

Total No. of Questions : 12]

SEAT No. :

P716

[Total No. of Pages : 4

[4659] - 1

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(Semester - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section - I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section - II.*
- 2) *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, electronics pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Describe the relationship between TOC, COD and BOD, as well as explain effect of change of life on sewage quality. [8]
- b) Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm dia. with sand particles of 1 mm dia. and specific gravity 2.66. Assume $\beta = 0.06$ and $f = 0.02$. Assume the sewer to run half full. Take $N = 0.012$. [8]

OR

- Q2)** a) A community discharges 20 MLD of wastewater. Draw a conventional flow diagram for Treating this wastewater. Discuss the concepts on which the design of the proposed treatment Units are based. [8]

P.T.O.

b) During BOD test conducted on a 5% dilution of waste, the following observations were taken. [8]

i) Do of aerated water used for dilution = 3.6 mg/L

ii) Do of original sample = 0.8 mg/L

iii) Do of diluted sample after 5 day incubation = 0.7 mg/L

Compute :

a) 5 day BOD and

b) Ultimate BOD

Assume deoxygenation constant at test temperature as 0.12.

Q3) a) With a neat diagram explain the various zones and types of settling tank. [8]

b) Give the Streeter – Phelps equation and explain each term in the equation. [8]

OR

Q4) a) What do you understand by self-purification property of a stream? Explain the factors affecting this property. [8]

b) Assuming suitable design criteria, design a horizontal flow type grit chamber for a proposed sewage treatment plant expected to treat 60,000 m³/day maximum flows. The estimated average and minimum sewage flows are 45,000 m³/day and 15,000 m³/day respectively. The flow through velocity of 0.3 m/s is to be controlled by a proportional weir. [8]

Q5) a) Write short note on : [8]

i) F/M Ratio

ii) MLVSS

iii) MCRT

iv) SLR

- b) Assuming reactor volume equal to 5000 m^3 , and MLSS concentration in the reactor as 3000 mg/L . Compute the sludge production rate, and sludge wasting rates [10]
- i) from recycled line and
 - ii) from the reactor for an activated sludge plant design to operate mean cell residence time of 10 days to maintain 1000 mg/L concentration of recycled sludge.

OR

- Q6)** a) Describe the removal mechanism in a rotating biological contactor. [8]
- b) Design a high rate single stage trickling filter for treating the following wastewater of a town having population of 4000 persons : [10]
- i) Domestic sewage @ 150 lpcd having 200 mg/l of BOD.
 - ii) Industrial wastewater @ $0.25 \text{ million litres per day}$ having 600 mg/l of BOD.

Assume the following.

- a) BOD removal in primary clarifier = 35% .
- b) Permissible organic loading of filter = $8000 \text{ mg/hect-m/day}$ (Excluding recirculated sewage).

Also determine the efficiency of the filter and BOD of the effluent.

SECTION - II

- Q7)** a) Classify the difference between the aerated lagoon and oxidation ditch with respect to process design. [8]
- b) Design an oxidation pond for treating sewage from a hot climatic residential colony with 5000 persons, contributing sewage @ $120 \text{ litres per capita per day}$. The 5-day BOD of sewage is 300 mg/L . [8]

OR

- Q8)** a) Elaborate phytoremediation technology for wastewater treatment. [8]
- b) Elaborate theory of root zone cleaning system. [8]

Q9) a) For a residential building, septic tank and the soil absorption system for the disposal of the septic tank effluent is to be designed having following data : **[8]**

No. of persons = 150

Percolation rate = 15 minutes per cm

b) Give a simple flow chart for sludge treatment and digestion; also explain the factors affecting sludge digestion. **[8]**

OR

Q10) a) Explain methods of sludge treatment and disposal along with advantages & disadvantages. **[8]**

b) Explain principle, mechanism, advantages & disadvantages of Up-flow Anaerobic Sludge Blanket (UASB) Reactor. **[8]**

Q11) Write short note on the following chemical treatments of Industrial wastewaters. **[18]**

a) Methods of sampling

b) Equalization

c) Neutralization

d) Chemical Coagulation

e) Adsorption

f) Air-stripping

OR

Q12) Give the range of important characteristics of wastewater from the following industries and draw a suitable flow diagram for treatment of each industry. **[18]**

a) Distillery Industry

b) Sugar Industry

c) Pulp and paper Industry.



