Compare and contrast EJB 2.0 and EJB 3.0. [8]

Q11)a) Describe .NET Architecture. What is role of CLR, CLS, CTS and CLI in it? [8]

b) Write short note on following: [8]

i) Components and Interfaces.

ii) .Net Remoting

OR

Q12)a) What kind of responsibilities does a web client have? How can one make web client more dynamic. [8]

b) Write short note on following: [8]

i) NET web services

ii) Legacy Application

x x x

Total No. of Questions : 12]

SEAT No. :

P3420

[4959]-195

[Total No. of Pages : 3

B.E. (Information Technology)

c-ADVANCED GRAPHICS

(2008 Course) (Semester - II) (Elective - III) (414450)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer question 1 or 2, 3 or 4, 5 or 6 from Section - I and question 7 or 8, 9 or 10, 11 or 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) *Assume Suitable data if necessary.*

SECTION - I

- Q1) a)** Explain in detail. **[6]**
- i) Parallel Projection
 - ii) Depth queuing.
- b) Explain Polygon surface and polygon Meshes. **[6]**
- c) Explain with mathematical model Bezier surface and B-Spline surface. **[6]**

OR

- Q2) a)** Explain following quadratic surfaces. **[6]**
- i) Ellipsoid
 - ii) Torus
- b) Explain Surface Rendering and polygon surfaces in detail. **[6]**
- c) Explain the issues related to three dimensional display methods. **[6]**

P.T.O.

Q3) a) What is meant by Animation Language? Explain the types of animation languages with appropriate examples. [8]

b) Explain briefly various real time animation techniques used in computer assisted animation. [8]

OR

Q4) a) Explain the basic rules of animation in brief. [8]

b) Which are the different animation software's? Explain any one animation software in detail. [8]

Q5) a) Explain in detail Quadtrees and Octrees. [8]

b) Explain desirable properties in solid representaiion. [8]

OR

Q6) a) Explain primitive instancing method for solid modeling. [8]

b) Write a short note on [8]

i) Primitive Instancing.

ii) Constructive solid geometry.

SECTION - II

Q7) a) Write a short note on polygon rendering methods. [8]

b) Explain RGB, HSV color models. [6]

c) Explain Conversion between RGB and HSV color models. [4]

OR

- Q8)** a) Explain HLV & HLS color cones. [8]
b) Explain YIQ color model. How is YIQ to RGB conversion done? [6]
c) Explain the conversion of CMY model to RGB model. [4]

- Q9)** a) Derive the simple illumination model. Include the contribution of Diffuse, ambient and specular reflection. [8]
b) What is rendering? Explain Monte-Carlo method for rendering. [8]

OR

- Q10)** a) Explain illumination W.R.T. Ambience, Specular reflection and diffuse reflection. [8]
b) Explain Phong's illumination model in detail. [8]

- Q11)** a) Explain the factors affecting the design of virtual reality system. [8]
b) Explain driving simulation application and different virtual reality devices used in it. [8]

OR

- Q12)** a) What is the need of virtual reality? Explain with real life example. [8]
b) What are different virtual reality languages. Explain any one in detail. [8]

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Total No. of Questions : 12]

SEAT No. :

P3421

[4959]-196

[Total No. of Pages : 3

B.E. (Information Technology)

d:ADVANCED COMPUTER NETWORKS

(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 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 detail the layers of ISO/OSI model. **[10]**
b) State and explain various principles of network design. **[8]**

OR

- Q2)** a) List the Networking principles and services with Layered architecture? **[12]**
b) Explain in detail Internet, ATM and cell phone. **[6]**

- Q3)** a) Draw and explain the ATM header. Explain the structure of the header. **[8]**
b) Explain mobility management issues in wireless networks. **[8]**

OR

- Q4)** a) Define Wireless communication and explain its architecture? **[8]**
b) Explain WDM system with diagram in Optical Networks. **[8]**

P.T.O.

- Q5)** a) What are various parameters of Quality of Service? Explain. [6]
b) Explain Congestion control and Flow control mechanism of datagram network w.r.t. Open Loop and Closed Loop. [10]

OR

- Q6)** a) Explain congestion control mechanism of ATM network w.r.t. [8]
i) Internal congestion control
ii) Global congestion control
b) Explain Markov Chain Models w.r.t. M/M/1 queue and M/M/2 queue. [8]

SECTION - II

- Q7)** a) Write notes on: BGP and RIP. [10]
b) Define traffic engineering and explain TE with MPLS. [8]

OR

- Q8)** a) Explain formats of various BGP messages. [8]
b) What are VPNs? Explain the significance of tunneling in VPNs. [10]

- Q9)** a) State the general characteristics of Mobile IP. [6]
b) List and explain various features of IPv6. [10]

OR

- Q10)** a) Describe RTP and RSVP. [8]
b) Explain API for IPv6. [8]

- Q11)a)** What is cluster based network architecture for ad-hoc networks. [6]
- b) What is ad-hoc network? Explain its limitations and application areas.[10]

OR

- Q12)a)** Explain implement of firewall in the network. [8]
- b) What are overlay networks? Why it is important? [8]

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Total No. of Questions :12]

SEAT No. :

P3422

[4959]-197

[Total No. of Pages :3

B.E. (Information Technology)
a - BIOINFORMATICS
(2008 Course) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, and Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10 and Q11 or Q12 from section II.*
- 2) *Answer 3 questions from section - I and 3 questions from section II.*
- 3) *Answer 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)** What is the scope of bioinformatics? Why is it treated as multidisciplinary field? **[8]**
- b) List the various Bioinformatics databases. Explain any one Protein database in detail. Also explain its importance in analysis and developing the BI applications. **[10]**

OR

- Q2) a)** Explain with neat diagram the central dogma of molecular biology. Explain the different molecules participating in Information flow and its importance in various Functional Sites. **[10]**
- b) Explain Bioinformatics applications with respect to the following areas:**[8]**
- i) Micro arrays
 - ii) Drug Discovery

P.T.O.

- Q3)** a) Explain the role and importance of clustering in Microarray data? Discuss any two methods of clustering applied on gene expression data. [8]
- b) Discuss any two statistical methods and tools used in data analysis of BI. [8]

OR

- Q4)** a) List various statistical analysis tools. Define Sensitivity and Specificity of a tool. Define in brief False Negative, True Negative, True Positive and False positive. [8]
- b) How Dynamic programming method is applicable in Sequence alignment? Write in detail about Needleman-Wunch algorithm (Global Alignment) and Smith Waterman Algorithm (Local Alignment). [8]
- Q5)** a) Explain the importance of pattern matching techniques in Bioinformatics. List the various techniques of pattern matching. Elaborate any one technique in detail. [8]
- b) Write short notes on: [8]
- i) Pairwise Sequence Alignment (PSA)
 - ii) Multiple Sequence Alignment (MSA)

OR

- Q6)** a) Explain the text mining with NLP Process. [8]
- b) How the machine learning techniques are used in Bioinformatics? Discuss any two machine learning methods used in BI applications. [8]

SECTION-II

- Q7)** a) Explain the process of Drug discovery. What high-throughput screening methods are employed in screening drugs? [10]
- b) Differentiate between Ab-Initio and Heuristic methods of Protein structure prediction process. [8]

OR

Q8) a) Draw and explain Collaboration-Communication model with appropriate examples and its hierarchy. [8]

b) Describe in brief the Metropolis algorithm with Monte Carlo method by considering with its major issues like consistency and performance.[10]

Q9) a) Explain steps followed by BLAST Algorithm to find a matching sequence. [8]

b) Discuss Similarities and Differences of FASTA and BLAST tools for sequence alignment. [8]

OR

Q10)a) What are the several ways of implementing the FASTA algorithm? Write the steps in FASTA algorithm. [8]

b) What is Hashing? How is it exploited in FASTA database algorithms?[8]

Q11)a) Define the importance of ecosystem. Describe in detail the factors affecting the ecosystem. [8]

b) What is Biotechnology? Discuss the relationship between Genetic Engineering and Biotechnnology with suitable example. [8]

OR

Q12)a) What is meant by pollutant? List different pollutants. How it affects atmosphere and hydrosphere? [8]

b) Discuss in brief Genetic Engineering. Explain how it helps in identifying the diseases. [8]

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Total No. of Questions : 12]

SEAT No. :

P3423

[4959]-198

[Total No. of Pages : 3

B.E. (Information Technology)

**b:NEURAL NETWORK AND EXPERT SYSTEMS
(2008 Pattern) (Semester - II) (Elective - IV) (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 indicate full marks.*
- 3) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Describe features of MP neuron Model with reference to biological neural Networks. **[9]**

b) What is activation function? Explain soft activation function in detail. **[7]**

OR

Q2) a) Discuss functioning of a simple artificial neuron. Explain how the functionality is affected if two such neuron are connected in series. **[8]**

b) Explain, with examples, differences between the following pattern recognition tasks: **[8]**

i) Classification Vs. Grouping

ii) Classification Vs. Clustering

Q3) a) Distinguish between linearly separable and linearly non-separable problems. Why a single layer of perceptron cannot be used to solve linearly non-separable problems. **[8]**

b) Explain and compare learning paradigms in detail. **[8]**

OR

P.T.O.

- Q4)** a) Explain models of artificial neurons namely, Perception and ADALINE. [8]
b) What are feed forward neural networks? Explain pattern regression using Multi-layer feed forward neural network. [8]

- Q5)** a) What is basic concept of Relevance Vector Machines? Explain how it is used in classification problems? [9]
b) Write a short note on optimal hyperplane for non-separable patterns. [9]

OR

- Q6)** a) Explain how Support Vector Machine is used for pattern classification? [9]
b) What are radial basis function networks? How it is used to perform complex pattern classification task? [9]

SECTION - II

- Q7)** a) Explain principal goal of self - organization map (SOM). Explain its three essential processes involved in the formation of SOM. [9]
b) Write a short note on “Bayesian neural Networks”. [8]

OR

- Q8)** a) Explain architecture of a Boltzmann Machine. Illustration learning in BM. [9]
b) What is Hopfield Model? What is meant by capacity of Hopfield Network. [8]

- Q9)** a) What are the advantages in keeping knowledge base separate from control module in knowledge based system? [8]
b) What is uncertainty? Explain two approaches that deal with uncertainty problem. [8]

OR

Q10)a) What is blackboard system architecture? Draw diagram to explain three functional components of blackboard system. [8]

b) Identify and describe an application area for an expert system within an University area. [8]

Q11)a) List programming languages for solving AI problems. Comment on language constructs in LISP. [9]

b) Write a short note on E-MYCIN. [8]

OR

Q12)a) What do you mean by knowledge Engineering? Explain various stages of knowledge acquisition. [9]

b) Write a short note on DENTRYL. [8]

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Total No. of Questions : 12]

SEAT No. :

P3424

[4959]-199

[Total No. of Pages : 3

**B.E. (Information Technology)
c:GEO INFORMATICS SYSTEM
(2008 Pattern) (Semester - II) (Elective - IV)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Draw neat diagram wherever necessary.*
- 2) *Assume suitable data, if necessary.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain visual image interpretation? Explain all basic elements of image interpretation with example. **[8]**

b) What are the different types of errors? Explain all methods used for correcting errors from digital images? **[8]**

OR

Q2) a) Explain the process of image enhancement in digital image processing? Explain with example the importance of preprocessing? **[8]**

b) Explain any four basic elements of image interpretation. **[8]**

Q3) a) Explain remote sensing and its types? Explain in detail the steps involved in remote sensing with example? **[9]**

b) Explain in detail the RADAR principle with equation? State the use of RADARs in remote sensing? **[9]**

OR

P.T.O.

Q4) a) Explain SAR and SLAR with suitable diagram. [9]

b) What are the different types of sensor parameters? Describe them. [9]

Q5) a) Explain in detail the architecture of GIS? On which factors geographic integration of information can be done? [8]

b) What is map projection and its types? Explain the type's maps which can be produced by using GIS? [8]

OR

Q6) a) Explain fundamental operations of GIS and theoretical framework of GIS along with diagram? [8]

b) Explain what is the M's of GIS? List and explain reasons for using computer in the process of making map? [8]

SECTION - II

Q7) a) What do you mean by Geospatial database? Explain the importance of digital database. [8]

b) What are the common errors in GIS data bases? How can they be prevented or corrected? [8]

OR

Q8) a) What is the significance of GIS data modeling? Explain the stages in creating GIS data model with suitable diagram. [8]

b) Explain spatial data model? Consider any spatial information and represent its features using types of spatial data model. [8]

Q9) a) Explain the types of data involved in GIS? Explain buffering with example. [8]

b) What is overlay analysis? Describe the process of digital terrain modeling. [8]

OR

Q10)a) What are the types of raster GIS models? Describe any two. [8]

b) Explain Binary and Index Model with suitable example. [8]

Q11)a) Describe the software scenario in GIS focusing on functionalities, products and developers. [8]

b) What is the role of GIS in urban management? Explain in brief? [5]

c) Explain types of queries in GIS. [5]

OR

Q12)a) Take an application of drainage system in Pune city and explain how GIS can be useful for that? [5]

b) What is the role of GIS in municipal management? Explain in brief? [5]

c) Explain in detail objectives of design of GIS? How this will ensure the effectiveness of GIS? [8]

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Total No. of Questions : 12]

SEAT No. :

P3293

[Total No. of Pages : 4

[4959]-2

B.E. (Civil) (Semester - I)

DAMS AND HYDRAULIC STRUCTURES

(2008 Pattern)

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) *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) Describe briefly guidelines for dam safety. [6]
b) What is economic height of dam. How it is determined? [6]
c) Write short note on : [6]
Application of remote sensing & GIS to watershed management.

OR

- Q2)** a) Discuss the data required to be collected before the construction of dam. [6]
b) Describe in detail instrumentation of dam. [6]
c) Explain the influence of following factor on the choice of the type of dam. [6]
i) Geological foundation conditions.
ii) Spillway size and location.

- Q3)** Write short note : [4 × 4 = 16]
a) Galleries in gravity dam.
b) Earthquake forces in gravity dam
c) Discuss the methods of construction of gravity dam.
d) Construction joints in gravity dam.

P.T.O.

OR

Q4) A gravity dam 80 m high, top width 7m. The face exposed to water has slope of 1H : 10V after a distance of 30 m from top. The free board is 3 m. The downstream face has slope of 0.7H to 1V after a vertical distance of 13 m from top.

Take specific weight of concrete = 24 kN/m³

Coefficient of friction $\mu = 0.7$

Shear strength of concrete = 1400 kN/m²

Check the stability of gravity dam for reservoir full condition considering weight of the dam, water pressure and full triangular uplift pressure. [16]

Q5) a) Explain various causes of failure of earthen dam. [8]

b) What is phoretic line? Enlist steps to draw phoretic line. [8]

OR

Q6) a) For an earthen dam of homogeneous section cross section is drawn to scale of 1 cm = 25 m. Following results were obtained on trial slip circle.

Area of N diagram = 4863 kN

Area of T diagram = 1831 kN

U = 1200 kN

If the angle of arc $\phi = 580^\circ$ and radius of slip circle 53.5 m.

Soil properties are cohesion = 24 kN/m³

Angle of internal friction = 25°

Specific weight = 24 kN/m³

Determine factor of safety of slope. [8]

b) Explain with sketch chimney drain. [4]

c) What do you understand by construction pore pressure in earth dams & how are they determined. [4]

SECTION - II

- Q7)** a) A Ogee type spillway has 12 crest gates each having 12m clear span. Find the max flood that can be safely passed by lifting all the gates when the max. reservoir level is 105.00m and crest level is 101.00m. Take Coeff. $C = 2.16$
Coeff of end contraction of piers = 0.05
Coeff of contraction for abutment = 0.1
Neglect velocity of approach.
Also design downstream profile of this spillway of gravity dam having downstream face slope 0.7H to 1V. [8]
- b) Write types of gates and explain any one. [5]
- c) Explain lanes weighted creep theory. [5]

OR

- Q8)** a) How does a siphon spillway function? What are the ways in which a siphon spillway can be primed? What are the limitations of siphon spillway. [8]
- b) Maintenance of outlet structure. [5]
- c) Compare Khoslas and Blighs creep length theory for seepage. [5]

- Q9)** a) Check whether following canal parameters conform to Kennedys theory of canal design.
Full supply discharge = 45 m³/s
Full slope depth = 1.8 m
Bed slope of channel = 1 in 4000
Side slopes = 1H : 2V
Bed width = 30 m
Critical velocity ratio = 1.17
Mannings constant $n = 0.023$ [8]
- b) What is meant by cross drainage works? State the types of cross drainage works and explain any one with neat sketch. [8]

OR

- Q10)** a) Design an irrigation channel in alluvial soil according to Lacey's theory for the following data. [8]
Full supply discharge = 50 m³/s
Lacey's silt factor = 1.00.
Side slope of channel = $\frac{1}{2}H : 1V$

- b) Write notes on : [8]
- i) Rapid falls
 - ii) Notch falls
 - iii) Stepped falls
 - iv) Glacis type falls

Q11) a) What is cut off? Describe briefly how a cutoff may be used as a river training measure. Also describe pitched islands. [8]

- b) What is meant by hydropower? What are different types of hydropower plants and explain any one with a neat sketch. [8]

OR

Q12) a) Write necessity of river bank protection and types of work for such protection. [4]

- b) Spur groynes as types of river training were. [4]

c) Define the term : [8]

- i) Load factor
- ii) Power factor
- iii) Utilization factor
- iv) Plant factor



Total No. of Questions : 12]

SEAT No. :

P3306

[Total No. of Pages : 3

[4959]-20

B.E. (Civil)

CONSTRUCTION MANAGEMENT (Elective - III)

(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 indicates full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, electronic pocket calculator and statistical tables is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain project monitoring and reporting system at each phase of construction with suitable example. [8]
- b) How Infrastructure development in India has contributed majorly in the country's economic growth? [6]
- c) Explain the necessity & applications of Construction Management.[4]

OR

- Q2)** a) What do you mean by Project Management Consultant? Explain its role in case fly over construction. [8]
- b) What is role of construction industry in economic development? [6]
- c) What are the reasons of project overruns? [4]

- Q3)** a) What are the factors affecting on scheduling? [4]
- b) What is WBS? Explain the WBS levels with suitable example? [6]
- c) Draw & explain a string diagram with suitable example. [6]

OR

P.T.O.

- Q4)** a) List out the various symbols used for different activities. [4]
b) Define work study and explain the procedure of work study. [6]
c) Write a note on Line of balance (LOB) technique with suitable example. [6]

- Q5)** Write short note on following any four : [16]
a) Building and other construction workers Act 1996
b) Child labor act
c) Capital investment
d) Means of finance
e) Profit loss account statement

OR

- Q6)** a) Write the need and importance of labor laws? [4]
b) What are the factors influencing working capital requirements? [6]
c) Explain in detail Workman's compensation Act 1923. [6]

SECTION - II

- Q7)** a) Write the role of insurance in risk management? [8]
b) Explain the concept of value engineering in the context of building construction project. [10]

OR

- Q8)** a) Write the concept of value and detail steps in value analysis? [8]
b) Explain following terms : [10]
i) Break even analysis
ii) Decision tree analysis

- Q9)** a) Define Supply Chain Management (SCM). Explain SCM in context with construction materials management? [8]
b) Explain the concept of performance appraisal and job evaluation. [8]

OR

- Q10)** a) Write down functions of materials management and explain in detail. [8]
b) Describe the human resource management process with suitable example. [8]

- Q11)** a) What are the applications of Artificial Neural networks in construction management? [8]
- b) Discuss the concept of Genetic algorithm. [8]

OR

- Q12)** a) What do you understand by Artificial Intelligence? And write its applications in Construction management? [8]
- b) Write short note on the following ; [8]
- i) Analogy between Biological neuron and Artificial neuron
 - ii) Fuzzy logic



Total No. of Questions : 12]

SEAT No. :

P3425

[4959]-200

[Total No. of Pages : 3

B.E. (IT)

BUSINESS INTELLIGENCE

(2008 Course) (Semester - II) (Open Elective) (414451)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Draw neat diagrams wherever necessary.*
- 2) *Assume suitable data, if necessary.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Compare analytical queries and transactional queries. **[8]**

b) Explain the process of business intelligence. **[8]**

OR

Q2) a) Explain the application where OLAP is more suitable than OLTP. Justify. **[8]**

b) Explain with the help of diagram various components of data warehouse. **[8]**

Q3) a) Suppose that a data warehouse consists of the four dimensions date, spectator, location and game and the two measures: count and charge where charge is the fare that a spectator pays when watching a game on a given date. Spectators may be students, adults or seniors, with each category having its own charge rate. Design the model using a suitable schema. Clearly specify facts. **[12]**

b) Define fact and dimension. **[4]**

OR

P.T.O.

- Q4)** a) Explain different types of SCDs with the help of examples. [8]
b) Which one of star and snowflakes schema is demoralized? Explain its advantages and disadvantages. [8]

- Q5)** a) What is staging in ETL? Explain different mechanisms of data staging?[9]
b) What are the challenges in extracting the data? Explain extraction phase of ETL. [9]

OR

- Q6)** a) What is loading of data in data warehouse? Explain initial and incremental loading. [9]
b) Explain the need for data transformation. Discuss different methods.[9]

SECTION - II

- Q7)** a) With the help of neat diagram explain reporting architecture. [8]
b) Explain the operations- drill down, drill up, slicing and dicing. [8]

OR

- Q8)** a) How are dashboards useful in reporting? [8]
b) Explain various report elements. [8]

- Q9)** a) Explain any one hierarchical clustering technique. [8]
b) How are decision trees formed? Explain any one method for selecting splitting attribute. [8]

OR

Q10)a) Write a short note on text mining. [8]

b) What are the challenges in time series data mining? How are they handled? [8]

Q11)a) Write a note on: HIVE and PIG. [9]

b) Explain Netezza. [9]

OR

Q12)a) What is real time and operational BI? [9]

b) How is BI deployed on cloud? [9]

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Total No. of Questions : 12]

SEAT No. :

P3426

[4959]-201

[Total No. of Pages : 3

B.E. (Computer Engineering)

c: CLOUD COMPUTING

(2008 Pattern) (Semester - II) (Elective - IV)

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) *Figures to the right indicate full marks.*
- 4) *Draw neat diagram wherever necessary.*
- 5) *Make suitable assumptions wherever necessary.*

SECTION - I

- Q1)** a) Explain the types of cloud. contrast between traditional network and cloud computing. **[8]**
- b) What are the essential characteristics of cloud? How cloud computing services uses various component? **[8]**
- c) What is Utility computing? **[2]**

OR

- Q2)** a) Describe Cloud computing. Enlist and explain three services model and four deployment models of cloud computing. **[8]**
- b) Explain the services provided by the Microsoft Azure in terms of subscriber perspectives. **[8]**
- c) Define Elastic Computing. **[2]**

- Q3)** a) What is virtualization? Describe types of virtualization. Enlist and explain some of the common pitfalls that come with virtualization. **[8]**
- b) Compare SOAP and REST paradigm in the context of programmatic communication between applications deployed on different cloud providers. **[8]**

OR

P.T.O.

Q4) a) What is the fundamental differences between virtual machines as perceived by traditional operating systems and system VM? [8]

b) What is role of web services? How asynchronous 'rich' interfaces applied for deployment of cloud services? [8]

Q5) a) Explain in detail the role of map Reduce in Cloud File System with its parallel efficiency. How Google develop data storage using BigTable?[8]

b) Explain how big tables are stored on distributed file system such as GFS and HDFS. [8]

OR

Q6) a) Explain with suitable example how a relational join could be executed in parallel using Mapreduce. [8]

b) How amazon dynamo works for data storage across distributed file systems? [8]

SECTION - II

Q7) a) Explain in detail security management in cloud system. Describe the following terms: [9]

i) VPN Tunneling ii) VM Security iii) Virtual Threats

b) Write in brief cloud risk issues. [9]

OR

Q8) a) Explain risks from multitennancy, w.r.t. various cloud environment. [9]

b) Explain fundamental functions: identity management, access control for secure cloud computing. [9]

- Q9)** a) Explain the issues in cloud computing w.r.t. implementing real time application over cloud platform. [8]
- b) Describe in detail design issues of QoS - aware distributed architecture for cloud. [8]

OR

- Q10)**a) Compare different issues in inter-cloud environments. [8]
- b) Explain in detail how QoS monitoring deployed in cloud computing? [8]

- Q11)**a) Explain in detail performance evaluation feature of Xen cloud platform with block diagram. [8]
- b) What is Open Nebula cloud? Explain main components of Open Nebula. [8]

OR

- Q12)**a) Explain conceptual representation of Eucalyptus Cloud with its components. [8]
- b) Write a short note on [8]
- i) Apache Virtual Computing Lab
- ii) Nimbus

x x x

Total No. of Questions : 12]

SEAT No. :

P3427

[4959]-202

[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 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)** a) What is divide and conquer strategy? Explain an algorithm for quick sort. State its time complexity. **[8]**
- b) Prove by contradiction that “there are infinitely many prime numbers”. **[6]**
- c) Explain the Greedy Kruskal’s minimum spanning tree. **[4]**

OR

- Q2)** a) Define the following: **[4]**
- i) Big “oh”.
 - ii) Theta
- b) Solve the following job sequencing with deadlines problem using greedy method. **[8]**
- Number of jobs (N) = 4
- Profits associated with jobs $(P_1, P_2, P_3, P_4) = (100, 10, 15, 27)$.
- Deadlines associated with jobs $(d_1, d_2, d_3, d_4) = (2, 1, 2, 1)$.
- c) Explain Dijkstra’s algorithm for a directed graph. **[6]**

P.T.O.

Q3) a) Solve the instance of 0/1 knapsack problem using dynamic programming: [8]

$$n = 4, m = 25$$

$$(P_1, P_2, P_3, P_4) = (10, 12, 14, 16)$$

$$(W_1, W_2, W_3, W_4) = (9, 8, 12, 14)$$

b) Explain Optimal Binary Search Tree problem. How it is solved using dynamic programming? [8]

OR

Q4) a) What is the flow shop scheduling problem? Explain how principle of optimality holds for this problem. How it is solved using dynamic programming approach? [8]

b) Explain how dynamic programming can be used for solving k-stage graph problem. [8]

Q5) a) Explain backtracking strategy and write general recursive and iterative backtracking algorithms. [8]

b) Explain the difference between FIFO and LC Branch and Bound solution to 0/1 knapsack. [8]

OR

Q6) a) Write recursive backtracking schema for m coloring of the graph. Determine the time complexity of the same. [8]

b) Explain branch and bound strategy. What are its disadvantages? [8]

SECTION - II

Q7) a) What is satisfiability problem? Explain in detail. [6]

b) Prove that vertex cover problem is NP-complete. [8]

c) Explain classes NP-Hard and NP-complete. [4]

OR

- Q8)** a) Prove that CNF-satisfiability reduces to clique decision problem. [6]
b) Explain node cover decision problem. [6]
c) Explain NP-Hard scheduling problem. [6]

- Q9)** a) Write an algorithm for prefix computation. Determine its time complexity. [8]
b) How Quicksort algorithm can be implemented on multiprocessor system? Explain with example. [8]

OR

- Q10)** a) Explain parallel computational models. [8]
b) Explain how graph problems can be solved using parallel processors. [8]

- Q11)** a) What is Convex Hull? Explain Quick Hull and Graham's Scan algorithm. [8]
b) Explain a deadlock detection and avoidance algorithm. [8]

OR

- Q12)** a) What is meant by heuristic algorithms? Discuss any one heuristic search algorithm. [8]
b) Explain Huffman coding theory algorithms. [8]



Total No. of Questions : 6]

SEAT No. :

P3428

[4959]-203

[Total No. of Pages : 2

B.E. (Computer Engg.)
PRINCIPLES OF COMPILER DESIGN
(2008 Course) (410442) (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.*

SECTION - I

Q1) a) Explain the role of lexical analyzer with suitable diagram. **[8]**

b) Explain how predictive parser works. **[10]**

OR

a) Explain use of yylex, yymore, yyless & yywrap functions. **[8]**

b) Write an algorithm to show the working of how LALR parser works. **[10]**

Q2) a) Construct syntax tree for $a + 4 - c$. **[8]**

b) Draw a diagram to show position of type checker. Explain how type checking is performed. **[8]**

OR

a) Write short note on : **[8]**

i) L-attributed definition

ii) S-attributed definition

b) Write short note on : Semantic analysis. **[8]**

Q3) a) Write intermediate code for assignment statement. **[8]**

b) Explain Indirect triple, quadruple with suitable example. **[8]**

OR

a) Write & explain intermediate code for 'declarative' statement. **[8]**

b) Write & explain intermediate code for 'do-while' statement. **[8]**

P.T.O.

SECTION - II

- Q4)** a) Explain source language issues in run-time storage organization. [8]
b) Write short note on [8]
i) stack allocation strategy
ii) heap allocation strategy

OR

- a) What is garbage collection? Explain its need. [8]
b) Draw & explain diagram of activation record. [8]

- Q5)** a) Explain machine dependent & machine independent code optimization. [8]
b) Write short note on : Issues in code generation. [10]

OR

- a) Illustrate dynamic programming with suitable example. [10]
b) Write all tree-techniques used for code generator - generator concept. [8]

- Q6)** a) Draw & explain data flow graph with suitable example. [8]
b) Write & explain data flow equations. [8]

OR

- a) Write short note on:
i) dead code elimination
ii) common sub expression elimination
iii) peephole optimization
iv) code movement [8]
b) Write short note on next - use information. [8]



Total No. of Questions : 12]

SEAT No. :

P3429

[4959]-204

[Total No. of Pages : 3

B.E. (Computer Engineering)
OBJECT ORIENTED MODELING AND 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.*

SECTION - I

Q1) a) What is the need of modeling software system? What are OO concepts used in software modeling and how? **[8]**

b) What do you mean by OMG? Explain the CORBA architecture. **[8]**

OR

Q2) a) Draw and explain 4+1 view architecture of the system models all the view of the system system? **[8]**

b) Explain the behavioral things in UML2.0 **[8]**

Q3) a) How UML2.0 supports requirements modeling? **[8]**

b) Give the activity diagram for 'Book a Ticket' in Railway Reservation System using swim lanes. State you assumptions. **[8]**

OR

Q4) a) Draw detailed use case diagram for online Internet Banking System using all advanced notations for use case diagram. **[8]**

b) What are boundary classes? Identify and model in UML the boundary classes in a ATM system. **[8]**

P.T.O.

- Q5)** a) Explain the element of a class diagram with an example. [8]
b) Explain the application of composite structure diagram. [6]
c) What do you mean by an active class? [4]

OR

- Q6)** a) Draw the class diagram for online Airline traffic management system. [8]
b) Explain the concept of Realization and Aggregation. [6]
c) How to draw object diagrams? [4]

SECTION - II

- Q7)** a) Explain the communication diagram with example. [6]
b) How timing diagram can be used in real time systems? [6]
c) Enlist and elaborate the significance of messages used in sequence diagram. [6]

OR

- Q8)** a) Explain the sequence diagram elements with a sequence diagram for "withdraw money" from ATM system. [8]
b) Explain following [6]
i) Composite State
ii) Self transition
iii) Sub State
c) How interaction overview diagram is related to activity diagram? [4]

Q9) a) Explain the purpose of a component diagram with a diagram and example. [8]

b) How do you model the deployment view in UML? [8]

OR

Q10)a) What are types of interfaces of a component? How it is modeled in UML? [8]

b) Draw the deployment diagram for client server 3 tier for your college website. [8]

Q11)a) Explain the forward engineering and reverse engineering with example. [8]

b) Give the solution for structural design pattern. [8]

OR

Q12)a) How do you forward engineer a class diagram? [8]

b) Explain the facade design pattern with an example. [8]

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Total No. of Questions : 12]

SEAT No. :

P3430

[4959]-205

[Total No. of Pages : 2

B.E.(Computer Engineering)

a:IMAGE PROCESSING

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

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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Explain the fundamental steps in Digital image Processing with block diagram. [8]

b) Explain the software and hardware required for digital imaging. [8]

OR

Q2) a) Write a short note on Human Visual System. [8]

b) Explain application of image processing. Explain different types of images. [8]

Q3) a) What is the need of transformation? Explain walsh transform. [8]

b) What is image enhancement? Explain image enhancement techniques in spatial domain. [8]

OR

Q4) a) Explain the contract stretching using histogram equalization. [8]

b) Explain the basic image pre-processing steps. [8]

Q5) a) With the help of appropriate mask explain the following. [9]

i) Point detection ii) Edge detection

b) What is texture? Explain statistical and spectral descriptor. [9]

OR

P.T.O.

- Q6)** a) Explain different methods of edge detection methods. [9]
b) Write short note on image processing filters. [9]

SECTION-II

- Q7)** a) Explain RLC coding and arithmetic coding with examples. [8]
b) Explain the methods used for lossless image compression. [8]

OR

- Q8)** a) Explain the image degradation and restoration model. [8]
b) Explain Blind-Deconvolution technique. [8]
- Q9)** a) Why image compression is needed? Explain Huffman coding [8]
b) Explain classification of object recognition approaches. [8]

OR

- Q10)**a) Explain the dictionary-based compression with suitable example. [8]
b) What are the regional descriptors for texture representation? [8]

Q11) Write short note [18]

- a) JPEG 2000
b) Sub-band coding
c) Dimension reduction

OR

Q12) Write short note [18]

- a) WAVELET with properties
b) Image Pyramids
c) Character Recognition application.



Total No. of Questions : 12]

SEAT No. :

P3431

[4959]-206

[Total No. of Pages : 3

B.E.(Computer Engineering)

b:DESIGN AND ANALYSIS OF COMPUTER NETWORKS

(2008 Course) (Semester-I) (410444)(Elective-I)

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 books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicates full marks.*

SECTION-I

Q1) a) Why distribution is required in network design? Explain exponential and geometric distribution? **[9]**

b) Message arrives 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 the utilization of server?

ii) What is the probability that there are two messages are in the system?

iii) What is the average message in the system?

OR

Q2) a) Consider a disk drive that can complete an average request in 10 ms. The time to complete a request is exponentially distributed. Over a period of 30 minute, 117000 requests were made to the disk. How long did it take to complete the average request? What is the average number of queued request? **[9]**

b) Describe exponential random variable and memory less property of random variable? **[9]**

Q3) a) Explain the steps for performance analysis and tuning. How performance of a system is tuned? **[8]**

P.T.O.

- b) Explain hierarchical and collapsible network architecture? [8]

OR

Q4) a) What is switch fabrics? Why a third generation switch fabrics does provides more bandwidth than second generation switch? [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 fill 6Mbps? [8]

- b) Explain the rate controlled scheduling for generated service conneciton? [8]

OR

Q6) a) Explain how TCP support flow control? Differentiate between open loop and close loop flow control technique? [8]

- b) Explain WFQ? What is the advantage of worst case fair weighted fair queuing(WF²Q) over WFQ? [8]

SECTION-II

Q7) a) Explain different traffic model in details? [8]

- b) What is QOS? Explain different queue manaement algorithms? [8]

OR

Q8) a) Explain, what are the different time scale and mechanism used at these time scale for traffic management? [8]

- b) What is signaling mechanism? Explain IETF signaling. [8]

Q9) a) Explain what is routing using masks with suitable examples? [8]

- b) What is subnetting and super-netting? Explain with suitable example?[8]

OR

- Q10)** a) Explain how fragmentation is handled in IPV4 and IPV6?. [8]
b) Explain Router architecture with suitable diagram. [8]
- Q11)** a) Discuss security issues at network layer with suitable example and possible solutions? [9]
b) What are the roles and responsibilities of network administrator? [9]

OR

- Q12)** Write short note on [18]
- a) Bandwidth management tools.
b) CIDR
c) Next generation network



Total No. of Questions : 12]

SEAT No. :

P3433

[4959]-208

[Total No. of Pages : 3

**B.E.(Computer Engineering)
SOFTWARE ARCHITECTURE
(2008Course) (Semester-I)(Elective-I(d)) (410444)**

Time :3Hours]

[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 indicate full marks.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) What is a deployment diagram? What kind of architectural decisions/ scenarios does a deployment diagram depict? Show the following two tier web application scenario using a deployment diagram Scenario: Browser based client using HTTP to access static web pages. [9]
- b) What do you understand by following concepts. [9]
- i) connectors and components
 - ii) Architectural structure modules:(decompose,classes)

OR

- Q2)** a) When and why will a software Architect choose following technology choices for any system, justify with examples: [9]
- i) JAVA
 - ii) Visual Basic
- b) “Architectures are influenced by stake holders”, Explain in detail. [9]

P.T.O.

Q3) Explain and illustrate the following concepts (in context of quality attribute/ tactics) with examples, in brief. **[16]**

- a) Authorization versus authentication
- b) UNDO command in Microsoft word
- c) Dynamic, interactive websites
- d) Testability userfriendliness

OR

Q4) a) Explain testability tactics. **[8]**

b) Explain Abstract Factory pattern with intent, structure and example. **[8]**

Q5) a) Define Design pattern. What are the types of design patterns? Explain in brief. **[8]**

b) Give structure of Façade. Explain with real life example. **[8]**

OR

Q6) In context of observer pattern answer the following. **[16]**

- a) How does action listener(event listener) in java work.
- b) What is publish subscribe
- c) What are roles of subject and observer?
- d) Give a non-software example of observer pattern.

SECTION-II

Q7) a) Explain role of middleware in 3-tier architecture. **[6]**

b) Write note on application server. **[6]**

c) What is socket? Enlist and explain different classes used in Java for socket programming. **[6]**

OR

Q8) a) Explain in brief various components of J2EE. **[6]**

b) Explain EJB components and interfaces. **[6]**

c) Write note on XML. **[6]**

- Q9)** a) Explain various technologies available to develop client side. [8]
b) Explain n-tier web architecture. [8]

OR

- Q10)** Briefly describe need, role, use of following technologies. [16]
a) AJAX
b) DOM tree
c) Rich Internet applications
d) DHTML

- Q11)** a) With neat diagram explain MVC. Also explain how it is supported by Java. [8]
b) What is Service Oriented Architecture? [8]

OR

- Q12)** a) How does a web application manage sessions? [6]
b) Consider an online DVD store application, show what concerns/ functionality of the online web based DVD store, will you distribute to presentation, business, data layers in 3 tier architecture. Make suitable assumptions about the features/scope of online DVD store. [6]
c) Explain servlet life cycle. [4]



Total No. of Questions :12]

SEAT No. :

P3434

[4959]-209

[Total No. of Pages :3

B.E. (Computer Engineering)
a: MULTIMEDIA SYSTEMS
(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 Question 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.*
- 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 the various devices used in multimedia systems? What are the different multimedia components present in windows OS? [8]
- b) What is Multimedia Authoring? State any explain any three multimedia authoring tools. [8]

OR

- Q2)** a) Explain in brief Multimedia Architecture. How Windows supports multimedia? [8]
- b) State and explain Multimedia Building Blocks. [8]
- Q3)** a) State and explain any four techniques to enhance the image in image processing. [8]
- b) Explain RLE and Huffman coding technique stating suitable example.[10]

OR

P.T.O.

- Q4)** a) Explain TIFF file format in brief. [8]
b) What is histogram of an image? Write algorithm for computing histogram of 8 bit gray scale image? [10]

- Q5)** a) What are different audio devices used in multimedia systems? Explain any three. [6]
b) Explain types of microphones based on constructional features and functional features. [10]

OR

- Q6)** a) Explain any two methods of audio compression. [8]
b) Explain with diagram components of elementary audio system. [8]

SECTION-II

- Q7)** Explain the algorithm of LZW text compression and decompression with suitable example. [16]

OR

- Q8)** a) Name different techniques used for text compression. Explain with suitable example Arithmetic coding applied to text data. [8]
b) Describe steps involved in MPEG video compression technique. [8]

- Q9)** a) Explain basic principles of 2D animation. [8]
b) State and explain ten types of primitives of OpenGL. [10]

OR

- Q10)**a) Explain major steps involved in 3D animation. [10]
b) State and explain methods of computer based animation. [8]

- Q11)** a) State and explain any four applications of multimedia over internet. [8]
- b) State and explain the requirements of Multimedia applications on the network. [8]

OR

Q12) Write short notes on following: [16]

- a) Video conferencing.
- b) Tele - robotics system.
- c) Multimedia over IP.

EEE

Total No. of Questions : 12]

SEAT No. :

P3307

[Total No. of Pages : 3

[4959]-21

B.E. (Civil)

**INTEGRATED WATER RESOURCES AND PLANNING
(2008 Pattern) (Elective - IV (a))**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answer any three questions from Section-I and three questions from Section-II.*
- 3) *Answer to the two sections should be written in separate answer booklet.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Your answer will be valued as a whole.*
- 7) *Use of electronic pocket calculator is allowed.*
- 8) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain the significance of prior appropriation. [4]
b) What are riparian rights? Explain any two. [6]
c) Discuss the different principles of planning and financing of water resource project. [8]

OR

- Q2)** a) What is National Water policy? Explain the recent norms of National Water Policy at state level. [6]
b) Write a short note on scope for privatization in the field of water resources. [4]
c) Enlist the different water infrastructure problems and their perspective. [8]

P.T.O.

- Q3)** a) The runoff of stream in the month of October has mean and standard deviation of 265 and 200 cumec months respectively. Assuming that lognormal distribution is a good fit. Find the probability that October runoff in the stream in any year exceeds 350 cumec months. What is the probability that the October runoff would fall in the range 150 to 350 cumec months? [8]
- b) Define mean, mode, median, standard deviation and coefficient of a distribution. [8]

OR

- Q4)** a) Write short note on : [8]
- i) Application on ANN in flood prediction/rainfall-runoff prediction.
- ii) Use of Fuzzy Logic in water resources planning & management.
- b) Define mean, mode, median, standard deviation and coefficient of a distribution. [8]

- Q5)** a) State general methods of flood forecasting used in India. [8]
- b) Distinguish between the mitigation plans of flood management and drought management. [8]

OR

- Q6)** a) Explain the use of geoinformatics in drought management. [8]
- b) What are different types of Drought? Explain severity index of drought with suitable examples in India. [8]

SECTION - II

- Q7)** a) State the different water requirements for environmental management and explain any three of them in detail. [9]
- b) What is water quality management? Discuss various issues related to water quality management. [9]

OR

- Q8)** a) What is the role of an Civil Engineer in protection of vital ecosystem.[9]
- b) Write a short note on Aquaculture. [9]

- Q9)** a) Correlate direct and indirect benefits of water resource development to employment generation. [8]
b) Explain 'Co-operative movement in the water resource development' with the help of case study. [8]

OR

- Q10)** 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 agro-industry. [8]

- Q11)** a) What is Decision Support System for Integrated Water Resource Planning and Management? Explain with suitable example. [10]
b) Explain the concept of perspective plan for basin development and management. [6]

OR

- Q12)** a) Write short note on : [8]
i) Application of ANN in flood prediction/rainfall-runoff prediction.
ii) Use of Fuzzy Logic in water resources planning and management.
b) State and define four statistical parameters used in statistical methods.[8]



Total No. of Questions :12]

SEAT No. :

P3435

[4959]-210

[Total No. of Pages :3

**B.E. (Computer Engineering)
MOBILE COMPUTING
(2008 Course) (Elective - II) (410445)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Question No. 1 or 2, 3 or 4, and 5 or 6 from section I and Q.No. 7 or 8, 9 or 10 and 11 or 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 indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** Explain the operational and technical requirements of GSM. **[10]**
- b) List the equipments and explain its functions in radio subsystem of GSM system. **[6]**

OR

- Q2) a)** Explain the functions of operational and maintenance center (OMC) subsystem of GSM. Provide GSM System model architecture. **[8]**
- b) With the help of a diagram explain the use of echo canceller on PSTN MSC interface. **[8]**
- Q3) a)** Explain the structure of a TDMA slot with a frame for following bursts**[8]**
- i) Normal Burst
 - ii) Dummy burst
- b) Explain the functions of MSC, HLR and VLR. **[8]**

OR

P.T.O.

- Q4)** a) Elucidate the time organization of Traffic channel (full and half rate). [8]
- b) Explain the logical control channels in GSM. [8]

- Q5)** a) What do you mean by Frequency hopping? Why to use it in GSM? Describe in brief an algorithm for the same. [8]
- b) Explain time organization of following control channels

Signaling Channel (Downlink Only): Frequency and Time Synchronizing Channels. [10]

OR

- Q6)** a) Explain the functions performed within the IMSI detach procedure. [8]
- b) What are the steps in the establishment of PSTN-MS call. Explain the call set-up with suitable signal and response diagram. [10]

SECTION-II

- Q7)** a) What are the two basic security issues in GSM, different from the fixed telephone network, justifying the higher protection requirements in GSM. How are these issues addressed in GSM? [8]
- b) Explain the equipment identification process in the context of security management in GSM system. [8]

OR

- Q8)** a) Narrate conditions under which the system will be forced to ask mobile for its IMSI. Why is it absolutely essential for the operator to have authentication of the visiting subscriber? [8]
- b) Explain, with the help of a diagram, the encryption procedure adopted in the GSM system. [8]

- Q9) a)** What are the multiplexing issues in frequency and time domains? [8]
- b) What are the advantages and disadvantages of TDMA, FDMA, CDMA? [8]

OR

- Q10)a)** Explain the functioning of CDMA system. [8]
- b) Compare TDMA and FDMA. [8]
- Q11)a)** Explain the procedures provided by RR layer during “Connection establishment Phase”. [8]
- b) Explain in detail the Mobility Management Common procedure and Mobility Management Specific procedure. [10]

OR

- Q12)a)** List the basic functionalities provided by three sublayers of the Application layer. [8]
- b) Explain MAP protocols for basic service support. [10]

EEE

Total No. of Questions :12]

SEAT No. :

P3436

[4959]-211

[Total No. of Pages :3

B.E. (Computer Engineering)

c: EMBEDDED SYSTEMS

(2008 Course) (Elective - II) (Semester - I) (410445)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Question No. 1 or 2, 3 or 4, and 5 or 6 from section I and Q.No. 7 or 8, 9 or 10 and 11 or 12 from section II.*
- 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.*

SECTION-I

- Q1)** a) What are the different categories of Embedded Systems depending on the area of applications? Give Examples. **[8]**
- b) Discuss various application areas of embedded system. **[4]**
- c) Explain how embedded processor and Application Specific system Processors are different than a general processor? **[6]**

OR

- Q2)** a) Differentiate between RISC and CISC architecture of the processors used in embedded systems. **[6]**
- b) What challenges are faced while designing an embedded system. **[6]**
- c) Draw layered architecture of Embedded system. Discuss various components in the Embedded System. **[6]**
- Q3)** a) Draw the architecture of ARM7 core. How ARM9 family is different than ARM7? **[8]**
- b) Discuss different structural units in a processor in an embedded system. Mention few advanced units. **[8]**

OR

P.T.O.

- Q4)** a) Which parameters are dependent on supply voltage and clock frequency in a system? [4]
- b) Describe different operating modes of ARM7 processor. [6]
- c) It is required to design a real time robotic control system. For this application, select the appropriate processor based on [6]
- i) Instruction cycle time
 - ii) Bus width
 - iii) MIPS
 - iv) On chip cache
 - v) On chip RAM/ROM
- Q5)** a) Compare RS232 and RS485 standards. [4]
- b) Discuss 12C protocol w.r.t. following points [8]
- i) Data transfer speed
 - ii) Arbitration
 - iii) Data frame format
- c) Which optical devices are commonly used in embedded systems? [4]

OR

- Q6)** a) Discuss different field in the data frame of CAN bus protocol. What are the applications of CAN? [8]
- b) Discuss the topology used by devices to communicate through USB protocol. Mention different types of data transfer. [8]

SECTION-II

- Q7)** a) What are the advantages and disadvantages of programming in C++ for Embedded system? [8]
- b) What is In-circuit-Emulator? Give details. [6]
- c) How cross compilers are different than compilers? [4]

OR

- Q8)** a) Explain the use of data structures namely stack and tree in brief. [6]
b) How java is useful in embedded system programming? Also mention its disadvantages. [6]
c) Explain the process of converting a C program into a file for ROM image. [6]

- Q9)** a) Explain the kernel services in an OS. [8]
b) How RTOS performs the schedule management of multiple tasks. [8]

OR

- Q10)** a) Discuss different ways in which interrupts are handled in RTOS environment. [6]
b) What are virtual device drivers? Explain. [6]
c) Differentiate between RTOS and embedded OS. [4]

- Q11)** a) Explain digital camera with respect to hardware and software components. [8]
b) Differentiate between soft real time operating system and hard real time operating system. [4]
c) Identify the requirements of s/w mobile phone and show it with the help of class diagram. [4]

OR

- Q12)** a) Discuss different features of μ COS-II. [4]
b) Differentiate between Embedded OS and Desktop OS. [4]
c) Write short note on any two [8]
i) Embedded Linux.
ii) VxWorks.
iii) Special OS features for automotive systems.

EEE

Total No. of Questions :12]

SEAT No. :

P3437

[4959]-212

[Total No. of Pages :5

B.E. (Computer Engineering)
SOFTWARE TESTING & QUALITY ASSURANCE
(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) 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) What is empirical relations? Give the some empirical relation for any attribute. Evaluate any five best-selling word processing programs in today's world with respect to empirical relations. Explain with example. **[18]**

- a) Likert scale.
- b) Forced ranking.
- c) Verbal frequency scale.
- d) Ordinal scale.
- e) Comparative scale.
- f) Numerical scale.

OR

- Q2)**
- a) Explain the representation conditions for measurement along with measurement mapping with examples. **[6]**
 - b) Give the key stages of formal measurement. **[6]**
 - c) Give the brief explanation for measurement mapping with example. **[6]**

P.T.O.

Q3) Calculate the Maurice Halstead's parameters for following code for size and complexity for counting of lines of codes. Parameters are length of program, vocabulary of program, volume of program, program level, difficulty of program, estimated program length, effort required to generate the program.[16]

```
int * sort (int A, int N)

int A[100], N, I, J, SAVE, M;

// routine sorts array A into descending order

if(N > 2)
{
    for ( i=2; i<=N; i++)
    {
        M = I - 1;
        for ( j=1; J<=M; j++)
            if ( A[i] > A[j])
                {
                    SAVE = A[i];
                    A[i] = A[j];
                    A[j] = SAVE;
                }
    }
return (A)
}
```

OR

- Q4)** a) Explain DeMarco's approach for functionality measurement. [8]
- b) Explain time and space complexity of program & measuring algorithmic efficiency. [8]

Q5) a)

A sample specification with defects
Specification for program calculate_coin_value
This program calculate the total rupees and paisa for set of coins. The user inputs the amount of 5 paisa, 10 paisa, 25 paisa, 50 paisa, 1 rupee coins held. There are 5 different denominations of coins. The program output the total rupees and paisa Input: number_of_coins is an integer Output: number_of_rupees is an integer number_of_paisa is an integer

Above specification has some type of defects. Identify and write down the defects with the specification. **[8]**

b) Give the comparison between black and white box testing. **[8]**

OR

Q6) a) Write down input equivalence classes for the following module. **[8]**

Function square_root

message (x: real)

when $x \geq 0.0$

reply (y: real)

where $y \geq 0.0$ & approximately $(y*y, x)$

otherwise reply exception imaginary_square_root

end function.

- b) During specification phase as STG (State Transition Graph) has to be generated for a system as a whole and or specific model. Draw the state transition graph or state chart for any behavior of the sample module of your project or any project. Draw the state table for the module and write down the transitions to be tested. [8]

SECTION-II

- Q7)** a) What are key differences in integrating the procedure oriented systems as compared to object oriented system. [6]
- b) Explain the GUI testing with questionnaire for any hypothetical software project. [6]
- c) Explain acceptance testing with example. [6]

OR

- Q8)** Write down the several types of system tests. Select from these types those you would perform or do for the software described below. For each category you choose [18]
- a) specify the test objectives and
- b) give the general description of the tests you would develop and tools you would need.

You may make any assumptions related to system characteristics that are needed to support to your answer.

An online fast food restaurant system.

The system reads customer orders, relays orders to the kitchen, calculates the customer's bill and gives changes. It also maintains inventory information. Each wait-person has terminal. Only authorized wait-person and as system administrator can access the system.

- Q9)** Explain ISO 9000 with following (any eight) subject matter [16]
- a) Management responsibilities.
- b) Quality system
- c) Contract review
- d) Design control

- e) Document design control
- f) Purchasing
- g) Control of customer's supplied product
- h) Process control
- i) Inspection and training
- j) Test status
- k) Control of quality records
- l) Corrective and preventive actions.

OR

Q10)a) Explain Malcolm Baldrige assessment system. **[8]**

b) Give brief description about Ishikawa's 7 basic tools. **[8]**

Q11) Write short notes on problem reporting with respect to following points:**[16]**

- a) Logistics in problem reporting.
- b) Tooling in problem reporting.
- c) Challenges in problem reporting.
- d) Best practices in problem reporting.

OR

Q12)a) Describe in brief choosing the method for Fix distribution in software maintenance. **[8]**

b) Explain categorization and identification of problem in problem resolution in software maintenance. **[8]**

EEE

Total No. of Questions : 12]

SEAT No. :

P3438

[4959]-213

[Total No. of Pages : 3

B.E.(Computer Engineering)
DISTRIBUTED OPERATING SYSTEMS
(2008 Course)(Semester-II)

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 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) How do we achieve the security in the distributed operating system? Explain it with access matrix model for security. **[6]**
- b) Compare between multiprocessor operating system, Multicomputer operating system, network operating system and distributed operating system. **[10]**

OR

- Q2)** a) Why distributed operating systems more difficult to design than the operating system for centralized time sharing system? **[6]**
- b) Explain the following with respect to distributed operating system. **[10]**
- | | |
|--------------------|-----------------------------|
| i) Naming | ii) Scalability |
| iii) Compatibility | iv) Process synchronization |
- Q3)** a) Explain the following with respect to synchronization in distributed operating system. **[10]**
- | | |
|----------------------|----------------------|
| i) Clock skew | ii) Drift rate |
| iii) Casual ordering | iv) Partial ordering |
- b) What is NTP? Discuss the factors to be taken into account when deciding to which NTP server a client should synchronize its clock. **[6]**

OR

P.T.O.

- Q4) a)** Compare the following. **[10]**
- i) physical clock
 - ii) logical clock
 - iii) vector clock
- in distributed operating system
- b) Why election algorithm is required in distributed operating system? Explain it with any one election algorithm. **[6]**

- Q5) a)** Discuss the impact of message loss following deadlock detection algorithms. **[10]**
- i) a path pushing algorithms
 - ii) a edge chasing algorithms
- b) Explain the Lamport's algorithm for mutual exclusion. Show that in Lamport's algorithm the critical section is accessed according to the increasing order of timestamp. **[8]**

OR

- Q6) a)** Distributed deadlock detection algorithms normally have substantial message overhead, even when there is no deadlock. Instead of using a deadlock detection algorithm, we can handle deadlocks in distributed systems simply by using "timeouts" i.e. after waiting certain time declares that it is deadlock, what are the risks in using this method? Explain the above scenario by comparing this with any deadlock detection algorithm. **[10]**
- b) Show that Byzantine agreement cannot always be reached among four processor if two processor are faulty. **[8]**

SECTION-II

- Q7) a)** Write short note on. **[12]**
- i) Log structure file system
 - ii) Google file system
- b) Discuss whether message passing or DSM is preferable for fault tolerant application. **[6]**

OR

- Q8) a)** What is distributed scheduling? Why it is needed? What are the different issues in load distribution? Explain receiver initiated algorithm in detail. **[12]**
- b) What are various coherence protocols used in DSM? Give the brief about each. **[6]**

- Q9)** a) How the recovery mechanism achieved in distributed operating system using rollback and shadow paging? Explain with suitable example. [10]
- b) What is checkpoints? How does it help in recovery mechanism? [6]

OR

- Q10)** a) What is the voting protocol for fault tolerant system? Explain any voting protocol in designing a fault tolerance system in distributed environment. [8]
- b) How do we achieve the security in the distributed operating system? Explain it with access matrix model for security. [8]

- Q11)** a) What is the cluster? How do you compare cluster with distributed system? How do we classify the clusters? Give any suitable example of the cluster. [8]
- b) What is service oriented architecture? How web services used in service oriented architecture? How does it different than component based development architecture? [8]

OR

- Q12)** a) Explain the relation of the following system with distributed system [10]
- | | |
|----------------------|-----------------------------------|
| i) cluster computing | ii) grid computing |
| iii) cloud computing | iv) service oriented architecture |
- b) Explain the following with respect to cloud computing [6]
- elements of cloud computing
 - features of cloud computing
 - advantages and disadvantages



Total No. of Questions : 12]

SEAT No. :

P3439

[4959]-214

[Total No. of Pages : 2

B.E.(Computer)

ADVANCED COMPUTER ARCHITECTURE

(2008 Course)(Semester-II) (410449)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to these 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 significance of Instruction Level Parallelism(IPL) and Thread Level Parallelism(TLP)? What is the difference between ILP and TLP?[8]
- b) Explain with a neat block diagram the EPIC features of Itanium processor. [10]

OR

- Q2)** a) What is importance of Parallel Processing and Multitasking Operating system? What is granularity? Explain any two levels of granularity. [10]
- b) Prove that 'n' stage pipeline processor can be at most 'n' times faster than a corresponding non-pipelined serial processor. [8]
- Q3)** a) What is meant by pipeline, superscalar and super pipeline processor? what are the various factors placing constraints on new start of pipeline processes? [8]
- b) Explain principles of internal data forwarding and register tagging in reference with design of pipelined processors. [8]

OR

- Q4)** a) Describe the various features of SPARC architecture. [8]
- b) What is role of Branch Prediction Buffer and Branch Target Buffer in Branch handling with respect to pipelining? [8]
- Q5)** a) Explain various types of vector instructions with suitable examples. [8]
- b) Explain matrix multiplication on SIMD architecture. Discuss complexity of multiplication algorithm. [8]

OR

P.T.O.

- Q6)** a) What are Array Processors? Why they are classified as SIMD processors? Compare Array processor and multiprocessing system. [8]
b) Discuss standard features of Pipeline chaining and Vector looping? [8]

SECTION-II

- Q7)** a) Discuss the Interconnection networks used in SIMD [10]
b) Describe loosely coupled and tightly coupled multiprocessor system? [8]

OR

- Q8)** a) What are the different ways available for interconnection network in multiprocessor system? Discuss the advantages and disadvantages of the same. [10]
b) Discuss different bus arbitration techniques used in multiprocessor system. [8]
- Q9)** a) What Basic Concept of Multithreading? Explain Multithreaded Architectures and its computational Model for Parallel Processing system. [8]
b) Explain following terms Associated with message passing. [8]
i) Synchronous and Asynchronous message passing schemes.
ii) Blocking and Non Blocking communication

OR

- Q10)** a) What are different message passing paradigm of Parallel programming? [8]
b) Describe the context switching policies of multithreaded architectures. [8]
- Q11)** a) State and explain various features of Parallel Programming Languages. [8]
b) Explain classification of Multiprocessor Operating system. [8]

OR

- Q12)** a) What are various issues with respect of exploiting concurrency for multiprocessing environment? [8]
b) Write short note on Grid computing. [8]



Total No. of Questions :12]

SEAT No. :

P3440

[4959]-215

[Total No. of Pages :3

**B.E. (Computer Engineering)
PATTERN RECOGNITION**

(2008 Course) (Semester - II) (Elective - III) (410450)

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) Describe steps involved in pattern recognition. [8]
b) Compare supervised and unsupervised pattern recognition. [8]

OR

- Q2)** a) Explain learning and adaption methods in pattern recognition system. [8]
b) What is unsupervised pattern recognition? State different methods and explain any one. [8]
- Q3)** a) Explain Bayesian classifier for defining risk for decision making. [8]
b) Explain with example following terms: [8]
- i) Loss function
 - ii) Bayes risk
 - iii) Feature space
 - iv) Risk

OR

P.T.O.

- Q4)** a) Explain Bayes criterion and Maximum a Posteriori (MAP) criterion. [8]
b) Explain linear discriminant function and decision hyper planes. [8]
- Q5)** a) Explain various parameter estimation methods of pattern classification. [8]
b) Write a note on Expectation-maximization method. [10]

OR

- Q6)** a) Discuss maximum Likelihood approach used for parameter estimation. [8]
b) Explain Gaussian mixture model for density estimation in detail? [10]

SECTION-II

- Q7)** a) What is problem of finding the best direction? Explain how scatter matrix is useful to solve this problem. [8]
b) What is the role of Dimension reduction in pattern recognition? State and explain different methods for Dimension reduction. [8]

OR

- Q8)** a) Explain how Hidden Markov Model (HMM) is effective to solve the problem of multiple decision? [8]
b) Explain Principal component analysis for dimension reduction. [8]
- Q9)** a) Explain non-parametric techniques for density estimation? Explain Kernel density estimation. [8]
b) Explain linear Support vector machine in detail. [8]

OR

- Q10)** a) Explain Quadratic and Polynomial discriminant function in detail. [8]
b) Explain the steps involved in SVM training, in brief. [8]

- Q11)a)** Explain k-Means and fuzzy k-Means clustering algorithm in detail. [8]
- b) What is Non-metric data? State and explain the technique used for classification of Non-metric data. [10]

OR

- Q12)a)** What is the difference between classification and clustering? State and explain various techniques used for clustering. [8]
- b) Justify the significance of Root node, Descendent and Subtree in a classification problem using decision tree with suitable example. [10]

EEE

Total No. of Questions :12]

SEAT No. :

P3441

[4959]-216

[Total No. of Pages :3

B.E. (Computer Engineering)
b:HIGH PERFORMANCE NETWORKS
(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) *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) *Figures to the right indicate full marks.*

SECTION-I

- Q1) a)** Discuss in short about 1000 BASE-X family with suitable applications.[10]
- 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? [10]
- 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. [7]

OR

P.T.O.

- Q4)** a) Describe the SS7 protocol architecture. [8]
b) Explain Frame-Mode Control Signaling with example. [7]
- 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. [7]

OR

- Q6)** a) Explain in details the ATM adaptation layer. [8]
b) What are the different ATM Service Categories? Explain in details. [7]

SECTION-II

- Q7)** a) Draw and explain a typical ADSL equipment configuration. [8]
b) Draw and explain the general block diagram of DMT Transmitter. [7]

OR

- Q8)** a) Explain architecture of VDSL. [8]
b) Explain in short why are some variations of xDSL asymmetric? [7]
- Q9)** a) Explain step-by-step MPLS operations that can occur on data packets in an MPLS domain. [8]
b) Explain working of RSVP. [7]

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. [7]

Q11)a) What is Wi-Fi? Explain with configuration steps. **[10]**

b) What is WiMax? Explain in details. **[10]**

OR

Q12)a) Comment on any 3 WiMaxQoS classes along with suitable Application support. **[10]**

b) Explain the following terms related to WiMax. **[10]**

i) Fixed wireless access

ii) Nomadic wireless access

EEE

Total No. of Questions :12]

SEAT No. :

P3442

[4959]-217

[Total No. of Pages :3

B.E. (Computer)

NEURAL NETWORKS

(2008 Course) (Elective - III) (410450) (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) *Attempt 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.*
- 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) Draw a McCulloch Pitts Neuron model. Define the firing rule and explain how it performs the basic logic operations for NOR Gate. [8]
- b) Compare the features and performance of computer to that of a biological neural network w.r.t. different parameters. [8]

OR

- Q2)** a) What is the significance of learning laws in ANN training? Discuss ADALINE computing model of a neuron. [8]
- b) Explain with example the task of pattern analysis as Classification and Clustering. Give examples of ANNs used for the same. [8]
- Q3)** a) What is error back propagation training? Discuss in brief the significance of learning constant, activation function and momentum term in back propagation training. [10]
- b) Draw and explain the architecture of RBFN (Radial Basis Function Network). How it act as classifier? [8]

OR

P.T.O.

Q4) a) Draw a 3-layer FeedForward Neural Network. Explain the Back propagation training algorithm in detail. [10]

b) With example discuss the pattern classification problem and explain how it can be solved using Perceptron Model. [8]

Q5) a) Explain the architecture of Boltzmann machine. [8]

b) How associative memory models classified? With diagram explain the working of Auto-associative Neural Network. [8]

OR

Q6) a) What is meant by capacity of a feedback network? What is the significance of hidden units? [8]

b) What is meant by simulated annealing? What is annealing schedule? [8]

SECTION-II

Q7) a) What is self-organizing feature map? Discuss the features and advantages of SOM. [10]

b) Discuss the architecture of Recurrent Neural Network. [8]

OR

Q8) a) What is plasticity-stability dilemma problem? Explain the ART Training algorithm used for pattern clustering. [10]

b) Explain how Support Vector Machine (SVM) can be used for pattern classification. [8]

Q9) a) Compare and Discuss the learning of SVM and RBFN. [8]

b) Explain with architecture and algorithms the use of ANN in hand written digit recognition. [8]

OR

Q10)a) How can we solve the optimization problem by ANN? Discuss the practical difficulty in solving the travelling salesman problem by means of ANN. [8]

b) Draw and explain the architecture of Bidirectional Associative Memory. [8]

Q11)a) What is Soft Computing? What are the application areas of Soft Computing? Compare the Neural Networks and Fuzzy Logic as important tools of Soft computing. [8]

b) How Fuzzy sets are different than traditional set? How Fuzzy logic can be used with Neural Networks for supervised or unsupervised learning? [8]

OR

Q12)a) What do you mean by Fuzzy Logic? What is the use of membership function? Give any Two examples. [8]

b) Explain the architecture of any suitable Neuro Fuzzy system designed for pattern recognition task. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P3443

[4959]-218

[Total No. of Pages :4

B.E. (Computer Engineering)

ADVANCE DATABASES

(2008 Course) (Semester - II) (Elective - IIID)

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) a) What are the different partitioning technique? Give an example of query for which that partitioning technique would provide the fastest response. **[8]**

b) What factors could result in skew when a relation is partitioned on one of its attribute by **[8]**

i) Hash partitioning

ii) Range partitioning

In each case, what can be done to reduce the skew.

OR

Q2) a) What is parallelism? Explain the interquery & Intraquery parallelism. **[8]**

b) Explain partitioned parallel hash join. **[8]**

Q3) a) What are the different approaches for high availability in the distributed system. **[8]**

b) Explain distributed transaction management. **[8]**

OR

P.T.O.

- Q4)** a) Explain the kinds of data storage and failure in distributed system. [8]
b) Explain two phase commit protocol. How three phase commit protocol overcome the disadvantages of the two phase commit protocol. [8]
- Q5)** a) Why do we have the XML DTD? What is well-formed documents? Explain with an example. [8]
b) Why do we need to maintain state at the middle tier? What are cookies and how does a browser handle the cookies? [10]

OR

- Q6)** Write short note on the following: [18]
- a) XQUERY
 - b) XPATH
 - c) Thin & Thick Client
 - d) 3tier architecture

SECTION-II

- Q7)** a) What are different data cleaning methods? Explain outlier analysis. [8]
b) Explain architecture of data warehouse with a neat diagram. [10]
- OR
- Q8)** a) Differentiate between OLAP & OLTP. [6]
b) Explain the following operation on the multidimensional data. [6]
i) Roll up and drill down.
ii) Slicing & dicing
c) What is star schema? With an example design a star schema. [6]

Q9) a) 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 $k=4$.

b) What is Best split? Explain ID3 algorithm to create decision tree. **[8]**

OR

Q10)a) Find the strong association rule by using Apriori algorithm for the given dataset which satisfy following requirements. **[8]**

- i) Support = 30%
- ii) Confidence = 90%

Customer	Products
C1	S1 S3
C2	S2
C3	S4
C4	S2 S3 S4
C5	S2 S3
C6	S2 S3
C7	S1 S2 S3 S4
C8	S1 S3
C9	S1 S2 S3
C10	S1 S2 S3

- b) Explain the following terms [8]
- i) Closed frequent itemset.
 - ii) Maximal frequent itemset.
 - iii) Outlier analysis.

Q11)a) What you mean by relevance ranking? Explain TF/IDF methods of relevance ranking for the Boolean & ranked query. [8]

- b) Explain the following: [8]
- i) Inverted Index
 - ii) Ontologies
 - iii) Stop words
 - iv) Random walk

OR

Q12)a) What is page ranking and popularity ranking? Explain in brief. [8]

- b) Explain the following terms: [8]
- i) Web crawlers.
 - ii) Homonyms.
 - iii) Vector space model.
 - iv) Synonyms.

EEE

Total No. of Questions : 12]

SEAT No. :

P3510

[4959]-219

[Total No. of Pages : 3

B.E. (Computer Engineering)

a:VLSI AND DIGITAL SYSTEM DESIGN

(2008 Pattern) (Semester - II) (Elective - IV) (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) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

SECTION - I

Q1) a) Compare Speed-Power Performance of ECL, CMOS, BiCMOS. [9]

b) Explain the types of technology scaling. [8]

OR

Q2) a) Explain design methodology with flow chart for ASIC design. [9]

b) Explain the different tools for device simulation. [8]

Q3) a) Explain Shallow Trench Isolation (STI) with process flow. [8]

b) Describe different limiting performance of CMOS technology. [9]

OR

Q4) a) Explain merits and demerits of Cu interconnect. [8]

b) Explain the different process options for device isolation. [9]

P.T.O.

- Q5)** a) Explain basic properties of Silicon Wafer. [4]
b) Explain Czochralski and Float-Zone Crystal Growth Methods. [4]
c) Explain Chemical vapor oxidation technique. [8]

OR

- Q6)** a) Write a short note on [8]
i) Nano imprint Lithography
ii) Electron-beam lithography.
b) Explain the different techniques of etching. [8]

SECTION - II

- Q7)** a) Write code in VHDL for 16:1 multiplexer. [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) Draw a state diagram and write a VHDL code for traffic Light Controller. [8]

- Q9)** a) Explain the types of programmable logic devices in details. [8]
b) Discuss logic levels and noise margins with respect to CMOS circuits. [4]
c) Explain role of interconnects in VLSI design. [4]

OR

- Q10)**a) Explain dynamic behavior of CMOS devices and Circuits. [8]
b) Computer ASIC and FPGA in details. [8]

- Q11)**a) Explain different design parameters for digital circuit design. [5]
b) Describe software aspect for digital design. [8]
c) Explain merits and demerits of FPGA. [4]

OR

- Q12)**a) Draw a neat diagram and explain briefly 6-T SRAM. [8]
b) For Clock Circuitry explains the following. [9]
i) Clock skew
ii) Clock jitter
iii) slew

x x x

Total No. of Questions : 12]

SEAT No. :

P5074

[Total No. of Pages :15

[4959] - 22

B.E. (Civil)

ADVANCED TRANSPORTATION ENGINEERING

(2008 Pattern) (Elective - IV)

Time :4. Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Q 1 or Q2, Q3 or Q 4, Q5 or Q6 and soon*
- 2) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Explain the concept of "zoning"and how it is useful in traffic and transportation planning, with a neat labelled sketch. [6]
- b) Explain "Household survey" and its importance in traffic characteristics forecasting. Explain detail procedure. [12]

OR

- Q2)** a) Explain " O - D " matrix and its utility with an example. [6]
- b) Explain "Manual traffic counts survey" with an example considering PCU equivalences. Also elaborate on moving vehicle method. [12]

- Q3)** a) Elaborate on any 5 problems of the urban transportation systems, which are faced by planners. [10]
- b) Discuss salient features of the proposed "Bullet train" project sanctioned by the Indian Government. [6]

OR

- Q4)** a) Highlight any 5 simple solutions to the existing problems of the pune city traffic movement, in detail. [10]
- b) Discuss the salient features of the proposed "Mumbai - Nagpur superfast expressway project sanctioned by the Maharashtra Government. [6]

P.T.O.

- Q5)** a) Discuss the cost categories which are considered while working out the total cost of any transportation system option, based on examples. [10]
- b) Explain benefits of public private partnerships (PPP) in transport planning. [6]

OR

- Q6)** a) Compare ARR method with IRR and suggest which method is suitable for evaluating the economic appraisal of a proposed new road designed for 20 years. Explain both methods. [10]
- b) Discuss limitations of BOT types of financial mechanisms, with examples. [6]

SECTION - II

Q7) Explain with sketches:

- a) OD surveys. [6]
- b) Grade separated intersections design aspects. [6]
- c) Parking surveys. [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 Benkelman Beam Surveys. [18]

OR

Q10) With neat labelled sketches explain the various types of distresses which occur in the rigid pavements. Explain how the pavement condition rating is done and how the pavement condition index is used in the management of pavement distresses? Discuss advantages of rigid pavements over other types. [18]

Q11) Design a rigid pavement as per IRC-58 based on the following data: **[16]**

- a) 2 way CVPD = 4000
- b) Flexural strength of concrete = 45 kg/cm²
- c) Effective modulus of subgrade reaction = 13.5 kg/cm²/cm length
- d) Elastic Modulus of concrete = 3.5×10^5 kg/cm²
- e) Poissons ratio = 0.18
- f) Coefficient of Thermal expansion of concrete = 10×10^{-6} per ° centigrade
- g) Tyre pressure = 9 kg/cm²
- h) Traffic growth rate = 7%
- i) Design life = 20 years
- j) Spacing of contraction joints = 4.0 m
- k) Slab width = 3.5m
- 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

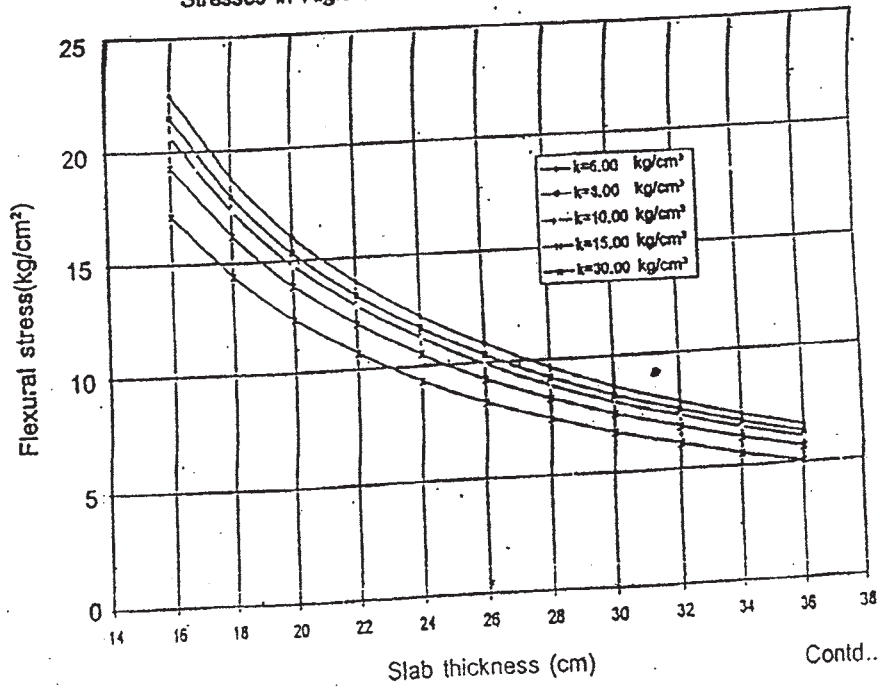
Design the pavement for withstanding all the other critical pavement conditions.

OR

Q12) Design the rigid pavement using the data mentioned in Q11, except for the fact that the CVPD (Two way) is decreased by 25%. **[16]**

Appendix-1

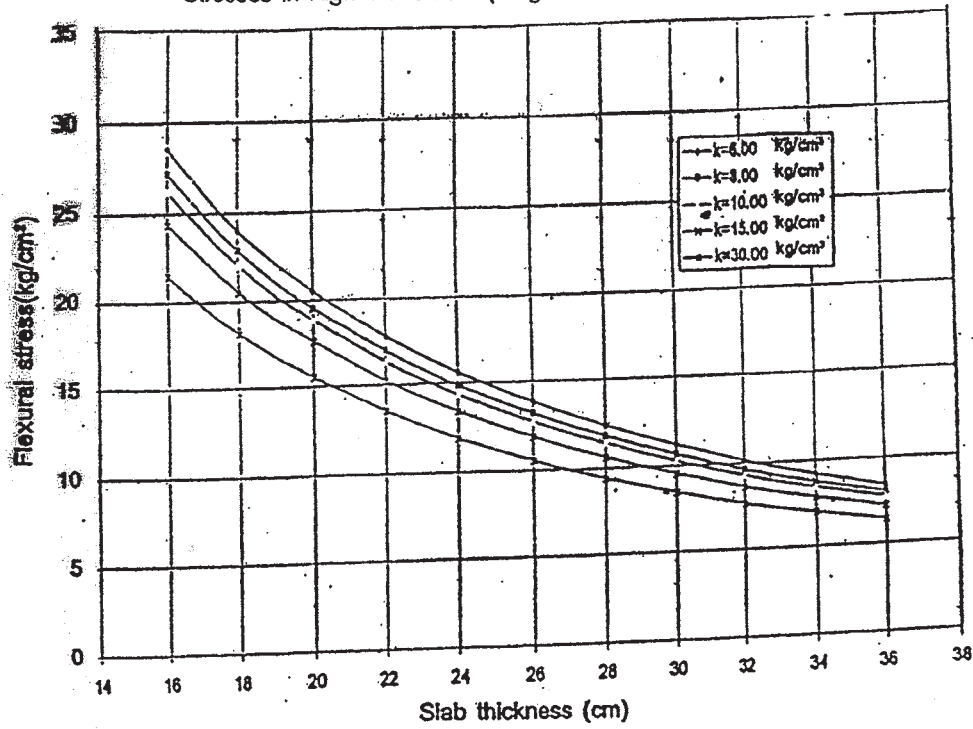
Stresses in Rigid Pavement (Single Axle Load = 6 tons)



Contd..

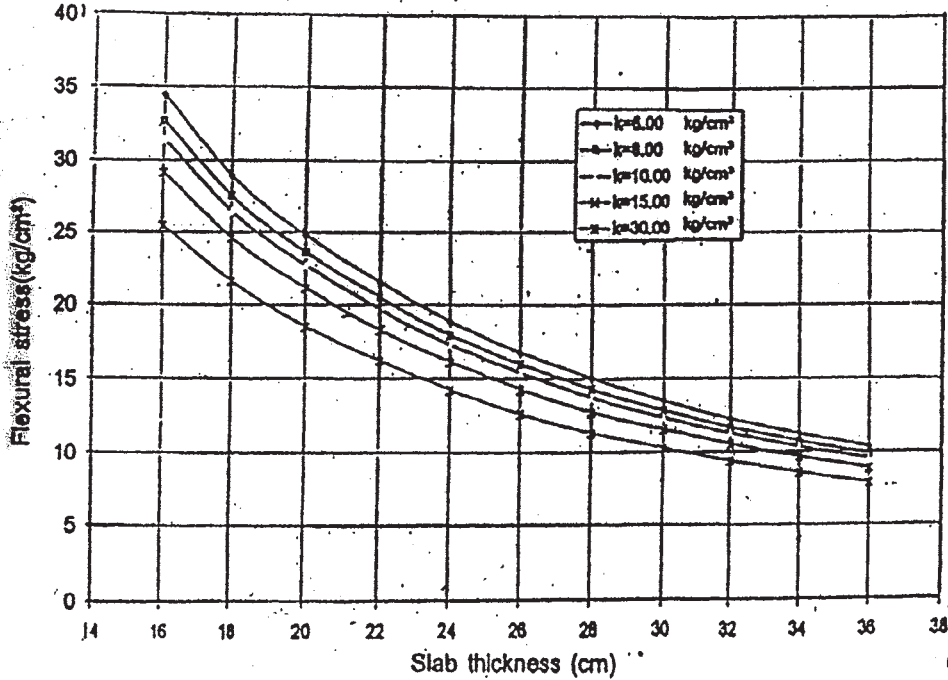
IRC:58-2002

Stresses in Rigid Pavement (Single Axle Load = 8 tons)



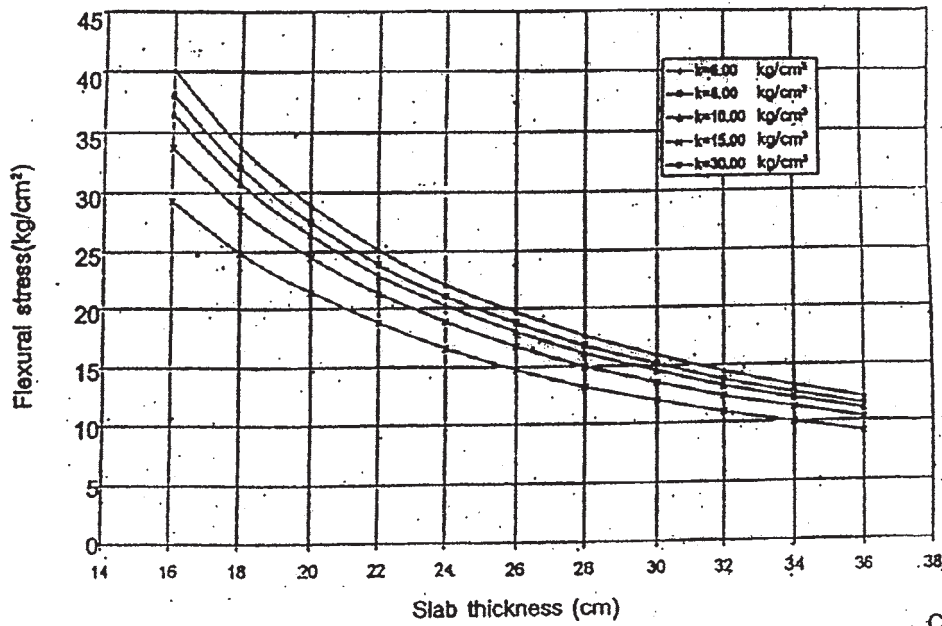
Contd..

Stresses in Rigid Pavement (Single Axle Load = 10 tons)



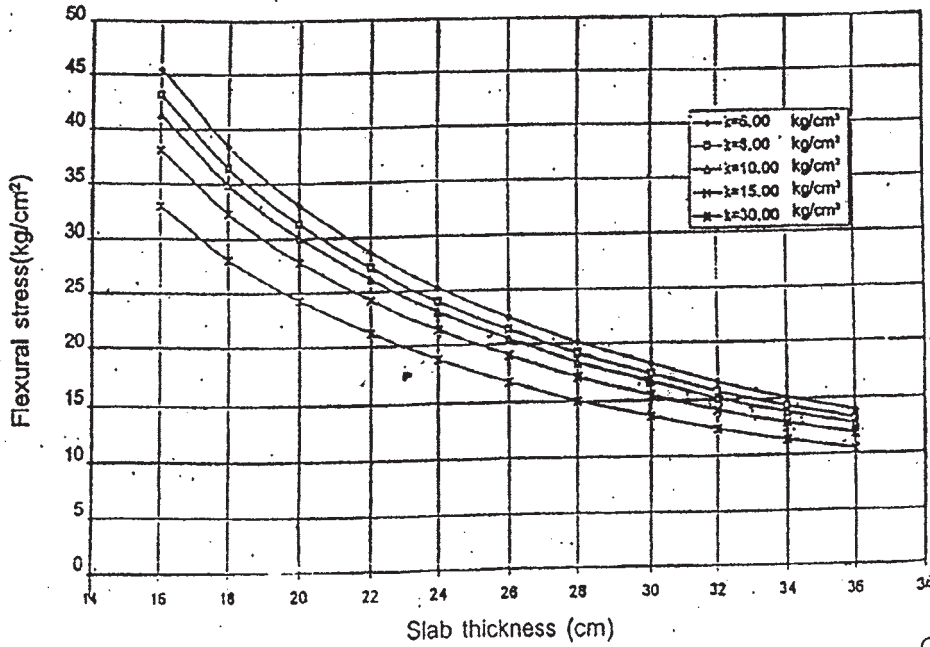
Contd..