Total No. of Questions : 12]

SEAT No. :

P1053

[Total No. of Pages : 3

[4659]-10

B.E. (Civil Engineering)

b-HYDROINFORMATICS

(2008 Course) (401005) (Semester-I) (Elective-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1) a)** Enumerate the basic scientific disciplines giving important aspects of each on which hydro informatics is based. **[10]**
- b) Design of hydro-informatics system to analyze the quantity and quality of available ground water in a particular area. **[8]**

OR

- Q2) a)** Define Hydroinformatics. What are the different techniques used in Hydroinformatics to solve the water scarcity problem in a particular area? **[8]**
- b) A commercial Hydroinformatics system is to be formed by managing reservoir operation with respect to release of water for an navigation system and for industrial use for a city what components you suggest, explain with justification. **[10]**

- Q3) a)** 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]**
- b) You have to design a graphical user interface for streamflow forecasting system, explain the front end and back end parameters. **[8]**

OR

P.T.O.

Q4) a) What is a decision support system in water resources engineering? What are its components? What is the role of government sector in decision support system? [8]

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

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

b) Discuss design of simulation model for industrial waste water 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) 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]

SECTION-II

Q7) a) 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. [10]

b) Define normalization in Artificial neural network. What is the importance of normalization? What are typical ranges of normalization? [8]

OR

Q8) a) Explain the statement “Artificial Neural Networks are gray boxes”. What is conjugate gradient algorithm? Explain different search routines of conjugate gradient algorithm. [12]

b) Explain in detail mutation and reproduction in GA. [6]

Q9) a) Discuss a study about application of Artificial Neural Networks in Water Resources Engineering giving details about problem definition, objective, data, inputs, outputs, algorithm used and results. [8]

b) State advantages of Genetic Algorithm over traditional methods. [8]

OR

Q10)a) Explain different techniques of evolutionary computing. Discuss any one of them in detail. [8]

b) Explain the terms epoch, normalization, performance function, activation function, delta rule, over fitting in relation to artificial neural networks? [8]

Q11)a) Discuss limitations Genetic Algorithm of with respect to data requirement, magnitude of data selection process and lack of physical concept. [8]

b) Write the working principle of artificial neural network and enlist various applications of ANN in Water Resources Engineering. [8]

OR

Q12) Write detail notes on (Any Two): [16]

a) Gradient descent algorithm with momentum.

b) Applications of GA in Water Resources Engineering.

c) Recurrent Neural Networks.



Total No. of Questions : 12]

SEAT No. :

P844

[4659]-103

[Total No. of Pages : 3

B.E. (Electronics & Telecommunication) (Semester - II)

***a* - ARTIFICIAL INTELLIGENCE**

(2008Pattern) (Elective-IV)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the different architectures of agents and give at least two examples where these agents are used. **[10]**

b) Compare Depth First and Breath First search methods. **[8]**

OR

Q2) a) Give PEAS descriptors for the following: **[10]**

- i) Medical Diagnosis System,
- ii) Interactive English Tutor.

b) Write C pseudo code for depth limit search method. Explain its merits and demerits. **[8]**

Q3) a) Compare the different uninformed searching strategies with respect to different parameters. **[8]**

b) Explain A* algorithm and write its C pseudo code. **[8]**

OR

P.T.O.

Q4) a) Explain hill climbing algorithm. Explain plateau, ridge, local maxima and global maxima. [8]

b) Define Heuristics. Explain the significance of Heuristic function in the informed search with suitable example. [8]

Q5) a) Explain the working of Unification algorithm with suitable example. [8]

b) State the rules and steps for converting a given well predicate logic statements to clausal form. [8]

OR

Q6) a) Explain backward chaining algorithm with suitable example. [6]

b) Consider the following axioms: [10]

If a triangle is equilateral then it is isosceles.

If a triangle is isosceles then two sides AB & AC are equal.

If AB&AC are equal then angle B and C are equal.

ABC is an equilateral triangle.

i) Represent these facts in predicate logic.

ii) Use resolution to prove: "Angle B is equal to angle C".

SECTION-II

Q7) a) What are the different learning methods? Explain them in short. [10]

b) Which are the different ways to assess the performance of learning algorithm? [8]

OR

Q8) a) Explain the decision tree algorithm with suitable example. [10]

b) Explain in detail architecture of artificial neural network. [8]

- Q9)** a) What is difference between expert system and traditional system? Comment on the advantages and disadvantages of expert system. [8]
- b) Design phases of an expert system to diagnose childhood disease. [8]

OR

- Q10)**a) Explain Waltz algorithm with example and comment on its limitations. [8]
- b) What is the perception? Give detailed structures of it. [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) Explain the Syntactic analysis with suitable example. [8]
- b) Explain the Semantic analysis with suitable Example. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P845

[4659]-104

[Total No. of Pages : 3

B.E. (Electronics & Telecommunications)
b - AUTOMOTIVE ELECTRONICS
(2008 Pattern) (Elective-IV) (Semester - II)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Compare and contrast S.I. and D.I. engine. **[8]**
- b) Explain with the help of neat diagram. **[10]**
- i) Drive train
 - ii) Suspension system

OR

- Q2)** a) Explain Ignition system for S.I. engine. **[8]**
- b) Write short note on following: **[10]**
- i) Battery charging / Technology.
 - ii) D.C. series motor.
- Q3)** a) Explain principle of hall effect sensor with any application in automotive. **[8]**
- b) Explain working principle required for sensing following parameters:**[8]**
- i) Manifold absolute pressure (MAP).
 - ii) Torque sensing.

OR

P.T.O.

- Q4)** a) Explain working principle and use of solenoid in automotive. [8]
b) With the help of block diagram explain engine control management. [8]
- Q5)** a) Explain significance of PID control in cruise control system. [8]
b) With the help of block diagram explain engine management system. [8]

OR

- Q6)** a) Why after braking steerability is possible in ABS. [8]
b) Explain Electronic control in spark ignition system. [8]

SECTION-II

- Q7)** a) Explain selection criteria for using controller in automotive system. [8]
b) Explain Interrupt structure of 8-bit PIC microcontroller. [6]
c) Explain any one use of timer / counter in automotive. [4]

OR

- Q8)** a) With the help of one example explain significance and role of DSP processor in automotive. [10]
b) Write a C|8 program to toggle only the PORT B.4 bit continuously for every 50 ms. Use timer 0, 16 bit mode, the 1:4 prescaler to create the delay. Assume XTAL = 10MHz. [8]
- Q9)** a) Explain requirement of MOST protocol in automotive with the help of any two applications. [8]
b) Explain an applications of GPS & GPRS in automotive. [8]

OR

Q10)a) Why CAN is called Real time protocol? Explain any one usage in automotive. [8]

b) Explain general structure of ECU in automotive. [8]

Q11)a) Explain on - Board diagnostics in automotive. [8]

b) Explain passenger safety norms in automotive. [8]

OR

Q12)a) Explain emission control standard. [8]

b) What are preliminary checks & adjustments in diagnostics? [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P846

[4659]-105

[Total No. of Pages : 3

B.E. (E &TC)

c - NANO TECHNOLOGY

(2008 Pattern) (Elective-IV) (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 diagram must be drawn wherever necessary.*
- 4) *Figure to the right indicates full marks.*

SECTION-I

Q1) Write short notes on:

[18]

- a) Nano crystal growth
- b) Dip pen Nano Lithography
- c) Spectroscopy

OR

Q2) a) Explain the tools to imagine the Nano behaviour.

[9]

b) List out the tools for measuring the Nano structures. Explain on tool in detail.

[9]

Q3) 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]

OR

Q4) a) Explain scanning probe microscopy.

[8]

b) Explain the silicon Nano crystal non volatile memory bit cell.

[8]

P.T.O.

- Q5)** a) List out & explain the applications of carbon Nano tubes. [8]
b) Write short notes on: [8]
i) Single wall carbon Nano tube.
ii) Multi wall.

OR

- Q6)** a) Explain the properties of metal Nano cluster. [8]
b) What are the different types of carbon structure? Explain it. [8]

SECTION-II

- Q7)** a) Explain the switching process of Azobenzene molecule with respect to molecular switches. [6]
b) Explain optical lithography. [6]
c) Explain fabrication technique used for NEMS. [6]

OR

- Q8)** a) Explain Nano imprint lithography. [6]
b) Explain in detail NEMS. [6]
c) Explain in detail Quantum Correl technology. [6]
- Q9)** a) Explain soft computing with respect to Nano electronics. [8]
b) What are the different tools for fabrication of micro and Nano structure. [8]

OR

Q10) Write short notes on with respect to Nano electronics: **[16]**

- a) EM field and photons.
- b) Quantization of action charge and flux.