Stresses in Rigid Pavement (Single Axle Load = 12 tons)



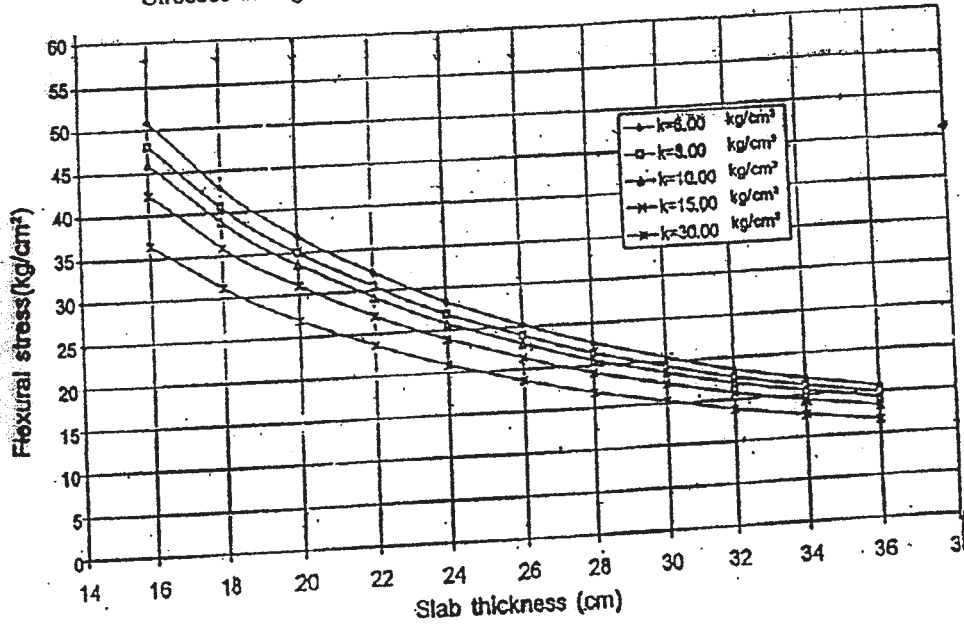
Contd..

Stresses in Rigid Pavement (Single Axle Load = 14 tons)



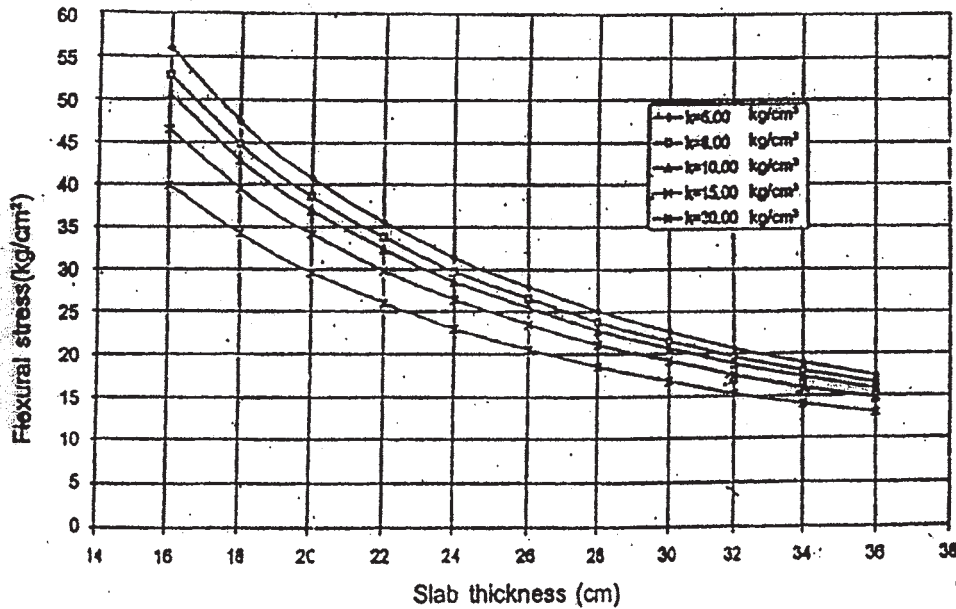
Contd..

Stresses in Rigid Pavement (Single Axle Load = 16 tons)



Contd..

Stresses in Rigid Pavement (Single Axle Load = 18 tons)

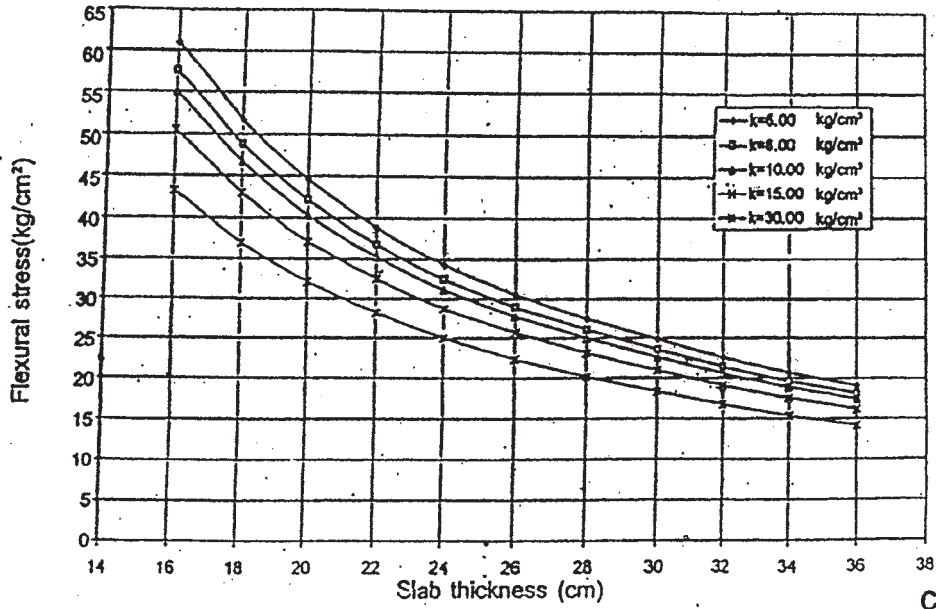


Contd..

Appendix-1 (Contd.)

IRC:58-2002

Stresses in Rigid Pavement (Single Axle Load = 20 tons)

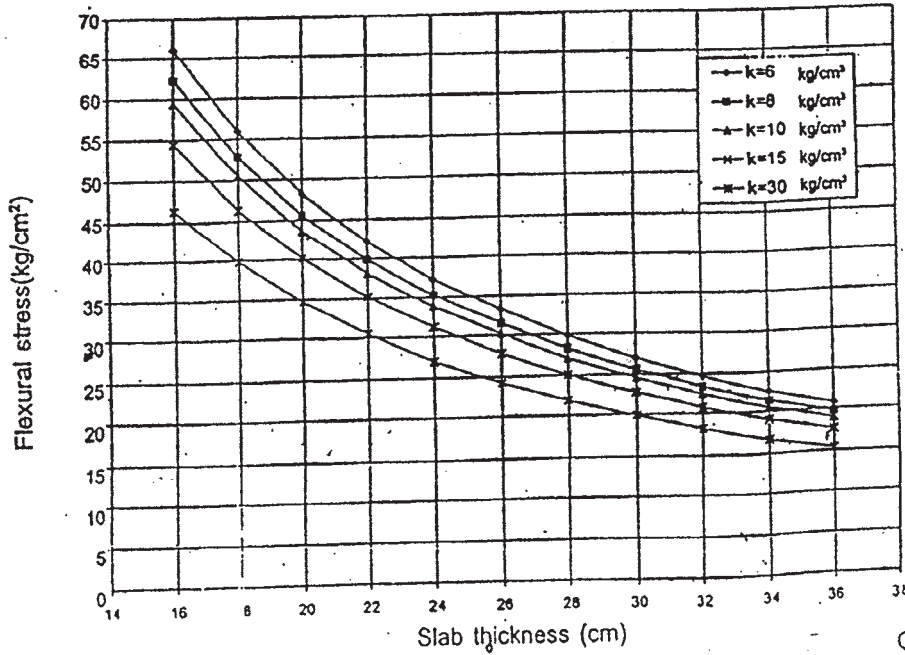


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Appendix-1 (Contd.)

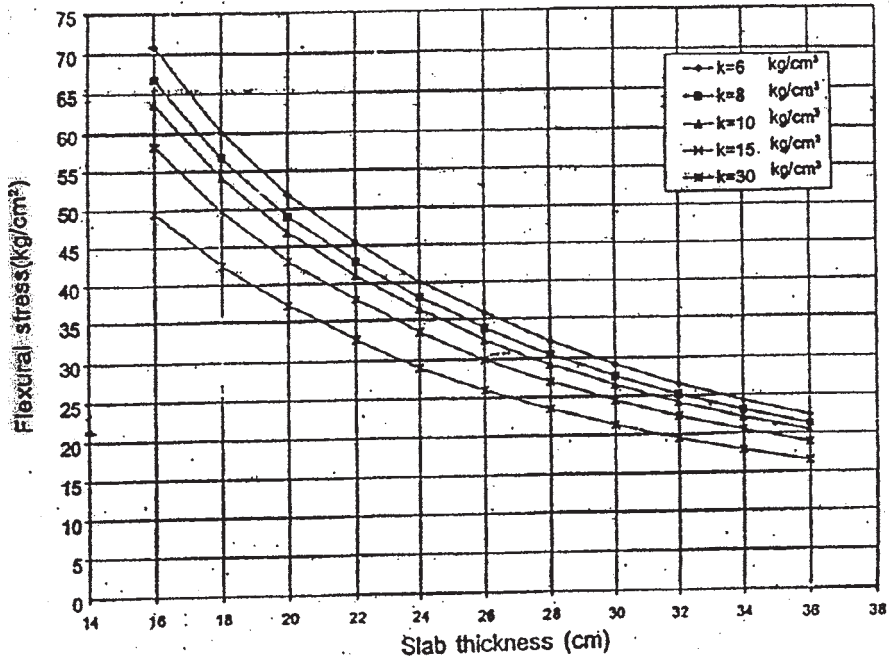
IRC:58-2002

Stresses in Rigid Pavement (Single Axle Load = 22 tons)



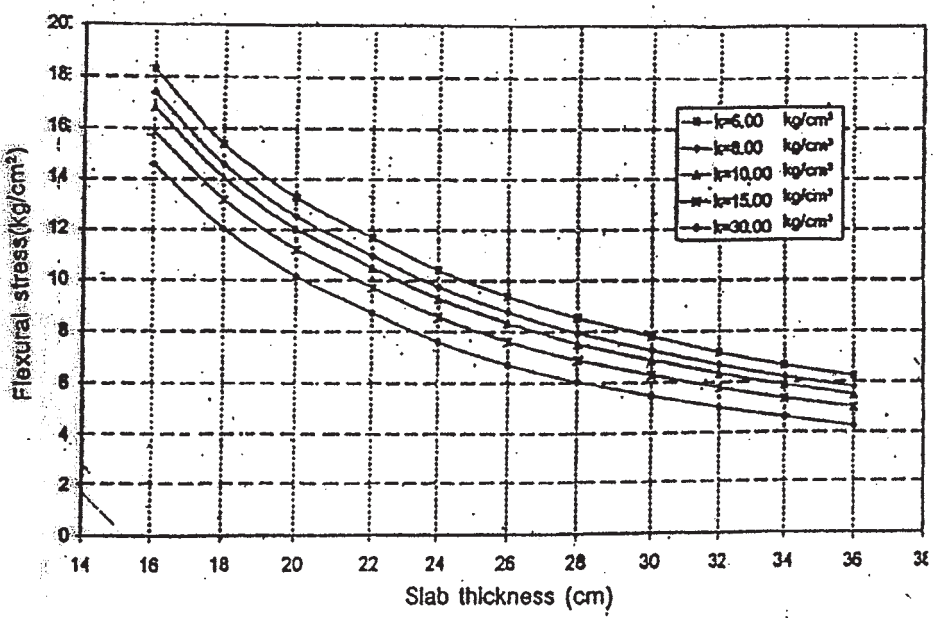
Contd..

Stresses in Rigid Pavement (Single Axle Load = 24 tons)



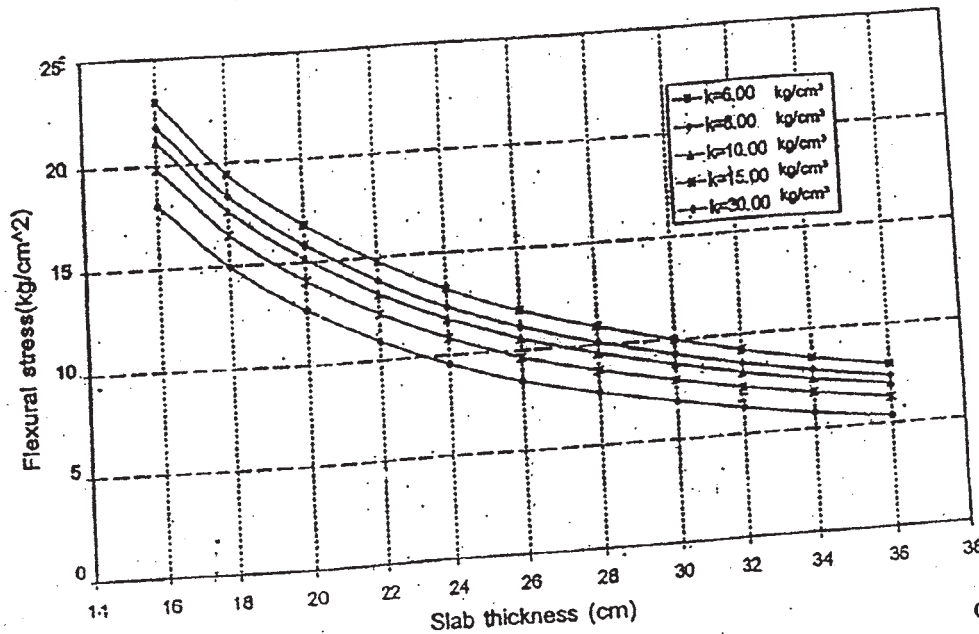
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Stresses in Rigid Pavement (Tandem Axle Load 12 tons)



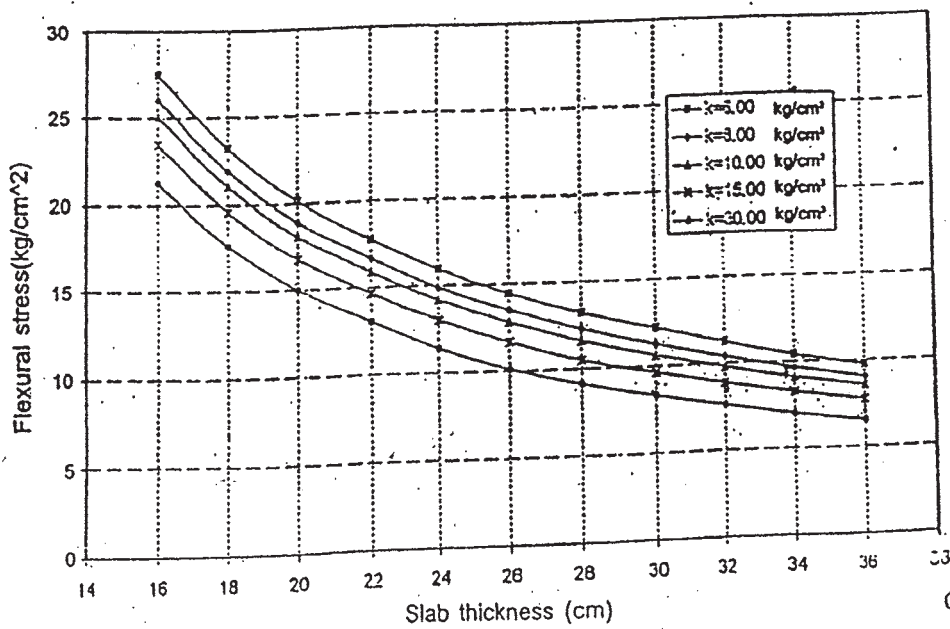
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Stresses in Rigid Pavement (Tandem Axle Load 16 tons)



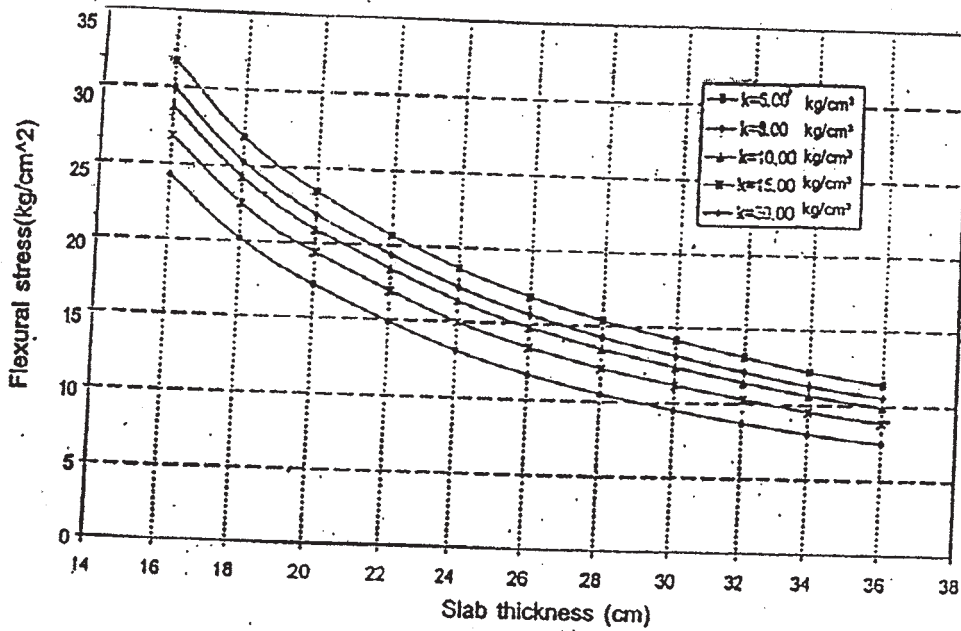
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Stresses in Rigid Pavement (Tandem Axle Load 20 tons)



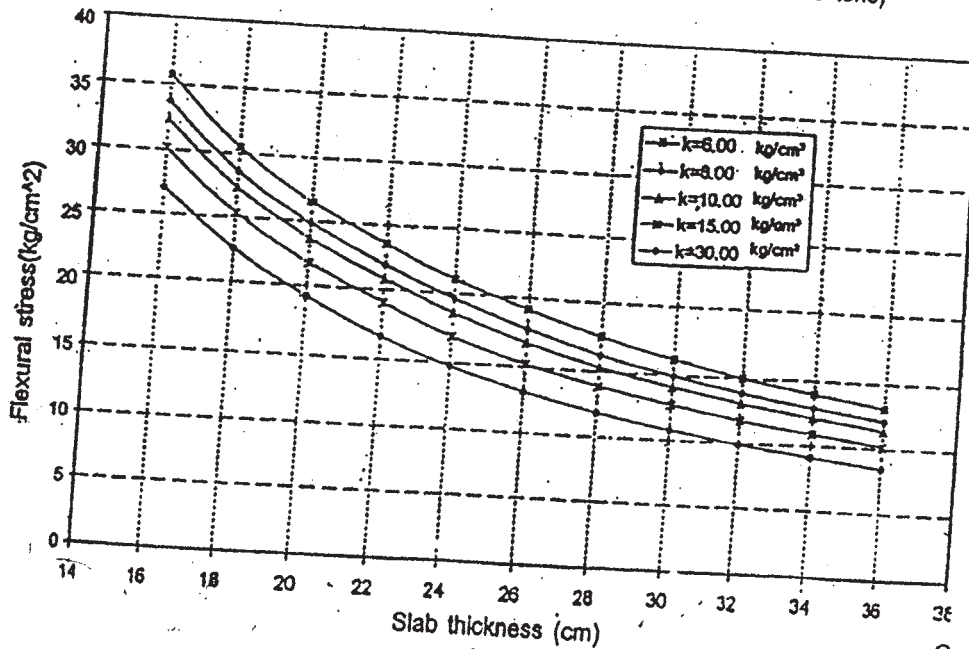
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Stresses in Rigid Pavement (Tandem Axle Load 24 tons)



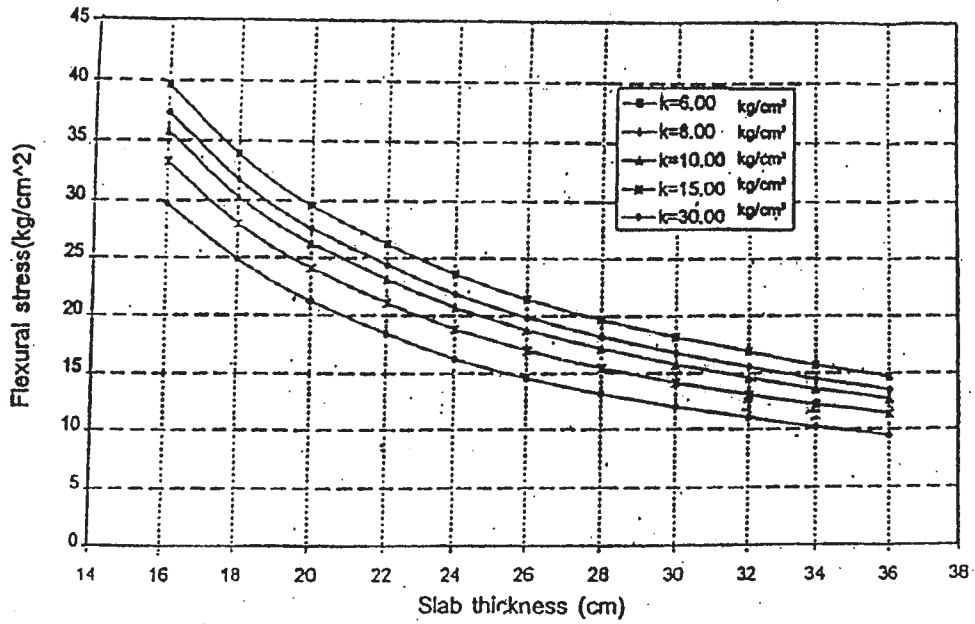
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Stresses in Rigid Pavement (Tandem Axle Load 28 tons)



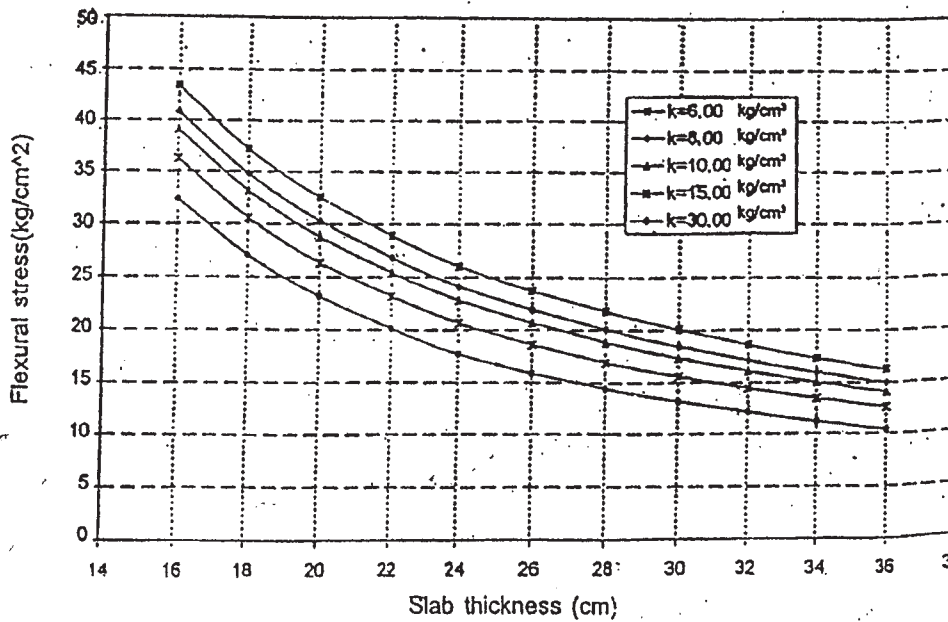
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Stresses in Rigid Pavement (Tandem Axle Load 32 tons)



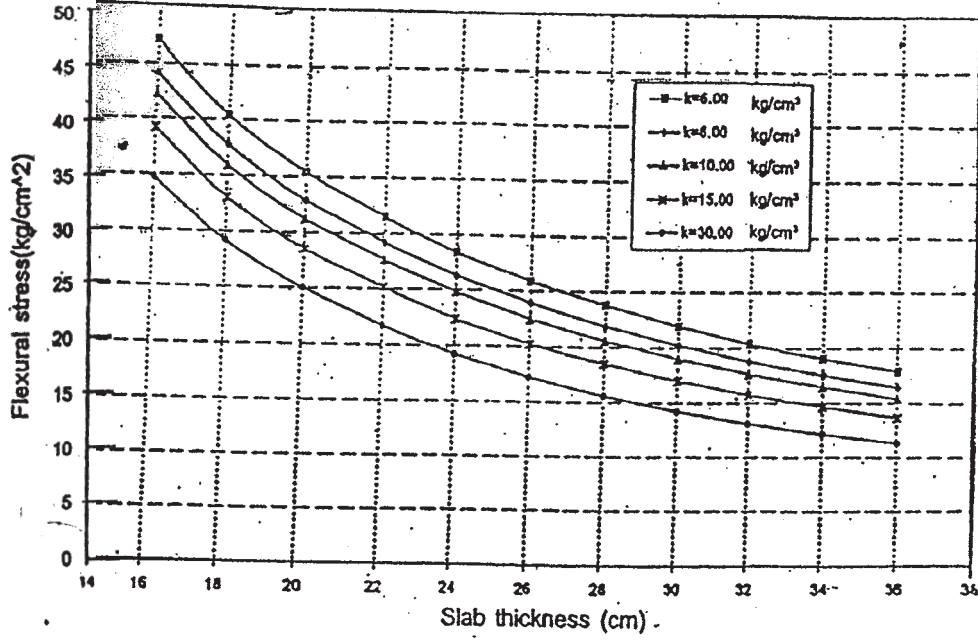
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Stresses in Rigid Pavement (Tandem Axle Load 36 tons)



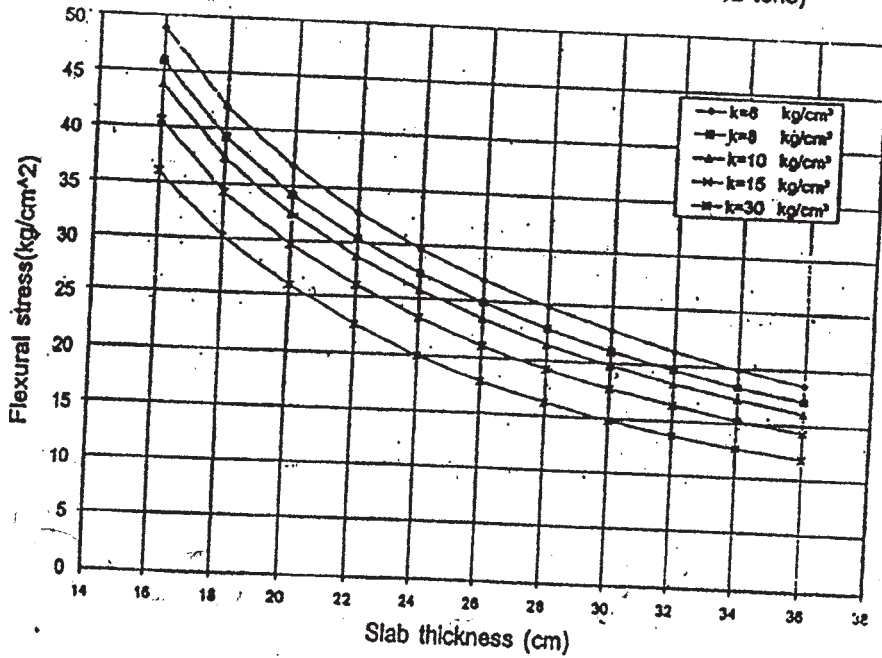
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 40 tons)



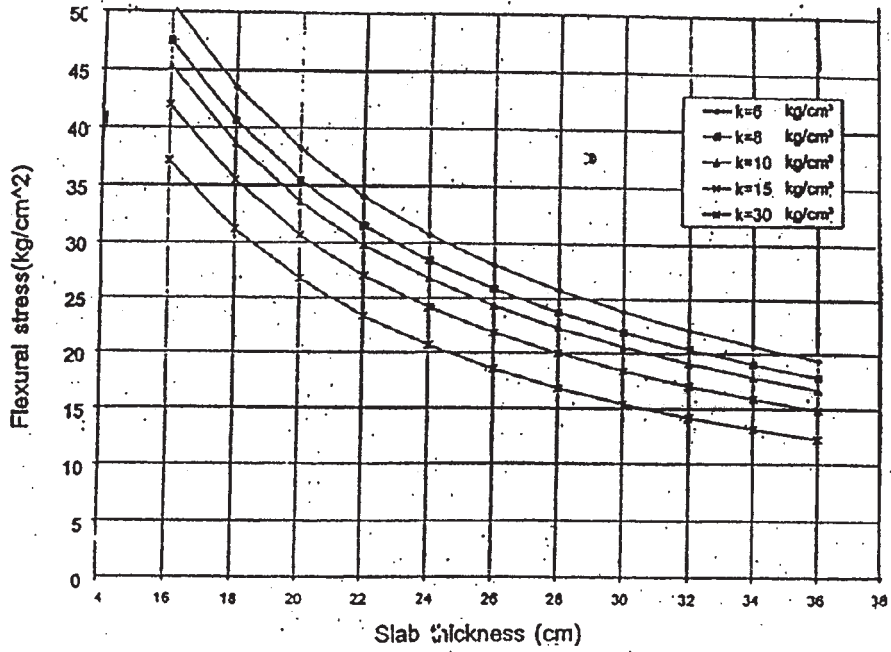
Contd..

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. :

P3444

[4959]-220

[Total No. of Pages : 5

B.E. (Computer)

b-OPERATIONS RESEARCH

(2008 Course) (Semester - II) (Elective - IV) (410451)

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) *Use of Non programmable Calculator is allowed.*
- 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) Derive constraint equation for the following problem. **[9]**

A paint company produces interior and exterior paints from two materials, M1 and M2. Following table gives basic data of the problem.

	Tons of Raw material per ton of		Maximum daily availability (tons)
	Exterior paint	Interior Paint	
Raw Material M1	6	4	24
Raw Material M2	1	2	6
Profit per ton (\$1000)	5	4	

A Market survey indicates that, the daily demand for interior paint can not exceed that of exterior paint by more than 1 ton & for interior paint 2 tons.

P.T.O.

- b) Solve the following LP problem using simplex method. [9]

$$\text{Maximize } z = x_1 + 2x_2 + x_3$$

Subject to constraints

$$2x_1 + x_2 - x_3 \leq 2$$

$$-2x_1 + x_2 - 5x_3 \geq -6$$

$$4x_1 + x_2 + x_3 \leq 6 \quad , \quad x_1, x_2, x_3 \geq 0$$

OR

- Q2) a) Solving following problem graphically

Maximize $Z = 3x_1 + 5x_2$ subject to constraints

$$x_1 + 2x_2 \leq 2000$$

$$x_1 + x_2 \leq 1500 \quad , \quad x_2 \leq 600 \text{ and } x_1, x_2 \geq 0 \quad [9]$$

- b) State and explain applications of linear programming from different Industries point of view. [9]

- Q3) a) Define probability. Explain with suitable examples [8]

- i) Addition law of probability
- ii) Conditional law of probability

- b) Consider the following pay - off matrix of game [8]

		Player 1		
		I	II	III
Player 2	I	1	7	2
	II	6	2	7
	III	5	1	6

Reduce matrix to 2×2 matrix & obtain the value of game.

OR

- Q4) a)** Give the proof of Baye's theorem. [8]
- b) Define following w.r.t. Game theory. [8]
- i) Characteristics
 - ii) Maxima - minima
 - iii) Saddle point
 - iv) Value of a game

- Q5) a)** Give a summary of various types of queueing models. [8]
- b) A software Tester finds that the time spent on debugging and fixing the error has an exponential distribution with mean 30 min per module. The arrival of modules is Poisson with an average of 10 modules per day of 8 hours. What is expected time per day?
- How many modules are there on average? [8]

OR

- Q6) a)** What is queueing system? Explain queueing systems transient state & steady state. [8]
- b) State and prove the arrival distribution theorem. [8]

SECTION - II

- Q7) a)** Describe following Terminologies with respect to job sequencing. [9]
- i) Processing order
 - ii) Idle time on machine
 - iii) Total Elapsed time
 - iv) No passing rule

- b) Describe following Terminologies with respect to PERT chart. [9]
- i) Total float
 - ii) Free float
 - iii) Independent float
 - iv) Dummy arrows in a network

OR

- Q8)** a) Explain the algorithm of finding critical path. [9]
- b) Solve following Job sequencing problem using Johnson's method to determine a sequence of 5 Jobs that will minimize the elapsed time T. Processing time as follows [9]

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

- Q9)** a) Explain general and canonical form of Non-Linear programming problem. [8]
- b) Define separable functions. Give one example of separable & non separable function. Explain separable programming problem. [8]

OR

- Q10)**a) Explain how to obtain normality & orthogonality conditions. [8]
- b) Explain Lagrangian method with respect to NLP. [8]

- Q11)a)** Explain Mathematical model of Bellman's principal. [8]
- b) Write a Note on Applications of dynamic programming. [8]

OR

- Q12)a)** Describe recursive nature of computations in dynamic programming. [8]
- b) Explain following concepts with respect to dynamic programming. [8]
- i) Principle of optimality
 - ii) State
 - iii) Stage

x x x

Total No. of Questions : 12]

SEAT No. :

P3445

[4959]-222

[Total No. of Pages : 3

**B.E. (Computer Engg)
d:INFORMATION SECURITY
(2008 Pattern) (Semester - II) (Elective - IV)**

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)** Enlist and explain different standards to information security. [6]
- b) What is cryptography? discuss different kinds cryptography in brief.[6]
- c) Which cryptography is called as classical cryptography?
- Explain any one classical cryptography in short. [6]

OR

- Q2) a)** What are professional issues of information security? Discuss it in brief. [6]
- b) Explain standard security architecture in detail. [6]
- c) What types of security are need for information in computer? Explain in short. [6]

- Q3) a)** What is IDEA? Explain the working principle of IDEA in the form of algorithm. [8]
- b) Explain RC5 encryption algorithm in details. [8]

OR

P.T.O.

- Q4)** a) Discuss different mechanisms of key distribution in detail. [8]
b) Explain block ciphering modes operations with suitable diagram. [8]

- Q5)** a) What is public key cryptography? Explain any one algorithm of public key cryptography. [8]
b) Write and explain the algorithm of ECC cryptography. [8]

OR

- Q6)** a) Differentiate Mac and Hash functions with suitable examples. [8]
b) What is PKI? Explain PKI with suitable examples. [8]

SECTION - II

- Q7)** a) Differentiate Mac and Hash functions with suitable examples. [6]
b) What is PKI? Explain PKI with suitable examples. [6]
c) What are the responsibilities of X.509 standard? [6]

OR

- Q8)** a) What is digital signature? Why is a need of it? Discuss any algorithm of digital signature. [6]
b) Explain working principles of HMAC? [6]
c) Compare all authentication functions with suitable parameters. [6]

- Q9)** a) Differentiate TLS and SSI with suitable parameters. [8]
b) What are the firewall-design principles? Discuss in short. [8]

OR

Q10)a) What is intrusion prevention? How can prevent network from intrusions. [8]

b) Differentiate Intrusion detection and intrusion prevention system. [8]

Q11)a) Discuss Electronic commerce security in detail. [8]

b) Explain PEm in details. [8]

OR

Q12)Write short notes of the following (Any Two) [16]

a) S/MIME

b) PGP

c) Web Security

x x x

Total No. of Questions : 8]

SEAT No. :

P4513

[Total No. of Pages : 3

[4959]-223
B.E. (Petrochemical)
REACTION ENGINEERING - II
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Attempt any three questions from each section.*
- 2) Answer 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) Carbon Monoxide reacts with Hydrogen to give Methanol over a copper catalyst. Derive two rate laws based on Langmuir-Hinshelwood mechanism assuming : **[16]**

- a) Monoxide adsorption is very slow and
- b) Surface reaction is limiting the overall rate.

Q2) A pilot plant CSTR, housing 1 Kg catalyst, yields following rate data. Feed concentration of A may be taken as 10 mol/m³. **[18]**

C_A mol/ m ³	1	2	3	6	9
v_o lit/ hr	5	20	65	133	540

Reaction is $A \rightarrow 2R + S$. Compare the catalyst inventory needed for 85% conversion for a throughput of 100 Nm³/hr feed stream having concentration of A as 3 mol/m³ assuming the reactor to be:

- a) Fixed Bed Reactor
- b) Fluidized Bed Reactor

P.T.O.

Q3) First order diffusion-free kinetics of a gas phase catalytic isomerization reaction is given as $-r_A = 0.82 C_A \text{ mol/m}^3 \text{ cat.s}$. Design fixed bed reactor needed to achieve 90% conversion of 65% pure A fed at the rate of 1000 K mol/hr assuming strong pore diffusion resistance. (Take catalyst pellet size as 12 mm and effective pore diffusivity to be $8 \times 10^{-6} \text{ m}^2/\text{m cat.s}$) [16]

Q4) Discuss in brief: [16]

- a) BET studies.
- b) Measurement of catalyst porosity.
- c) Design for exothermic reversible reactions.
- d) Promoters and inhibitors.

SECTION - II

Q5) Sketch interface concentration profiles obtained in gas-liquid absorption accompanied with reaction. Based on upon relative rate of reaction vis-à-vis rate of mass transfer, derive overall rate expression to be used in tower design for any two cases. [16]

Q6) An acidic impurity A in a gaseous stream is to be removed so as to reduce its partial pressure from 855 Pa to 100 Pa (total pressure is 250 KPa) 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 $0.012 \text{ mol/hr. m}^3 \text{ Pa}$. Gas side resistance to mass transport in absence of the reaction is 40% whereas the liquid film contributes the remaining resistance. Henry's constant is $135 \text{ Pa.m}^3/\text{mol}$. L/G ratio is 5 Kmol/Kmol. 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) Discuss shrinking core model as applied to a gas-solid reaction where ash is deposited on solid as product of the reaction. [10]
- b) Spherical particle of zinc sulfide with initial diameter of 2 cm is subjected to roasting in presence of air. Roasting reaction yields SO_2 as also the layer of ZnO. Molar density of solid may be assumed to be 0.07 mol/cm^3 . Diffusivity of gas through the product layer is $0.05 \text{ cm}^2/\text{s}$. Calculate the time required for 85% conversion of the particle. [6]
- Q8)** a) Discuss key engineering features of the reactors employed in catalytic cracking and steam reforming. [8]
- b) Discuss kinetic lumping used in FCC reactions. [8]



Total No. of Questions :12]

SEAT No. :

P3953

[4959]-224

[Total No. of Pages :4

B.E. (Petrochemical)
PROCESS DYNAMICS AND CONTROL
(2008 Course) (Semester - I)

Time : 3 Hours

[Max. Marks :100]

Instructions to candidates:

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Answers to the two sections should be written in separate books*
- 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) Discuss the objectives of process control. **[4]**
- b) Explain with the help of a block diagram the working of a closed loop feedback system with all its elements. **[8]**
- c) What do you mean by control valve characteristics? Explain its significance with respect to process control. **[4]**

OR

- Q2)** a) A thermometer having first order dynamics is placed in a temperature bath of 45°C. After the thermometer reaches the equilibrium with the bath. The bath temperature is subjected to sinusoidal forcing function about its average temperature of 45°C with amplitude of 50°C if the period of oscillation is 30 sec/cycle and the time constant of the thermometer is 10 second. Determine the following: **[8]**
- i) Maximum and minimum temperature indicated by the thermometer.
 - ii) Amplitude ratio.
 - iii) Phase lag.
- b) Explain the hierarchy of process control activities and discuss in detail the time scales involved in each activity. **[8]**

P.T.O.

Q3) a) The transfer function of a process measuring element and the control valve are given by $G_p(s) = \left(\frac{3}{3s+1} \right)$, $H(s) = \left(\frac{1}{6s+1} \right)$

$G_V(s) = \left(\frac{1}{s+1} \right)$ respectively. A proportional controller with a sensitivity $K_c=3$ is used. Obtain the closed loop transfer function for a servo problem. Draw the block diagram showing all the transfer functions. **[8]**

b) With the help of a neat sketch obtain the transfer function for N-identical non-interacting system in series. Compare the dynamic response of a non interacting and interacting system. **[8]**

OR

Q4) a) The overall transfer function of the control system is given as

$G(s) = \left(\frac{16}{1.5s^2 + 2.4s + 6} \right)$ A step change of magnitude 6 is introduced into the system. Determine. **[10]**

- i) Overshoot .
- ii) Period of oscillation.
- iii) Natural period of oscillation.
- iv) Rise time.
- v) Ultimate value of response and.
- vi) Maximum values of response.

b) Derive the transfer function of a transportation lag parameter. Give the effects of transportation lag on process control. **[6]**

Q5) a) Derive the transfer function of a PID controller. A unit step change is given in the error signal to a PI controller. If the controller gain is 4, the integral time is 2 min. Obtain the response of the PI controller. **[8]**

- b) Explain with neat sketch the effect of Proportional control action on a closed loop system response. Derive that the offset is the characteristics of proportional controller for a servo mechanism control problem following a step change. [10]

OR

- Q6)** a) Explain the following. [8]
- i) Proportional band.
 - ii) Limit cycle.
 - iii) Controller tuning.
 - iv) Integral wind up.
- b) Discuss the factors affecting the selection of the Air-to-Close or Air-to-open pneumatic control valve. [4]
- c) A pneumatic controller is used to control temperature range of 0-100°C for the output change from 30 to 90 K/m² as the temperature change from 90 to 105°C. Calculate the proportional band sensitivity of the controller. [6]

SECTION- II

- Q7)** Write a Short note on the following. [18]
- a) Routh Test for stability.
 - b) Root Locus diagram.
 - c) Bode Diagram.
 - d) Gain margin and Phase margin.

OR

- Q8)** a) Explain the role of frequency response analysis in the design of the control system. Derive the expression for Amplitude ratio and phase lag as a frequency response of a first order system. [9]
- b) Derive the amplitude ratio and phase angle for the proportional derivative control. Draw the Bode diagram for the PD controller. [9]

Q9) a) Write a Short note with the help of block diagram on any two of the following. [12]

i) Cascade Control of a Shell and tube heat exchanger.

ii) Inferential Control strategy.

iii) Ratio Control.

iv) Adaptive control.

b) Discuss advantages and disadvantages of feedback and feed forward control systems. [4]

OR

Q10)a) Explain significance of degrees of freedom analysis in design of a control system. [5]

b) Discuss the need of Advanced process control strategies for process industry. [5]

c) Write a short note on Model Predictive Control. [6]

Q11)What do you mean by SCADA? With respect SCADA discuss the following: [16]

a) Control components of SCADA.

b) Network communication Components of SCADA.

c) Configuration of SCADA.

OR

Q12)a) What is DCS control system? Discuss in detail the comparison between SCADA and DCS. [8]

b) What is PLC? Explain its various components. What do you mean by Ladder diagram? Illustrate. [8]



Total No. of Questions : 12]

SEAT No. :

P3511

[4959]-225

[Total No. of Pages : 3

**B.E. (Petrochemical Engineering)
ENVIRONMENTAL ENGINEERING
(2008 Pattern) (Semester - I)**

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 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 is Ozone Layer depletion? What is effect of ozone layer depletion on global warming? [6]
- b) Discuss in detail about major precautions to be taken to handle and treat Biomedical waste. [6]
- c) Describe the structural and functional components of Ecosystem. [6]

OR

- Q2)** a) State the effects resulting due to ozone layer depletion. [9]
- b) How the project is decided for CDM? What are its criteria? What are examples of projects in CDM? [9]

- Q3)** a) Hot gases from a foundry operation are sent to a fibre filter made of glass wool fibres of 10 microns diameter. The thickness of fibre material is 2 mm. The gases containing particles of an average size of 1 micron, flow through the fiber material at a velocity of 0.6 m/s. Find the grade efficiency of the fiber material if the void fraction of latter is 0.96. [12]

Density of gases = 0.0011 g/cm³

Viscosity of gases = 0.02 Cp

Diffusivity of 1 micron particles = 2.7×10^{-7} Cm²/s

P.T.O.

- b) With the help of flow diagram, explain working of scrubber for SO₂ removal. [4]

OR

- Q4)** a) Discuss at least three basic mechanisms with principle, working, advantages and disadvantages for removing particulate matter from gas streams. [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 Behaviors' with the conditions required for formation of these plumes and impact created on surrounding. [8]
- b) Which are the different air pollutants? [8]

OR

- Q6)** Write a short note on following: [16]
- a) CDM.
- b) Kyoto Protocol.
- c) Carbon credits.
- d) COD/BOD ratio.
- e) Green House effect.
- f) Temperature lapse rates & stability.

SECTION - II

- Q7)** a) State water pollution control laws/ standards for discharge to sea water. [8]
- b) Discuss the role of MPCB & CPCB. [8]

OR

- Q8)** a) Discuss the various operations for generation of wastewater in any process plant. [8]
- b) Name at least 4 physical and chemical waste water characteristics & their significance. [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) Elaborate on difference between suspended growth and attached growth process. [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 'Trickling Filter' process with neat sketch. [9]

OR

Q12) Write Short note on following. (Any four) [18]

- a) Role of adsorption in advanced waste water treatment.
- b) Biochemical Oxygen Demand.
- c) Sludge treatment & disposal.
- d) Trickling filter.
- e) Sludge volume index (with formula).

× × ×

Total No. of Questions :8]

SEAT No. :

P3446

[4959]-227

[Total No. of Pages :3

B.E. (Petrochemical)

b : NOVEL SEPARATION PROCESSES

(2008 Course) (Semester - I) (Elective - I) (412404)

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 side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

Q1) Attempt the following:

[18]

- a) Explain the process principles involved in adsorptive bubble separation techniques.
- b) Write a note on: Energy Requirement for Separation Processes.
- c) Explain in brief the selection criteria for chemical engineering separation processes.

Q2) Classify the models for gas separation by membranes. Develop Cross current model for membrane separation processes. State the assumption made. Discuss the solution strategy for different cases. **[18]**

Q3) a) A liquid containing dilute solute A at a concentration 3×10^{-2} kgmol/m³ is flowing rapidly by a membrane of thickness, 3×10^{-5} m. the solute diffuses through the membrane and its concentration on the other side is 0.50×10^{-2} kgmol/m³. The mass transfer coefficient k_{c1} is large and can be considered as infinite and $k_{c2} = 2.45 \times 10^{-5}$ m/s.

Data: Distribution coefficient $K' = 1.25$ and

Diffusivity, $D_{AB} = 5 \times 10^{-11}$ m²/sec in the membrane.

[8]

P.T.O.

- i) Derive the equation to calculate the steady state flux, N_A and make a sketch.
 - ii) Calculate the flux and concentration at the membrane interfaces.
- b) Discuss in brief different types of membrane modules with neat sketches by giving industrial applications. [8]

Q4) Write short notes: [16]

- a) Classification of Membrane Separation Processes.
- b) Diffusion type model for Reverse osmosis.
- c) Micro emulsions and Macro emulsions.

SECTION-II

- Q5)** a) Discuss in brief the process principles involved in Pressure Swing Adsorption (PSA) and Temperature Swing Adsorption (TSA) with industrial application. [10]
- b) Discuss in brief Breakthrough concentration curve with its salient features. [8]

Q6) Activated carbon is used to adsorb ethanol vapor from an airstreams. The laboratory experiment to investigate this has a bed 4 cm in diameter and 14 cm high. Exit data for an input of 0.754 liter/second are as follows: [18]

Time (hours)	0	3	3.5	4	4.5	5	5.5	6.0	6.2	6.5	6.8
C/C_0	0	0	0.002	0.030	0.155	0.396	0.658	0.903	0.946	0.978	0.993

Do as follows:

- a) Determine breakthrough time if break point is $C/C_0 = 0.05$.
- b) Calculate the height of a new column of the same diameter that has breakthrough at 8.5 hours.
- c) Calculate the diameter of this new column if it is to process 3 liter/min.

Q7) a) Define the following terms in connection with chromatographic separations and give appropriate equations: **[10]**

i) Partition coefficient (K)

ii) Retention Volume (V_R)

iii) Retention Ratio (R)

iv) Capacity factor (k)

v) HETP

b) The retention ratio in chromatography is defined as: **[6]**

$$R = t_M / t_R = \frac{\text{time for solvent to pass through the column}}{\text{time for solvent to pass through the column}}$$

Show that R is related to the capacity factor, given by equation:
 $R = 1/K + 1$.

Q8) Write short notes on: **[16]**

a) Reactive Distillation.

b) Reverse Micelle Extraction.

c) Zone Melting.

EEE

Total No. of Questions :12]

SEAT No. :

P3447

[4959]-228

[Total No. of Pages :3

B.E. (Petrochemical)

**ELEMENTS OF FLUIDIZATION ENGINEERING
(2008 Course) (Semester - I) (Elective - I) (412404 C)**

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 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) With help of suitable examples explain the benefit of fluidization compared to other processes. [8]
- b) Explain an experimental procedure of measuring minimum fluidization velocity. What is the significance of minimum fluidization velocity. [8]

OR

- Q2)** a) With help of neat sketches explain various regimes of fluidized bed. Explain their applications as well. [8]
- b) Obtain the force balance equation for a fluidized bed unit. [8]
- Q3)** a) Name four different distributors of fluidized bed and discuss their relative advantage and disadvantages. [8]
- b) What is Geldart's classification of particles and discuss its important characteristics and significances. [8]

OR

P.T.O.

Q4) a) Calculate the minimum fluidization velocity u_{mf} for a bed of crushed anthracite coal fluidized by gas. [10]

$$\rho_s = 1.7 \text{ gm/cm}^3, \rho_g = 1.22 \times 10^{-3} \text{ gm/cm}^3, d_p = 80 \text{ }\mu\text{m}, \phi_s = 0.7, \epsilon_{mf} = 0.52, \mu_g = 1.8 \times 10^{-4} \text{ gm/cm.s } L_{mf} / d_t = 3.8.$$

Obtain the mathematical expression of fluidization velocity based on first principles model.

b) Write a short note on the damages caused on the distributors used for fluidization. How can it be reduced. [6]

Q5) a) With help of neat sketch explain how the hydrodynamic behavior of fluidized bed can be mapped using radioactive tracing techniques. [9]

b) With help of neat diagram explain the hydrodynamic of a fluidized bed. [9]

OR

Q6) a) Discuss the effect of pressure and temperature on fluidized bed with help of representative examples. [9]

b) Discuss the difficulties in measurement of multiphase flow. In this context highlight the ideal characteristics of multiphase flow meter. [9]

SECTION-II

Q7) a) With help of neat diagram explain the operation of a fluidized bed boiler. Highlight the challenges of the technology. [9]

b) Explain the similarities between fluidized bed and a bubble column. [9]

OR

Q8) a) With help of suitable diagram explain the means by which difficult to fluidize particles can be fluidized in better manner. [9]

b) How can fluidized bed heat transfer be used commercially - Explain with help of suitable examples. [9]

Q9) a) Provide a comparative account of different models available for Fluidized bed reactors. [8]

b) With help of suitable diagrams discuss flow of gas through bubbles for slow moving and fast moving bubbles. [8]

OR

Q10)a) With help of important assumptions derive Kunii-Levenspiel model for the bubbling fluidized bed. [10]

b) Write a short note on Davidson's Bubble Cap. [6]

Q11)a) How can fluidized bed be used for power industries - explain the operation and the key characteristics. [8]

b) Fluidized bed is a suitable alternative for Polyethylene Manufacture elaborate the statement with help of technicalities and a schematic diagram. [8]

OR

Q12) Write short notes on (any three): [16]

a) Attrition in fluidized bed.

b) FCC Reactor Technology.

c) Biomass combustion in fluidized bed.

d) Scale up of Fluidized Bed Reactor.

EEE

Total No. of Questions : 8]

SEAT No. :

P4524

[Total No. of Pages : 2

[4959]-229

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 supercritical state of matter and applications of super critical carbon dioxide.
b) Discuss the concepts of environmental management systems as stipulated in ISO 14001

[16]

- Q2)** Explain the steps involved in biomass conversion in to bulk chemical intermediates.

[16]

- Q3)** Explain in detail the twelve principles of green chemistry.

[16]

- Q4)** a) Explain the concept of atom economy and discuss its significance in gauging 'greenness' of a process.
b) Write a note on potential of photochemical route of synthesis as green synthesis.

[18]

P.T.O.

SECTION - II

- Q5)** a) Compare green synthesis of a known chemical with the traditional route.
b) Discuss principles of electro-organic synthesis.

[16]

- Q6)** a) Discuss green process for manufacturing lactic acid.
b) Write a note on microreactors for process intensification

[16]

- Q7)** a) Discuss how green chemistry approach takes care of process safety.
b) Discuss possible green methods for preparation of aniline and the bottlenecks in their commercialization.

[16]

- Q8)** Write notes on :

[18]

- a) Solar energy potential of India -
b) Carbon capture technologies



Total No. of Questions : 12]

SEAT No. :

P4525

[Total No. of Pages : 2

[4959]-230

B.E. (Petrochemical Engineering)

OPTIMIZATION TECHNIQUES FOR PROCESS INDUSTRIES

(Elective - 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 f necessary*

SECTION - I

Q1) An Urea manufacturing unit wants to undergo process optimization in the plant. Considering the unit operations and processes involved, decide an optimization strategy for the same [16]

OR

Q2) Heat losses from steam pipe are to be reduced. Discuss various strategies of optimization with their merits and demerits for reducing heat losses. [16]

Q3) Note the steps involved in simplex method as a numerical optimization method.[16]

OR

Q4) Explain the solution approach for single variable optimization scenarios using bracketing method. [16]

Q5) Illustrate the Unconstrained NLP with the concept of local minimum and saddle point. [18]

OR

Q6) With design diagrams, explain the Golden search method for multivariable optimization. [18]

P.T.O.

SECTION - II

Q7) Optimize the following system of equations by the Gauss-Seidel method:[16]

$$10x_1 + x_2 + x_3 = 12$$

$$2x_1 + 10x_2 + x_3 = 13$$

$$2x_1 + 2x_2 + 10x_3 = 14$$

Compute the answers correct to four decimal places.

OR

Q8) Transform the following linear program into standard form: [16]

$$\text{Minimize: } f = x_1 + x_2$$

$$\text{Subject to : } 2x_1 + 3x_2 \leq 6$$

$$x_1 + 7x_2 \geq 4$$

$$x_1 + x_2 = 3$$

$$x_1 \geq 0, x_2 \text{ unconstrained in sign}$$

Q9) Explain various Multiobjective Optimization Problems and methods to solve them. [16]

OR

Q10) Discuss the implications of uncertainty in Linear Programming Optimization models. [16]

Q11) A coconut shell fired furnace has to be optimized for heat recovery. With schematic diagram, explain optimization strategy. [18]

OR

Q12) In a refinery, Plant Scheduling and Optimization for petroleum products is to be implemented. Draw the flowchart and explain the steps involved in detail. [18]



Total No. of Questions :12]

SEAT No. :

P3954

[Total No. of Pages :4

[4959] - 232

B. E. (Petrochemical Engineering)

NATURAL GAS TECHNOLOGY

(2008 Course) (Elective - II) (Semester - I) (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) Discuss the outlook for world gas production. **[8]**

b) Describe origin of natural gas. **[8]**

OR

Q2) a) Explain in detail thermal gas reservoir. **[8]**

b) Discuss unconventional reservoirs. **[8]**

Q3) a) Explain in detail method for measuring interfacial tension. **[8]**

b) Explain in detail analysis of composition of natural gas. **[6]**

c) Discuss measurements taken during sampling. **[4]**

OR

P.T.O.

- Q4)** a) Discuss dry gas, wet gas and associated gas. [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]

Data:

Mi	Pci	Tci	μ_{gi}
16.043	667.8	343.1	0.0110
30.070	707.8	549.8	0.0092
44.097	616.3	665.7	0.0082

- c) Discuss compressibility of natural gas. [4]
- Q5)** a) Explain in detail predicting hydrate formation by equilibria chart method. [6]
- b) Explain in detail phase diagram for hydrate formation. [6]
- c) Write a short note hydrate inhibitors. [4]

OR

- Q6)** a) Discuss modeling and kinetics of hydrate formation based on semi empirical correlation. [6]
- b) Elaborate on hydrate structures. [6]
- c) Write a short note on Nucleation. [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) Explain with flow sheet acid gas removal by selexol process. [8]
b) Describe with flow sheet acid gas removal by potassium carbonate process. [8]

- Q9)** a) Explain with flow sheet natural gas liquefaction using TEALARC process with two pressure level. [6]
b) Discuss safety precautions for natural gas pipeline. [6]
c) Discuss LNG carriers with Technigaz integrated tank. [6]

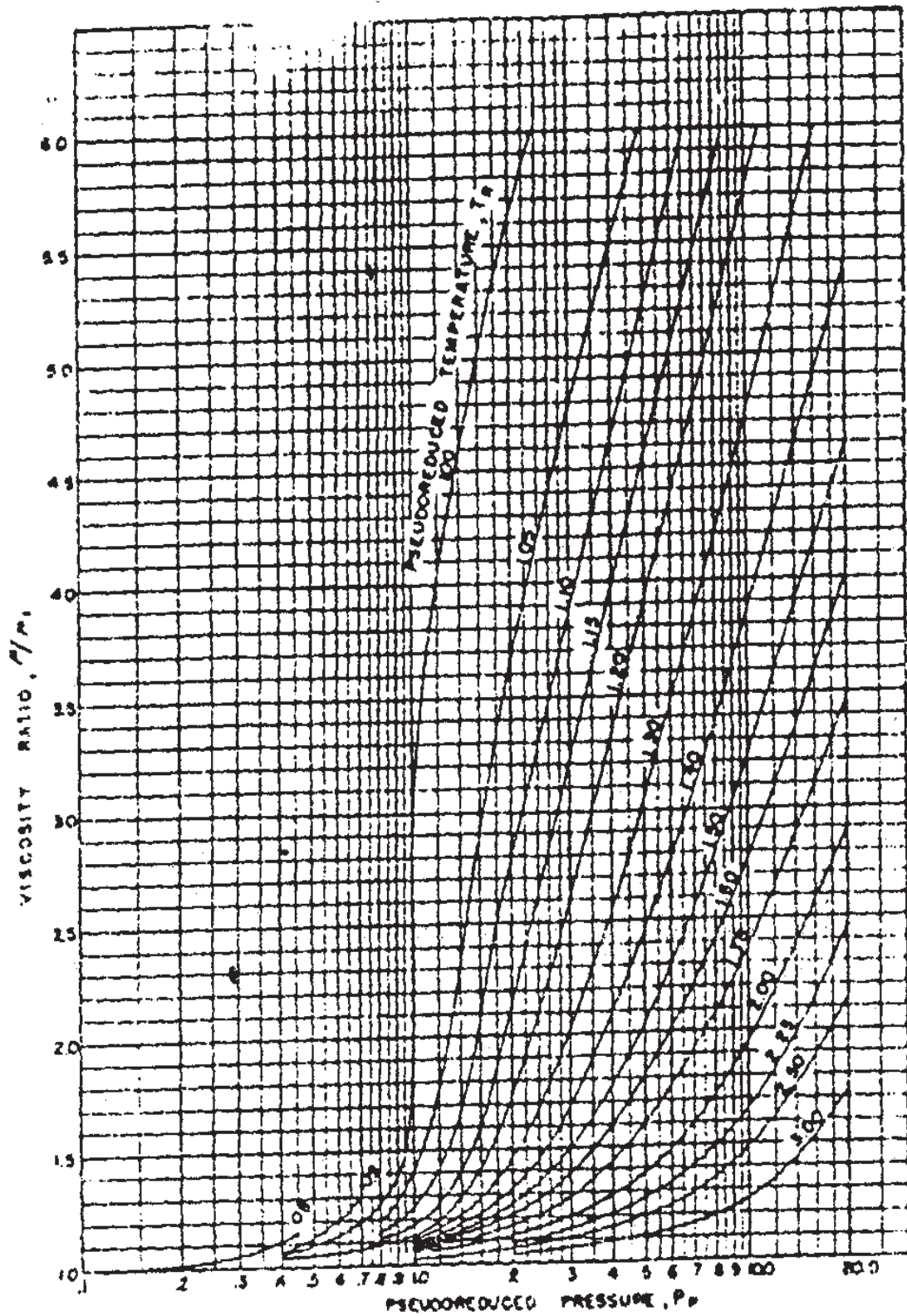
OR

- Q10)**a) Explain in detail construction and working reciprocating compressor. [6]
b) Describe in detail different gas chains. [6]
c) Write a short note on LNG carriers. [6]

- Q11)**a) Explain in detail cryogenic storage and underground storage for natural gas. [8]
b) Describe with flow sheet Fisher-Tropsch synthesis process in moving bed reactors. [8]

OR

- Q12)**a) Describe with flow sheet routes for the chemical conversion of methane. [8]
b) Write a short note on [8]
i) Production of gasoline from methanol.
ii) Thermal coupling process.



Figures 4.b Viscosity ratio versus pseudoreduced pressure.



Total No. of Questions : 8]

SEAT No. :

P4526

[Total No. of Pages : 5

[4959]-234

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) *Answer 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) Distillation column with total condenser has a top product composition given as 30 Mol% n-butane, 40 Mol% n-pentane, and 30 Mol% n-hexane. Cooling water is the cold utility employed. Plant air has reported DBT 40 C and WBT as 20 C. Estimate the pressure at which we should operate the column. Assuming an appropriate value of overall heat transfer coefficient, estimate the heat transfer area required in the condenser for the given duty. Assume distillate rate as 1000 Kmol/h and reflux ratio as 3. [18]

Q2) Calculate number of actual trays required for separation of ethylene from ethane. Feed is 20% vaporized liquid having 50% ethylene and 50% ethane by weight. The column operates at 7 bar pressure. Purities of both ethylene and ethane streams should be 99%. Also report the approximate height of the tower based on your calculations. State your assumptions clearly. [16]

- Q3)** a) Discuss Packie Charts from operations view point. [6]
b) Explain overflash. [3]
c) Explain energy integration in distillation section of a crude refinery. [7]

P.T.O.

- Q4)** a) Discuss how weeping or flooding condition of the column can be gauged with help of some crucial operating parameters. [8]
- b) Discuss in detail internals used in distillation column. [8]

SECTION - II

- Q5)** a) State the steps used in the rating of a shell and tube heat exchanger. [8]
- b) Describe NTU-HTU method of designing heat exchanger. [4]
- c) Discuss types of tube pitches used in heat exchanger. [4]
- Q6)** a) Discuss steps involved in designing of a furnace in refinery. [8]
- b) Discuss two important refinery units which make use of furnace. [8]
- Q7)** With reference to centrifugal pump operation and design, discuss the following: [18]
- a) Power calculation
- b) NPSHR
- c) Energy conservation
- Q8)** Discuss
- a) Surge and Anti-surge in Compressor operation [5]
- b) Compressor power rating calculation [5]
- c) Selection of compressor type [6]

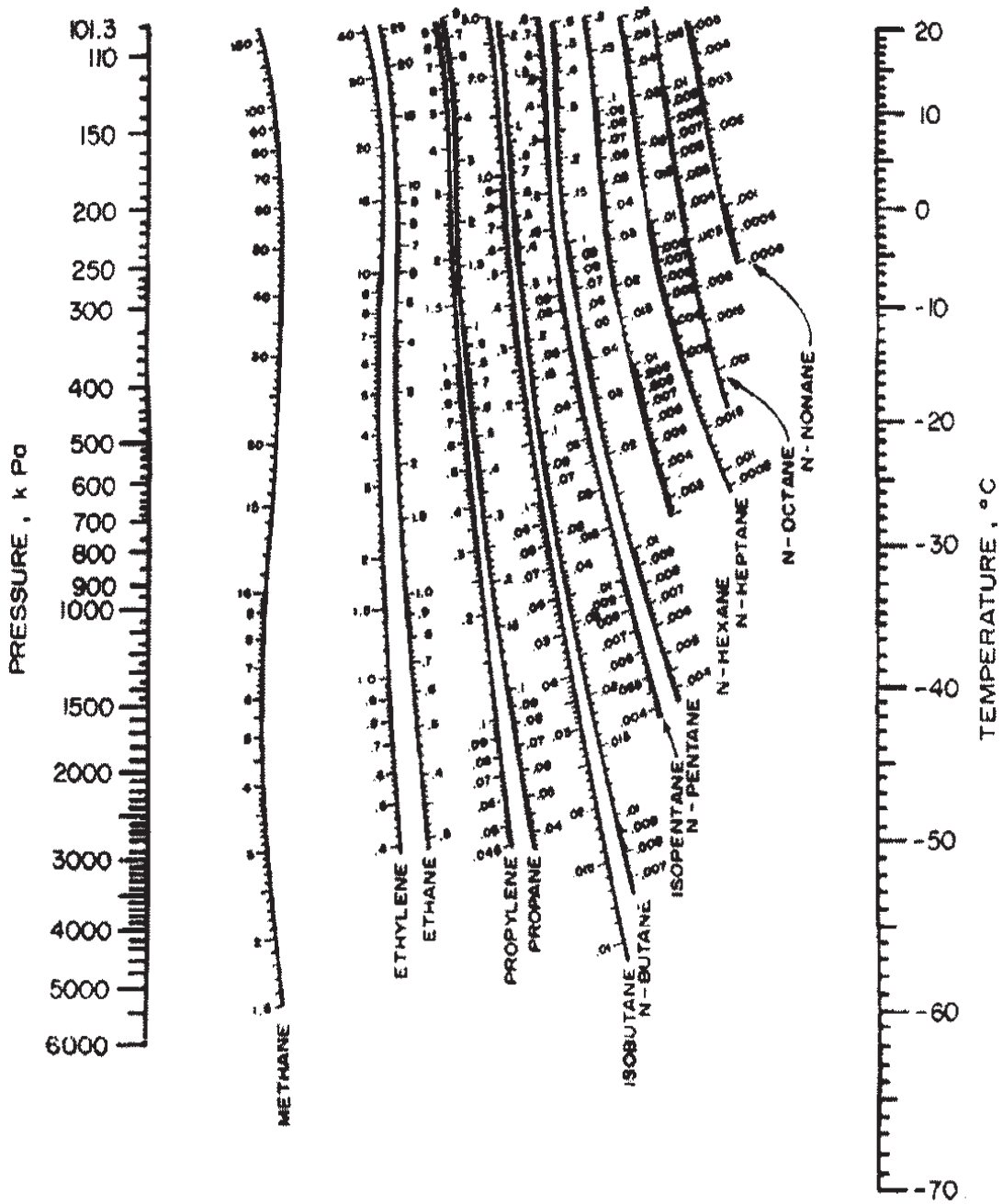


FIG 1: K-Chart for low temperature range

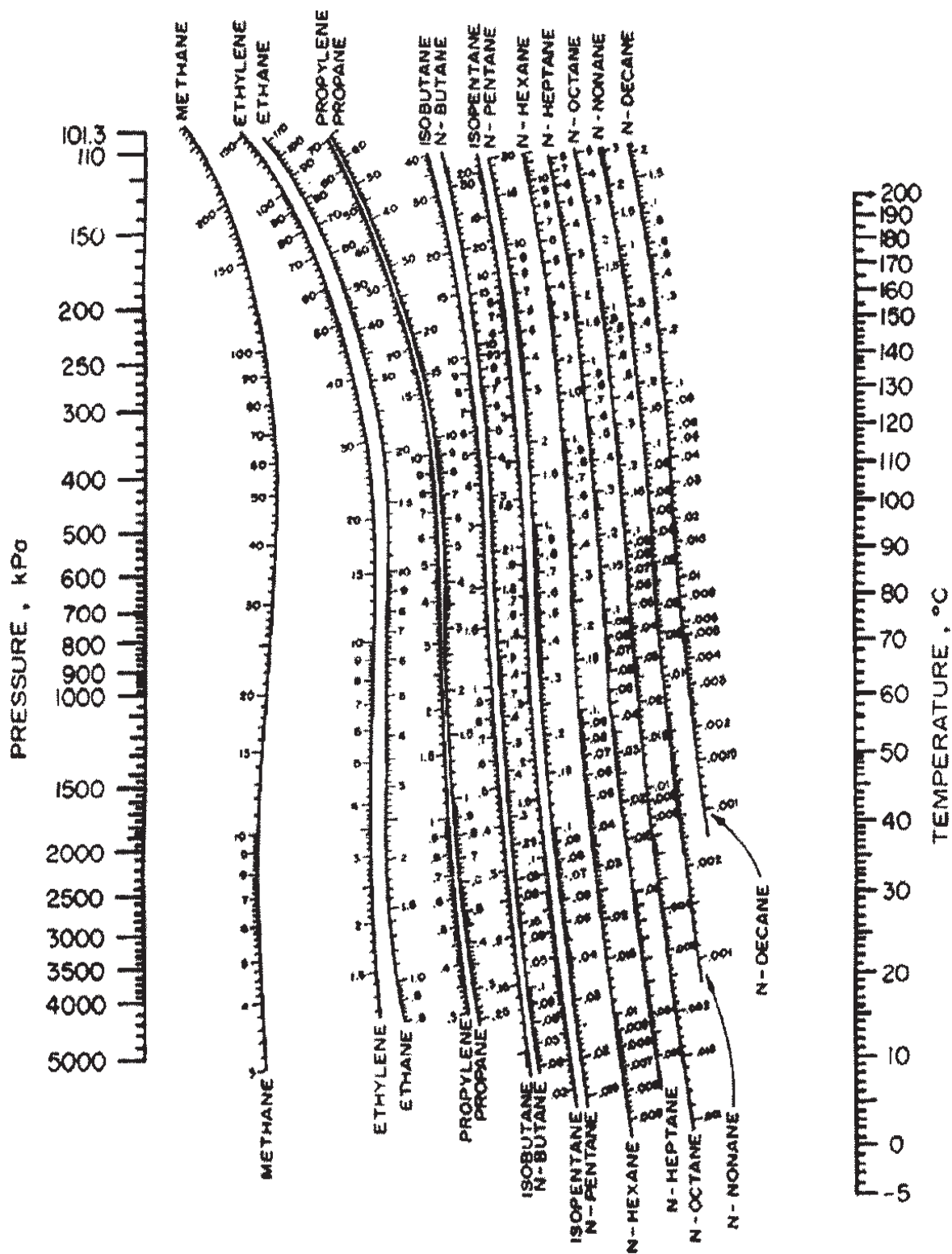


FIG 2: K-Chart for high temperature range

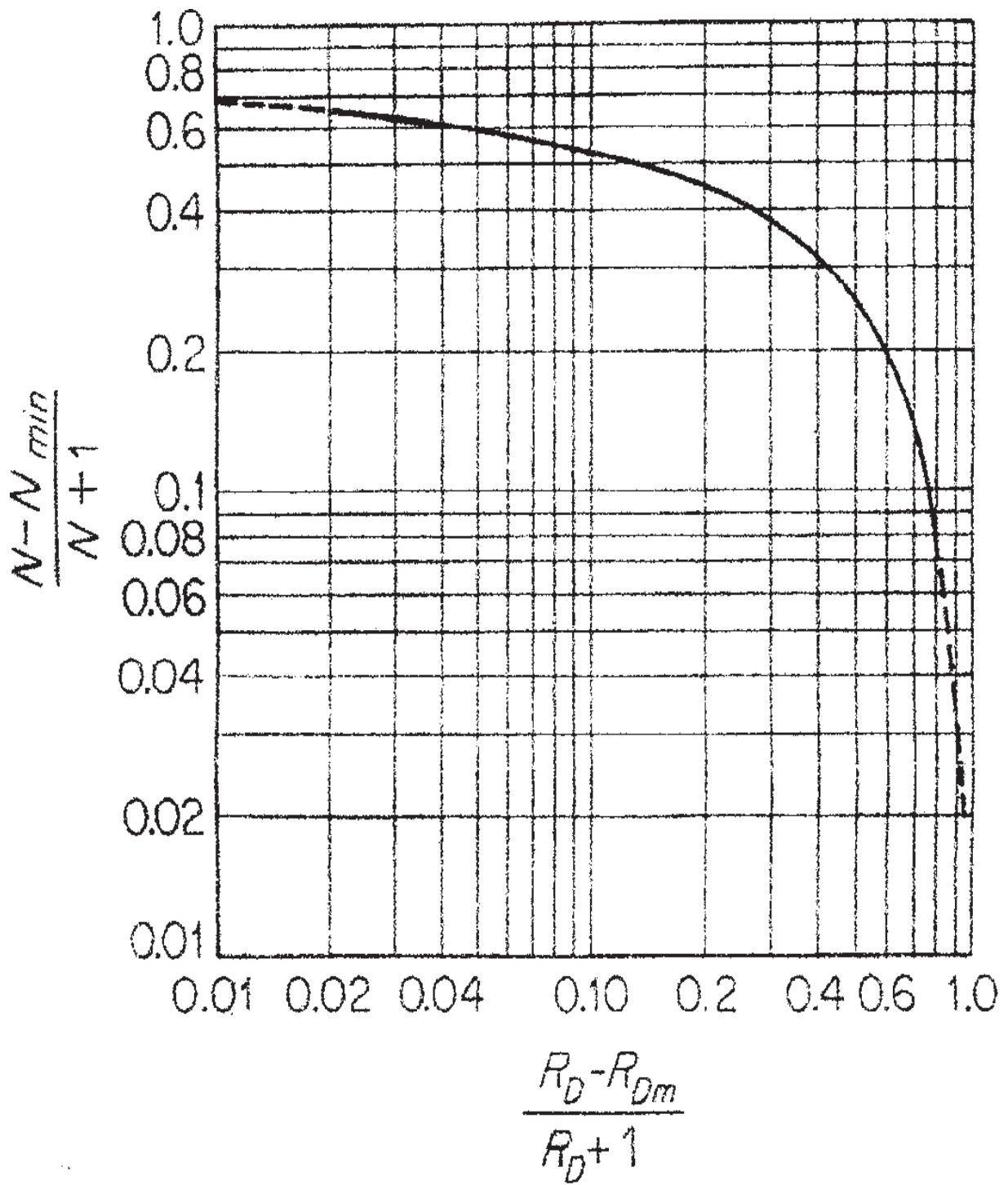


FIG 3: Gilliland Curve



Total No. of Questions :8]

SEAT No. :

P3955

[4959]-235

[Total No. of Pages :2

B.E. (Petrochemical)
PLANT DESIGN AND PROCESS ECONOMICS
(2008 Course) (Semester - II)

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) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain standard sources of information for manufacturing chemical product. [6]
- b) Explain steps involved in plant operations and control. [6]
- c) Explain the safety devices used in process plants. [6]
- Q2)** a) Explain the requirements of a good plant location and layout. [8]
- b) With suitable example, explain the importance of trips and interlock systems in process plants. [8]
- Q3)** Explain the process hazard assessment techniques- HAZOP, HAZAN, and fault tree analysis. [16]
- Q4)** a) Explain the battery limits and off-site facilities for process plant. [8]
- b) Explain the project monitoring and control techniques - PERT & CPM.[8]

P.T.O.

SECTION - II

- Q5)** a) Explain types of depreciation and methods of determining depreciation. [8]
- b) The original value of equipment is Rs. 22,000 and its salvage value is Rs. 2,000 at the end of service life of 10yrs. Determine the book value of the equipment at the end of 5 years using - [8]
- i) Straight line method.
- ii) Double declining balance method.

Q6) The total capital investment of a chemical plant is Rs. 25,00,000 and working capital is 20% of TCI. The annual total product cost is Rs. 15,00,000 with total income-tax rates of 48% on gross earnings. Calculate

- a) % of TCI returned annually as gross earnings. [8]
- b) % of TCI returned annually as net profit. [8]

(The industry accepts the thumb rule that Rs.1 of annual sales requires Rs. 1 of FCI)

Q7) A Company has 4 alternative designs and wants to select best among them. The Company requires minimum of 10% of ROI. Use following data to select the best design. [16]

Item	Design I	Design II	Design III	Design IV
Total initial cost (Rs.)	10,000	16,000	20,000	26,000
Operating cost per gr (Rs.)	100	100	200	100
Fixed charges (% of initial cost)	20	20	20	20
Cash flow per year (Rs.)	4,100	6,000	6,900	8,850

Q8) Write short notes on the following: [18]

- a) Cost indices used in process industries.
- b) Perpetuity and inflation.
- c) Alternative investments and replacements.

EEE

Total No. of Questions : 12]

SEAT No. :

P4527

[Total No. of Pages : 2

[4959]-236

B.E. (Petrochemical Engineering)

PROCESS MODELING AND SIMULATION

(2008 Pattern) (Elective - III(a))

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) Note the fundamental laws applicable in model development. Write in details on any three laws with equations. **[16]**

OR

Q2) In a perfectly mixed vessel, the volumetric feed rate of liquid is V_i with a density of ρ_i . The volumetric flowrate from the vessels is V_o with a density of ρ . Write down the total continuity equation model describing the mass balance. **[16]**

Q3) In a refinery, a heavy oil stream is used to remove benzene from a benzene-air gas feed stream. An absorption column with trays is used for the recovery. Develop the dynamic process model for the absorption column. **[18]**

OR

Q4) A perfectly mixed, isothermal CSTR has an outlet weir. The flowrate over the weir is proportional to the height of liquid over the weir, h_{ow} to the 1.8 power. The weir height is h_w . The cross sectional area of the tank is A . With constant density, a first order reaction $A \rightarrow B$ with rate constant K takes place in the tank. Derive the equations describing the system. **[18]**

P.T.O.

Q5) Solve the following system of equations by the Gauss-Seidel method: [16]

$$10x_1 + x_2 + x_3 = 12$$

$$2x_1 + 10x_2 + x_3 = 13$$

$$2x_1 + 2x_2 + 10x_3 = 14$$

Compute the answers correct to four decimal places.

OR

Q6) Find the real root of the equation by applying Newton- Raphson method at the end of fifth iteration: [16]

$$x^3 + 2x - 5 = 0$$

SECTION - II

Q7) Explain the input and output model of a process simulator with their interactions. [18]

OR

Q8) What are interacting and non interacting tanks? Explain model development procedure for two interactive tanks coupled to one non interacting tank.[18]

Q9) Draw the network and explain working of Single Loop Controllers. [16]

OR

Q10) With two examples, discuss the advantages of State space models over state models. [16]

Q11) With block flow diagram, explain Supervised learning of neural networks.[16]

OR

Q12) What are basic models of ANN? Explain classification based on interconnections. [16]



Total No. of Questions : 8]

SEAT No. :

P4528

[Total No. of Pages : 2

[4959]-237

B.E. (Petrochemical)

FINE CHEMICAL INDUSTRIES

(Elective - III(b)) (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.

SECTION - I

- Q1)** a) Explain how fine chemicals manufacture differs technologically from bulk chemicals. Give examples. [10]
- b) Discuss how fine chemical manufacture can be made more environment-friendly. [8]
- Q2)** a) Discuss importance of catalyst in fine chemical manufacturing. Comment on homogeneous vs heterogeneous choice. [8]
- b) Discuss growth prospects for Indian fine chemicals sector. [8]
- Q3)** a) Explain challenges in distillation and extraction crucial to fine chemicals manufacture. [10]
- b) Discuss fine chemicals market at global level. [6]

P.T.O.

- Q4)** a) Write a note on mixed plants. [10]
b) Discuss with examples strategies for zero discharge in fine chemicals sector. [6]

SECTION - II

- Q5)** a) Compare operation of batch plants with continuous plants. [12]
b) What do you understand by scale down methodologies? [6]
- Q6)** Discuss in detail manufacturing process for any two fine chemicals. [16]
- Q7)** a) Write a note on ion exchange resins and their role as catalysts. [8]
b) Discuss the shifting of manufacturing bases for fine chemicals from west to the east with reference to Make in India movement recently launched by our government. [8]
- Q8)** Discuss [16]
a) Supercritical CO₂ and its uses
b) Green Synthesis



Total No. of Questions : 12]

SEAT No. :

P4529

[Total No. of Pages : 3

[4959]-239

B.E. (Petrochemical Engg.)

RENEWABLE ENERGY SOURCES

(2008 Pattern) (Elective - III(d))

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 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) Name five different Renewable Energy Sources and make a comparative account of the relative advantages and disadvantages. **[10]**
- b) With help of proper data explain the recent initiative taken in India on Solar Power. **[8]**

OR

- Q2)** a) Discuss the Technological gap exists in India on the Renewable Energy sector and comment on the methodologies to bridge the gap. **[9]**
- b) Renewable energy are must for Green and Clean World – Explain and elaborate with help of sustainability aspects. **[9]**

P.T.O.

- Q3) a)** With help of neat sketches explain new generation solar photo-voltaic cell technologies. Comment on the materials involved. [8]
- b) What is solar flux? Discuss the potential of India based on solar energy distribution. What are the methods and means to harness the untapped potential. [8]

OR

- Q4) a)** How water desalination can be done effectively with help of solar energy explain in details. [8]
- b) Explain the various techniques and methods of measurement of solar radiation, draw neat sketches. [8]

- Q5) a)** Municipal Solid Wastes can be utilized effectively for Biogas production. Explain with help of neat diagram. Highlight the challenges involved. [8]
- b) With help of neat diagram Explain a Biorefinery and the Products obtainable from a model biorefinery. [8]

OR

- Q6) a)** With help of neat diagram explain the fluidized bed gasifier fed on Biomass. Discuss the design aspect as well. [10]
- b) Explain the Biodiesel Synthesis – How can the process be made economically viable. [6]

SECTION - II

- Q7) a)** With help of neat diagram explain the design aspects of Wind Turbines. [8]
- b) Give a detailed account of Wind Energy potential in India. Compare advantages and disadvantages of wind energy. [8]

OR

- Q8) a)** Discuss the major challenges faced by OTEC technology. Highlight how the commercial feasibility of OTEC can be increased. [10]

- b) “Ocean is a vast source of Energy, only we need to develop the Technology to harness the untapped potential” – Explain the statement and comment.[6]

Q9) a) With help of data explain the Potential of Geothermal Energy in context of Global Energy shortage. [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) Discuss the importance of storage of electrical energy. Name different types of cells can be utilized. Discuss operation of any one of the cell.[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) With help of schematic diagram explain the principle of operation of Fuel Cells. Comment on Cathode, Anode and the type of Electrolytes.[9]

- b) Discuss the recharging of a Battery with help of neat diagram. What are the key factors involved, how can the recharge timing of a Battery be reduced. [9]



Total No. of Questions : 12]

SEAT No. :

P3939

[4959]-24

[Total No. of Pages : 3

B.E. (Civil Engineering)

FINITE ELEMENT METHOD IN CIVIL ENGINEERING
(Open Elective) (2008 Course) (Semester - II) (401008)(Elective - IV)

Time : 3 Hours]

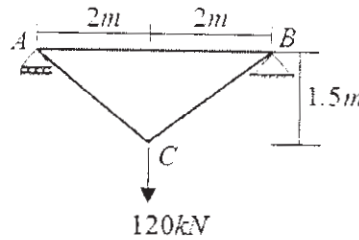
[Max. Marks : 100

Instructions to the candidates:

- 1) Answer to the two sections should be written in separate answer books.
- 2) 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.

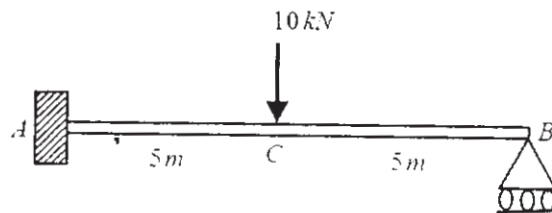
SECTION - I

Q1) Analyze the truss and find member forces. Cross-sectional area of members are $AB = 1000 \text{ mm}^2$, $BC = 800 \text{ mm}^2$, $CA = 800 \text{ mm}^2$. take $E = 2 \times 10^5 \text{ MPa}$. [18]

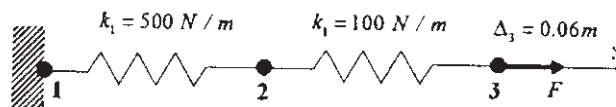


OR

Q2) a) Obtain rotation at B for the beam shown below using finite element method. Consider given beam as one element. Take $E = 2 \times 10^8 \text{ kN/m}^2$ and $I = 4 \times 10^{-6} \text{ m}^4$. [10]

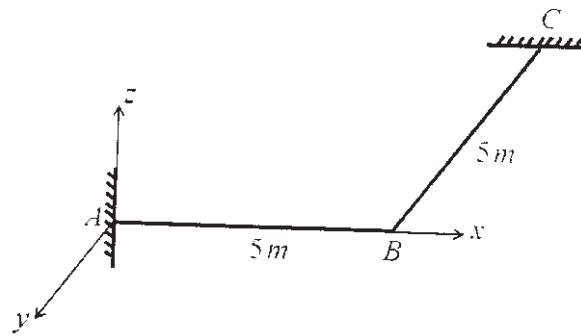


b) Determine elongation at node 2 and pulling force 'F' at node 3 for the spring assembly given below. Take pull at node 3 is 0.06m. [8]



P.T.O.

- Q3) a)** Derive the stiffness matrix for the grid elements as shown in Figure. Take flexural rigidity EI and torsional rigidity GJ same for both the elements. [10]



- b) Derive the transformation matrix for the two noded grid element. [6]

OR

- Q4)** Develop stiffness matrix for two noded frame element with three degrees of freedom at each node. Take EI constant. [16]

- Q5) a)** Explain in brief state of stress and state of strain at a point in 3D elasticity problem. [8]

- b) Derive Saint Venant's strain compatibility conditions. [8]

OR

- Q6) a)** Derive the stress compatibility conditions for 2D plane stress elasticity problem. [8]

- b) Write short note on plane stress, plane strain and axisymmetric problems. [8]

SECTION - II

- Q7) a)** Explain in brief 2D and 3D pascal's triangle with example. [8]

- b) Derive stiffness matrix for the two noded bar element using finite element formulation. [10]

OR

Q8) a) Derive the shape function for two noded bar element using polynomial in Cartesian coordinate system. [8]

b) State and explain the convergence criteria for the choice of the displacement function in FEM with examples. [10]

Q9) a) Derive shape functions of eight noded hexahedron element using Lagrangian interpolation function. Use natural coordinate system (ξ, η) . [8]

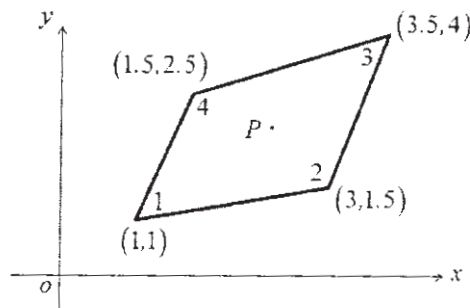
b) Derive the area coordinates of constant strain triangular (CST) element. [8]

OR

Q10) a) Explain in brief isoparametric, super parametric and sub parametric elements. [8]

b) Derive shape functions for the nine noded rectangular elements in natural coordinate (ξ, η) system using Lagrange's interpolation function. [8]

Q11) Derive the Jacobian matrix for the four noded quadrilateral isoparametric element as shown in Figure. [16]



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. [16]



Total No. of Questions : 10]

SEAT No. :

P3956

[4959]-240

[Total No. of Pages : 2

B.E. (Petrochemical Engineering)

PETROLEUM EXPLORATION AND PRODUCTION OPERATIONS

(2008 Pattern) (412411 A) (Elective - IV) (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) *Figures to the right indicate full marks.*
- 3) *Draw suitable diagrams wherever necessary.*

SECTION - I

- Q1)** a) Explain different components of Petroleum Geosystem. [10]
b) How Original Oil in Place is calculated? Why the recovery of oil is always low? [5]

OR

- Q2)** a) What are traps? Describe with suitable diagram one example each of stratigraphic and structural Trap. [10]
b) How is migration of hydrocarbons recognized? [5]

- Q3)** Describe important physico-chemical properties of crude oil and gas. [15]

OR

- Q4)** What are important rock properties? How are they determined? [15]

- Q5)** Write notes on any four of the following: [20]

- a) Reservoir Drive Mechanism.
- b) Seismic interpretation.
- c) Use of different logs in the understanding of porosity of formations.
- d) Different sources of subsurface data.
- e) Oil differential.
- f) Geochemical surveys.
- g) Sandstone and carbonate reservoirs.
- h) Subsurface maps.

P.T.O.

SECTION - II

Q6) a) Explain with the help of neat sketches any two well completion methods. [10]

b) What are commonly encountered problems during drilling? [5]

OR

Q7) a) What are the components of well control system? [5]

b) Why is it necessary to use different logs for evaluation of formation? [10]

Q8) a) Explain with suitable diagram concepts of nodal analysis. [5]

b) Draw and describe typical configuration of a gas lifted well. [10]

OR

Q9) a) What are the surface and subsurface components of Electrical Submersible Pumps? [5]

b) Explain in brief probable reasons for production decline in case of oil and gas wells. [10]

Q10) Answer in brief Any Five of the following: [20]

- a) Injection Wells and utility.
- b) Anatomy of an oil rig.
- c) Factors affecting production.
- d) Perforations.
- e) Inflow Performance Relationship, IPR.
- f) Primary and Enhanced Recovery.
- g) Chemical Flooding.
- h) Matrix Acidizing.
- i) Oil Processing System
- j) Relative Permeability Curve.



Total No. of Questions :12]

SEAT No. :

P3448

[4959]-241

[Total No. of Pages :4

B.E. (Petrochemical Engineering)
CATALYST SCIENCE AND TECHNOLOGY
(2008 Course) (Semester - II) (Elective - IV) (412411 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 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

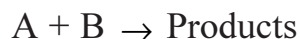
- Q1)** a) Discuss the importance of measurement techniques and characterizations in catalytic reactors. **[10]**
- b) Write a short note on Homogeneous catalysis. **[6]**

OR

- Q2)** a) List down five important characteristics of industrial catalysts - briefly explain each one of them. **[10]**
- b) Define: **[6]**
- i) Activity,
 - ii) Active site,
 - iii) Turnover frequency.

P.T.O.

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.

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) What are the modes of deactivation of commercial catalysts how to prevent them - explain with help of suitable examples. [6]

b) Derive Langmuir adsorption isotherm - mention the important assumptions. [6]

c) Explain the precipitation method of catalyst manufacture. [4]

Q5) a) Low temperature (-195.8°C) nitrogen adsorption data were obtained for an $\text{Fe-Al}_2\text{O}_3$ 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. (cm^3) at 0°C and 1 atm	51.3	65	74	81.5	99	110	135	153	182

The vapor pressure of N_2 at -195.8°C is 1 atm. Estimate the surface area of the catalyst in square meter per gram basis.

Data: Density of liquid N_2 at -195.8°C is 0.808 g/cm^3 .

b) With help of neat sketches explain the measurement of crushing strength of the industrial catalysts. [6]

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) 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). [6]

Mass of catalyst sample placed in chamber = 101.5 g

Volume of helium displaced by sample = 45.1 cm³

Volume of mercury displaced by sample = 82.7 cm³

SECTION-II

- Q7)** a) What are the speciality of metallic catalysts - how can the costly metals be recovered from worn out catalysts - explain with help of suitable examples. [8]
- b) Draw a neat diagram to 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) Discuss the reactor, catalysts and operating conditions for hydrogenation of oils and fats, discuss its utility. [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) Draw neat diagram of Trickle bed reactor and explain its operation with special emphasis on temperature control for hydrodesulfurization of diesel. [8]

Q11)a) 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]

b) Discuss the importance of support in catalysis, name three important support commonly used. [6]

c) Name for characterization techniques for the supported metal catalysts. [4]

OR

Q12) Write short notes on (any three): [18]

a) Packed Bed Heterogenous Reactor for Exothermic Reactions.

b) Three Way Catalysts.

c) Ammonia Manufacturing Reactor.

d) How Catalyst Enhances Speed of Reaction.

EEE

Total No. of Questions : 8]

SEAT No. :

P4530

[Total No. of Pages : 2

[4959]-242

B.E. (Petrochemical Engineering)

(C) POLYMER REACTION ENGINEERING

(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 books.*
- 2) *Solve any three questions from each section.*
- 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) Explain how mixing patterns affect the final product in polymer manufacture. **[8]**
b) Discuss any two mechanisms of polymerization. **[8]**

- Q2)** Discuss in detail mathematical model of Free radical polymerization taking place in a batch reactor. **[18]**

- Q3)** Styrene is polymerized in batch reactor at 60°C with the free radical initiator. The initial concentration of styrene is 10 gmole/lit. and the concentration of initiator is kept constant at 0.06 gmole/lit. Assume termination takes place only by combination. The rate constants are as $K_o = 7 * 10^{-6} \text{ sec}^{-1}$, $k_p = 190 \text{ lit/gmole}\cdot\text{sec}$, $k_c = 1.2 * 10^7 \text{ lit/gmole}\cdot\text{sec}$, $f = 0.7$ The volume of the reactor filled by the reacting system is 5000 lit. **[16]**

For a reaction time of 50 min, compute the following:

- a) The percentage of the styrene polymerized,
- b) The number average molecular weight of the product formed

P.T.O.

Q4) Define: **[16]**

- a) Weight Fraction,
- b) First moment of P_j 's
- c) Number Average Degree Of Polymerization
- d) Weight Average Degree Of Polymerization
- e) Number Average Molecular Weight
- f) Weight Average Molecular Weight

SECTION - II

Q5) a) State why copolymers are used. Discuss industrially important copolymers. **[8]**

b) Discuss how copolymer behavior changes based on monomer reactivity ratio. **[8]**

Q6) a) Write a note on Aqueous Emulsifier Solutions. **[6]**

b) Discuss mathematical model for batch Emulsion polymerization. **[10]**

Q7) Discuss special considerations involved in process control strategies employed in polymerization processes with help of suitable examples. **[16]**

Q8) Draw and discuss process flow diagram for the production of **[18]**

- a) Nylon 6 and
- b) PVC



Total No. of Questions :8]

SEAT No. :

[Total No. of Pages :5

P3957

[4959] - 243

**B. E. (Petroleum Engineering)
RESERVOIR ENGINEERING - II
(2008 Course) (412381) (Semester - I)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers to the two sections must 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 should 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) Write down the assumptions used for deriving the continuity equation?[6]

b) Derive the diffusivity equation in radial coordinates. **[10]**

Q2) Following data is given:

$$q = 30 \text{ stb/d}$$

$$h = 140 \text{ ft}$$

$$B = 1.47 \text{ RB/STB}$$

$$k = 0.2 \text{ md}$$

$$c_t = 1.4 \times 10^{-5} \text{ psi}^{-1}$$

$$\mu = 0.72 \text{ cp}$$

$$r_w = 0.5 \text{ ft}$$

$$P_i = 3100 \text{ psi}$$

$$\text{porosity} = 20\%$$

$$r_e = 2800 \text{ ft}$$

Calculate the reservoir pressure at the radius of 1 ft, 5 ft, 10 ft and 50 ft after 3 hours of oil production. **[18]**

P.T.O.

- Q3)** a) How is superposition in time different from superposition in space? Explain in detail. [4]
- b) How is a semi-log plot different from a Horner plot? Explain the difference. [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: $B_0 = 1.25$ rb/stb, $h = 20$ ft, $\phi = 0.20$, $r_w = 0.29$ ft, $ct = 19.5 \times 10^{-6}$, and viscosity = 1.1 cP. From these data, estimate the formation permeability, k , pi , and skin factors. Use the Semi-Log graph. [8]

Shut-in time, $Del-t$ (hr)	$(tp + Del-t)/Del-t$	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) Is a DST same as a PBU of DD test? If yes - explain, If No –explain why? [6]
- b) Why are two drawdowns and buildups required in a DST? [10]

SECTION - II

- Q5)** a) Explain the two ways to assess gas well test data.
- b) Explain Isochronal and Modified Isochronal Well test. **[16]**
- Q6)** Explain flow regimes in horizontal well test. **[16]**
- Q7)** Explain in detail, Arp's type curves, Fetkovich's type curves and Agarwal-Gardner type curves. How are they different from each other? **[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

$$p = p_i + 70.6 \frac{qB\mu}{kh} \text{Ei} \left(- \frac{948\phi\mu c_i r^2}{kt} \right)$$

$$t_D = \frac{0.000264kt}{\phi\mu_o c_i r_w^2}$$

$$p_{ws} = p_i - \frac{162.6 q_o \mu_o \beta_o}{kh} \log \left[\frac{t_p + \Delta t}{\Delta t} \right]$$

$$p_D = -\frac{1}{2} \text{Ei} \left(-\frac{r_D^2}{4t_D} \right)$$

$$s = 1.151 \left[\frac{p_{1hr} - p_{ws}(\Delta t=0)}{m} - \log \left(\frac{k}{\phi\mu_o c_i r_w^2} \right) + 3.23 \right]$$

$$p_{wf} = p_i - \frac{162.6 q_o \mu_o \beta_o}{kh} \left[\log t + \log \left(\frac{k}{\phi\mu_o c_i r_w^2} \right) - 3.23 + 0.869s \right]$$

$$p = p_i + 70.6 \frac{qB\mu}{kh} \left[\ln \left(\frac{1,688\phi\mu c_i r^2}{kt} \right) \right]$$

$$\frac{(3.975 \times 10^5)\phi\mu c_i r_w^2}{k} < t < \frac{948\phi\mu c_i r_e^2}{k}$$

$$p_{1h} = p_i + m \left[\log \left(\frac{k}{\phi\mu_o \beta_o c_i r_w^2} \right) - 3.23 + 0.869s \right]$$

$$p(r,t) = LS(r,t) = p_i - \frac{70.6 Q \mu}{kh} \left[-\text{E}_i \left(-\frac{948.1 \Phi \mu c_i r^2}{kt} \right) \right]$$

$$k = \frac{162.6 q_o \mu_o \beta_o}{mh}$$

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	3.218	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	4.89×10^{-2}	4.26×10^{-2}	3.72×10^{-2}	3.25×10^{-2}	2.84×10^{-2}	2.49×10^{-2}	2.19×10^{-2}	1.92×10^{-2}	1.69×10^{-2}	1.48×10^{-2}
3	1.30×10^{-2}	1.15×10^{-2}	1.01×10^{-2}	8.94×10^{-3}	7.89×10^{-3}	6.87×10^{-3}	6.16×10^{-3}	5.45×10^{-3}	4.82×10^{-3}	4.27×10^{-3}
4	3.78×10^{-3}	3.35×10^{-3}	2.97×10^{-3}	2.64×10^{-3}	2.34×10^{-3}	2.07×10^{-3}	1.84×10^{-3}	1.64×10^{-3}	1.45×10^{-3}	1.29×10^{-3}
5	1.15×10^{-3}	1.02×10^{-3}	9.08×10^{-4}	8.09×10^{-4}	7.19×10^{-4}	6.41×10^{-4}	5.71×10^{-4}	5.09×10^{-4}	4.53×10^{-4}	4.04×10^{-4}
6	3.60×10^{-4}	3.21×10^{-4}	2.86×10^{-4}	2.55×10^{-4}	2.28×10^{-4}	2.03×10^{-4}	1.82×10^{-4}	1.62×10^{-4}	1.45×10^{-4}	1.29×10^{-4}
7	1.15×10^{-4}	1.03×10^{-4}	9.22×10^{-5}	8.24×10^{-5}	7.36×10^{-5}	6.58×10^{-5}	5.89×10^{-5}	5.26×10^{-5}	4.71×10^{-5}	4.21×10^{-5}
8	3.77×10^{-5}	3.37×10^{-5}	3.02×10^{-5}	2.70×10^{-5}	2.42×10^{-5}	2.16×10^{-5}	1.94×10^{-5}	1.73×10^{-5}	1.55×10^{-5}	1.39×10^{-5}
9	1.24×10^{-5}	1.11×10^{-5}	9.99×10^{-6}	8.95×10^{-6}	8.02×10^{-6}	7.18×10^{-6}	6.44×10^{-6}	5.77×10^{-6}	5.17×10^{-6}	4.64×10^{-6}
10	4.15×10^{-6}	3.73×10^{-6}	3.34×10^{-6}	3.00×10^{-6}	2.68×10^{-6}	2.41×10^{-6}	2.16×10^{-6}	1.94×10^{-6}	1.74×10^{-6}	1.56×10^{-6}



Total No. of Questions : 8]

SEAT No. :

P3512

[4959]-244

[Total No. of Pages : 2

B.E. (Petroleum)

PETROLEUM FORMATION EVALUATION

(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer to the questions of both the sections should be written in separate answer books.*
- 2) *Solve any three questions each from section I and section II.*
- 3) *Draw neat diagrams wherever necessary.*

SECTION - I

Q1) Describe borehole environment with the help of a neat sketch. Explain the empirical relationship between different zones and fluids. **[15]**

OR

Q2) Explain the principle of any one type of neutron logging tool with the help of a sketch. **[15]**

Q3) Explain important resistivity logging methods with the help of neat sketches. **[15]**

Q4) Write notes on any four of the following: **[20]**

- a) Use of caliper logs in the understanding of geometry of beds.
- b) Radioactivity in rocks.
- c) Estimation of formation boundary.
- d) Parameters measured in mud logging.
- e) Temperature logs.
- f) SP Log.

SECTION - II

Q5) How is water saturation calculated from logs? Outline the detailed procedure for the same. **[15]**

Q6) Explain special core analyses. How does it help in formation evaluation?**[15]**

OR

Q7) a) Write a note on Importance and methods to determine net to gross thickness. **[5]**

b) How are moveable hydrocarbons recognized? **[5]**

c) What is the importance of calculation of shale volume? **[5]**

Q8) How will you recognize various depositional environments using logs? Draw appropriate sketches for the same. **[20]**



Total No. of Questions :6]

SEAT No. :

P3513

[4959]-245

[Total No. of Pages :1

**B.E. [Petroleum Engineering]
Well Engineering and Design
(2008 Course) (Semester - I)**

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.*

SECTION - I

- Q1)** a) Discuss casing design considering collapse, burst and tension in brief. [9]
b) Explain casing shoe depth selection process in brief. [9]
- Q2)** a) Discuss 'S' type trajectory of a directional well in detail. [10]
b) What are different horizontal wells? Discuss completion techniques in brief. [6]
- Q3)** a) Discuss graphically Driller's method of well control. [8]
b) Discuss accumulator system of BOP in detail. [8]

SECTION - II

- Q4)** Discuss Liner hanger setting and cementation with illustrative figure in detail. [18]
- Q5)** a) Discuss Bingham plastic model in detail. [8]
b) Describe functions of hydraulics in brief [8]
- Q6)** Write short note on. [16]
a) Drill string design.
b) AFE calculation.



Total No. of Questions : 6]

SEAT No. :

P3514

[4959]-246

[Total No. of Pages : 2

B.E. (Petroleum)

**a:PETROLEUM EXPLORATION
(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 books.*
- 2) *Neat diagrams should be drawn wherever necessary.*
- 3) *Attempt any two questions each from Section -I and Section - II.*
- 4) *Figures to the right indicate marks.*

SECTION - I

- Q1)** a) What are the different corrections applied to magnetic survey. Explain in brief any two of them. [10]
- b) Explain the construction of Scintillation Counter. How it is used in radioactivity survey? [10]
- c) Explain the different explosive energy sources used in seismic surveys.[5]
- Q2)** a) Explain the concept of half anomaly width for a sphere and a horizontal slab with vertical fault in the interpretation of gravity data. [10]
- b) Explain with suitable diagram VES using Schlumberger technique. [10]
- c) What are the limitations of VES using Wenner arrangement? [5]
- Q3)** a) Write notes on any three of the following [15]
- i) Time lapse Seismic
 - ii) Direct Hydrocarbon Indicators
 - iii) Amplitude Versus Offset
 - iv) 3 D seismic imaging
 - v) VRMS, VStack,
- b) Describe in brief the field procedure adopted for geochemical surveys. [10]

P.T.O.

SECTION - II

Q4) a) Describe with the help of a flow diagram steps involved in the modeling of sedimentary basins during the search of hydrocarbons. **[15]**

b) Calculate the risk involved from the given data **[10]**

Existence of source rock 0.90, Effective trapping mechanism, 0.75, Migration path to reservoir. 0.8, Reservoir rock with porosity and permeability, 0.75, Existence and persistence of seal, 0.80

Explain whether the risk is low or high? What may be the reasons for increasing/decreasing risk?

Q5) a) Explain the volumetric method of reserves estimation for oil and gas. How is uncertainty reduced in the calculation of area and thickness?**[15]**

b) How GIS helps in developing multivariate maps from the available subsurface data? **[10]**

Q6) a) Describe in brief strategies are to be adopted for exploration in stratigraphic traps? **[15]**

b) Explain the deterministic and probabilistic approach in risk analysis.**[10]**

x x x

Total No. of Questions :12]

SEAT No. :

P3449

[4959]-247

[Total No. of Pages :3

B.E. (Petroleum Engineering)

b:ADVANCED INSTRUMENTATION AND PROCESS CONTROL

IN PETROLEUM INDUSTRY

(2008 Course) (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 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)** Explain the principle of operation of variable speed drives. Discuss their advantages. **[10]**
- b) Write short note on speed control of DC motor. **[6]**

OR

- Q2) a)** Classify electric motors required in upstream industry. Explain with neat diagram principle, construction and working of AC motor. **[8]**
- b) Differentiate between the Analog and Digital Instruments and discuss their relative advantages and disadvantages. **[8]**
- Q3) a)** Name four different pressure measuring devices. Describe with neat diagram construction, principle and working of any one of them. **[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]**

OR

P.T.O.

- Q4)** a) Explain the principle of operation of pH meter, draw a schematic diagram. [8]
- b) Define torque. Explain principle, construction and working of proximity torque sensor with help of neat diagram. [8]
- Q5)** a) Explain the principle of operation of pneumatic control valves with help of necessary sketches. Draw and explain air to open and air to close mechanisms. [10]
- b) Discuss various important features of SCADA systems. Write down the advantages of SCADA based control strategy. [8]

OR

- Q6)** Write short notes on: [18]
- a) PLC based control architecture.
- b) Controller Tuning.
- c) Importance of Sensors in Oil Industry.

SECTION-II

- Q7)** a) Explain the need of Limit Switches and Alarm Systems in Upstream Industry. [8]
- b) With help of schematic diagram explain Cascade Control. Discuss the controllers employed and the control mechanism in details. [8]

OR

- Q8)** a) What are the design goals of automatic remotely controlled fracturing processes - explain with help of proper sketches. [8]
- b) Differentiate between PLC, DCS and PC - based Control Systems. [8]

- Q9) a)** What is Dynamic Positioning of Floating Vessels - with help of suitable diagram explain how it helping in the deep sea operations. [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 diagram explain the control mechanism of a separator used in oil industries. [8]
- b) Define kick, how can it be detected? Also indicate the mechanism of control. [8]
- Q11)a)** Discuss the key features of the emergency shutdown system - Elaborate the methodology also. [8]
- b) Discuss the challenges of subsea production operation and associated instrumentation and control issues. [10]

OR

- Q12)Write short notes on:** [18]
- a) Accuracy and Repeatability.
- b) Multiphase Flow Meter.
- c) Kick Risk Evaluation Model (REM).

EEE

Total No. of Questions : 6]

SEAT No. :

P4925

[Total No. of Pages : 2

[4959]-25
B.E. (Civil)
(B) : GEOINFORMATICS
(Open Elective) (2008 Pattern)

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) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain EMR. State the characteristics of different frequencies. [8]
b) Define resolution and explain any 2 types. [8]

OR

- a) Describe characteristics of LANDSAT 1, 2 & 3. [8]
b) What are the elements of Visual Image Interpretation? Explain their significance and factors influencing them. [8]

- Q2)** a) What is false colour composite (FCC) Images? What are its advantages? [8]
b) Write a note on: [8]
i) Image Rectification.
ii) Geo referencing.

OR

- a) Explain Supervised and Unsupervised Classification. [8]
b) Explain any two satellite images and its application. [8]

P.T.O.

- Q3)** a) Describe Characteristics of IR Images. [10]
b) “Geometric” Corrections in Images under processing. [8]

OR

- a) What is Digital Image processing and briefly explain its application [10]
b) Write a note on ‘System Pour 1’ Observation de la Terre. [8]

SECTION - II

- Q4)** a) What is ‘MAP’? Describe different types of maps in brief. What are its limitations? [8]
b) Explain [8]
i) Vector Model
ii) Resolution

OR

- a) Define GIS? Explain in detail its components. [8]
b) Write a note on: [8]
i) Data types in DBMS.
ii) Attributes.

- Q5)** a) Explain any one GIS software’s and write a detail account on its Modules. [8]
b) What is RDBMS? Explain the Normal form with one example. [8]

OR

- a) Write a note ‘Buffering’. [8]
b) Describe ‘Raster’ data structure. Write advantages and disadvantages. [8]

- Q6)** a) Explain application of Geo Informatics in following areas: [10]
i) Geotechnical Engineering.
ii) Water Resource management through canal irrigation.

- b) Write a brief note on “Role of GIS in Terrain Analysis” [8]

OR

- a) Explain application of Geo Informatics with working flow charts in following areas: [10]
i) Road Survey and Investigations.
ii) Infrastructure Development.
- b) Write in detail Satellite Data acquisition. [8]



Total No. of Questions :12]

SEAT No. :

P3450

[4959]-250

[Total No. of Pages :3

B.E. (Petroleum Engineering)
PETROLEUM REFINING TECHNOLOGY
(2008 Course) (Semester - I) (Elective - II) (412385 A)

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, Q7 or Q8, Q9 or Q10 Q11 or Q12.*
- 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 mean by Nelson Complexity Index? Explain in detail. [8]
- b) Define cloud point of a petroleum product. Describe in detail the method to determine the same. [8]

OR

- Q2)** a) With the help of a neat labeled diagram, enlist the major products of a refinery. [8]
- b) What are the various components of a crude assay? [8]
- Q3)** a) What are the factors affecting the desalting process? [8]
- b) What is the necessity of a vacuum distillation? Explain the process in detail. [8]

OR

P.T.O.

- Q4)** a) Compare between pump back, pump around and overhead reflux in the ATU. [8]
b) Compare the single stage and two stage desalting process. [8]
- Q5)** a) Discuss the catalysts used in the FCC process. [9]
b) Write a note on fluid coking. [9]

OR

- Q6)** a) What is the need for air blowing of bitumen? Discuss air blowing of bitumen. [9]
b) Discuss the different types of coke. Hence give the uses of coke. [9]

SECTION-II

- Q7)** a) Define the term alkylation. Describe the process of alkylation by hydrofluoric acid. [8]
b) Explain the semiregenerative process for catalytic reforming. [8]

OR

- Q8)** a) Explain the reactions taking place in catalytic reforming. [8]
b) Write a note on the isomerization process to increase the octane number. [8]

- Q9)** a) Discuss the properties desired to obtain a good lube oil base stock. [8]
b) Explain the process of solvent extraction in case of lube oil base stock by furfural. [8]

OR

- Q10)** a) Write a note on propane deasphalting unit. [8]
b) Discuss the various finishing processes in the production of lube oil. [8]

- Q11)a)** How is steam reforming for production of hydrogen accomplished? [9]
- b) What are the typical sources of waste water in the refineries? How is the waste water treated? [9]

OR

- Q12)a)** What is blending process? Write a note on line blending process. [9]
- b) Write a note on the Claus process for sulphur recovery. [9]

EEE

Total No. of Questions : 10]

SEAT No. :

P3515

[4959]-252

[Total No. of Pages : 3

B.E.(Petroleum Engineering)
NON- CONVENTIONAL HYDROCARBON RESOURCES
(2008 Course)(Elective-II) (Semester-I)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Assume additional data if necessary.*
- 3) *Draw neat diagrams wherever necessary.*

SECTION-I

Q1) Define and describe the following **[15]**

- a) Tar Sand and Bituminous
- b) Organic Richness and Thermal Maturity
- c) Tight Gas Reservoirs
- d) Classification of heavy and extra heavy oil on API and viscosity
- e) Cleats in CBM

OR

Q2) a) Draw a schematic diagram of methane flow dynamics in a coal seam system. **[5]**

b) Describe the risk and planning associated with drilling horizontal wells drilled in tight reservoirs. **[10]**

Q3) a) Explain different types of fracturing fluids used in shale gas fracturing. **[10]**

b) The following sorption isotherm data is given by for a coal sample. **[5]**

504.0	507.0	756.0	1001.0	1008.0
265.3	267.2	311.9	339.5	340.5

Calculate the Langmuir isotherm constant V_m and the Langmuir pressure constant b for the coal sample

OR

Q4) a) What are the basic characteristics of gas bearing shale reservoirs? **[10]**

P.T.O.

b) Discuss in brief testing of high strength proppants used in hydraulic fracturing operations. [5]

Q5) a) Write in brief about thermodynamics of gas hydrate equilibria. [10]

b) What are the geological and geophysical indicators of Gas Hydrates?[10]

SECTION-II

Q6) a) Describe the CBM gas production profile with the help of neat diagram. [10]

b) What are the direct methods of Coal Liquefaction? [5]

OR

Q7) a) Write in brief about new technologies for recovering heavy oil. What are the hybrid modes of heavy oil technologies. [10]

b) What are the environmental consequences of conversion processes?[5]

Q8) Write a detailed note on Decline curve analysis for unconventional gas reservoirs [15]

OR

Q9) a) Following mineralogical variation is observed during detailed petrophysical studies of the potential shale horizon. [10]

No	Depth in meters	Mineralogy percent			
		Quartz	Carbonate	Clay minerals	Others
1	2500m	38	10	45	07
2	2510	34	07	49	10
3	2520	32	12	52	06
4	2530	44	10	41	05
5	2540	56	12	25	07
6	2550	58	10	27	05

Evaluate behavior of shale for given depths to understand brittleness. Give justification. What additional information is required to realize potential of this horizon?

- b) A homogeneous isotropic rock plate of width 40 mm and length 500mm, thickness 10 mm with original unreformed volume $0.2 \times 10^6 \text{ mm}^3$ has Young's modulus $5 \times 10^{10} \text{ Pa}$ and Poisson's ratio of 0.25. The plate is subjected to compressive force of 500 N at the faces of its lateral end. Find out change in volume during loading. [5]

Q10) Write in brief any two of the following. [20]

- a) Environmental problems related to drilling and production operations.
- b) NORM in Shale
- c) Prevention and control methods in gas hydrate formation
- d) Produced water management.



Total No. of Questions :12]

SEAT No. :

P3958

[Total No. of Pages :3

[4959] - 253

B. E. (Petroleum)

CARBON MANAGEMENT IN PETROLEUM INDUSTRY

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

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) Discuss the 'United Nations Framework Convention on Climate Change' (UNFCCC) in detail. **[18]**

OR

Q2) a) How carbon credit related trading will be useful to minimize carbon emission? Explain with example. **[10]**

b) Write the expectations from developing countries to minimize GHG Emission? **[8]**

Q3) a) Discuss the impact of green house gases on change in weather pattern. **[8]**

b) Which major and minor industrial sectors are responsible for carbon emission? Why? Explain. **[8]**

OR

P.T.O.

Q4) Give in brief the description of operations and resources that are responsible for emission in following industrial sectors. Power, automobile, petroleum and refining. Elaborate at least one example for each. [16]

Q5) Describe in detail, design considerations of a project in which, 'environmental benefits by reducing CO₂ concentration in the atmosphere and economical benefits by maximizing oil recovery is a viable option to reduce carbon emission. [16]

OR

Q6) a) Discuss in brief scope, challenges, and benefits involved in carbon dioxide flooding in deep geological formations or depleted petroleum reservoirs. [8]

b) Explain the role of any two largest carbon sinks and effect of excess carbon emission due to Industrialization on it, in brief. [8]

SECTION - II

Q7) Discuss in detail wind and solar energy generation and its distribution. [18]

OR

Q8) What is sustainable development? Discuss in detail all the factors that are to be considered for the achievement of it. Also write uses of clean development mechanism. [18]

Q9) Why biomass energy is considered as a green technology? Write in brief any one method of manufacturing biofuels.

Also state true or false with justification in brief: 'controlled cultivation and consumption of biomass can provide sustainable energy by using biogas, vegetable oil, biodiesel, producer gas and gasifiers'. [16]

OR

Q10) Describe in detail scope, challenges and applications of Bio-energy. Also explain in brief biological approach in carbon sequestration. **[16]**

Q11) What is carbon credit? How it is useful to minimize carbon emission? Explain in detail various methods to earn and transfer carbon credit. **[16]**

OR

Q12) Write short notes on, **[16]**

- a) Emission reduction calculations.
- b) Kyoto protocol.
- c) Methods to minimize energy losses.
- d) Carbon cycle.



Total No. of Questions :8]

SEAT No. :

P3959

[4959]-254

[Total No. of Pages :5

B.E. (Petroleum Engineering)
IMPROVED OIL RECOVERY AND RESERVOIR SIMULATION
(2008 Course) (Semester - II) (412387)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections must 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 should be drawn wherever necessary.*
- 6) *Use of non-programmable calculator, log-log, and semi-log paper is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) How is Reservoir Simulation different from modeling? Explain in detail. **[6]**

b) How does Reservoir simulation play a central role in field development? Explain with appropriate diagrams. **[10]**

Q2) a) Explain in detail why an equation is discretized? Discretize the following equation given below, using 1 of the above defined explicit and 1 implicit scheme **[10]**

$$\frac{\partial u}{\partial t} - \alpha \frac{\partial^2 u}{\partial x^2} = 0$$

b) Write the 1-D horizontal general fluid flow equation for oil, water and gas (both undersaturated as well as saturated) **[8]**

Q3) a) What types of block ordering techniques used in reservoir simulation? Why? **[6]**

P.T.O.

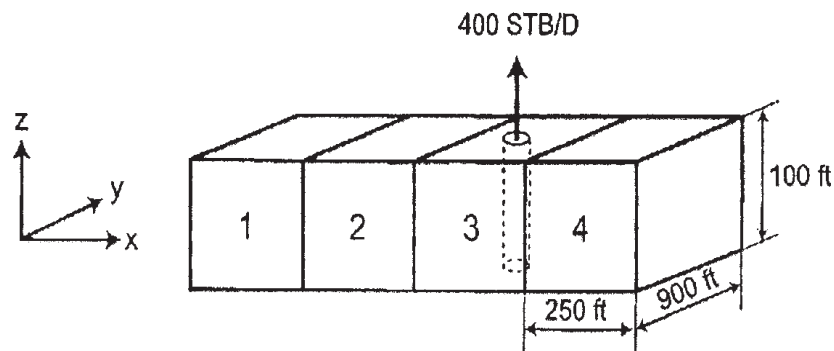
- b) Using any of the finite difference schemes, solve the following differential equation. Consider a 3 element system with four nodes, u_1 to u_4 , with both these being boundary nodes. Boundary conditions are provided for these nodes: [10]

$$\frac{\partial^2 u}{\partial x^2} - 2u = 0 \text{ where } 0 < x < 1 \text{ and } f(x) = 4x^2 - 2x - 4$$

Boundary conditions are:

$$u_1 = 0 \text{ @ } x = 0 \text{ and } u_4 = -1 \text{ @ } x = 1.$$

- Q4) a)** A well produces @ 275 STB/D. Dimensions of the block are - $\Delta x = 250$ ft; $w = 900$ ft; $h = 100$ ft; $kx = 270$ md. $Fvf = 1.0$ rb/stb; viscosity = 2 cp. write the flow equation for block 3, as shown in the figure below: [8]



- b) Explain in detail, the difference between implicit, explicit and semi-implicit discretization techniques. [8]

SECTION-II

- Q5)** Describe MEOR in detail with the screening criteria. Why does such a screening criteria exist. [16]

Q6) Explain Thermal EOR, with the screening criteria. Why does such a screening criteria exist. **[16]**

Q7) Explain waterflooding models with their assumptions. **[16]**

Q8) Write short notes on (any three): **[18]**

- a) Polymer EOR.
- b) Well site layout for Surfactant Polymer EOR.
- c) Fractional flow theory.
- d) Buckley Leveret Model.

Formulas / Equations for the exam

$$\int_{t^n}^{t^{n+1}} \{T_{x_{i+1/2}} [(p_{i+1} - p_i) - \gamma_{i+1/2} (Z_{i+1} - Z_i)]\} dt + \int_{t^n}^{t^{n+1}} \{T_{x_{i-1/2}} [(p_i - p_{i-1}) - \gamma_{i-1/2} (Z_i - Z_{i-1})]\} dt$$

$$+ \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \frac{d}{dp} \left(\frac{\phi}{B} \right)_i [p_i^{n+1} - p_i^n],$$

$$\int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{m_i} dt = m_{a_i}$$

$$T_{z_{i,j,k-1/2}}^m [(p_{i,j,k-1}^m - p_{i,j,k}^m) - \gamma_{i,j,k-1/2}^m (Z_{i,j,k-1} - Z_{i,j,k})]$$

$$+ T_{y_{i,j-1/2,k}}^m [(p_{i,j-1,k}^m - p_{i,j,k}^m) - \gamma_{i,j-1/2,k}^m (Z_{i,j-1,k} - Z_{i,j,k})]$$

$$+ T_{x_{i-1/2,j,k}}^m [(p_{i-1,j,k}^m - p_{i,j,k}^m) - \gamma_{i-1/2,j,k}^m (Z_{i-1,j,k} - Z_{i,j,k})]$$

$$+ T_{x_{i+1/2,j,k}}^m [(p_{i+1,j,k}^m - p_{i,j,k}^m) - \gamma_{i+1/2,j,k}^m (Z_{i+1,j,k} - Z_{i,j,k})]$$

$$+ T_{y_{i,j+1/2,k}}^m [(p_{i,j+1,k}^m - p_{i,j,k}^m) - \gamma_{i,j+1/2,k}^m (Z_{i,j+1,k} - Z_{i,j,k})]$$

$$+ T_{z_{i,j,k+1/2}}^m [(p_{i,j,k+1}^m - p_{i,j,k}^m) - \gamma_{i,j,k+1/2}^m (Z_{i,j,k+1} - Z_{i,j,k})]$$

$$+ q_{sc_{i,j,k}}^m = \frac{V_{b_{i,j,k}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j,k}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j,k}^n \right],$$

$$T_{y_{i,j-1/2}}^m [(p_{i,j-1}^m - p_{i,j}^m) - \gamma_{i,j-1/2}^m (Z_{i,j-1} - Z_{i,j})]$$

$$+ T_{x_{i-1/2,j}}^m [(p_{i-1,j}^m - p_{i,j}^m) - \gamma_{i-1/2,j}^m (Z_{i-1,j} - Z_{i,j})]$$

$$+ T_{x_{i+1/2,j}}^m [(p_{i+1,j}^m - p_{i,j}^m) - \gamma_{i+1/2,j}^m (Z_{i+1,j} - Z_{i,j})]$$

$$+ T_{y_{i,j+1/2}}^m [(p_{i,j+1}^m - p_{i,j}^m) - \gamma_{i,j+1/2}^m (Z_{i,j+1} - Z_{i,j})] + q_{sc_{i,j}}^m = \frac{V_{b_{i,j}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j}^n \right]$$

$$\int_{t^n}^{t^{n+1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right]$$

$$T_{x_{i-1/2}}^m [(p_{i-1}^m - p_i^m) - \gamma_{i-1/2}^m (Z_{i-1} - Z_i)] + T_{x_{i+1/2}}^m [(p_{i+1}^m - p_i^m) - \gamma_{i+1/2}^m (Z_{i+1} - Z_i)] + q_{sc_i}^m = \frac{V_{b_i}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right]$$

$$T_{x_{i+1/2},k} = \left(\beta_c \frac{k_x A_x}{\mu B \Delta x} \right) \Big|_{x_{i+1/2,k}} = \left(\beta_c \frac{k_x A_x}{\Delta x} \right)_{x_{i+1/2,k}} \left(\frac{1}{\mu B} \right)_{x_{i+1/2,k}} = G_{x_{i+1/2,k}} \left(\frac{1}{\mu B} \right)_{x_{i+1/2,k}}$$

$$T_{y_{i,j+1/2,k}} = \left(\beta_c \frac{k_y A_y}{\mu B \Delta y} \right) \Big|_{y_{i,j+1/2,k}} = \left(\beta_c \frac{k_y A_y}{\Delta y} \right)_{y_{i,j+1/2,k}} \left(\frac{1}{\mu B} \right)_{y_{i,j+1/2,k}} = G_{y_{i,j+1/2,k}} \left(\frac{1}{\mu B} \right)_{y_{i,j+1/2,k}}$$

$$T_{z_{i,j,k+1/2}} = \left(\beta_c \frac{k_z A_z}{\mu B \Delta z} \right) \Big|_{z_{i,j,k+1/2}} = \left(\beta_c \frac{k_z A_z}{\Delta z} \right)_{z_{i,j,k+1/2}} \left(\frac{1}{\mu B} \right)_{z_{i,j,k+1/2}} = G_{z_{i,j,k+1/2}} \left(\frac{1}{\mu B} \right)_{z_{i,j,k+1/2}}$$

EEE

Total No. of Questions :12]

SEAT No. :

P3960

[4959]-255

[Total No. of Pages :3

B.E. (Petroleum)

PETROLEUM PRODUCTION ENGINEERING-II

(2008 Course) (412388)

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 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) Discuss considerations in optimization of surface production facility?[6]
b) Draw and design a three phase vertical separator using the following data: [12]

Gas flow rate (Qg) = 10 MMscf/day

Oil flow rate (Qo) = 2000 bbls/day for 39° API

Operating Pressure = 980 psia

Operating Temperature = 60°F

Specific Gravity of Gas = 0.6

Gas compressibility = Z = 0.80

From std. graph given value of k = 0.284 (Constant based on liquid gas properties)

Liquid drop to be separated = dm = 100 micron

Assume slenderness ratio of 3 & 4. Retention time 2 & 3 minutes.

OR

P.T.O.

Q2) Draw and explain in brief, process flow diagram of a group gathering station. Explain various components and features of it. [18]

Q3) Use following data for sizing of a horizontal treater. [16]

Oil gravity = 38° API. Oil flow rate = 6000 bbl/day. Initial oil temperature = 90°F. Inlet BS & W and outlet BS & W are 6% and 2% respectively. Water S.G. = 1.01. Plot d Vs L_{eff} , computation of vessel diameter and length of coalescing section with retention time less than 10 minutes. Calculate heat required and choose suitable combination of d and L_{eff} that is not in the shaded area, for this treater.

Treating temperatures	100°F	120°F	140°F
Corresponding oil viscosity in cp	30	15	8
Diameter of water droplet to be settled from the oil, in microns.	120	130	150

OR

Q4) a) Draw schematic sketch of a vertical heater treater. [6]

b) Discuss in detail working of a floating roof tank. [10]

Q5) a) Describe in brief different methods to control oilfield corrosion. [10]

b) Explain Pilling and Bedworth rule used in corrosion calculations. [6]

OR

Q6) a) Write the role of different factors that contribute to corrosion process. [10]

b) Discuss the factors that are helpful in the prevention of corrosion. [6]

SECTION -II

Q7) a) Discuss in brief any two methods to remove paraffin from wells. [9]

b) Write various categories of scale and discuss the method of their removal in brief. [9]

OR

- Q8) a)** What is the role of temperature and pressure variation in scale deposition? Explain. [6]
- b) Explain drill stem testing method for testing of productive formation in brief. [6]
- c) Write applications of repeat formation test in brief. [6]

Q9) Use following data and evaluate formation damage using pressure-build up method. Show plot of 'P_{ws}' Vs '(t_o+Δt) /Δt on a semi log graph paper. Flow test data: 100 bbl/day. Pay zone thickness H = 50 ft. Bottom hole flowing pressure, P_{wf} = 1400 psi. Drainage radius, r_e = 700 ft. Wellbore radius, r_w = 0.30 ft. Fluid properties: Viscosity 20 cp, Oil formation volume factor, B_o = 1.10 res.bbl/STB. Cumulative production = 3500 bbl. Total shut in time, t_o = 700 hrs. Readings of pressure build up are given below. Values of Δt is included in '(t_o+Δt) /Δt', term. Use this term directly. [16]

P _{ws}	1480	1645	1750	1970	2020	2050	2070	2090	2105	2115	2120	2125	2129	36
(t _o + Δt) /Δt	1440	700	360	180	120	90	72	61	52	46	37	31	25	21

OR

Q10) Discuss water and gas shut-off job in detail. [16]

- Q11)a)** Explain various methods to improve production performance of a depleted oilfield in brief. [10]
- b) Draw intelligent well completion system. Indicate various elements of it. [6]

OR

Q12) Write short notes on: [16]

- Problem well analysis
- Unconventional hydrocarbon resources
- Well completion
- Horizontal well technology

EEE

Total No. of Questions : 6]

SEAT No. :

P3516

[4959]-256

[Total No. of Pages :1

B.E.(Petroleum Engineering)

**a : ADVANCE DRILLING ENGINEERING
(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 side indicate full marks.*
- 3) Assume Suitable data if necessary.*

SECTION - I

Q1) Discuss effect of change in temperature, Pressure and Mud density on casing buckling in detail. **[18]**

Q2) a) Discuss corrosion protection methods in detail. **[16]**

b) Discuss air drilling mechanism in detail.

Q3) a) Discuss Ton-mile calculations and its importance in detail. **[8]**

b) Discuss different logs to identify cement bond with casing and formation. **[8]**

SECTION - II

Q4) Find out minimum and maximum mud weight limits using Insitu stresses and Mohr's coulomb criteria. **[18]**

Q5) a) Discuss casing while drilling in detail. **[8]**

b) Describe importance of Managed pressure drilling. **[8]**

Q6) Discuss Lower completion and upper completion jewellery and its functions for horizontal well. **[16]**



Total No. of Questions : 6]

SEAT No. :

P3517

[4959]-257

[Total No. of Pages : 1

B.E. (Petroleum Engineering)
b-DEEP WATER TECHNOLOGY
(Semester - II) (2008 Course) (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 side indicate full marks.*
- 3) Assume Suitable data if necessary.*

SECTION - I

- Q1)** Discuss different motions involved on a floating vessel. Explain working of motion compensator with suitable figure. **[18]**
- Q2)** Explain pressure testing of subsea BOP and accumulator design with illustrative figure. **[16]**
- Q3)** a) Discuss different components of riser and their functions in detail. **[10]**
b) Discuss anchor deployment procedure in brief. **[6]**

SECTION - II

- Q4)** What are different types of offshore platforms? Explain any one with design considerations in detail. **[18]**
- Q5)** a) Describe 2 phase separator design considerations in detail. **[8]**
b) Discuss offshore development and planning in detail. **[8]**
- Q6)** Discuss EOR techniques used in deep water wells in detail. **[16]**

x x x

Total No. of Questions : 12]

SEAT No. :

P4531

[Total No. of Pages : 3

[4959]-258

B.E. (Petroleum Engineering)

(C) Transport of Oil and Gas

(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) *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.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right side indicate full marks.*
- 6) *Use of Calculator is allowed.*
- 7) *Assume suitable data if necessary*

SECTION - I

- Q1)** a) What is the significance of moody's friction factor in designing pipeline? **[10]**
- b) Write in brief about : **[8]**
- i) Reciprocating compressor
 - ii) Erosional flow

OR

- Q2)** Find pressure drop in a 6 inch and 8 inch I.D. line using the general equation and Hazen- William's equation. Data given: Flow rate of condensate and water is 600 and 230 bpd. Specific gravity of condensate and water is 0.87 and 1.05, Viscosity = 3 cp, Length = 12,000 ft, inlet pressure = 800 psi, temperature = 80 F. $\epsilon = 0.004$, $C = 120$, $f = 0.032$ and 0.034 for 6" and 8" respectively. **[18]**

P.T.O.

Q3) a) Gas flows to dehydrator, which operates at 800 psi. Line is rated for 1480 psi. Choose a line size and wall thickness using B 31.3 and B 31 .8. Data given: $Z= 0.67$ $V_{max} = 60$ ft/s, $V_{min} = 10-15$ ft/s Pressure drop = $900-800 = 100$ psi. Gas Flow rate = 23 MMscfd, Viscosity = 3 cp, Gas Gravity = 0.85, Length = 7000 ft, $E = 0.95$ $\rho_m = 6.93$ lb/cu ft. For 8" $F = 0.72$, $E = 1$, $T = I$, $S = 35,000$. For 6" $F=0.6$, $E= 1$, $T= 1$, $S = 25,000$. For 4" $F =0.4$, $E= 1$, $T= 1$, $S = 20,000$ [10]

b) Explain ANY THREE: [6]

- i) Limit-state based Strength Design
- ii) Out of Roundness Serviceability Limit
- iii) Hoop Stress vs. Equivalent Stress Criteria
- iv) Fatigue Assessment based on S-N Curves

OR

Q4) a) Explain in brief: (any two) [8]

- i) use of dampeners in compression
- ii) Nominal bore size
- iii) Piping hookup

b) What is the HP required in compressing 1 MMSCFD from 100 psia and 80 F to 1600 psia using adiabatic equation? The gas is cooled to 80 F between stages. What is the discharge temperature of the gas? $k =1.28$, gas gravity= 0.6, Z at 400 and 1600 psia are 0.985, 0.94 respectively.[8]

Q5) Explain with a flow diagram process to convert natural gas into methanol.[16]

OR

Q6) Write about the role of gas monetization options in oil and gas industry. [16]

SECTION - II

- Q7)** a) Discuss safety measure taken during commissioning of subsea pipelines. [8]
b) Write about: [8]
i) pigging operations
ii) pipeline inspection and testing

OR

- Q8)** a) Explain heat transfer and thermal insulation for pipeline operations. [8]
b) Explain with help of process diagram gas to urea. [8]

- Q9)** Write about various reasons for pipeline corrosion, their preventive and remedial measures. With help of neat sketch explain cathodic protection system. [16]

OR

- Q10)** Explain in brief about: [16]
a) Types of valves used in piping
b) Vortex-induced Vibrations (VIV) and Fatigue
c) Instrumentation use in piping system
d) FLNG

- Q11)** Explain in detail natural gas sweetening processes? [18]

OR

- Q12)** Short notes on [18]
a) Pipeline coating
b) FPSO
c) Flow assurance in oil and gas transport



Total No. of Questions :10]

SEAT No. :

P3961

[4959]-259

[Total No. of Pages :3

B.E. (Petroleum Engineering)
ENVIRONMENTAL TECHNOLOGY AND SAFETY IN
PETROLEUM INDUSTRY
(2008 Course) (Elective - III) (Semester - II)

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]**

OR

P.T.O.

- 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]



Total No. of Questions : 12]

SEAT No. :

P3308

[Total No. of Pages : 3

[4959]-26

B.E. (Civil)

HYDROPOWER ENGINEERING (Open Elective)

(2008 Pattern)

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) *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.*

SECTION - I

- Q1)** a) Explain concept, process, advantages and limitations of : [8]
i) Nuclear power
ii) Tidal power
b) What are the different investigations required to be executed before initiating the hydropower plant project? [8]

OR

- Q2)** a) Which are the six major hydropower potential river systems exists in India. State examples of significant hydropower stations established these systems. [8]
b) For each state four constraints for development of tidal power and wind power. [8]
- Q3)** a) Classify and explain different types of pumped storage plants at least two with sketch. [8]
b) Differentiate between base load and peak load plant. [8]

OR

P.T.O.

- Q4)** a) Explain the location and main components of tidal plant in detail. [8]
b) Explain the classification of hydropower plant based on : [8]
i) Function
ii) Plant capacity
iii) Head
iv) Location

- Q5)** 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 12000 kW to maximum of 44000 kW. Two turbo generators of capacities 22000 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

OR

- Q6)** a) Define and state equation for : [8]
i) Load factor
ii) Capacity factor
iii) Utilisation factor
iv) Plant factor
b) A river has a constant flow of 40 cumers with the head of 15 m considering overall efficiency of 80% determine : [10]
i) Firm capacity of run of river plant for 8 hrs without pondage
ii) Pondage factor
iii) Firm capacity of plant with pondage
iv) Volume of pondage

SECTION - II

- Q7)** a) What is meant by Instrumentation of power house. [8]
b) Explain constructional and design features of generator in hydropower generation. [8]

OR

- Q8)** a) Explain the criteria for dimensions of super structures bays for power house. [8]
b) Differentiate between head development underground power house and tail development underground power house. [8]

- Q9)** a) Determine the number of turbines and diameter of runner for a power plant having 40 cumers 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]
b) Explain classification of turbines according to various criteria in detail.[8]

OR

- Q10)** a) Write all steps to design the different parameter of reaction turbines with sketch. [10]
b) With the help of sketch explain governing of impulse turbine. [8]

- Q11)** a) Explain the duties of electricity generating companies in detail. [8]
b) Explain the concept of carbon credit and give its significance. [8]

OR

- Q12)** a) What are the functions of state load dispatch centres as per Electricity act 2003 ? [8]
b) Explain the participation of private sector in economics of Hydroelectric power. [8]



Total No. of Questions : 6]

SEAT No. :

P3962

[4959]-260

[Total No. of Pages : 4

B.E. (Petroleum)

PETROLEUM ECONOMICS

(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) Solve any two questions each from section I and II.*
- 3) Use of graph paper is allowed.*
- 4) Figures to the right indicate full marks.*
- 5) Assume additional data, if necessary.*

SECTION - I

Q1) a) Write notes on any two of the following: [16]

- i) Reserves calculation using decline curves.
- ii) Economic limit for different companies
- iii) Hubert curve.

b) Explain in brief on effects of oil price on import bill in India. [9]

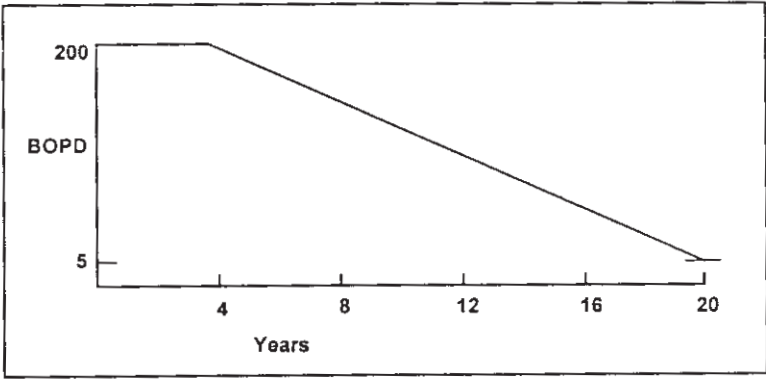
Q2) a) Write notes on any two of the following: [16]

- i) Resource classification system recommended by SPE.
- ii) Factors controlling oil pricing in international market.
- iii) Reserves auditing.
- iv) Reserves accretion and discovery of field size scenario in past 20 years.

b) Explain with the help of hypothetical cash flow diagram, various concepts used in the mathematical methods of profitability evaluation. [9]

P.T.O.

Q3) a) Figure given below shows that the well has produced at a constant rate of 200 BOPD for 4 years. The production then declined exponentially over the next 16 years to an economic limit of 5 BOPD. The company demands a minimum ROR of 8% and oil from this field is \$4.55/ bbl. net after local taxes, royalty and operating expenses. **[15]**



Calculate a composite NPV of a barrel of oil using annual compounding. Assume that NPV of decline production, as of start of decline, is \$4,50,000.00.

b) Define and explain in brief the following, Incremental analysis, sensitivity analysis, and replacement analysis. **[10]**

SECTION - II

Q4) a) A wildcat well is being considered in a relatively unknown but highly promising area. Available data indicates that three separate horizons independent from one another would most possibly be producing.

Create a decision tree for the success and failure for the horizons (X, Y, and Z) to illustrate the probability of occurrence of these events with possible outcome of events. **[15]**

- b) Write notes on any two of the following: [10]
- i) Profitability in projects and equivalence of field size in different countries within the framework of Production Fiscal System.
 - ii) Petroleum Accounting System.
 - iii) Risk analysis applied to Petroleum field development.
 - iv) Variation in technical costs of exploration and production of oil and gas as a function of water depth and geographic location.

Q5) a) Initial cost of the completely installed reactor is \$ 40,000 and its salvage value towards the completion of useful life is \$ 4000. Service life of the reactor is 8 years. Calculate its depreciation using Straight Line Depreciation (SLD), and Double Declining Balance (DDB) methods. **[15]**

Prepare a plot of book value against number of years and compare the results obtained with different methods in your own words.

- b) The following table lists recoverable reserves of 30 wells on a prospect (in Stb).

32.65	135.00	33.00	49.00	149.35
171.35	43.65	36.80	163.40	152.72
70.15	75.20	138.12	64.95	126.5
48.35	207.15	57.50	147.50	88.55
46.00	58.67	98.96	58.65	94.96
47.15	157.65	174.80	126.50	79.43

Plot the data in equal interval class. What may be the frequency of reserves for each class? Generate the histogram and Cumulative Frequency Diagram (CFB).

Using the information plotted in the answer sheet, what is the

- i) Probability of reserves greater than 60.00Stb.
- ii) Probability of reserves less than 100.00 Stb.
- iii) Probability of reserves between 60.00 Stb and 140.00 Stb.

[10]

Q6) a) What are the components of Production sharing contract in India? Explain the procedure for distribution of one barrel of oil between government and operator. Draw necessary diagrams. [15]

b) An oil and gas company has developed information on an offshore structure. The investment required is \$ 12 MM, there is a 50% chance that the structure may be dry. However, if successful, there is a 60% chance that the NPV will be \$ 30 MM and 40% chance of \$ 50 MM NPV. Should management opt for this proposal? Draw decision tree and justify your decision with proper calculations based on EMV. [10]



Total No. of Questions : 10]

SEAT No. :

P3963

[4959]-261

[Total No. of Pages : 3

B.E.(Petroleum Engineering)
PETROLEUM PRODUCTION ENHANCEMENT AND
OPTIMIZATION
(2008 Pattern) (412390B) (Elective-IV)(Semester-II)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Answer three questions from section I and three questions from section II.*
- 3) *Figures to 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) Write short notes on acid stimulation and hydraulic fracturing. [6]
b) What is the impact of fluid leak-off and closure pressure on the effectiveness of a hydraulic fracturing job? Explain with a diagram. [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
vi) Frictional pressure gradient = 400 psi/1000 ft
vii) Number of perforations = 4 perfs/ft; Diameter of Perforations=0.4"
viii) Perforation friction=12.7 psi
xi) $P_{NET} = 240$ psi
b) Write short note on Data Frac operation. How is it relevant to the actual job? [8]

P.T.O.

- Q3)** a) How is a DataFrac different than a calibration test? With the help of a diagram, explain the various pressure terms used in DataFrac and calibration test [10]
- b) Write short notes on: [6]
- Near wellbore pressure losses
 - Step up and Step down test
- Q4)** a) Calculate the fracture gradient under the following conditions: [10]
- i) Casing 7", # 29 to 3,500 ft
 - ii) M.D. top perf 3,250 ft
 - iii) M.D. bottom perf 3,348 ft
 - iv) Fluid being pumped– OIL API gravity 35°
 - v) ISIP = 1,400psi
- b) What do you mean by PKN and KGD models? How are they different from each other? [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) Draw the generic nature of following graphs and explain their role in optimization in brief [12]
- i) Choke performance curves
 - ii) Production rate Vs Tubing diameter
 - iii) Pressure drop in tubing Vs production rate at optimum GLR and for various GLR values.
- b) How choke differ from other completion equipment such as SSV or SSSV? List the reasons for which it is often necessary to control the flow through chokes. [6]

Q7) Draw the sequence of flow regimes that takes place before liquid loading of a gas well. Draw schematic sketches and explain in brief any three techniques to unload the liquid from a gas well. [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 real time monitoring? Write the benefits of real time monitoring of surface and subsurface production system in oil and gas field. How it is useful in the diagnosis of system performance? Explain in brief. [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

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. [16]



Total No. of Questions : 6]

SEAT No. :

P3518

[4959]-262

[Total No. of Pages : 2

**B.E. (Petroleum Engineering)
c-WELL CONTROL METHODS
(2008 Course) (Elective - IV) (Semester - II)**

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.*

SECTION - I

- Q1)** a) Discuss D exponent curve. **[18]**
- b) Describe Leak off test in detail.
- Q2)** a) Calculate shut in casing pressure with the following data Well depth 13, 750ft, SIDPP= 600 PSI, Mud weight = 12 ppg, Annular volume = 0.0459 bbl/ft Influx gradient = 0.112 psi/ft, Kick size = 30bbl **[4]**
- b) Discuss U tube concept in detail. **[6]**
- c) Define Trip gas, Connection gas and Swabbing. **[6]**
- Q3)** a) Draw line diagram for hard shut off. **[6]**
- b) Discuss the pressures at various locations in a well when gas is being circulated up the hole during a killing operation. **[10]**

P.T.O.

SECTION - II

Q4) a) Discuss volumetric method in detail. [9]

b) Discuss Driller's method in detail. [9]

Q5) a) Discuss well control problem Plugged choke and bit nozzle with remedy. [8]

b) Write Short note on:

i) IBOP

ii) Diverter system [8]

Q6) Write short note on [16]

a) BOP function test.

b) Snubbing.

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Total No. of Questions : 12]

SEAT No. :

P3451

[4959]-263

[Total No. of Pages : 3

B.E. (Chemical Engineering)
PROCESS DYNAMICS & CONTROL
(2008 Course) (409343) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Assume suitable data, if necessary.*
- 2) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Attempt the following questions:

- Q1)** a) Solve the following differential equation using Laplace and inverse Laplace transformations, $\frac{dy}{dt} + 2y = 3$, to find the time response equation, subject to initial conditions:

$$y(0) = y'(0) = 0 \quad [10]$$

- b) Describe the initial-value, final-value and time-shift theorems as applied to Laplace transformations. [6]

OR

- Q2)** Develop the complete mathematical model of a stirred tank heater, heated with an electrical heater coil supplying heat 'Q' to the liquid in the tank. List all the variables involved and state the assumptions made. [16]

- Q3)** Derive the transfer function of a U-tube manometer second-order system, starting from the basic force balance equation. [16]

OR

P.T.O.

Q4) A standard first-order process is controlled by a P-controller. Determine the following, assuming $G_m = G_f = 1$. [16]

- a) Overall closed-loop transfer function.
- b) Order of the closed-loop system.
- c) Offset equation for a unit step input in $Y_{sp}(s)$.
- d) Overall gain of the closed-loop system.

Q5) a) What is stability? Describe stability for a first-order process in terms of its transfer function. [9]

- b) Check the stability of the closed loop system that has the following characteristic equation, $CE = s^4 + 4s^3 + 6s^2 + 2s + 3 = 0$ [9]

OR

Q6) What is a root locus diagram and how is it used to find stability of a system? Explain stepwise construction of a root locus with a suitable example. [18]

SECTION - II

Q7) a) Explain controller tuning by Ziegler-Nichols tuning method with the PID controller settings. [6]

- b) Explain GM and PM in a Bode diagram of a system and find the K_c value for a P-controller for a system with. [10]

$$G_{OL}(s) = \frac{1}{(3s+1)(s+1)(5s+1)}$$

for the gain margin of 1.5, where the cross-over frequency is 0.78.

OR

Q8) Sketch the Bode plots of the following system, mentioning each step in detail, [16]

$$G(s) = \frac{1}{(4s+1)(s+1)}$$

- Q9)** a) Explain feed-forward control of a liquid level control system with a neat process diagram. [8]
- b) Explain how dead time compensation is done in a typical control loop having a significant dead time with a block diagram. [8]

OR

- Q10)**a) Explain inverse-response phenomena and the methods of compensation of such systems. [8]
- b) Explain split-range control system with a suitable example. [8]

Q11) Write short notes on:

- a) Programmable logic controllers and their applications (PLC). [9]
- b) Supervisory control and data acquisition systems (SCADA). [9]

OR

- Q12)**a) Describe working of a hold element in a digital control system with respect to a zero-order. [9]
- b) Explain the design of a Direct Digital Control (DDC) system through a neat block diagram. [9]



Total No. of Questions : 12]

SEAT No. :

P3452

[4959]-264

[Total No. of Pages : 4

B.E.(Chemical)

CHEMICAL REACTION ENGINEERING -II
(2008 Course) (409344)(Semester-I)

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 books.*
- 3) *Neat diagrams must be drawn whenever 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) Derive conversion- time expression for cylindrical constant size particle with ash layer diffusion control. **[8]**
- b) A solid feed consisting of 20 wt% of 1mm particles and smaller, 30 wt% of 2mm particles, 50wt% of 4mm particles is to be passed through a rotating tubular reactor, somewhat like a cement klin, where it reacts with gas of uniform composition to give a hard reasonable solid product. Experiments show that the progress of conversion can reasonably be represented by reaction control for the unreacted core model, and that the time for complete conversion of 4mm particles is 4 hrs. Find the residence time needed in the tubular reactor for 75% conversion of solids. **[10]**

OR

- Q2)** a) Derive an expression for fractional conversion of solids in case of mixed flow of particles of a single unchanging size with uniform gas composition for different resistance controls. **[8]**
- b) What are the various factors responsible for design of Fluid-solid reactors? Explain various types of reactors used for fluid-solid reactions in detail with suitable diagram. **[10]**

P.T.O.

Q3) a) Derive the rate expressions for fast reactions with second order rate and pseudo First order rate in case of fluid-fluid reactions by considering suitable reaction. [8]

b) The concentration of an undesirable impurity A in air is to be reduced from 0.1% to 0.2% by absorption in pure water. Find the height of the tower required for counter-current operation. [8]

$$k_{Ag}a = 32000 \text{ mol/hr.m}^3 \cdot \text{atm}$$

$$k_{Al}a = 0.1/\text{hr}$$

$$H_A = 125 \times 10^{-6} \text{ atm.m}^3/\text{mol}$$

$$L \approx L' = 7 \times 10^5 \text{ mol/hr.m}^2$$

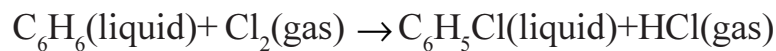
$$G \approx G' = 1 \times 10^5 \text{ mol/hr.m}^2$$

$$\pi = 1 \text{ atm}$$

$$C_T = 56000 \text{ mol/m}^3$$

OR

Q4) Benzene is to be chlorinated in a tower by countercurrent contacting with a stream of pure gaseous chlorine. The reaction is slow, elementary, and irreversible.



The reaction occurs in the liquid between dissolved chlorine and benzene. The required assumptions are:

Constant molar density of liquid $C_T = \text{constant}$; Constant pressure in gas phase, $\pi = \text{constant}$; Plug flow of both streams; small amount of dissolved and unreacted chlorine in liquid; Low solubility of HCl in liquid; The reaction of Cl_2 with $\text{C}_6\text{H}_5\text{Cl}$ to be neglected.

Derive the expression for the height of tower as a function of the system variables. [16]

Q5) a) Define void volume and pore density in case of solid catalyst. Explain both in detail. [8]

b) Explain the BET method for determination of surface area of catalyst. [8]

OR

- Q6)** a) Explain catalyst poisoning with types of catalyst poisons in detail. [8]
 b) Discuss adsorption isotherms in detail. [8]

SECTION-II

- Q7)** a) Explain diffusion in porous catalysts with the help of suitable sketch. [8]
 b) Explain and derive an expression for effectiveness factor. [8]

OR

- Q8)** a) Write a short note on mass transfer with reaction with the help of effectiveness factor in catalytic reactions. [8]
 b) Derive an expression for gaseous diffusion in single cylindrical pores of catalyst. [8]

- Q9)** The catalytic reaction $A \rightarrow 4R$ is studied in a plug flow reactor using various amounts of catalyst and 20 liter/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 runs as follows

Run	1	2	3	4	5
Catalyst used,kg	0.020	0.040	0.080	0.120	0.160
$C_{A, out}$, mol/lit	0.074	0.060	0.044	0.035	0.029

Find a rate equation to represent this reaction using integral method of analysis with following data

$$C_{A0} = 0.1 \text{ mol/lit}, F_{A0} = 2 \text{ mol/hr}, \epsilon_A = 3 \quad [16]$$

OR

- Q10)** Write a short note on [16]
 a) Differential Reactor.
 b) Mixed Reactor
 c) Integral Reactor
 d) Batch Reactor

Q11) Write a short note on design procedures for

[18]

- a) Slurry reactor
- b) Fluidized bed reactor
- c) Packed bed reactor

OR

Q12) a) Explain in detail design of staged adiabatic reactor.

[9]

b) Explain Michaelis- Menton Kinetics with its model parameters.

[9]



Total No. of Questions :12]

SEAT No. :

P3964

[4959]-265

[Total No. of Pages :4

B.E. (Chemical)

**Chemical Engineering Design - II
(2008 Course) (Semester - I)**

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.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) With neat sketches explain axial flow impellers. **[6]**

- b) A jacketed reactor with agitator has a diameter of 1.5 m with a hemispherical bottom and a flat top. Jacket is fitted to the cylindrical section only and extends to a height of 1.2 m. The spacing between the jacket and the vessel wall is 75 mm. The jacket is fitted with a spiral baffle. The pitch between the spirals is 200 mm. Cold water at 10°C is used as a coolant @ 32,000 kg/h with an exit temperature of 20°C. Estimate the heat transfer coefficient at the outside wall of the reactor and the pressure drop in the jacket. Density of water = 998 kg/m³, viscosity of water = 1.136 mNs/m², $N_{pr} = 7.9$, $k_f = 0.59$ W/mK, $j_f = 3.2 \times 10^{-3}$. **[10]**

OR

Q2) a) Write a note on jackets and coils for reaction vessels. **[8]**

- b) Calculate the diameter of shaft for an agitation system. Power required for agitation is 3HP and speed of rotation is 56 rpm. Impeller diameter is 65 cm. Maximum torque is 18900 kg-m while bending moment is 27700 kg-m **[8]**

Permissible shear stress = 400 kg/cm²

Permissible tensile stress = 600 kg/cm²

P.T.O.

Q3) a) Find the column diameter of a plate column for the following specifications: Feed stream: 10% w/w acetone in aqueous stream, 20°C, 13000kg/h. No. of theoretical stages 16, slope of bottom operating line =5, slope of top operating line = 0.57, $x_D=0.94$ (98%w/w), $x_W = 50$ ppm, $R = 1.35$, plate efficiency = 60%, plate pressure drop = 100 mm, Vapor density at bottom = 0.72 kg/m³, liquid density at bottom = 954 kg/m³, surface tension at bottom = 57×10^{-3} N/m, Vapor density at top = 2.05 kg/m³, liquid density at bottom = 753 kg/m³, surface tension at top = 23×10^{-3} N/m, surface tension at bottom = 57×10^{-3} N/m, $K_{1 \text{ top}} = 0.09$ and $K_{1 \text{ Bottom}} = 0.075$. **[12]**

b) What are the various types of areas used for design of plate column? How these areas are decided? **[6]**

OR

Q4) a) Explain. **[8]**

i) Liquid flow patterns on cross flow trays.

ii) Types of downcomers.

b) Explain the downcomer back up calculations for a sieve plate column with all the equations. **[10]**

Q5) a) Explain the estimation of packed bed height for an absorption column with all the relevant equations. **[8]**

b) Discuss the general guidelines for the choice between plate and packed columns. **[8]**

OR

Q6) a) Describe the Van Winkle method for predicting plate efficiency. **[6]**

b) Sulphur dioxide produced by combustion of sulphur in air is absorbed in water. Pure SO_2 is then recovered from the solution by steam stripping. The feed is 5000 kg/h gas of containing 8% w/w SO_2 . A 95% recovery of SO_2 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 $\text{H}_2\text{O}/\text{m}$ packing height.

Data - Type of packing = Intalox saddle,

Material = Ceramic , Size = 38 mm , $F_p = 170 \text{ m}^{-1}$ Gas density = 1.21 kg/m^3 ,

Liquid density = 1000 kg/m^3 , Liquid viscosity = 10^{-3} N.S/m^2

Select the K_4 value from the table given below.

[10]

$F_L V$	0.2	0.6	0.75	1.0
K_4 At flooding	2.2	0.95	0.80	0.60
K_4 At desing ΔP	0.65	0.45	0.35	0.25

SECTION - II

Q7) a) Make a preliminary design for a separator to separate a mixture of steam and water. Steam flow rate is $2,000 \text{ kg/h}$ and water flow rate is $1,000 \text{ kg/h}$. operating pressure is 4 bar . Liquid density = 927 kg/m^3 , Vapour density = 2.2 kg/m^3 . [10]

b) Explain oil- water separator with neat sketch. [6]

OR

Q8) a) Explain the design of decanter with all equations involved. [8]

b) With neat sketches explain the different types of flanges used in piping networks. [8]

Q9) a) Explain the pipeline design for transportation of crude oil. [8]

b) Water is to flow through a pipeline at a rate of 1 kg/sec to a distance of 1.5 kilometer . The impressed head of water is 9.8 m Density of water = $1,000 \text{ kg/m}^3$, viscosity = 1 mN s/m^2 , What should be the diameters of the pipeline? [10]

OR

Q10)a) Explain the calculations of friction factor and pressure drop for non-compressible and compressible fluids. [9]

b) Natural gas with a specific gravity 1.20 at 1,43,000 kPa and 46°C is being blown down to 1,02,000 kPa. The flow rate could be from 95 m³/day. The drop through pressure reducing regulator is 3,100 kPa, leaving 1,000 kPa for the pipe. The pipe length is 140 m upstream of the regulator and 8.7m downstream pipe diameters Molecular weight of gas = 20, $\psi = 0.6$. [9]

Q11)a) Explain different codes used for pipeline design. [10]

b) Discuss the functions and desirable properties of gasket materials. [6]

OR

Q12)a) Explain the materials used for low, normal and high temperature service pipeline. [8]

b) Explain most commonly used piping components. [8]



Total No. of Questions :12]

SEAT No. :

P3453

[4959]-266

[Total No. of Pages :2

B.E. (Chemical)

a : ENVIRONMENTAL ENGINEERING

(2008 Course) (Semester - I) (Elective - I) (409341)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers three questions from sections 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) Write Air pollution Episode in detail. **[16]**

OR

Q2) With the help of neat figure explain carbon cycle & nitrogen cycle. **[16]**

Q3) a) Explain kyoto protocol.

b) Discuss the equation of efficiency of Electrostatic precipitator. **[16]**

OR

Q4) Explain venturi scrubber in detail. **[16]**

Q5) Explain centrifugal scrubber in detail. **[18]**

OR

Q6) Discuss about different toxic effects of gaseous pollutants. **[18]**

P.T.O.

SECTION-II

Q7) Discuss how the least square method can be used to calculate the BOD constant for the wastewater. **[16]**

OR

Q8) What are the nine categories of water pollutants? Discuss in detail. **[16]**

Q9) a) Explain oxygen sag curve.

b) Write procedure to determine BOD₅ of wastewater in detail, with formula. **[18]**

OR

Q10)a) Explain trickling filter in detail.

b) Explain activated sludge process in detail.

[18]

Q11) Write short notes on:

[16]

a) Acid Rain

b) Flotation

OR

Q12) Explain Ion Exchange process with neat figure.

[16]

EEE

Total No. of Questions :12]

SEAT No. :

P3454

[4959]-267

[Total No. of Pages :3

B.E. (Chemical Engineering)
b:MEMBRANE TECHNOLOGY
(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 indicate full marks.*
- 5) Use of calculator is allowed.*
- 6) Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Explain historical background of membrane processes. [6]
- b) Define membrane and classify membrane separation processes. [6]
- c) State merits and demerits of membrane processes over conventional separation processes. [6]

OR

- Q2)** a) Classify membranes used for separation purpose. [6]
- b) Distinguish between osmosis and reverse osmosis. [6]
- c) distinguish between MF, UF, and RO processes based on pore size and solute rejection properties. [6]
- Q3)** a) State materials and their properties used for membranes. [8]
- b) Explain the effect of molecular weight and chain interactions in case of polymeric membranes on removal efficiency. [8]

OR

P.T.O.

Q4) a) Explain the effect of chain flexibility on properties of polymeric membranes. [8]

b) Define the glass transition temperature of polymer and explain the effect of polymer structure on it. [8]

Q5) Explain any four methods of preparation of composite membranes. [16]

OR

Q6) Explain the following methods of preparation of synthetic membranes:

a) Phase inversion [8]

b) Immersion precipitation [8]

SECTION-II

Q7) Explain any four methods of characterization of nonporous membranes. [16]

OR

Q8) Explain any four methods of characterization of porous membranes. [16]

Q9) a) Explain the transport processes involved in porous and nonporous membranes. [8]

b) Explain the nonequilibrium thermodynamic principles involved in membrane transport processes. [8]

OR

Q10) Explain theory and applications of any four pressure-driven membrane separation processes. [16]

Q11) Write short notes on the following:

[18]

- a) Boundary layer model for concentration polarization of membranes.
- b) Membrane fouling.
- c) Hollow fiber membrane module.

OR

Q12) Write short notes on the following:

[18]

- a) Osmotic pressure model for concentration polarization of membranes.
- b) Gel layer model for concentration polarization of membranes.
- c) Spiral wound membrane module.

EEE

Total No. of Questions :12]

SEAT No. :

P3455

[4959]-269

[Total No. of Pages :2

B.E. (Chemical)

d:CORROSION ENGINEERING

(2008 Course) (Semester - I) (Elective - I) (409341)

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) Compare wet and dry corrosion. [8]
- b) State importance of Faraday's law in the study of corrosion. [10]

OR

- Q2)** a) Discuss the method for calculating rate of corrosion. [10]
- b) What EMF series? How is it useful? [8]
- Q3)** a) Explain construction and working of electrode used for corrosion measurement. [8]
- b) What is charge transfer resistance? [8]

OR

- Q4)** a) What is effect of polarization on corrosion? [8]
- b) Write short note on: Evans diagram. [8]

P.T.O.

- Q5)** a) What is stress corrosion? Give some industrial examples of it. [12]
b) Explain the term pitting corrosion. [4]

OR

- Q6)** a) Why dezincification occurs? [4]
b) How galvanic corrosion can be prevented? [12]

SECTION-II

- Q7)** a) What is pilling Bed worth ratio? [7]
b) Discuss various corrosion testing methods. [9]

OR

- Q8)** a) Which factors influence corrosion of steel in aqueous media? [8]
b) Describe mechanism of oxidation of metals. [8]

- Q9)** a) How alloying helps in prevention of corrosion. [8]
b) Inappropriate heat treatment of metal leads to corrosion. Justify your answer. [8]

OR

- Q10)**a) Enlist industrially important surface coatings used for prevention of corrosion. [8]
b) What is mechanical method of surface treatment? [8]

- Q11)**a) What is electroplating? Where is it practiced? [10]
b) What are principles of cathodic protection technique? [8]

OR

- Q12)**a) Discuss electro-chemical nature of metals. [10]
b) With some practical examples describe various forms of corrosion. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P3505

[4959]-27

[Total No. of Pages : 3

B.E. (Civil)

d:INDUSTRIAL WASTE WATER MANAGEMENT

(2008 Pattern) (Semester - II) (Open Elective)

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 logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Explain the following processes for the removal of colloidal & dissolved solids in waste water: **[18]**

- a) Ultra filtration
- b) Reverse- osmosis
- c) Electro- Dialysis

OR

Q2) Attempt the followings

- a) Discuss in detail about the Physical unit processes commonly used in waste water treatment. **[10]**
- b) Explain the process for removal of color and Odour from waste water by activated carbon filtration. **[8]**

P.T.O.

Q3) Attempt the followings

- a) State & draw the single stage and two stage lime treatment process flow diagram for phosphorus removal. [10]
- b) Discuss in detail about the chemical oxidation with ozone for the reduction in COD & colour in waste water? [6]

OR

Q4) Attempt the followings

- a) Explain briefly how wetland could be used for waste water treatment system? [9]
- b) Explain chemical process for removal of heavy metals from waste water. [7]

Q5) Attempt the followings

- a) Explain briefly about the biological process for removal of phenol from industrial waste water? [9]
- b) Discuss the recycling of treated sewage after tertiary treatment? [7]

OR

Q6) Write in brief about: [16]

- a) Membrane reactor with submerged membrane.
- b) Cyclic reactor.
- c) Nitrification process.
- d) De-nitrification process.

SECTION - II

Q7) Attempt the followings

- a) Draw & describe the schematic diagram of a waste water treatment plant to reuse the sewage in residential complex. [9]
- b) Describe the methods of three R principles to convert waste in to wealth? [9]

OR

Q8) Attempt the followings

- a) Explain how waste water could be used for irrigation? Also discuss about preventive measures and health aspects? [9]
- b) Explain the mechanism of Soda recovery in pulp and paper mills? [9]

Q9) Attempt the followings

- a) Explain the concept of Zero Discharge of effluent? [8]
- b) Discussed the application of zero discharge technology based on three R principles for pulp & paper industries. [8]

OR

Q10) Attempt the followings

- a) Draw & discuss the flow sheet for the zero discharge of waste water produced in Sugar cane industries? [8]
- b) Explain about the zero discharge of solid waste from residential complex? [8]

Q11) Attempt the followings

- a) Discuss the pollution hazards due to radioactive materials? [8]
- b) Explain the sorption mechanism & BDST model? [8]

OR

Q12) Attempt the followings

- a) Explain in brief the standards related to solid waste from residential complex? [6]
- b) Discuss about the green processes adopted in the industries? [10]

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Total No. of Questions :12]

SEAT No. :

P3456

[4959]-270

[Total No. of Pages :3

B.E. (Chemical Engineering)
CHEMICAL PROCESS SYNTHESIS
(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) *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 are the different considerations for the development of a chemical process. [8]
- b) Explain in short, the hierarchy of process design and Onion model. [8]

OR

- Q2)** a) Explain different steps for complete engineering design and development of new process. [8]
- b) Write a short note on - Overall process design. [8]
- Q3)** a) Explain in detail different parameter in choice of reactor. [8]
- b) Explain reactor system for multiple reactions in series producing biproduct with respect to choice of reactor. [8]

OR

P.T.O.

- Q4)** a) Explain the role of temperature and pressure during the choice of reactor. [8]
- b) Write a short note on any two: [8]
- i) Reaction path.
 - ii) Idealized reactor model.
 - iii) Selection criteria for polymerization reactions.
- Q5)** a) When and how you select the absorption and evaporation operation as a choice of reactor? [8]
- b) What are the methods of separation of homogeneous mixtures? Explain any one. [10]

OR

- Q6)** Write a short note on - any three: [18]
- a) Choice and selection criteria for separator.
 - b) Azeotropic distillation as a choice of separator.
 - c) Role of phase and catalyst during the choice of reactor.
 - d) Separation of heterogeneous mixtures.

SECTION-II

- Q7)** a) Explain the concept of direct and indirect sequencing using simple columns. [8]
- b) Explain the concept of thermal coupling with the help of side rectifier and side stripper arrangements. [8]

OR

- Q8)** a) Write a short note on - optimization of reducible structure. [8]
- b) Discuss heuristics used for the sequence selection for simple distillation column. [8]

- Q9)** a) Explain in short - Heat recovery pinch. [8]
b) Explain the concept of energy targets, and composite curves. [8]

OR

- Q10)**a) Write a short note on - Integration of heat pump. [8]
b) Explain the concept of Heat exchanger network and utilities of chemical processes. [8]
- Q11)**a) Explain various types of explosion hazards. [6]
b) Discuss attenuation of hazardous materials. [6]
c) Write short note on -safety devices. [6]

OR

- Q12)** Write short note on - any three: [18]
- a) Toxic release.
b) Overall safety and health consideration.
c) Fire hazards.
d) Intensification of hazardous materials.

EEE

Total No. of Questions :12]

SEAT No. :

P3457

[4959]-271

[Total No. of Pages :2

B.E. (Chemical)

b: ADVANCED MATERIALS

(2008 Course) (SEMESTER-) (Elective - II) (409342)

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) 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)** Explain in detail Austempered Ductile Iron. **[8]**
- b) Write down the different types Steels for special applications with example. **[10]**

OR

- Q2) a)** Discuss Advanced Metallic Systems. **[9]**
- b) Write down the different types of steels used in chemical industries. **[9]**
- Q3) a)** Describe the different types of polymeric materials with example in detail. **[8]**
- b) Describe Polymer Technology. **[8]**

OR

- Q4)** Explain in detail advanced polymeric materials with example. **[16]**

P.T.O.

Q5) Discuss in detail Advanced Ceramic Materials with examples used in chemical industrial applications. [16]

OR

Q6) a) Describe Advanced powder synthesis techniques. [8]

b) Explain different Advanced processing methods for Engineering Materials. [8]

SECTION-II

Q7) a) Write down the Physical and Chemical properties of Composite Materials. [8]

b) Write down the different advantages and disadvantages of Polymer Composites. [8]

OR

Q8) Explain Reinforcing mechanisms and matrix materials with example in detail. [16]

Q9) a) Explain Mechanical behaviour and properties of Metal Composites. [12]

b) Write short note on different types of reinforcement of metal. [6]

OR

Q10) Describe fabrication methods of Ceramic Composites. [18]

Q11) Explain Carbon composites, their properties, fabrication methods and their applications. [16]

OR

Q12) Define Nanomaterials with example. Write down the synthesis of nonmaterial's and what are the different applications of nonmaterials in chemical industries. [16]

EEE

Total No. of Questions :12]

SEAT No. :

P3458

[4959]-272

[Total No. of Pages :3

B.E. (Chemical Engineering)

c: POLYMER TECHNOLOGY

(2008 Course) (Elective - II) (Semester - I) (409342)

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 Linear, Branch and Cross linked polymers with one example each. **[10]**
- b) Explain in detail different factors which need to be considered for determining mechanical properties of polymers. **[8]**

OR

- Q2)** a) Explain the properties of polymers based on geometric isomerism and chemical composition. **[10]**
- b) Explain the properties of polymers based on Tacticity. **[8]**
- Q3)** a) Explain with one example in detail Suspension Polymerization technique. **[8]**
- b) Write a note on Addition Polymerization. **[8]**

OR

P.T.O.