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 Electronics & explain any two of them in detail. **[8]**

EEE

Total No. of Questions : 12]

SEAT No. :

P847

[4659]-106

[Total No. of Pages : 3

B.E. (Electronics & Telecommunication)
d -PLC & INDUSTRIAL PROCESS AUTOMATION
(2008 Pattern) (Elective-IV) (Semester- II)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from each Section.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

- Q1) a)** Explain the following: **[8]**
- i) Control system networks.
 - ii) Foundation field bus and Profi bus.
- b) Explain the process control elements with the help of process control system. **[8]**

OR

- Q2) a)** What is P&I diagrams? Explain what information it contains & its use for system engineer. **[8]**
- b) Explain the process control principle with the help of examples. **[8]**
- Q3) a)** What are signal transmission standards used in process control systems? Which signal standard is most popular? Why? **[8]**
- b) A temperature sensor has a span of 20° - 250°C. A measurement results in a value of 55°C for the temperature. Specify the error if the accuracy is **[8]**
- i) $\pm 0.5\%$ full scale
 - ii) $\pm 0.75\%$ of span
 - iii) $\pm 0.8\%$ of reading.
- What is possible temperature in each case?

OR

P.T.O.

- Q4)** a) What is the need of transmitter? Explain two wire transmitter topology in detail? What are the drawbacks of two wire transmitters and how to eliminate them? [8]
- b) Explain the following terms concern to process measurement. [8]
- i) Repeatability
 - ii) Span and range
 - iii) Accuracy and ways to express it.
 - iv) Linearity and linearization
- Q5)** a) A PD controller has a 0.4 to 2.0 V input measurement range and 0 to 5 V output range. $K_p = 5\% / \%$, $K_D = 0.08\% / (\%/min)$. The period of the fastest expected signal change is 1.5 sec. Implement this controller with Op-Amp. [4]
- b) What is linearization of the sensor? What are the various methods used for linearization? [6]
- c) Explain any one controller tuning method in brief. [8]

OR

- Q6)** a) Discuss and derive PID algorithm for Digital implementation. [8]
- b) State various implementation of PI controller? Explain any one in detail. Explain effect of integral action on loop response. [8]

SECTION-II

- Q7)** a) Draw the block diagram of final control operation. Explain the operation of each block in it. [8]
- b) Explain the different signal conversion techniques related to final control operation. [8]

OR

- Q8)** a) Write a short notes on electrical actuators. [4]
- b) Draw and explain the pneumatic and hydraulic actuators. [6]
- c) A magnetic amplifier requires a 5V to 10 V input signal from a 4mA to 20mA control signal.
Design and draw a signal conversion system. [6]

- Q9) a)** Draw and explain the block diagram of PLC. Why PLC is popular in process industry? [10]
- b) Draw diagram with appropriate sensing elements for level control process automation for pumping the water from ground tank T_1 to overhead tank T_2 , the following operation is required. [8]
- Pump the water in T_2 only when there is low level in T_2 and no low level in T_1 .
 - Pumping should stop on high level of T_2 .
 - T_1 inlet valve should close automatically on high level of T_1 .
- Draw appropriate ladder diagram?

OR

- Q10)a)** Explain what is PLCs in following regards: [8]
- Elements of PLCs.
 - Operation of PLC.
 - Scan Cycle and Scan Time.
 - PLC Programming Languages.
- b) Draw ladder diagram for below logic. [6]
- $\overline{A.B} = \bar{A} + \bar{B}$
 - $\overline{A+B} = \bar{A}.\bar{B}$
- c) Write down the selection criteria of PLC. [4]
- Q11)a)** Write a short notes on: [8]
- Fuzzy logic system
 - Statistical Process Control.
- b) Explain fuzzy controller in details. [8]

OR

- Q12)a)** Explain Artificial Neural Network (ANN) controller in details. [8]
- b) Draw ladder diagram for 4:1 multiplexer. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P763

[4659] - 108

[Total No. of Pages : 3

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) With the help of block diagram, explain different stages of an electronic product development. **[8]**
- b) Compare consumer, industrial and military products on the basis of reliability, cost to the performance ratio and temperature range. **[6]**
- c) Explain the bath tube curve indicating all its regions. **[4]**