- Q4)** a) Explain in detail with examples Interfacial Polymerization Technique. [8]
b) Write a note on “Bulk polymerization”. [8]
- Q5)** Explain in detail with one example each the effect of Molecular weight on properties of polymers. [16]

OR

- Q6)** a) Find the Number average, weight average Molecular weight and polydispersity Index of the given mixture which is composed of 10 molecule of 10,000 monomer lengths and 190 molecules of 20,000 monomer lengths and 25 molecules of 2000 monomer lengths. [10]
b) Write a note on “Effect of Molecular weight on Engineering Properties of Polymers”. [6]

SECTION-II

- Q7)** a) Discuss “Kinetics Coordination Polymerization”. [8]
b) Explain with example importance of chain Transfer Agents. [8]

OR

- Q8)** a) Discuss the mechanism of Free Radical Polymerization and derive necessary equations kinetics of Free Radical Polymerization. [8]
b) Discuss Gel Effect in Chain Growth Polymerization. [8]
- Q9)** a) Explain Dough Molding Composition. [9]
b) Explain in detail with neat sketch Resin Transfer Molding. [9]

OR

- Q10)** a) Explain any two methods with neat sketch, working of thermoplastic molding. [10]
b) Discuss the following additives with the importance: Plasticizer, Filler, fire retardant. [8]

Q11) Write a short note on reactor systems used for PE and PS.

[16]

OR

Q12) Give technology overview for the following polymer

[16]

- a) Butyl rubber,
- b) Nylon 66,
- c) Unsaturated polyester.

EEE

Total No. of Questions : 12]

SEAT No. :

P3965

[4959]-274

[Total No. of Pages : 3

B.E. (Chemical)

**e-ADVANCED SEPARATION PROCESSES
(2008 Course) (Semester - I) (409342) (Elective - II)**

Time :3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answers 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, it necessary.*

SECTION - I

- Q1)** a) What is cross flow filtration? What are its advantages over dead end filtration? [6]
- b) What is the principle and working of Ultrafiltration? Discuss its application. [10]

OR

- Q2)** a) Explain the detail working of chromatography. [6]
- b) Explain the basic concept of HPLC process. [10]

- Q3)** a) Give the application of chromatography in separation of enzymes and proteins. [8]
- b) Explain adsorption mechanism in separation of fluid-solid system. [8]

OR

- Q4)** a) Discuss the classification of membrane processes along with its applications. [8]
- b) Explain the basic types of modules used in Reverse Osmosis. [8]

P.T.O.

- Q5)** a) Calculate the osmotic pressure of a solution containing 0.10 gmol NaCl/1000 g H₂O at 250°C. Density of water = 997.0 kg/m³ [6]
- b) Write down the classification of the membrane module. [8]
- c) Explain the following terms: [4]
- i) Rejection
 - ii) Permeate

OR

Q6) Discuss the following in detail.

- a) Characteristics of the complexing agent used in chemical-complexation. [9]
- b) Reactive distillation process. [9]

SECTION - II

- Q7)** a) Write down 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) Write short notes on

- 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) Adductive Crystallization. [8]

OR

Q10) Write short notes on:

- a) Zone Electrophoresis. [8]
- b) Differentiate between electrophoresis and dielectrophoresis and discuss advantages of dielectrophoresis over electrophoresis techniques? [8]

Q11) Explain the classification of unit operations based on the property difference. [16]

OR

Q12) Write short notes on: [16]

- a) Exchange Reaction.
- b) Describe mechanism and applications of supercritical fluid extraction in chemical & biochemical industry?

x x x

Total No. of Questions :12]

SEAT No. :

P3459

[4959]-275

[Total No. of Pages :3

B.E. (Chemical)

f: PETROLEUM REFINING

(2008 Course) (Elective - II) (Semester - I) (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) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

SECTION-I

- Q1) a)** Describe in details about introduction to petroleum industries in India as well as world and its scenario. **[8]**
- b) Describe the tests and properties of gasoline and kerosene. **[8]**

OR

- Q2) a)** Give brief account on origin formation and composition of Petroleum? **[12]**
- b) Why Pre-refining operation is necessary in the petroleum Industry? **[4]**
- Q3) a)** Describe Heating through exchangers and pipe still heaters with schematic diagram? **[12]**
- b) What are the pre-refining techniques? Discuss its role in the refinery. **[4]**

OR

- Q4)** Describe Atmospheric distillation Unit with suitable Diagram. **[16]**

P.T.O.

- Q5) a)** What would be the feed and final products of Fluid Catalytic Cracking units? Describe FCC with schematic diagram? [12]
- b) What is cracking operation? Differentiate between thermal cracking and catalytic cracking? [6]

OR

Q6) Write short notes on: [3×6=18]

- a) Hydro cracking
- b) Coking
- c) Reforming

SECTION-II

Q7) Why desulphurization is necessary in the refinery? Discuss Hydro-desulphurization process with typical schematic diagram along with reaction and operating parameters. [16]

OR

- Q8) a)** What is the need of chemical refining? Describe chemical refining operation with schematic diagram. [8]
- b) Discuss Hydro-refining techniques with typical schematic diagram? [8]
- Q9) a)** Why additives are added in the petroleum products? Discuss in brief about the additives used for gasoline and diesel. [12]
- b) Discuss the transportation methodologies for petroleum products. [4]

OR

- Q10)a)** Discuss various safety aspects in the refinery? [8]
- b) Discuss in details various recent trends in Marketing of petroleum and petroleum products? [8]

- Q11)a)** Discuss in details about the recent trends in petroleum in terms of Distillation. [12]
- b) Discuss the recent advances in the packing materials. [6]

OR

- Q12)a)** What is the role of catalysis in the petroleum industry? Enlist various catalyst used for refining and treatment techniques of petroleum fractions. [12]
- b) What are the general classifications of finished refinery products? Differentiate between Bio-refinery and hydrogen refinery? [6]

EEE

Total No. of Questions : 12]

SEAT No. :

P3966

[4959]-276

[Total No. of Pages : 4

B.E. (Chemical)

**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

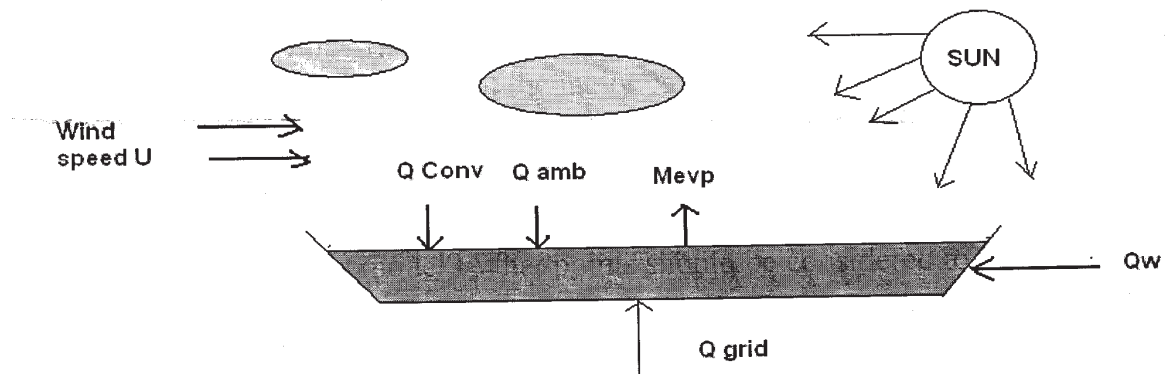
- Q1)** a) Why modeling? Explain. [8]
- b) Provide a classification of the major categories of equations in process model. What are the subclasses in each major category. [8]

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:

- The modeling definition.
- The principle mechanism.
- The key assumptions.
- The principle balance volume of the system.
- The convective flows in the system.
- The key data that might be needed.

OR

Q4) Write component continuity equations describing the CSTR with your notations. **[18]**

- Simultaneous reactions-first order, isothermal $A \xrightarrow{k_1} B \quad A \xrightarrow{k_2} C$.
- 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 triple effect evaporator. Write assumptions. Draw a figure. [16]

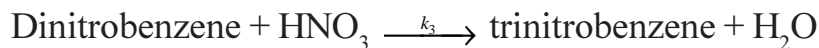
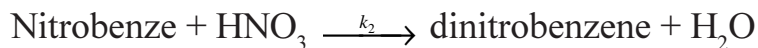
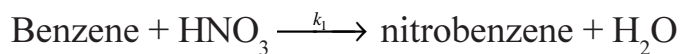
SECTION - II

Q7) Develop a model for stripper. [16]

OR

Q8) Develop a model for batch 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 Biochemical reactor. [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. **[16]**

$$0 = \frac{F}{V} C_{in} - \frac{F}{V} C - KC^3$$

Where $\frac{F}{V} = 0.1 \text{ min}^{-1}$, $C_{in} = 1.0 \text{ kg mol/m}^3$, $K = 0.05 \text{ m}^6 / \text{kg mol}^2 \text{ min}$.

- a) How many steady state solutions are there?
- b) Write two different direct substitution methods and assess the convergence of each.



Total No. of Questions :12]

SEAT No. :

P3967

[4959]-277

[Total No. of Pages :4

B.E. (Chemical)

PROCESS ENGINEERING COSTING & PLANT DESIGN

(2008 Course) (Semester - II) (409352)

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) Explain factors affecting process selection. **[8]**

b) Explain the factors that govern selection of plant location. **[8]**

OR

Q2) a) Explain safety considerations in plant design. **[8]**

b) Write a note on flowsheet preparation. **[8]**

Q3) a) Explain impact of taxes and insurance on economic situation of an industry. **[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]**

OR

P.T.O.

- Q4) a)** Explain the methods for determining depreciation. **[8]**
- b) A heat exchanger has been designed for 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 heat exchanger 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 heat exchanger is cheaper by comparing capitalized costs. **[8]**
- Q5) a)** Explain in detail mathematical methods for profitability evaluation with neat diagram. **[9]**
- b) Explain cash flow analysis for an industrial operation. **[9]**

OR

- Q6) a)** Explain with a neat sketch cumulative cash position showing effects of cash flow with time for an industrial operation neglecting time value of money. **[9]**
- b) A company has three alternative investments which are being considered. Because all these investments are for the same type of unit and yields same service only one of the investments can be related. If a company Incharge expects 15% rate of return on original investment which one will be suitable? **[9]**

Item	Investment (I)	Investment (II)	Investment (III)
Initial Fixed Capital (Rs.)	1,00,000	1,70,000	2,10,000
Working Capital Investment (Rs.)	10,000	10,000	15,000
Annual Cash Flow (Rs.)	30,000	52,000	59,000
Annual Expenditure (Rs.)	15,000	28,000	21,000

SECTION-II

- Q7) a)** By using La-Grange multiplier method minimize the following objective function that is subject to single equality constraints: **[6]**

$$\text{Minimize } f(x) = 4x_1^2 + 5x_2^2$$

$$\text{subject to } 2x_1 + 3x_2 = 6$$

- b) A plant produces water pumps at the rate of P units per day. The variable costs per water pumps have been found to be Rs. $47.73 + 0.1 P^{1.2}$. The total daily fixed charges are Rs. 1750, and all other expenses are constant at Rs. 7325 per day. The profit is selling price per water pump minus total cost per water pump. Total cost per water pump is given as,

$$C_T = 47.73 + 0.1 P^{1.2} + (1750 + 7325)/P$$

If the selling price per water pump is Rs. 173, determine: **[10]**

- i) The daily profit at production schedule giving the minimum cost per pump.
- ii) The daily profit at production schedule giving the maximum daily profit.
- iii) The production schedule at the break-even point.

OR

- Q8) a)** Explain graphical and analytical procedure for optimization with two or more variables. **[10]**

- b) Write a note on optimum conditions in cyclic operations. **[6]**

- Q9) a)** Write a note on Pinch Technology. **[8]**

- b) Derive the following equation for the optimum outside diameter of insulation on a wire for maximum heat loss: **[8]**

$$D_{\text{opt}} = \frac{2k_m}{(h_c + h_r)_c}$$

Where k_m the mean thermal conductivity of the insulation and $(h_c + h_r)_c$ is the combined and constant surface heat transfer coefficient. The values of k_m and $(h_c + h_r)_c$ can be considered as constants independent of temperature level and insulation thickness.

OR

Q10)a) Derive the equation for optimum cooling water flow rate in condenser. **[8]**

b) Explain preparation of Techno-economic feasibility report. **[8]**

Q11) Define CPM and PERT and explain the application of the same for setting up a new chemical plant. Define the activities involved in this project and construct the network diagram. **[18]**

OR

Q12)a) What points should be considered while deciding plant location? Draw a plant layout and name the parts. **[9]**

b) Differentiate between CPM and PERT. Give one example of each. **[9]**

EEE

Total No. of Questions : 12]

SEAT No. :

P4932

[Total No. of Pages : 2

[4959]-278

B.E. (Chemical Engineering)

(A) : 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) Enlist the rules used in Prolog coding for artificial intelligence. Explain any two rules in details. **[16]**

OR

Q2) Draw the network diagram for data objects in Prolog. Explain structured object. **[16]**

Q3) AI is to be applied for designing a Reaction vessel. Draw neat sketch indicating steps in design. **[16]**

OR

Q4) Explain the Breadth-first search with various steps involved in finding optimal solution. **[16]**

Q5) Note the control mechanism in blackboard systems. **[18]**

OR

Q6) Object-Oriented Programming is used for developing networks. Describe the methodology with explanation. **[18]**

P.T.O.

SECTION - II

Q7) Draw neat diagram to show the semantic network for LPG vaporizer unit. **[18]**

OR

Q8) Write in details on the frame-based system in AI. **[18]**

Q9) AND-OR Strategies for AI are to be applied for stripper network systems. With sketch, explain the implementation of strategies in details. **[16]**

OR

Q10) Enlist the application of AI systems to Process Modeling and Simulations field. **[16]**

Q11) Explain the functioning and applications of FALCON expert system. **[16]**

OR

Q12) With structure, explain the BIOEXPERT system and enlist its applications. **[16]**



Total No. of Questions :12]

SEAT No. :

P3968

[4959]-279

[Total No. of Pages :3

B.E. (Chemical Engineering)
ENERGY CONSERVATION IN CHEMICAL PROCESS
INDUSTRIES
(2008 Course) (Elective - III)

Time : 3 Hours

[Max. Marks :100]

Instructions to candidates:

- 1) Assume suitable data, if necessary.*
- 2) Neat figures to the right indicate full marks.*
- 3) Attempt section I and section II on two separate answer books.*
- 4) Use of scientific calculator is allowed.*
- 5) 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, Q11 or from section II.*

SECTION - I

Q1) Write short note on. **[18]**

- a) Solar energy.
- b) Tidal energy.
- c) Geo-Thermal energy.
- d) Energy from Biomass.

OR

Q2) a) State first and Second Law of Thermodynamics. **[2]**

b) Explain how thermodynamics helps in energy loss analysis and its saving. Explain with suitable example. **[6]**

c) Explain how increase in number of effects in evaporator helps to save the energy. Explain with neat diagram and example. **[16]**

Q3) What are various methods for reducing thermodynamic irreversibility in chemical Technology processes? **[16]**

OR

P.T.O.

- Q4)** 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.

Q5) Explain how advanced control and optimization in chemical industries helps to save energy. Explain with suitable example. [16]

OR

- Q6)** a) Enlist three basic types of steam traps. Explain any one in detail. [8]
- b) Draw a neat sketch of Jacketed Agitated Vessel. Briefly explain energy conservation opportunities for the same. [8]

SECTION - II

- Q7)** a) Explain how improvement in the yield of raw materials in the chemical reactors helps to save the energy. [9]
- b) Write short note on how energy conservation can be achieved in sugar industries. [9]

OR

- Q8)** a) Explain how structural approach to energy management helps to improve energy efficiency in industry. [10]
- b) What is a significance of knowing energy costs? [4]
- c) Write short note on good housekeeping. [4]

Q9) Explain how following factors acts as barriers to improving energy efficiency in industry. [16]

- a) Government and policy matters.
- b) Lack of sufficient data.

OR

- Q10)a)** What are objectives of energy audit and how they can be achieved? [8]
b) State and explain the importance of energy policy for industries. [8]

- Q11)a)** What do you understand by the term fuel substitution? Give Examples.[4]
b) Write short note on. [8]
i) Primary audit.
ii) Detailed audit.
c) Explain the methodology of energy audit. [4]

OR

- Q12)a)** Write short note on. [8]
i) Role of process design in energy saving.
ii) Waste heat utilization for power generation.
b) Enlist energy saving opportunities in industries and explain any two.[8]



Total No. of Questions : 12]

SEAT No. :

P3309

[Total No. of Pages : 4

[4959]-28

B.E. (Civil)

MECHANICS OF WAVES (Elective - IV (e))

(2008 Pattern)

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) *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 the phenomenon of wave growth considering the wave frequency and wave energy. [4]
- b) Define wave length, wave period, wave steepness. [6]
- c) For a wind of corrected speed 26 m/s remaining constant over a fetch of 43 km obtain H_s and T_s values using Hasselmann technique, if
- i) water is very deep
 - ii) water depth is 5.2 m [8]

OR

- Q2)** a) Discuss the process of wave decay. [4]
- b) Distinguish between Sea and Swell. [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 720 mm of Hg. Maximum wind speed occurs at 70 km from the centre. What is the wave height and period at 300 km to the right of the centre. [8]

P.T.O.

- Q3)** a) Prove that in deep water $C_0 = \frac{gT}{2\pi}$ and in shallow water $C_s = \sqrt{gd}$ with usual notations. Start with linear dispersion relationship. How to obtain C (wave velocity) and L (wave length) in intermediate water? [8]
- b) A wave with a period 8 seconds is propagated shoreward over a uniformly sloping shelf from a depth of 300m to 3.3m. Find individual wave velocity (C) and wavelength (L) corresponding to 300 m and 3 m. [8]

OR

- Q4)** a) Write short note on choice of wave theories. [4]
- b) Derive expression for water surface profile (η) starting with expression for velocity potential (ϕ). [4]
- c) Derive expression for group wave velocity. Modify the formula for deep water and shallow conditions. [8]

- Q5)** a) Define wave energy spectra. What are the methods of deriving wave spectra? Explain in brief. [6]
- b) The annual maximum wave heights observed at Chennai in m are as follows;
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 $N = 20$, $\bar{y}_n = 0.5236$, $S_n = 1.0628$. [10]

OR

- Q6)** a) Enlist various theoretical wave spectra. Explain any one of them in detail. [6]
- b) What is difference between short term and long term wave statistics? Give details of Rayleigh distribution for short term statistics. [4]
- c) Define probability density function, probability distribution function. [6]

SECTION - II

- Q7)** a) What is wave reflection? Give equation of resultant wave profile. State variation of reflection with structure characteristics and wave properties. [8]
- b) A beach having a 1 on 20 slope, a wave with deep water height of 3m 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) What is diffraction? Explain with neat sketch. What are the causes and effects of diffraction? Enlist the assumptions in the theory of diffraction. [8]
- b) A wave of 2.8 m height and 8 second period strikes over a beach with a slope of 1 in 35. (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. [10]

- Q9)** a) Draw pressure distribution diagram for non-breaking waves acting on vertical walls for crest and trough of clapotis on wall. What is the limitation of Sainflou's method? [8]
- b) A wave of 1.5 m height attacks a smooth vertical wall of height 5.85m. 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 broken wave on wall seaward of still water level and wall landward of still water level. [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) Discuss variation of C_D and C_m with K_c (Keulegan-Carpenter number) and Reynolds number Re . [6]
b) Derive equation for wave force on entire member length. [10]

OR

- Q12)** a) Derive equation for Keulegan-Carpenter number. [8]
b) Write short note on calculation of wave forces using Stokes' fifth order theory. [4]
c) What are limitations of Morrison's equation. [4]



Total No. of Questions :12]

SEAT No. :

P3531

[4959]-280

[Total No. of Pages :3

B.E. (Chemical)

CHEMICAL PROCESS SAFETY
(2008 Course) (Semester -II) (Elective - III)

Time : 3 Hours]

[Max. Marks :100

Instructions:

- 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.*

SECTION -I

- Q1)** a) Explain FAR, FR and OSHA incidence rate? [8]
b) Discuss in detail important steps in accident process? [8]

OR

- Q2)** Discuss the importance of safety culture in chemical process industry and explain in detail any two significant chemical plant disasters? [16]

- Q3)** a) What is Industrial Hygiene? Explain the various government regulations pertaining to industrial hygiene? [8]
b) How will you estimate worker exposures to toxic vapors? [8]

OR

- Q4)** Explain Material Data Safety Sheets (MSDS) with the format during an industrial hygiene study? [16]

P.T.O.

Q5) Define the following terms. **[18]**

- a) Deflagration.
- b) Boiling liquid expanding vapour explosion (BLEVE).
- c) Shock wave.
- d) Mechanical explosion.
- e) Ignition temperature.
- f) Unconfined explosion.

OR

- Q6)** a) Distinguish between fire and explosion. Explain Fire Triangle in detail? **[9]**
b) Discuss the concept of minimum oxygen concentration and inerting? **[9]**

SECTION -II

- Q7)** a) Explain the various design methods to prevent fire and explosion? **[8]**
b) Write a short note on storage and handling of flammable, toxic chemicals? **[8]**

OR

- Q8)** Explain the following terms: **[16]**
- a) Sprinkler systems.
 - b) Ventilation.
 - c) Static electricity.
 - d) Explosion proof equipment and instrument.

- Q9)** a) Write a short on revealed and unrevealed failure? **[8]**
b) Describe types of safety reviews and concept of risk assessment? **[8]**

OR

Q10) Explain the concept of HAZOP study and state guide words used for the HAZOP procedure? Discuss in detail process hazard checklists? [16]

Q11)a) Explain in detail safety versus production, Hazard models? [9]

b) Discuss the plan for Emergency in the industry? [9]

OR

Q12) Write short notes on the following: [18]

a) Prevention of human hazard element.

b) Risk management routines.

c) Tackling disasters.



Total No. of Questions : 12]

SEAT No. :

P4933

[Total No. of Pages : 3

[4959]-281

B.E. (Chemical Engineering)

(D) : FOOD TECHNOLOGY

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

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) Assume suitable data, if necessary
- 6) Use of electronic pocket calculator is allowed.

SECTION - I

- Q1)** a) Explain different types of fluids with example encountered in food processing. Give importance of heterogeneity in food technology. [8]
b) Explain status of Indian food processing and compare with the world. [8]

OR

- Q2)** a) With neat diagram explain how taste can be defined for the particular food product. What are the conventional terms for each segments of taste. [8]
b) How nutritional value of processed food is determined in the laboratory? [8]

- Q3)** a) Discuss post harvesting technologies food grains. [6]
b) For which food wet cleaning is used? Explain advantages and disadvantages of wet cleaning? [6]
c) 'What is water activity and how it is calculated? Give at least three examples of food with the range of water activity. [6]

OR

P.T.O.

- Q4)** a) With neat diagram explain size sorting machine and its applications. [6]
b) Discuss applications of dry cleaning process with advantages and disadvantages. Name the food for which it is applicable. [6]
c) What do you understand by water activity? List water activity of some. [6]

- Q5)** a) Explain UHT cycle for milk treatment and compare with conventional process. [8]
b) With neat diagram explain oil extraction process from oil seeds. [8]

OR

- Q6)** a) Give neat flow sheet and explain ice-cream manufacturing process. [10]
b) How chemical sterilization is done. Explain methods with example. [6]

SECTION - II

- Q7)** a) With neat flow-sheet describe process of manufacture of jellies. [8]
b) Explain importance of pectin in jam and jelly manufacture. [4]
c) List the preservatives used for beverages and beverages storage. [4]

OR

- Q8)** a) What is canning? Explain process of tomato sauce manufacture. [10]
b) How preservatives are classified. Give examples and explain the action of preservatives to prevent food spoilage. [6]

- Q9)** a) Explain wheat grain grinding and the effect on product and product quality. [8]
b) Discuss with neat sketch industrial frying machines and name food products produced from such units. [8]

OR

- Q10)** a) Discuss effect of freeze drying and storage on sensory, nutritional characteristics of food. [8]
b) With neat sketch explain frozen food processing and storage. [8]

- Q11)**a) Explain importance of coating and coating materials used in chocolate industry. [6]
- b) What is temper evident packaging? What is its importance in food and beverages industry. [6]
- c) Explain various types of containers used in food industry stating advantages and disadvantages. [6]

OR

- Q12)**a) Explain enrobing process used in food industry with examples. [6]
- b) Explain different container types and the applications. [6]
- c) What information should be available on the packaging material of food? [6]



Total No. of Questions : 12]

SEAT No. :

P3969

[4959]-282

[Total No. of Pages : 3

B.E.(Chemical)

**STANDARDIZATION AND QUALITY ASSURANCE IN
CHEMICAL PROCESS INDUSTRY
(2008 Pattern) (Semester-II)(Elective-IV)**

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 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 and explain the various objectives for standardization of equipment and materials. [9]
- b) What is the importance of Material of Construction? Elaborate various policies to select material of construction in process design. [9]

OR

- Q2)** a) Elaborate on return on investment and enlist the importance of financial management. [9]
- b) Explain Qualitative and Quantitative standards of chemical process Industries. [9]
- Q3)** a) Enlist the various quality standards required for the process industries. Elaborate two types of industry standards followed 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) ISO standard for tanneries
 - ii) ISI mark
- b) Explain the role of statistical Quality control (SQC) for effective utilization of resources in industry. [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) Write an explanatory note on equipment inspection and criteria for equipment inspections. [8]
b) Explain the control charts with suitable example. [8]

SECTION-II

- Q7)** a) Explain the objectives and importance of Total Quality Management (TQM). [9]
b) Explain the formation of Quality circle(QC)? Explain the functions of QC. [9]

OR

- Q8)** a) What is Quality control? Explain statistical quality control with suitable example. [9]
b) Explain in detail the advantages and disadvantages of Quality Control. [9]

- Q9)** Explain with example the various standards followed in fabricating a storage vessels for process industry. [16]

OR

- Q10)** Write notes on following concepts [16]
a) Work sampling
b) Zero defects

- Q11)** a) Explain in detail the role of automation in standardization. [8]
b) Explain ISO. Elaborate on importance of ISO certification in global market. [8]

OR

Q12) Write notes on

[16]

- a) Personal protective Equipment(PPE)
- b) ISO 9000 series
- c) Six sigma
- d) HSE management System



Total No. of Questions :12]

SEAT No. :

P3460

[4959]-283

[Total No. of Pages :4

B.E. (Chemical Engineering)

b: CATALYSIS

(2008 Course) (Elective - IV) (Theory) (409350) (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) Assume suitable data, if necessary.*
- 3) Neat diagrams must be drawn wherever necessary.*

SECTION-I

Q1) a) Explain mechanism of homogeneous catalyst. **[8]**

b) Explain catalytic reaction feasibility with respect to activation energy and temperature. **[8]**

OR

Q2) a) Explain the qualitative nature and concept of catalysis and catalyst. **[8]**

b) Explain the role of supports in heterogeneous catalysis. **[8]**

Q3) a) For the reaction, $A \rightarrow 4R$, (gaseous reaction) run at 3.2 atm and 117°C. The rate at this temperature is measure as - $VA^1=96 C_A$, Mol/kg cat.hr. Determine the amount of catalyst needed in a packed bed reactor with a very large recycle rate for 35% conversion of A to R for a feed rate of 2000 mol/hr of pure A. **[10]**

b) Give the general characteristics of catalysis and its industrial significance. **[8]**

OR

P.T.O.

Q4) a) Explain Eley-Rideal mechanism for surface reaction. [6]

b) A small experimental packed bed reactor ($w = 1\text{kg}$) using very large recycle of product steam gives the following kinetic data: [12]

A \rightarrow R	C_A , mol/m ³	1	2	3	6	9
$C_{A0} = 10$ mol/m ³	v_0 , lit/hr	5	20	65	133	540

Find the amount of catalyst needed for 75% conversion for a flow rate of 1000 mol A/hr of a $C_{A0} = 8$ mol/m³ feed stream:

- In a packed bed reactor with no recycle of exit fluid.
- In a packed bed reactor with very high recycle.

Q5) The reaction $A \rightarrow 2R$ in an experimental packed bed reactor using various amounts of catalyst and a fixed feed rate $F_{A0} = 10$ kmol/hr gives the following results. [16]

- Find the reaction rate at 50% conversion.
- In designing a large packed bed reactor with feed rate $F_{A0} = 500$ kmol/hr, how much catalyst would be needed for 50% conversion?
- How much catalyst would be needed in part (ii) if the reactor employed a very large recycle of product stream?

W (kg catalyst)	1	2	3	4	5	6	7
X_A	0.12	0.20	0.27	0.33	0.37	0.41	0.44

OR

Q6) a) What is chemical and physical adsorption and explain its significance. [8]

b) Compare and contrast alumina and silica as catalyst support/carrier. [8]

SECTION-II

- Q7)** a) Explain the major steps involved in the preparation of the catalyst. [8]
b) Derive the mathematical model for kinetics of catalyst deactivation. [8]

OR

- Q8)** a) Explain BET method for determination of surface area of the catalyst. [8]
b) Describe the general method of preparation of metal catalysts. [8]

Q9) Write short notes on the following: [18]

- a) Industrial application of molecular sieves.
b) Fluid catalyst cracking.
c) Zeolite synthesis.

OR

Q10) Data for the enzyme catalyzed reaction $S \rightarrow P$ is as follows: [18]

[S] (M)	6.25×10^{-6}	7.50×10^{-5}	1.00×10^{-4}	1.00×10^{-3}	1.00×10^{-2}
v (nmoles/lit min)	15.00	56.25	60.00	74.90	75.00

- a) Estimate V_{\max} and K_m
b) What would 'v' be at $[S] = 2.5 \times 10^{-5}$ M and at $[S] = 5.0 \times 10^{-5}$ M?
c) What would 'v' be at 5.0×10^{-5} M if the enzyme concentration were doubled?

Q11) Write short note on following:

[16]

a) Strong acid catalyst

b) Protein

OR

Q12)a) Explain the methods for evaluating the constants (k and C_m) of the m-m equation. **[8]**

b) Give the kinetics of competitive Inhibition. **[8]**

EEE

Total No. of Questions : 12]

SEAT No. :

P4532

[Total No. of Pages : 3

[4959]-284

**B.E. (Chemical Engineering)
Nanotechnology
(2008 Pattern) (Elective - IV(C))**

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) *Assume suitable data, if necessary*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) Explain the different types of nanomaterials along with their physical properties and applications? [10]

b) Write a short note on fullerenes, metallofullerenes? [8]

OR

Q2) a) Explain any two synthesis methods used for synthesis of graphite? [8]

b) Write a note on: [10]

i) Nanosize effect and

ii) surface area to volume ratio

iii) Feynman's vision about Nanotechnology

Q3) a) Discuss Epitaxial growth and Self-assembly? [8]

b) Explain High pressure CO conversion method for nanotube synthesis?[8]

P.T.O.

OR

- Q4)** a) Explain Pulsed Laser Vaporization (PLV) technique for the synthesis of graphite? [8]
b) Write a short on ultrasound assisted emulsion types for the synthesis of nanomaterials? [8]

- Q5)** a) Explain the principle, construction and working of UV-Vis spectrometer with schematic diagram? [8]
b) Explain scanning tunneling microscope (STM) in brief? [8]

OR

- Q6)** Explain the construction and working of scanning electron microscope (SEM) with schematic diagram. Mention any two applications. [16]

SECTION - II

- Q7)** a) State De-Broglie hypothesis and derive the expression for De-Broglie wavelength? [10]
b) Explain Pauli exclusion principle along with application? [8]

OR

- Q8)** a) Explain how quantum cryptography is used for secure data communication? [8]
b) What is quantum dot, quantum well and wire? Explain in detail? [10]

- Q9)** a) Explain various methods for measuring surface tension. [8]
b) Write down the various factors affecting on contact angle and wetting? [8]

OR

- Q10)** a) Explain the concept of colloid stability and zeta potential? [8]
b) Explain experimental procedure for finding out contact angles. Explain with neat sketch? [8]

- Q11)** a) Discuss different types of nanomaterials used for waste water treatment? [8]
b) Explain health and environmental Impacts of nanotechnology? [8]

OR

Q12) Write short notes on.

[16]

- a) Polymer nanocomposites and fillers
- b) Biological nanomaterials
- c) Nanoclay and its applications
- d) Drug Delivery using nanomaterials



Total No. of Questions :12]

SEAT No. :

P3461

[4959]-285

[Total No. of Pages :4

B.E. (Chemical)

d - FUEL CELL TECHNOLOGY

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

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.*
- 6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*

SECTION-I

- Q1)** a) Explain the thermodynamics steps involved in fuel cells. **[8]**
- b) Discuss the advantages and limitations of fuel cell operating at low and high temperatures respectively, taking the example of PEMFC and SOFC. **[8]**

OR

- Q2)** a) Describe Molten carbonate fuel cell with neat diagram. **[8]**
- b) Discuss the operating temperature of different types of fuel cell and its limitations. **[8]**
- Q3)** Develop the comprehensive material balance for the SOFC generating 800 kW power at 85% CHP efficiency and 60% electrical efficiency, by using externally reformed methane as a fuel and theoretical excess air as an oxidizer. **[18]**

OR

P.T.O.

Q4) Gibbs free energy for the formation of water is -59.69 cal/mol at STP conditions. In the typical SOFC, the partial pressure of hydrogen, oxygen and water vapor are 0.8, 0.21 and 0.3 atm. Assume that the activities of the components are proportional to their partial pressures. The cell is operated at 885°C . Calculate: **[18]**

- a) Standard open circuit potential.
- b) Open circuit potential at the operating conditions.

Faraday's constant is 96487 J/V.mol.

Q5) a) A current density of 15 A/m² is obtained when pure hydrogen is fed to SOFC at the pressure of 1.8 atm. Total pressure of gases at anodic side is observed to be 2.5 atm. Air is supplied at 1.8 atm. The cell is operated at 1000°C . The diffusion factor for hydrogen, oxygen and water vapor are 95, 70 and 55 C/s.m² atm respectively. Calculate concentration over potentials across anode and cathode. **[8]**

- b) Calculate fuel utilization factor, air ratio, power output and fuel efficiency of SOFC using following data: **[8]**

Average current density	: 14A/m^2
Active anode surface area	: 0.2 m^2
Fuel flow rate	: 25 mol/h
Fuel compositions	: H_2 70% and CO 30%
Air flow rate	: 20 mol/h
Output potentials	: 230 V
Lower heating value of fuel	: 30000 kcal/kg

OR

Q6) What is the importance of Nernst equation? Derive the Nernst equation for calculating open circuit potential of SOFC using H_2 as a fuel and O_2 as an oxidizer. **[16]**

SECTION-II

- Q7) a)** Consider hydrogen-oxygen fuel cell operating at 25°C and at atmospheric pressure. Under these conditions, oxygen, hydrogen and product liquid water are in their standard states. Using the data given below, calculate the thermodynamic potential (E) and the heat transfer (Q) between the cell and surrounding to maintain isothermal conditions and the electrochemical efficiency of the fuel cell. [8]

$$\Delta H = - 285840 \text{ J/mol}$$

$$\Delta G = - 237190 \text{ J/mol}$$

$$F = 96487 \text{ J/V.mol}$$

- b) What is steam reforming? What are the advantages of internal steam reforming over external steam reforming? State its limitations. [8]

OR

- Q8) a)** Design tubular SOFC to generate 200kW power from methane as a fuel. Single tube has anodic diameter of 20mm and active length of 1.8m. [8]

- b) Derive the Butler-Volmer form of equation for the charge transfer rates. [8]

- Q9) a)** Explain the Kroger-Vink defect structure in solids. [8]

- b) Calculate mole fraction of defect at 150 and 950°C. Defect energy is 66 kJ/ mol. Comment on the significance of results. [8]

OR

- Q10) a)** Design a planer SOFC to generate 750 kW power for ethanol as a fuel. [8]

- b) Illustrate and compare between planer and tubular design of SOFC. [8]

Q11)a) Explain the required characteristics of materials of construction, electrode, electrolyte and interconnect for SOFC. [9]

b) What is three phase boundary (TPB)? Explain the mechanism of charge transfer in TPB. [9]

OR

Q12) Explain the design of typical direct ethanol SOFC considering following aspects: [18]

a) Catalyst

b) Structure

c) Reactions and

d) Exit gas characteristics

EEE

Total No. of Questions : 12]

SEAT No. :

P4533

[Total No. of Pages : 2

[4959]-286

B.E. (Chemical)

PETRO CHEMICAL ENGINEERING

(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 diagram 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) Discuss the importance and the status of Petrochemical Industries [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) Draw a suitable diagram and describe the BTX aromatic separation process. [8]

- Q3)** Draw a flowsheet for production of Naphthene and explain the process with all specifications and process conditions. [16]

OR

- Q4)** Describe CDU with suitable diagram? Distinguish between CDU and VDU [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) Ziegler – Natta catalysts.
 - b) Thermal cracking
 - c) Delayed coking

SECTION - II

- Q7)** Draw a schematic diagram and describe the production of terephthalic acid from p-xylene? Discuss the major engineering problems. [16]

OR

- Q8)** Discuss in detail about the production of ethylene glycol and the essential Reaction steps for the same. Draw the necessary diagram. [16]

- Q9)** a) Explain Emulsion polymerization of styrene. [8]
b) Discuss polymer synthesis and monomer purification [8]

OR

- Q10)** a) Draw a neat sketch and explain in detail 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 disadvantage. [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) “Power on, India on”- Write views on power generation through Petrochemical plants and justify the above statement. [9]
b) Give the brief description on safety considerations in Petrochemical industry? [9]



Total No. of Questions :12]

SEAT No. :

P3462

[4959]-287

[Total No. of Pages :3

B.E. (Chemical)

f - COMPUTER - AIDED PROCESS CONTROL

(2008 Course) (Semester - II) (409350)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I and solve 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) *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) With the help of block diagram, explain Digital feedback control system. Describe various components involved. **[18]**

OR

Q2) a) What are advantages and disadvantages of digital control? **[8]**

b) Differentiate between digital and analogue control. **[10]**

Q3) a) What is Relative Gain Array? Explain in detail the properties of RGA. **[10]**

b) Steady state gain matrix is given by **[6]**

$$G = \begin{bmatrix} -0.002 & 0.001 \\ 0.002 & 0.003 \end{bmatrix}$$

Find Neiderlynsky Index. Comment on the stability of system.

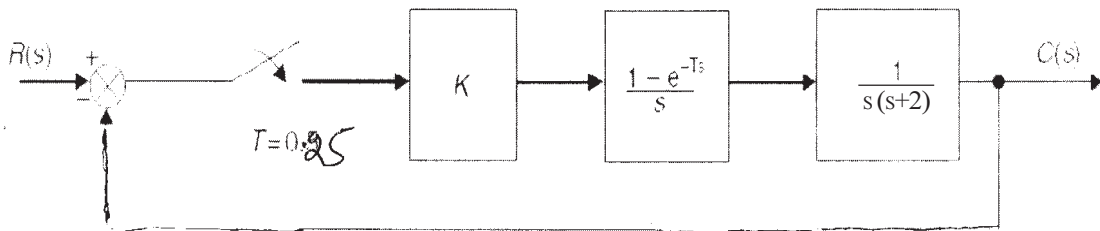
OR

P.T.O.

Q4) a) Draw block diagram for 2 x 2 MIMO system and explain interaction caused by the two interconnected control loops. [8]

b) How the cross interactions in (a) can be removed using decoupling. Explain the decoupling phenomena using Block Diagram. [8]

Q5) Following figure shows digital control system. With $K = 1$ and sampling time 0.25 seconds. Determine (a) The difference equation for the discrete time response (b) Pulse transfer function for feedback loop. [16]



OR

Q6) a) Derive the z-transform of (a) a unit step function, (b) a decaying exponential, and (c) a cosine wave. [9]

b) Explain the working principle of hold elements in digital feedback control system. [7]

SECTION-II

Q7) Describe in detail hardware and software modules used in computer aided process control. [16]

OR

Q8) Explain the use of MATLAB and Simulink for simulating control systems. [16]

Q9) What is DCS? Explain various elements of DCS with the help of block diagram. State advantages and disadvantages. [16]

OR

Q10) What is plantwide control? Describe procedure for the design of plantwide control systems with suitable example. **[16]**

Q11) Write short notes on the following: **[18]**

- a) MIMO control for Packed bed reactor.
- b) Microcomputers for digital control.
- c) Supervisory Control.

OR

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

- a) Testing stability of MIMO Systems.
- b) Basic structure of PLC.
- c) Standard discrete input test signals.

EEE

Total No. of Questions : 12]

SEAT No. :

P3940

[4959]-29

[Total No. of Pages : 3

B.E. (Civil Engineering)
FERROCEMENT TECHNOLOGY
(2008 Course) (Elective - IV) (Open Elective) (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, 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.*
- 5) *Use of calculator is allowed.*
- 6) *Answers to the Section - I and Section - II must be written in two separate answer sheets.*

SECTION - I

- Q1) a)** Define ferrocement? What are the different characteristics of it? Also discuss merits and demerits of ferrocement over reinforced concrete? **[10]**
- b) Explain special type of ferrocement along with its applications? **[8]**

OR

- Q2) a)** Write a note on tools and plants used in ferrocement technology? **[10]**
- b) Explain proportioning of cement mortar using ferrocement technology? **[8]**

- Q3) a)** Explain in detail process of constructing ferrocement structures in respect of: **[5 × 2 = 10]**

- i) planning the work
 - ii) fabricating skeleton
 - iii) tying of wire meshes
 - iv) mortaring
 - v) curing
- b) Enlist different mechanical properties and typical features affecting design of ferrocement structures. **[6]**

OR

P.T.O.

- Q4)** a) Enlist the various construction methods of ferrocement. Explain the skeleton armature method with advantages and disadvantages. [8]
- b) Explain the effect of creep and shrinkage on ferrocement structures and also the protective surface treatment given to the same. [8]

- Q5)** a) What are the special design considerations for ferrocement and typical features of ferrocement affecting design? [8]
- b) Explain in detail specific surface method and crack control method. [8]

OR

- Q6)** a) Enlist and explain properties of ferrocement structures under static and dynamic loading conditions. [8]
- b) Draw the neat sketches of various structural forms & Also give the comparative study of behavior forms in respect of strength and design parameters with ferrocement technology. [8]

SECTION - II

- Q7)** a) State and explain factors governing cost analysis. Also compare cost of ferrocement structures with conventional structures. [10]
- b) Explain the role of ferrocement in building construction of following building accessories: [4 × 2 = 8]
- i) foundations
 - ii) walls
 - iii) floors
 - iv) roofs

OR

- Q8)** 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. [10]
- b) Explain the special characteristics of ferrocement to resist shock affected during earthquakes. [8]

- Q9)** a) What are different applications of ferrocement with hydraulic structures. Explain in detail any one. [8]
- b) Explain design & method of fabrication and casting of counterfort retaining wall. [8]

OR

- Q10)**a) Explain the use of ferrocement in layered form used for lining, water proofing and surface coating. [8]
- b) Compare ferrocement container with conventional container for storage of granular materials. [8]

- Q11)**a) Give the different methods of ferrocement precasting and Explain any one in detail. [8]
- b) Give the testing methodology and quality control for ferrocement materials. [8]

OR

- Q12)**a) Explain role of ferrocement technology in construction of large size special purpose structures like shell and domes. [8]
- b) Explain the need of ferrocement technology in different types of building components in today's world. [8]



Total No. of Questions : 12]

SEAT No. :

P4534

[Total No. of Pages : 3

[4959]-290

B.E. (Polymer) (Semester - I)

Polymer Processing Operation - II

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 Questions from section II*
- 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 working of blow molding process with complete operation. [9]
b) Explain terms like wall thickness control, parison swell, and parison inflation, cutting devices and process parameters. [9]

OR

- Q2)** a) Give the importance of product quality control during extrusion blow molding along with few moulding defects - causes and remedy. [9]
b) Explain how injection stretch blow molding is carried out. and what parameters one has to take care of while processing. [9]

- Q3)** a) Explain thermoforming process step by step and give few examples. [8]
b) Explain plug-assist forming and the advantages it offers. Also explain how is it different than vacuum forming. What is the temperature to which the sheet is heated before forming. [8]

OR

P.T.O.

- Q4)** a) Explain drape forming, air-slip forming and pressure forming. [8]
b) Give the defects in thermoformed articles and remedies. [8]

- Q5)** a) Explain Calendaring basic process with roll configurations. [8]
b) Explain significance of roll separation forces and methods of compensation along with roll bending and roll deflection during calendaring process, [8]

OR

- Q6)** a) Explain embossing lines along with the various parameters, control and their effect on quality. [8]
b) What methodologies are required to take care of roll bending & deflection. [8]

SECTION - II

- Q7)** a) Explain rotational molding with significance of major and minor axis. [9]
b) Explain rotational molding of liquids with any one example. [9]

OR

- Q8)** a) Give effect of any five parameters on rotamolding. [9]
b) Explain the types of faults and remedies during rotational molding. [9]

- Q9)** a) Explain the Microstructure development in slow crystallizing and fast crystallizing polymers. [8]
b) Give the process for Gas injection molding and how is it different that conventional injection molding. [8]

OR

- Q10)** a) Explain molecular orientation and effect of crystallinity on material properties, [8]

b) Give classification of different water injectors. [8]

Q11) a) Explain printing equipments used for on-line printing and batch printing [8]

b) Explain Recycling of plastics with individual steps in the process and their purpose. [8]

OR

Q12) a) Give the special guidelines for machining of polymers with respect to tool geometry and other machining parameters [8]

b) What is vacuum metallizing and how is it done. [8]



Total No. of Questions :12]

SEAT No. :

P3463

[4959]-293

[Total No. of Pages :3

B.E. (Polymer Engineering)
c: POLYMER REACTION ENGINEERING
(2008 Course) (Semester - I) (Elective - I) (409364-C)

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 detail the quantities commonly used for the Characterization of Polymers. **[12]**
- b) Explain the different parameters used for designing of polymerization reactor. **[6]**

OR

- Q2) a)** Discuss the importance of molecular weight and Molecular weight distribution of polymer. **[6]**
- b) Explain the characteristics of Chain Growth Polymerization and 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.

Q4) a) MMA is to be polymerized at 70°C with Free radical Polymerization in a batch reactor. The initial concentration of monomer is 8.14 gmole/lit., and the concentration of initiator is kept constant at 0.05 gmole/lit. Assume termination takes place only by combination. The rate constant are as $K_0=3 \times 10^{-6} \text{ sec}^{-1}$, $k_p=176 \text{ lit/gmole.sec}$, $k_c=3.6 \times 10^7 \text{ lit/gmole.sec}$, $f=0.6$. Find the number average molecular weight, weight average molecular weight and MWD for a reaction time of 200min. **[10]**

b) Derive the necessary equation of the rate of Initiation (r_i) in terms of Initiator concentration $[I]$. **[6]**

Q5) Derive the necessary equation of Overall rate of polymerization in emulsion Polymerization if **[16]**

Case 1) Number of the Free radicals per polymer particles small compared with unity.

Case 2) No transfer of polymer radicals out of the particle through diffusion and high rate of termination.

OR

Q6) a) Write a note on Auto Acceleration effect in free radical polymerization. **[8]**

b) Write a Note on: Aqueous emulsifier solution. **[8]**

SECTION-II

Q7) Write a short note on reactor systems used for PET, PVC, High Density Polyethylene polymers. **[18]**

OR

Q8) Give technology overview for the following polymer **[18]**

a) SBR rubber,

b) Nylon 6,

c) Polystyrene

- Q9)** a) Explain with the importance of the term Ceiling temperature of free radical polymerization under equilibrium condition. [8]
- b) Write a note on Control of molecular weight in free radical polymerization at high degree of conversion. [8]

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) Explain the reactor design in terms of following factors. Polymerization Mechanism, Stoichiometry Factors, Thermodynamics Factors, and Transport Limitations. [8]
- b) Discuss the choice between batch and continuous reactor for polymerization process. [8]

EEE

Total No. of Questions : 8]

SEAT No. :

P3294

[Total No. of Pages : 4

[4959]-3

B.E. (Civil)

STRUCTURAL DESIGN - III

(2008 Pattern)

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) *Answer to the two sections should be written in separate answer books.*
- 4) *Figures to the right indicates 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 Stress concept, Load balancing concept and strength Concept in detail. **[8]**
- b) A Post tensioned pre stressed Concrete beam section has top flange 450×150 mm, web 200×750 mm and bottom flange 350×350 mm is simply supported over an effective span of 12 meter. The beam is pre stressed with 4no's of 12/7 Freyssinet parabolic cables ($F_y = 1500$ Mpa) with their C.G. 100 mm from extreme bottom fiber, stressed from both ends. Calculate total loss of prestress at the age of 120 days if $K = 0.0026/m$ length of cable, slip of anchorage = 2 mm, $C_c = 1.8$, $E_s = 2 \times 10^5$ Mpa, Concrete grade M 40, Creep and relaxation = 1% of initial prestress. **[17]**

OR

- Q2)** a) Explain need of High strength concrete and high strength steel in Prestress Construction. **[8]**

P.T.O.

- b) An unsymmetrical prestressed concrete section has top flange 450×200 mm, bottom flange $400 \text{ mm} \times 300$ mm, and web $200 \text{ mm} \times 700$ mm, it is supported over a span of 13 m carries super imposed load of 20 KN/m, the effective prestressing force is 1500 KN located at 100 mm 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 25 KN/m^3 . [17]

Q3) Design a Post tensioned Pre stressed concrete beam using I-section for flexure to carry a live load of 12 KN/m over a simply supported span of 15 m with M 40 grade of concrete and Freyssinet cables of 12/5 ($f_y = 1750 \text{ Mpa}$) or 12/7 ($f_y = 1500 \text{ Mpa}$), 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 pre stressed concrete Two-way slab of $6.5 \text{ m} \times 9 \text{ m}$ with discontinuous edge to support imposed load of 4 KN/m^2 using S3 strands each having cross sectional area 100 mm^2 and $f_y = 1900 \text{ Mpa}$ check the safety of the slab at collapse and deflection at service load. Use M45 grade of concrete. [20]

SECTION - II

- Q5) a)** Fig.1 shows an intermediate frame of multistoried building the frames are spaced at 3.5 m centre to centre analyze the rigid jointed frame taking live load as 3.5 KN/m^2 and dead load as 3 KN/m^2 for panel AB and BC respectively. The self weight of beam AB is taken as 4 KN/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 20% redistribution of moments for vertical load moments. Use M20 and Fe500. [25]

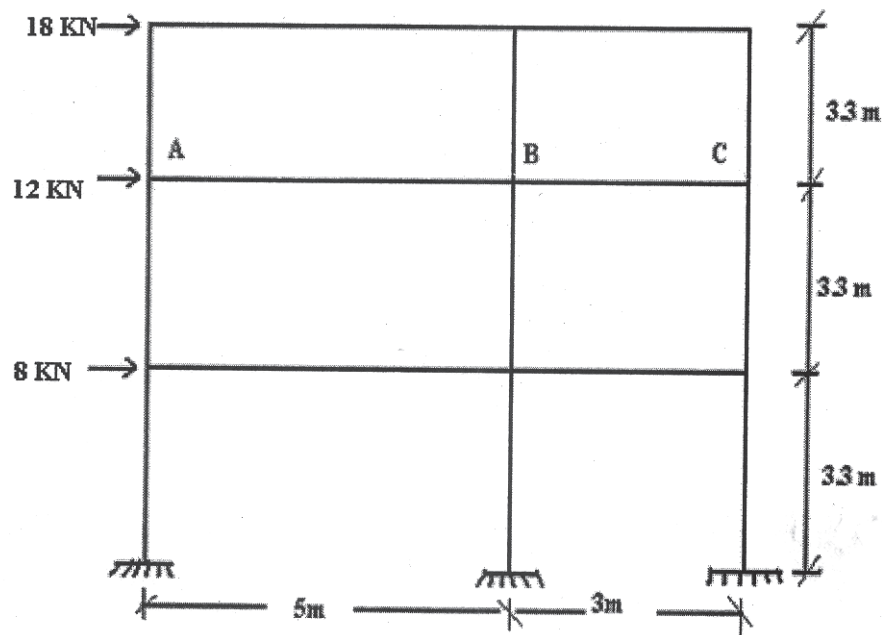


Fig. 1

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 12 KN/m and 15 KN/m on Span GH and 16 KN/m and 20 KN/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 verticle loading Using 20% redistribution of moments for vertical loading. Use M25 and Fe 415. [18]

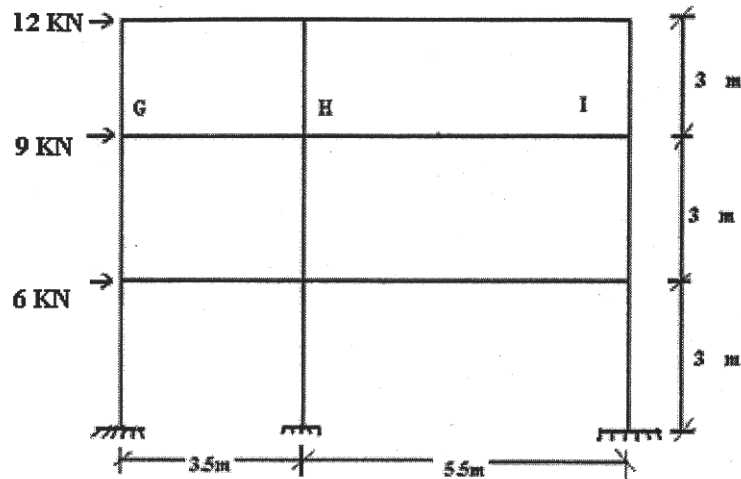


Fig. 2

Q7) a) State the Necessity of Combined footing and mentioned situations where it is to be provided. [5]

b) Design a cylindrical water tank resting on ground of 5 lack Liter capacity, open at top, the joint between wall and base slab is rigid, taking height of water in tank as 3.5 m the safe bearing capacity of supporting strata is 200 KN/m^2 , Design the wall and bottom slab of the tank. Draw details of reinforcement, use I.S Code method. [20]

OR

Q8) Design a L-Shape Cantilever retaining wall with following data

- Height of soil to be retained above base = 4.2 m
- Unit weight of Soil = 17 KN/m^3
- Angle of repose = 30°
- SBC of Soil = 200 KN/m^2
- Coff. of friction between base & soil = 0.45
- Material - M25 & Fe-500
- Leveled Backfill

Show all necessary stability checks & details of reinforcement in stem, heel & toe along with curtailment if any. [25]



Total No. of Questions : 12]

SEAT No. :

P3464

[4959]-300

[Total No. of Pages : 2

B.E.(Polymer Engineering)
PROCESSING OF COMPOSITES
(2008Course)(Semester-II) (409370B)(Elective-III)

Time :3Hours]

[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) Explain in detail with any two examples Treatment of Carbon and Kevlar Fibers and its use in Polymer composites. **[12]**

b) Explain various types and applications of glass fibers. **[6]**

OR

Q2) a) Explain in detail with any two examples of natural fibers as a reinforcement material in composites. **[10]**

b) Explain the properties and applications of polyamide fibers. **[8]**

Q3) a) Explain the role of viscosity in composite processing. **[8]**

b) Explain in detail Injection molding of Thermoset. **[8]**

OR

Q4) a) Write a short note on Bulk Molding compounds. **[8]**

b) Explain how to determine the Curing Characteristics of Resin-Catalyst Combination. **[8]**

Q5) Explain with neat diagram the followings: **[16]**

a) Resin Transfer Molding

b) Autoclave Processing

OR

Q6) Explain with neat diagram in detail Pultrusion Process and its advantages and disadvantages. **[16]**

P.T.O.

SECTION-II

- Q7)** a) Explain in detail with applicable diagrams Resin Film Infusion, Structural Reaction Injection Molding. [12]
- b) Discuss the various raw materials and additives including the matrix material and the reinforcements used in Autoclave Processing [6]

OR

- Q8)** Discuss in detail Matrix flow model, Application of Pultrusion and Design considerations for pultrusion die. [18]

- Q9)** a) Discuss different types of Adhesive used in Composites and explain modes of failure in adhesive bonding. [8]
- b) Write a note on Machining of composites. [8]

OR

- Q10)**a) Explain thermo mechanical model as applied to filament winding. [8]
- b) Discuss different types of Adhesive used in composites and explain modes of failure in adhesive bonding. [8]

- Q11)**a) Explain Applications of carbon nano-tubes composites. [6]
- b) Differentiate between polymer Nano-composites with other normal composites. [10]

OR

- Q12)** Explain classification of nano-particles and with two case studies explain Polymer nanocomposites. [16]



Total No. of Questions :12]

SEAT No. :

P3465

[4959]-304

[Total No. of Pages :3

B.E. (Polymer Engineering)

POLYMER THERMODYNAMICS AND BLENDS

(2008 Course) (Elective - IV) (409371-C) (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) *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)** Explain the following terms:
Phase Rule, Intensive Properties, Enthalpy, Internal Energy. [6]
- b) Explain changes in enthalpy and entropy during addition polymerization and condensation polymerizations. Correlate it to the molecular weight obtained during the reaction. [6]
- c) Describe first law of thermodynamics. Explain it with reference to reversible processes. [6]

OR

- Q2) a)** State the importance of entropy in the explanation of free energy change in process. Explain the isothermal process. [10]
- b) Explain thermodynamic criteria of polymeric dissolution. Describe the condition under which it is not a spontaneous process. [8]
- Q3) a)** What is ideal behaviour of mixing? How do real chemicals other than polymer show deviation from ideality? Explain behaviour of polymers during mixing. [8]
- b) Describe assumptions of Hildebrand in explaining regular solutions. State its limitations of the theory. [8]

OR

P.T.O.

Q4) a) Discuss with necessary diagram the effect of temperature on the Phase stability. [8]

b) Explain the importance of Molecular weight parameter with necessary diagram on the miscibility of polymer blend systems. [8]

Q5) a) State phase rule. Explain it with reference to various phases possible in polymeric melts. [8]

b) Explain the terms UCST and LCST in polymeric solutions. Explain the cases where $UCST > LCST$ and $LCST > UCST$. [8]

OR

Q6) a) Explain behaviour of LCST and UCST of polymer with variation in second virial coefficient and free energy of mixing. [8]

b) Explain miscibility of blend on the basis of thermodynamic principles. [8]

SECTION-II

Q7) a) Discuss the merits and Demerits of the following Polymeric modifier: [10]

i) Polycarbonate (PC)

ii) Acrylonitrile butadiene styrene (ABS)

iii) Polyethylene Terephthalate (PET)

b) Explain with the help of graph of property VS composition the properties of Miscible and Immiscible blends. [8]

OR

Q8) a) Explain the merits and demerits of solution blending over melt blending. [6]

b) Explain different Polymeric Modifier used to improve the following properties such as Impact Strength, Chemical Resistance, Heat Deflection Temperature, Flame Resistance. [6]

c) Write a short note on Engineering Polymer Blends, Classification of PB. [6]

- Q9)** a) Discuss any two methods of Compatibilization with suitable examples. [10]
- b) Explain any two methods of characterization (Thermal and Microscopic) of polymer Blends. [6]

OR

- Q10)**a) Discuss with one example the role of Maleic Anhydride grafted polymers in blend Technology. [8]
- b) Discuss Toughened Polymers via blend technology. [8]
- Q11)**a) Explain applicable Rheological models to explain Miscible and Immiscible Polymer Blends. [10]
- b) Explain Permeability of Blends to Gases and vapors. [6]

OR

- Q12)** 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]

EEE

Total No. of Questions : 12]

SEAT No. :

P3466

[4959]-305

[Total No. of Pages : 3

**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 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 on P-controller design for deadtime dominant processes. [8]
b) Differentiate clearly with suitable example multi capacity and single capacity process. [8]

OR

- Q2)** Clarify the following terms: [16]
a) Proportional Element.
b) Degrees of freedom.
c) Interacting and Non-interacting Processes.
d) Capacitance Element.

- Q3)** a) Compare SLPC and MLPC. [8]
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 Level control loop. [10]

OR

P.T.O.

Q4) a) Explain term 'Scaling'. Explain procedure of scaling with proper examples. [10]

b) Explain in brief: [8]

i) Loop Gain

ii) Transmitter gain

iii) Valve gain

iv) Process gain

Q5) a) Draw a schematic of feedback control system and describe the necessary components of feedback control system. [8]

b) Explain in brief purpose of Correlations for Tuning Constants. [8]

OR

Q6) a) What do you mean by Fine Tuning? Explain with suitable example. [8]

b) Discuss in brief three goals to evaluate the control performance. [8]

SECTION - II

Q7) a) Explain the working of a Feedforward control with suitable application. Explain in brief importance of adding Feedback to it. [8]

b) Explain in brief Limiters & Dead band. [8]

OR

Q8) a) Explain with neat block diagram cascade control system? Comment on tuning of cascade controller. [8]

b) What is Auctioneering control? Explain 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 2×2 systems. List important properties of RGA. **[10]**

OR

- Q10)**a) Discuss on Multiloop control Performance through Single Loop Enhancements. **[10]**
- b) Explain with suitable example role of RGA for analysis of Interaction and pairing of I/O variables. **[8]**

- Q11)**a) Explain with suitable block schematic Optimal Controller. **[8]**
- b) Explain with suitable block diagram “Internal Model Control”. Also discuss design steps. **[8]**

OR

- Q12)** Write short notes on: **[16]**
- a) Fuzzy Logic Controller.
- b) Artificial Neural Network.

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Total No. of Questions : 12]

SEAT No. :

P3467

[4959]-306

[Total No. of Pages : 4

B.E. (Instrumentation and Control)
DIGITAL CONTROL
(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

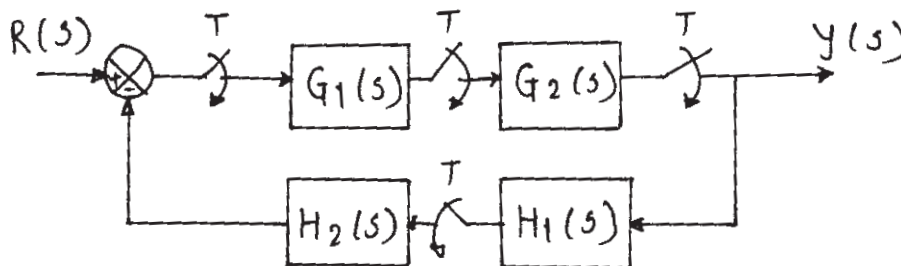
- 1) Answer three questions from Section I and three questions from Section II.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data, if necessary.

SECTION - I

- Q1) a)** Compare Digital Control System with an Analog Control System. [8]
b) Explain the block diagram of Digital Control System in detail. [10]

OR

- Q2) a)** Find Pulse Transfer Function of the system below. [8]



- b)** Derive mathematical model of Zero Order Hold. [10]

- Q3) a)** List salient features of Deadbeat Controller. [6]
b) Derive the Pulse Transfer Function of Positional form of Digital PID Controller. [10]

OR

P.T.O.

- Q4)** a) Compare Velocity and Positional form of Digital PID Controller. [6]
b) Derive the Pulse Transfer Function of Velocity form of Digital PID Controller. [10]

- Q5)** a) Obtain the State Model for the system below by Direct Programming Method. [8]

$$\text{PTF} = \frac{3z^2 - 11z}{(z-1)(z-2)(z-3)}$$

- b) Explain the concept of Transfer Function with reference to presence and absence of sampler between the series blocks. [8]

OR

- Q6)** a) Write a short note on Bilinear Transformation. [8]
b) Explain with the help of diagram stability in S-Plane, Z-Plane and W-Plane. [8]

SECTION - II

- Q7)** a) Explain the following terms: [8]
i) State Vector.
ii) State Trajectory.
iii) State Space.
iv) State Variables.
b) Derive the State Transition Matrix for the State Model. [8]

OR

- Q8)** a) Explain the following terms: [6]
i) Eigen Value
ii) State transition Matrix
iii) Eigen Vector

- b) Diagonalise the following matrix [10]

$$G = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 6 & -11 & 6 \end{bmatrix}$$

- Q9)** a) Define the following terms: [6]

- i) Controllable Canonical Form
- ii) Observable Canonical Form
- iii) Jordan Canonical Form

- b) Find the State Controllability and Observability for the system given by the equations below: [10]

$$\begin{bmatrix} X_1(K+1) \\ X_2(K+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} X_1(K) \\ X_2(K) \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} U(K)$$

$$y(K) = \begin{bmatrix} 1 & 2 \end{bmatrix} \begin{bmatrix} X_1(K) \\ X_2(K) \end{bmatrix}$$

OR

- Q10)** a) State and derive the condition for complete state controllability. [6]

- b) Find the State Controllability and Observability for the system given by the equations below: [10]

$$X(K+1) = \begin{bmatrix} 1 & 2 \\ 0 & -2 \end{bmatrix} X(K) + \begin{bmatrix} 2 \\ 1 \end{bmatrix} U(K)$$

$$y(K) = \begin{bmatrix} 1 & 0 \end{bmatrix} X(K)$$

- Q11)** a) Write a short note on State Observers. [8]

- b) Write a short note on Optimal Control and explain the term Performance Index. [10]

OR

Q12) For the linear discrete time system with a state model.

[18]

$$X(k+1) = G X(k) + H U(k) \text{ and}$$

$$G = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} \quad H = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$\text{Initial condition } X(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

Find the Optimal Control Sequence $U(k)$ such that the following Performance Index is reduced to

$$J = \frac{1}{2} X^*(8) \cdot S \cdot X(8) + \frac{1}{2} \sum_{k=0}^7 [X^*(K) \cdot Q \cdot X(K) + U^*(K) \cdot R \cdot U(K)]$$

Also find J_{\min} .

$$Q = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} ; R = 1 ; S = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$



Total No. of Questions :12]

SEAT No. :

P3468

[4959]-307

[Total No. of Pages :3

B.E. (Instrumentation and Control)
PROJECT ENGINEERING AND MANAGEMENT
(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 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? What are various types of organizational structure? Explain line and staff organizational structure in detail. **[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. **[10]**
- b) What is degree of automation? **[6]**
- Q3) a)** What are the types of estimates? Explain in detail. **[8]**
- b) Write short notes on WBS an SOW. **[8]**

OR

P.T.O.

- 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]
- 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 flow loop control. [8]

OR

- Q6)** a) Write short note on methods of tagging and nomenclature scheme based on ANSI / ISA standards. [8]
- b) What are the various standards used in instrumentation project. Explain in detail. [10]

SECTION-II

- Q7)** a) What is Plant layouts and General arrangement drawing. Write its importance. [8]
- b) Draw installation sketch of DPT. [8]

OR

- Q8)** a) What are the types of cables used in plant automation? Suggest cables for carrying transmission signal. Justify your answer. [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 cold and hot commissioning? Explain in detail. [10]
c) What is tendering? [2]

OR

- Q10)**a) Explain bidding process in detail. [9]
b) What are the construction activities involved in project? Explain step by step. [9]
- Q11)**a) Explain control room engineering. [8]
b) Write a short note on consoles. [8]

OR

- Q12)**a) Explain the inspection of control panel in detail. [8]
b) Write a short note on consoles. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P3469

[4959]-308

[Total No. of Pages : 3

B.E. (Instrumentation & Control)
BIOMEDICAL INSTRUMENTATION
(406264) (2008 Course) (Elective - I) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

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

SECTION - I

- Q1)** a) Draw & explain the equivalent circuit for two electrodes connected to the skin for biopotential measurements? **[8]**
- b) Define the following terms: Half cellpotential, Evoked Potential, Electrode Offset Potential, Action Potential. **[8]**

OR

- Q2)** a) Explain the ergonomics consideration in medical equipment design for dental chair. **[8]**
- b) Explain Physiological parameters & suitable transducers for its measurements, operating principles (Any Two). **[8]**

- Q3)** a) Explain different chambers of heart. Explain an Electrical conduction system of heart. **[8]**
- b) Why Transient Protection is necessary in designing the biomedical equipment? Explain the transient Protection circuit. **[8]**

OR

P.T.O.

- Q4)** a) Discuss the various Uni-polar ECG leads configuration in detail. [8]
b) Enlist various preamplifiers used in bio signal conditioning? Explain the Isolation Amplifier with the help of neat diagram. [8]

- Q5)** a) What is Phonocardiogram? List out the various microphones used in phonocardiography? Explain phonocardiography in details. [10]
b) Explain the Plethysmography with the help of neat diagram. [8]

OR

- Q6)** a) Calculate the cardiac output for heart rate of 85 beats/ min. and stroke volume of 65 ml. Explain the Dye Dilution method for cardiac output measurements. [10]
b) Explain the Principle, Working of Electromagnetic blood flow meter with neat diagram. [8]

SECTION - II

- Q7)** a) What is Electromyograph? State the type of electrode used for its measurements. Explain Electromyography in details. [10]
b) Define the following terms:-
i) Efferent Nerve, ii) Afferent Nerve,
iii) Biofeedback, iv) Evoked Potential [8]

OR

- Q8)** a) What is EEG? State the EEG Recording modes. List out the various waveforms generated during the EEG along with the frequency range, amplitude. State the significance of each waveform. [10]
b) Explain the 10-20 Electrode placement for the EEG Recording. [8]

Q9) a) Define a hearing Threshold. Explain the Bekesy Audiometer with neat diagram. [8]

b) Enlist the various Ophthalmic instruments & Explain. Tonometer in details. [8]

OR

Q10)a) Draw & Explain the three main sections of human auditory system? Explain the middle ear functioning. [8]

b) Explain the various errors in Vision & their method of correction with neat sketch. State the Functions of three layers of eyes. [8]

Q11)a) What is Spirogram? Draw & Explain the working of basic water sealed spirometer for Respiration measurements. [8]

b) Explain the different methods of Accident Prevention. [8]

OR

Q12)a) What is Oxygenator? Explain the principle & working of Bubble type Oxygenator. [8]

b) Define the Let go current, Macro Shock, Micro shock, Leakage Current. [8]

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Total No. of Questions : 12]

SEAT No. :

P4535

[Total No. of Pages : 3

[4959] - 309

B.E. (Instrumentation and Control)

B : LASER APPLICATION IN INSTRUMENTATION

(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 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 different processes of generation of laser light. [9]

b) Explain the Laser modes in detail. [9]

OR

Q2) a) Explain in detail the process of emission and absorption of radiation in Laser. [9]

b) Explain the Q-Switching in Lasers. [9]

Q3) a) List out the properties of commercial and industrial laser system. Explain each in short. [8]

b) Explain the construction of a Laser diode with neat diagram. [8]

OR

Q4) a) Explain the construction and working of GaAs homojunction semiconductor diode laser. [8]

b) How the Laser products are classified for safety standards? [8]

P.T.O.

- Q5)** a) Explain the application of Fabry-Perot interferometer to small displacement measurements in detail. [8]
b) Describe subjective and objective speckles with the help of neat sketch. [8]

OR

- Q6)** a) Explain how speckle patterns are used in measurement of displacement. [8]
b) What are the properties of subjective and objective speckles? Describe each in short. [8]

SECTION -II

- Q7)** a) Explain the two electronic processing configurations of doppler signal? [9]
b) Explain the principle of doppler signal. Compare the electronic processing techniques of doppler signal. [9]

OR

- Q8)** a) Explain the frequency domain processing of doppler signal in detail.[8]
b) Explain the principle and operation of laser velocimeter in detail. [8]

- Q9)** a) Write short note on Ring Laser Gyroscope. [8]
b) Explain in detail the closed loop configuration of Fiber Optic Gyroscope. [8]

OR

- Q10)**a) What is Sagnac effect? Show how is the phase shift is proportional to the angular velocity. [8]
b) List out the components in FOG configuration? Explain each in short.[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 1.45 per unit length in x-direction and the fringe spacing is found to be 1 mm. Hence find the strain. [8]

b) List out the applications of holographic interferometer that you know. Explain any one in detail. [8]

OR

Q12) Write short notes on:

a) Holographic Interferometer. [8]

b) Emulsions used to record the holograms. [8]



Total No. of Questions : 12]

SEAT No. :

P3310

[Total No. of Pages : 3

[4959]-31

B.E. (Civil)

H : GREEN BUILDING TECHNOLOGY (Open Elective - IV)
(2008 Pattern)

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) *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. [9]
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. [6]
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. [5]

OR

P.T.O.

- Q4)** a) Explain hybrid system of active and passive refrigeration and air conditioning. [8]
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. [8]

OR

- Q6)** a) Discuss the improvement for thermal comfort. [8]
b) Discuss the followings : [8]
i) LEED Criteria & its application
ii) 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. [6]

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. [7]

- Q9)** a) Explain what is indoor environmental quality. [8]
b) Discuss how the quality of indoor environment is maintained? [8]

OR

- Q10)** a) Differentiate the following : [4+3]
i) Adhesives and Sealants
ii) Paints and Coatings
b) Discuss the uses of following : [3+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 : [4+3+3]
i) Operation Phase
ii) Construction Phase
iii) Use of Foudry sand
b) Explain in details about Construction waste management. [6]



Total No. of Questions : 12]

SEAT No. :

P4536

[Total No. of Pages : 3

[4959] - 310

B.E. (Instrumentation and Control Engineering)

ADVANCED CONTROL SYSTEMS (C)

(Semester - I) (2008 Pattern) (Elective - I)

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 with neat diagrams of Limit cycle. [6]

b) Define Singular points. find out the nature of second order system for Singular point. [12]

$$\ddot{x} + 0.3\dot{x} + 2x + x^2 = 0$$

OR

Q2) a) Compare linear and non-linear control systems. [6]

b) Determine describing function of the Relay with dead zone. [12]

Q3) a) Explain with neat diagram of Jump resonance. [8]

b) Determine whether following quadratic form is positive definite or not [8]

$$Q(x) = 8x_1^2 + 4x_2^2 + x_3^2 + 3x_1x_2 - 2x_2x_3 - 6x_1x_3$$

OR

Q4) A Two Phase Servomotor is driven by an amplifier as shown in figure. The transfer function of the motor is, $G(s) = K e^{-0.1s} / s(0.1s + 1)$ Investigate the stability of the system for $K = 0.1$. What is the largest value of K for no limit cycle to exist. [16]

P.T.O.

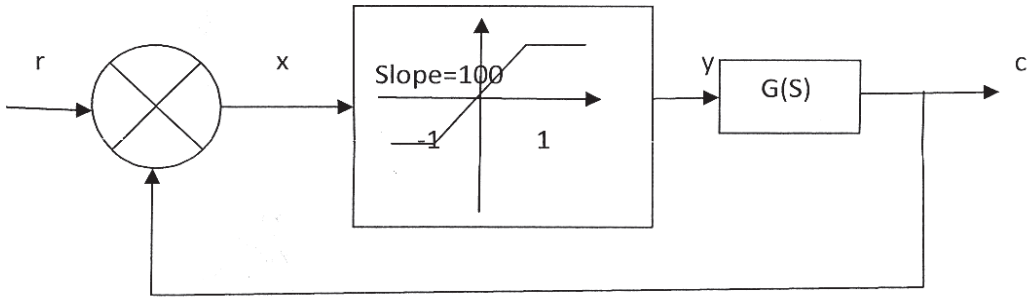


figure :Q 4

- Q5) a)** Explain with neat diagram of Direct and indirect model reference adaptive controller. [8]
- b)** Explain with neat diagram of MIT rule for continues time MRAC system. [8]

OR

- Q6) a)** Explain with neat diagram of basic configuration of adaptive control system. [8]
- b)** Explain in detail Lypunov and hyper stability approach for continuous time MRAC systems. [8]

SECTION -II

- Q7)** In the self- tuning regulator following input output data has been obtained from the real plant. [18]

Time (t)	Input data u(t)	Output data y(t)
1	2.0	0.1
2	1.3	3.0
3	1.8	-1.3
4	2.5	4.0
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 $e(t)$ = error signal.
 Explain in brief Different approaches to self-tuning regulator

OR

Q8) a) Explain with neat diagram of Recursive parameter estimation of STR. [9]

b) Explain with neat diagram of Implicit and explicit self tuning regulator. [9]

Q9) a) Explain adaptive control technique for temperature control of CSTR system. [8]

b) Explain adaptive control technique for control of pulp and dryer control. [8]

OR

Q10)a) Explain application of adaptive controller in distillation column control system. [8]

b) Explain in detail the general purpose adaptive regulator. [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:
$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

OR

Q12) The first order system is described by the differential equation [16]

$$\dot{x}(t) = 2x(t) + u(t)$$

It is desired to find the control law that minimizes the performance index

$$J = \frac{1}{2} \int_0^{t_f} \left(3x^2 + \frac{1}{4}u^2 \right) dt, \quad t_f = 1 \text{ sec}$$



Total No. of Questions : 12]

SEAT No. :

P3470

[4959]-311

[Total No. of Pages : 3

**B.E. (Instrumentation & Control)
d:BUILDING AUTOMATION - I
(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 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) Draw the block diagram of building life safety system & explain each block. **[8]**
- b) Explain different fire development stages. Which detectors are normally used to detect fire in fire stage & Why? **[10]**

OR

- Q2)** a) Explain notification appliances and notification appliances circuit. **[8]**
- b) Explain classification of fire detection systems. What are fire suppression systems. **[10]**

- Q3)** a) Explain Cause and effect phenomenon with suitable example. **[6]**
- b) What is IDC. Explain class A IDC with alarm open and trouble condition. **[10]**

OR

P.T.O.

- Q4)** a) Give classification FAS loops. Explain any one. [8]
- b) Explain following FACP parts [8]
- i) Central Processing unit
 - ii) Main power supply
 - iii) FACP display interface
 - iv) SLC interface card

- Q5)** a) Explain Types of smoke detector. Elaborate photoelectric type. [8]
- b) Explain relays and contacts used in FAS. [8]

OR

- Q6)** a) Explain single and double action manual station. [8]
- b) Discuss various heat detector with neat diagram. [8]

- Q7)** a) Draw and Explain the architecture of access control systems. [10]
- b) Discuss communication between card and card reader technology with the help of weigand card. [8]

OR

- Q8)** a) Discuss false acceptance and false rejection in biometrics while installation of various access control system. [8]
- b) Draw and Explain biometrics for security system. [10]

- Q9)** a) Define :
- i) Fixed dome camera [8]
 - b) Explain camera sensitivity with neat sketch. [8]

OR

- Q10)**a) Explain biometric access control system with neat sketch. [8]
- b) Explain network access control system with neat sketch. [8]

- Q11)**a) Explain DVR with neat sketch. [8]
- b) Explain any one type data compression technique. [8]

OR

- Q12)**a) Explain NIDS with neat sketch. [8]
- b) Explain PIDS with neat sketch. [8]

x x x

Total No. of Questions :12]

SEAT No. :

P3471

[4959]-312

[Total No. of Pages :3

B.E. (Instrumentation and Control Engineering)

a: ENVIRONMENTAL INSTRUMENTATION

(2008 Course) (Semester - I) (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) *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)** With the help of suitable diagram explain how flame ionization detectors are used to measure total hydrocarbon. **[8]**
- b) Write the advantages and disadvantages of portable instruments over stationary instruments in environment instrumentation. **[8]**

OR

- Q2) a)** Explain the typical hardware of gas chromatograph. **[8]**
- b) What are the absorptive techniques used in ultraviolet analyser? Explain non dispersive technique in detail. **[8]**
- Q3) a)** What are the different parameters of quality of water? Explain any 4 in detail. **[8]**
- b) Explain the process of water treatment from instrumentation point of view. **[8]**

OR

P.T.O.

Q4) a) Explain how thermal conductivity meter is helpful in measuring quality of water. [8]

b) Write a short note on opacity meter. [8]

Q5) a) Explain the instrumentation scheme in assessment of ground water samples.. [9]

b) What is the sedimentation process? What is the criteria for sizing of settling basin? With the help of neat diagram explain ideal sedimentation tank. [9]

OR

Q6) a) How to do the laboratory analysis of ground water samples. [9]

b) Discuss the instrumentation set up in ground water monitoring. [9]

SECTION-II

Q7) a) What are the preliminary steps in processing of a municipal waste water. [8]

b) Enlist the latest method of waste water treatment plants. Explain any one in detail. [8]

OR

Q8) a) Discuss the instrumentation set up for waste water treatment plants. [8]

b) Explain the components in waste water sampler. [8]

Q9) a) Classify the air pollutants? Explain them briefly. [9]

b) What are different principles used in the equipments of air sampling. Explain any two in detail. [9]

OR

Q10)a) How the air sampling methods can be classified? What are difficulties encountered in sampling? What are basic considerations of air sampling. [9]

b) What are different methods used for analysis of air pollutants? Explain any one method in detail. [9]

Q11)a) What are the different measurements carried in monitoring of air quality. Explain any one in detail. [8]

b) Write a short note on open channel waste water flow measurement. [8]

OR

Q12)a) What is the necessity of rain water harvesting? Explain methods involved in Urban areas. [8]

b) What are the different parameters decides the quality of storage water? How the quality of the storage water is checked. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P3472

[4959]-313

[Total No. of Pages :2

B.E. (Instrumentation and Control)
b:NANO 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) Neat diagrams must be drawn wherever necessary.*
- 3) Figure to the right indicates full marks.*

SECTION-I

- Q1)** a) Explain electron transport in a two dimensional electron gas. [6]
- b) Write a note on energy subbands and density of states in Nano scale structure. [6]
- c) Write a note on Nanolithography. [6]

OR

- Q2)** a) Write a note on self assembly technique. [6]
- b) Explain CVD for the synthesis of Nano materials. [6]
- c) Explain the various properties and applications of Nano materials. [6]
- Q3)** a) Write a note on Scanning near field optical microscopy. [8]
- b) Explain Atomic force microscopy in detail. [8]

OR

- Q4)** a) Write a note on scanning tunneling microscopy. [8]
- b) Explain magnetic and optical actuation of cantilevers. [8]

P.T.O.

- Q5)** a) Write a note on CNT based FET. [8]
b) Explain microwave devices based on CNT. [8]

OR

- Q6)** a) Explain CNT based Resonant Tunneling Diode. [8]
b) Write a note on CNT based NEMS. [8]

SECTION-II

- Q7)** a) Explain Spin relaxation mechanism, Spin injection and spin detection in spintronic devices. [8]
b) Write a note on Spin diode. [8]

OR

- Q8)** a) Explain Spin valve in detail. [8]
b) Write a note on Spin Filter. [8]

- Q9)** a) Write a note on mesoscopic devices at room temperature. [8]
b) Explain downscaling of MOSFET dimension up to few nm and ballistic FET. [8]

OR

- Q10)** a) Write a note on Single electron transistor. [8]
b) Explain various resonant tunneling devices and circuits. [8]

- Q11)** a) Write a note on 'Nano-mechanical sensors'. [6]
b) Explain magnetic nanotransducers. [6]
c) Describe CNT based Nano laser. [6]

OR

- Q12)** a) Write a note on chemical Nano scale sensors. [6]
b) Explain Nano switches and molecular switches. [6]
c) Describe CNT based LED. [6]

EEE

Total No. of Questions :12]

SEAT No. :

P3473

[4959]-314

[Total No. of Pages :2

B.E. (Instrumentation and Control)
c:ADVANCED DIGITAL SIGNAL PROCESSING
(2008 Course) (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 polyphase decomposition in Multirate signal processing. [12]
b) Explain noble identity in up sampling and down sampling systems. [6]

OR

- Q2)** a) Explain analysis and synthesis filter bank in detail. [12]
b) Explain term Interpolation. [6]
- Q3)** a) Explain forward linear prediction. [10]
b) Explain Random Processes, Stationary, Random Processes, and statistical Averages. [6]

OR

- Q4)** a) Explain AR Lattice structure. [10]
b) Derive the Yule Walker equations or normal equations for AR process.[6]

P.T.O.