OR

- Q2)** a) Explain the concept of reliability. Calculate MTBF and reliability for 10,000 Hrs, if the total F.R= 2.5×10^{-6} **[8]**
- b) Differentiate between Quality and reliability. **[6]**
- c) Explain different reliable soldering practices. State their advantages and limitations. **[4]**

- Q3)** a) Explain typical motor control system using ADC MAX 11046 as data acquisition system. **[8]**
- b) Explain the significance of following errors associated with ADC- **[8]**
- i) Gain error
 - ii) Offset error
 - iii) Non linearity error.

What are the techniques used to minimize these errors.

P.T.O.

OR

- Q4)** a) What are the factors affecting the choice of op amp in signal conditioning? Explain with the help of example. [8]
- b) Explain the need of Vref in ADC. Explain the factors to be considered while selecting Vref. Discuss on error budget depending on Vref and no. of output bits. [8]
- Q5)** a) Explain the selection of microcontroller to particular application based on- [8]
- i) I/O pins.
 - ii) Counters
 - iii) RAM & ROM
 - iv) Architecture
- b) Design and explain four channel temperature scanner using AD7817 with any microcontroller. [8]

OR

- Q6)** a) Explain I2C and SPI protocols with application and limitations. [8]
- b) Design and explain interfacing of 4×4 keypad and 4 wire resistive touch screen with microcontroller. [8]

SECTION - II

- Q7)** a) Explain different phase of software design. [10]
- b) With the help of suitable example explain in detail how waterfall model is used for software development. [8]

OR

- Q8)** a) Explain in detail debugging tools and techniques for software. [10]
- b) Write note on- [8]
- i) Compiler
 - ii) Emulator
 - iii) Simulator
 - iv) Assembler

- Q9)** a) What are the different PCB Design issues of analog and mixed signal Circuits. Explain in details. [8]
- b) What are the issues to be considered in ensuring the signal integrity in high speed circuits? [4]
- c) Write a note on EMI and EMC standards. [4]

OR

- Q10)**a) Explain PCB design rules for grounding and shielding. [8]
- b) Why bare board testing of PCB is important. [4]
- c) Two tracks on PCB laminate having thickness of 3.2 mm and $\epsilon_r = 4.7$ and having an overlapping area of 4 cm². What will be the capacitance between two tracks. [4]

- Q11)**a) Justify the usefulness of sensitivity analysis with the help of suitable example. [8]
- b) Why environmental testing is necessary? How it is carried out? [8]

OR

- Q12)**a) Explain the significance of following specifications of DSO- [8]
- i) Memory depth
- ii) Sampling rate
- iii) Bandwidth
- b) Explain how debugging of electronics circuit is carried out by logic analyzer. [8]



Total No. of Questions : 12]

SEAT No. :

P723

[Total No. of Pages : 4

[4659] - 11

B.E. (Civil)

TQM AND MIS IN CIVIL ENGINEERING
(Semester - I) (2008 Pattern) (Elective - II (c))

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 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 indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain any 3 definitions of quality with proper examples from the construction sector. [9]
- b) Enlist any 9 reasons for poor quality of construction on a project. [9]

OR

- Q2)** a) Discuss the challenges faced on a construction project, due to globalization. [9]
- b) Enlist any 9 measures to be adopted by a manager for improving quality of construction. [9]
- Q3)** a) Differentiate between a process based approach and a product based approach with proper examples. [4]
- b) Differentiate between QA and QC with proper examples. [4]
- c) Discuss importance of checklists in construction of an RCC item of footing, with examples. [8]

P.T.O.

OR

Q4) a) Explain with examples : **[8]**

- i) Leadership from top management.
- ii) Customer delight
- iii) Decision making based on facts.
- iv) Reciprocal supplier relationships.

b) Explain what type of documentation is necessary in order to achieve an ISO 9001 certification for a construction organisation building multistoreyed buildings. **[8]**

Q5) a) Define TQM and explain short term and long-term objectives. **[8]**

b) Determine the six sigma level for a concreting activity based on the following data : **[8]**

| Sr No. | Quantity of concrete cast (m ³) | Defective work (m ³) |
|--------|---|----------------------------------|
| 1 | 200 | 90 |
| 2 | 150 | 20 |
| 3 | 180 | 35 |
| 4 | 220 | 105 |
| 5 | 160 | 45 |
| 6 | 190 | 75 |
| 7 | 155 | 25 |
| 8 | 175 | 80 |
| 9 | 210 | 50 |
| 10 | 215 | 25 |

What steps do you suggest to improve the sigma level? Explain.