- Q5)** a) Discuss the direct and indirect methods of estimation of energy density spectrum. [8]
b) Explain Blackman & Tukey method of power spectrum estimation with computational requirement. [8]

OR

- Q6)** a) Explain Yule-Walker method for AR Model parameters. [8]
b) Explain the term periodogram. [8]

SECTION-II

- Q7)** a) Explain FIR Adaptive filters. [8]
b) Brief the different steps in RLS algorithm. [8]

OR

- Q8)** a) Explain different steps in LMS algorithm. [8]
b) Explain Linear predictive coding of speech using adaptive filtering. [8]
Q9) a) Explain floating point dsp processors. [8]
b) Discuss the linear and circular addressing modes in TMS320C67XX. [10]

OR

Q10) Draw the functional block diagram of TMS320C6713. Explain each block in detail. [18]

- Q11)** a) Explain fundamental difference between STFT and Wavelet Transform. [6]
b) Explain Daubechies Wavelet transform. [10]

OR

- Q12)** a) Explain different features and applications of STFT. [10]
b) Explain properties of Gabor Transform. [6]

EEE

Total No. of Questions :12]

SEAT No. :

P3474

[4959]-315

[Total No. of Pages :3

B.E. (Instrumentation & Control Engineering)

d: AUTOMOBILE INSTRUMENTATION

(2008 Course) (Semester - I) (406265)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 Q11 or Q12.*
- 2) *Answers 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.*

SECTION-I

- Q1)** a) Explain the various open loop & closed loop components of Engine management system. [8]
- b) Explain Vehicle motion control in detail. [8]

OR

- Q2)** a) Explain the role of electronics instrumentation in Automobiles. [8]
- b) Explain working of the petrol/diesel engine with suitable diagram. [8]
- Q3)** a) Explain the principle of fuel injection system in details with neat diagram. [8]
- b) What are the types of solid state Ignition system? Explain the Electronic spark timing control system with neat diagram. [8]

OR

- Q4)** a) Explain the principle of Carburettor control system with neat diagram. [8]
- b) What is multiport or point fuel Injection system in regards with automobile engine operation? Explain it with neat block diagram. [8]

P.T.O.

- Q5)** a) Explain the various sensors related to engine control system with their functions? [8]
- b) Define the following terms with respect to engine's performance: [10]
- i) Power
 - ii) BSFC
 - iii) Volumetric Efficiency
 - iv) Thermal Efficiency

OR

- Q6)** Write short note on: [18]
- a) Exhaust Emission Control system.
 - b) Idle speed Control.
 - c) Engine Mapping.

SECTION-II

- Q7)** a) Explain Cruise Control System with neat block diagram in details. [8]
- b) Explain automatic transmission electronic control system in details. [8]

OR

- Q8)** a) What is ABS? Explain its operation with neat diagram. [8]
- b) Explain the working of Electronic Power Steering in details. [8]
- Q9)** a) Explain control system for automotive / car door locking system in details. [8]
- b) Write short note on control system for Antitheft control Technology. [8]

OR

- Q10)** a) Write safety features of any vehicle and explain in brief the importance of air bag technology in automobile? [8]
- b) Explain control system for automatic door and windows in vehicle. [8]

Q11) Write short note on:

[18]

- a) Automatic gear control system.
- b) Steering Control Techniques.
- c) Emission Standards.

OR

Q12) Write short note on:

[18]

- a) Lightening system in vehicle.
- b) Emission Standards.
- c) Air conditioning system in automobile control system.

EEE

Total No. of Questions : 12]

SEAT No. :

P3475

[4959]-316

[Total No. of Pages : 2

B.E.(Instrumentation & Control)
PROCESS DYNAMICS AND CONTROL
(2008 Pattern) (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 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) Explain dynamic behavior of second-order system with an example. [8]

b) Comment on stability of linear and non-linear system. [8]

OR

Q2) a) Explain need of mathematical modeling. Explain step test. [8]

b) Draw and explain laboratory flow control system. Explain modeling procedure for the same. [8]

Q3) a) Explain feed forward control scheme of heat exchanger system with 3-way valve. [10]

b) List dynamics of heat exchanger system. Also explain degree of freedom. [8]

OR

Q4) a) Explain feedback control of Liquid-to-Liquid Heat exchanger. [10]

b) Explain exchanger response to changes in Load. [8]

Q5) a) Explain 3-element level control in boiler drum system. [8]

b) Explain burner management system for boiler. [8]

OR

P.T.O.

- Q6)** a) Explain with neat sketch feed forward control of feed water. [8]
b) Explain concept of optimization. Write short note on boiler optimization. [8]

SECTION-II

- Q7)** a) Explain end point detection of continuous reactors. [10]
b) Explain sequential and logic control in batch reactors [8]

OR

- Q8)** a) Draw and explain control configuration for flow and temperature in reactor system. [10]
b) Explain time constants in reactors. Explain effect of lags in case of reactors [8]

- Q9)** a) Explain with neat sketch column pressure control scheme in case of distillation column. [8]
b) Draw and explain overhead and bottom composition control schemes in case fo distillation column system. [8]

OR

- Q10)** a) Explain control scheme for distillate reflux control. [8]
b) Explain frequency response and lag in liquid of distillation system. [8]

- Q11)** a) Explain design aspects of waste-water treatment plant. [8]
b) Explain multi pump system controls. [8]

OR

- Q12)** a) Write short note on controls required in compressors. [8]
b) Discuss control scheme development for waste-water treatment plant.[8]



Total No. of Questions : 12]

SEAT No. :

P3476

[4959]-317

[Total No. of Pages : 2

**B.E.(Instrumentation & Control)
INDUSTRIAL AUTOMATION
(2008 Pattern)(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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate marks.*
- 5) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) What is the impact of automation in Industries? Explain the benefit of it and justify it with suitable example. [10]
b) With the help of block diagram explain the different stages of preparing functional Design Specifications. [8]

OR

- Q2)** a) Explain the role of PLC and PAC system with reference to automation pyramid. [10]
b) Explain “SCADA” with suitable example. [8]
Q3) a) What is “HART”? Explain the Structure. [8]
b) Write short note on Profibus. [8]

OR

- Q4)** a) What is LAS? Explain the role of LAS in Foundation Fieldbus network. [8]
b) Explain the messaging structure in MODBUS Protocol [8]
Q5) a) Explain the procedure for interfacing a PLC with SCADA System. [8]
b) Explain the PID Control function blocks used in PLC systems. [8]

OR

- Q6)** a) With an example explain the “Sequential Function Chart”. [8]
b) Write short note on CNC Machine. [8]

P.T.O.

SECTION-II

- Q7)** a) With an example explain at least four major components of the DCS system. [8]
- b) Discuss the hierarchical structure of DCS in detail. [10]

OR

- Q8)** a) Explain DCS support for Enterprise Resource Planning(ERP). [8]
- b) Write a program in DCS system(any make) using FBD programming method for any temperature control loop. Write the different steps involved in the configuration of function blocks. [10]
- Q9)** a) Explain how alarms are classified and prioritized in any DCS system.[8]
- b) Explain enhanced function like advanced process control in DCS system. [8]

OR

- Q10)**a) Give DCS Specifications and explain. [8]
- b) Explain why and how database access management is done in any DCS system. [8]
- Q11)**a) Explain different layers of protection. [8]
- b) What is Process Hazard Analysis(PHA)? How it is carried out? [8]

OR

- Q12)**a) What are the different safety architectures? Which are commonly used in industrial applications? [8]
- b) Explain IEC 61511 standard for functional safety. [8]



Total No. of Questions : 12]

SEAT No. :

P3477

[4959]-318

[Total No. of Pages : 3

B.E.(Instrumentation)

**ADVANCED BIOMEDICAL INSTRUMENTATION
(2008 Course) (Semester-II)(Elective-III)(406269A)**

Time :3Hours]

[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 and Q11 or Q12 from section-II.*
- 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.*

SECTION-I

- Q1)** a) What are the important blocks of Heart Lung Machine. Explain any one of them in detail with the help of a diagram [8]
- b) Explain different modes of ESU with the help of waveforms. [5]
- c) What care should be taken to avoid burns? [3]

OR

- Q2)** a) Write a shortnote on 'Bedside Monitor' [8]
- b) Distinguish between [8]
- i) AC& DC Defibrillator
 - ii) Synchronous & Asynchronous pacemakers
- Q3)** a) Explain the need of Auto analyser. Discuss the important blocks and their function used in it. [8]
- b) Draw and explain Health level 7 protocol used in biomedical communication. [8]

OR

- Q4)** a) Describe any four applications of Telemetry in Biomedical field. How parameters of telemetry system should be selected based on application. [8]

P.T.O.

b) Draw the graph explaining basic working principle of oximeter. Describe In Vivo Oximeter with the help of a neat diagram. [8]

Q5) a) Discuss design criteria of Xray tube to handle high temperature during Xray generation. Specify the materials used for anode. [8]

b) Describe four generations of gantries used in CT scanner [10]

OR

Q6) a) Compare Radiography and Fluoroscopy. [6]

b) Discuss the need of image intensifier in Fluoroscopy. Explain its working with a neat diagram. [8]

c) What is Hounsfield No? How it is used in computed tomography? [4]

SECTION-II

Q7) a) Explain M mode of ultrasound with any one application of it. [8]

b) Explain the photon annihilation process in radionuclide imaging. How Radionuclide imaging is beneficial over other imaging techniques? [8]

OR

Q8) a) Define T1, T2 and FID in MRI instrumentation. What useful information is obtained from it? [8]

b) Write a short note on 2D Echocardiography. [8]

Q9) a) Explain thermal and non thermal interaction of tissue with LASER. [8]

b) What is an endoscope? Explain the construction with the help of a neat diagram. [8]

OR

Q10) a) Describe any two applications of laser in Dermatology. [8]

b) Write a shortnote on Ultrasound Diathermy. [8]

Q11)a) What are different front panel indicators provided in hemodialysis machine. Also mention different interlock conditions **[10]**

b) Define orthosis and Prosthesis concepts used in rehabilitation engineering. List out two example of each. **[8]**

OR

Q12)a) What is Lithotripsy? Explain the setup of lithotripsy with a detailed block diagram. **[10]**

b) List out the following in connection with wheel chair:- **[8]**

i) Main types of frame design

ii) Four critical performance factors in wheel design to optimize interaction of wheel with ground.

iii) Rear wheels types.



Total No. of Questions : 12]

SEAT No. :

P3478

[4959]-319

[Total No. of Pages : 3

B.E.(Instrumentation & Control)

b: FIBRE OPTIC INSTRUMENTATION

(2008 Course)(Elective-III) (406269)(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 answer 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) With a suitable ray diagram, explain 'Total Internal Reflection'. How 'Total Internal Reflection' is achieved in an optical fiber? **[8]**
- b) Explain with suitable diagrams(any three) **[9]**
- i) Acceptance angle
 - ii) Numerical Aperture
 - iii) Skew rays
 - iv) Evanescent field

OR

- Q2)** a) An optical fiber has a numerical aperture of 0.22 and cladding refractive index of 1.553. Determine **[6]**
- i) The acceptance angle for the fiber in water of refractive index of 1.333
 - ii) The critical angle at the core-cladding interface.
- b) Differentiate between step Index Fiber and Graded Index Fiber on the basis of structure, refractive index profile and applications **[6]**
- c) With suitable diagram, explain Goos -Haenchen shift. **[5]**

P.T.O.

- Q3)** a) What do you mean by signal degradation in an optical fiber? Discuss various signal degradation mechanisms in an optical fiber. [9]
- b) Write a note on 'Optical Time Domain Reflectometer'(OTDR). Also describe the role of OTDR in distributed optical fiber sensing. [8]

OR

- Q4)** a) Compare stimulated Brillouin and stimulated Raman scattering in optical fibers. [6]
- b) Explain the reasons for pulse broadening in optical fiber. [6]
- c) Differentiate between Micro-bending and Macro-bending. [5]
- Q5)** a) What are the requirements for a source in an optical fiber. Enlist some sources, which are used in optical fiber. [8]
- b) Compare PN diode with P-I-N photodiode. [8]

OR

- Q6)** a) What is difference between splices and connectors. Describe any two types of splices in optical fibers with suitable diagrams. [8]
- b) Describe three types of mechanical fiber misalignments, which may contribute to insertion loss at an optical fiber joint. [8]

SECTION-II

- Q7)** a) What are the attractive features of Optical Fiber Sensors? Also enlist some of the limitations of optical fiber. [9]
- b) Write a note on 'Intensity Modulation based Optical Fiber Sensors' based on following points [9]
- i) Principle of operation with diagram
 - ii) Advantages and disadvantages
 - iii) The parameters, measured by this type of sensors

OR

- Q8)** a) What are the characteristics of light, which may be monitored in sensing applications? Describe one technique of sensing which is based on phase modulation. [10]
- b) Write a note on 'Encoding based position sensors'. [8]
- Q9)** a) What is 'Optical Fiber Brag Grating'? Explain with suitable diagram working of 'Optical Fiber Brag Grating'. [10]
- b) Explain a fabrication technique of 'Optical Fiber Brag Grating'. [6]

OR

- Q10)** a) What do you understand by 'Distributed Optical Fiber Sensing'? Enlist the advantages of Distributed Optical Fiber Sensing. [8]
- b) Explain Distributed Optical Fiber Sensing for the dam structure monitoring. What are limitations of this type of sensing? [8]
- Q11)** a) What do you understand by 'Integrated Optics Device'? What are advantages of Integrated Optical Devices over conventional optical devices? [8]
- b) Explain with the aid of suitable diagrams, following integrated optical devices: [8]
- i) Beam splitter
- ii) Directional coupler

OR

- Q12)** a) Sketch the major elements of a fiber amplifier and describe the operation of the device. Indicate the benefits of fiber amplifier technology in comparison with that associated with silicon laser amplifiers (SLAs). [12]
- b) What are the advantages of Optical Amplifiers over conventional electric amplifiers used in optical applications? [4]



Total No. of Questions : 12]

SEAT No. :

P3311

[Total No. of Pages : 4

[4959]-32

B.E. (Mechanical)

CAD / CAM and Automation

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer two sections in two separate answer books.*
- 2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 and Q11 or Q12.*
- 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 reflection of geometrical entity about line $y = mx + c$, with schematic representation and write concatenated transformation matrix. **[6]**
- b) Find concatenated matrix if the transformations are performed as per the following sequence. **[10]**
- i) Rotation through 30° anticlockwise.
 - ii) Translation through 4 and 5 units along the x and y directions.
- What is the effect of above transformations on triangle having co-ordinates A (0, 0), B (5, 0) and C (0, 5).

OR

- Q2)** a) Compare Geometrical transformation and mapping. **[4]**
- b) A tetrahedron is defined by the following points A(2,3,5), B(6,3,5), C(2,5,5) and D(4,4,10) with a transformation matrix generate data for the orthographic view of the object in viewing plane. Also sketch the three views. **[12]**

P.T.O.

Q3) a) Explain non parametric and parametric curves. Compare its mathematical formulations for line and advantages of parametric representation of line. [6]

b) A circle is represented by centre point (5, 5) and radius 10 units. Find parametric equation of circle by recursive method and determine the various points on the circle if increment of angle is 30°. [10]

OR

Q4) a) Plot the hermite cubic spline curve for the points at the value of $u = 0, 0.2, 0.4, 0.6, 0.8$ and 1 having the end points $P_0(2,2)$ and $P_1(6,8)$. The tangent vector for end P_0 is defined by the line between P_0 and another point $P_2(6,8)$ whereas the tangent vector for end P_1 is defined by the line between P_1 and point $P_3(8,7)$. [10]

b) Specify different methods of solid modeling. Explain feature based modeling. [6]

Q5) a) An axial step bar is shown in figure 1. It is subjected to axial pull P of 10 kN. If material of bar is uniform and having a modulus of elasticity as 150 GPa. Determine deflection and stresses in each element and reaction force. [12]

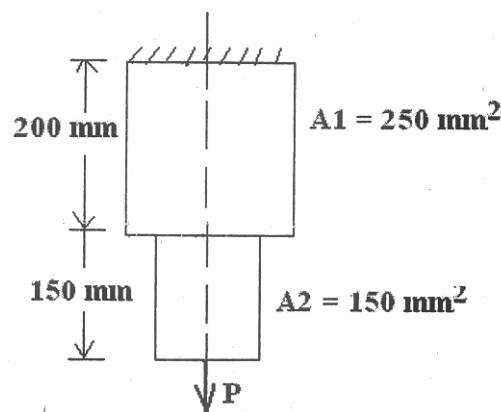


Fig 1

b) Derive the stiffness matrix for 1-D problem. [6]

OR

- Q6) a) A two bar truss is shown in figure 2. Solve the problem as FEM problem and find Nodal displacement & stress. [12]

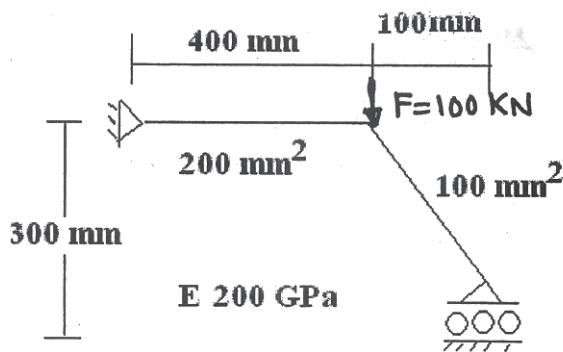
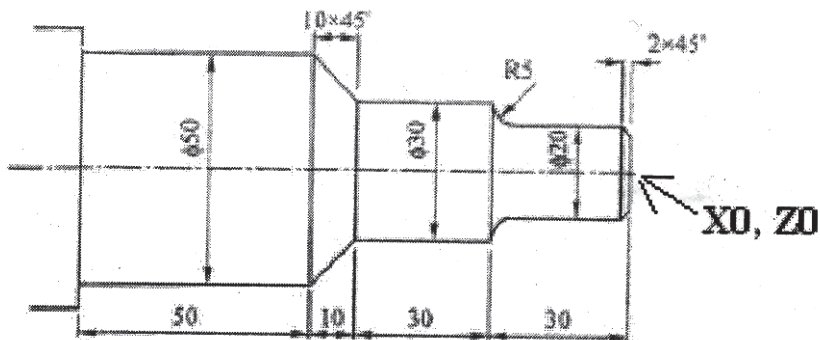


Figure 2

- b) Explain plane stress and plane strain with suitable example. [6]

SECTION - II

- Q7) a) Explain fixed Zero and floating zero for CNC machine. [4]
 b) Write a G code to draw circle having center (0, 0), starting and end point (10,00 and radius 10 when cut is taken clockwise and anticlockwise. [4]
 c) Write a CNC part program to take a finish cut for the shape shown in the figure. Assume suitable machining data. [10]



OR

- Q8) a) What are different Adaptive Control in NC machines and its advantage over NC system. Explain any one in detail. [8]
 b) Explain the concept of Sub programming in NC programming. [4]
 c) Explain canned cycle for peck drilling and tapping. [6]

- Q9)** a) Compare various types of automation. [8]
b) Explain OPTIZ part classification and coding system in Group technology. [8]

OR

- Q10)** a) Explain Machining centre. [8]
b) What are the various elements of Flexible Manufacturing system? [8]

- Q11)** a) Explain the various terminologies used in Robot. [8]
b) Explain articulated configuration robot with application and draw its work envelope. [8]

OR

- Q12)** a) List various programming technique for Robot. Write short note on teach pendant method of programming. [8]
b) List various types of gripper with one application. What is the consideration in selection of Gripper. [8]



Total No. of Questions : 12]

SEAT No. :

P3479

[4959]-321

[Total No. of Pages : 2

B.E.(Instrumentation & Control)

BUILDING AUTOMATION-II

(2008 Course) (Semester-II)(Elective-III)(406269D)

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 with neat sketch basic Air Conditioning Process. [8]
b) Explain which parameters are controlled in HVAC system. [8]

OR

- Q2)** a) What is Human comfort explain human comfort zone, List different factor affecting to human comofort zone. [8]
b) Write a short notes on (any four) [8]
i) Sensible Cooling
ii) Conduction
iii) Convection
iv) Dry bulb Temperatures
v) Dew point Temperature

- Q3)** a) Explain single duct, variable air volume(VAV) system with neat sketch [10]
b) Explain fire tube type of boiler with neat sketch. [8]

OR

- Q4)** a) What is vapour compression cycle; summarize refrigerant state according to location in vapour compression cycle. Explain evaporator used in vapour compression cycle. [10]

P.T.O.

- b) Write a short notes on [8]
i) FCU
ii) Unit Ventilator

- Q5)** a) Explain DDC Architecture with neat sketch. [8]
b) Explain two position control and floating control. [8]

OR

- Q6)** a) Explain Peer-Peer and Polling LAN Controller. [6]
b) Explain Third party Interface in DDC System [10]

SECTION-II

- Q7)** a) What is Motor control center? Explain Basic Components of Motor Control Centre with neat sketch. [10]
b) Explain MODBUS Protocol with neat sketch. [8]

OR

- Q8)** a) Explain Lon Talk communications protocol [8]
b) Explain Dedicated network & shared network used in building automation [10]

- Q9)** a) Explain the concept of Green Building in detail [8]
b) Explain the term Control Reset in HVAC with neat sketch [8]

OR

- Q10)** a) List various types of Control Points with an example. [8]
b) What do you mean energy management system(EMS) Explain benefits of Energy Measurement system. [8]

- Q11)** a) Explain IBMS With neat sketch, List benefits of IBMS [10]
b) Explain any one application of BMS Verticals [6]

OR

- Q12)** a) Explain in brief Integrated building management system with neat sketch. [10]
b) Explain remote system access the benefits of energy management system. [6]



Total No. of Questions :12]

SEAT No. :

P3480

[4959]-322

[Total No. of Pages :3

B.E. (Instrumentation and Control)
a - INSTRUMENTATION IN AGRICULTURE
(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) *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 Mohr's circle of stress with equation. [8]

OR

- Q2) a)** Explain in short: [2×4=8]
- i) Sonic Anemometer
 - ii) Hygrometer (Any one)
- b) Explain open & close path gas analysers. [8]
- Q3) a)** Explain the instrumentation for Sugar plant. [9]
- b) Explain the instrumentation for Dairy industry. [9]

OR

P.T.O.

- Q4)** a) Explain the flow diagram of Fermenter Process. [9]
b) Explain the flow diagram of juice extraction process. [9]
- Q5)** a) Compare the different irrigation methods (Any three methods). [10]
b) Explain the necessity of Irrigation system in agriculture. [6]

OR

- Q6)** a) Explain concept of irrigation scheduling and Irrigation efficiencies. [8]
b) Explain the following terms: [2×4=8]
i) Gypsum block soil moisture sensor.
ii) Thermal based method.

SECTION-II

- Q7)** a) Explain the application of SCADA for DAM parameters. [8]
b) Explain irrigation control management of up stream & down stream control system. [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. [6]
b) With a block diagram explain the application of SCADA & PLC for cold storage systems. [10]

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) Leaf area length evapotranspiration, temperature, wetness & respiration measurement system. **[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]**

EEE

Total No. of Questions :12]

SEAT No. :

P3481

[4959]-323

[Total No. of Pages :2

B.E. (Instrumentation and Control)

b: MICRO ELECTRO MECHANICAL SYSTEMS

(2008 Course) (Semester - II) (Elective - IV) (406270)

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) Figure to the right indicate full marks.*

SECTION-I

Q1) a) What are advantages of smart system. [8]

b) Explain role of Micro actuator and sensor in micro technology. [8]

OR

Q2) a) What is the importance of miniaturization. [8]

b) Explain working of smart Bridge with neat sketch. [8]

Q3) a) Explain working of comb drive with neat diagram. What are its application? [8]

b) Explain working of lab on chip with diagram. What are advantages of lab on chip? [8]

OR

Q4) a) Explain wide scope of application of piezoresistive pressure sensor. [8]

b) Explain working principle of Piezoelectric Inkjet actuator with neat diagram. [8]

P.T.O.

- Q5) a)** What is photolithography? What are different steps involved in it. [9]
b) What is surface micromaching and bulk micromaching? [9]

OR

- Q6)** Explain following micromachining Techniques with neat diagram. [18]
a) Thermal evaporation
b) Etching

SECTION-II

- Q7) a)** Explain in detail bimorph effect. [6]
b) Explain with neat sketch transversaly deformabale element: A Beam. [10]

OR

- Q8) a)** Define stress & strain. [6]
b) Explain in detail effect of residual stress and residual stress gradient. [10]
Q9) a) Explain in detail the difference between. Finite Difference Method and Finite Element Method. [10]
b) What is Finite element method. [8]

OR

- Q10)a)** How Finite element Method is beneficial over analytical method. [8]
b) Derive finite element equation. [10]

- Q11)a)** Explain working of NPN transistor with neat diagram. [8]
b) What is need of signal conditioning for sensors in MEMS. [8]

OR

- Q12)a)** Draw and explain feedback control system. [8]
b) What are different types of rectifiers? Draw and explain half wave Rectifier. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P3970

[4959]-324

[Total No. of Pages :2

**B.E.(Instrumentation and Control)
c: DIGITAL IMAGE PROCESSING
(2008 Course) (Semester-II) (406270)(Elective-IV)**

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 or Q10.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data if necessary.*

SECTION-I

Q1) Explain in detail the hardware used in digital image processing. **[16]**

OR

Q2) Discuss image degitizing components. **[16]**

Q3) Explain the human visual systems. **[16]**

OR

Q4) Explain the basic image transformations with suitable examples. **[16]**

Q5) Obtain the 2D DCT of the following image: **[18]**

10 20 30

40 50 60

70 80 90

OR

Q6) Explain Gabour transform. Discuss its properties and applications. **[18]**

SECTION-II

Q7) Explain various spatial filters for image enhancement. **[18]**

OR

Q8) Explain image enhancement using Discrete Fourier Transform. **[18]**

P.T.O.

Q9) Explain image degradation model. [16]

OR

Q10) Explain inverse filtering. [16]

Q11) Compare various edge detecting operators. [16]

OR

Q12) Discuss edge detection in image with suitable application. [16]



Total No. of Questions : 11]

SEAT No. :

P3482

[4959]-325

[Total No. of Pages : 2

**B.E. (Biotechnology)
BIOSEPARATION - II
(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 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 downstream Processing? Explain in detail requirements of design of any bioseparation process with case study. **[16]**

OR

Q2) What are process design criteria for low volume high value products? Give at least four examples of each category and explain process design criteria for any one specific product. **[16]**

Q3) Describe instrumentation of Spectrophotometer in details. **[16]**

OR

Q4) Describe in detail NMR with principle. **[16]**

Q5) Explain the process of reverse phase chromatography in details. **[18]**

OR

Q6) Explain the process of Hydrophobic Interaction chromatography in details. **[18]**

P.T.O.

SECTION - II

Q7) Write short notes on :(Any 2) (8 M Each) **[16]**

- a) Gas Chromatography.
- b) Liquid Chromatography.
- c) Mass spectrometry
- d) Hyphenated Techniques.

Q8) Explain in details Mass spectrometry Instrumentation with different types of detectors and principle of protein identification. **[16]**

OR

Q9) Write short notes on: **[16]**

- a) Super critical Fluid Extraction.
- b) MALDI - TOF.

Q10) Write and explain flow sheet of separation of following bioproducts (9 M each) **[18]**

- a) Beer production.
- b) Biopolymer production.

OR

Q11) Write and explain flow sheet of separation of following bioproducts (9 M each) **[18]**

- a) Peptide Antibiotics.
- b) Commodity Acids.



Total No. of Questions : 12]

SEAT No. :

P3483

[4959]-326

[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 Q1 or Q2, Q3 or Q4 and 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 side marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Describe in brief principle, construction and working of McLeod pressure gauge. **[8]**
- b) Describe working principle of any one instrument used for temperature measurement. **[8]**

OR

- Q2)** Explain in brief working principle of following instruments **[16]**
- a) Electromagnetic flow meter.
 - b) Optical pyrometer.

- Q3)** a) Derive the transfer function for a liquid level system with constant flow output. Also derive its response for a unit step input and state the characteristics of the output. **[6]**
- b) Consider a CSTR in which a reaction is occurring $A \rightarrow B$ and it proceeds at a rate $r = kC_0$. Derive the transfer function for this system. **[6]**
- c) A thermometer follows first order dynamics with time constant of 0.2 min. 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 0.2 min. It is then returned to the original bath at 100°C. Calculate reading of the thermometer at $t = 6$ seconds and $t = 24$ seconds. **[4]**

OR

P.T.O.

- Q4) a)** With the help of neat sketch explain the characteristic response of first order system to a step input. [8]
- b) A thermometer having a time constant of 1 min is at a steady state temperature of 30°C. At time $t = 0$, the thermometer is placed in a temperature bath maintained at 100°C. Determine the time needed for the thermometer to read 90°C. [4]
- c) write a short note on Seebeck effect. [4]

- Q5) a)** A step change of magnitude 4 is introduced in to a system having the transfer function. [12]

$$\frac{Y(S)}{X(S)} = \frac{10}{(S^2 + 1.6S + 4)}$$

Determine

- i) Percent Overshoot
 - ii) Maximum value of $Y(t)$
 - iii) Rise Time
 - iv) Ultimate Value of $Y(t)$
- b) How does the response of interacting and non- interacting tank systems vary from that of a single tank system? Why. [6]

OR

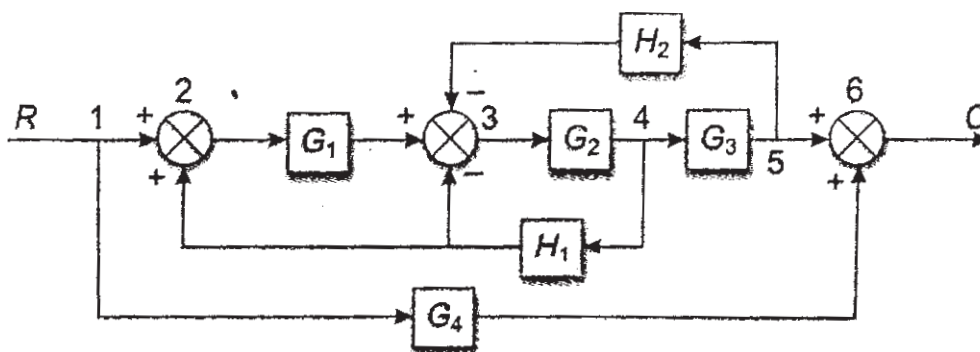
- Q6) a)** For a second order under damped response, Define and explain. [8]
- i) Overshoot
 - ii) Decay Ratio
 - iii) Rise Time
 - iv) Response Time
- b) Derive the transfer function for a two tank interacting system. [10]

SECTION - II

- Q7) a)** With the help of a block diagram of a control system, derive the transfer function for a Servo and Regulator problem. [10]
- b) What is proportional derivative control? Derive its transfer function and state the characteristics of the response generated by a PD controller. [8]

OR

- Q8) a)** Obtain the transfer function $C(s)/R(s)$ of the block diagram shown below [12]



- b) Explain in brief control action of PI controller. [6]

- Q9) a)** Draw the Bode Plot for the following system [8]

$$G(s) = \frac{10}{(s+1)(0.5s+1)}$$

- b) Write a note on Cohen Coon tuning method. [8]

OR

- Q10) a)** Draw the Root locus for the following system

$$G(S) = \frac{K}{S(S^2+2S+2)} \quad [8]$$

- b) Discuss the stability of the control system having following characteristic equation $S^4 + 3S^3 + 5S^2 + 4S + 2 = 0$. [8]

Q11)a) Explain in detail what cascade control is. Support your answer with example. [8]

b) Write short note on [8]

i) Split Range Control.

ii) Foam Controller.

OR

Q12)Write short note on [16]

a) Auctioneering control system.

b) Ratio control system.

c) Fuzzy Logic.

d) Override control system.



Total No. of Questions :12]

SEAT No. :

P3971

[4959]-327

[Total No. of Pages :3

B.E. (Biotechnology)
Bioprocess Equipment Design
(2008 Pattern) (Semester -I) (415465)

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 Q1 or 2, Q3 or 4, Q5 or 6 from section I and Q7 or 8, Q9 or 10, Q11 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) Explain Maximum distortion energy and Maximum shear stress theory. **[10]**
- b) Describe the general design procedure for process equipment. **[8]**

OR

- Q2)** a) Write short note on purging. **[6]**
- b) Define and explain Design Stress, Polar Moment of Inertia **[6]**
- c) In a biodiesel production process an agitator having a Load of 5 KN to be raised is attached at the end of the steel wire is not to be exceed 200 MPa, what is the minimum diameter of wire required. **[6]**
- Q3)** a) Discuss in detail design procedure for spherical shell. **[8]**
- b) Why it is necessary to consider the corrosion allowance while specifying the final thickness of vessel? **[8]**

OR

P.T.O.

Q4) a) Explain auto frottage and shrink fit construction for high pressure vessel. [8]

b) Explain the design procedure of various types of head for pressure vessel. [8]

Q5) a) Discuss the design consideration for various types of jackets with neat sketch. [8]

b) Explain various flow pattern in agitated vessel and power curves in agitation. [8]

OR

Q6) a) With the classification of agitator discuss the selection criteria of agitator. [8]

b) 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: [8]

N_{Re}	1000	2000	3000	4000
N_p	1.1	1.2	1.3	1.4

SECTION - II

Q7) a) Explain the thermal design procedure for shell and tube heat exchanger. [8]

b) Discuss about Codes and Standards and various types of heat exchanger. [8]

OR

Q8) a) What are the different types of heat exchanger? [4]

b) Explain the procedure with equations to calculate the tube side heat transfer coefficient. [6]

c) Explain various methods of feeding for multiple effect evaporators. [6]

- Q9)** a) Define percent flooding and weep point. [8]
b) Define Murphree plate. Overall plate (column) efficiency. [8]

OR

- Q10)**a) Explain typical performance diagram for a sieve plate. [8]
b) Compare the different types of plates in distillation. [8]

- Q11)**a) Write short note on Tangential Flow Filtration (TFF). [6]
b) Explain recessed plate construction of plate and frame filters. [6]
c) Explain the need of downstream processing in the biological process. [6]

OR

- Q12)** Discuss on: [18]
a) Continuous sterilization.
b) High performance thin layer chromatography.
c) TFF system.



Total No. of Questions : 12]

SEAT No. :

P3972

[4959]-328

[Total No. of Pages : 2

B.E. (Biotechnology)

**a: ENVIRONMENTAL BIOTECHNOLOGY
(2008 Pattern) (Semester - II) (Elective -I) (415461)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Neat diagrams must be drawn whenever 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) Enlist the water quality standards mentioned by WHO and MPCB. **[18]**

OR

Q2) Explain in detail about primary and secondary treatment of waste water. Explain the advantages and disadvantages of the same. **[18]**

Q3) Write in detail about **[16]**

- a) Rotating biological contactors.
- b) Aerated lagoons.

OR

Q4) Answer the following **[16]**

- a) Differentiate between Fluidized bed reactor and packed bed reactor.
- b) Describe the principle, advantages, and disadvantages of oxidation ditches used in waste water treatment

P.T.O.

Total No. of Questions : 12]

SEAT No. :

P3312

[Total No. of Pages : 5

[4959]-33

B.E. (Mechanical Engineering) (Semester - I)

DYNAMICS OF MACHINERY

(2008 Pattern)

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) *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) Why single cylinder engines cannot be balanced completely? Explain.[4]
b) Four masses A, B, C and D carried by a rotating shaft at radii 80 mm, 100 mm, 160 mm and 120 mm respectively are completely balanced. Masses B, C and D are 8 kg, 4 kg and 3 kg respectively. Determine the mass A and the relative angular positions of the four masses, if the planes are spaced 500 mm apart. [12]

OR

- Q2)** a) Explain the method of direct and reverse crank to determine the unbalance forces in radial engines. [4]
b) The successive cranks of a 5 cylinder inline engine are at 144° apart. The spacing between the cylinder center lines is 400 mm. The length of crank and connecting rod are 100 mm and 450 mm respectively and the reciprocating mass for each cylinder is 20 kg. The engine speed is 630 rpm. Determine the maximum values of the primary and secondary forces and couples and the position of the central crank at which these occur. [12]

P.T.O.

Q3) a) Define the following terms with respect to free damped vibrations:[4]

i) Logarithmic decrement

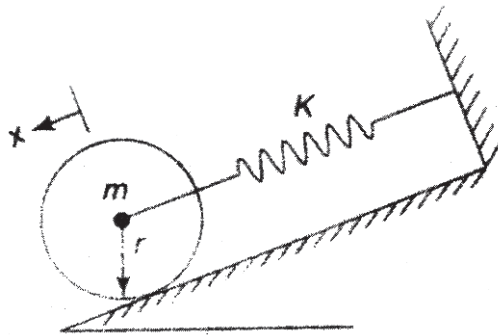
ii) Damping coefficient

iii) Coulomb damping

iv) Damping factor

b) A homogeneous solid cylinder of mass 'm' is linked by a spring of constant 'k' N/m as shown in following fig. If it rolls without slipping, show that frequency of oscillations is [6]

$$\omega_n = \sqrt{\frac{2k}{3m}} \text{ rad / sec}$$



c) An under damped shock absorber is to be designed for an automobile. It is required that initial amplitude to be reduced to 1/16th in one cycle. The mass of the automobile is 200 kg and damped period of vibration is one sec. Find the necessary stiffness and damping constant of shock absorber. [8]

OR

Q4) a) Derive a relation to determine the loss of amplitude per cycle in case of Coulomb damping. [6]

b) A spring mass system with mass m kg and stiffness 'k' N/m has a natural frequency of 'f' Hz. Determine the value of stiffness 'k₁' of another spring which when arranged in conjunction with spring of stiffness 'k' in series will lower the natural frequency by 20%. [6]

- c) A 500 kg vehicle is mounted on springs such that its static deflection is 1.5 mm. What is the damping coefficient of viscous damper to be added to the system in parallel with the springs, such that the system is critically damped? [6]

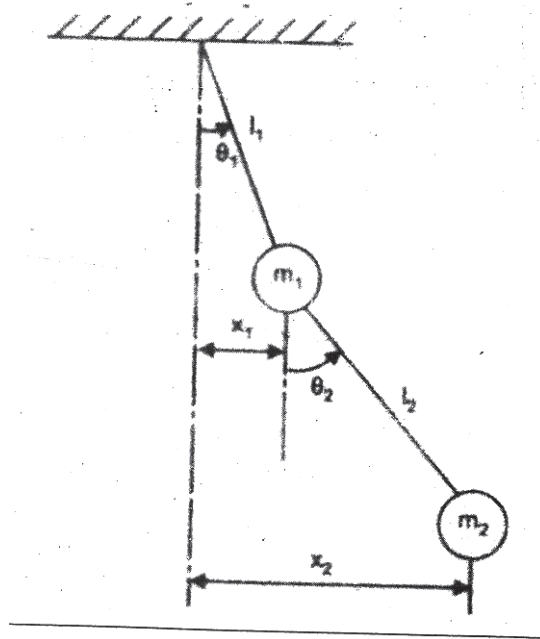
- Q5)** a) Derive an expression for magnification factor in case of steady state vibration subjected to an external periodic force $F_0 \sin(\omega t)$. [8]
- b) The springs of an automobile trailer are compressed 0.1 mm under its own weight. Find the critical speed when the trailer is passing over a road with a profile of sinewave whose amplitude is 80 mm and the wavelength is 14 m. Find amplitude of vibration at a speed of 60 kmph. [8]

OR

- Q6)** a) The weight of an electric motor is 125 n and it runs at 1500 rpm. The armature weighs 35 N and its CG lies 0.05 cm from the axis of rotation. The motor is mounted on 5 springs of negligible damping so that the force transmitted is $1/11^{\text{th}}$ of the impressed force. Assume that the weight of the motor is equally distributed among the 5 springs. Determine : [8]
- Stiffness of each spring
 - Dynamic force transmitted to the base at operating speed.
 - Natural frequency of the system.
- b) A vertical single stage air compressor having a mass of 500 kg is mounted on springs having stiffness of 1.96×10^5 N/m and $\xi = 0.20$. The rotating parts are completely balanced and the equivalent reciprocating parts weigh 20 kg. The stroke is 0.2 m. Determine the dynamic amplitude of vertical motion and the phase difference between the motion and excitation force, if the compressor is operated at 200 rpm. [8]

SECTION - II

- Q7) a) Set up the differential equations of motion for the double pendulum shown in following fig., using the coordinates x_1 and x_2 and assuming small amplitudes. Find the natural frequencies and ratios of amplitude, if $m_1 = m_2 = m$ and $l_1 = l_2$. [14]



- b) Explain principal modes of vibration with respect to 2DOF translational system. [4]

OR

- Q8) a) Two rotors A and B are attached to the end of a shaft 500 mm long. Weight of the rotor A is 300 N and its radius of gyration is 300 mm. The corresponding values of rotor B are 500 N and 450 mm respectively. The shaft is 70 mm in diameter for the first 250 mm, 120 mm diameter for the next 100 mm and 100 mm diameter for the remainder of its length. Modulus of rigidity for the shaft material is 8×10^{11} N/m² Find : [12]

- i) the position of the node and
- ii) the frequency of torsional vibration.

Draw the mode shapes.

- b) Explain the concept of torsionally equivalent shaft and derive the relevant equation for it. [6]

- Q9)** a) Define the following terms : [4]
- i) Sound power level
 - ii) Sound pressure level
 - iii) Sound intensity
 - iv) Decibel scale
- b) Explain human hearing mechanism with a neat sketch. [6]
- c) A machinist working in a machine shop is operating 5 machines having their sound pressure levels as 95 dB, 90 dB, 92 dB 88 dB and 83 dB respectively. Determine the total sound pressure level when all 5 machines are turned on and when machine 4th & 5th are turned off.[6]

OR

- Q10)** a) Explain the working of microphone. [4]
- b) What is sound field? What are the various types of sound fields in the vicinity of a sound source? [6]
- c) What do you understand by sound enclosure? Describe the 2 types of sound enclosures. [6]
- Q11)** a) What do you mean by vibration absorber? Explain the principle of operation of it. [4]
- b) What do you mean by vibration isolation? What are the various methods of vibration isolation? [6]
- c) A vibration measuring device is used to find the displacement, velocity and acceleration of a machine running at 120 rpm. If the natural frequency of the instrument is 5 Hz and it shows 0.04 mm. What are the 3 readings? Assume no damping. [6]

OR

- Q12)** Write short notes on the following : [16]
- a) FFT Analyser
 - b) Piezo electric accelerometer
 - c) Stroboscope



Total No. of Questions : 12]

SEAT No. :

P3484

[4959]-330

[Total No. of Pages : 3

B.E. (Biotechnology)

c:BIOTHERAPEUTICS TECHNOLOGY

(2008 Course) (Elective - I) (Semester - I) (415461)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, and 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.*

SECTION - I

Q1) Briefly describe the process of drug discovery. **[10]**
Enlist and explain various steps in drug development process. **[8]**

OR

Q2) Justify-Recombinant protein therapeutics have changed the face of modern medicine. **[18]**

Q3) Write short notes on (ANY TWO) **[16]**

- a) Biopharmaceuticals,
- b) Cloning vectors,
- c) Transfection

OR

Q4) a) With the help of flow chart describe hybridoma technique for production of MAb. **[10]**

b) Give 3 examples of MAbs available in market with its therapeutic use. **[6]**

P.T.O.

Q5) Give comparative account of different hosts used for Biotherapeutics production. [16]

OR

Q6) Write short notes on (8marks each)

- a) Glycosylation
- b) Expression vectors. [16]

SECTION - II

Q7) Write notes on

- a) labeling of Biopharmaceutical,
- b) QC tests for final product. [18]

OR

Q8) Explain the design of Clean room and its importance in biopharmaceutical production. [18]

- Q9)** a) Write a note on -water for biopharmaceutical production. [8]
- b) Write a note on -QA parameters for biopharmaceuticals. [8]

OR

Q10) Write notes on (ANY TWO) [16]

- a) Oral dosage forms,
- b) targeted drug delivery,
- c) sustained release forms,
- d) Semi solid dosage forms

Q11) Write notes on

[16]

- a) Biopharmaceutical stability,
- b) Pharmacokinetics

OR

Q12)a) Describe master and working cell bank

[8]

b) What is a patent and what is patentability.

[8]

x x x

Total No. of Questions : 12]

SEAT No. :

P3485

[4959]-331

[Total No. of Pages : 3

B.E. (Biotechnology)

BIOENERGY AND RENEWABLE RESOURCES

(2008 Course) (Elective - II) (Semester - 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, and Q11 or Q12.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

Q1) a) Write down the principle, advantages and disadvantages of the following **[10]**

- i) Fuel cells
 - ii) Tidal energy
- b) What is meant by renewable energy sources? Explain in brief these energy sources with special reference to Indian context. **[8]**

OR

Q2) Write down the principle, advantages and disadvantages of the following **[18]**

- a) Wind energy
- b) Solar thermal energy
- c) Geothermal energy

Q3) a) Explain with neat sketch working of wind energy systems with main components. **[8]**

- b) Write a note on “Uses of Geothermal energy and Geothermal power plants”. **[8]**

OR

P.T.O.

- Q4)** a) Explain in detail the flashed steam system for geothermal energy. [8]
b) What is the basic principle of wind energy conversion system, explain briefly. [8]

- Q5)** Explain in details [16]
a) The need of solar energy in the world and in India.
b) Domestic and industrial applications of solar energy.

OR

- Q6)** Enumerate the different main applications of solar energy. What is the principle of solar photovoltaic power generation? What are the advantages and disadvantages of photovoltaic solar energy conversion? [16]

- Q7)** a) What are the types of photobioreactors? Explain with neat sketch working of any three photobioreactors, it's advantages and limitation. [14]
b) Explain the advantages of microalgae as feed stock for biofuels. [4]

OR

- Q8)** What are microalgae? Describe in detail about microalgae biomass production by [18]
a) Raceway ponds and
b) Photobioreactors

- Q9)** a) What is the role of detoxification? Explain one method each for physical, chemical and biological detoxification. [10]
b) Why pretreatment is required for lignocellulosic material? Explain in detail any two methods of pretreatment. [6]

OR

Q10) Describe in detail about [16]

- a) Ethanol production from lignocellulosic materials.
- b) Challenges in ethanol production

Q11)a) What is anaerobic digestion? What are the factors affecting the biodigestion? Explain briefly. [8]

- b) List and explain briefly the techniques suggested for biogas production and maintenance. [8]

OR

Q12) Describe in detail about following biogas plant [16]

- a) Continuous and batch types.
- b) The dome and drum types.
- c) Different variations in the drum type.

x x x

Total No. of Questions : 12]

SEAT No. :

P3486

[4959]-332

[Total No. of Pages : 2

B.E. (Biotechnology)

BIOMATERIALS

(2008 Course) (Elective - II) (Semester - I) (415462)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Any three from section I and any three 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) What are medical fibers? Name and explain processes for preparation of biofibers with its application and importance. **[16]**

OR

Q2) List out different mechanical properties of materials and describe their importance when material is implanted in human body. **[16]**

Q3) How cross linking or curing occur in silicone elastomers? Describe methods of curing with mechanism. Explain an example of oxidative addition/reductive elimination of Pt in silicone elastomers. **[16]**

OR

Q4) What are various types and properties of metals which are being used during implants? Explain processing steps involved for metallic implant device with one case study. **[16]**

Q5) Explain the properties and biomedical applications of three natural polysaccharides. **[18]**

OR

Q6) a) Describe the synthesis of polylactic acid starting from lactic acid highlighting the intermediate products. **[9]**

b) Discuss the biomedical application of Pullulan in targeted drug delivery. **[9]**

P.T.O.

SECTION - II

Q7) What is a biocatalyst? Explain in detail application of biocatalyst in production of aromatic precursors with one suitable case study? [16]

OR

Q8) What are PHA and PHB? Discuss in detail production of PHA with its applications. [16]

Q9) Write a short note on: (Any Three) [18]

- a) Dental implants
- b) Porous materials
- c) Ceramics
- d) Nanobiomaterials

OR

Q10) Explain the optical Properties of quantum dots and enumerate their applications in biomedicine. [18]

Q11)a) What are the characteristics of bioadhesives? Describe various applications of bioadhesives. [8]

- b) How can we use stress strain diagram in selecting the most appropriate materials for orthopedic biomaterials. [8]

OR

Q12) List a type of materials used in each of the following medical applications:[16]

- a) Skin repair.
- b) Bone plates
- c) Contact lenses
- d) Tissue engineering scaffold.

x x x

Total No. of Questions : 12]

SEAT No. :

P3519

[4959]-333

[Total No. of Pages : 2

B.Tech.(Biotechnology)

**C-STEM CELL BIOLOGY AND REGENERATIVE MEDICINE
(2008Pattern) (Elective - II)(415462)(Semester-I)**

Time :3Hours]

[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 Q2, Q 3 or Q4, Q5 are Q6 from section I and Q 7 or Q8,Q 9 or Q10, Q 11 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) Explain - Stem cells niche and its significance [16]

OR

Q2) a) Define the following : [10]

- | | |
|----------------------|------------------------------|
| i) Progenitor cells. | ii) Transit amplifying cells |
| iii) Plasticity | iv) Transfection |

b) Diagrammatically explain the Chromatin immunoprecipitation protocol.[6]

Q3) a) Explain FACS and its application in stem cell research. [12]

b) Write short note on Gene targeting. [6]

OR

Q4) a) Describe pancreatic stem cells and give the advantages. [10]

b) Define properties of hematopoietic stem cells. [8]

Q5) a) Summarize Induced pluripotent stem cell technology. [10]

b) Write a note on isolation of embryonic stem cells. [6]

OR

P.T.O.

- Q6)** a) Describe therapeutic cloning. [8]
b) Describe isolation and culture of the neural stem cell. [8]

SECTION-II

- Q7)** a) Give the clinical applications of umbilical cord blood stem cells. [9]
b) Explain the Validation of manufacturing process. [9]

OR

Q8) Write a note on- Guidelines for stem cells research and therapy in India. [18]

- Q9)** a) Write a short note on use of working cell banks. [8]
b) Describe the banking or distribution of hESCs. [8]

OR

- Q10)** a) Explain the cell replacement therapy. [8]
b) Explain Stem cells in mammalian development. [8]

- Q11)** a) Explain - Application of stem cells in degenerative medicine. [10]
b) Discuss the involvement of stem cells in the retinal replacement therapy [6]

OR

- Q12)** Discuss on: [16]
a) MSC on myocardial regeneration.
b) Skin lineage commitment in stem cells.



Total No. of Questions : 12]

SEAT No. :

P3487

[4959]-334

[Total No. of Pages : 2

B.E.(Biotechnology)

BIOPROCESS MODELING AND SIMULATION

(2008Course) (Semester-II)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q1 or Q 2,Q 3or Q 4, Q 5 or Q 6 , Q 7 or Q 8, Q 9 or Q 10,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.

SECTION-I

Q1) With a neat sketch, define model building. Explain different phases of model building. [18]

OR

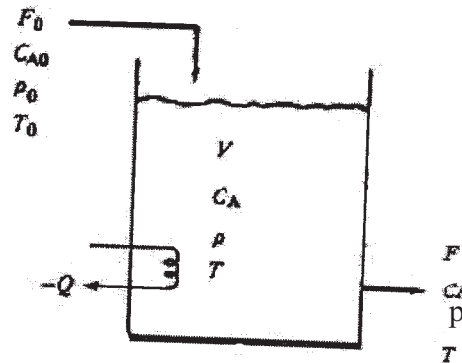
Q2) Define and explain: [18]

- a) Process model
- b) Simulation of a model

Q3) Write detailed notes on applications of mathematical modelling. [16]

OR

Q4) Write the modelling equations for the CSTR in which consecutive first order reactions occur with exothermic heats of reaction λ_1 and λ_2 . [16]



P.T.O.

Q5) Write a brief note on “Boundary conditions”. Give suitable examples. What are the advantages of using boundary conditions? [16]

OR

Q6) Briefly explain with suitable examples the classification of mathematical models based on. [16]

- a) State of the process
- b) Variation of independent variables

SECTION-II

Q7) In a chemostat with cell recycle, the feed flow rate and culture volumes are $F=100\text{ml/hr}$ and $V=1000\text{ml}$ respectively. The system is operated under glucose limitation, and the yield coefficient, $Y_{x/s}^M$, is $0.5\text{gdw cells/g substrate}$. Glucose concentration in the feed is $S_0 = 10\text{g glucose/l}$. The kinetic constants of the organisms are $\mu_m = 0.2\text{ h}^{-1}$, $K_s = 1\text{ g glucose/l}$. The value of C is 1.5 , and the recycle ratio is $\alpha = 0.7$. The system is at steady state. [18]

- a) Find the substrate concentration in the recycle stream(S).
- b) Find the specific growth rate (μ_{net}) of the organisms.
- c) Find the cell(biomass) concentration in the recycle stream.
- d) Find the cell concentration in the centrifuge effluent(X_2).

OR

Q8) Define Chemostat? How recycle stream affects the yield of bio product in Chemostat? Model a Chemostat with proper assumptions and neat sketch?[18]

Q9) Write short notes on Agitated and Sparged Bio reactor. List out their applications in Biotech industries. [16]

OR

Q10) Model suspended growth systems with proper diagram and assumptions.[16]

Q11) With a neat sketch and assumptions, model ideal binary distillation column and prove that the system is critically specified. [16]

OR

Q12) Model a reactor with mass transfer and prove that the system is critically specified. Also discuss the rate limiting steps involved in the process. [16]



Total No. of Questions :12]

SEAT No. :

P3973

[4959]-335

[Total No. of Pages :3

B.E. (Biotechnology)

PLANT ENGINEERING AND PROJECT COSTING

(2008 Pattern) (Semester - II) (415470)

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 and 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)** Draw a symbolic representaiton of any six process equipments used in process industry. **[6]**
- b) Why process flow diagram is prepared? Discuss. **[10]**

OR

- Q2) a)** Discuss about various factors consider in techno economic feasibility study in plant design. **[8]**
- b) Differentiate between qualitative and quantitative type of process flow diagram. **[8]**
- Q3) a)** Explain the criteria for location of different building and facilities in the drawing of plant layout. **[8]**
- b) Draw a flow diagram illustrating hierarchical process. **[8]**

OR

P.T.O.

Q4) Discuss in detail about the following: [16]

- a) Kinetic feasibility
- b) Thermodynamic feasibility

Q5) a) What are the different steps used for process piping design? Discuss. [9]

b) Why process P & ID diagram is prepared? Discuss. [9]

OR

Q6) a) Discuss the capacity estimation and economic factors for various utilities. [9]

b) State different types of thermal insulation for heating and cooling used in piping design. [9]

SECTION -II

Q7) a) What are the different factors affecting on fixed capital and working capital? Discuss any one in detail. [12]

b) Write short note on pipe sizing and colour code of pipeline. [6]

OR

Q8) a) A company manufacturing plant and equipment for biodiesel manufacturing plant is quoting a tender. The delivery date is fixed. The project manager has listed down the activities in project as under: [12]

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) Discuss on plant testing and commissioning. [6]

Q9) State and explain the methods of profitability evaluation technique. [16]

OR

Q10)a) Explain discount factor and capital recovery factor. [8]

b) Discuss the effect of inflation on profitability analysis. [8]

Q11) Write short note on: [16]

a) Sinking fund

b) Current value and

c) Salvage value

OR

Q12)a) Define depreciation and what are the various methods used for determination? [8]

b) What are the different practical factors used in alternative-investment and replacement analysis? Discuss. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P3974

[4959]-336

[Total No. of Pages :2

B.E. (Biotechnology)

a : Food Biotechnology

(2008 Course) (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 side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Draw a schematic overview of the radiation spectrum. Give the general procedure and specifications for food irradiation. What are the potential applications of food irradiation? What type of food can be irradiated? [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) HTST treatment.
- b) Canning.

Q5) Explain the technique of Modified Atmosphere Packaging in detail. What are its advantages and applications? [16]

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) Write a note on time and temperature calculation for HTST pasteurization. [8]

SECTION - II

Q7) Write a note on production and use of microbial polysaccharides in food. [16]

OR

Q8) Explain in brief use of solid state bioprocessing for functional food ingredients. [16]

Q9) Explain the classes of industrially important enzymes used in food industries. [18]

OR

Q10) Explain the use of enzymes in cereal and bakery industry. [18]

Q11) What is food industrial waste? Explain in brief the liquid waste treatment methods used in food industries. [16]

OR

Q12) Write a note on different waste disposal methods used in food industries. [16]



Total No. of Questions :12]

SEAT No. :

P3975

[4959]-338

[Total No. of Pages :2

B.E. (Biotechnology)

**C - INTRODUCTION TO SYSTEMS BIOLOGY
(2008 pattern) (Semester - II) (Elective - III) (415467)**

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 side 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 derive time response equation with graphical representation for**[18]**

- a) Steady state.
- b) In absence of signal.
- c) At start of signal
- d) For stable protein.

OR

Q2) Write down different components of system biology explaining each. **[18]**

Q3) Answer the following. **[16]**

- a) Explain chain termination method for DNA sequencing.
- b) Write about use of structural genomics in biotechnology.

OR

Q4) what is Next generation sequencing? Describe it in detail **[16]**

Q5) What are microarrays? Enlist its different types. Explain any two in details.**[16]**

OR

P.T.O.

- Q6)** Write in detail about [16]
- a) Data pre-processing.
 - b) Affimatrix microarray.

SECTION - II

- Q7)** What is epigenetics? Explain different epigenetic mechanisms for regulation of gene expression and organization. [18]

OR

- Q8)** Answer the following. [18]
- a) List the key factors that cause epigenetic changes.
 - b) Write a note on applications of epigenetics in treating diseases.

- Q9)** Answer the following. [16]
- a) Explain factors, organs and functions of Drug Metabolism.
 - b) Explain the factors affecting the variations in drug response.

OR

- Q10)** Differentiate between [16]
- a) Pharmacokinetics and Pharmacodynamics.
 - b) Phase I and phase II reactions.

- Q11)** Answer the following. [16]
- a) State and explain the analytical approaches of metabolomics.
 - b) What are the applications and limitations of metabolomics?

OR

- Q12)** Explain mass spectrometry with the help of following points: [16]
- a) Principle.
 - b) Instrumentation.
 - c) Working.
 - d) Applications.



Total No. of Questions : 12]

SEAT No. :

P3313

[Total No. of Pages : 4

[4959]-34

B.E. (Mechanical) (Semester - I)

INDUSTRIAL FLUID POWER

(2008 Pattern)

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

SECTION - I

Q1) a) Write a short note on classification of “Hydraulic Fluids”. [8]

b) Write a short note on “Types of Seals”. [8]

OR

Q2) a) Write a short note on “Types of Filters used in Hydraulic Systems”. [8]

b) What are the “sources of contamination”? Explain in detail. [8]

Q3) a) Explain with neat sketch working of “External Gear Pump”. [8]

b) Explain with neat sketch working of “Bent Axis Pump”. [8]

OR

Q4) a) Write a short note on “Pressure and Temperature Switches”. [8]

b) Explain with neat sketch working of “Bladder Type Accumulator”. [8]

P.T.O.

- Q5)** a) Explain with neat sketch construction and working of “Pressure Relief Valve”. [9]
 b) Explain with sketch construction and working of “Counter Balance Valve”. [9]

OR

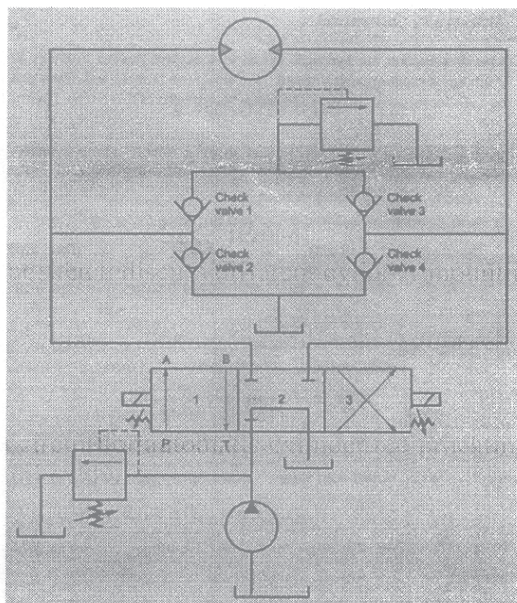
- Q6)** a) Explain with sketches :
 i) Meter in circuit
 ii) Meter out circuit [10]
 b) Draw symbols :
 i) 4/2 way lever operated D.C.V.
 ii) 4/3 way push button operated DCV
 iii) 3/2 way Roller operated valve
 iv) 5/3 way solenoid operated valve [8]

SECTION - II

- Q7)** a) With the help of neat sketch discuss different cylinder mounting methods in fluid power system. [8]
 b) Draw and explain actuator locking circuit using pilot check valves used in hydraulic system. [8]

OR

- Q8)** a) Draw and explain a circuit for automatic cylinder reciprocating of a double acting cylinder using solenoid valve. [8]
 b) Analyze the given hydraulic circuit. [8]



- Q9)** a) Discuss the factors for selection of compressors in pneumatic systems.[8]
b) Draw and explain two handed safety circuit used in pneumatics. [8]

OR

- Q10)** a) Explain with a neat sketch the working of time delay valve. [8]
b) Explain with a neat sketch working of shuttle valve with a typical application. [8]

- Q11)** a) Which are the different actuators used in pneumatics? Draw symbols of them. [6]
b) A pneumatic cylinder is needed to press fit a pin to a hole. Design a circuit diagram with a precondition that while actuating, both the hands of the operator should be engaged. [12]

OR

- Q12)** Two identical cylinders A and B are to be operated simultaneously. The cylinder a moves against a load of 25 KN while the cylinder B has a load of 20 KN. Both the cylinders have a stroke of 1 m. The return stroke of the cylinder B is to start only after the cylinder A is completely retracted. The return speeds are to be as fast as possible. Draw the circuit which will fulfill these requirements. Select different components from the data given. In case the component is not available in the data given, mention its range.[18]



DATA SHEET

DATA

(a) Suction strainer:

Model	Flow Capacity (lpm)
S ₁	38
S ₂	76
S ₃	152

(b) Pressure gauge:

Model	Range (bar)
PG ₁	0 - 25
PG ₂	0 - 40
PG ₃	0 - 100
PG ₄	0 - 160

(c) Vane pump:

Model	Delivery in lpm		
	At 0 bar	At 35 bar	At 70 bar
P ₁	8.5	7.1	5.3
P ₂	12.9	11.4	9.5
P ₃	17.6	16.1	14.3
P ₄	25.1	23.8	22.4
P ₅	39.0	37.5	35.6

(d) Relief valve:

Model	Flow capacity (lpm)	Max. working pressure & bar
R ₁	11.4	70
R ₂	19.0	210
R ₃	30.4	70
R ₄	57.0	105

(e) Flow control valve:

Model	Working pressure (bar)	Flow range (lpm)
F ₁	70	0 - 4.1
F ₂	105	0 - 4.9
F ₃	105	0 - 16.3
F ₄	70	0 - 24.6

(f) Directional control valve:

Model	Max. working pressure & bar	Flow capacity (lpm)
D ₁	350	19
D ₂	210	38
D ₃	210	76

(g) Check valve:

Model	Max. working Pressure & bar	Flow capacity (lpm)
C ₁	210	15.2
C ₂	210	30.4
C ₃	210	76

(h) Pilot operated check valve:

Model	Max. working Pressure (bar)	Flow capacity (lpm)
PO ₁	210	19
PO ₂	210	38
PO ₃	210	76

(i) Cylinder (Max. working pressure 210 bar)

Model	Bore diameter (mm)	Rod diameter (mm)
A ₁	25	12.5
A ₂	40	16
A ₃	50	35
A ₄	75	45
A ₅	100	50

(j) Oil reservoirs:

Model	Capacity (litres)
T ₁	40
T ₂	100
T ₃	250
T ₄	400
T ₅	600

Total No. of Questions : 12]

SEAT No. :

P3976

[4959]-340

[Total No. of Pages :2

B.E.(Biotechnology)
b-IPR,BIOETHICS AND REGULATIONS
(2008 Course) (Elective-IV)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 or Q10,Q 11 or Q 12.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right side 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) Answer the following [18]

- a) What are the conditions in which IECs waive consent?
- b) What are ethics? Are ethical decisions important? What happens without ethics?

OR

Q2) Answer the following [18]

- a) What is the relation between society– ethics– morals – moral judgment? Describe about virtue ethics
- b) What is informed consent? Describe the importance of informed consent

Q3) What are the basic consumer claims concerning consumption of biotechnological food products? Describe any two in detail [16]

OR

Q4) What are the ethical issues raised to use the transgenic plants and animals for the manufacture of vaccines? Which safety issues are consider such manufacture process? [16]

Q5) Answer the following [16]

- a) What is a patent? What rights does a patent provide? How long does patent protection last in India?
- b) What is patent cooperation treaty(PCT)? Who coordinates the activities of PCT? What is the need for PCT?

OR

P.T.O.

Q6) Answer the following [16]

- a) Write in detail about patent prosecution flow chart in India
- b) What practical steps need to be taken to obtain patent protection? Can anyone obtain a patent for a software-related invention?

SECTION-II

Q7) Answer the following [18]

- a) Differentiate between
 - i) Trademark and domain name
 - ii) Copyright and trademark
- b) Differentiate between infringement and passing off of trademarks in India

OR

Q8) What is the scope of protection in the copyright Act, 1957? What are the guidelines regarding registration of a work under the Copyright Act? How long does a copyright last? What are limitations and exceptions to copyright? [18]

Q9) Why we need good manufacturing practices? What are the basic personnel safety and hygiene requirements in food industry? For drug products formulated with preservatives to inhibit microbial growth, is it necessary to test for preservatives as part of batch release and stability testing? [16]

OR

Q10) What are cGMP? What are the fundamentals of cGMP's? Where did the food drug and cosmetic come from? What happens if cGMP's are not followed? what are the consequences of non compliances? [16]

Q11) Answer the following [16]

- a) Which organizations support clinical trials? Differentiate between phase I and phase II clinical trials
- b) What are sanitary and phytosanitary measures? What are the categories of sanitary and phytosanitary measures? Describe any two in short

OR

Q12) Answer the following [16]

- a) What are the basic requirements to import goods? What is import general manifest?
- b) What is meant by quality assurance? What are the factors which influence the quality?



Total No. of Questions : 12]

SEAT No. :

P3977

[4959]-341

[Total No. of Pages : 3

B.E. (Biotechnology)

**c : INDUSTRIAL ORGANISATION AND MANAGEMENT
(2008 Pattern) (Elective - IV) (415468) (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 Q 1 or Q2, Q3 or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain in detail functional approach management. **[8]**

b) Explain in detail various functions of managers in an organization. **[8]**

OR

Q2) a) Explain Management By Objectives (MBO). **[8]**

b) State various forms of business. Explain cooperative societies in detail. **[8]**

Q3) a) Define Manpower Planning. Enlist various objectives and requirements of Manpower Planning. **[8]**

b) What is Merit Rating? Explain in detail various methods of merit rating. **[8]**

OR

Q4) a) Explain the selection process in a large scale continuous chemical industry. **[8]**

b) Explain in detail classification of Job Evaluation. **[8]**

P.T.O.

Q5) a) What is inventory built up? Explain in detail A-B-C policy and its objectives. [9]

b) What is store keeping? State various functions of storekeeper in a chemical Industry. [9]

OR

Q6) a) Enlist and explain various functions of purchase department. [12]

b) Write notes on: [6]

i) Bin Cards and

ii) Stores Ledger

SECTION - II

Q7) a) What are the various methodologies used for effective marketing strategies in the competitive market? [9]

b) Define market research. What are the different methods of market research? [9]

OR

Q8) a) Explain the role of advertising in Marketing. Give various advantages of advertising. [9]

b) Explain Sales and channels of distribution. Explain each channel of distribution with an appropriate example. [9]

Q9) a) Explain the following: [8]

i) ISO system

ii) ISO 9001

b) Write an explanatory note on Total Quality Management (TQM). [8]

OR

Q10)a) Explain the role of Quality Circles for Quality Management of a process industry. [8]

b) Explain in detail various steps in exporting equipment to a foreign based customer. [8]

Q11)a) Explain the term Agreement in Contract Act. Explain the various types of Contract according to enforceability, formation and performance. [8]

b) Write note on FERA and FEMA. [8]

OR

Q12)Discuss on: [16]

a) Factories Act

b) Therbligs

c) Monopolies Restrictive Trade Practices

d) SIMO charts



Total No. of Questions : 12]

SEAT No. :

P3488

[4959]-342

[Total No. of Pages : 5

B.E. (Automobile)

**AUTOMOTIVE REFRIGERATION AND AIR CONDITIONING
(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 books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of logarithmic tables slide rule, Mollier charts, psychometric chart, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data, if necessary.*
- 5) *All questions are compulsory.*

SECTION - I

- Q1) a)** Explain Vapor and gas as a refrigerant in reverse Carnot cycle. **[8]**
- b) In a refrigeration plant working on Bell Coleman cycle, air is drawn into the compressor at a pressure of 1bar & at a temperature of - 50C. After the adiabatic compression to 5 bar, the air is cooled at a constant pressure to a temperature of 150C. Then the air is expanded polytropically to a find pressure of 1bar. The polytropic index of expansion is 1.2. Calculate
- i) refrigerating effect.
 - ii) COP. **[8]**

OR

- Q2) a)** Explain Bell Coleman cycle with neat sketch. **[8]**
- b) A refrigeration machine using R-12 as refrigerant operates between the pressures 2.5 bar & 9 bar. The compression is an isentropic and there is no undercooling in the condenser. The vapor is in dry saturation condition at the beginning of the compression. Estimate the theoretical coefficient of performance. If the actual coefficient of performance is 0.65 of theoretical value. Calculate the net cooling produced per hour. The refrigerant flow is 5 kg per min. properties of refrigerant are: **[8]**

P.T.O.

Pressure(bar)	Temp. °C	Enthalpy (kJ/kg)		Entropy of saturated vapor, (kJ/kg K)
		Liquid	Vapor	
9	36	70.55	201.8	0.6836
2.5	-7	29.62	184.5	0.70001

Q3) a) Explain the types of refrigerants. [9]

b) Describe Accumulators, receiver driers used in refrigerating system. [9]

OR

Q4) a) Explain the refrigerant charge capacity determination with neat sketch. [9]

b) State and explain the different types of condensers used in refrigeration system. [9]

Q5) a) Describe the different air distribution modes in car with neat sketch. [8]

b) Write short note on comfort condition in the car A/C system. [8]

OR

Q6) a) Explain the Vehicle operation modes & Cool -down performance. [8]

b) Write a short note on (ANY TWO) [8]

i) A/C ducts

ii) Air filter

iii) Blower fans

SECTION - II

Q7) a) Discuss the any two psychometric processes with the help of hand drawn psychometric chart. **[8]**

- i) Sensible cooling & sensible heating.
- ii) Evaporative cooling.
- iii) Adiabatic chemical dehumidification.
- iv) Adiabatic mixing of two air stream for fog formation.

b) Air at 10°C DBT & 90% RH is to be heated & humidified to 35°C DBT & 22.5°C WBT. The air is preheated sensibly before passing to the air washer in which water is recirculated. The RH of air coming out of the air washer is 90%. This air is again reheated sensibly to obtain the final desired condition.

Find: **[8]**

- i) The temp. to which air should preheated.
- ii) The total heating required.
- iii) The make-up water required in the air washer.
- iv) The humidifying efficiency of the air washer.

OR

Q8) a) Explain the following psychometric relation. **[8]**

- i) Humidity ratio.
- ii) Relative humidity.
- iii) Degree of saturation.
- iv) Daltons law of partial pressure.

b) For a sample of air having 28°C DBT and relative humidity 40% at barometric pressure of 760 mm of Hg, Calculate: [8]

- i) Vapour pressure of air
- ii) Humidity Ratio.
- iii) Vapour density or absolute humidity.
- iv) Enthalpy

Verify your result by psychometric chart.

Q9) a) Define following with neat sketch: [9]

- i) OASH
- ii) ERSHF
- iii) GSHF

b) The following data refer to summer air conditioning of building: [9]

Outside design conditions = 43°C DBT, 27°C WBT

Inside design condition = 25°C DBT, 50% RH

Room sensible heat gain = 84000 kJ/h

Room Latent heat gain = 21000 kJ/h

By pass factor of the cooling coil used = 0.2

The return air from the room is mixed with outside air before entry to cooling coil in the ratio of 4 : 1 by mass. Determine

- i) Apparatus Dew Point of cooling coil
- ii) Condition of the air entering & exit for cooling coil
- iii) Fresh air mass flow rate
- iv) Refrigerant load on cooling coil

OR

- Q10)a)** Explain the air conditioning electrical and electronic control with sketch. [9]
- b) Explain the effect of air conditioning load on engine performance. [9]

- Q11)a)** Explain Any 2 from the following: [8]
- i) Initial vehicle inspection.
 - ii) Temperature measurement.
 - iii) Odour removal.
 - iv) Retrofitting.
- b) Write a short note on refrigerant recovery, recycle and charging. [8]

OR

- Q12)a)** Explain the system oil giving at least 2 examples of oil. [8]
- b) Explain leak detection test. [8]



Total No. of Questions : 11]

SEAT No. :

P3489

[4959]-343

[Total No. of Pages : 3

B.E. (Automobile Engg.)
MACHINE & VEHICLE DYNAMICS
(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer to the questions of both the section be written in separate answer books.
- 2) All questions are compulsory
- 3) Draw neat diagrams wherever necessary.

SECTION - I

Q1) a) Write a short note on partial Ballancing. **[6]**

- b) Four cylinder engine having crankradius 140mm & connecting rod 560 mm for each cylinder. If piston is 20kg & rotate with 600 rpm then show that there are complete primary balance of engine with 90° intervals of action. **[10]**

OR

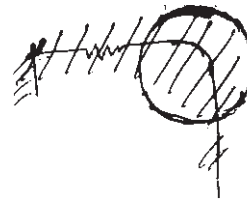
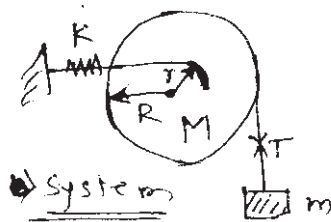
Q2) a) Write a short note on direct - reverse crank method. **[6]**

- b) A shaft supported in bearing 2m apart 600mm beyond bearings. It carries 3 pulley 1 at center and other at end masses of ends pulley 40 kg & 30kg & centers of mass are at 15mm & 20 mm respectively. Center pulley is 40 kg. & center of mass is 15 mm IF pulley are instatic balance find angular positions & forces at 210 rpm.

[10]

Q3) a) Explain Different types of damping. **[8]**

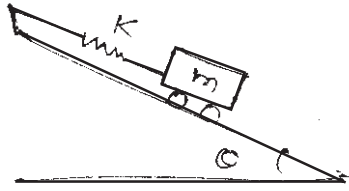
- b) Find natural frequency for following system. **[8]**



OR

P.T.O.

- Q4)** a) Derive the relation between logarithmic decrement and natural frequency. [8]
 b) Find Natural frequency of system shown below. [8]



- Q5)** a) Derive the general equation for forced vibration due to harmonic excitation. [10]
 b) Write a short note on vibration isolators. [8]

OR

- Q6)** a) Write a short note on force & Motion transmissibility with derivation. [10]
 b) One vehicle have spring constant 1000 KN/m & damping ratio is 0.6 having speed of 100 km/hr moving on a sinusoidal amplitude of 10cm where wavelength is 10m. If mass of vehicle is 1000kg then determine amplitude of oscillation. [8]

SECTION - II

- Q7)** a) Write a brief note on aerodynamic life & its controlling. [8]
 b) Explain the terms: [8]
 i) Stopping distance
 ii) Braking force.

OR

- Q8)** a) How dynamic axle load can be calculated for different conditions of driving. [8]
 b) Explain the terms [8]
 i) Separation terms
 ii) Down force

- Q9)** a) How mathematical model of ride can be made? [8]
b) How vibration dampers are different from vibration absorber? [8]

OR

- Q10)** a) write a short note on active 4 semi active suspension. [8]
b) Explain pitch 4 bounce motion in brief. [8]

Q11) Write a short note on following (any 3) [18]

- a) Tyre Nomenclature.
- b) Low speed cornering.
- c) Ackerman steering.
- d) Lateral acceleration gain.
- e) Constant radius testing.
- f) Vehicle shock absorbers.



Total No. of Questions :12]

SEAT No. :

P3490

[4959]-344

[Total No. of Pages :4

**B.E. (Automobile Engineering)
AUTOMOTIVE SYSTEM DESIGN
(2008 Pattern) (Semester - I) (416490)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve 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) *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 understand by ergonomic consideration in design? [6]
- b) Write short notes on
- i) Design Tolerances [6]
 - ii) Aesthetic Consideration [6]

OR

- Q2)** a) What are adequate design and optimum design? [8]
- b) State and explain Johnson Method of Optimisation. [8]
- c) State the Reliability for Design. [2]
- Q3)** a) Enlist the lining material in friction clutches, give design requirements friction clutch. [8]

P.T.O.

- b) A plate clutch has three discs on the driving shaft and two discs on the driven shaft, providing four pairs of contact surfaces. The outside diameter of the contact surfaces is 240mm and inside diameter 120mm. Assuming uniform pressure and $\mu = 0.3$, find the total spring load pressing the plates together to transmit 23KW power at 1475 revolution per minute. If there are 6 springs each of stiffness 13KN/m and each of the contact surfaces has worn away by 1.25mm. Find the maximum power that can be transmitted, assuming uniform wear. [8]

OR

- Q4) a)** Why multi-plate clutch is preferred in two-wheelers? [4]
- b) A centrifugal clutch is to be designed to transmit 20 HP at 900rpm. the shoes are 4 in no. The speed at which the engagement begins is $3/4^{\text{th}}$ of the running speed. The inside radius of the pulley rim is 15 cm. The shoes are lined with ferodo for which the coefficient of friction may be taken as 0.25. Determine [12]
- i) Weight of the shoes.
- ii) Size of the shoes.

- Q5) a)** What are the advantages of increasing the number of gear ratio Steps in automobile gearbox? [4]
- b) A four speed gear box is to be constructed for providing the ratios of 1.0, 1.46, 2.28, and 3.93 to 1 as nearly as possible. The diameter of each gear is 3.25 mm and smallest pinion is to have at least 15 teeth. Determine the suitable number of teeth of different gears. What is the distance between main and lay shaft. [12]

OR

- Q6) a)** Explain the selection of bearing in gearboxes. [4]
- b) An Automotive gear box gives three forward speeds and one reverse with a top gear of unity and bottom and reverse gear ratio of approximately 3.3:1. The centre distance between the shafts is to be 110mm approximately. Gear teeth of module 3.25mm are to be employed.
- Sketch the layout of a typical constant mesh gear box for these conditions giving the number of teeth for the various gear wheels and showing closely how the different ratios are obtained. [12]

SECTION-II

- Q7)** a) An automobile engine develops 28KW at 1500 rpm & it's bottom gear ratio is 3.06. If a propeller shaft of 40 mm outside diameter is to be used, determine the inside diameter of mild steel tube to be used, assuming a safe shear stress of 55E3 KPa for the MS. [8]
- b) A car has pivot pin 114 cm apart, the length of each track arm is 15.25 cm and the track rod behind the axle is 104 cm long. Determine the wheel base for true rolling of all wheel when the inner wheel stub axle is at 55° to the centre line of the car. [8]

OR

- Q8)** a) What are the types of front and rear axels. [4]
- b) Write short notes on: [12]
- i) Condition for true rolling.
 - ii) Turning circle radius.
 - iii) Bearing Loads on Front axle.
- Q9)** a) Explain Effect of Expanding Mechanism of Shoes on Total Braking Torque. [4]
- b) In hydraulic single line braking system force on foot pedal is 100N, pedal leverage ratio is 4, cross sectional area of master cylinder is 4 cm², cross sectional area of front piston 20 cm², cross sectional area of rear piston 5 cm² and distance moved by effort is 1 cm. Calculate, [12]
- i) Front to rear brake ratio
 - ii) Percentage of front and rear braking
 - iii) Total force ratio
 - iv) Distance moved by output
 - v) Cylinder movement ratio
 - vi) Total movement ratio

OR

Q10)a) Explain in Brief Hand Brake or Parking Brake. [4]

b) In a shoe brake with leading and trailing, the total actuating force of 471 N acts at a distance of 0.15m from the pivot of the shoes which is 0.075 m from the axis of the drum of radius 0.09 m. The shoes have symmetrical lining with coefficient of friction 0.45. If the effective radius of the friction force is 0.1m, calculate the total braking torque, when [12]

i) The actuating mechanism gives equal forces to the shoes, and

ii) When the actuating mechanism gives equal forces to the shoes.

Q11)a) State and explain any two types of front independent suspension. [6]

b) Explain Design procedure of Torsion Bar Spring. [12]

OR

Q12)a) Explain the components of steering system. [12]

b) What are the characteristics of under steer? [3]

c) What are the causes of over steering? [3]

EEE

Total No. of Questions : 10]

SEAT No. :

P3491

[4959]-345

[Total No. of Pages : 3

B.E. (Automobile Engineering)

a:AUTOMOTIVE AERODYNAMICS & STYLING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answer any 3 questions from Section I and 3 questions from Section II.*
- 2) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 3) *Figures to right indicate full marks.*
- 4) *Assume Suitable data, if necessary.*

SECTION - I

Q1) a) Explain adiabatic steady state flow equation. **[8]**

b) Write a note on flow through converging diverging passage. **[8]**

OR

Q2) a) Write a note on lift & drag. **[8]**

b) Derive continuity equation. **[8]**

Q3) a) How angle of attack affect lift? **[8]**

b) What are different characteristics of swept wings? **[8]**

OR

P.T.O.

- Q4)** a) Explain phenomenon of flow around aerofoil & cylinder. [8]
b) What is transonic area rule & explain tip effect? [8]

Q5) Write a brief note on (any 3) [18]

- a) External & internal flow problem.
b) Drag force.
c) Optimization of car body.
d) Resistance to vehicle motion.
e) Car as a bluff body.

SECTION - II

- Q6)** a) Write a note on front end modification of cars. [8]
b) What is role of 'CFD' in vehicle industry? [8]

OR

- Q7)** a) Write a short note on dirt accumulation on vehicle body. [8]
b) What is the difference between downforce & lift? [8]

- Q8)** a) Enlist velocity measuring equipment in wind tunnel & explain working of any one. [8]
b) 'Climatic wind tunnels explain in brief. [8]

OR

Q9) a) Enlist pressure measuring equipment in wind tunnel & explain any one. **[8]**

b) 'Water tunnel'. Explain in brief. **[8]**

Q10) Write a short note on (any 3) [18]

a) front grill shapes.

b) Vehicle color codes.

c) Brand image.

d) Headlight shapes.

e) Body styles.

x x x

Total No. of Questions :12]

SEAT No. :

P3492

[4959]-347

[Total No. of Pages :5

B.E. (Automobile)

c: CAD/CAM & AUTOMATION

(2008 Course) (Elective - I) (Semester - I) (416491) (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 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) Derive concatenated transformation matrix for mirroring about line $y=mx+c$. **[8]**
- b) A triangle ABC represented as A(50, 50), B(80, 50) and C(50, 100). Determine the composite transformation matrix and the new coordinates of the triangle. **[8]**
- i) Rotated by 60° anticlockwise about vertex A.
 - ii) Scaled 2 times in X and 3 times in Y direction about vertex A.

OR

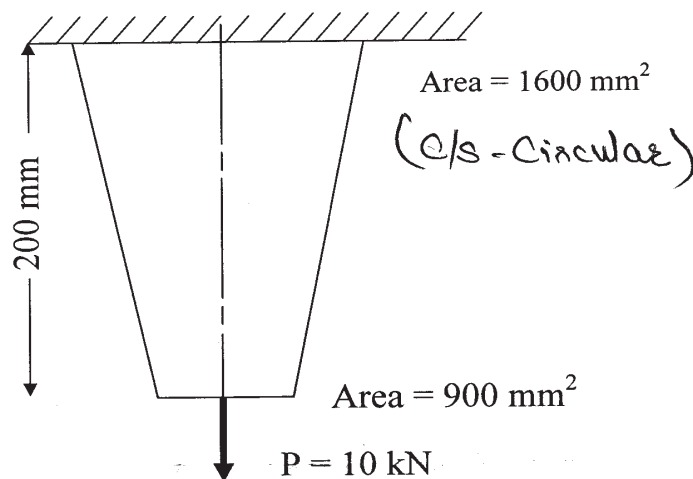
- Q2)** a) What are the advantages of Open GL programming? Write Open GL commands for vertex, Color, scale and translate. **[8]**
- b) Given a point P(1, 3, -5) find: **[8]**
- i) A transformed point P* if P is translated by $d = 2i+3j-4k$ and rotated by 30° about the Z axis.
 - ii) Same as in (i) but point P rotated first, then translated.
 - iii) If the final point P* the same in both (i) and (ii)? Explain your answer.

P.T.O.

- Q3)** a) Distinguish between synthetic and analytical curves. [4]
- b) Write a short note on “Order of Continuity”. [4]
- c) The line L_1 is in between $P_1(3, 4, 7)$ and $P_2(5, 6, 1)$. Line L_2 is in between $Q_1(1, 5, -2)$ and $Q_2(2, 9, 0)$. [8]
- Find parametric equation of lines.
 - Determine lines are parallel or perpendicular.
 - Find coordinate of point of intersection, if any

OR

- Q4)** a) Explain following terms with reference to modeling [8]
- Coons patch
 - Tabulated surfaces
 - Surface of revolution
 - B-Spline surface
- b) Explain CSG method of solid modeling with suitable example of any mechanical component. [8]
- Q5)** a) Explain in brief the steps involved in Finite element Analysis. [6]
- b) Find the stresses and reaction at the support by modeling following system in two finite elements. Use penalty approach $E = 200$ GPa. [12]

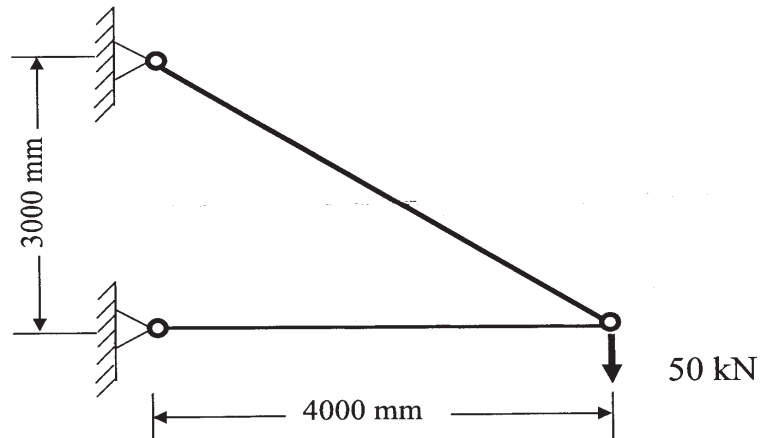


OR

Q6) a) Explain the terms (Any two): [6]

- i) Constant strain triangle (CST).
- ii) Penalty Approach in FEA.
- iii) Elimination Approach in FEA.

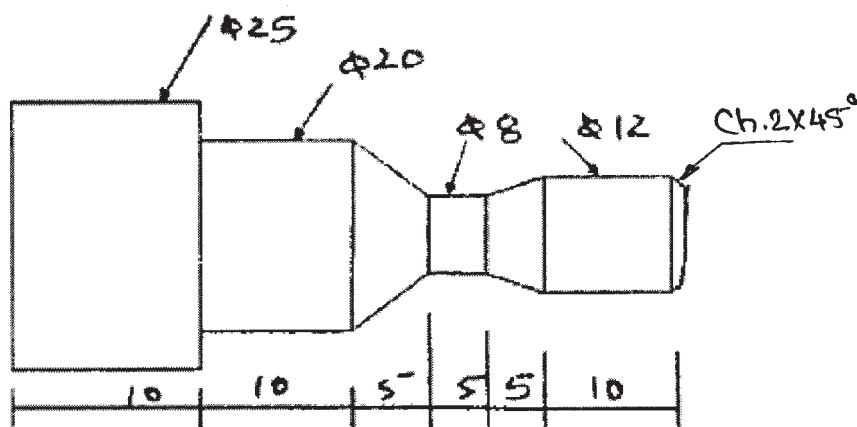
b) A two member truss is as shown in fig. the cross sectional area of each member is 150 mm^2 and modulus of elasticity is 210 GPa . Determine the deflection, reactions and stresses in each of the members. [12]



SECTION-II

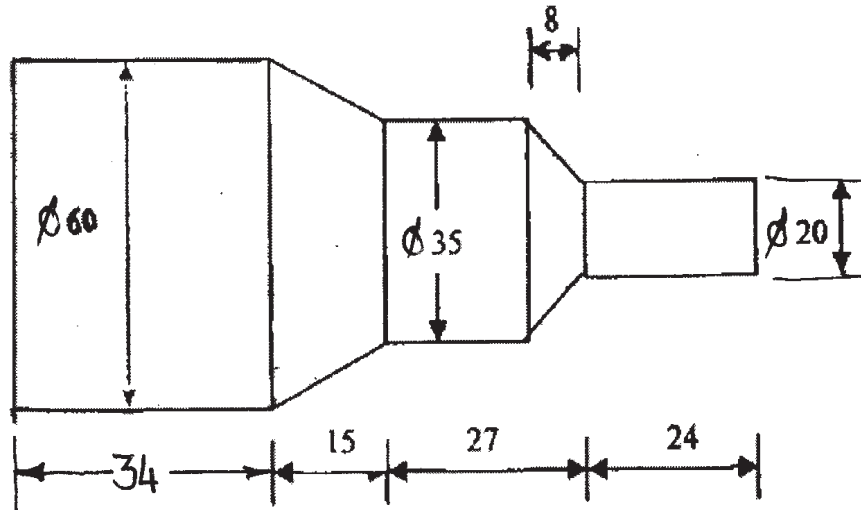
Q7) a) What are canned cycles used in CNC lathe? Explain any two with necessary G codes and neat sketches. [8]

b) Write a manual part program for finishing a forged component as shown in the figure. Assume the speed and feed on the turning centre as 600 rpm and 0.2 mm/rev . assume 1 mm material is to be removed radially from external diameter. [10]



OR

- Q8) a)** What is tool compensation? Explain its need & how it is incorporated in the program? [6]
- b) Write CNC program for the component shown in fig. by using G and M codes compatible to the FANUC controller from bar of MS bar of 60 mm diameter and 100 mm length. Use canned cycle for roughing and finishing. Assume suitable cutting speed, feed and depth of cut. [12]



- Q9) a)** Explain concept of group technology with relative merits and demerits. [8]
- b) Compare fixed, programmable and flexible automation. [8]

OR

- Q10) a)** Explain Geneva mechanism used for indexing. [4]
- b) Explain following (Any two): [12]
- i) Flexible Manufacturing System (FMS).
 - ii) Automatic Storage and Retrieval System (ASRS).
 - iii) Automated Guided Vehicles (AGV).

Q11)a) What are different robot configurations? Explain with neat sketch, work envelope of any two configurations. **[8]**

b) What are different methods of robot programming? Explain any one in detail. **[8]**

OR

Q12)a) With the help of neat sketch, explain different degrees of freedom available to a robot wrist. **[6]**

b) Differentiate between continuous path and point to point path robot. **[4]**

c) Write short note on Vacuum gripper. **[6]**

EEE

Total No. of Questions : 12]

SEAT No. :

P3978

[4959]-347-A

[Total No. of Pages : 3

**B.E. (Automobile Engineering)
AUTOMOTIVE NVH (Elective - ID)
(2008 Course) (Semester - I) (416491D)**

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) *Use of Logarithmic tables, Slide rule, Electronic pocket calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) What is the role of NVH in an Automotive design & Development. Explain it with example. **[10]**
- b) Define the following **[8]**
- i) Periodic Motion & Time Period
 - ii) Frequency & Amplitude
 - iii) Fundamental mode of vibration
 - iv) Degree of Freedom

OR

- Q2)** a) Enlist the different types of vibrations. Explain any one in detail. **[10]**
- b) Write a note on different sources of Vibration and Noise in an Vehicle. **[8]**
- Q3)** a) An unknown mass M is attached to one end of a spring of stiffness K having natural frequency of 6 Hz. when 1 kg mass is attached with M , the natural frequency of the system is lowered by 20%. Determine the value of unknown mass M and stiffness K . **[8]**
- b) Discuss in detail Modal Analysis. **[8]**

OR

P.T.O.

- Q4)** a) Write a note on generalized coordinates. [8]
b) The spring of Automobile trailer is compressed 0.1m under its own weight wave. Find the critical speed when the trailer is travelling over a road with a profile approximated by a sine wave of amplitude 0.08m and a wavelength of 14m. What will the amplitude of vibration at 60km/hr? [8]

- Q5)** a) Describe in detail untuned dry friction damper & draw its frequency response curve. [8]
b) How to control torsional oscillations amplitude in engine crank shaft? Describe its procedure in detail? [8]

OR

- Q6)** a) Write a note on Viscous Damper. [8]
b) How to obtain the engine vibration isolation from vehicle structure. [8]

SECTION - II

- Q7)** a) Describe the following [8]
i) Structure Born Sound
ii) Air Born Sound
b) Explain the effect of reflecting surfaces on sound wave propagation. [8]

OR

- Q8)** a) Derive the relationship between sound power and sound intensity. [8]
b) Describe the Anatomy of human ear. [8]

- Q9)** a) Enlist the types of the Noise measuring instruments. Explain Microphone as Noise measurement device in detail. [10]
b) Discuss in brief Ambient Emission Noise standards in India. [8]

OR

Q10)a) The worker is exposed to noise according to the following schedule:[10]

Exposure Level DB	92	95	97	102
Period of Exposure	3	2	2	1

Does the daily noise dose is exceeded as per OSHA standards?

b) Explain in detail Interior Noise in a Vehicle. [8]

Q11)a) Explain in detail Vehicular Noise Measurement Techniques? [8]

b) What do you mean by Noise Control along the path? Discuss it in brief.[8]

OR

Q12)a) Write a note on Engine Noise Control. [8]

b) Discuss the following. [8]

i) Brake Noise

ii) Tyre Noise

x x x

Total No. of Questions : 10]

SEAT No. :

P3493

[4959]-348

[Total No. of Pages : 3

**B.E. (Automobile Engineering)
a-AUTOMOTIVE MATERIALS
(Semester - I) (2008 Pattern) (Elective - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) Answer any 3 questions from each section.*
- 2) Assume Suitable data, if necessary.*
- 3) Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain determination mechanism in elastic materials. **[8]**

b) Describe iron-carbide diagram. **[8]**

OR

Q2) a) Write in brief about alloys used in automobile industry. **[8]**

b) How laminated material improves ability? **[8]**

Q3) a) Explain any 2 surface hardening techniques. **[8]**

b) Write a short note on hot dipping. **[8]**

OR

Q4) a) Write a note on hard facing & thin film coating. **[8]**

b) What is thermal spraying? Explain in brief. **[8]**

P.T.O.

Q5) Write in brief about criteria of material selection for following parts. (any 3) [18]

- a) Chassis
- b) Engine valve
- c) Brake lining
- d) Radiator
- e) Piston

SECTION - II

Q6) a) Write in brief about fibre glass. [8]

b) What is generalized Hook's law? Explain it's importance. [8]

OR

Q7) a) What are assumption made for homogeneous orthotropic lamina? [8]

b) Explain in brief about 'Bag moulding' [8]

Q8) a) How thermoplastic resin matrix composites are fabricated? [8]

b) Write a note on 'X – radiography'. [8]

OR

Q9) a) Enlist & explain several surface treatment on fibers. [8]

b) Write a note on 'compression & shear test of composite'. [8]

Q10) Write in brief about (any 3)

[18]

- a) Bucky Paper
- b) Behaviour of UD composite
- c) Use of composite in defence
- d) Cross ply lamination
- e) Recent trends in composite materials.

x x x

Total No. of Questions : 12]

SEAT No. :

P3494

[4959]-349

[Total No. of Pages : 3

**B.E. (Automobile)
VEHICLE SAFETY**

(2008 Course) (416492B) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) Answer 3 questions from each section.*
- 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 side indicates full marks.*
- 5) Assume Suitable data if necessary.*

SECTION - I

Q1) a) Explain the importance of ergonomics in automotive safety. **[8]**

b) What is the role of safety systems in automotive. **[8]**

OR

Q2) a) What are the characteristics of vehicle structure? **[8]**

b) List safety system in automobile & explain any one in detail? **[8]**

Q3) a) Explain the crashworthiness of vehicle. **[8]**

b) Explain different types of Impact tests. **[8]**

OR

P.T.O.

Q4) a) List down the types of movable barrier tests. Explain any one of them in detail with neat sketch. [8]

b) What are the general requirements of the vehicle body structure. [8]

Q5) a) Explain different types of dummies. [9]

b) Write a short note on: [9]

i) Anthropometry

ii) Location of control

OR

Q6) a) Explain in detail about human impact and tolerances with respect to vehicle ergonomics. [9]

b) How do you determine injury threshold. Explain the procedure for the same in detail. [9]

SECTION - II

Q7) a) Explain active safety and passive Safety. [8]

b) Explain the working of air bags & bumpers with respect to Safety. [8]

OR

Q8) a) Explain the need of safety glass? [8]

b) Types of different mirror & their location? [8]

Q9) a) List the automotive lamp & testing of automotive lamps. [8]

b) Explain the number plate light or lamp. [8]

OR

- Q10)a)** Write a short note on: **[8]**
- i) Direction Indicator
 - ii) Stop Lamp
- b) Explain recent trend in automobile lightening. **[8]**

- Q11)a)** List AIS regulation as per CMVR of 1989 act. **[9]**
- b) What are the general requirement of body structure. **[9]**

OR

- Q12)a)** What are the safety regulation as per 2002 act. **[10]**
- b) What do you mean by fuel economy with respect to safety regulation. **[8]**

x x x

Total No. of Questions :12]

SEAT No. :

P3314

[4959]-35

[Total No. of Pages :3

B.E. (Mechanical)

Energy Audit and Mangement

(2008 Course) (Semester -I) (Elective - I)(402044A)

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) *Use of Lagarithmic tables, slide rule, electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION -I

- Q1) a)** Why energy conservation is important in the prevailing energy scenario? **[8]**
- b) Explain current energy consumption pattern in global and Indian industry. **[8]**

OR

- Q2) a)** Write short note on. **[8]**
- i) Energy security and reliability.
 - ii) Energy and environment.
- b) Discuss different aspects of Energy Policy and strategy in energy Conservation systems. **[8]**

- Q3) a)** Write short note on. **[10]**
- i) Responsibility of energy auditor.
 - ii) Energy Audit software.
- b) State and explain the function of measuring instrument used for energy audit? **[8]**

OR

P.T.O.

- Q4)** a) Explain the aim of energy audit. Accurate measurement is very important in energy audit. Why? [8]
b) Describe Energy conservation opportunities in pumping systems. [10]

- Q5)** a) Explain following financial analysis methods. [8]
i) Present value of money.
ii) Sensitivity analysis.
b) Determine simple pay back period for a boiler that cost Rs.75 lakhs to purchase and Rs.5 lakhs per year on an average to operate and maintain and is expected to save Rs.30 lakhs. [8]

OR

- Q6)** a) Describe advantages and drawbacks of simple payback period financial technique. [8]
b) How you will determine cost of electricity generated in case of steam power plant? [8]

SECTION -II

- Q7)** a) A centrifugal pump lifts 50 litres/s water under a static head of 18m. The suction and delivery pipes are both of 15cm diameter. The lengths of suction and delivery pipes are 8m and 60m respectively. If the overall efficiency is 75%, find the power required to drive the pump. Assume the Darcy's friction factor $f = 0.03$ [8]
b) Describe energy saving opportunities in compressed air system. [8]

OR

- Q8)** a) What are the measures to be taken for efficient operation of HVAC System? [8]
b) Explain in brief steam trap and why it is important in thermal power plant. [8]

- Q9) a)** What possible improvement measure you would look for general lightening system. [9]
- b) What are the types of lamps used in lighting system? Write down their features with typical application. [9]

OR

- Q10)a)** Explain the following terms. [9]
- i) Power Factor.
 - ii) Maximum Demand.
 - iii) Copper losses.
- b) What are different types of motor? Explain motor speed control systems. [9]

- Q11)a)** Explain cogeneration systems using the back pressure turbine, extraction-condensing turbine and double extraction back pressure turbine. [8]
- b) Describe direct and indirect benefits of waste heat recovery? [8]

OR

- Q12)a)** Explain how cogeneration is advantageous over conventional power plant. [8]
- b) Describe heat wheel used for waste heat recovery with neat sketch. [8]



Total No. of Questions : 12]

SEAT No. :

P3495

[4959]-350

[Total No. of Pages : 3

**B.E. (Automobile Engineering)
c-OFF ROAD VEHICLE (Elective - II)
(2008 Course) (Semester - 1)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) Answers to the two sections should be written in separate books.*
- 2) Neat diagram must be drawn whenever necessary.*
- 3) Figures to the right indicate full marks.*
- 4) Assume suitable data if necessary.*

SECTION - I

- Q1) a)** Detailed out Multi-axle vehicles and types of vehicles? **[8]**
- b) What is the power plant in off road vehicles give brief discussion? **[8]**

OR

- Q2) a)** What is off road vehicles give classification and introduction. **[6]**
- b) Explain any one application of off road machine with construction layout and capacity of that? **[10]**

- Q3) a)** Discuss the various types of earth moving machine with application and it's uses. **[6]**
- b) Write in brief loader and it's attachment with neat sketch. **[6]**
- c) Write short note on dump truck. **[6]**

OR

P.T.O.

Q4) a) Give selection criteria of tractor and function of tractor with its specification. [9]

b) What is dozers and detailed out with neat sketch and attachment of dozer? [9]

Q5) a) What is ditchers and explain in brief. [8]

b) Classification of scrapper with detail working. [8]

OR

Q6) a) Give detailed information about grader and various types of grader and working? [8]

b) What are the shovels and various shovels use in recent Trends? [8]

SECTION - II

Q7) a) Which type of transport vehicle used in India with one in detailed? [8]

b) What is power take off of military vehicles? [8]

OR

Q8) a) Explain any one military vehicles with construction layout. [8]

b) What is combat vehicles explain it in brief. [8]

Q9) a) What is OCDB explain it also Dry DTSC callper brakes? [8]

b) Explain the working of Hydro pneumatic suspension cylinder? [8]

OR

Q10)a) Explain the factor affecting power steering system in detailed working of it? [8]

b) Recent to end in dumper with safety features? [8]

Q11)a) What is soil vehicle mechanics with characteristics of soil and layer? [8]

b) Explain the traction performance and factor affecting traction performance. [10]

OR

Q12) Write a short note (any three) [18]

a) Normal Ground pressure and mean maximum pressure.

b) Dynamic behavior and traction on wet soil.

c) Vehicle cone index & rated core index.

d) Earth moving machine.

x x x

Total No. of Questions : 12]

SEAT No. :

P3496

[4959]-351

[Total No. of Pages : 3

B.E. (Automobile)

AUXILIARY ENGINE SYSTEMS

(Elective - II) (2008 Course) (416492) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to 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 whenever 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 effect of supercharging on the air consumption and power output from the engine and explain in detail the types and characteristic of compressor used in supercharger. **[8]**

b) Explain gas exchange process in case of supercharging. **[8]**

Q3) a) What is pulse turbocharging? Explain it with neat diagram. **[8]**

b) Explain positive displacement mechanical supercharger. **[8]**

OR

Q4) a) What are the advantages and disadvantages of supercharger and turbocharger? Explain any one type of turbocharger in detail. **[8]**

b) What are the different applications of exhaust gas turbocharger? **[8]**

P.T.O.

- Q5)** a) Explain in details cooling the charge air? Effect of cooling charge air on engine performance. [10]
- b) Explain in detail effects of turbocharger on the engine performance. [8]

OR

- Q6)** a) Difference between mechanical supercharger and exhaust supercharger. [8]
- b) What are the different aspect of turbocharging in case of passenger cars with gasoline engines. [10]

SECTION - II

- Q7)** a) Enlist the advantage of constant pressure turbocharging over the pulse turbocharging? [8]
- b) Explain Altitude derating in details. [10]

OR

- Q8)** a) What are the effect of supercharging on exhaust emissions of diesel and petrol engine? [10]
- b) Explain torque characteristics of engine with exhaust turbocharger. [8]

- Q9)** a) Explain comprex supercharger. [8]
- b) Explain exhaust gas turbocharger. [8]

OR

- Q10)**a) What are the different types of material used for manufacturing the turbine of supercharger. [8]
- b) With the help of compression graph explain the various aspects related with compressor and it's 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 coolant? **[8]**

OR

Q12)a) Which are the different aspects related with the designing of cooling air fan. **[8]**

b) Write different aspect of design of Radiator. **[8]**

x x x

Total No. of Questions : 12]

SEAT No. :

P3497

[4959]-352

[Total No. of Pages : 3

B.E.(Automobile)

ALTERNATIVE FUELS AND EMISSION CONTROL

(2008 Pattern) (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 answer 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 electronic pocket calculator is allowed.*

SECTION-I

- Q1) a)** How are SI and CI engine fuels rated? **[6]**
b) Discuss any five important qualities of SI and CI engine fuel. **[10]**

OR

- Q2) a)** Write the calorific value & general chemical formula of following fuels.(any three) **[6]**
i) petrol ii) diesel
iii) LPG iv) CNG
v) BIO GAS
b) What do you mean by alternative fuels? Explain its need, advantages and applications in an automobile. **[10]**

- Q3) a)** Explain the properties of hydrogen fuel & give its advantages and disadvantages over conventional fuels. **[6]**
b) Write a note on biogas as a fuel for IC engine. **[6]**
c) Differentiate LPG & Petrol by its properties, advantages, disadvantages and applications. **[6]**

OR

P.T.O.

- Q4)** a) Explain engine modifications required while using bio-diesel as fuel for IC engine? [6]
- b) Can alcohol be used for IC engine? Explain. [6]
- c) Write note on CNG as fuel for IC engines. [6]
- Q5)** a) What are the different synthetic fuels used in vehicle? Explain its effect on engine performance. [8]
- b) Explain any two synthetic fuels with its properties, advantages, disadvantages & handling. [8]

OR

- Q6)** Write note on
- a) Engine running on compressed air. [8]
- b) Water as fuel. [8]

SECTION-II

- Q7)** a) What is the effect of compression ratio on SI engine emission? [8]
- b) What is positive crankcase ventilation? Explain. [8]

OR

- Q8)** a) How will you reduce the NO_x emission in IC engine? [6]
- b) Explain effect of design and operating parameters on SI engine emission. [10]

- Q9)** Explain effect of design and operating parameters on CI engine emission [16]

OR

- Q10)** a) Why turbocharger is used in automobile engines, explain effects of turbocharging on emission? [8]
- b) Describe the sources and causes of soot and particulet formation? [8]

Q11) Write a note on

- a) Effect of NO_x emission on human as well as on environment. [6]
- b) Indian emission norms. [6]
- c) Ambient air quality monitoring. [6]

OR

- Q12)** a) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? [9]
- b) Explain the remedies for engine emission. [9]



Total No. of Questions : 10]

SEAT No. :

P3498

[4959]-353

[Total No. of Pages : 2

B.E.(Automobile)

VEHICLE PERFORMANCE & TESTING

(2008 Pattern)(Semester-II)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Every section must be on seperate answer book.*
- 2) *Figures to the right side indicate marks.*

SECTION-I

- Q1)** a) Write a short note on vehicular suspension system. [8]
b) Sketch EGR system & discuss on merit & demerits. [8]

OR

- Q2)** a) How lambda close loop control system affects gasoline vehicle performance? [8]
b) How brakes of vehicle are tested. [8]
- Q3)** a) Write in brief about Epicyclic transmission. [8]
b) What will happen if clutch replaced by torque convertor unit? [8]

OR

- Q4)** a) Compare any three Automotive gear boxes. [8]
b) Write in brief about differential unit. [8]
- Q5)** Write a note on(any three) [18]

- a) Euro III Norms.
- b) Coast down test.
- c) Proving Ground
- d) Wheel alignments & Balancing
- e) Free acceleration Test
- f) Any three test tracks

P.T.O.

SECTION-II

Q6) a) What is Indian government motor vehicle safety standard. [8]

b) How roll over protection system improves vehicle stability? [8]

OR

Q7) a) Write a short note on GPS unit. [8]

b) How Airbags unit reduces fatalities at the time of accident? [8]

Q8) a) Write any three occupant safety systems in brief. [8]

b) How side impact test will be carried out? [8]

OR

Q9) a) What are Human testing methods used for crash testing? [8]

b) Explain in brief about sensor mountings for crash testing? [8]

OR

Q10) Write a short note on (any three) [18]

a) Engine noise

b) Model test & full scale test

c) Wind noise

d) Noise measuring instrument

e) Vibration measuring instrument

f) Pass by noise test.



Total No. of Questions : 12]

SEAT No. :

P3499

[4959]-356

[Total No. of Pages : 4

B.E.(Automobile Engg.)

HYDRAULICS & PNEUMATICS

(2008 Course) (Elective-IIIC)(416497C)(Semester-II)

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 logarithmic tables, slide rules, electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Classify the types of hydraulic fluids. What are the desirable properties of hydraulic fluid. [6]
- b) Discuss in brief the different materials used for seals used in hydraulic component. [4]
- c) Explain the Pascal's law with its application. [6]

OR

- Q2)** a) Explain the different types of pipes. [4]
- b) What are the sources of contamination & also explain contamination control. [6]
- c) Explain pressure drop in hoses or pipes. [6]

- Q3)** a) Discuss with drawing the performance characteristics of a gear pump. [8]
- b) A positive displacement pump has geometric displacement of 81.95cm^3 . It delivers 75.84 lpm of oil operating at 1000 rpm at a pressure of 6.9MPa. The input torque of the prime mover is 101.25 Nm. Determine,
- i) Overall efficiency of the pump.
 - ii) Theoretical torque required to operate the pump. [8]

OR

P.T.O.

- Q4)** a) Explain different types of mounting of a hydraulic cylinder. [8]
b) Design an intensifier for the following requirements [8]
Required work force=54 kN
Total work cylinder stroke=0.3m
High pressure work stroke= 25mm
Available air pressure = 7 bar
- Q5)** a) What is a function of a pressure relief valve? Draw simple sketch & symbol. State its applications. [6]
b) Explain in detail with neat sketch how a pressure compensated flow valve works. [6]
c) Draw the symbols for following [6]
i) Fixed capacity two directional flow hydraulic pump.
ii) Cylinder with double adjustable cushion.
iii) 5 port 2 way DCVS
iv) Air dryer reservoir
v) Quick Action couplings with NRV
vi) Tandem center position of DCV.

OR

- Q6)** a) Write short note on cartridge valve. [6]
b) What is 'Open center' & 'Closed center' valve position control valve. Explain with sketch the importance & application of these center positions of DCV. [6]
c) Write a short note on meter in circuit with its characteristics. [6]

SECTION-II

- Q7)** a) Explain need of speed control of hydraulic motor. Explain any 2 methods of it in brief. [6]
b) Explain the application & working of Tandem cylinder. [4]
c) Describe different efficiencies related to hydraulic motor. [6]

OR

- Q8) a)** A hydraulic system consists of two cylinders. The cylinders are required to be operated as per the following sequence: [8]
- i) Cylinder 'A' extend.
 - ii) Cylinder 'B' extend.
 - iii) Cylinder 'A' retract.
 - iv) Cylinder 'B' retract.

Develop a hydraulic circuit for the above requirements.

- b) What do you mean by cushioning of cylinder? How is it done? [4]
 - c) Explain in brief fail safe circuit. [4]
- Q9) a)** Write a short note on [6]
- i) Time delay valve
 - ii) Quick exhaust valve
- b) Write down advantages & disadvantages of air motor(Pneumatic rotary actuator) [6]
 - c) What is the purpose of providing lubricator, muffler & dryer in pneumatic circuit? [6]

OR

- Q10)a)** Explain DCV actuation with diagrams. [6]
- b) Draw & explain the compressed air system used in medium scale industry. [6]
 - c) Draw & explain the speed control of pneumatically operated double acting cylinder. [6]
- Q11) a)** Explain in detail design aspect of hydraulic system. [8]
- b) Explain selection of components based on design. [8]

OR

- Q12)**Two identical cylinders A & B are to be operated simultaneously. The cylinder A moves against a load 25kN,while the cylinder B moves against a load of 20 kN. Both the cylinders have stroke of 1m. The working stroke has to be completed in 20 seconds. The return stroke of cylinder B is to start only after the cylinder A is completely retracted. The return speeds are to be fast as possible. Draw a circuit which fullfill these requirements. Select the different components you have used in the circuit from the given data. [16]

DATA

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S ₁	38
S ₂	76
S ₃	152

2. Pressure Gauge :

Model	Range (bar)
PG ₁	0 - 25
PG ₂	0 - 40
PG ₃	0 - 100
PG ₄	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P ₁	8.5	7.1	5.3
P ₂	12.9	11.4	9.5
P ₃	17.6	16.1	14.3
P ₄	25.1	23.8	22.4
P ₅	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R ₁	11.4	70
R ₂	19	210
R ₃	30.4	70
R ₄	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F ₁	70	0-4.1
F ₂	105	0-4.9
F ₃	105	0-16.3
F ₄	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D ₁	350	19
D ₂	210	38
D ₃	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C ₁	210	15.2
C ₂	210	30.4
C ₂	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO ₁	210	19
PO ₂	210	38
PO ₃	210	76

9. Cylinder-(Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia. (mm)
A ₁	25	12.5
A ₂	40	16
A ₃	50	35
A ₄	75	45
A ₅	100	50

10. Oil Reservoirs :

Model	Capacity (litres)
T ₁	40
T ₂	100
T ₃	250
T ₄	400
T ₅	600



Total No. of Questions : 12]

SEAT No. :

P3500

[4959]-357

[Total No. of Pages : 2

B.E.(Automobile)

PRODUCT DEVELOPMENT AND COSTING
(2008 Course) (Semester-II)(416497) (Elective-III D)

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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

- Q1)** a) Explain the front end process with block diagram. [8]
b) Write a short note on AFM Development Process. [8]

OR

- Q2)** a) What are the objectives of product development organization? Explain in brief. [8]
b) Explain the product planning process in detail. [8]
- Q3)** a) How to identify the customer needs? Explain in detail. [8]
b) Explain the documentation process of interaction with customers. [8]

OR

- Q4)** a) Explain the importance of needs in the organization. [6]
b) Explain the procedure of establishing the product specification & how to set the final specifications? [10]
- Q5)** a) Explain the five step method to clarify the problem. [10]
b) Write a short note on following:
i) Concept classification tree [4]
ii) Concept combination table [4]

OR

P.T.O.

- Q6)** a) What are the benefits of structured method? [6]
b) Explain the activity generation concept. [6]
c) Explain the benchmarking process of related products. [6]

SECTION-II

- Q7)** a) Write a short note on product development & costing. [8]
b) How to manage the trade-off between differentiation and commonality? [8]

OR

- Q8)** a) Explain the procedure of establishing the Architecture of the Chunk. [8]
b) Explain the types of modularity. [8]
Q9) a) How to assess the need & expenditure of industrial design. [10]
b) Write a short note on Ergonomic Needs, Aesthetic Needs in industrial design. [6]

OR

- Q10)** a) Explain the procedure of assessing the quality of industrial design. [8]
b) Write a short note on Design for manufacturing.(DFM). [8]
Q11) a) How to estimate the manufacturing costs, explain in brief. [8]
b) Explain the impact of DFM on development time& cost. [10]

OR

Q12) Write short note on the following:

- a) Qualitative Analysis. [6]
b) Quantitative Analysis. [6]
c) Economics analysis process. [6]



Total No. of Questions :12]

SEAT No. :

P3501

[4959]-358

[Total No. of Pages :3

B.E. (Automobile)

**a: TRANSPORT MANAGEMENT & MOTOR INDUSTRY
(2008 Course) (Semester - II) (Elective - IV)**

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) List out the document detail procedure for the Licensing of driver and conductor. **[9]**

b) State particulars that have to be collected for the purpose of preparing a accident report. **[9]**

OR

Q2) a) Detail out the responsibility of driver in case of accident. **[9]**

b) Define the terms: **[9]**

i) Good vehicle

ii) Public Place

iii) Transport place

Q3) a) Describe taxation and objective of taxation in detail. **[8]**

b) Write in detail about one time tax on transport and non-transport vehicles. **[8]**

OR

P.T.O.

- Q4)** a) Why road tax is laid on vehicles? [8]
b) Enlist different types of taxes on motor vehicles and explain the taxation structure for passenger and goods transport vehicles. [8]

- Q5)** a) Detailed description about motor vehicle Insurance. [6]
b) What is third party Insurance? What are the advantages and disadvantages. [6]
c) What are the duties of surveyor and loss assessor. [4]

OR

- Q6)** a) Explain in details accident claims procedure. [6]
b) Give detailed about insurance and type of insurance. [6]
c) Give difference between insurance and assurance. [4]

SECTION-II

- Q7)** Attempt any three: [18]
a) Modes of road transport.
b) Scheduling of transport operation.
c) Classification of transport operation.
d) Passanger transport operation.

OR

- Q8)** a) Write in details theory of fares in passenger transport operation. [6]
b) What is the use of computer in passanger transport operation. [6]
c) How do you select a vehicle for particular operation. [6]

Q9) Describe the following: [16]

- a) Management information system.
- b) Storage and transportation of petroleum product.

OR

Q10)a) Explain in brief good transport operation. [6]

b) Give function of good transport organisation and also explain the structure. [6]

c) Describe the shedule structure of good transport organisation. [4]

Q11)a) Write in details about global positioning system. [8]

b) Write in brief about traffic control in towns. [8]

OR

Q12) Write a short note on (Any two): [16]

- a) "Control of traffic".
- b) Advance techniques in traffic management.
- c) Alternative fuel for vehicle.

EEE

Total No. of Questions :12]

SEAT No. :

P3502

[4959]-360

[Total No. of Pages :2

B.E. (Automobile)

HYBRID ELECTRIC & FUEL CELL VEHICLE

(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 books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

Q1) a) What are the components of electric vehicle? Give advantages & disadvantages of electric vehicle. [8]

b) Explain DC motor & its types with circuit diagram. [8]

OR

Q2) a) Explain construction & working of BLDC motors with neat sketch. [8]

b) Explain the configuration & working modes of parallel mild hybrid electric drive train. [8]

Q3) a) Define Road load force & illustrate the forces acting on the vehicle. [8]

b) Explain series hybrid vehicle with its advantages & disadvantages. [8]

OR

Q4) a) Draw typical performance characteristics of electric motor for traction & explain briefly. [8]

b) What is mild hybrid technology? Explain the energy recuperation in mild hybrid. [8]

Q5) Compare in detail the hybrid vehicles, electric vehicles & conventional vehicles. [18]

OR

P.T.O.

- Q6)** a) Classify the hybrid vehicle & explain any one. [9]
b) What are the advantages & disadvantages of hybrid vehicle over the conventional vehicles. [9]

SECTION-II

- Q7)** a) What are the different battery parameters describe Nickel-cadmium battery with neat sketch. [8]
b) Explain the sizing of an electric motor. [8]

OR

- Q8)** a) What are the types of batteries? Explain lead-acid battery. [8]
b) Describe & explain IC engine force- velocity characteristics & road load characteristics. [8]
- Q9)** a) Explain construction & working of molten carbonate fuel cell with neat sketch. [8]
b) Explain fuel cell electric vehicle with neat sketch. [8]

OR

- Q10)**a) What are the characteristics of fuel cell explain direct methanol fuel cell. [8]
b) Explain supercapacitors & ultracapacitors. [8]
- Q11)**a) Explain hydraulic accumulators & pumps. [9]
b) Explain continuously variable transmission briefly. [9]

OR

- Q12)**a) Explain ultra high speed flywheel with neat sketch. [9]
b) Explain pneumatic hybrid engine system operation modes. [9]

EEE

Total No. of Questions :12]

SEAT No. :

[Total No. of Pages :4

P3316

[4959]-37

B.E. (Mech.)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2008 Course) (Semester - I) (402044 C) (Elective -I)

Time : 3 Hours

[Max. Marks :100]

Instructions to candidates:

- 1) Answer any 3 questions from section I and any 3 questions from section - II.*
- 2) Answers to the sections must be written in separate Answers 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 performance characteristics of pumps, compressors, fans & Blowers. **[8]**
- b) Explain different Applications of compressors fans & Blowers. **[8]**

OR

- Q2)** a) Write equations of Energy Transfer between fluid and rotor, **[6]**
- b) Explain the following Terms: **[10]**
- i) Flow machines.
 - ii) Turbines.
 - iii) Pumps.
 - iv) Compressible flow machines.
 - v) Incompressible flow machines.

P.T.O.

- Q3)** a) Explain the various efficiencies of centrifugal pump. [8]
b) Explain various types of characteristic curves usually prepared for centrifugal pumps. [8]

OR

- Q4)** a) Write short notes on. [12]
i) Different types of losses in centrifugal pumps.
ii) Cavitation in centrifugal pumps.
b) Define specific speed. What is its significance. [4]

- Q5)** a) Explain in details design procedure of centrifugal pump. [10]
b) Write a short note on “Selection of pumps” [8]

OR

- Q6)** a) Explain various forms of corrosion occurred in “Hydraulic Machines.” [10]
b) Explain in details various Application Areas of centrifugal pump. [8]

SECTION- II

- Q7)** a) Explain design procedure & selection, optimization of blower. [8]
b) Write a short note on “Applications of Fans & Blowers” [8]

OR

- Q8)** a) What are main cause for noise generation? What are methods for reducing the fan noise? [8]
b) How does dust erosion of centrifugal impeller occurs? What is its effect on the performance. [8]

- Q9)** a) State design consideration and imperial relations used to determine various for design parameters in fans & blowers? [8]
- b) Explain the terms Surging and Stalling [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) Explain the terms degree of reaction & Slip factor? [8]
- b) An Axial compressor stage has the following data. [10]

i) Temperature and Pressure at Entry	300K,1.0bar
ii) Degree of Reaction	50%
iii) Mean Blade ring diameter	36cm
iv) Rotational speed	18000rpm
v) Blade Height at entry	6cm
vi) Air angles at rotor and stator exit	25°
vii) Axial velocity	180m/s
viii) Work done factor	0.88
ix) Stage Efficiency	85%
x) Mechanical Efficiency	96.7%

Determine :

- 1) Air angles at the stator and rotor entry.
- 2) The mass flow rate of air.
- 3) The power required to drive the compressor.
- 4) The loading coefficient

- 5) The pressure ratio developed by the stage
- 6) Mach number at the rotor entry.

OR

Q12)a) Draw the velocity triangles at the entry and exit for the following axial compressor stage:- **[8]**

- i) $R = \frac{1}{2}$
 - ii) $R < \frac{1}{2}$
 - iii) $R > \frac{1}{2}$
- b) Air enters the inducer of centrifugal compressor at $P_{o1} = 1.02$ bar, $T_{o1} = 335$ K. The hub and tip diameters of the impeller eye are 10 and 25 cm respectively. If the compressor runs at 7200 rpm and delivers 5.0 kg/s of air. Determine the air angle at the inducer blade entry and the relative Mach number. If IGVs are used to obtain a straight inducer section, determine the air angle at IGVs exit and the new value of the relative mach number. **[10]**



Total No. of Questions :12]

SEAT No. :

[Total No. of Pages :5

P3317

[4959]-38

B.E. (Mechanical)

TRIBOLOGY

(2008 Pattern) (402044D) (Elective - I) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve in 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 whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data wherever necessary.*

SECTION -I

- Q1) a)** Write short note on- **[6]**
- i) Tribology in design.
 - ii) Tribology in industry.
- b) Explain different lubricating regime using stribeck curve. **[6]**
- c) Explain the term 'Viscosity Index' and how V.I can be improved? **[4]**

OR

- Q2) a)** Explain following- **[4]**
- i) Classification of Greases.
 - ii) Uses of Greases.
- b) Discuss the effect of pressure on lubricating oil and also explain why excessive amount of E.P. additives is harmful for material. **[6]**
- c) Explain the importance of recycling of used oils. Explain different ways of disposal of used oil. **[6]**

P.T.O.

- Q3) a)** Using the Bowden and tabor's theory of simple adhesion prove that coefficient friction due to adhesion is- [8]

$$f_a = \frac{kS_{sy}}{S_{yc}}$$

- b) Discuss the effect of following on coefficient of friction between two surfaces- [4]
- Surface finish.
 - Sliding velocity.
- c) Write a short note on 'Pitting.' [4]

OR

- Q4) a)** Show that the volume of abrasive wear per unit sliding distance with conical abrasive particles is given by- [8]

$$Q = \left[\frac{2k_w \cot\alpha}{\pi} \right] \frac{W}{P}$$

- b) Write short note on Delamination Wear. [4]
- c) Classify different friction measurement tests with their application. [4]
- Q5) a)** Derive the two dimensional Reynolds equation for hydrodynamic lubrication. Also state the assumptions in derivation. [12]
- b) Using diagram show the pressure distribution along the axis and circumference in infinitely long and narrow hydrodynamic journal bearing. [6]

OR

- Q6)** Following data is given for 360°C hydrodynamic bearing. (refer Table 1).[18]

Radial load: 10kN

Journal speed:1450rpm

$$l/d=1$$

Bearing length=50mm

Radial clearance=20 microns

Eccentricity= 15 microns

Specific gravity of lubricant=0.86

Specific heat of lubricant=2.09kJ/kg°K

Calculate:

- i) Minimum oil film thickness;
- ii) Coefficient of friction;
- iii) Power lost in friction;
- iv) Viscosity of lubricant in cp;
- v) Total flow rate of lubricant in l/min;
- vi) Side leakage;
- vii) Average temperature, if make up oil is supplied at 30°C.

Table:1

l/d	h_o/C	ϵ	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	∞	∞	3.1420	0.000	0.000

SECTION- II

- Q7)** a) What is stiffness of hydrostatic step bearing? Obtain an expression for stiffness of hydrostatic step bearing in terms of thrust load. [8]
- b) A vertical shaft rotating at exceptionally low speed is supported by the hydrostatic step bearing. The thrust load acting on shaft is 900 kN. The diameter of shaft is 450mm. The minimum oil film thickness required for avoiding the metal to metal contact is 95 microns. The fluid pump has efficiency of 90%. The pumping power loss should be minimum as possible, if frictional power loss in bearing is negligible. Calculate,
- i) Recess Diameter.
 - ii) Supply pressure of fluid.
 - iii) Flow rate of fluid in lpm.
 - iv) Pumping power required.
 - v) Temperature rise. [10]

OR

- Q8)** a) Derive an equation for load carrying capacity for given velocity of approach and film thickness in case of rectangular plate approaching a plane. [8]
- b) A plate of 27.5 mm length and infinite width is separated from a plane by an oil film of 26 micron thickness and having viscosity of 0.05 Pa - sec. If the normal load per unit width of 22 kN/m is applied on plate. Determine, [10]
- i) Time required to reduce the film thickness to 2.6 microns.
 - ii) Maximum pressure.
 - iii) Avg. Pressure.

- Q9)** a) Explain Elasto-hydrodynamic lubrication between two long cylinders and hence derive equation of pressure distribution. [8]
- b) Explain the principle and application of elasto-hydrodynamic lubrication. [8]

OR

- Q10)**a) Derive an expression for volume flow rate of air in case of aerostatic step bearing. [8]
- b) Write short notes on. [8]
- i) Lubrication in wire drawing and extrusion.
 - ii) Self lubricated bush bearings.

- Q11)a)** What is surface engineering? Explain its concept and scope. **[8]**
- b) Explain the mechanism of electro and electro less plating with industrial application. **[8]**

OR

- Q12)a)** Explain different geometrical properties of surface and state various parameters used for measurement of surface properties. **[8]**
- b) What is the concept of PVD, CVD and PECVD. Explain with the help of schematic illustration by suitable industrial example. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3318

[4959]-39

[Total No. of Pages : 3

**B.E.(Mechanical Engineering)
AUTOMOBILE ENGINEERING
(Elective-II)(2008Course) (Semester-I) (402045A)**

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 chassis? Compare conventional chassis frame with frameless type chassis frame. **[8]**

b) Explain with neat sketch different types of vehicle bodies. **[8]**

OR

Q2) a) What are vehicle specifications? Describe specification of any one light motor vehicle of your choice. **[8]**

b) Sketch a typical layout of a passenger car and briefly describe its various parts. **[8]**

Q3) a) How do you classify clutches? Explain with neat sketch operation of electromagnetic clutch. **[10]**

b) Describe the synchronization mechanism used in synchromesh gear box. **[6]**

OR

Q4) a) Write notes on following: **[10]**

i) Continuous variable transmission

ii) Electronic transmission control

b) Explain with neat sketch the function of differential in rear axle. **[6]**

P.T.O.

- Q5)** a) Explain with neat sketch construction of stub axle and wheel mounting. [8]
b) Explain wheel alignment and wheel balancing in details. [10]

OR

- Q6)** a) Explain with neat sketch construction and working of collapsible steering. [8]
b) How are the tyres classified? What are the advantages of tubeless tyre over tubed tyre. [6]
c) Write the purpose and requirement of front axle. [4]

SECTION-II

- Q7)** a) What is interconnected suspension? Sketch and describe in briefly. [9]
b) Explain air brake system in detail. Also state its advantages over hydraulic brake system. [9]

OR

- Q8)** a) Explain ABS brake system in detail. Also state its advantages over other braking system. [9]
b) Explain hydro gas suspension system. Also write its advantages. [9]
- Q9)** a) Explain in brief electrical car layout. [6]
b) Explain with neat sketch wiper mechanism. [5]
c) Explain with neat sketch lead acid battery. [5]

OR

Q10) Write short notes on any Four: [16]

- a) Vehicle starting system
- b) Electronic stability control
- c) Sensors and actuators
- d) Dash board instruments
- e) Vehicle charging system

Q11) Write short notes on any Four:

[16]

- a) Vehicle safety
- b) Seat belts
- c) Vehicle interior
- d) Vehicle performance curve
- e) Types of collisions

OR

Q12) a) Explain different vehicle body moments.

[6]

- b) For typical motor car, the road resistance is given by 23N per 1000N, the air resistance by the expression $0.0827V^2$, transmission efficiency 88% in top speed; car weights 19934N when fully loaded. Calculate
 - i) The kW required for a top speed of 144km/h
 - ii) The acceleration in m/s^2 at 48 km/h, assuming the torque at 48 km/h in the top gear 25% more than at 144 km/h
 - iii) The kW required to drive the car up a gradient of 1 in 5 at 48km/h, transmission efficiency 80% in bottom gear. The resistance being in N and V the speed in km/h and $g =$ acceleration due to gravity = $9.81 m/s^2$

[10]



Total No. of Questions : 12]

SEAT No. :

P3295

[Total No. of Pages : 4

[4959]-4

B.E. (Civil) (Semester - I)

STRUCTURAL DESIGN OF BRIDGES (Elective - I)

(2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Que.1 or Que.2, Que.3 or Que.4, Que.5 or Que.6 from Section I and Answer Que.7 or Que.8, Que.9 or Que.10 and Que.11 or Que.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) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary & mention it.*
- 6) *Use of cell phones is prohibited in examination hall.*
- 7) *Use of Non-programmable Electronic Pocket calculator is allowed.*
- 8) *Use of I.S. 456, I.S. 800, 875, I.S. 1343 & Steel table is allowed.*

SECTION - I

- Q1)** a) Give the classification of bridges according to material used for construction and forms of super structure. **[8]**
b) Explain the various loads considered in the Design of highway bridges. **[8]**

OR

- Q2)** a) Explain Pigeaud's Method for the analysis of deck slab. **[8]**
b) Explain role of impact factor in the design of Highway Bridge & how it is calculated. **[8]**

Q3) Design an interior panel of a R.C.C. T-beam deck slab bridge for a two lane highway with following data.

- a) Span of bridge = 27 m
- b) Foot path on either side = 1.2 m

P.T.O.

- c) Width of carriage way = 7.5 m
- d) Three longitudinal girders are provided at 3.3 m c/c
- e) Cross girder spacing = 3.0 m c/c
- f) Thickness of wearing coat = 75 mm
- g) Loading IRC class AA tracked vehicles.
- h) Use $m_1 = 0.038$ and $m_2 = 0.031$ for D.L and
 $m_1 = 0.08$ and $m_2 = 0.059$ for L.L

Use M30 and Fe 415, Sketch the Details of Reinforcement. [18]

OR

Q4) The following Data is referred for Proposed Highway Bridge.

- a) Span of bridge - 30 m
- b) Width of carriage way - 7.5 m
- c) Width of foot path on either side - 1.2 m
- d) Spacing of Main girder = 3 m c/c.
- e) Spacing of cross-girders = 5 m c/c.
- f) Material M40 & High tensile steel strands with loss ratio 0.85

Design the intermediate Post tensioned pre-stressed main girder. [18]

Q5) a) Design the cantilever of R.C.C.T - beam Deck Bridge for Que.3 above and & Draw the details of Reinforcement. [10]

b) Explain economic span of highway bridge. [6]

OR

Q6) Design an electrometric pad bearing for following data.

- a) Span of main girder = 20 m
- b) Live load on bearing = 900 kN
- c) Dead load on bearing = 350 kN
- d) Longitudinal frictional force on bearing = 45 kN
- e) Rotation on bearing = 0.0025 rad
- f) Concrete grade - M 30
- g) Shear Strain = 5×10^{-4}

[16]

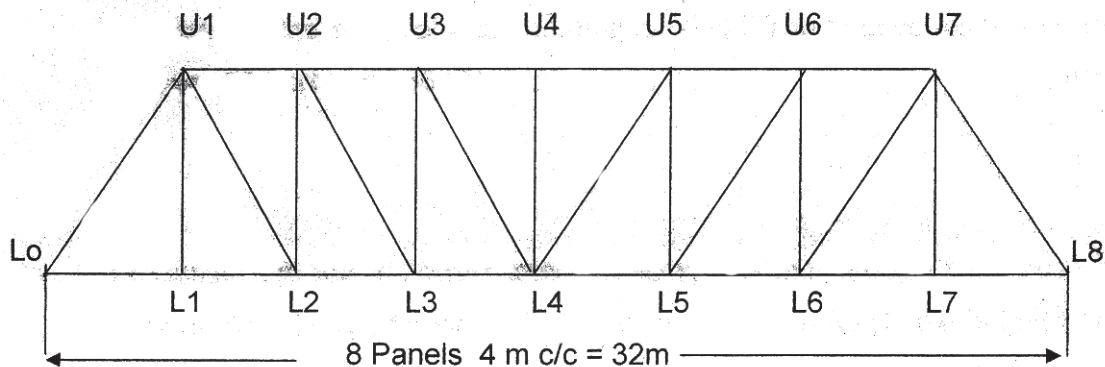
SECTION - II

- Q7)** a) Explain in brief the various forces acting on Railway Bridge. [8]
b) Classify railway steel bridges according to cross section, span and type of connection. [8]

OR

- Q8)** a) Explain in brief arrangement of deck & through type truss girder bridges with sketches. [8]
b) Explain in brief dynamic effect & impact effect for the design of railway truss steel bridges. [4]
c) Describe Hudson's formula. [4]

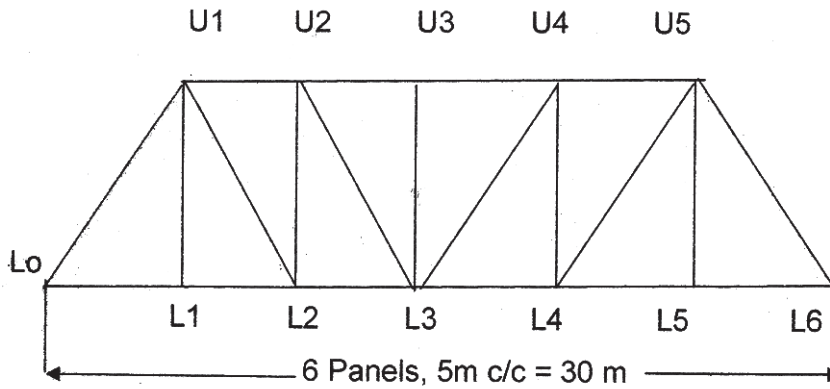
- Q9)** A truss girder through type railway steel bridge consist of two pratt trusses as shown in fig (1) the span of truss in 32 m c/c of bearings, the bridge supports EUDL of 100 kN/m the D.L transmitted to each truss including self wt is 20 kN/m. Considering impact factor as 0.35. Design member U_3U_4 and U_3L_4 . Spacing of Truss is 3m and height of truss is 4m. [18]



(Fig 1)

OR

- Q10)** Using channel section, design the members $U_2 - U_3$, $U_2 - L_3$, $U_3 - L_3$ for the railway truss bridge shown in fig (2) also draw the neat sketch of connection details of joint U_3 .
- Weight of stock rail – 0.68 kN/m.
 - Weight of check rail – 0.48 kN/m.
 - Timber Sleeper of size $-0.25 \times 0.25 \times 2.5$ m @ 0.45 m c/c
 - Unit weight of timber – 7.6 kN/m³.
 - Spacing of truss - 6.00 m c/c.
 - The bridge supports a EUDL of 2950 kN. [18]



(Fig 2)

Q11) Design the rocker bearing for 30 m span truss girder Railway Bridge with following Data.

The reaction due to D.L, L.L & Impact load is 1500 kN, Vertical reaction due to overturning effect of wind at each end of girder is 120 kN. The lateral load due to wind effect of each bearing is 60 kN. The tractive force and braking force are 981 kN and 686 kN respectively. [16]

OR

Q12) Design the top & bottom lateral bracing for the through type truss girder railway steel bridge for single B.G track as shown in fig (1) the height of girder between C.G to C.G of chord member is 6.0 m the spacing between main girder is 7.0 m the rail is 800 mm above the C.G of bottom chord. The chord members are 600 mm deep and 650 mm wide. The end post is 600 mm deep and 660 mm wide. The Inner web members are 600 mm deep & 600 mm wide. [16]



Total No. of Questions : 12]

SEAT No. :

P4520

[Total No. of Pages : 4

[4959]-41

B.E. (Theory) (Mechanical Engineering)

QUANTITATIVE AND DECISION MAKING TECHNIQUES (C)

(Elective - II) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.
- 2) Two separate answers 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) Explain [6]

- i) Minimax and Maximum Principle
- ii) Two Person Zero Sum Game

b) Solve following Game problem by Graphical Method. [10]

B's Strategies

		B1	B2	B3	B4
A's Strategies	A1	8	5	-7	9
	A2	-6	6	4	-2

OR

Q2) a) Explain decision making environments and decision making criteria. [6]

b) Find the Game Value of following problem. [10]

B's Strategies

		B1	B2	B3	B4
A's Strategies	A1	-5	16	13	15
	A2	20	-5	60	-70
	A3	-5	9	12	10
	A4	20	2	50	-80

P.T.O.

Q3) Solve Given LPP by Simplex Method.

[18]

Maximise $Z = 2x_1 + 3x_2 + 4x_3$

Subjected to

$$3x_1 + x_2 + 4x_3 \leq 600$$

$$2x_1 + 4x_2 + 2x_3 \geq 480$$

$$2x_1 + 3x_2 + 3x_3 = 540$$

$$x_1, x_2, x_3 \geq 0$$

OR

Q4) a) Explain Any one of the following with respect to Linear Programming.[6]

i) Types of solution by graphical method with respect to type of problem.

ii) Sensitivity Analysis

b) Solve Given LPP by Simplex Method.

[12]

Minimize $Z = 12x_1 + 20x_2$

Subjected to

$$6x_1 + 8x_2 \geq 100$$

$$7x_1 + 12x_2 \geq 120$$

$$x_1, x_2 \geq 0$$

Q5) a) Explain Trans - Shipment problems.

[6]

b) Solve following Problem by VAM to minimize transportation cost. Cell entries are transportation cost per unit.

[10]

DEMAND

		D1	D2	D3	D4	D5	Available
SOURCE	S1	68	35	4	74	15	18
	S2	57	88	91	3	8	17
	S3	91	60	75	45	60	19
	S4	52	53	24	7	82	13
	S5	51	18	82	13	7	15
	Required	16	18	20	14	14	

OR

- Q6) a)** Explain Steps to solve Assignment Problem by Hungarian Method. [8]
b) Solve following Maximization Assignment Problem. [8]

	A	B	C	D
I	42	35	28	21
II	30	25	20	15
III	30	25	20	15
IV	24	20	16	12

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

Calculate EOQ and Total Cost.

OR

- Q8) a)** Explain Elements of Queuing System. [6]
b) Customer arrive at a bank counter manned by a single cashier according to Poisson distribution with mean arrival rate 6 customer/hour. The cashier attends the customer on first come first serve basis at an average rate of 10 customers/hour with the service time exponential distribution. [10]

Find

- i) The probability of the number of arrivals (0 to 5) during 15 minute interval and 30 minute interval.
- ii) The probability that the queuing system is idle.
- iii) The time a customer should expect to spend in the queue.

- Q9)** a) A manufacturing company produces a single product whose selling price is Rs. 16/unit and the variable cost is Rs. 12/unit. If annual fixed cost of the firm are estimated as Rs. 1,20,000. Find the break even point in units, in rupees and as a percentage of capacity if the firm has an estimated capacity of 50,000 units of the product. What is margin of safety? [8]
- b) Explain Payback Period Method. [4]
- c) Write difference between Payback Period Method and IRR Method. [4]

OR

- Q10)** a) Discuss various replacement analysis models. [8]
- b) A manufacturer have machine A having price 2500/- It's maintaince 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 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]

Normal Distribution total area under curve values are as below

Z	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6
$\Psi(Z)$	0.8159	0.8413	0.8643	0.8849	0.9032	0.9192	0.9332	0.9452

- d) Differentiate between PERT and CPM. [6]

OR

Q12) Write Short note on following. [18]

- a) Types of Floats
- b) Dynamic Programming
- c) Goal Programming



Total No. of Questions : 12]

SEAT No. :

P3319

[4959]-42

[Total No. of Pages : 3

B.E.(Mechanical)

**POWER PLANT ENGINEERING
(2008 Coures) (Semester-II) (402047)**

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Discuss in details various factors which must be considered in selecting a site for Thermal Power plant? [6]
- b) Discuss the role & participation of private sector in development of power sector in India. [6]
- c) Write a short note on Load scheduling. [6]

OR

- Q2)** a) Write a short note on current status of power generation in India [4]
- b) Write a detail note on carbon credit. [4]
- c) The peak load on a power plant is 60 MW. The loads having maximum demands of 30 MW, 20MW,10MW and 14MW are connected to the power plant. The capacity of the power plant is 80 MW and the annual load factor is 0.50. Estimate [10]
- i) the average load on the power plant.
 - ii) the energy supplied per year
 - iii) the demand factor
 - iv) the diversity factor

P.T.O.

- Q3)** a) Explain construction and working of Fluidized bed combustion system for power plant with its merits and demerits. [10]
- b) What do you understand by coal beneficiation? [6]

OR

- Q4)** a) Explain principle working of Electrostatic dust collector with the help of neat diagram also enlists merits and demerits. [10]
- b) What are the various system of ash handling? Explain any one with neat sketch. [6]

- Q5)** a) Discuss various types of dams with neat sketch bring out clearly their applications. [8]

- b) In an open cycle gas turbine power plant, the maximum pressure and temperature are limited to 5 bar and 650K. The pressure and temperature of the gas entering the compressor are 1 bar & 300K. The exit pressure of the turbine is also 1bar. Assuming isentropic efficiency of the compressor and the turbine to 80% & 85% respectively, calculate the thermal efficiency of the cycle. Take overall A:F ratio as 60:1. Assume $C_p=1\text{kJ/kg- }^\circ\text{C}$. Also $\gamma=1.4$. If the plant consumes 5 kg of fuel/ sec, find the power generating capacity of the plant. [8]

OR

- Q6)** a) Compare the steam hydro gas power plant on the basis of site, initial cost fuel cost, maintenance cost, cooling water requirements. [8]
- b) A simple gas turbine takes in air at 1 bar 15 °C and compresses to 6 bar with an isentropic efficiency of 80%. The maximum temperature of the cycle is 750 °C. The isentropic efficiency of turbine being 80%. If the net power developed is 1.1 MW. Estimate the flow rate of gases and air. Assume that there is fall in pressure of 0.1 bar in the combustion system and $C_p= 1\text{kJ/kg-K}$ & $\gamma = 1.4$. Neglect additional mass flow rate of the fuel in the combustion chamber. The calorific value of the fuel used is 20,000kJ/kg. [8]

SECTION-II

- Q7)** a) Describe the boiling water reactor with the help of neat sketch and explain its chief characteristics. [10]
- b) What are the desirable properties of a good moderator? [6]

OR

Q8) a) Give the layout of diesel engine power plant. What are the advantages and disadvantages of diesel power plants? **[10]**

b) Describe briefly the commonly used starting system in large and medium size engines. **[6]**

Q9) a) Write a note on Magneto Hydrodynamic Power Generation Technology. **[8]**

b) Sketch a typical layout of Geothermal Power Plant and state its advantages and disadvantages. **[8]**

OR

Q10) a) Compare different types of switchgear installations used in a power plant. **[8]**

b) Draw a typical layout of tidal power plant and discuss their advantages. **[8]**

Q11) a) Write a note on Different pollutants from power plants and their effects on human health. **[10]**

b) Discuss various ways to control pollutants which are of particulate matter type. **[8]**

OR

Q12) Write notes on any three. [18]

a) Acid Rain: causes, effects & precautions

b) Thermal pollution and its control

c) Global warming and greenhouse effect

d) Pre & Post treatments for SO₂ control.



Total No. of Questions : 12]

SEAT No. :

P3320

[4959]-43

[Total No. of Pages : 6

B.E. (Mechanical Engineering)
MECHANICAL SYSTEM DESIGN
(2008 Pattern) (Semester - II)

Time : 4 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) *All questions carry equal marks.*
- 6) *Your answers will be valued as a whole.*
- 7) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 8) *Assume Suitable data if necessary.*

SECTION - I

- Q1) a)** Derive Clavarino's equation for thick cylinder subjected to internal pressure. **[6]**
- b) A pressure vessel consists of a cylindrical shell with an inner diameter of 1500mm and thickness of 20mm. It is provided with a nozzle with an inner diameter of 250 mm and thickness of 15 mm. The yield strength of the material for the shell and nozzle is 200N/mm² and the design pressure is 2.5 MPa. The extension of the nozzle inside the vessel is 15mm. The corrosion allowance is 2mm, while the weld joint efficiency is 0.85. Neglecting the area of welds, determine whether or not a reinforcing pad is required for the opening. If so, determine the dimensions of pad made from a plate of 15mm thickness. **[12]**

OR

- Q2) a)** Explain the design of openings in pressure vessels by the area compensation method. **[6]**

P.T.O.

- b) A horizontal pressure vessel consists of a cylindrical shell enclosed by hemispherical ends. The volumetric capacity of the vessel should be approximately 2m^3 and the length should not exceed 3m . Assuming the thickness negligibly small compared with overall dimensions of the vessel, determine the internal diameter and the length of the cylindrical shell.

The pressure vessel is fabricated from steel plates with a yield strength of 225 N/mm^2 . The weld joint efficiency factor is 0.85 and corrosion allowance 2mm the pressure vessel is subjected to an operating pressure of 2Mpa . Calculate the thickness of the cylindrical shell and the hemispherical end closures. [12]

- Q3) a)** What is desirable properties of I.C. engine piston material? What are the advantages and disadvantages of aluminium piston over cast Iron Piston. [6]

- b) The following data is given for the cap and bolts of the big end of connecting rod:

Engine speed = 1800 rpm , Length of connecting rod = 350mm

Length of stroke = 175mm , Mass of reciprocating parts = 2.5kg

Length of crank pin = 76mm , Diameter of crank pin = 58mm ,

Thickness of bearing bush = 3mm ,

Permissible tensile stress for bolts = 60N/mm^2 ,

Permissible bending stress for cap = 80N/mm^2 ,

Calculate the nominal diameter of bolts and thickness of cap for the big end. [10]

OR

- Q4) a)** Explain dry and wet liner with neat sketch. Discuss the stresses developed in the cylinder wall. [6]

- b) Design a valve spring for the exhaust valve of a four - stroke engine using the following data:

Diameter of valve head = 75mm

Lift of valve = 25mm

Maximum suction pressure = 0.02MPa below atmosphere stiffness of spring = 10N/mm

spring index = 8

Permissible torsional shear stress for spring wire = 300N/mm²

Modulus of rigidity = 84×10^3 N/mm²

Total gap between consecutive coils, when the spring is subjected to maximum force can be taken as 15% of the maximum compression. **[10]**

- Q5) a)** What is 'adequate design' and 'optimum design'? Explain with suitable examples. **[4]**

- b) A cylindrical shell of the heat exchanger is required to accommodate a total of 100m length to standard diameter copper tubes. One meter square cross-sectional area inside the shell can accommodate 200 copper tubes. Design the heat exchanger shell with an objective of minimizing the cost of the heat exchanger, by using the following data:

i) Cost of the copper tubes = Rs. 20000

ii) Cost of the heat exchanger shell = Rs, 60000 D^{2.5}L

iii) Cost of floor space occupied by the heat exchanger = Rs. 10000 DL

Where , D = diameter of the heat exchanger shell, m.

L = Length of the heat exchanger shell, m. **[12]**

OR

- Q6) a)** A tensile bar of length 500mm is subjected to the constant tensile force of 3000N. If the factor of safety is 2, design the bar with the objective of minimizing the material cost, out of the following materials. **[12]**

Material	Mass Density ' ρ ' kg/m ³	Material Cost per Unit Mass C, Rs/kg	Yield strength S_{yt} N/mm ²
Alloy Steel	7800	28	400
Aluminium alloy	7850	150	900
Titanium Alloy	2800	132	150
Plain Carbon Steel	4500	2200	800

- b) Explain the Johnson's method of optimum design. **[4]**

SECTION - II

- Q7) a)** Explain the mechanical reliability in the modern engineering design? How it differs from the factor of safety? **[4]**
- b) A batch of spindles, to be used in machine tool, are designed for a mean torque transmitting capacity of 15N-m. The spindles are subjected to mean load torque of 10N-m. The torque transmitting capacity as well as the load torque are normally distributed with a standard deviation of 2N-m and 2.5N-m respectively. Estimate the percentage of spindles likely to fail. The areas under the standard normal distribution curve from zero to Z are follows: **[12]**

Z	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0
area	0.3413	0.3849	0.4192	0.4452	0.4641	0.4772	0.4861	0.4918	0.4953	0.4974	0.4987

OR

- Q8) a)** Explain the design recommendation for qualitative displays . [6]
- b) A mechanical component is subjected to a mean stress of 207 N/mm² with a standard deviation of 55.2 N/mm². The material has a yield strength of 276 N/mm² with a standard deviation of 41.4N/mm². [10]

Determine:

- i) Probability of failure.
- ii) the minimum factor of safety available &
- iii) the average factor of safety available.
- Q9) a)** Draw the suitable speed ray diagram for a 14 speed machine tool gear box having six speeds for high range operations with ceramic tools. The spindle speed range is between 160 rpm and 4200 rpm. The gearbox is driven by 5kW, 1440 rpm electric motor. [12]
- b) What is the need of multispeed gearbox in a machine tool or automobile? [6]

OR

- Q10)a)** Explain and compare different laws of stepped speed Regulation. [6]
- b) A machine tool requires 12 speeds in the range $n_{\max} = 1000$ rpm to $n_{\min} = 180$ rpm. List the most suitable speeds to be provided. [6]
- c) What is structure diagram? Explain the procedure to construct a structure diagram for a multi-speed drive. [6]

- Q11)a)** Explain in brief the system concept for material handling? [6]
- b) With neat sketches, explain the following: [6]
- i) Flat belt conveyors,
 - ii) Chain conveyors,
 - iii) Screw conveyors,
- c) Explain the procedure to estimate the power requirement for belt conveyors. [4]

OR

- Q12)a)** An inclined belt conveyor is used for loading the mineral ore in a ship. The belt inclination is 20° for which the flow ability factor 'k' is 2.5×10^{-4} . The belt width is 1000mm while belt speed is 2 m/s. If the specific weight of the mineral ore is 16000 N/m^3 , determine the capacity of the conveyor. [6]
- b) Write short notes on following: [10]
- i) Power requirement of belt conveyors.
 - ii) Methods of feeding to flat belt conveyor.



Total No. of Questions : 12]

SEAT No. :

P3321

[4959]-44

[Total No. of Pages : 3

B.E. (Mechanical / Sandwich)
a: COMPUTATIONAL FLUID DYNAMICS
(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) *Black 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 differential energy conservation equation for any model using Control volume method. **[12]**
- b) Explain mathematical aspect of substantial derivative to describe the physics of flow. **[4]**

OR

- Q2)** a) Give examples of automobile and sports equipment design and analyses using CFD concepts for application development. **[8]**
- b) Explain the importance of viscosity in the governing equations considering stoke's law. **[8]**

- Q3)** a) Using block diagram, give an overview process of computational procedure. **[9]**
- b) Given the function $f(x) = (\frac{1}{4}) X^2$; find the first derivative of $f(x)$ at $x = 2$; using forward, backward and central differencing of order (Δx) . Use a step size of $\Delta x = 0.1$ **[9]**

OR

P.T.O.

Q4) a) Derive quotient for first partial derivative of finite difference representation of a steady heat transfer. [10]

b) Describe the equations used to represent marching & initial boundary value problems. [8]

OR

Q5) a) Describe Structured grid considering aspect ratio and skewness. [6]

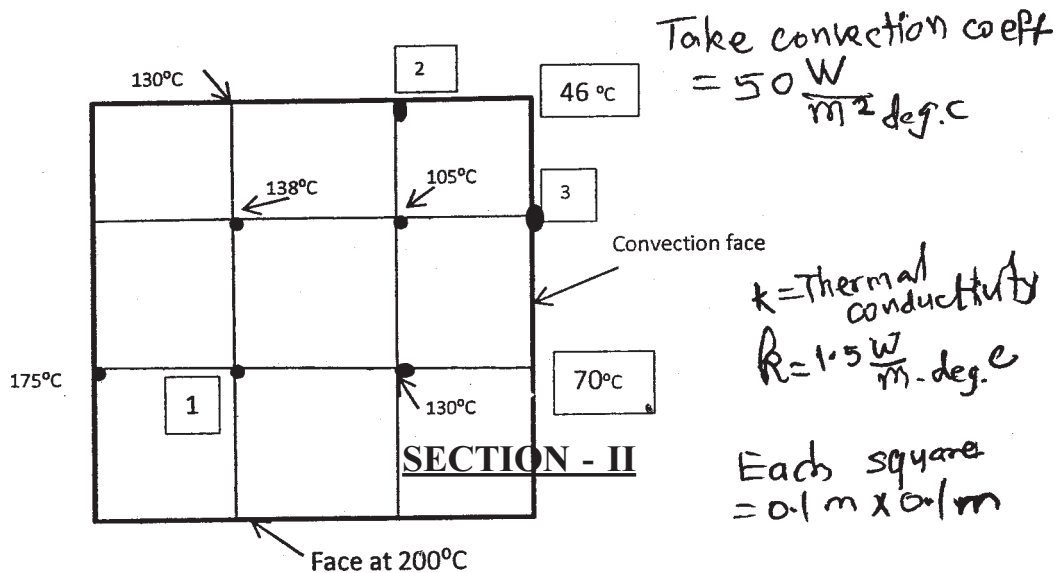
b) Considering mass conservation, determine the discretized form of two dimensional continuity equation. $\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0$

By finite volume method in a structured uniform grid arrangement. [12]

OR

Q6) a) Derive differential equation of the 1D heat transfer by conduction with heat generation. [8]

b) Calculate the temperature at points 1, 2, and 3 using numerical method for equidistant grid. Top face is insulated. [10]



SECTION - II

Q7) The temperature distribution at a certain time instant through a 50 cm thick wall is described by the equation

$$T = 300 - 500x + 100x^2 + 140x^3;$$

Where temperature t in degree C and the distance x meters measured from the hot surface. If thermal conductivity of the wall is 20 kJ/m-hr-deg. C.

Calculate the energy stored per unit area of the wall. [16]

OR

Q8) a) Distinguish the explicit and implicit finite difference approach. [8]

b) How does time step affect stability, explain with suitable example. [8]

Q9) Describe the following types of grids:

a) Unstructured

b) Staggered grid

c) C type grid

d) H type grid

[16]

OR

Q10)a) Considering the steps of SIMPLE algorithm, justify the need for SIMPLER algorithm. [8]

b) Describe the pressure correction method in incompressible viscous flow. [8]

Q11)a) Explain space marching two dimensional method for inviscid flow. [8]

b) Justify the need of Pressure correction method. [8]

OR

Q12) Write short notes on any two: [16]

a) Explicit method

b) Implicit method

c) Types of errors resulting in numerical solution

d) Stability and oscillation in solution.

x x x

Total No. of Questions : 12]

SEAT No. :

P3322

[4959]-45

[Total No. of Pages : 5

B.E. (Mechanical Engineering)

FINITE ELEMENT METHOD

(2008 Pattern) (Semester - II) (Elective - III) (402049 B)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I and Q7 or Q8, Q9 or Q10, Q.11 or Q.12 from Section - II.*
- 2) *Answer to the two section should be written in separate answer books.*
- 3) *Draw Neat diagrams wherever necessary.*
- 4) *Assume suitable data, wherever necessary.*
- 5) *Figures to the right side indicate full marks.*

SECTION - I

- Q1)** a) Explain The concept of FEM briefly and outline the procedure. [8]
- b) Explain Principle of minimum potential energy used in deriving element stiffness metrix and equations. [8]

OR

- Q2)** a) Explain essential and natural boundary conditions. [8]
- b) Explain in brief matrix decomposition and partitioning of matrix. [8]

- Q3)** a) For the plane truss as shown in fig. 3a, determine the following. Each element has $E = 20 \times 10^6 \text{ N/cm}^2$. [10]
- i) Write down the elemental stiffness matrices for each element,
 - ii) Assemble k matrices to get global stiffness matrix K.
 - iii) Find horizontal and vertical displacement of node 2.
 - iv) Evaluate stresses in each element.

P.T.O.

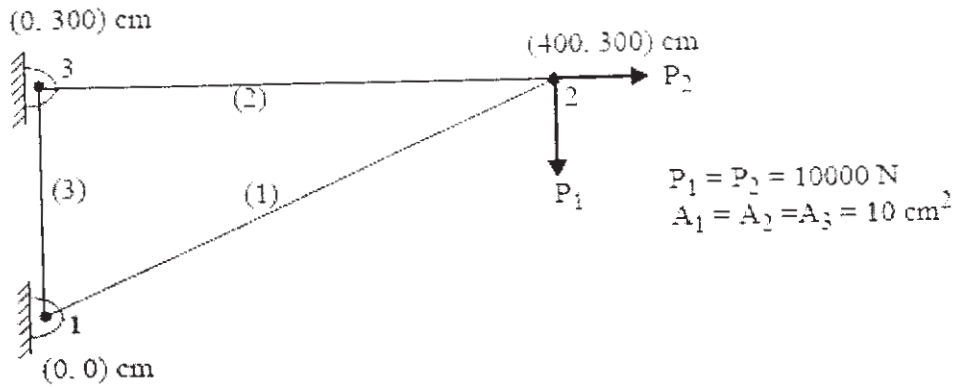


Fig. 3a

b) Consider the bar loaded as shown in figure 3b. $E = 200 \times 10^9 \text{ N/m}^2$. Determine [8]

- i) Stiffness matrix for each element
- ii) Global stiffness matrix
- iii) Nodal displacements
- iv) Elemental stresses
- v) Support reactions

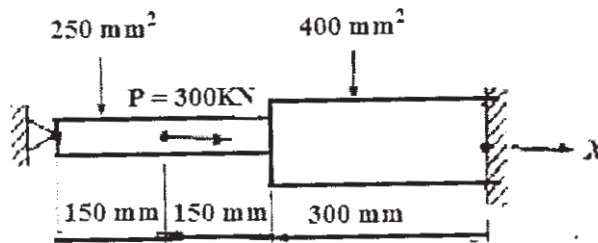


Fig. 3b

OR

Q4) a) Determine the slope and deflection at load point for the beam as shown in fig. 4a. taking the modulus of elasticity of material as $20 \times 10^6 \text{ N/cm}^2$ and moment of Inertia as 2509 cm^4 . [8]

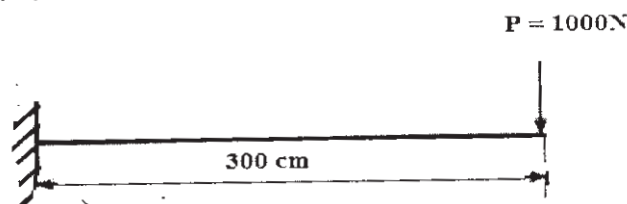


Fig. 4a

- b) Derive elemental stiffness matrix and force vector for two noded (linear) bar element using Principal of Minimum Potential Energy (PMPE) Method. [10]

Q5) Evaluate Following integrals using three point Gaussian quadrature method. [16]

- a) $\int_{-1}^1 s^4 ds$
- b) $I = \int_{-1}^1 (2 + x + x^2) dx$

OR

Q6) a) For the triangular element as shown in fig. 6a the nodal values of displacements at node 1, 2 and 3 are (2,1), (3,2) and (5,3) respectively. For point p within the element, determine

- i) the natural coordinates
- ii) The shape functions
- iii) The displacements

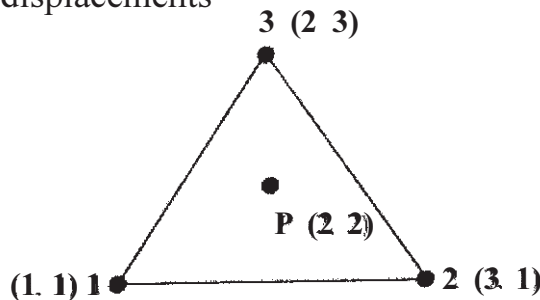


Fig. 6a

[8]

- b) What is 'serendipity family element'? Using this concept find shape function of quadratic serendipity family element. [8]

SECTION - II

Q7) The fin as shown in fig. 7 a is insulated on the perimeter. The left end has a constant temperature of 100°C. A positive heat flux of $q = 5000 \text{ W/m}^2$ acts on the right end.

Let $K_{xx} = 6 \text{ W/m}^\circ\text{C}$ and cross section area $A = 0.1 \text{ m}^2$. Determine the temperatures at $L/4$, $L/2$, $3L/4$, and L , where $L = 0.4 \text{ m}$. [16]

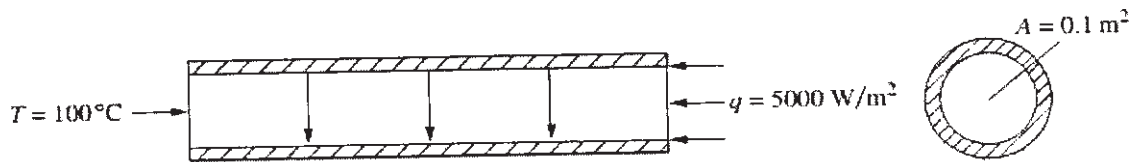


Fig. 7a

OR

- Q8)** For the composite wall shown in fig.8a, determine the interface temperatures. What is the heat flux through 8 cm portion? Use the finite element method. Use three elements with the nodes shown. [16]

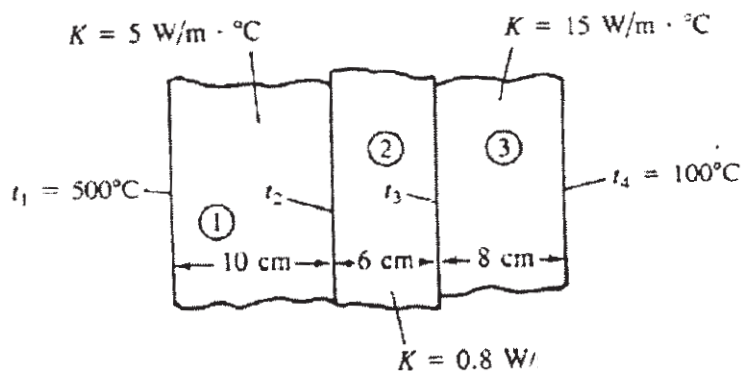


Fig. 8a

- Q9)** Find the natural frequencies longitudinal vibration of the constrained stepped shaft of areas A and $2A$ and of equal length L , as shown in the fig. 9a. Compare the result obtained using lumped mass matrix approach and consistent mass matrix approach. [16]

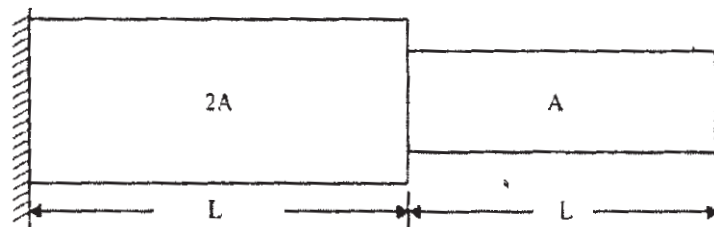


Fig. 9a

OR

- Q10)**a) Differentiate between consistent mass matrix and lumped mass matrix. **[8]**
b) Derive the consistent mass matrix for bar element. **[8]**
- Q11)**a) Explain free and mapped meshing. What are the advantages and limitations of free & mapped meshing in finite element method? **[8]**
b) Explain the terms **[10]**
i) Elemental connectivity
ii) Strain & Stress recovery

OR

- Q12)**a) Define skew, jacobian and distortion. Explain their significance in FEM. **[8]**
b) Write a short note on (any two) **[10]**
i) Preprocessor
ii) Postprocessor
iii) Static and Modal analysis.



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :3

P3323

[4959]-46

B.E.(Mechanical)

ROBOTICS

(2008 Course) (Part - II) (402049 C) (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) *Use of electronic pocket calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1) a)** “Degrees of freedom in a robot are intended to emulate the versatility of movement possessed by human body”. Discuss the statement with neat sketches of a suitable motion configuration. **[10]**
- b) What are the functions of a resolver? Explain with neat sketch. **[6]**

OR

- Q2) a)** “Final accuracy of a robotic system depends on its mechanical inaccuracies, the computer control algorithms and the system, resolution”. Discuss. **[8]**
- b) Explain the term “Compliance” in terms of a robot? Explain passive type of Compliance. **[8]**

- Q3) a)** Which sensor can be used along with the gripper to sense whether the object is falling? Explain the working principle. **[8]**
- b) Explain the criteria for gripper design. **[8]**

OR

P.T.O.

- Q4) a)** Discuss in brief “classification of grippers used in robotics”. [8]
- b) Discuss the various characteristics of sensing devices used in industrial robot. [8]

- Q5) a)** Explain different types of controllers used in industrial robots. [8]
- b) A revolute joint in a PTP robot moving with velocity of 15 deg/sec traverses from an initial position of 15°. Determine the position and velocity of the joint at the end of each second and plot the results. The range of initial and final position is covered in 5 seconds with a finite acceleration of 6 deg/sec². [10]

OR

- Q6) a)** What is point-to-point and continuous path planning? Enlist at least two applications for each. [8]
- b) Explain types of control systems used in present industrial robots. [10]

SECTION - II

- Q7) a)** The coordinates of a point q_{abc} is given by $[7 \ 5 \ 3]^T$ which is rotated about the OX - axis of the reference frame OXYZ by an angle of 60°. Determine the coordinates of the point q_{xyz} ? [10]
- b) Explain the procedure for Denavit-Hartenberg parameters representation. [8]

OR

- Q8) a)** A mobile body reference frame OABC is rotated about 60° about OY - axis of reference frame OXYZ. If $P_{xyz} = [2 \ 4 \ 6]^T$ and $Q_{xyz} = [3 \ 5 \ 7]^T$ are the coordinates with respect to OXYZ plane, What are the corresponding coordinates of P and Q with respect to OABC frame? [10]

- b) Explain the terms: [8]
- i) Direct kinematics.
 - ii) Indirect kinematics.

- Q9)** a) Explain the lead through programming technique. [8]
- b) Write short note on Edge detection. [8]

OR

- Q10)** a) Explain WAIT, SIGNAL and DELAY commands. [6]
- b) Explain various Image processing Techniques. [10]

- Q11)** a) Write in brief about AI techniques. [8]
- b) Explain different Techniques of Simulation. [8]

OR

- Q12)** a) What is the need of Artificial Intelligence and give its application. [8]
- b) Write in brief about the economical aspects for robot design. [8]



Total No. of Questions : 12]

SEAT No. :

P3324

[4959]-47

[Total No. of Pages :4

B.E.(Mechanical)

**D : ADVANCED AIR CONDITIONING AND REFRIGERATION
(2008 Course) (Semester - II) (Elective - III) (Part - II) (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 books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1) a)** Write a short note on HP/LP receivers. **[6]**
- b) Explain following methods of defrosting **[12]**
- i) Multiple evaporator systems.
 - ii) reverse cycle defrosting.
 - iii) re-evaporator coils.
 - iv) Reverse cycle defrosting using four way valve.