OR

- Q6)** a) Discuss advantages of implementing TQM principles in the construction sector with examples. [8]
- b) What is 6 sigma? How are the sigma levels decided? Why 6 sigma is a useful tool in management? Explain. [8]

SECTION - II

- Q7)** a) Define Management Information System (MIS) and with help of a diagram, explain the 5 information system resources which any MIS handles. [10]
- b) With any practical example, explain the 3 basic interacting components of a dynamic system. [8]

OR

- Q8)** a) Define a system. Explain various subsystems of MIS with practical examples from construction organisations. [10]
- b) Explain the basic foundation concepts of information systems and technologies with examples. [8]

- Q9)** a) Explain how the PRRT software will help the management activity of quality assurance as a part of the project site operational control mechanism, in detail. [10]
- b) Explain use of an MIS in the strategic planning of a contractor's organisation, executing township projects. [6]

OR

- Q10)** a) Explain how the PRRT software will help for achieving management control on rework associated with a building construction project in detail. [10]
- b) Explain MIS structure consisting of Internet, Intranet and Extranet for managing e-business operations and e-commerce with help of a flow chart. [6]

- Q11)** a) With a diagram, explain the framework which outlines the major areas of information based support system knowledge needed by business professionals, in detail. [10]
- b) Explain the ERP software as an MIS used by construction organisations mentioning various features of the same. [6]

OR

- Q12)** a) Discuss advantages of ERP softwares used by the construction organisations executing township building projects, by giving proper examples. [10]
- b) Explain the type of information necessary to develop an MIS for a construction organisation constructing a bungalow, in order to increase the sales. [6]



Total No. of Questions : 12]

SEAT No. :

P765

[4659] - 110

[Total No. of Pages : 3

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

EMBEDDED SYSTEM

(2008 Pattern)

Time : 3 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 books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Neat diagrams must be drawn wherever necessary.*
- 6) *Use of non programmable electronic pocket calculators is allowed.*

SECTION - I

Q1) a) Define embedded systems. With an example, explain the design metrics challenges in developing embedded system **[8]**

b) With the help of protocol stack and state transition diagram describe the communication in Bluetooth protocol. **[8]**

OR

Q2) a) Explain the role of Integrated Development Environment (IDE) for embedded application design. **[8]**

b) What is time to market? Draw and explain simplified revenue model and also calculate losses if product is delayed by 4 and 8 weeks, assuming product life to be 52 weeks. **[8]**

Q3) a) Explain the software architectures used in Embedded Systems. **[10]**

b) List and explain specifications of embedded processor. Compare Harvard and Von-Neumann processor architectures. **[8]**

OR

Q4) a) What factors need to be considered while selecting a memory? Explain interfacing a memory with a processor with suitable example. **[10]**

b) What is a role of interrupt in Embedded System? Explain how timings are controlled using interrupts. **[8]**

P.T.O.

- Q5)** a) List and explain different operating modes in ARM7 processor. [8]
b) List the features of LPC 2148. Explain the LPC 2148 registers used configuring ADC. [8]

OR

- Q6)** a) What do you understand by a programming model? Explain the difference between ISP and IAP. [8]
b) Draw and explain the block diagram of LPC 2148. [8]

SECTION - II

- Q7)** a) Explain on chip ADC/DAC of LPC2148. Also write a program for ADC interfacing to display analog input on LCD. [8]
b) List the on chip communication protocols in LPC2148. Write and explain the program to transmit a single character using UART of LPC2148. [8]

OR

- Q8)** a) Explain the tool chain for programming using Embedded C. [8]
b) Write and explain the code for interfacing of 4×4 matrix keyboard with LPC 2148. Display the key pressed on LCD. [8]

- Q9)** a) Enlist the μ cos - II features. Draw and Explain the μ cos - II Architecture in detail. [8]
b) What do you understand by the term “clock tick” in RTOS? Explain the time management functions in μ cos - II [8]