OR

- Q2) a)** Explain actual vapour compression cycle using p-h and T-s diagram. **[10]**
- b) Explain ejector-expansion transcritical refrigeration cycle. **[8]**
- Q3) a)** Discuss the various methods of capacity controls of reciprocating compressor. **[6]**

P.T.O.

- b) Write a short note on : [10]
- i) electronic expansion valve
 - ii) thermostatic expansion valve

OR

- Q4)** a) Explain Pumped circulation system. [6]
- b) Explain the procedure of estimating length and pressure drop of capillary tube. [10]

- Q5)** a) Describe the methods of controlling IAQ. [6]
- b) Discuss the main characteristics of filter. [6]
- c) Explain the followings: [4]
- i) Motor over current protection
 - ii) adjustable speed drives

OR

- Q6)** a) Explain the construction working of direct acting solenoid valve. [8]
- b) List the pollutants & contaminants present in the air with source. [4]
- c) Discuss the types of safety valves. [4]

SECTION - II

- Q7)** a) Write a short note on “Choice of Supply Design Conditions”. [6]

- b) A 25 cm thick wall is exposed to the periodic temperature and incident radiant variation on an hourly basis between 7am and 6pm is given in the table. Determine heat gain of the room per unit area of the wall. The outdoor maximum and minimum temperatures are 40°C and 22°C respectively. The outside and inside design temperature are 40 and 25°C respectively. [12]

What is the time of maximum heat gain from the wall?

Density of material, $\rho = 2400 \text{ kg/m}^3$

Thermal conductivity, $k = 1.5 \text{ W/mk}$

Outside wall coefficient $h_o = 23 \text{ W/m}^2\text{K}$

Inside wall coefficient, $h_i = 7 \text{ W/m}^2\text{K}$.

Time	7	8	9	10	11	12	1	2	3	4	5	6
	am	am	am	am	am	noon	pm	pm	pm	pm	pm	pm
Wall Mass (kg/m ²)	Equivalent Temperature Difference (ΔT_E) °C											
500	3.9	3.3	3.3	3.3	3.3	3.3	3.9	4.4	5.5	6.7	9.4	11.1
600	6.1	5.5	5.0	4.4	4.4	4.4	5.0	5.5	5.5	5.5	6.1	6.7

OR

- Q8)** a) Draw and discuss modified comfort chart. [9]
 b) Explain the term “Decrement factor & time lag”. [9]
- Q9)** a) Discuss supply air distribution of Data centre. [8]
 b) Draw and explain air-to-liquid heat pump circuit. [8]

OR

- Q10)** a) Write a short note on “Celan Room”. [6]
b) Discuss the factors which influence the load calculations of auditorium. [6]
c) State applications of heat pump. [4]

Q11) Write a short note on: [16]

- a) Liquefaction of nitrogen.
b) Liquefaction of hydrogen.
c) Liquefaction of helium.

OR

- Q12)** a) Sketch and explain Claude cycle using T-s and p-h diagram. [8]
b) Discuss various properties of cryogenic fluids. [8]



Total No. of Questions : 12]

SEAT No. :

P3325

[4959]-48

[Total No. of Pages : 5

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) *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 indicate full marks.*
- 3) *Assume suitable data if necessary.*

SECTION - I

Q1) a) A shell-and-tube heat exchanger is designed to cool the shell-side lubricating oil from 65°C to 60°C. Following are the specifications for the shell-and-tube heat exchanger: **[6]**

Tube outside diameter = 19 mm

Tube wall thickness = 1.2mm

Tube pitch = 25 mm, square layout number of baffles = 14

Crossflow area near the shell centerline = 0.04429 m²

Number of effective tube rows crossed in one window zone = 3:868

Flow area through the window zone = 0.01261m² oil flow rate = 36.3kg/s

Ideal tube bank friction factor = 0:23

Number of effective tube rows baffle section = 9

Shell-side Reynolds number = 242

Oil density = 849 kg/m³

P.T.O.

Factors for various leakage and bypass flows for the pressure drop correction are,

For baffle-to-shell and tube-to-baffle leakage streams = 0.59, for baffle-to-shell bypass stream = 0.69 and

For unequal baffle spacing on inlet and exit baffle sections = 0.81.

Calculate- the shell side pressure drop

- b) Classify heat exchangers according to construction? [5]
- c) What are the different assumptions made in the design of thermal heat exchangers? [5]

OR

- Q2)**
- a) Explain plate heat exchangers? What are the different assumptions made for that? [6]
 - b) Explain construction and working of hairpin heat exchangers? [6]
 - c) Draw and explain tube layout pattern with figure? [4]

- Q3)**
- a) Why Baffles are used in heat exchangers? What are different types of baffles used in general (shapes and sizes)? [6]
 - b) A shell and tube heat exchanger is to be provided with tubes 4m long and 3.1 cm outer diameter and 2.7 cm inner diameter. The heat exchanger is required for heating water from 22°C to 45°C with the help of condensing steam at 100°C on the outside of tubes. Calculate the number of tubes required if the water flow rate through tubes is 10 kg/sec and heat transfer coefficients on vapor and water side are 5500 W/m² °C and 850 W/m² °C respectively. Neglect all other resistances. Assume Cp of water = 4168 J/kg°C. Also calculate the rate of steam consumption if latent heat is 2200 kJ/kg. [6]
 - c) Short notes on: contents in TEMA standard. [4]

OR

- Q4)** a) Explain stepwise procedure for the calculation of heat exchanger design using kern's method? [8]
- b) Explain various leakage and bypass streams on the shell side. How do they affect the performance of STHE? [8]
- Q5)** a) What do you understand by compact heat exchanger? State advantages and limitation of compact heat exchanger as compare to shell and tube heat exchanger? [6]
- b) Explain in detail gasketed type plate fin exchanger? [6]
- c) Draw a well labeled diagram tube fin heat exchangers and also explain its working. [6]

OR

- Q6)** a) A counter flow heat exchanger is employed to cool 0.55kg/sec of oil from 115°C to 40°C by the use of water. The inlet and outlet temperatures of cooling water are 15°C and 75°C, respectively. The overall heat transfer coefficient is expected to be 1450 W/m² °C. Using NTU METHOD, calculate the following: [9]
- i) The mass flow rate of water
- ii) The effectiveness of the heat exchanger,
- iii) The surface area required.
- b) "Brazed aluminum Plate Fin Heat Exchanger (PFHE) is the only choice for cryogenic field application"- COMMENT on the statement. [9]

SECTION - II

- Q7)** a) Explain all types of direct contact type condensers? Draw a neat sketch from one of them? [6]
- b) Write short notes on
- i) Air cooled condenser [5]
- ii) Water cooled condenser [5]

OR

- Q8)** a) Describe chillers in detail? [5]
- b) Describe direct expansion evaporator with sketch? [5]
- c) Which parameters to be specially considered for design of condensers compared to design of heat exchangers? [6]
- Q9)** a) What are the different parameters measure during testing of cooling towers? [5]
- b) Different materials used for the construction of cooling towers? [5]
- c) List out different mechanical and electrical components for smooth operations of cooling towers? [6]

OR

- Q10)**a) Factors which affects the performace of cooling towers? [6]
- b) Different auxiliary components used for construction of cooling towers? Explain each component in brief? [10]

Q11) Write short notes on (any three)

- a) Selection of material for wick. [6]
- b) Explain constructional features of Printed Circuit Board (PCB)? How it works? [6]
- c) State advantages and disadvantages of forced electronics cooling? [6]
- d) Explain cooling of personal computers? [6]

OR

Q12) Solve all questions:

- a) Draw a well labeled diagram of heat pipe. Explain construction and working of heat pipe? Write Advantages of heat pipe. [10]
- b) What are the different performance characteristics related with heat pipe? [3]
- c) How does cooling of electric motor carried out? [3]
- d) What are the different working fluids used in Heat pipes? [2]

x x x

Total No. of Questions : 12]

SEAT No. :

P3326

[4959]-49

[Total No. of Pages : 3

B.E. (Mechanical)

MANAGEMENT INFORMATION SYSTEM

(2008 Pattern) (402050 B) (Elective - IV) (Semester- 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) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) MIS creates an impact on the organizational function, performance and productivity. Explain it with suitable examples. **[8]**
- b) What is the role of MIS in an organisation? How information can be a Strategic resource? **[8]**

OR

- Q2)** a) Explain Operation Support system and management support system in details. **[8]**
- b) Explain the role of MIS in a Business Enterprise. **[8]**

- Q3)** a) What is KBES? Explain in details structured and non programmed decisions. **[8]**
- b) Explain factors, configuration and components in DSS. **[8]**

OR

P.T.O.

- Q4)** a) What is expert system in MIS? Explain GDSS in details. [8]
b) Explain spiral SDLC model. [8]
- Q5)** a) Draw a E-R diagram for college library. Consider the following entities and their attributes. [6]
i) student
ii) book
iii) librarian
iv) book rack
b) Write a note on distributed data structure. [6]
c) Explain ESS with architecture. [6]

OR

- Q6)** a) What are the components of Data mining? Explain file model of Database. [6]
b) Explain classical, Administrative model in Decision making models. [6]
c) Explain DFD for online examination system of engineering students. [6]

SECTION - II

- Q7)** a) Write a short note on object oriented system development. [4]
b) State various Software inspection and testing methodologies and tools in details. [10]
c) What are software standards? [2]

OR

- Q8)** a) What is software matrix? Explain quality management in software standards. [4]
b) What is CMM? Explain all its five levels. [10]
c) What is software verification? [2]

- Q9)** a) Describe walkthrough and inspection techniques in software testing. [8]
b) Write a short note on [8]
i) Software reliability
ii) Software piracy

OR

- Q10)**a) Explain briefly Black box testing and white box testing. [8]
b) Write a short note on [8]
i) Hacking
ii) Software models

- Q11)**a) Explain MIS with HR and marketing management. [10]
b) Write applications of MIS in supply chain management. [8]

OR

- Q12)** Write short note on [18]
a) 360 degree feedback
b) MIS in production management
c) Applications of MIS

x x x

Total No. of Questions : 12]

SEAT No. :

P3296

[Total No. of Pages : 5

[4959]-5

B.E. (Civil Engineering) (Semester - I)

SYSTEM APPROACH IN CIVIL ENGINEERING (Elective - I)

(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)** a) What is Optimization Technique? Explain various applications of Optimization Techniques in Civil Engineering. [8]
- b) Enlist various models used in System Approach. Explain any one in detail with suitable example. [8]

OR

- Q2)** a) What do you mean by System Approach? Explain different stages involved in System Approach. [8]
- b) What is Linear Programming? Define following terms related to Linear Programming. [8]
- i) Feasible Solution
 - ii) Basic Feasible Solution
 - iii) Optimum Basic Feasible Solution.
 - iv) Unbounded Solution

- Q3)** Cement to be supplied from four sources to four different construction project sites. The quantity of cement required for each site, the quantity available at each sources is given in the following table. [16]

P.T.O.

Source	Villages				Quantity Available
	A	B	C	D	
1	6	8	10	9	60
2	5	7	11	10	70
3	3	5	14	12	110
4	2	6	10	8	150
Quantity Required	80	90	100	120	390

Determine the transportation policy which will minimize the total cost of transportation. Solve by North West Corner Method & Least Cost Method.

OR

Q4) Write a short note on : **[16]**

- i) Assignment model
- ii) Transportation model
- iii) Advantages of Assignment Model and Transportation Model in Civil Engineering.

Q5) a) It is proposed to develop hydropower project on reservoir across 3 possible river sites. **[12]**

The total financial resources available are Rs. 400 Cr. The return function for each of the possible investment is given below. Find out maximum returns by Dynamic Programming.

Resources Allocated	Return from Sites		
	A	B	C
00	00	00	00
100	120	140	300
200	750	550	500
300	910	700	700
400	980	800	750

b) What is Multistage Decision Process? Explain with suitable example. **[6]**

OR

- Q6)** a) In an irrigation project, 6 million m³ of water is to be supplied to 3 irrigation district. The net returns depending upon the quantity of water supplied are given below Using Dynamic Programming determine the allotment of water to each district so that the maximum return can receive. **[12]**

Qty.of water in million m ³	Returns from Districts		
	1	2	3
0	1	2	3
1	0	0	0
2	5	6	4
3	9	11	9
4	14	15	13
5	17	19	18
6	21	22	20
7	25	26	23

- b) What is Dynamic Programming in Civil Engineering? Explain advantages and disadvantages of Dynamic Programming. **[6]**

SECTION - II

- Q7)** a) What is Non-Linear Programming? Enlist methods of Non-Linear Programming. **[8]**
- b) With Fibonacci Method maximize $f = 16x - 0.2x^2$ in the interval (0, 100) to an accuracy of 0.1% carry out 4 stages. **[10]**

OR

- Q8)** a) Explain minimizing procedure of Fibonacci Method. **[8]**
- b) Using Fibonacci method solve
Minimize $Z = x^3 - 108x$ in the range (0, 10) with an accuracy 0.1%. **[10]**

Q9) a) What is Sequencing Model? Explain with suitable example? Mention assumptions made in it. [8]

b) Five jobs are to be processed on 2 machines M_1 and M_2 in order M_1, M_2 , processing time is in hours. Find the sequence of the total elapsed and idle time. [8]

Jobs	Machine A	Machine B
1	5	2
2	1	6
3	9	7
4	3	8
5	10	4

OR

Q10) A sample of 100 arrivals of 100 Dumpers at a construction Site is found to be according to following distribution. [16]

Time of arrival in (Min)	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Frequency	2	6	10	24	20	15	10	7	4	2

A study of service time reveal time the following distribution.

Service Time (M)	0.5	1	1.5	2	2.5
Frequency	13	22	37	20	8

Estimate :

- i) The average waiting time of dumpers,
- ii) The percentage waiting time for dumper
- iii) Average idle time & Percentage idle time for 10 arrivals

Use the following random numbers

Arrival	16	77	23	02	77	28	06	24	25	93
Service Time	56	65	05	61	86	90	92	10	79	80

Q11) a) Explain the following methods : [8]

- i) Average cost method
- ii) Annual equivalent annuity method
- iii) Present value method
- iv) MAPI method

b) For the Game given below, Determine the Optimal Strategies for A.[8]

Player A	Player B	
	I	II
I	4	2
II	3	8
III	2	12

OR

Q12) The estimate of maintenance cost, resale value for a machine A whose purchase price is Rs. 6000 over the years is given below. **[16]**

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs)	1000	1200	1400	1800	2300	2800	3400	4000
Resale Value (Rs)	3000	1500	750	375	200	200	200	200

A similar estimate for another machine B, which has 50% more capacity than a machine A and where purchase value is Rs 8000 is given below.

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs)	1200	1500	18000	2400	3100	4000	5000	6100
Resale Value (Rs)	4000	2000	1000	500	300	300	300	300

Find the replacement ages for machine A and Machine B as well as the corresponding minimum average annual costs.



Total No. of Questions : 12]

SEAT No. :

P3327

[4959]-50

[Total No. of Pages : 5

B.E. (Mechanical)

c-RELIABILITY ENGINEERING

(2008 Pattern) (Semester - II) (Elective - IV) (402050)

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 and 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 must be drawn wherever necessary.*

Q1) a) Explain the term Product Liability in detail. Also state the impact of reliability engineering on Product life cycle. **[6]**

b) Following table shows the test result of 1000 spark plugs tested simultaneously. Evaluate: Hazard rate, failure density function, reliability and also plot these functions against time interval. **[10]**

Operating Time (hrs.)	0	100	200	300	400	500	600	700	800	900	1000
no. of surviving components	1000	895	810	730	660	600	545	495	450	410	373

OR

Q2) a) Explicate the main objectives of reliability engineering. Also discuss the role of reliability engineering in an engineering development project and state the correlation between quality and reliability. **[8]**

b) Explain availability and maintainability. Explain the types of availability in detail. **[5]**

c) What do you mean by instantaneous failure rate? Discuss with suitable example. **[3]**

P.T.O.

Q3) a) Arman Malik has put \$ 2 in each of the 3 horses running three different races in Dubai Horse Racing center. He feels that each of the bets he has made has a 0.2 probability of winning. A winning ticket on any of the three horses will earn Arman Malik \$40. Assuming a Bernoulli process, answer the following questions: [9]

- i) What is the probability of at least 2 horses (on which Arman Malik has bet) winning?
- ii) What is the Expected Earnings from all the three horses?
- iii) What is the probability of at most 1 out of the three horses (on which Arman Malik has bet) winning?

What is the probability distribution of his possible earnings from all the three races?

b) Elaborate system reliability model in parallel configuration with the help of suitable example. [9]

OR

Q4) a) Determine the reliability of bridge network using Delta star method. [6]

b) What do you mean by redundance allocation? Explain in detail. [6]

c) P. Chidambaram believes that the annual profit of State Bank of India is a normal random variable with a mean of \$600, 000 and a standard deviation of \$ 100,000. P.Chidambaram is currently analyzing those banks whose annual profit volume lies between \$500,000 and \$650,000. [6]

- i) If total number of banks is 270, what is the approximate number of bank that Chidambaram will analyze?
- ii) Chidambaram randomly selects a bank to analyze, what is the probability that this bank will have an annual profit volume of more than \$400,000?

- Q5) a)** Explain the minimum effort method to determine reliability of system. **[6]**
- b) A system requires a reliability of 0.9 for 10 hours of operation. There are four units connected in series with failure rates $\lambda_1 = 0.003$, $\lambda_2 = 0.006$, $\lambda_3 = 0.008$, $\lambda_4 = 0.010$ allocate reliabilities to four units. **[6]**
- c) Describe ARINC apportionment technique. **[4]**

OR

- Q6) a)** What do you mean by redundancy? Explain different techniques of incorporating redundancy in a system. **[6]**
- b) State the assumptions to be made while using AGREE method. Find out the failure rates of the component so that the system reliability becomes 0.99 provided with following observations: **[8]**

Subsystem	No. of component modules	Operating Time	Importance factor
1	25	10	1.0
2	80	09	0.97
3	45	10	1.0
4	60	07	0.95
5	70	10	1.0
6	20	10	0.95

- c) Enlist the objectives of Apportion Method. **[2]**

Q7) a) The following data collected at FMCG plant: **[10]**

- Mean time before failure: 35 Hrs.
- mean time to repair: 10 Hrs
- Administrative and logistic time: 50% of MTTR

Calculate operational availability and inherent availability of the plant. Also on the basic of the system define availability and maintainability concept.

b) Describe Specific Maintainability Design considerations and explain the design factors involved in maintainability design. **[6]**

OR

Q8) a) For a Pharmaceutical Lab a suitable HVAC system has to be designed. Its should have reliability value of 0.95 for an operation of 800 hrs. The availability value over the same period of time is required to be 0.98. Assume constant hazard for failure and repair. Estimate MTBF and MTTR. **[8]**

b) What do you understand by Operational Availability and Inherent availability? Derive expression for these two. **[8]**

Q9) a) What is FMECA? Explain the steps involved to perform design with FMECA. **[6]**

b) For an emergency operation theatre in a hospital, the power is obtained from the main city supply through a transformer connected in series. To ensure an uninterrupted power supply, an auxiliary generator is used for switching over. The probability of failure of the main city supply is 0.01 and transformer reliability is 0.996. The auxiliary power generator has a reliability factor of 0.99. Draw a block diagram for the system. Construct the fault tree and calculate reliability of the system. **[6]**

c) Explain the minimal cut-sets method. **[4]**

OR

- Q10)a)** Discuss the method of obtaining criticality of a component or a subsystem using Risk Priority Number. [6]
- b) Write short note on Monte Carlo Evaluation. [4]
- c) A heavy current special machine demands continuous DC power supply during a particular period. The required power can be made available through a converter. In order to ensure uninterrupted power supply, two converters are used, so that even if one fails, the other converter provides necessary current. The two converters receive their power supplies from a substation which is connected to the main grid. Construct the fault tree for the system. [6]

- Q11)a)** Explain Accelerated life testing and HALT in detail. [8]
- b) The mean strength and standard deviation of a bolted joint are 3000kgf/cm² and 300kgf/cm² respectively. The joint is loaded such that stress induced has a mean value of 2500kgf/cm² with standard deviation of 50kgf/cm². Assuming that shear strength and the induced stresses are independent and normally distributed, find out the probability of survival of bolted joint. The data from statistics is: [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)** Explain Reliability Testing with suitable example. [6]
- b) Derive Reliability function using Markov Model. [6]
- c) Discuss Stress-Strength Interacting using Probabilistic Approach. [6]

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Total No. of Questions : 12]

SEAT No. :

P3328

[4959]-55

[Total No. of Pages : 8

B.E. (Mechanical Sandwich)
MACHINE & COMPUTER AIDED DESIGN
(2008 Pattern) (Semester - I)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Any 3 questions from each section.*
- 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) *Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator is allowed.*
- 6) *Assume suitable data wherever necessary.*

SECTION - I

- Q1) a)** Derive the expression of beam strength of straight bevel gear tooth. How is the wear strength expression modified for straight bevel gear. **[8]**
- b) A pair of straight bevel gear with 20 pressure angle consist of 20 teeth pinion meshing with 30 teeth gear. The module is 4mm while the face width is 20mm. The pinion and gear material has surface hardness of 400 BHN. The pinion rotates at 720 rpm and receives 3 kW power from a motor taking service factor of 1.5 and Barth's factor for dynamic loading. Determine factor of safety in pitting. **[8]**

OR

- Q2) a)** Derive expression for Efficiency of Worm & Worm Gear Drive. **[4]**
- 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 transmitted 5 KW power from an electric motor running at 1500 rpm to a machining running at 75 rpm. The service factor is 1.25, while the factor of safety required is 2. The face width of the worm gear is 0.73 times the pitch circle diameter of worm. The worm gear factor is 0.685N/mm^2 , while the diametrical quotient is 10. The normal pressure angle is 14.5° if the coefficient of friction between worm and worm gear teeth is 0.03. Design the gear pair and find power lost. Would you recommend the fan for

P.T.O.

gear box? Assume the permissible temperature rise 50°C. [12]

Use following data

$$\text{Lewis form Factor} = 0.39 - \frac{215}{Z_G}$$

$$\text{Velocity Factor } C_v = \frac{6}{6 + V_G}$$

$$\text{Area of Housing } A = 1.14 \times 10^{-4} X(a)^{1.7} \text{m}^2.$$

where a =centre distance

- Q3)** a) What are the Methods of Pre-stressing of thick cylinder? Explain any one. [6]
- b) An air receiver consists of a cylindrical shell of an internal diameter 1m and length 2m, closed by hemispherical heads. The air pressure inside the vessel is limited to 15 bar. The shell as well as ends are made of plain carbon steel with an ultimate tensile strength of 390N/mm². The Efficiencies of the circumferential and longitudinal welded joint in the vessel shell are 80% and 85% respectively. The efficiency of the welded joints in the hemispherical head is 80%. Determine [12]
- The thickness of the vessel shell;
 - The thickness of the hemispherical head;
 - The storage capacity of the vessel.

OR

- Q4)** a) Explain the various categories of the welded joints used in unfired pressure vessel. [6]
- b) A hydraulic cylinder made of gray cast iron FG300 is subjected to internal pressure 15MPa. If the inner and outer diameter of cylinder are 200mm and 240mm respectively. Determine factor of safety. If the cylinder pressure is further increased by 50%, what will be the factor of safety.[12]

- Q5) a)** Explain the basic principle of DFME. **[4]**
- b) Cantilever beam is made of plain carbon steel 25C8 having the mean yield strength of 280 N/mm² and a standard deviation of 20 N/mm². Determine: **[12]**
- i) The reliability of the beam;
 - ii) The minimum factor of safety available; and
 - iii) The average factor of safety available.

Given that $A_1 = 0.4875$; $A_2 = 0.5$.

Refer following table for the areas below the standard normal distribution.

OR

- Q6) a)** Explain the aesthetic and ergonomics design principle of car steering wheel with a priority sequence. **[8]**
- b) Explain factors to be considered while designing the component for Casting. **[8]**

SECTION - II

- Q7) a)** Explain the procedure to estimate power requirement for belt conveyors. **[6]**
- b) A belt conveyor is to be design to carry the bulk material at the rate 300×10^3 kg/hr with following details: **[12]**
- | | | |
|---|---|----------------------|
| Bulk density of material | = | 800kg/m ³ |
| Angle of response of bulk material | = | 15° |
| Belt speed | = | 10 km/hr |
| Material factor for plies, k_1 | = | 2.0 |
| Belt tension and arc of contact factor, k_2 | = | 63 |
| No. of plies for the belt | = | 4 |

Determine:

- i) The suitable width of the length.
- ii) Diameter of the drive pulley.
- iii) Length of the drive pulley.

OR

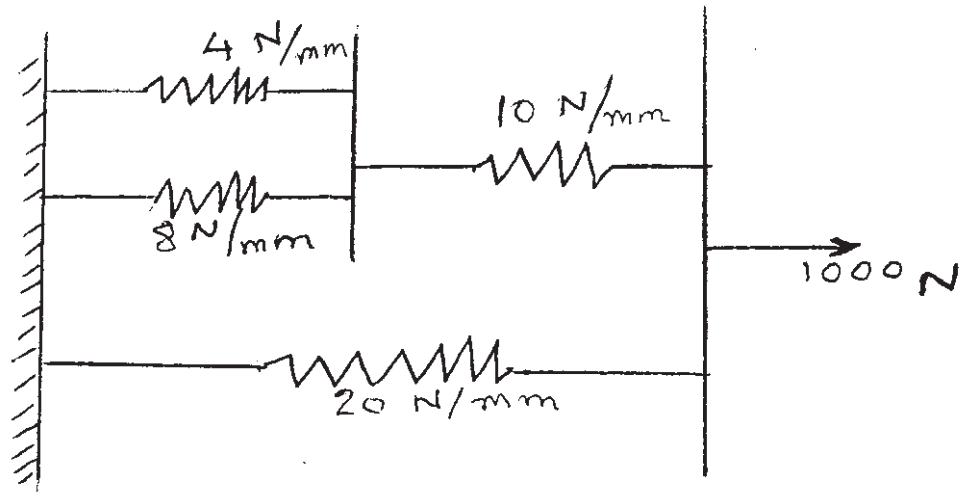
Q8) a) What is adequate design and optimum design? Explain with the suitable example. **[6]**

b) A shaft is to be used to transmit the torque of 1500Nm. The required torsional stiffness of the shaft is 100 Nm/degree, while the factor of safety based on yield strength in shear is 2.0. Using the maximum shear stress theory design the shaft with objective of minimising the weight, out of the following materials: **[12]**

Material	Weight density $w, \text{N/m}^3$	Tensile Yield strength $S_{yt}, \text{N/mm}^2$	Modulus of Rigidity $G, \text{N/mm}^2$
Chromium Steel	77×10^3	420	84×10^3
Plain Carbon Steel	76.5×10^3	230	84×10^3
Titanium Alloy	44×10^3	900	42×10^3
Magnesium Alloy	17.5×10^3	225	15×10^3

Q9) a) Figure below shows a cluster of four springs. One end of the assembly is fixed and a force of 1000N is applied at the end. Using finite element method, Determine: **[8]**

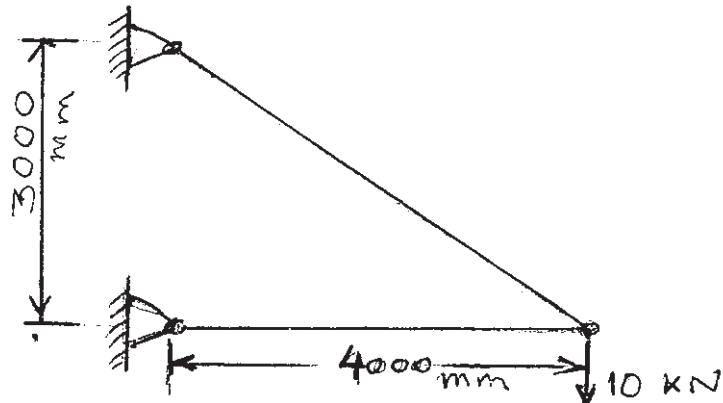
- i) Deflection of each spring.
- ii) The reaction Forces at support.



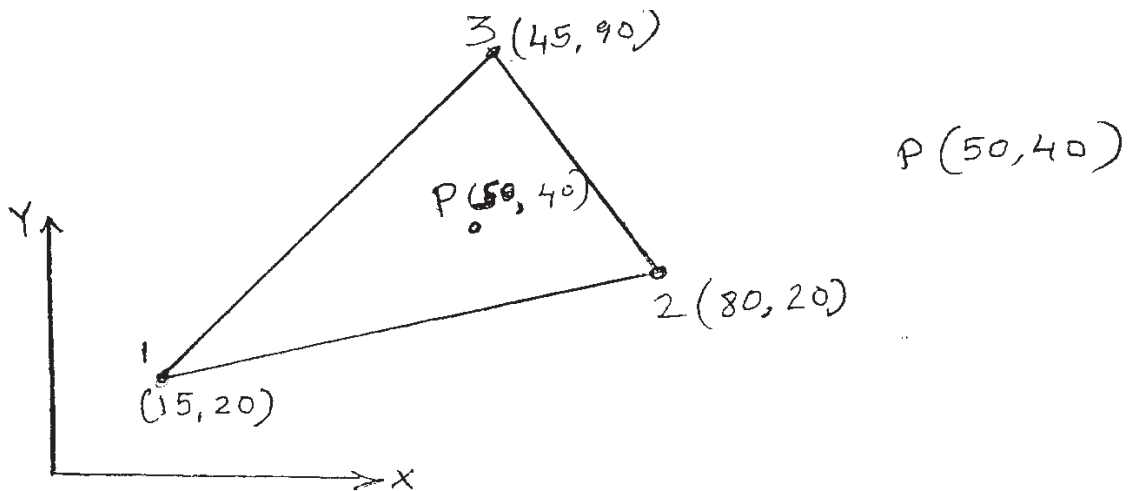
b) Explain the Galerkin approach of element stiffness Matrix. [8]

OR

Q10)a) A two member truss is as shown in figure below. The cross-sectional area of each member is 200 mm^2 and modulus of elasticity is 200 GPa . Determine the deflection, reaction and stresses in each of the members. [8]

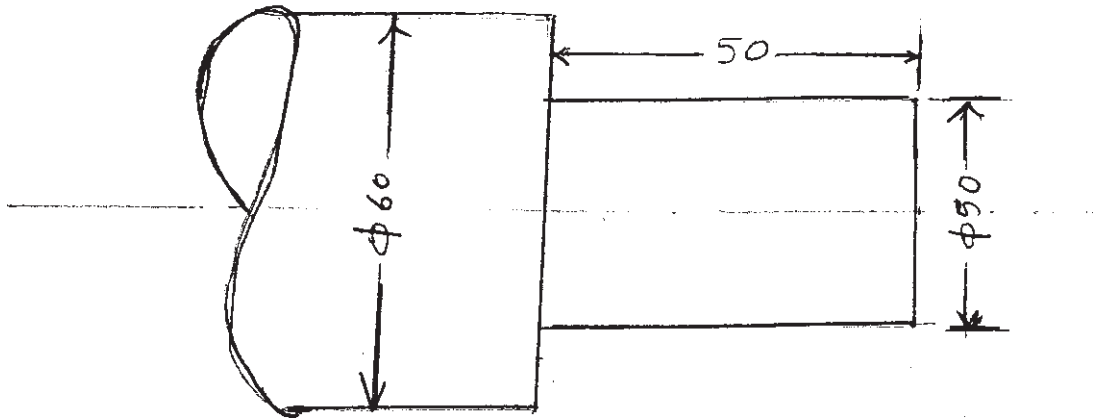


b) Determine shape function N_1 , N_2 and N_3 at the point P for the triangular element as shown in figure below: [8]



Q11)a) Comparison between NC and CNC machines. **[6]**

b) Write a manual part program to finish the stepped shaft in the $\phi 50\text{mm}$ section as shown in figure below. Assume spindle speed as 400rpm and feed rate as 0.5mm/rev. **[10]**



OR

Q12)a) Write major advantages and Disadvantages of computer Integrated Manufacturing (CIM). **[8]**

b) Discuss the significance of Flexibility in Automation system. **[4]**

c) What are the features of FMS layout configurations? **[4]**

<i>z</i>	0	1	2	3	4	5	6	7	8	9
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4208	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998

Q.5 Table

Q.5 Table:

Table 4.2 : Areas Below Standard Normal Distribution Curve from 0 to z

z	0	1	2	3	4	5	6	7	8	9
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0754
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1142
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2258	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2518	0.2549
0.7	0.2580	0.2612	0.2643	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2996	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389

z	0	1	2	3	4	5	6	7	8	9
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

Total No. of Questions : 12]

SEAT No. :

P3329

[4959]-57

[Total No. of Pages : 3

B.E. (Mechanical) (SW)
INDUSTRIAL HYDRAULICS & PNEUMATICS
(2008 Pattern) (402062) (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 logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Classify the types of hydraulic fluids. What are the desirable properties of a hydraulic fluid? [6]
- b) Draw a simple hydraulic circuit, showing all its essential components. State the functions of each component. [6]
- c) Explain following terms related with filters
- i) Beta rating.
 - ii) Absolute rating. [6]

OR

- Q2)** a) Explain sources of contamination in hydraulic system. [6]
- b) What are the materials used in making seal? Discuss the composition, application & design or shape. [6]
- c) Explain the purpose and construction of a good connecting fitting with neat sketch. [6]

P.T.O.

- Q3)** a) Distinguish between positive displacement pumps and non positive displacement pumps. [4]
- b) What are the various efficiency expressions for a pump. [4]
- c) What are the functions of reservoirs? Draw a neat sketch of standard reservoir, showing its internal and external features. [8]

OR

- Q4)** a) Compare characteristics, advantages and applications of gear pumps, vane pumps, axial piston pumps and radial piston pumps. [8]
- b) Explain with sketch the operation of a balanced vane pump. [8]
- Q5)** a) Explain the counter balance valve with a neat sketch, showing its typical application. [8]
- b) Explain with simple circuits the application of accumulator as [8]
- i) Power saving device.
- ii) Hydraulic shock absorber device.

OR

- Q6)** a) Compare the advantages and disadvantages of the three types of flow control methods. [8]
- b) What is a pilot operated check valve? Draw its sketch and explain its typical use. [8]

SECTION - II

- Q7)** a) What is the effect of increasing motor's displacement on speed and torque? What is the effect of decreasing the displacement on speed and torque? [6]
- b) Draw and explain a circuit using standard graphic symbols, in which a hydraulic motor is used in conjunction with a hydraulic cylinder. [10]

OR

- Q8)** a) Write a short note on “Cylinder Mountings” .[8]
b) Explain with neat diagram “Fail safe circuit”. [8]
- Q9)** a) Explain with neat sketch “Pneumatic Clamping Circuit”. .[8]
b) Draw Symbols:- [8]
i) Quick Exhaust valve.
ii) Time Delay Valve.
iii) Twin Pressure Valve.
iv) Shuttle Valve.

OR

- Q10)**a) Write a short note on “Airdryers” and “Types of filters” used in a Pneumatic system. [10]
b) Write a short note “Applications of Pneumatics for Low cost Automation”. [6]
- Q11)**a) Design a “Hydraulic Power unit” for 500 tonne capacity “Hydraulic Press”. [10]
b) Draw a Hydraulic circuit for “Rivetting Application” & Explain its working. [8]

OR

- Q12)**a) Explain with a practical example “Steps Involved in Designing a Hydraulic circuit”. .[9]
b) Explain with a practical example “Steps Involved in Designing a pneumatic circuit”. [9]



Total No. of Questions : 12]

SEAT No. :

P3330

[Total No. of Pages :5

[4959] - 58

B.E. (Mechanical S/W)

REFRIGERATION AND AIR-CONDITIONING

(2008 Pattern) (Elective - II (a))

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.

Note:- Pl provide p-h chart for R-12 along with question paper.

SECTION - I

Unit - I

Q1) Write briefly about

- a) Steam - Jet refrigeration. [5]
- b) Evaporative refrigeration. [5]
- c) Vortex tube. [6]

OR

- Q2)** a) Why there is need of air-conditioning of air crafts at high altitudes where ambient temperatures are very low. [6]
- b) Discuss the different classifications of air-craft refrigeration systems.[10]

Unit - II

- Q3)** a) What are requirements/characteristics of a fluid to be used as a refrigerant. [8]
- b) Write in short.
- i) Montreal Protocol and Kyoto Protocol.
 - ii) Ozone depletion potential (ODP) and Global Warming Potential (GWP). [8]

P.T.O.

OR

- Q4)** a) Discuss the importance of boiling-point and freezing point in selecting the proper refrigerant. [8]
- b) What is the need of recovery re-cycling and re-claiming of refrigerants. [8]

Unit - III

- Q5)** a) Describe with the help of schematic and p - H diagram a multi pressure refrigeration system with two evaporators with two individual compressors and individual expansion valves. Briefly discuss how to determine COP of such a system. [8]
- b) A refrigeration system with R-12 as a refrigerant uses two evaporators of capacities 25 TR at 0°C and 30 TR at -20°C with individual compressors and individual expansion valves. The condenser is maintained at 40°C and liquid refrigerant leaving the condenser is subcooled to 30°C. Exit state of refrigerant at each evaporator is dry-saturated. Draw the arrangement and p - H diagram of the system. Find the power required and overall COP of the system. Refer to p - H chart for R - 12 properties. [10]

OR

- Q6)** a) Explain Electrolux refrigeration system. How the system is operated to obtain different pressures in the cycle without a pump? [6]
- b) Compare the vapour compression system with vapour absorption refrigeration system. [6]
- c) Describe with a neat sketch the working of practical vapour-absorption system. [6]

SECTION - II

Unit - IV

- Q7)** a) What do you understand by **[10]**
- i) All air - system
 - ii) All water - system
 - iii) Air - Water system
 - iv) Infiltration and ventilation load as applied to air-conditions.
- b) Define following terms. **[8]**
- i) Sensible Heat factor.
 - ii) Room sensible heat factor.
 - iii) Gross sensible heat factor.
 - iv) Apparatus Dew-Point temperature.

OR

- Q8)** a) What equipments are used in Air-conditioning systems? Explain any one of these equipments used. **[8]**
- b) Differentiate clearly between **[10]**
- i) Unitary and Central Air-conditioning systems.
 - ii) Industrial and automobile air-conditioning systems.

Unit - V

- Q9)** a) What quantities you require to control, in refrigeration systems? Explain. **[8]**
- b) What are the different elements of control used in air-conditioning systems? How the bi-metal control works? **[8]**

OR

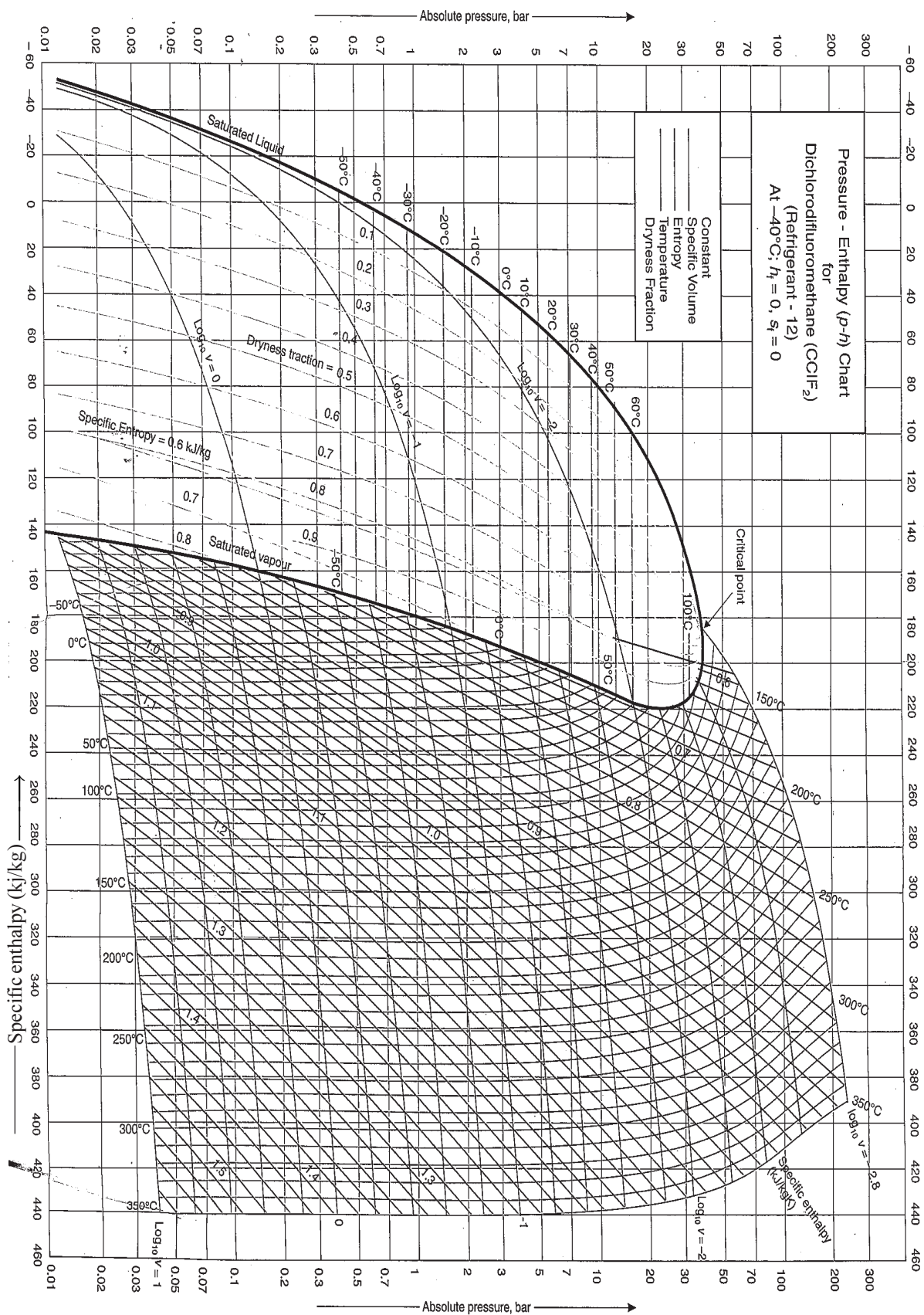
- Q10)a)** What are the objectives of duct designing? Explain static regain method of duct designing giving its advantages and disadvantages. [8]
- b) What are the desirable properties of an ideal duct material? Name some commonly used duct materials. [4]
- c) Prove that the equivalent circular diameter of a rectangular duct is given by $D=1.265 \left[\frac{(ab)^3}{a+b} \right]^{0.2}$ with usual notations. [4]

Unit - VI

- Q11)a)** What is an enzyme? In what manner an enzyme spoils the foods? Explain. [8]
- b) Write briefly about the cold storage. What different types of these storages can be used. [8]

OR

- Q12)a)** Why a vapour-compression refrigeration system is not used for producing low temperatures? [8]
- b) Explain with neat sketch the process of liquefaction of Helium. Where this liquid helium is used? [8]



XXXX

Total No. of Questions :12]

SEAT No. :

P3331

[4959]-59

[Total No. of Pages :3

b:B.E. (Mechanical / Sandwich)
COMPUTATIONAL FLUID DYNAMICS
(2008 Pattern) (Semester -I) (402063) (Elective -II)

Time : 3 Hours]

[Max. Marks :100

Instructions to 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) Explain computational domain versus physical domain. **[10]**
- b) Write energy equation in differential form considering first law of thermodynamics. **[6]**

OR

- Q2)** a) How is CFD being used in the biomedical device design and electronics industry? **[8]**
- b) Explain physical significance of the force on a fluid element by Newton's second law. **[8]**

- Q3)** a) Considering finite difference approach, write equation of first order forward, central and rearward, difference. **[8]**
- b) Given the function $f(x) = 0.35x^2$; find the first derivative of $f(x)$ at $x=2$; using forward backward and central differencing of order (Δx) . Use a step size of $\Delta x=0.1$. **[8]**

OR

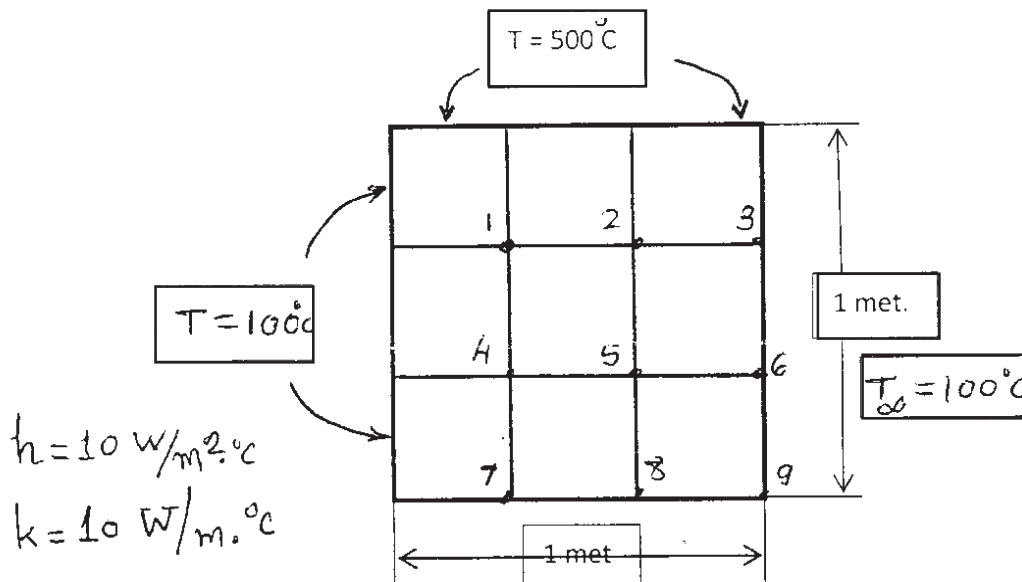
P.T.O.

- Q4) a)** Explain Crank Nicholson method of finite difference analysis. [10]
- b) What are the main advantages and disadvantages of discretization of the governing equations through finite difference analysis? [6]

- Q5) a)** Explain the significance of selecting boundary conditions citing Dirichlet and Neuman type of boundary conditions. [6]
- b) The temperature distribution at a certain time instant through a 50 cm thick wall is given as $T = 300 - 500X + 100X^2 + 140X^3$; where temperature t is in degree Celsius and the distance x in meters has been measured from the surface. If thermal conductivity of the wall material is 20 kJ/m-hr-degree, calculate the heat energy stored per unit area of the wall. [12]

OR

- Q6) a)** For two dimension transient heat conduction, explain Alternating Direction Implicit scheme. [8]
- b) Consider 1 met. Square plate shown below in Fig. 6 (B). The left face is maintained at 100°C and the top face at 500°C , while the other two faces are exposed to environment at 100°C . Compute the temperature of the various nodes as indicated. [10]



SECTION -II

Q7) Explain steady convection-diffusion process with suitable examples. [16]

OR

Q8) a) Explain advantages and disadvantages of the explicit and implicit finite difference approach [8]

b) What are different sources of error generated from numerical solution? Explain their correlation. [8]

Q9) a) Explain stretched (Compressed) grids considering physical and computation plane. [8]

b) How accuracy and convergence is affected for coarse and fine grid [8]

OR

Q10)a) Considering the steps of SIMPLE algorithm, justify the need for this algorithm. [8]

b) Explain the concept of artificial viscosity in numerical solution. [8]

Q11)a) What is the Neumann boundary condition? Explain how is it used as an outlet boundary condition.. [9]

b) Explain corrector step in the McCormack techniques. [9]

OR

Q12) Write short notes on any two: [18]

a) Numerical dissipation.

b) Lax-Wendroff technique

c) Finite difference and Finite volume method: compare and contrast.



Total No. of Questions : 12]

SEAT No. :

P3297

[Total No. of Pages : 3

[4959]-6

B.E. (Civil Engineering) (Semester - I)
AIR POLLUTION & CONTROL (Elective - I)
(2008 Pattern)

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) *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, electronics pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain in brief types of plume behaviour. [10]
b) Explain in detail about effects of air pollution on human health. [8]

OR

- Q2)** a) Write short note on zones of atmosphere and temperature lapse rate. [10]
b) Determine the effective height of stack for the given data. [8]
i) Physical stack is 203m tall with 1.07 m inside diameter.
ii) Wind velocity is 3.56 m/s.
iii) Air temperature is 14° C.
iv) Barometric pressure is 1000 millibars.
v) Stack gas velocity is 10 m/s.
vi) Stack gas temperature is 150° C.

P.T.O.

- Q3)** a) Explain in detail about air pollution survey in detail. [10]
b) State devices used for sampling and explain about duration of sampling period. [6]

OR

- Q4)** a) What principles should be followed for correct sampling and write about basic consideration of air sampling? [10]
b) Explain in brief about location of sampling sites. [6]

- Q5)** a) Explain about indoor air pollution, effects and causes of it. [10]
b) Explain in detail about control of indoor air pollution. [6]

OR

- Q6)** a) Explain in detail about the methods which may be employed alone or in various combination to eliminate or diminish odour. [10]
b) What are the sources and effects of odours on environment? [6]

SECTION - II

- Q7)** a) Enlist control devices for particulate contaminants and explain working of any two in detail? [10]
b) Write short note on control of air pollution from automobiles. [8]

OR

- Q8)** a) State major treatment processes available for control of gaseous pollutants and explain adsorption and absorption process in detail to control gaseous pollutants. [10]
b) Explain in brief control of air pollution by process modification, substitution of fuel and by changes in operational practices. [8]

- Q9)** Explain in brief about : [16]
a) Air Pollution Act 1981
b) Environment Protection Act 1986

OR

- Q10)** a) Write short note on National Ambient Air Quality Standards. [8]
b) Explain about emission standards in relation to mobile sources and stationary sources. [8]

Q11) a) Explain methodology for preparing environmental impact assessment. [8]

b) Explain role of regulatory agencies and control boards in obtaining environmental clearance for project. [8]

OR

Q12) a) Write short note on role of general public in environmental clearance.[8]

b) Explain environmental impacts of water resources projects in India.[8]



Total No. of Questions :12]

SEAT No. :

P3332

[4959]-60

[Total No. of Pages :5

**B.E. (Mechanical -Sandwich)
FINITE ELEMENT METHOD**

(2008 Pattern) (Elective -II) (Semester -I) (402063 C)

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 and Q.9 or Q.10 Q.11 or Q12 from Section-II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Draw Neat diagrams wherever necessary.*
- 4) *Assume suitable data where ever necessary*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of calculator is allowed.*

SECTION -I

- Q1)** a) Explain steps in FEM. Explain advantages and disadvantages of FEM over other methods. **[8]**
- b) What are the shape functions? Derive the shape functions for a linear spring element of length L. Use direct equilibrium approach. **[8]**

OR

- Q2)** a) Write short note on (Any 2) **[8]**
- i) Finite Difference method.
 - ii) Finite Volume method.
 - iii) Sources of errors in FEM.
- b) A system of spring as shown in fig 2b. Using Finite element method, determine **[8]**

P.T.O.

- i) The Stiffness matrix of each element.
- ii) The Global stiffness matrix.
- iii) The Deflection of each spring.
- iv) The reaction force at support.

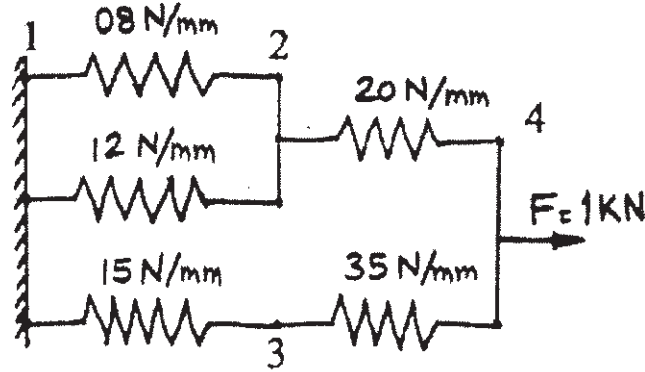


Fig. 2b

- Q3) a)** Explain the potential energy approach and Galerkin approach [8]
- b)** Consider the bar as shown in fig 3b. An axial load of $P = 300 \times 10^3$ N is applied as shown. Determine. [10]
- i) Stiffness matrix of each element.
 - ii) Global stiffness matrix.
 - iii) Nodal Displacements.
 - iv) Stresses in each element.
 - v) Reaction forces.

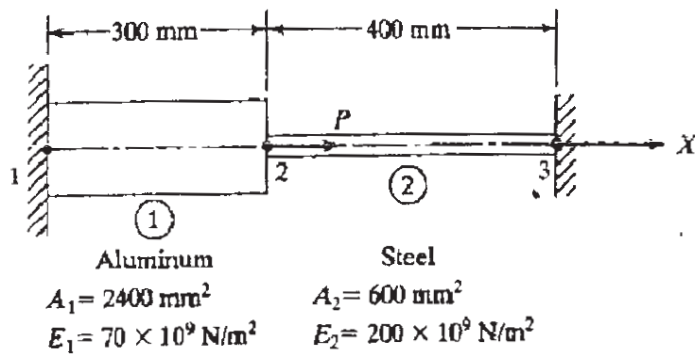


Fig. 3b

OR

- Q4) a)** The two bar truss made of steel ($E = 70$ GPa) is subjected to the vertical force of 12000N as shown in the fig. 4a The cross-sectional area is 200 mm^2 for each element. Using finite element method, determine. [10]

- i) Stiffness matrix for each element.
- ii) Global stiffness matrix
- iii) Nodal displacement
- iv) Stresses in each element.
- v) The reaction forces at the support.

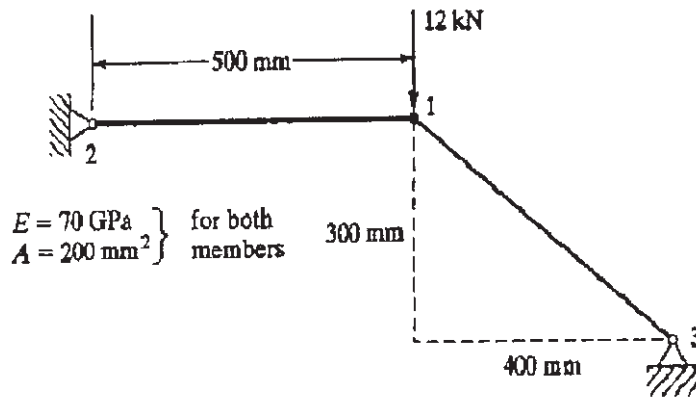


Fig. 4a

- b) Write short note on (any two). [8]
 - a) Quadratic shape function.
 - b) Symmetric truss.
 - c) Discretization.

Q5) a) What is an isoparametric Representation. What is CST element? [6]

- b) In a CST element, the node 1,2 and 3 have the Cartesian coordinates (0,0),(10,0) and (5,8) respectively. The temperatures, in degree Celsius, at nodes 1,2 and 3 are 100,200 and 300 respectively. For a point P(5,6) within the element, determine: [10]

- i) The natural coordinates.
- ii) Shape functions.
- iii) Temperature.

OR

Q6) a) Explain the concept of Plane stress and Plane strain in finite element Method. [6]

b) For the triangular element as shown in fig. the deflection at point 1,2 and 3 are 0.2mm, 0.15 mm, 0.45mm respectively. For point p (250,100) within the element, determine: [10]

i) The natural coordinates.

ii) The shape functions.

iii) The Deflection.

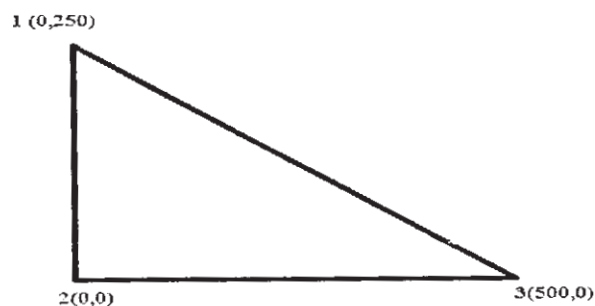


Fig. 6b

SECTION - II

Q7) a) Given a beam with fixed support at left end. $L=1000\text{cm}$ $E=20 \times 10^6 \text{ N/cm}^2$, $I=2509\text{cm}^4$. Determine local k 's and then global K and then displacement and slopes at each node. [10]

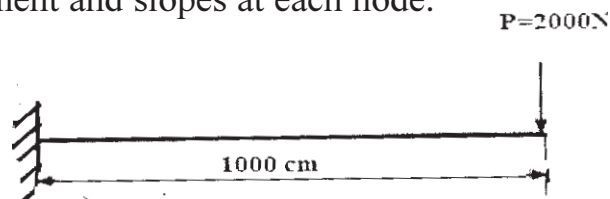


Fig. 7a

b) Explain potential energy approach to derive beam element equations. [6]

OR

- Q8)** a) Derive stiffness matrix of beam element. [10]
b) Explain how to convert distributed load on frame into nodal loads. [6]

Q9) A metallic fin, with thermal conductivity $360 \text{ W/m}^\circ\text{K}$, 0.1 cm thick and 10 cm long extends from a plane wall whose temperature is 235°C . Determine the temperature distribution along the fin if heat is transferred to ambient air at 20°C with heat transfer coefficient of $9 \text{ W/m}^2^\circ\text{K}$. Take width of the fin as 1 m . [16]

OR

- Q10)a)** Write short note on (Any two) [8]
i) One dimensional heat conduction analysis.
ii) Two dimensional heat conduction analysis.
iii) Point sources in heat transfer problems.
b) Formulate the one dimensional Heat transfer equations. [8]

- Q11)a)** Explain Pre and Post processing. [6]
b) Explain in brief static and dynamic analysis. [6]
c) Explain crash analysis. What is the necessity of crash analysis? [6]

OR

- Q12)** Write short notes on (Any Three). [18]
a) NVH analysis.
b) Types of Nonlinearities.
c) Quality checks in meshing.
d) Modal Analysis.



Total No. of Questions : 12]

SEAT No. :

P3333

[4959]-61

[Total No. of Pages : 3

**B.E.(Mechanical Sandwich)
AUTOMOBILE ENGINEERING
(2008Course) (Semester-I)(Elective-III) (402064A)**

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 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 vehicle layouts and list one example of each. **[8]**

b) What are the various resistances to motion of vehicle? How does these resistances affect power required by vehicle? **[8]**

OR

Q2) a) Discuss constructional details of Automotive chassis system. **[8]**

b) Explain with sketch the following layouts and also include advantages and disadvantages. **[8]**

i) Four wheel Drive

ii) Rear Engine and Rear wheel Drive.

Q3) a) What is the purpose of clutch plate? Explain with sketch kinds of clutch plates used in automobile. Explain function of various components of it. **[8]**

b) Compare synchromesh gear box with constant mesh gear box. Explain the purpose of synchronizer and its operation in a gear box. **[8]**

OR

Q4) a) Explain with neat sketch **[8]**

i) Semi floating rear axle

ii) Full floating rear axle.

P.T.O.

b) Write note on any two from following: [8]

i) Tractive Effort,

ii) Performance Curve

iii) Power required for acceleration and gradability

iv) Selection of gear ratio

Q5) a) Draw a schematic diagram showing the layout of pneumatic suspension system and explain its working with advantages and disadvantages. [10]

b) What are different factors contributing to A.C. load in Cars? [8]

OR

Q6) a) What do you understand from terms: Center point steering, cornering Force slip Angle and scrub Radius? [8]

b) Classify Brakes and Discuss operation of any two types of Brake. [10]

SECTION-II

Q7) a) Explain following systems in view of vehicle maintenance [8]

i) Cooling Systems

ii) Lubrication Systems

iii) Brake Systems

iv) Petrol and Diesel Systems.

b) List out common steering troubles, their possible causes and remedies. [8]

OR

Q8) a) How vehicle tyres can be maintained, serviced and reconditioned. [8]

b) List out common suspension troubles, their possible causes and remedies. [8]

Q9) a) Justify importance of ergonomics in automotive safety. [8]

b) Enlist all kinds of lighting systems in vehicle with their necessity in vehicle. [10]

Q10) a) What is Adaptive Front Lighting system (AFLS)? Explain its necessity and working. [8]

b) Sketch various types of body structures used in automobiles. Describe importance of vehicle structure regards to crashworthiness of it [10]

Q11) a) Explain various microprocessor applications in today's automobile. [8]

b) Explain with the help of block diagram the electronic engine control system used in automobile. [8]

OR

Q12) a) Explain in detail electronic antilock braking system. [8]

b) Write short note on the following (any two): [8]

i) Warning Devices

ii) Stepper motor-relays

iii) Digital Cruise Control

iv) Digital Engine Control System.



Total No. of Questions : 12]

SEAT No. :

P3334

[4959]-62

[Total No. of Pages : 7

**B.E. (Mechanical-Sandwich)
OPERATIONS RESEARCH**

(2008 Course) (Semester - I) (Elective -III) (Theory) (402064-B)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Two separate answer books are used for Section I and Section II.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is permitted.*
- 5) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Define following terms of Linear Programming: Basic Solution, Feasible Solution and Artificial Variables. **[6]**

b) Solve LPP by Suitable Method **[12]**

Maximize:

$$Z = 100X_1 + 60X_2 + 40X_3$$

Subject to:

$$X_1 + X_2 + X_3 \leq 100$$

$$10X_1 + 4X_2 + 5X_3 \leq 600$$

$$2X_1 + 2X_2 + 6X_3 \leq 300$$

Where, $X_1, X_2, X_3 \geq 0$

OR

P.T.O.

- Q2) a)** What is optimization? Explain various applications of linear programming. [6]
- b) A firm manufactures three products S_1 , S_2 and S_3 on which the profits earned are Rs. 2, Rs. 5 and Rs. 4 respectively. Each product need two types of raw materials R_1 and R_2 which the firm can purchase up to a maximum of 500 and 400 units respectively. Design production plan so as to maximize the profit. [12]

Raw Material	Consumption of raw materials per unit product		
	S_1	S_2	S_3
R_1	0.5	1	1
R_2	2	0.5	0.5

- Q3) a)** What is balanced and unbalanced transportation problem? How unbalanced problems solved? [6]
- b) Solve the following Transportation problem involving three sources and three destinations. The cell entries represent the cost of transportation per unit. Obtain the initial solution by VAM method and find optimal solution by MODI method. [10]

		Destinations			
		1	2	3	Supply
Sources	1	1	4	8	10
	2	7	2	3	20
	3	5	4	2	15
Demand		23	12	10	

OR

Q4) a) Explain Hungarian Method to solve assignment problems. [6]

b) Five jobs are to be assigned to 5 machines to minimize the total time required to process the jobs on machines. The time is in hours for processing each job on each machine is given in the following matrix. Make assignment of jobs to machines so that total assignment cost should be reduced. [10]

		Machines				
		A	B	C	D	E
Jobs	1	2	4	3	5	4
	2	7	4	6	8	4
	3	2	9	8	10	4
	4	8	6	12	7	4
	5	2	8	5	8	8

Q5) a) Explain the break even chart. [6]

b) The annual demand of parts is 3200. The unit cost is Rs. 6 and inventory carrying charges are estimated as 25% per annum. If the cost per procurement is Rs. 150 find: [10]

- i) Economic order quantity
- ii) Time between two consecutive orders.
- iii) Number of orders per year.
- iv) The optimum cost.

OR

Q6) a) What is dynamic programming? Explain detailed procedures to solve problems of dynamic programming. [6]

b) We have five jobs, each of which must go through A, B and C. Processing times (in hours) are given in the following table: [10]

Machines	JOBS						
	1	2	3	4	5	6	7
A	3	8	7	4	9	8	7
B	4	3	2	5	1	4	3
C	6	7	5	11	5	6	12

Determine the optimal sequence of jobs that minimizes the total elapsed time. Also find the idle time for machines A, B and C.

SECTION - II

- Q7)** a) What are the situations which make replacement of items necessary? [6]
- b) Obtain the optimal strategies for both persons and the value of game for two person zero sum game whose pay off matrix is as follows (Use graphical Method) [12]

		Player B	
		B1	B2
Player A	A1	1	-3
	A2	3	5
	A3	-1	6
	A4	4	1
	A5	2	2
	A6	-5	0

OR

- Q8)** a) Explain the graphical method of solving 2 X n or m X 2 games. [6]
- b) Machine A costs Rs. 45,000 and its operating costs are estimated to be Rs. 1000 for the first year and then increasing by Rs. 10,000 every subsequent year. Machine B costs Rs. 50,000 and operating costs are Rs. 2,000 for the first year and then increasing by Rs. 4,000 every subsequent year. If at present we have a machine A, should we replace it with machine B? if so when? Assume both the machines have no resale value and their future costs are not discounted. [12]

Q9) a) What is the need of simulation? How can you use simulation to solve industrial problems? Discuss with example. [6]

b) A Warehouse has only one loading dock manned by three person crew. Trucks arrive at the loading doc at average rate of 4 trucks per hour and the arrival rate is Poisson distributed. The loading of the trucks 10 minute in average and can be assumed to be exponentially distributed. The operating cost of the truck is Rs. 20 per hour and the members of the loading crew are paid Rs 6 each per hour. What you advise the truck owner to add another crew of three persons? [10]

OR

Q10)a) Derive different equations for the queuing model $\{(M/M/1) : (\infty/FCFS)\}$ [6]

b) A firm has a single channel service station with the following arrival and service time distribution: [10]

Inter arrival Time (Minutes)	Probability
10	0.10
15	0.25
20	0.30
25	0.25
30	0.10

Service Time (Minutes)	Probability
5	0.08
10	0.14
15	0.18
20	0.24
25	0.22
30	0.14

The customers arrival at service station is a random phenomenon. And the time between arrival varies between 10 to 30 minutes. The service time varies from 5 minutes to 30 minutes. The queuing process begins at 10 am and proceeds for nearly 8 hours. The arrival goes to the service facility if it is free. The queue discipline is FCFS. If the attendant wages are Rs. 10 per hour and the customer waiting time costs Rs. 15 per hour, then what would be the proposition to engage the second attendant? Answer using Monte Carlo simulation method.

Use following random numbers

for interarrival time : 20,73,30,99,66,83,32,75,04,15,29,62,37,68,94 and

for service times :26,43,98,87,58,90,84,60,08,50,37,42,28,84,65.

Q11)a) Explain the rules devised by Fulkerson. **[4]**

b) Estimated time for the jobs of a project are given below

Job	A	B	C	D	E	F	G	H	I	J	K	L
Time (Weeks)	13	5	8	10	9	7	7	12	8	9	4	17

The constraints governing the job are

A & B are start jobs; A controls C, D & E; B controls F & J; G depends on C; H depends on D; E & F controls I & K; K follows J; L is also controlled by K; G,H,I & L are the last jobs. Draw the network, determine float for each activity, project duration and the critical path. **[12]**

OR

Q12) Construct a PERT network from the following information **[16]**

Job	A	B	C	D	E	F	G	H	I	J	K	L
Optimistic Time	1	2	2	6	4	6	8	12	4	10	2	6
Most likely Time	2	4	6	8	6	10	10	14	8	12	4	10
Pessimistic Time	3	6	10	10	8	14	12	16	12	14	6	14
Immediate predecessors	--	A	A	B	C	C	E	F	G,H	G,H	I	J

- a) Construct the network and find critical path
- b) Assume that the schedule allows 50 days to complete the project, calculate the probability of completion by the scheduled date
- c) Contractor wants scheduled completion date that will give him 98% chance of completing the project, how many days should be allowed in his schedule.

Use $z = 2.09$ for $\psi(z) = 0.98$

z	1.57	1.58	1.59	1.60	1.61
$\psi(z)$	0.9418	0.9429	0.9441	0.9452	0.9463

x x x

Total No. of Questions : 12]

SEAT No. :

P3335

[4959]-63

[Total No. of Pages : 2

B.E.(Mechanical -Sandwich)

ROBOTICS

(2008Course) (Part-II)(Elective-III)(Semester-I)

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 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) Define a robot and state its related three laws. **[8]**

b) Give classification of robot in detail. **[8]**

OR

Q2) a) Explain the anatomy of a robot. **[8]**

b) What are the socio economic aspects of robotisation. **[8]**

Q3) a) Which sensor can be used along with the gripper to sense whether the object is falling? Explain the working principle. **[8]**

b) Explain the criteria for gripper design. **[8]**

OR

Q4) a) Discuss in brief “classification of grippers used in robotics”. **[8]**

b) Discuss the various characteristics of sensing devices used in industrial robot. **[8]**

Q5) a) Explain different types of controllers used in industrial robots. **[8]**

b) A revolute joint in a PTP robot moving with velocity of 15 deg/sec traverses from an initial position of 15°. Determine the position and velocity of the joint at the end of each second and plot the results. The range of initial and final position is covered in 5 seconds with a finite acceleration of 6 deg/sec². **[10]**

OR

P.T.O.

- Q6)** a) What is point-to-point and continuous path planning? Enlist at least two applications for each. [8]
- b) Explain types of control systems used in present industrial robots. [10]

SECTION-II

- Q7)** a) The coordinates of a point q_{abc} is given by $[7 \ 5 \ 3]^T$ which is rotated about the OX- axis of the reference frame OXYZ by an angle of 60° . Determine the coordinates of the point q_{xyz} ? [10]
- b) Explain the procedure for Denavit- Hartenberg parameters representation. [8]

OR

- Q8)** a) A mobile body reference frame OABC is rotated about 60° about OY-axis of reference frame OXYZ. If $P_{xyz} = [2 \ 4 \ 6]^T$ and $Q_{xyz} = [3 \ 5 \ 7]^T$ are the coordinates with respect to OXYZ plane, what are the corresponding coordinates of P and Q with respect to OABC frame? [10]
- b) Explain the terms: [8]
- i) Direct kinematics
 - ii) Indirect kinematics

- Q9)** a) Explain different types of motion transmission elements with its advantages and disadvantages. [8]
- b) Write short note on Edge detection. [8]

OR

- Q10)** a) Explain need of solid modeling techniques for robots using simulating software. [6]
- b) Explain various Image processing Techniques. [10]
- Q11)** a) Explain the walk through programming technique. [8]
- b) Write in brief about AI techniques. [8]

OR

- Q12)** a) Explain the lead through programming technique. [8]
- b) What is the need of Artificial Intelligence and give its application. [8]



Total No. of Questions : 12]

SEAT No. :

P3336

[4959]-64

[Total No. of Pages :5

B.E.(Mechanical S/W)

**a: COSTING AND COST CONTROL
(2008 Course)(Semester-II)(Elective-IV)**

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 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 accounting. **[8]**

b) Differentiate between financial accounting & cost accounting. **[8]**

OR

Q2) a) Calculate the prime cost, factory cost, cost of production cost of sales and profit from the following particulars: **[8]**

	Rs.		Rs.
Direct Materials	2,00,000	Office stationary	1000
Direct wages	50,000	Telephone charges	250
Direct expenses	10,000	Postage and telegrams	500
Wages of foreman	5,000	Salesmen's salaries	2500
Electric power	1,000	Travelling expenses	1,000
Lighting Factory	3,000	Repairs and renewal plant	7,000
office	1,000	Office premises	1,000
Storekeeper's/wages	2,000	Carriages outward	750
Oil and water	1,000	Transfer to reserves	1,000

P.T.O.

Rent: Factory	10,000	Discount on shares written off	1,000
:Office	5,000	Advertising	2,500
Depreciation Plant	1,000	Warehouse charge	1,000
Office	2,500	Sales	3,79,000
Consumable store	5,000	Income tax	20,000
Managers salary	10,000	Dividend	4,000
Directors fees	2,500		

b) State the explain limitations of financial accounting? [8]

Q3) a) Explain the different methods of costing used in manufacturing industries. [8]

b) Explain the detail various parameters used for classification of costs?[8]

OR

Q4) a) What do you understand by direct expenses? What are the characteristics [4]

b) Are direct expenses more important than indirect expenses? Explain [4]

c) Define and explain in details the following with suitable examples [8]

Manufacturing overheads

Indirect labour cost

Sales and distribution overhead

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 per day basic plus D.A. @ 120% of basic. He is allowed to take 30 minutes off during his hours shift for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to: [8]

Job X 15 hrs.

Job Y 12hrs.

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 workers for the week ?

- b) State the method of allocation of administration overhead to cost centers or products. [10]

OR

- Q6)** A company has three production departments (M1, M2 and A1) and three service departments, one of which Engineering services department, servicing the M1 and M2 only. The relevant information is as follows: [18]

Production department	Product X	Product Y
M1	10 Machine hours	6 Machine hours
M2	4 Machine hours	14 Machine hours
A1	14 Direct Labour hours	18 Direct Labour hours

The annual budgeted overhead cost for the year are

Production Department	Indirect Wages (Rs.)	Consumable Supplier (Rs.)
M1	46,520	12,600
M2	41,340	18,200
A1	16,220	4,200
Stores	8,200	2,800
Engineering Service	5,340	4,200
General Service	7,520	3,200

Depreciation on Machinery (Rs.) 39,600

Insurance of Machinery (Rs.) 7,200

Insurance of Building (Rs.) 3,240

(Total building insurance cost for M1 is one third of annual premium)

Power (Rs.) 6,480

Light (Rs.) 5,400

Rent (Rs.) 12,675

(The general service deptt. Is located in a building owned by the company)

It is valued at Rs.6,000 and is charged into cost at notional value of 8% per annum. This cost is additional to the rent shown above)

The value of issues of materials to the production departments are in the same proportion as shown above for the consumable supplies.

The following data are also available:

Department	Book value Machinery (Rs.)	Area (Sq.ft)	Effective H.O Hours	Production Direct Labour Hours	Capacity Machine hour
M1	1,20,000	5,000	50	2,00,000	40,000
M2	90,000	6,000	30	1,50,000	50,000
A1	30,000	8,000	05	3,00,000	
Stores	12,000	2,000	-		
Engineering Service	36,000	2,500	10		
General service	12,000	1,500	-		

- i) Prepare a overhead analysis sheet, showing the bases of apportionment of overhead to departments.
- ii) Allocate service department overhead to production department ignoring the apportionment of service department cost among service departments.
- iii) Calculate suitable overhead absorption rate for the productions.
- iv) Calculate the overheads to be absorbed by two products, X and Y.

SECTION-II

Q7) a) A coking manufacturing company produces the following products by using 5,000 tonnes of coal @ Rs.15 Per tonne into a common process. **[8]**

Coke 3,500

Tar 1,200 tonnes

Sulphate of ammonia 52 tonnes

Benzol 48 tonnes

Apportion the joint cost amongst the products on the basis of the physical unit method

- b) Find out the cost of joint products A and B using contribution margin method from the following data: [8]

Sales

Product A: 100kg @ Rs.60per kg

Product B: 120Kg @ Rs.30 per kg

Joint costs

Marginal cost Rs. 4,400

Fixed cost Rs. 3,900

OR

- Q8)** a) Discuss the distinguishing features of process cost system. [8]

- b) What are the methods of apportioning joint costs? Explain any one in brief. [8]

- Q9)** a) A manufacturing company incurs fixed costs of Rs.3,00,000 per annum. It is a single product company with annual sales budgeted to be 70,000 units at a sales price of Rs.300 per unit. Variable costs are Rs. 285 per unit.

- i) Draw a point volume graph, and use it to determine the breakeven point. [8]

- b) State the limitations of breakeven analysis. [8]

OR

- Q10)**a) Explain the concept of contribution and contribution to sales ratio in marginal costing. [8]

- b) Difference between absorption costing and marginal costing. [8]

- Q11)**a) State the basis of standard costing. [9]

- b) State the need for standard costs [9]

OR

- Q12)** Write a short note (any two) [18]

- a) Controllable and uncontrollable variances
b) Techniques of marginal costing
c) Types of standards in standard costing



Total No. of Questions : 12]

SEAT No. :

P3337

[4959]-66

[Total No. of Pages :2

B.E.(Mechanical Sandwich)

c:ENERGY MANAGEMENT AND INDUSTRIAL POLLUTION

(2008 Course)(Semester-II) (Elective-IV) (402066)(Theory)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 or Q10 ,Q 11 or Q 12.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Discuss environmental impacts due to conventional energy use. Explain the current energy scenario in India. **[9]**

b) Discuss energy security and energy strategy for the future of the nation.**[9]**

OR

Q2) a) What are different types of Electric Motors? Explain in detail the energy efficiency improvements in energy efficient motors . **[9]**

b) Explain the concept of **[9]**

i) power factor improvement

ii) maximum demand control

Q3) a) With suitable examples,explain the concept of fuel substitution. **[8]**

b) Explain in detail methodology for conducting detailed energy audit. **[8]**

OR

Q4) a) Discuss the various financial analysis techniques for investments in energy efficiency projects. **[8]**

b) A cogeneration system installation is expected to reduce an annual company's bill by Rs.20 Lacks. If the capital cost of the new cogeneration installation is Rs.60 Lacks & Rs.5 Lacks per year on an average required maintaining & operating plant. Calculate simple payback period & % return on Investment(%ROI). What is the future value of Rs.1000/- after 3 years if the interest rate is 10%? **[8]**

P.T.O.

- Q5) a)** Explain the opportunities for improving energy efficiency in HVAC systems. [8]
b) Write short note on Economic thickness of insulation. [8]

OR

- Q6) a)** How energy conservation is possible in pumping systems? [8]
b) State the function of steam trap. Explain the working of any one type of steam trap. [8]

SECTION-II

- Q7) a)** Write a note on Man, machine and Environment. [9]
b) Discuss the concept of Emission Trading and clean Development Mechanism. [9]

OR

- Q8) a)** Discuss Ozone layer depletion and Global warming environmental problems. [10]
b) Write short note on Fossil fuel related pollutants. [8]
Q9) a) What are the sources of water pollution and air pollution with reference to industrial pollution? [10]
b) Explain in short, different air quality control techniques? [6]

OR

- Q10) a)** Write short notes on. [10]
i) Noise Pollution
ii) Water pollution laws and standards
b) Write a short note on waste water treatment. [6]

- Q11) a)** Write a note on waste minimization techniques. [8]
b) What are the direct and indirect benefits of waste heat recovery? [8]

OR

- Q12) a)** What do you understand by Environmental Impact Assessment? [8]
b) Explain the concept of cogeneration with suitable example. [8]



Total No. of Questions : 12]

SEAT No. :

P3338

[4959]-67

[Total No. of Pages : 3

B.E. (Electrical)

**PLC AND SCADA APPLICATIONS
(2008 Course) (Semester - I) (403141)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Define PLC and explain how it is helpful in automated process. [6]
b) Explain Output module in detail. [6]
c) State some applications of PLC. [6]

OR

- Q2)** a) Draw and explain the main block diagram of PLC. [9]
b) State and explain advantages and disadvantages of PLC in detail. [9]
- Q3)** a) Explain the rules for constructing the ladder diagram. [8]
b) Draw the ladder diagram for the following function table. [8]

Inputs-I1,I2

Outputs-Q1, Q2

I1	I2	Q1	Q2
0	0	1	0
0	1	0	1
1	0	0	1
1	1	1	0

OR

P.T.O.

- Q4)** a) Explain different types of timers. [8]
b) Explain Input ON/OFF and analog devices in detail. [8]

- Q5)** a) Explain PID control using PLC. [8]
b) What is tuning of PID? Explain in detail. [8]

OR

- Q6)** a) Draw and explain AC motor starter. [8]
b) Explain speed control of DC motor with DC source. [8]

SECTION - II

- Q7)** a) Define SCADA and explain its architecture with neat diagram. [8]
b) State advantages and disadvantages of SCADA system. [8]

OR

- Q8)** a) Define and Explain [8]
i) HMI ii) MTU
iii) RTU iv) SCADA
b) Explain SCADA data transfer through PLCC. [8]

- Q9)** a) Explain SCADA system functional architecture in detail. [8]
b) Explain with block diagram any one application of SCADA. [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 IEC 61850 layered architecture. [9]
b) Explain Control Net, Ethernet/IP. [9]

OR

- Q12)a)** Explain control and information protocol. [9]
b) Write note on security Implications of the SCADA protocols. [9]

x x x

Total No. of Questions : 12]

SEAT No. :

P3339

[4959]-68

[Total No. of Pages : 3

B.E. (Electrical Engineering)
POWER SYSTEM OPERATION & CONTROL
(2008 Course) (Semester - I) (403142)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4 and 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) *Black 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 with mathematical equations, the equal area criterion of stability analysis for sudden increase in mechanical input to generator. [9]
- b) Explain the following terms in short: [9]
- i) Swing curve and its importance in power system stability.
 - ii) Multimachine stability.
 - iii) Steady state stability.

OR

- Q2)** a) Explain the equal area criterion of stability for sudden short circuit on one of the parallel lines away from line ends (in the middle of a line). Derive the expression for critical clearing angle. [10]
- b) Explain the methods to improve power system stability. [8]
- Q3)** a) Draw a loading capability curve of a synchronous generator and Explain the reactive power generation by a synchronous generator. [8]
- b) Write a note on effect of excitation control. [8]

OR

P.T.O.

Q4) a) Explain how series compensation is obtained for transmission lines. Explain the advantages of providing series compensation and also explain problems associated with series compensation. [8]

b) Write a note on Sub-synchronous resonance. [8]

Q5) a) What are the different types of Static V Ar Compensators (SVCs)? Explain in details. [8]

b) Explain the principle of operation, circuit diagram and also give the applications of Thyristor Controlled Series Capacitors (TCSC). [8]

OR

Q6) a) Explain Principle of working, advantages and applications of Static Compensator (STATCOM). [8]

b) Explain Principle of working, advantages and applications of Unified Power Flow Controller (UPFC). [8]

SECTION - II

Q7) Write short note on any four of following: [16]

- a) Necessity of Automatic Generation Control (AGC).
- b) Speed governing system of turbo generator.
- c) Droop Characteristic of speed governor of generator.
- d) Single area case and two area case.
- e) Area control error.
- f) Free Governor mode-operation.

OR

Q8) a) With neat block diagram and response, explain two area load frequency control. Draw frequency response and deviation in tie line power for change in load demand of any one area. [10]

b) Explain constraints on generator and speed governor-operation. [6]

- Q9) a)** Define and explain the necessity of following: [6]
- i) Unit commitment
 - ii) Economic load dispatch.
- b) Explain following constraints with reference to unit commitment task [12]
- i) Minimum up time
 - ii) Minimum down time
 - iii) Must Run Time
 - iv) Fuel constraint
 - v) Crew constraint

OR

- Q10)a)** Explain with mathematical formulation, Lagrange multiplier method of economic load dispatch without transmission loss and including equality constraint of meeting load. [12]
- b) Consider two thermal units, with following incremental production cost, [6]
- $$dC_1/dP_1 = (20.5 + 0.10 \cdot P_1) \text{ Rs/MWh}$$
- $$dC_2/dP_2 = (10.5 + 0.20 \cdot P_2) \text{ Rs/MWh}$$
- The minimum and maximum generation limit of each generating unit is 10 MW and 100 mW. Dispatch the load of 50MW at optimum condition. Calculate the value of Lagrange multiplier (λ).

- Q11)a)** What is the Capacity interchange and Diversity interchange type of power interchange? [8]
- b) What are the technical as well as commercial benefits of Power Pool? [8]

OR

- Q12)** Explain following mode of power transaction. [16]
- a) Emergency power interchange.
 - b) Inadvertent power exchange.



Total No. of Questions :12]

SEAT No. :

P3340

[4959]-69

[Total No. of Pages :3

B.E. (Electrical)
CONTROL SYSTEM-II
(2008 Course) (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.*

SECTION-I

- Q1) a)** Give comparison between lead and lag compensating network. [8]
- b) Design a lead compensator for a type 2 system with an openloop transfer function $G(s) = \frac{K}{s^2(0.25+1)}$. Assume that the system is required to have phase margin = 35°, & Ka = 10. [10]

OR

- Q2) a)** Explain effect of lag, lead and lag-lead network of compensation on the behaviour of system performance. [8]
- b) A unity feedback system has OLTF $G(s) = \frac{K}{S(S+1)(0.25+1)}$. Design a phase lag compensation for the system to achieve: velocity error constant $K_v = 8 \text{ sec}^{-1}$ and phase margin $\phi_{pm} = 40^\circ$. [10]
- Q3) a)** Derive an expression of transfer function from its state space model.[8]
- b) Obtain eigen values, eigen vectors & model matrix for system having

$$A = \begin{bmatrix} -9 & 1 & 0 \\ -26 & 0 & 1 \\ -24 & 0 & 0 \end{bmatrix}. \quad [8]$$

OR

P.T.O.