OR

- Q10)**a) Compare the traditional OS with RTOS and explain the task states and enlist the function for transition of state in the μ cos - II. [8]
b) Define the context switching. What are the steps involved in μ cos - II context switching? Why it puts additional burden on OS? [8]

Q11)a) Explain digital camera with suitable block diagram and state its hardware and software requirements. **[10]**

b) Explain priority inversion problem in μ cos - II RTOS with an example and discuss the solution for same. **[8]**

OR

Q12)a) Explain interrupt management in μ cos - II with timing diagram. **[8]**

b) Explain with neat diagram of adaptive cruise control of vehicle with its hardware and software requirements. **[10]**



Total No. of Questions : 12]

SEAT No. :

P766

[4659] - 111

[Total No. of Pages : 3

**B.E.(Electronics) (Semester - I)
ADVANCED MEASUREMENT SYSTEMS
(2008 Pattern) (Elective - I(a))**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer 3 questions from Section - I and 3 questions from Section - II*
- 2) Answer to the two sections should be written in separate books.*
- 3) Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Discusses the signal Integrity and different design issues related to it. [8]
- b) Explain the different features of MSO (Mixed Signal Oscilloscope) and its applications in electronic measurements. [8]

OR

- Q2)** a) Explain Arbitrary Waveform Generator and it's typical applications. [8]
- b) What are differences between DSO and DPO? Give typical application of DPO. [8]

OR

- Q3)** a) Explain with necessary diagram, different DSO trigger methods. [8]
- b) Explain with diagram functional working of swept spectrum Analyzer explain measurements by spectrum analyzer. [8]
- Q4)** a) Explain with necessary diagram working of logic analyzer. [8]
- b) Define the terms with respect to spectrum analyzer. i) Resolution BW. ii) Span, iii) Sensitivity, iv) DynamicRange [8]

P.T.O.

- Q5)** a) Explain the interfacing techniques for touch screen and thermal printer. [8]
b) Write a short note on: (Any Two) [10]
i) USB standard
ii) I2c standard
iii) AT commands for GSM

OR

- Q6)** a) What is the need of interfacing in embedded systems? [6]
b) Explain the interfacing of graphic LCD display with typical embedded processor . [6]
c) Explain the use of RF modules and Ethernet in Embedded systems. [6]

SECTION - II

- Q7)** a) Discuss EMI/EMC test set up for conducted and radiated emission measurement [8]
b) Explain the terms: [8]
i) Microwave Enclosures
ii) Microwave Hazards

OR

- Q8)** a) Explain different attenuation measurement techniques in microwave network. [8]
b) Write short notes on: [8]
i) Microwave power measurement
ii) Typical cavity wave meters.

- Q9)** a) Explain the concept of virtual Instrumentation and its applications [8]
b) Explain the term of virtual Instrumentation [8]
i) GPIB
ii) VXI

OR

- Q10)**a) Explain SCPI coding with respect to virtual Instrumentation. [8]
b) Explain in brief the role of software and Hardware in virtual Instrumentation. [8]

Q11) Draw the block diagram of universal counter and explain how the universal counter is used to measure frequency, period, Time Interval and Ratio. [18]

OR

- Q12)**a) Explain the concept of DAC. List various types and Explain any two types of DAC. [10]
b) Explain the terms: [8]
i) Measurement errors in counter
ii) Data logger



Total No. of Questions : 12]

SEAT No. :

P2138

[Total No. of Pages : 3

[4659] - 112

B.E. (Electronics)

B : ADVANCED POWER ELECTRONICS

(Semester - I) (2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.no. 1 or 2; Q.no. 3 or 4; Q.no. 5 or 6 from Section - I and Q.no.7 or 8; Q.no.9 or 10; Q.no.11 or 12 from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams and waveforms 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 stream tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What is the need of series converter? Explain with the help of neat circuit diagram and waveforms working of single phase series full converter for level load. **[10]**
- b) For the above converter, derive an expression for input power factor. **[8]**

OR

- Q2)** a) With the help of neat circuit diagram, explain double side PWM Converter. Comment on power factor. **[10]**
- b) With the help of neat circuit diagram and relevant waveforms, explain Twelve-Pulse converter and its industrial application. **[8]**

P.T.O.