Q4) a) Explain various methods to determine State Transition Matrix (STM) for the system. [8]

b) For the given matrix find the diagonalization matrix. $A = \begin{bmatrix} 3 & -2 \\ -1 & 2 \end{bmatrix}$. [8]

Q5) a) Explain different methods to obtain state feedback gain matrix K. [8]

b) Comment on controllability & observability of given system:

$$\dot{X} = \begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u; y(t) = [12]x. \quad [8]$$

OR

Q6) a) Define observability. Explain Kalman's & Gilberts test for observability. [8]

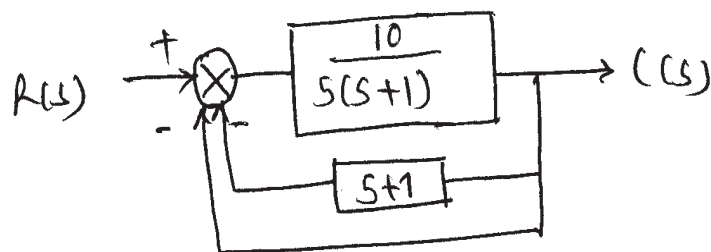
b) Design a state feed back vector K to shift pole position to a new position of poles $S = -4, -5$ for a system represented in state variable form as [8]

$$\dot{X} = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u.$$

SECTION-II

Q7) a) Describe Zigler-Nichol's method for tuning of PID controllers. [8]

b) [8]



For the above system find: K_p, K_v, K_a .

OR

Q8) a) Explain PID controller with its characteristics, applications & its effect on system performance. [8]

b) Compare linear control system with Nonlinear one. [8]

Q9) a) Classify nonlinearities & explain them. [8]

b) A unity feed back system has OLTF $G(s) = \frac{100}{(s+1)(s+2)(s+5)}$; Design PI controller in frequency domain so that P.M is 60° at frequency 0.5 rad/sec. [8]

OR

Q10)a) Derive describing function of an Ideal Relay. [8]

b) Explain Jump resonance and non-linear spring mass system in connection with NLCP. [8]

Q11)a) Explain the procedure of Isocline method for construction of phase trajectory. [9]

b) Determine the kind of singularity for: [9]

i) $\ddot{y} + 3\dot{y} + 12y = 0$

ii) $\ddot{y} - 8\dot{y} + 17y = 34$

OR

Q12)a) Explain Liapunaov's second method and Liapunavo's stability theorem. [9]

b) Show that the following quadratic form is positive definite or not by Sylverster's criterion. [9]

$$V(x) = 8X_1^2 + X_2^2 + 4X_3^2 + 2X_1X_2 - 4X_1X_3 - 2X_2X_3.$$

EEE

Total No. of Questions : 12]

SEAT No. :

P3298

[Total No. of Pages : 3

[4959]-7

B.E. (Civil)

ARCHITECTURE AND TOWN PLANNING

(2008 Pattern) (Elective - I (d))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Use separate answer sheets for Section-I and Section-II.*
- 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) *Assume suitable data if necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) "The design and planning of any structure depends upon architectural factors and composition". Justify the statement. [9]
- b) Elaborate two garden styles in detail. [8]

OR

- Q2)** a) Why water body conservation is important? Give the reference of any case study. [8]
- b) What are environmental filters? Elaborate the importance of the same in relation with urban design. [9]

- Q3)** a) What is the relation between urban renewal and built environment? Elaborate considering 4 aspects. [9]
- b) What is redevelopment? How it differs from urban renewal? [8]

OR

- Q4)** a) What is liveability? How it is related with urban renewal? [8]
- b) How Quality of life and liveability of an area are interlinked? Elaborate with an appropriate example. [9]

P.T.O.

- Q5)** a) Why sustainable materials are gaining more importance? Give an appropriate example. [8]
- b) Enlist different rating systems; elaborate any two. [8]

OR

- Q6)** a) “Sustainable Technologies : Need of the hour”. Justify the above statement by giving two examples. [8]
- b) Give the details of any case study of rated buildings under any one rating system. [8]

SECTION - II

- Q7)** a) Elaborate the concept of “New Towns”. [8]
- b) Write a short note on : [8]
- i) Ribbon development
- ii) Concentric development

OR

- Q8)** a) Write a short note on “development theories”. [8]
- b) Explain in detail - “Town Planning Schemes”. [8]
- Q9)** a) Elaborate the need of planning agencies and its impact on various levels of planning. [9]
- b) What is traffic management? State its impact on function of a Town.[8]

OR

- Q10)** a) What is the purpose and scope of City Development plan ? Explain in detail. [8]
- b) Classify the traffic volume. Mention the impact of the same on traffic management by giving an appropriate example. [9]

Q11) a) How to use UDPFI guidelines for finding water supply of a town and land use detailing. [8]

b) Write a short note on application of recent tools in town planning. [9]

OR

Q12) a) Write a short note on SEZ. [8]

b) Why GIS, GPS and RS play a vital role in developmental process of a city? [9]



Total No. of Questions :12]

SEAT No. :

P3341

[4959]-70

[Total No. of Pages :3

B.E. (Electrical)

**a: ROBOTICS AND AUTOMATION
(2008 Course) (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 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 is allowed.*

SECTION-I

Q1) a) Explain types of Automation. **[9]**

b) Explain Work envelop and Tip speed with neat sketch. **[9]**

OR

Q2) a) Explain least three reason for using a robot than human being. **[9]**

b) Explain the robotic laws and definition given by international standards organization. **[9]**

Q3) a) Explain various sensors and actuators used in robot with their selection criteria. **[8]**

b) Explain different types of links and end effectors. **[8]**

OR

Q4) a) With the help of a neat diagram, explain **[8]**

i) Cylindrical Robot

ii) Articulated Robot

b) Write short note continuous path and point to point path trajectory. **[8]**

P.T.O.

Q5) a) The coordinates of the point 'P' on the body are given by $\{2, -3, 1.5\}^T$. The point is rotated about x axis by 30° and then about y axis by 30° and then z axis by 30° . Find the final coordinates of the point 'P' w.r.t. the fixed frame. [8]

b) Explain the difficulties occurred in via point in trajectory planning. [8]

OR

Q6) a) The point P with co-ordinate $\{1, 2, 1\}^T$ is travel by 6 unit on x axis and then by 4 unit on z axis. Find the final point. Also discuss on homogeneous matrix. [8]

b) Explain Rotational translation in detail with example. [8]

SECTION-II

Q7) a) Explain D-H representation and it's importance for robotic manipulator. [9]

b) Explain concept of geometric approach in inverse kinematics. [9]

OR

Q8) a) Explain [9]

i) Geometric Method

ii) Direct Method

b) Draw a neat diagram of 'PUMA Robot' and discuss on its degrees of freedom. [9]

Q9) a) Explain lagrangian analysis using KE and PE. [8]

b) Explain Jacobean analysis used in robot science. [8]

OR

Q10)a) Explain joint Position control for robot motion. [8]

b) What do you mean by robot motion. [8]

- Q11)a)** Write a note on online programming and offline programming. [8]
- b) Explain how a robot can be used for underwater welding application. [8]

OR

- Q12)a)** Write a note on programming languages. [8]
- b) Explain 'Painting Robot' with details of selection criteria and methods of control. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P3342

[4959]-71

[Total No. of Pages : 3

B.E. (Electrical)

b:POWER QUALITY

(2008 Course) (403143) (Semester - I) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *In section I, attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, in section II attempt Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicates full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1) a)** Explain various definitions of power quality with reference to each stake holders and why are we concerned more about power quality now a days? **[10]**
- b) What are objectives of grounding? Explain various grounding practices as per IEEE standard. **[8]**

OR

- Q2) a)** Define and explain following terms **[10]**
- i) short duration voltage fluctuations
 - ii) long duration voltage fluctuations.
- b) State and explain the relationship between immunity, emission and compatibility. **[8]**

P.T.O.

- Q3)** a) What are the various causes of voltage flicker? What are its impacts on power system equipment? [9]
- b) Explain power quality issues like overvoltage, under voltage, voltage sag and voltage imbalance. [7]

OR

- Q4)** a) Explain various voltage flicker parameters obtained from flicker measurements. [7]
- b) List various devices used for voltage regulations. Explain reactive power management concept. [9]

- Q5)** a) Explain various voltage sag characteristics. [8]
- b) Explain in detail economic impact of voltage sags. [8]

OR

- Q6)** a) Explain various utility mitigation measures for voltage sags? [6]
- b) Explain influence of fault location and fault level on voltage sags. [10]

SECTION - II

- Q7)** a) What are the causes and explain effects of harmonics on power system equipment's. [10]
- b) Explain the terms series and parallel resonances. [8]

OR

- Q8)** a) Explain harmonic study procedure and computer tools used for harmonic analysis. [8]
- b) Explain various harmonics mitigation methods. [10]

- Q9)** a) Explain impulsive transients due to lightening. [8]
b) Explain the following terms concerned with transient overvoltage.
i) Capacitor switching ii) Ferroresonance [8]

OR

- Q10)**a) Explain basic principles of over-voltage protection. Enlist various devices used for overvoltage protection. [8]
b) Explain basic principles of over-voltage protection. Enlist various devices used for overvoltage protection. [8]

- Q11)**a) With suitable block diagram explain operation of power quality monitors. [8]
b) What are the requirements of power quality monitor to monitor various power quality parameters? [8]

OR

- Q12)**a) Explain various techniques of data collection and its analysis. [8]
b) What is reactive and proactive approach for power quality monitoring? [8]

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Total No. of Questions : 12]

SEAT No. :

P3343

[4959]-72

[Total No. of Pages : 3

B.E. (Electrical)

ILLUMINATION ENGINEERING
(2008 Course) (Elective - I) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answer 3 questions from section I and 3 questions from Section II.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Explain the structure of eye. **[10]**
- b) State and explain the laws of illumination. **[8]**

OR

- Q2) a)** Define - **[10]**
- | | |
|-------------------------|-------------------------|
| i) Plane angle | ii) Solid angle |
| iii) MHCP | iv) Depreciation factor |
| v) Glare | vi) Illuminous flux |
| vii) Luminous intensity | viii) Absorption factor |

Derive the relationship between plane angle and solid angle.

- b) Write the principle of production of light in detail. **[8]**

P.T.O.

Q3) a) Explain the principle and working of High pressure mercury vapour Lamp. [8]

b) Write short note on fluorescent tube with neat diagram. [8]

OR

Q4) a) List the salient features and applications of

i) LASERs ii) LEDs iii) Optical fibre. [9]

b) What is Induction Lamp? Give the principle, working and construction of the same. [7]

Q5) a) Explain various optical control schemes. [8]

b) Explain Dimining. [8]

OR

Q6) a) Classify the light fittings according to the way light reaches the object. [8]

b) State and explain Luminaries design considerations and luminaries standard. [8]

SECTION - II

Q7) a) Explain the various factors that are to be considered while designing lighting. [10]

b) Write a short note on Hospital lighting. [8]

OR

Q8) a) Explain zonal cavity method for general lighting design. [10]

b) State the various criteria for selection of lamps and luminaries for indoor lighting. [8]

Q9) a) What are the different types of reflectors? Explain the importance of reflectors and diffusers. [8]

b) Write the road lighting code in India. [8]

OR

Q10)a) Explain with example payback calculation, life cycle costing. [8]

b) Write the design procedure of road lighting using point by point method. [8]

Q11)a) Explain with neat diagram Emergency lighting in

i) Central systems ii) Standalone systems [8]

b) Explain concept and method of generation of cold lighting. [8]

OR

Q12) Write short note on [16]

a) Photovoltaic lighting.

b) Day lighting.

x x x

Total No. of Questions :12]

SEAT No. :

P3344

[4959]-74

[Total No. of Pages :3

B.E. (Electrical)

**a: RESTRUCTURING & DEREGULATION
(2008 Course) (Elective - II) (Semester -I) (403144)**

Time : 2.5 Hours

[Max. Marks :100]

Instructions to candidates:

- 1) *Answer Q.1 or Q.2 Q.3 or Q.4 Q.5 or Q.6 question from Section I and Q.7 or Q.8 Q.9 or Q.10 Q.11 or Q12 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.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain functions of Ministry of power and PFC. [8]
b) What are various challenges before Indian Power Sector? [8]

OR

- Q2)** a) Explain the institutional structures of Indian power sector before and after restructuring. [8]
b) Why the reformation has taken place in electrical power system? [8]

- Q3)** a) Explain the desirable characteristics of tariff of electricity. [8]
b) Explain. [8]
i) O and M expanses.
ii) Subsidy and cross subsidy

OR

P.T.O.

- Q4)** a) Explain Average, Marginal and avoided costs. [8]
b) Write short notes on: [8]
i) Capital Cost.
ii) Profitability indices.

- Q5)** a) Explain the role of Central Electricity Regulatory Commission and State Electricity Regulatory Commission. [10]
b) What are the regulation externalities? [8]

OR

- Q6)** a) Explain following methods of regulations: [12]
i) Incentive regulation.
ii) Rate of return regulation
b) Explain why Public Participation is necessary in regulatory process. [6]

SECTION - II

- Q7)** a) Explain various ownership models. [8]
b) Explain electricity reforms of Orissa and Maharashtra. [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) Wholesale competition.
ii) Multilateral trades.

- Q9)** a) What is trading of electricity market? What are the rules that govern the electricity markets? [10]
b) Explain power exchange in India. [8]

OR

Q10) Write short note the following electricity trading models: [18]

- a) Integrated.
- b) Wheeling.
- c) Decentralised.

- Q11)** a) What are transmission congestion issues, explain in detail. [8]
b) Explain the three parts of availability based tariff, how they are implemented. [8]

OR

- Q12)** a) What are the functions of TRANSCO, Independent System Operators (ISO) and Load Dispatch Center (LDC)? [8]
b) Explain the concept of open access and transmission rights. [8]



Total No. of Questions :10]

SEAT No. :

P3345

[4959]-75

[Total No. of Pages :3

B.E. (Electrical)

b - Embedded System

(2008 Course) (Semester - I) (403144) (Elective - II)

Time : 3 Hours

[Max. Marks :100]

Instructions to candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

- Q1)** a) What is an Embedded System. What are its main components? Elaborate [6]
- b) Explain the design process of an Embedded system. As a system designer, what are the important considerations to be kept in mind while selecting a processor. [10]

OR

- Q2)** a) Explain how software is incorporated in an embedded system. Give details of the various software tools used. [8]
- b) Give the main characteristics and features of a microcontroller. [8]
- Q3)** a) Explain the various types of ADC and give their advantages. [10]
- b) How is a temperature sensor interfaced in an embedded system? [6]

OR

- Q4)** a) With the help of a diagram, explain the interfacing of 4×4 matrix keypad to a microcontroller. [8]
- b) Explain the working of a Stepper motor and show how it is interfaced with a microcontroller. [8]

P.T.O.

- Q5)** Write notes on any three. **[18]**
- a) RTOS.
 - b) LEP ripple.
 - c) Interfacing a solenoid with microcontroller.
 - d) Motordrive ICs.
 - e) RISC and CISC.

SECTION - II

- Q6)** a) Explain how interprocessor communication is performed in an embedded system: **[9]**
- b) Explain the term Task. What are the various states of a task. **[9]**

OR

- Q7)** a) Explain in detail following scheduling algorithms. **[10]**
- i) First in first out.
 - ii) Round robin with priority.
 - iii) Shortest job first.
 - iv) Non-preemptive multitasking.
 - v) Preemptive multitasking.
- b) Explain the concept of semaphores as an event signaling variable. **[8]**

- Q8)** a) What is kernel? Explain architecture of kernel. **[8]**
- b) Explain how memory management is done in RTOS. **[8]**

OR

- Q9)** a) What are differences between General purpose operating systems and RTOS? **[8]**
- b) Explain the features of Vxworks. **[8]**

Q10) With the help of a neat diagram explain how an embedded system is incorporated in any two of the following applications **[16]**

- a) Digital Camera.
- b) Smart Card.
- c) Aircraft Attitude control.



Total No. of Questions :12]

SEAT No. :

P3941

[Total No. of Pages :4

[4959] - 76

B.E. (Electrical)

EXTRA HIGH VOLTAGE TRANSMISSION

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer 3 questions from each section.*
- 2) Answer one question from each unit of section I & section II.*
- 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

UNIT - I

- Q1) a)** A power of 3000 MW is to be transmitted over 1200km distance. Use 400 kV three phase line. Suggest the number of circuits required. With 50% series capacitor compensation calculate power loss in circuit & percentage power loss. Phase difference between sending end and receiving end voltage is 30° . The resistance and reactance per km length of conductor are 0.031 ohm and 0.327 ohm respectively. **[8]**
- b) Write note on mechanical considerations in line performance. **[8]**

OR

- Q2) a)** State and derive expression for travelling wave equations. Also derive solution for travelling wave equations. **[8]**
- b) Surge impedance of line is " Z_0 " It is terminated in medium of impedance Z_t . Derive expression for transmission and reflection coefficient for voltage and current at the receiving end. **[8]**

P.T.O.

UNIT - II

- Q3)** a) For three phase ehv line with horizontal configuration, derive the expression for flux linkage matrix and hence inductance matrix in terms of Maxwell's coefficient matrix. Draw the neat sketch. [8]
- b) Derive the expression for GMR of bundle conductor in terms of bundle radius R , radius of subconductor 'r' and number of subconductors 'n' [8]

OR

- Q4)** a) For 3 phase ehv ac completely transposed line derive for inductance offered to zero sequence and positive components of current in terms of self and mutual inductances. [12]
- b) Find the GMR of bundle conductor consisting of two subconductors each of radii 1.75 cm. Bundle radius is $R = 0.225$ meter. [4]

UNIT - III

- Q5)** a) For two-subconductor bundle derive expression for maximum and minimum surface voltage gradient on the subconductors. Show locations for maximum and minimum voltage gradient. State the assumptions made in deriving these expressions. From this write expression for voltage gradients for 'n' subconductors.

Find maximum surface voltage gradient on two subconductor-bundle of bundle radius $R = 0.225$ meter, subconductor radius $r = 1.75$ cm. The charge on the bundle is $4.88 \mu\text{C/m}$. [10]

- b) For horizontal configuration of phases of 3 phase ehv line derive the expression for maximum surface gradient on outer phases and on central phase according to Mangolt-Mengele. [8]

OR

- Q6)** a) Derive the condition for maximum charge on 3 phase ehv ac line. [8]
b) Compare field of line charge with that of point charge. [6]
c) A point charge $Q = 10^{-6}$ coulomb is kept at the center of sphere of radius 2 cm. Calculate potential and electric field strength on surface of sphere. [4]

SECTION - II

UNIT - IV

- Q7)** a) Derive expression for voltages induced in conductors of the uncharged circuit of double circuit three phase ehv ac line. [10]
b) Discuss the biological effects of electrostatic field on humans, animals and plants. [6]

OR

- Q8)** a) Write note in secondary shock currents. State effect of different values of secondary shock currents on human body. Also define threshold value and let go value of shock currents. State expression for tolerable current in terms of duration of shock current.

Also define primary shock current and write expression for the tolerable value of shock current in terms of duration of shock. [10]

- b) Write note on magnetic field effect on human health. [6]

UNIT - V

- Q9)** a) Draw the sketch of bipolar HVDC system showing major components and explain function of each components. [8]
b) Draw the neat sketch of 3-phase full wave bridge circuit. Derive the expression for direct voltage in terms of ac voltage when there is no ignition delay. Explain effect of ignition delay angle α on dc voltage. [8]

OR

- Q10)a)** Explain operation of converter as inverter. Define the transition angle value of ignition delay angle α . Also define ignition advance angle β and extinction angle γ . [8]
- b) Find expression for converter transformer rating in terms of ideal dc voltage and rated direct current. [8]

UNIT - VI

- Q11)a)** State and explain the important requirements for the satisfactory operation of dc link. [9]
- b) Write note on direct voltage control and grid power control by tap changer and grid control. [9]

OR

- Q12)a)** Write note on ideal and actual VI characteristics of HVDC system. [9]
- b) Explain what is meant by firing control system. State the basic types of firing control system and explain any one firing control system. [9]



Total No. of Questions : 12]

SEAT No. :

P3346

[4959]-77

[Total No. of Pages : 3

**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) *Answer 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 Solve Q. 7 or Q. 8, Q. 9 or Q. 10, and Q. 11 or Q. 12 from section - II.*
- 3) *Figures to the right indicates full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable additional data if necessary.*

SECTION - I

- Q1)** a) What is need of Smart Grid. Explain the functions of Smart Grid. [10]
- b) Give CDM opportunities in Smart Grid. [8]

OR

- Q2)** a) Highlight on evolution of electric grid and the concept of Smart Grid.[10]
- b) Write a note on present development in Smart Grid considering any one case. [8]

- Q3)** a) Explain how smart meters can play an important role to make a system smart. [8]
- b) Write a note on, "Vehicle to Grid." [8]

OR

P.T.O.

Q4) a) Explain smart sensors and how it will reduce the stress on system and make it smart. [8]

b) How home and building automation can be achieved. Explain step by step approach. [8]

Q5) a) Write a note on “IED”. [8]

b) Explain the concept SMES. [8]

OR

Q6) a) Write a note on substation Automation. [8]

b) Explain any two smart storage equipments. [8]

SECTION - II

Q7) a) Describe the concept of Micro Grid and also its need and applications. [10]

b) Write a note on variable speed wind Generators. [8]

OR

Q8) a) Explain issues of interconnection in microgrid. [10]

b) Write a note on Thin film solar cells. [8]

Q9) a) Highlight on web based power Quality monitoring. [8]

b) Explain power Quality conditioners for Smart Grid. [8]

OR

Q10)a) Why power Quality is considered to be an important issue especially in Smart Grid. [8]

b) Explain EMC and its importance in Smart Grid. [8]

Q11)a) Explain the concept of WAN related to Smart Grid. [8]

b) Explain the wireless mesh network in Smart Grid. [8]

OR

Q12)a) Explain the importance of Bluetooth in Smart Grid. [8]

b) Explain the importance of cloud computing and cyber security in Smart Grid. [8]

x x x

Total No. of Questions :12]

SEAT No. :

P3347

[4959]-78

[Total No. of Pages :3

B.E. (Electrical)
SWITCHGEAR & PROTECTION
(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 electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain resistance switching in case of circuit breakers. [8]
- b) Explain current chopping phenomenon in case of circuit breaker. How it is prevented. [8]

OR

- Q2)** a) Explain arc interruption methods in case of circuit breakers. [8]
- b) For a 132 kV system the reactance & capacitance upto the location of circuit breaker is 3Ω & $0.015 \mu\text{F}$ respectively. Calculate the following. [8]
- i) The frequency of transient oscillations.
 - ii) The maximum value of restricting voltage.
 - iii) The maximum value of RRRV.
- Q3)** a) With neat diagram explain construction & working of vacuum circuit breaker. [8]
- b) Explain various ratings of circuit breaker. [8]

OR

P.T.O.

Q4) a) With neat diagram explain construction & working of air blast circuit breaker. [8]

b) Explain various properties of SF₆ gas used in SF₆ CB. [8]

Q5) a) With neat diagram explain the construction and working of Directional over current relay. [10]

b) Write a short note on 'Protective zones'. [8]

OR

Q6) a) With neat diagram explain principle of operation of [10]

i) Plain Impedance relay.

ii) Percentage current differential relay.

b) Explain the need of protective system? What are different types of faults. Explain its effects on power system. [8]

SECTION-II

Q7) a) With neat block diagram explain the working of static relay. State its advantages and disadvantages over electro-magnetic relays. [10]

b) Write short notes on [8]

i) Antialiasing filter

ii) Sampling theorem

OR

Q8) a) With neat block diagram explain the working of digital relay. State its advantages. [10]

b) With block diagram explain Phasor Measurement Unit (PMU). [8]

Q9) a) Explain the protection of transformer from magnetising inrush current. Draw neat diagram for the scheme. [8]

b) Explain the protection of alternator from [8]

i) Loss of primemover

ii) Loss of excitation

OR

Q10)a) Explain with neat diagram construction & working of Buchholz relay. State its advantages & disadvantages. [10]

b) Explain protection of alternators against unbalanced loading. [6]

Q11)a) Explain wide area measurement system. [8]

b) Explain plain impedance relay using numerical relaying algorithm. [8]

OR

Q12)a) Explain the effect of arc resistance and power swing on the operation of distance relay. [10]

b) Explain three stepped distance protection scheme. [6]

EEE

Total No. of Questions : 12]

SEAT No. :

P3348

[4959]-79

[Total No. of Pages : 3

B.E.(Electrical)

INDUSTRIAL DRIVES AND CONTROL

(2008 Pattern) (Semester-II)(403148)

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 a drive? Draw block diagram showing parts of a drive system. State the selection factors of a drive? [8]
- b) Explain Constant Torque and Constant power operation of a drive. [8]

OR

- Q2) a)** Explain the types of Mechanical Loads using speed torque characteristics and suitable examples. [8]
- b) A drive has following parameters. $J=10\text{kgm}^2$, $T= 15-0.01N,Nm$ and passive load torque $T_l= 0.005N, Nm$, where N is speed in rpm. Initially the drive is operating in steady state. Calculate time required for starting. [8]
- Q3) a)** What are the electrical braking methods? Explain regenerative braking method used for separately excited DC shunt motor. Draw braking Torque speed characteristics. [8]
- b) A 230 V, 1000 rpm, 150 A dc separately excited motor has an armature resistance of 0.02 ohm. Motor is required to brake using dynamic braking from 900 rpm. Calculate the value of external resistance to be connected in the armature to limit braking current to full load current and value of braking torque. [8]

OR

P.T.O.

Q4) a) Explain plugging in Induction motor. Draw torque speed characteristics during motoring and braking. What precautions are required to be taken to use this method? [8]

b) Explain closed loop control of a drive with torque and speed control. [8]

Q5) a) Explain operation of a separately excited dc motor fed from a single phase full converter in armature circuit and from single phase semi bridge converter in field circuit for speed control below rated speed. Explain the quadrants in which it will operate. [9]

b) Draw speed control scheme for control below and above base speed for a separately excited dc motor. Explain its operation. [9]

OR

Q6) a) Explain the operation of a dc separately excited motor with armature fed from a class A chopper and with constant rated field supply. Explain the possible quadrant operations and range of control of motor. [9]

b) Explain closed loop control of separately excited DC motor with the help of block diagram for constant power mode of operation. [9]

SECTION-II

Q7) a) Draw speed torque characteristics to explain static stator voltage speed control method used in induction motor drives. What is the range of speed control and what are the limitations. [8]

b) Why V/f control is preferred in induction motor control? What are advantages and limitations of this method? How V/f ratio is decided? [8]

OR

Q8) a) Explain static rotor resistance control method used for IM speed control with the help of neat diagram and required relations. [8]

b) What are the advantages of closed loop control? Explain scheme for closed loop control used in VSI fed IM drives. [8]

Q9) a) What are the selection criteria of motor? How rating of motor is obtained? [8]

b) How time and energy required for the starting of a motor is calculated? Explain with equations. [8]

OR

- Q10)** a) What are duties of motor as per NEMA std? Explain with diagrams. [8]
b) A motor operates on a periodic duty consisting of a loaded period of 20 min.s and no load period of 10 min.s. The maximum temp rise is 60°C. Heating and cooling time constants are 50 and 70 min.s resp.ly. When operating continuously on no load, the temp. rise is 10°C. Determine
- Mini temp during duty cycle
 - Temp when motor is loaded continuously. [8]

- Q11)** a) Explain FOC in Induction Motor drives. [9]
b) Explain AC servo drives with neat diagram and applications. [9]

OR

Q12) Write short notes (any two)

- Drives used in Rolling mills. [9]
- Drives used in Textile mills [9]
- Drives used in sugar mills [9]



Total No. of Questions : 12]

SEAT No. :

P3299

[Total No. of Pages : 3

[4959]-8

B.E. (Civil) (Semester - I)

ADVANCED GEOTECHNICAL ENGG. (Elective - I)

(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) *Your answers will be valued as a whole.*
- 5) *Use of logarithmic tables electronic pocket calculator is allowed & IS codes are not allowed.*

SECTION - I

Q1) Explain the following :

[4×4=16]

- a) PRA classification
- b) USCS
- c) ISCS
- d) A-line chart

Q2) a) Differentiate between Tetrahedral & Octahedral unit.

[8]

b) Explain the different soil structures.

[8]

Q3) a) Explain 'Modified Culman's Method.

[10]

b) Discuss :

[7]

i) AEP

ii) PEP

iii) ER at rest.

P.T.O.

- Q4)** a) Explain the steps for 'Anchored sheet pile design'. [9]
b) Derive expression for 'Ko'. [8]
- Q5)** a) Explain 'Soil Anchors'. [9]
b) Discuss the use of 'Geosynthetics' in Geoenvironment. [8]
- Q6)** a) Explain 'Binguiet & Lec' theory. [9]
b) Discuss different functions of geosynthetics. [8]

SECTION - II

- Q7)** Explain the following : [4×4=16]
a) Elastic Half space
b) Spring analogy
c) Krishna & Nagraj Method
d) Barken's Method
- Q8)** a) Discuss the design criteria for impact type machines as per IS-2974 (Pt-II) 1966. [8]
b) How will you determine spring constants in the field as well as in laboratory. [8]
- Q9)** Explain the following :
a) Compaction pile. [4]
b) Vibrofloatation [4]
c) Stone column [4]
d) Sand drains [5]

- Q10)** a) Discuss different methods for grouting. [9]
b) Explain the stages for construction of Vibro-expanded pile. [8]
- Q11)** a) Explain 'Rheology' & discuss 'basic' & 'composite' models. [9]
b) Explain 'Creep' & 'Secondary Consolidation'. [8]
- Q12)** Explain the following :
- a) Hookeart Newtonian model [5]
b) Kelvin model [4]
c) Bingham's model [4]
d) Burger's model. [4]



Total No. of Questions : 12]

SEAT No. :

P4521

[Total No. of Pages : 3

[4959]-80

B.E. (Electrical)

VLSI DESIGN

(2008 Pattern) (Elective - III(a))

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 is FSM? Explain with one example & also differentiate between mealy & moore model [10]
- b) Draw the truth table, circuit diagram & timing diagram for 4 bit ring counter. [8]

OR

- Q2)** a) Explain the concept of various configurations of shift register. Draw circuit diagram, timing diagram of 4 bit PISO shift register. [10]
- b) What is the difference between latch & flip flop explain various triggering methods of FF. [8]

- Q3)** a) Explain complete VLSI design flow with ref. to EDA tool. [10]
- b) Explain the structural modelling with the example of 4 : 1 multiplexer.[6]

OR

- Q4)** a) What is configuration? Explain it with suitable example in VHDL. [10]
- b) Define - Architecture, schematic, component with its syntax in VHDL.[6]
- Q5)** a) Explain any four data types & any four data objects used in VHDL. [8]
- b) What is subprogram overloading? Explain with suitable example. [8]

P.T.O.

OR

- Q6)** a) Differentiate concurrent & sequential statements in VHDL. [8]
b) Differentiate synthesizable & Non - synthesizable statements. [8]

SECTION - II

- Q7)** a) Define [8]
i) fan - in
ii) FOM
iii) Noise margin
iv) Propagation delay
w.r.t CMOS. Also give its std. values.
b) Explain voltage transfer characteristics of CMOS Inverter. [8]

OR

- Q8)** a) Implement following gates using CMOS [8]
i) NAND
ii) NOR
iii) AND
iv) OR
b) Compare CMOS & NMOS [8]

- Q9)** Compare PAL, PLA, CPLD & FPGA in detail. [16]

OR

- Q10)** Explain the following terms. [16]
a) Simulation
b) Synthesis
c) Floor planning
d) PAR
e) Configuration of FPGA
f) Boundary Scan
g) BIST

- Q11)* a) Write VHDL code for signed comparator [9]
b) Write VHDL code for triangular wave generator. [9]

OR

- Q12)* a) Write VHDL code for Barrel shifter [9]
b) Write VHDL code for ALU. [9]



Total No. of Questions : 12]

SEAT No. :

P3349

[4959]-81

[Total No. of Pages : 3

B.E. (Electrical Engineering)
b:HIGH VOLTAGE ENGINEERING
(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) *Answer to the two sections should be written in separate book.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic table slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the Townsend's Theory of breakdown of gaseous dielectrics. Explain Townsend's breakdown criterion. [8]
- b) Explain and also compare the corona discharges for point plane electrode combination with positive and negative pulse application. [8]

OR

- Q2)** a) What is Paschen's Law? Explain the meaning of minimum breakdown voltage. [8]
- b) Explain electron attachment process. Explain the properties of electronegative gas. Give examples of electronegative gas. [8]
- Q3)** a) Explain any two breakdown phenomenon in case of liquid dielectric material. [8]
- b) What type of impurities are found in liquid dielectric material? Explain the purification cycle of liquid dielectric material to remove impurities. [8]

OR

P.T.O.

Q4) a) Write short note on electromechanical breakdown and thermal breakdown. [8]

b) Explain the breakdown in composite dielectrics. [8]

Q5) a) What are the causes of occurrence of switching surge. [8]

b) Compare horn gap type lightning arrester and ZnO gapless lightning arrestors. [10]

OR

Q6) a) What is statistical approach of insulation co-ordination on high voltage power system and substation? [10]

b) Compare between Simpson and Wilson theory of charge formation in clouds. [8]

SECTION - II

Q7) a) Define impulse waveform. What do you mean by a standard impulse waveform? Explain wave front and wave tail time. [8]

b) With a neat sketch explain Tesla coil. How high ac voltage of high frequency is generated with it? [8]

OR

Q8) a) What is the principle of operation of resonant transformer? How it is advantageous over cascade connected transformer? [8]

b) A 12 stage impulse generator has $0.2 \mu\text{F}$ capacitors. The wave front and the wave tail resistance connected are 600 ohms and 4000 ohms respectively. If load capacitor is 1000PF, find the front and tail times of the impulse wave produced. [8]

- Q9) a)** With neat diagram explain CVT. Explain its advantages also. **[8]**
- b) Discuss the use of sphere gap unit for measurement of high magnitude DC, AC and impulse voltage. Explain the effect of various factors influencing the spark-over voltage of sphere gap. **[10]**

OR

- Q10)a)** Explain resistance, capacitance and mixed potential dividers with their advantages and disadvantages. **[12]**
- b) A generating voltmeter has to be designed so that it can have a range from 30 to 200kV DC if the indicating meter reads a minimum current of 2 micro Ampere, what will be maximum current of meter? What should be the capacitances of generating voltmeter be? **[6]**
- Q11)a)** What is partial discharge? With neat diagram explain the method of measurement of partial discharge. **[8]**
- b) Explain high voltage testing of power transformer. **[8]**

OR

- Q12)** Write any two tests on following: **[16]**
- a) Insulators
 - b) Bushings
 - c) Isolators
 - d) Circuit Breakers

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Total No. of Questions : 12]

SEAT No. :

P3350

[4959]-82

[Total No. of Pages : 4

B.E. (Electrical)

c-DIGITAL SIGNAL PROCESSING

(2008 Course) (Semester - II) (403149) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt Q1 or Q2, Q3 or Q4, and 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 indicate full marks.*
- 4) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Define following terms with example **[6]**
- i) Causal & non causal sequence.
 - ii) Linear & non linear sequence.
- b) Explain following operations on discrete time signals. **[6]**
- i) Folding
 - ii) Time shifting
 - iii) Down sampling
- c) Determine whether following systems are time variant or invariant & static or dynamic. **[6]**
- i) $y(n) = x(-n)$
 - ii) $y(n) = n \cdot x^n(n)$

OR

- Q2)** a) Compute the convolution sum of the sequences $x_1(n) = \{2,1,0,0.5\}$ and $x_2(n) = \{2,2,1,1\}$ using tabular method. **[6]**
- b) Explain the process of Analog to digital conversion. **[6]**
- c) Construct a block diagram of the discrete time system whose i/o relation is given as **[6]**
- $$y(n) = 3x(n-2) + 2x(n) + 3y(n-1) + 2y(n-2)$$

P.T.O.

SECTION - II

- Q7)** a) Obtain DFT of
delayed unit impulse $\delta(n-n_0)$ [4]
- b) Perform circular convolution of the two sequences by Matrix method-
[6]
 $x(n) = \{0,1,2,3\}$ and $h(n) = \{2,1,1,2\}$
- c) Obtain 4-point DFT of the sequence-
 $x(n) = \{1,2,3,4\}$ using DIT FFT [8]

OR

- Q8)** a) What is twiddle factor? State it's any three properties. [4]
- b) Compute 4-point DFT of the sequence $x(n) = u(n) - u(n-2)$ using twiddle factor. [6]
- c) Obtain 4-point DFT of the sequence-
 $x(n) = \{1,2,3,4\}$ using DIF FFT. [8]

- Q9)** a) Explain about Ideal filter characteristics & necessity of approximations. [6]
- b) Design a Butterworth digital IIR low-pass filter for the following specifications:- [10]

Pass-band gain required :-1 dB;

Frequency up to which pass-band gain must remain more or less steady: 25Hz.

Amount of attenuation required :-30dB

Frequency from which the attenuation must start: 75 Hz.

Sampling frequency: 300Hz.

OR

Q10)a) Explain impulse invariant and bilinear transformation techniques. [6]

b) Design a low-pass FIR filter using Fourier Transform method for the following specifications:- [10]

Cut-off frequency = 500 Hz

Sampling frequency = 2000 Hz

Order of filter = 10

Filter length required = 11

Note: Use Hanning window.

Q11)a) Determine the Direct form-I & Direct Form-II realization of the system characterized by the transfer function [6]

$$H(z) = \frac{z+1}{z^2+3z+5}$$

b) Write short note on Applications of DSP in – [10]

i) Power factor correction,

ii) Harmonic Analysis & measurement

OR

Q12)a) Obtain the cascade structure of the FIR filter defined by the TF- [6]

$$H(z) = (3 + 4z^{-1} + 6z^{-2}) (1+2z^{-1}) (1 + 5z^{-2})$$

b) Write short note on Applications of DSP to –

i) DSP based vibration analysis system.

ii) Spectrum Analysis. [10]

x x x

Total No. of Questions : 12]

SEAT No. :

P3351

[4959]-83

[Total No. of Pages : 2

B.E. (Electrical)

**d:ANN AND IT'S APPLICATIONS IN ELECTRICAL ENGINEERING
(2008 Course) (Semester - II) (Elective - III)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt not more than 3 questions of which at least 3 questions must be from each section.*
- 2) *Answers to the two sections should be written in separate book.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Black 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)** a) Explain with neat sketch for neuron model and give its mathematical formulation. [9]
- b) Explain various transfer function for ANN. [9]

OR

- Q2)** a) Explain Biological inspiration of ANN with neat sketch. [9]
- b) Explain basic MC-Lock pitts model with neat sketch. [9]

- Q3)** a) Explain MLP with learning algorithm using weight update rule. [8]
- b) Draw and explain Hebbian learning based neural network. Explain its activation function. [8]

OR

- Q4)** a) Explain delta rule in detail. [8]
- b) What is Error - correction learning for artificial neural network. [8]

P.T.O.

- Q5)** a) Explain Perceptron architecture with neat sketch and activation function. [8]
b) What is Least Mean Square algorithm used in ANN. [8]

OR

- Q6)** a) What is Perceptron training algorithm? Explain with AND gate. [8]
b) Explain linear rate η . [8]

SECTION - II

- Q7)** a) Explain feed forward Neural Network with neat sketch. [9]
b) What is Back propagation algorithm and its error evaluation. [9]

OR

- Q8)** a) Give step by step procedure of Back-propagation method. [9]
b) Explain momentum coefficient needed in neural network. [9]

- Q9)** a) What is Kohonen Organizing Maps? [8]
b) Explain Associative Resonance Theory. [8]

OR

- Q10)**a) Explain ART1 with neat sketch. [8]
b) Explain theory of Adaptive Response Theory. [8]

Q11) Explain reactive power management using ANN. [16]

OR

Q12) Use ANN to solve the risk assessment in power system network. [16]

x x x

Total No. of Questions : 12]

SEAT No. :

P3352

[4959]-85

[Total No. of Pages : 2

B.E. (Electrical Engineering)
b-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 Q1 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) Describe concentrating solar power Technologies. [8]
- b) Write a note on 'Economics of Distributed Resources'. [8]

OR

- Q2)** a) Explain with neat sketch Biomass for Electricity generation. [8]
- b) Explain combined neat and power technology. [8]

- Q3)** a) Write a note on, types of wind turbines. [8]
- b) Give simple estimates of wind turbines energy. [10]

OR

- Q4)** a) List the methods and explain how maximum power can be achieved by controlling speed. [10]
- b) Write a note on, environmental impacts of wind turbines. [8]

P.T.O.

- Q5) a)** Explain the concept, 'Altitude Angle of the sun at solar Noon'. [8]
b) Write a note on, solar Radiation Measurements. [8]

OR

- Q6) a)** Explain the solar position at any time of the Day. [8]
b) Write a note on, direct and diffused radiation and its effect on power generation. [8]

SECTION - II

- Q7) a)** Explain from cells to a module and from module to arrays. [8]
b) Explain the impacts of Temperature and Insolation on I-V Curves. [8]

OR

- Q8) a)** Explain the PV IV curve under standard test conditions. [8]
b) Write a note on Thin-Film photovoltaic. [8]

- Q9) a)** Explain different photovoltaic system types. [8]
b) Write a note on Grid-connected PV system Economics. [10]

OR

- Q10)a)** Explain the concept of 'peak - Hours', approach to estimate the PV performance. [10]
b) Write a note on, Bi-direction Metering. [8]

- Q11)a)** Explain Nuclear energy power plant. [8]
b) Write a note on Global warming and climate change. [8]

OR

- Q12)a)** Explain Bio-chemical and photosynthesis techniques. [8]
b) Write a note on Nuclear waste disposal. [8]

x x x

Total No. of Questions : 12]

SEAT No. :

P3353

[4959]-86

[Total No. of Pages : 4

B.E. (Electrical)

DIGITAL CONTROL SYSTEMS

(2008 Pattern) (Semester - II) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any one Question from each pair of Questions Q1 & 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 indicate full marks.*

SECTION - I

Q1) a) Explain various types of Analog to Digital & Digital to Analog converters. **[8]**

b) State with proper reason, whether the following systems are **[8]**

- i) Static or Dynamic
- ii) Linear or Non linear
- iii) Shift invariant or variant
- iv) Causal or Noncausal

$$:\rightarrow (1) Y(n) = x(-n+2) \quad (2) Y(n) = x(2n)$$

OR

Q2) a) Compare Digital control system with Analog control system. **[8]**

b) What are different sampling methods? Give importance of Shanon's sampling Theorem. **[8]**

P.T.O.

- Q3) a)** Derive Z-transform of: **[8]**
- i) Unit Impulse ii) Delayed unit impulse
- iii) Unit ramp iv) Delayed unit ramp
- b) What is relation between pulse transfer function and state model of discrete time system? Derive it. **[8]**

OR

- Q4) a)** Explain various methods to obtain Inverse Z-transform: **[8]**
- b) Find inverse - Z transform of following: **[8]**
- i) $X(z) = \frac{1}{(z-1)(z-3)}$
- ii) $\frac{X(z)}{z} = \frac{5}{6z^2 - z - 1}$

- Q5) a)** Explain with proper diagrams mapping between s-plane and z-plane. **[9]**
- b) The characteristic equation of system is
- $$F(z) = z^4 - 0.6z^3 - 0.81z^2 + 0.67z - 0.12 = 0$$
- Describe its stability by Jury's Test. **[9]**

OR

- Q6) a)** What do you mean by stability analysis using bilinear Transformation? Explain it with Routh's stability criterion. **[9]**
- b) For the following system, determine what should be the range of gain K using Jury's stability test: $z^3 + (3k)z^2 + (k+2)z + 4 = 0$ **[9]**

SECTION - II

- Q7)** a) What are different methods to determine state transition matrix (STM) for state difference equation $x(k+1) = Gx(k) + Hu(k)$? Explain them. [8]
- b) Determine a suitable gain matrix k for the following system such that it will have close loop poles at $z = 0.5 \pm j 0.5$ $G = \begin{bmatrix} 0 & 1 \\ -0.16 & -1 \end{bmatrix}$; $H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ [8]

OR

- Q8)** a) With proper diagrams, explain direct, cascade & parallel decompositions of Discrete time Pulse Transfer Function. (P.T.F.) [8]
- b) Obtain STM of $x(k+1) = Gx(k) + Hu(k)$; where [8]

$$G = \begin{bmatrix} 0 & 1 \\ -0.2 & -1 \end{bmatrix}; \quad H = \begin{bmatrix} 1 \\ 1 \end{bmatrix}.$$

- Q9)** a) Define the concepts 'Controllability' & 'Observability' of discrete time system. Also explain their tests. [8]
- b) Investigate controllability & observability of system: [8]

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -0.01 & 0.21 & 0.8 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$$

$$y(k) = [0 \ 0 \ 1] x(k) + 0$$

OR

- Q10)** a) With proper block diagram explain Full order observer. What are its types? [8]
- b) Design a full order state observer for the system having desired eigen values at $z = -1.8 + j2.4$ & $-1.8 - j2.4$ for [8]

$$G = \begin{bmatrix} 0 & 20.6 \\ 1 & 0 \end{bmatrix}; \quad H = \begin{bmatrix} 1 \\ 0 \end{bmatrix}; \quad C = [0 \ 1]$$

Q11)a) Draw proper block diagram of Digital temperature control system & explain function of each block. **[8]**

b) Determine state space representation in controllable canonical form for the system $\frac{Y(z)}{U(z)} = \frac{4z^2 - 3z + 0.5}{z^3 + z^2 - z - 0.75}$ **[10]**

OR

Q12)a) Explain digital position control system with proper block diagram. **[8]**

b) Write short note on : Transformation of state space model to controllable & observable canonical form. **[10]**

x x x

Total No. of Questions : 12]

SEAT No. :

P3354

[4959]-88

[Total No. of Pages : 3

B.E. (E & TC)

ELECTRONIC PRODUCT DESIGN

(2008 Course) (404181) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section - I & 3 questions 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) *Figures to the right indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data wherever necessary.*

SECTION - I

- Q1)** a) Explain in brief the concept of product development with the help of block schematic. **[6]**
- b) Explain the bathtub curve for reliability indicating all its regions, & discuss how failures can be reduced prior to shipment of product. **[8]**
- c) Explain the terms MTTF & MTBF. **[4]**

OR

- Q2)** a) Explain reliability assessment techniques for the product. **[8]**
- b) A multivibrator circuit uses 2 transistors, 8 resistors, 2 capacitors & 2 diodes. It is followed by buffer circuit consisting of one transistor & one resistor. Failure rates of various components are as given below find MTTF of the circuit in years. **[6]**

Component	Failure rate / 10^6 Hrs
Resistor	0.6
Diode	0.2
Capacitor	0.6
Transistor	0.65

- c) Explain different types of product as per the classification of it. **[4]**

P.T.O.

- Q3)** a) Explain data acquisition system for suitable application. [8]
b) Explain different factors on which selection of ADC or DAC is done. [8]

OR

- Q4)** a) Explain typical Instrumentation amplifier with its characteristics. [8]
b) Explain at least 4 analog circuits with diagrams used in signal conditioning. [8]

- Q5)** a) Explain in detail Microcontroller selection criteria with suitable examples. [10]
b) Explain different display technologies. Which types of touch screen is more popular & Why? [6]

OR

- Q6)** a) Explain different protocols used in electronic system. Explain their advantages & limitations for given application. [10]
b) Explain different LED configurations with suitable example. [6]

SECTION - II

- Q7)** a) Explain different software debugging techniques. [10]
b) Compare assembly & high level language. [8]

OR

- Q8)** a) What is importance of documentation? Explain details of documentation for software. [10]
b) Explain hardware test programs with different applications. [8]

- Q9)** a) What is importance of EMI & EMC considerations? Explain different EMI-EMC standards related to conducted emissions, radiated emissions & susceptibility to radiation. [8]
b) Explain different factors in high speed designs & PCB layout for it. [8]

OR

Q10)a) Explain mixed signal circuit design considerations. How to minimize interference in mixed signal circuits. [8]

b) Explain working of PLL. [8]

Q11)a) Explain various sources of signal noise & signal loss. [8]

b) Write short notes on: [8]

i) Interleaver

ii) Equalizer

OR

Q12)a) Explain criteria for selecting particular band of frequencies for particular application. [8]

b) Explain communication link & analyse. [8]



Total No. of Questions : 12]

SEAT No. :

P3355

[4959]-89

[Total No. of Pages : 3

B.E.(E&Tc)

**VLSI DESIGN & TECHNOLOGY
(2008 Coures) (Semester-I)(404182)**

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 writtern 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 tables is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Draw and explain push pull CMOS Inverter. **[8]**

Draw small signal Model of push-pull Inverter

b) Draw and explain CMOS differential amplifier. **[8]**

OR

Q2) a) What are the cascode amplifier? Draw the diagram of cascode amplifier and explain its voltage transfer curve? **[8]**

b) With I-V characteristics explain MOSFET as current source and current sink **[8]**

Q3) a) Explain CMOS transmission gate in details? **[8]**

Draw 4:1 multiplexer using transmissiongate

b) Explain CMOS Inverter DC transfer characteristics in detail. **[8]**

OR

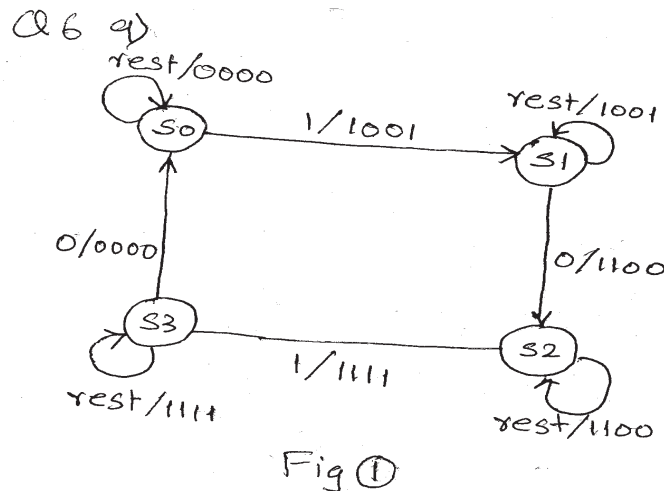
P.T.O.

- Q4) a)** Design the circuit described by the function $y = \overline{(A.B)} + \overline{(C.D)}$ using CMOS logic [4]
- b) Explain. [4]
- Power delay product
 - Noise Margin
- c) Explain static, dynamic and short circuit power dissipations in CMOS [8]

- Q5) a)** What are different modeling styles in VHDL? How to make a decision to use a particular style? Explain. [9]
- b) Design 8 : 1 Mux using 4:1 Mux? Write VHDL code and test bench for the same [9]

OR

- Q6) a)** Write a VHDL code to design sequential circuit described by diagram as shown in. [6]



- b) Mealy machine is closer to Real time approach than moore machine explain. [3]
- c) Write short note on [9]
- Synthesizable and non-synthesizable codes
 - Attributes
 - Metastability

SECTION-II

- Q7)** a) Draw and explain the architecture of FPGA. [8]
b) Explain in detail function block. [8]

OR

- Q8)** a) Compare CPLD and FPGA. [8]
b) Describe following in not more than five words.
CLB, IOB, JTAG, LUT, ISP, STA, UCF, DLL, Xilinx, Altera, Virtex, Spartan, ASIC, PLA, PAL. [8]

- Q9)** a) What is the need of design for testability? Explain different types of faults. [8]
b) Explain the terms.
i) Controllability
ii) Predictability
iii) Testability
iv) Boundary scan. [8]

OR

- Q10)** a) Draw the architecture of TAP controller and explain in detail. [8]
b) Explain BIST in detail. [8]

- Q11)** a) What is the need of clock distribution? Explain techniques of clock distribution [9]
b) Write short note on
i) EMI immune design
ii) clock jitter
iii) off chip connections. [9]

OR

- Q12)** a) What are the limitations of single phase clock? Explain with neat schematic two phase clock system in detail. [9]
b) Draw the schematic and explain I/O architecture. [9]



Total No. of Questions : 12]

SEAT No. :

P3504

[4959]-9

[Total No. of Pages : 3

B.E. (Civil)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(2008 Pattern) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Nest diagram must be drawn whenever 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) Explain in detail **[16]**

- a) Ill conditioned matrix
- b) Importance of Matrix Algebra in Matrix Methods of structural analysis.

OR

Q2) a) Write a note on “Computer algorithm and programming aspects”. **[6]**

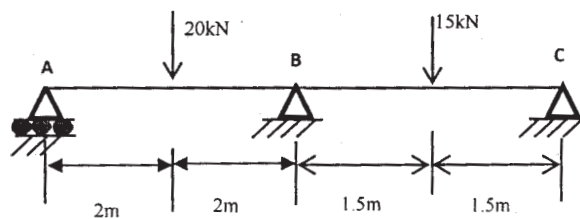
- b) Solve the following equations by Gauss Eliminating Method **[10]**

$$15X_1 - 6X_2 + 12X_3 = 15$$

$$-6X_1 + 3X_2 + 3X_3 = 3$$

$$12X_1 + 3X_2 = 18$$

Q3) Analyze the beam shown below by flexibility method (EI is constant) **[16]**

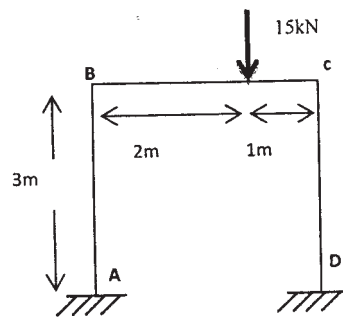


OR

P.T.O.

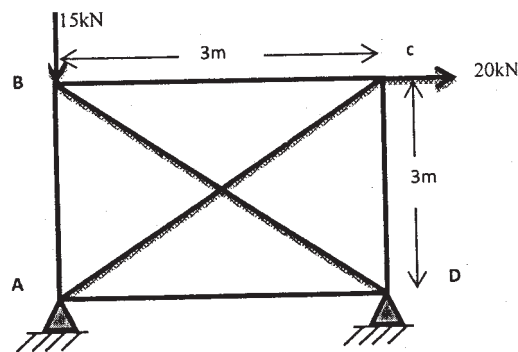
Q4) Analyze the portal frame using Flexibility Method (EI Constant)

[16]



Q5) Analyze the truss by Flexibility Method (EI Constant)

[18]



OR

Q6) Analyze the beam shown in Ex. 3 by Stiffness Method (EI Constant) **[18]**

SECTION - II

Q7) Write a note on (any two)

[16]

- Force Method of structural analysis.
- Determinacy and Indeterminacy.
- Effective node numbering.

OR

Q8) a) Explain how support conditions are accounted in structure approach and member approach. [8]

b) State and explain transformation matrix. [8]

Q9) Using proper DOF's, write stiffness matrix equation for a member of orthogonal grid structure and also explain properties and special characteristics of stiffness matrix of a structure [16]

OR

Q10) Stating clearly DOF's, explain stiffness matrix for space truss member and space frame member. In which case you need transformation matrix. Explain reason. [16]

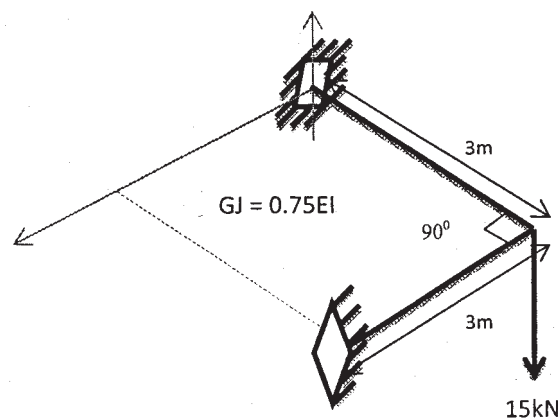
Q11) A single bay two storied frame is to be analyzed by computer programme of stiffness matrix method [18]

a) Prepare the flow chart for the programme and state input required for the same.

b) How will you input support conditions of the structure.

OR

Q12) Analyze and draw BMD for grid structure as shown below by stiffness method. [18]



X X X

Total No. of Questions : 12]

SEAT No. :

P3356

[4959]-90

[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) *Answer any 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.*

SECTION - I

- Q1)** a) Draw ISO-OSI model and explain in brief function of each layer. [8]
- b) Explain Briefly: [4]
- i) Host
 - ii) Subnet
 - iii) Broadcast network
 - iv) Point to point Network
- c) Compare Coaxial Cable, Twisted pair cable and Fiber optic cables. [6]

OR

- Q2)** a) Draw and explain typical cable TV system. How cable video signal and internet data can be sent over the same cable. [8]
- b) Compare and contrast a circuit - switched and packet - switched network. [4]
- c) What is dial up modem technology? Explain in brief V.32 modem standards with data rate. [6]

P.T.O.

- Q3)** a) Explain Go Back - N ARQ and selective repeat ARQ protocols. [8]
- b) What is the decision of DLL under the following situation? [8]
- i) Normal operation
 - ii) Damaged or lost frame
 - iii) Acknowledgement is lost
 - iv) Acknowledgement is delayed. Explain with neat diagram.

OR

- Q4)** a) Draw the HDLC frame format and explain in detail the control field used in HDL protocol for different frame types. [8]
- b) State and explain common standard Ethernet implementations. [8]
- Q5)** a) What is backbone network? What are its types? Explain in brief. [8]
- b) Explain the connecting devices used in networking. [8]

OR

- Q6)** a) Explain medium access control in IEEE 802.11. [8]
- b) Draw the layer architecture and explain the functions of each layer in Bluetooth. [8]

SECTION - II

- Q7)** a) For a given classless IP address, how will you extract network address and host address? Explain with suitable example. [8]
- b) Compare IP v4 and IPv6. [8]

OR

- Q8) a)** Write short notes on: **[10]**
- i) ARP
 - ii) DHCP
- b) Compare static and dynamic routing algorithm with suitable example. **[6]**

- Q9) a)** What are different transport service primitives? Explain QoS at transport layer. Define delay, congestion, through put and jitter. **[10]**
- b) Draw and explain TCP header. **[6]**

OR

- Q10)a)** What are the causes of congestion in network? Explain any one algorithm to avoid congestion. **[10]**
- b) What are the main objectives of transport layer? Explain with neat diagram process to process delivery in transport layer. **[6]**

- Q11)a)** What are the main responsibilities of Application layer? Explain in brief. **[10]**
- b) Explain : FTP and Telnet protocols. **[8]**

OR

- Q12)Discuss** in brief the following: **[18]**
- a) DNS.
 - b) E-mail system.
 - c) WWW and internet.



Total No. of Questions : 12]

SEAT No. :

P3357

[4959]-91

[Total No. of Pages : 4

B.E. (E & TC)

**a: DIGITAL IMAGE PROCESSING
(2008 Course) (Semester - I) (Elective - I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

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

SECTION - I

Q1) a) Write the various ways of finding distance between two pixels. State the significance of distance finding. **[8]**

b) Explain the statistical parameters mean, standard deviation, SNR, PSNR w.r.t. image. **[8]**

OR

Q2) a) Consider the image segment shown: **[8]**

3 1 2 1(q)

2 2 0 2

0 2 1 0

1 0 1 1

(p)

Let $V = \{1,2\}$ and compute the lengths of 4 and 8 connectivity paths between 'p' and 'q'.

b) Explain how an image is formed in an eye? In this regard explain focal length. **[8]**

P.T.O.

- Q3) a)** Justify the statement ‘Median filter is an effective tool to minimize salt & paper noise’ considering the segment of image [8]

$$I = \begin{bmatrix} 23 & 21 & 32 \\ 34 & 255 & 24 \\ 24 & 22 & 33 \end{bmatrix}$$

- b) Describe in brief simultaneous contrast, brightness adaption, weber ratio and mach bands. [8]

OR

- Q4) a)** What is histogram equalization? How it is achieved using PDF and CDF. [8]

- b) What is the need of high-boost filtering. Explain the concept and high-boost filtering mask. [8]

- Q5) a)** A 2×2 block of image is as given: [10]

$$\begin{bmatrix} 4 & 4 \\ 8 & 8 \end{bmatrix}$$

Determine its DCT coefficients.

- b) Write note on harr transform. [8]

OR

- Q6) a)** Compare the following image transform techniques using transform equation, simplicity, energy compaction and computational effort, as parameters. [14]

- i) Discrete Fourier Transform
- ii) Discrete cosine Transform
- iii) Hadamard Transform
- iv) KL Transform

b) Prove that:

High pass filtered Image

= Original Image - low pass filtered image. [4]

SECTION - II

Q7) a) With neat block schematic explain baseline JPEG compression system. [9]

b) Discuss redundancies observed in an image. How we can exploit these redundancies for image compression? [9]

OR

Q8) a) Briefly explain the following: [9]

i) Predictive coding

ii) run length coding

iii) White block skipping

b) With suitable example explain 'Arithmetic coding.' Compare with Huffman coding. [9]

Q9) a) Explain Laplacian edge detector. Explain why LOG mask is preferred over laplacian mask for edge detection. [8]

b) Write notes on: [8]

i) Local & Global thresholding

ii) Chain code

OR

- Q10)a)** What is Hough transform? How it is used for edge linking? [8]
- b) With the help of appropriate mask explain the following: [8]
- i) Point detection
 - ii) Line detection
 - iii) Edge detection

- Q11)a)** Draw and explain model of image degradation/restoration process. [8]
- b) Explain in detail about character Recognition using image processing. [8]

OR

- Q12)a)** Explain in detail 'Weiner filtering'. [8]
- b) Explain Remote sensing using satellite images. [8]

x x x

Total No. of Questions : 12]

SEAT No. :

P3358

[4959]-92

[Total No. of Pages : 3

B.E. (Electronics & Telecommunication)
b:EMBEDDED SYSTEM & RTOS
(2008 Course) (Semester -I) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Attempt Q1 of Q2, Q3 or Q4, Q5 or Q6 From SEC-I.*
- 2) *Attempt Q7 or Q8, Q9 or Q10, Q11 or Q12 From SEC-II.*
- 3) *Assume Suitable data if necessary.*

SECTION - I

Q1) a) What is meant by design metrics? List & explain various design metrics used in embedded system. **[10]**

b) Compare CAN, LIN & FlexRay protocols. **[6]**

OR

Q2) a) Discuss current trends & challenges in embedded system. **[8]**

b) Compare Bluetooth, GPRS, IRDA & 802.11. **[8]**

Q3) a) How processor is selected For embedded system Explain with typical application. **[8]**

b) Write 'C' program using LPC2148 to display analog voltage on LCD display. **[8]**

OR

Q4) a) Compare ARM7, ARM9, ARM11 & ARM CORTEX processors. State applications of each. **[8]**

b) Write 'C' program for serial communications using LPC 2148 to send & receive data from PC. Select suitable baud rate. **[8]**

P.T.O.

- Q5)** a) Compare traditional O.S. with embedded O.S. [6]
- b) Explain difference between Monolithic and Microkernel. [4]
- c) Write 'C' program using μ cos RTOS to send message from one task to another task using mailbox. use minimum 3 tasks. What are the limitations of mailbox and how they are overcome. [8]

OR

- Q6)** a) Compare various scheduler algorithms used in embedded system. Which one is most popular Justify your answers. [8]
- b) What is need of 32 bit (ARM processors) in RTOS based embedded system. [4]
- c) Write 'C' program in RTOS Environment to control access of common resources. [6]

SECTION - II

- Q7)** a) Why linux 0.5 is popular in embedded system. [6]
- b) What are important components of embedded development system. [6]
- c) What is device driver. [4]

OR

- Q8)** a) Explain following
- | | |
|---------------|--------------|
| i) BOA loader | ii) Busy box |
| iii) Lib C, | iv) MTD |
- [8]
- b) What is kernel module? Write simple module program to display "Hello world". in embedded linux

Give complete steps for compiling, loading, attaching , running & removing module. [8]

- Q9) a)** Compare Vx works with μ COS RTOS. [8]
b) Explain software development cycle. [8]

OR

- Q10)a)** List various O.S used for mobile phones. Explain architecture Features of symbian O.S. [8]
b) Compare various models for software development. [8]

- Q11)a)** With suitable block diagram explain Hardware implementation of digital camera. State selection criterea for each hardware block. [8]
b) Energy meter is to be implemented using RTOS, briefly explain Following.
i) Number of Tasks ii) Task priority
iii) Memory requirement iv) IPC's types and number. [10]

- Q12)a)** Based on specifications implement hardware design of point of sales terminal (POS).
State selection criterea for each hardware block [8]
b) For mobile phone as embedded system discuss hardware and software design implementations. [10]

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Total No. of Questions : 12]

SEAT No. :

P3359

[4959]-93

[Total No. of Pages : 3

B.E. (E & TC)

INDUSTRIAL DRIVES & CONTROL
(2008 Course) (Semester - I) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to 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 indicates full marks.*
- 5) *All questions carry equal 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)** a) What are DC- to DC converters? Explain with diagram 4-Quadrant reversible dc drive with inductive load Draw suitable wave forms. [9]
- b) What is soft start? Explain. [3]
- c) Compare dual converter operating in circulating & non-circulating mode. [6]

OR

- Q2)** a) What are phase controlled converters? Explain with circuit diagram & wave forms working of 3-phase Fully controlled converter working with inductive load. Comment on Rectification & Inversion mode. [10]
- b) What is regenerative braking? Explain. [5]
- c) What is motor coasting? Explain in brief. [3]

P.T.O.

- Q3)** a) What are inverters? Explain with circuit diagram & waveforms working of 3 ϕ VSI operating in 180° mode conduction with star connected resistive load. State equation for any one line voltage. [10]
- b) What are cycloconverters? Explain with circuit diagram & state its applications. [6]

OR

- Q4)** a) What is Resonant converter? Explain with circuit diagram & wave forms working of Zero voltage switching resonant converter. [10]
- b) Compare Linear, switched mode & resonant converter. [6]
- Q5)** a) What are DC drives? Explain with circuit diagram & wave forms, working of 1 ϕ , separately excited DC motor working with highly inductive load. [8]
- b) Explain in brief, DC motor performance characteristics. [4]
- c) Explain field failure protection circuit for above motor. [4]

OR

- Q6)** Write short notes on any three [16]
- a) 3 ϕ Dual converter
- b) Speed control of 3 ϕ series motor
- c) 3 ϕ CSI
- d) Buck converters.
- e) Multi-level Inverters.

SECTION - II

- Q7)** a) What are induction motors? Explain with circuit diagram, speed control technique of IM by using $\frac{V}{f}$ control technique. [8]
- b) What is the necessity of soft - start in IM? Explain a simple method to provide soft-start. [4]
- c) What is slip-power recovery? Explain. [4]

OR

- Q8)** a) What is static scherbius system? Explain how will you improve the slip-power. State its subsynchronous & Supersynchronous modes. [10]
b) Discuss the variable frequency control method of an IM below & above rated frequencies. [6]
- Q9)** a) What is stepper Motor? Mention various types of stepper motors & explain any one type. State its applications. [8]
b) What are brushless motors? Explain with block diagram & comment on speed Vs Tq characteristics. [8]
- Q10)** a) What are permanent magnet motors? Explain any one type & state its applications. [8]
b) What is reluctance motor? Compare with salient pole PM. [8]
- Q11)** a) Explain the operation of fuzzy logic based IM for wind generation system. [10]
b) What is power Quality? Mention various types of power line disturbances & suggest prevertive & nullifying measures for these disturbances. [8]

OR

- Q12)** Write short notes on any three [18]
- Traction Drives.
 - LCI (Line commutated Inverter)
 - Flux Vector control of IM.
 - Static Krammer drive.
 - Protection Circuits for motors.

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Total No. of Questions : 12]

SEAT No. :

P3360

[4959]-94

[Total No. of Pages : 3

B.E. (E & Tc)

d:MICROWAVE COMMUNICATION AND RADAR

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 questions from section - I. and Q7 or Q8, Q9 or Q10, and Q11 or Q12 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 the IEEE electromagnetic frequency spectrum. [4]
- b) Explain the advantages and application of microwave. [4]
- c) Determine the cut-off wavelength of dominant mode in rectangular wave guide of breadth 10 cm. For a 2.5GHz signal propagated in this waveguide in the dominant mode. Calculate the guide wavelength, the group velocity and phase velocity. [6]
- d) Explain the need of coupling probes and loops alongwith diagram. [4]

OR

- Q2)** a) What is waveguide? Explain the parameters of rectangular waveguide. [6]
- b) What do you understand by the terms [8]
- i) Cut off wavelength ii) Dominant Mode
- iii) Phase velocity iv) Group velocity
- c) What is re-entrant cavity? Explain its uses briefly. [4]

P.T.O.

- Q3)** a) Explain the working principle, of construction and application of isolator and circulator. [8]
- b) Why is hybrid E-H plane Tee referred to as a magic tee. State and explain various applications of magic tee. [8]

OR

- Q4)** a) State and explain the properties of S parameters. [8]
- b) Explain the following in brief. [8]
- i) Waveguide transitions
- ii) Matched termination

- Q5)** a) What are cross field devices? Explain the π mode of oscillations in Magnetron. [8]
- b) Explain the operation of travelling wave tube along with slow wave structure. [8]

OR

- Q6)** a) Explain the bunching process in klystron tube. [8]
- b) A reflex klystron operates at the peak mode $n=2$ with $V_0 = 280$ volts, $f_0 = 22$ mA and a signal voltage $V_1 = 30$ volts calculate. [8]
- i) I/p power ii) O/p power iii) Efficiency

SECTION - II

- Q7)** a) Explain the working of Gunn diode with the help of two valley theorem. [8]
- b) What are the avalanche transit time devices? Explain the working of TRAPATT. [8]

OR

- Q8) a)** Write short note on **[8]**
- i) Varactor diodes
 - ii) Parametric amplifiers
- b) Explain the principle of operation, I-V characteristics and equivalent circuit of microwave tunnel diode. **[8]**

- Q9) a)** Describe the set up for the measurement of Q of a cavity resonator. **[8]**
- b) Write a short note on. **[10]**
- i) Measurement of noise factor
 - ii) Measurement of frequency and wavelength

OR

- Q10)a)** Explain in brief Network analysis. **[6]**
- b) Explain the phase shift measurement using double minimum method at microwave frequency. **[6]**
- c) How calorimetric method is used for measurement of microwave power? **[6]**

- Q11)a)** Explain the principle and working of MTI radar. **[8]**
- b) Explain the following terms **[8]**
- i) Blind speed
 - ii) PRF
 - iii) Monopulse tracking
 - iv) Duplexer

OR

- Q12)a)** Derive the RADAR range equation and explain the factors affecting the RADAR range. **[8]**
- b) Explain the following **[8]**
- i) Phased Array Radars
 - ii) Planar array radars.

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Total No. of Questions : 12]

SEAT No. :

P3361

[4959]-95

[Total No. of Pages : 3

B.E.(E&Tc)

**ENTREPRENEURSHIP DEVELOPMENT
(2008Course) (404185)(Elective-II)(Semester-I)**

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 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) State and explain the different skills required to be a good entrepreneur?[8]
b) State the various rules for writing a business Letter? [8]

OR

- Q2)** a) State and explain the various steps involved in the problem solving process? [8]
b) The monthly sales for your car wash firm for the first year were as shown:- [8]

Jan. \$ 2,750.	Apr. \$ 2,890	Jul. \$ 2,975	Oct. \$ 3,350
Feb. \$ 2,820.	May. \$ 2,920	Aug. \$ 3,025	Nov. \$ 3,400
Mar. \$ 2,875	Jun. \$ 2,960	Sep. \$ 3,130	Dec. \$ 3,550

- i) How does you calculate the total sales and average monthly sales.
- ii) Find the profit or Loss for the year, assuming that the total expenses were \$ 21,250.
- iii) Find the average monthly growth rate?
- iv) If the sales continue to grow at this rate, what will be the sales for every month next year?

P.T.O.

- Q3)** a) How does market economy differ from command economy? [8]
b) Explain how the entrepreneurs are affected by the taxes and subsidies?[8]

OR

- Q4)** a) State the advantages and disadvantages of owning a franchise? [8]
b) Why do many entrepreneurs prefer to start a new business rather than purchase a existing business? [8]

- Q5)** a) What is a market research? Explain the primary and secondary data market Research? [10]
b) Name and explain the three methods of determining the prices of a product? [8]

OR

- Q6)** a) What are the main options for Locating a retail business? Also enumerate its advantages and disadvantages. [10]
b) What are some of the reasons banks reject loan applications? [8]

SECTION-II

- Q7)** a) How can you motivate employees? Why should you deligate and Listen to your employees? [6]
b) What are the different training techniques. [6]
c) Explain the various factors which determine the amount of inventory you keep in stock. [6]

OR

- Q8)** a) Why do some businesses hire accounting professionals? [6]
b) Mr. Sanjay sells food processors under a combination plan. He earns Rs.15.00 per hour plus 15% of whatever he sells. Last month, he worked for 155 hours and had sold 13 food processors.
Five of the food processors were of top-model with a price band of Rs.1,350/- each. The remaining food processors were of Rs. 750/- each.
What is Sanjay's compensation of last month. [6]
c) Enumerate the steps involved in hiring the employees? [6]

Q9) a) Enumerate some of the ways by which you can improve your cash flow? [8]

b) What are some of the sources you can use to help you decide what technology equipment you need to purchase? [8]

OR

Q10) a) Enumerate the advantages of using the email and world wide web. state some of the things your website should include. [8]

b) Explain the Break Even point analysis with a suitable diagram? [8]

Q11) a) What are the responsibilities the entrepreneurs should have towards suppliers, customers and community? [8]

b) Why is it important for entrepreneurs to establish and write a code of ethics. [8]

Q12) a) As a business owner, what are some things you can do to protect the environment? [8]

b) Enumerate some of the risks and benefits of competing internationally. [8]



Total No. of Questions : 12]

SEAT No. :

P3362

[4959]-96

[Total No. of Pages : 3

B.E.(E&TC)

JOINT TIME FREQUENCY ANALYSIS

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

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 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) State Parseval's Theorem and verify the same for signal given below,

$$x(t) = e^{-15t} \cdot u(t) \quad [8]$$

b) Calculate the time variance and frequency variance for the function given as $\psi(t)$, the Haar Wavelet function. [10]

OR

Q2) a) Prove with an example that a time limited signal can not be band limited or vice versa. [8]

b) Write short note on: [10]

- i) STFT
- ii) Hilbert Transform

Q3) a) Find the instantaneous frequency of given signal, [6]

$$x(t) = \cos 20 t \cdot \cos 100 t$$

b) Obtain and sketch the magnitude and frequency response of Analysis filters of Haar 2- band filter bank. [10]

OR

P.T.O.

Q4) a) Explain the difference between $X(z)$ & $X(-z)$. Elaborate the difference using the equation, $X(z) = 1 + z^{-1}$ [6]

b) $x(n) = \{2, 1, 3, 7\}$

Decompose $x(n)$ belonging to V_2 subspace till V_0 subspace using Haar Wavelet packet. Also show the reconstruction of $x(n)$. [10]

Q5) a) What are the Nested Subspaces? Discuss the MRA axioms with neat diagram of nested subspaces. [10]

b) Draw and discuss the tiling diagrams of STFT & Wavelet transforms. [6]

OR

Q6) a) Derive the alias cancellation condition for 2-band Haar filter bank. Give the transfer functions of LPF & HPF used in analysis & synthesis filter banks. [10]

b) Prove that for Haar 2-band filter bank, analysis filters are power complementary. [6]

SECTION-II

Q7) a) If

$$\begin{aligned} x(t) &= t & 0 \leq t \leq 1 \\ &= 2-t & 1 \leq t \leq 2 \end{aligned}$$

Find projections of $x(t)$ on V_0 , V_1 & W_0 subspaces. [10]

b) Prove that $V_1 = V_0 \oplus W_0$ for above signal. [6]

OR

Q8) a) $H_0(z) = 1 + z^{-1} + z^{-2}$ &

$$H_1(z) = 1 - z^{-1} + z^{-2} - z^{-3}$$

Consider the two channel filter bank whose filters are given above.

Find out filters $G_0(z)$ & $G_1(z)$ so that alias cancellation occurs. [8]

b) State the advantages of Daubechies over Haar filters. Derive Daubechies filter coefficients. [8]

- Q9)** a) Derive the filter coefficients for 5/3 Biorthogonal filter bank. [10]
b) Discuss the properties of wavelet. [6]

OR

Q10) $x(n) = \{2, 7, 6, 12\}$.

Decompose $x(n) \in V_2$ using Lifting Scheme. Show the 'split', 'update' & 'predict' stages clearly on the diagram.

Show the reconstruction of $x(n)$ from the decomposed components. [16]

- Q11)** a) Explain the need for joint-time-frequency analysis with minimum three examples. [8]
b) Compare the spectrogram and scalogram alongwith mathematical equations. [10]

OR

Q12) Write short notes on (any three): [18]

- a) Signal denoising
- b) JPEG
- c) Speech Compression
- d) Hilbert & Banach spaces.



Total No. of Questions : 12]

SEAT No. :

P3363

[4959]-97

[Total No. of Pages : 2

B.E.(E & Tc)

**C: MICRO-ELECTROMECHANICAL SYSTEM& SYSTEM ON CHIP
(2008Course) (Elective-II)(404185)(Semester-I)**

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt from section-I : Q1 or Q2, Q3 or Q4,Q,5 or Q6 and from section-II: Q7or Q8,Q9 or Q10,Q11 or Q12*
- 2) *Draw neat diagrams.*
- 3) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain basic working principal of micro pressure sensor. What are major problems in these sensors? [8]
- b) What do you mean by scaling in electromagnetic force? Justify: electromagnetic force is $F \propto l^4$ for cross section area of conductor. [8]

OR

- Q2)** a) Explain mechanical properties of materials used in MEMS sensor design. [8]
- b) Explain working principal, advantage and disadvantage of Piezoresistive microaccelerometers? [8]
- Q3)** a) Explain principal planes of a silicon crystal. What characteristics do silicon principal planes offers? [8]
- b) Explain in general optical and optical silicon properties. [8]

OR

- Q4)** a) Explain various technological aspects of sensors. [8]
- b) Explain in detail necessary ingredients that will be involved in microsystem design. [8]
- Q5)** a) Explain working principal of biosensor for measurement of blood glucose concentration in a patient. [9]

P.T.O.

- b) Explain in detail electrophoresis. What is its role in MEMS fabrication?[9]

OR

- Q6)** a) Which different properties of molecule-based biosensors are used in MEMS based sensor design. [9]
b) Explain working principal of optical transducers. In which applications it is used? [9]

SECTION-II

- Q7)** a) Explain main characteristics of VLSI technology that are leading to overall organization of microprocessors. [8]
b) Explain in detail schematic of an MPEG2 encoder for terrestrial transmission. [8]

OR

- Q8)** a) Explain how code translation in a context to hardware and software. [8]
b) Explain in detail operation and working of dataflow execution. [8]

- Q9)** a) Explain abstraction levels in contact to synthesis tool. [8]
b) What are the goals of layout synthesis tool? Which technical issues CMOS layout tool handles? Differentiate horizontal versus vertical routing. [8]

OR

- Q10)** a) Explain in detail different approaches in area routing. [8]
b) Compare and contrast dataflow versus control flow. [8]

- Q11)** a) Explain the terms: [9]
i) Defects and fault method
ii) Fault simulation.
b) Explain in detail SOC test and how issues are demonstrated? [9]

OR

- Q12)** a) What are the issues in testing of core based systems on chip. [9]
b) What are the issues in packing the systems on chip? Which important features are needed to test MEMS and SOC chips? [9]



Total No. of Questions : 12]

SEAT No. :

P3364

[4959]-98

[Total No. of Pages : 2

B.E.(E & Tc)

**d- MOBILE COMMUNICATION
(2008Course) (Elective-II)(404185)**

Time :3Hours]

[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) *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) Compare common wireless communication system. [8]
b) List and explain hand off strategies in cellular communication [10]

OR

- Q2)** a) Describe the working operation of cell splitting and sectoring to improve coverage & copacity in cellular systems. [8]
b) Explain with neat diagram, significance of co-channel and adjacent channel Interference. [10]

- Q3)** a) With neat diagram, derive the expression for received power in free space propogation model. [8]
b) A receiver is located 12 km from a 25 W transmitter. The carrier frequency is 900 MHz. Find the power at receiver assuming free space propagation with $G_T=1$ and $G_r=2$. Also find the magnitude of E-field at the receiver antenna. [8]

OR

- Q4)** a) With neat diagram, describe doppler shift effect in mobile radio propagation path. [8]
b) Explain and differentiate between small scale and large scale fading. [8]

P.T.O.

- Q5)** a) Compare BPSK and QPSK modulation techniques. [8]
b) Explain with neat diagram any one adaptive equalization algorithm. [8]

OR

- Q6)** a) What is spread spectrum modulation technique. Describe direct sequence spread spectrum. [8]
b) Explain any one of the diversity technique in mobile receiver. [8]

SECTION-II

- Q7)** a) Compare FDMA and TDMA multiple access techniques for wireless communication. [8]
b) Describe with neat diagram working of GSM codec. [8]

OR

- Q8)** a) Explain CDMA multiple access techniques with neat waveforms [8]
b) List criterias for selection of speech coder for mobile communication.[8]

- Q9)** a) Draw the block diagram for GSM system architecture and explain function of each block. [10]
b) Explain steps involved in a call set up by a mobile phone. [8]

OR

- Q10)**a) Classify and brief the significance of physical and logical channels in GSM. [10]
b) List and explain GSM services. [8]
Q11) a) Describe soft hand over mechanism in IS-95 CDMA system. [8]
b) Discuss the evolution of CDMA 2000 from IS 95 and compare them.[8]

OR

- Q12)** a) Draw and explain IS-95 system block diagram. [8]
b) Give significance of air - interface in IS-95 CDMA system. [8]



Total No. of Questions : 12]

SEAT No. :

P3365

[4959]-99

[Total No. of Pages : 3

B.E.(E&Tc)

TELECOMMUNICATION SWITCHING SYSTEM

(2008 Coures) (Semester-II) (404187)

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain with neat diagram the time division switching with two basic ways to control the time stage memories. **[8]**

b) Write short note on digital cross connect systems and explain various blocks. **[8]**

OR

Q2) a) Compare space division & time division switching. **[8]**

b) Compare packet switching and message switching. **[8]**

Q3) a) Explain the following terms. **[10]**

- i) Busy hour
- ii) Grade of service
- iii) call completion Rate
- iv) Blocking probability
- v) Morkov chain

b) Derive and explain 'Erlang's lost-call formula with suitable assumptions. **[8]**

OR

P.T.O.

- Q4)** a) State and explain ‘constant and Exponential’ Holding time distributions [10]
- b) Explain following term [8]
- i) BHCR
 - ii) CCM and CM
 - iii) BHCA
 - iv) GOS

- Q5)** a) Design a three stage network that has 120 incoming line and 360 outgoing trucks. Also calculate the total cross points. [8]
- b) Explain with neat diagram in channel and common channel signaling. [8]

OR

- Q6)** a) Define and explain the terms “Availability” and unavailability of a dual processor system with necessary equations. [8]
- b) Explain the working of fully connected three stage switching network and derive the expression to find minimum switching elements. [8]

SECTION-II

- Q7)** a) What is the goal of network management? Explain the routing & flow control in network management. [8]
- b) What is pulse stuffing approach for network synchronization? [8]

OR

- Q8)** a) Explain the interface between TDM transmission link and a digital switch using Elastic store. [8]
- b) Explain the term “ Timing Jitter”. Draw neat diagram and explain the method for measuring timing Jitter. [8]

- Q9)** a) Explain the various types of services provided by ISDN. [8]
- b) Explain the need of pulse-stuffing in asynchronous multiplexing. [8]

OR

Q10) a) Explain user level and network level signaling in ISDN. [8]

b) Explain the ISO - OSI model in detail. [8]

Q11) Write a short note on any three: [18]

a) GPRS

b) Enhanced services in GSM

c) Frequency Reuse scheme

d) Cellular system topology

OR

Q12) a) What is handoff? Explain various types of Handoff. [9]

b) Compare personal communication system and standard cellular system. [5]

c) What are the advantages of Digital TDMA system. [4]