Q3) a) With the help of block diagram, explain PLL control of DC drives and state its advantages. [8]

b) With the help of neat circuit diagram, explain Cycloconverter based 3-phase induction motor drive. [8]

OR

Q4) Write a short note on any two : [16]

a) Microcontroller based DC drives.

b) Indirect vector control of AC drives.

c) Adaptive control.

Q5) a) With the help of neat circuit diagram and relevant waveforms, explain the operation of cascaded multilevel inverters. What are the advantages and disadvantages of it? [12]

b) What are the types and features of multilevel inverters? [4]

OR

Q6) a) What are the advanced modulation techniques of inverters? Explain. [12]

b) With the help of neat circuit diagram, explain the operation of variable dc-link inverter. [4]

SECTION - II

Q7) a) What are the advantages of resonant converters over switch mode converters? [6]

b) With the help of neat circuit diagram, relevant waveforms and mode equivalent circuits, explain the operation of a ZCS resonant DC-DC converter. [10]

OR

- Q8)** a) What are low drop out Regulators? Explain. [8]
b) What is the need of hot swappable redundant power supplies in industries? Explain. [8]

- Q9)** a) What is the role of Power Electronics in renewable energy? Explain with neat circuit diagram variable wind energy conservation system. [10]
b) What are solar powered drives? Explain. [8]

OR

- Q10)** Write a short note on any three : [18]
a) Traction drives.
b) Battery Charger.
c) Photo voltaic energy conservation system.
d) Energy conservation in electrical drives.

- Q11)** a) What is the need of energy audit? Explain in brief. [8]
b) What is HVDC? Explain. [8]

OR

- Q12)** a) What is power quality? Why it is required? Explain different types of power line disturbances. [8]
b) Explain the term 'voltage sag' and 'voltage swell'. What are the different sources / causes of voltage sags and swells? [8]



Total No. of Questions : 12]

SEAT No. :

P767

[4659] - 113

[Total No. of Pages : 2

B.E.(Electronics)

BIO-MEDICAL INSTRUMENTATION (TH)

(2008 Pattern) (Elective - I(c)) (Semester- I)

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) Explain the various types of body signal. [6]
b) Draw and explain electrical equivalent circuit of the body cell structure. [6]
c) Explain in detail the electrode skin interface and motion artifact. [6]

OR

- Q2)** a) Write a short note on Bio-Medical instrumentation system. [6]
b) Explain the construction and working principle of chemical sensor for measurement of pH. [6]
c) Write a note on Bio-Electrodes. [6]

- Q3)** a) Explain 10-20 electrode placements for EEG. [8]
b) Write a note on analysis of diseases using EEG. [8]

OR

- Q4)** a) Explain the types and significance of EEG signals. [8]
b) Write a note on EMG machine. [8]

- Q5)** a) Draw and explain the Einthoven's Triangle showing clearly the standard wave patterns recorded. [8]
b) Write a note on Phonocardiography. [8]

P.T.O.

OR

- Q6)** a) Explain the correlation of the four heart sounds with electric and mechanical events of the cardiac cycle. Also give different Auscultation techniques. [8]
- b) Explain in detail ECG Machine. [8]

SECTION - II

- Q7)** a) Write in brief about the life saving instrument - Defibrillator. [6]
- b) Explain finger plethysmography. [6]
- c) Give any two techniques for the blood flow measurement. [6]

OR

- Q8)** a) Explain briefly the types of pacemakers. [6]
- b) Explain the sphygmomanometer. [6]
- c) Write a note on Bedside monitor. [6]

- Q9)** a) Explain the concept of blood gas analyzer. [8]
- b) Explain the significance and working principle of an electron microscope. [8]

OR

- Q10)**a) Explain pulse oximeter with neat diagram. [8]
- b) Explain in brief dialysis system. [8]

- Q11)**a) Explain the MRI machine. [8]
- b) How lasers are used in dermatological applications. [8]

OR

- Q12)**a) Write a note on Ultrasonic Doppler Machine. [8]
- b) Explain the Ortho Pentamo graph. [8]



Total No. of Questions : 12]

SEAT No. :

P1769

[4659] - 114

[Total No. of Pages : 3

B.E. (Electronics Engg.)

d - MECHATRONICS

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

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 indicate full marks.*
- 5) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) Define Mechatronics Systems. Explain any two components with their major functions. **[8]**
- b) Explain in detail, modelling procedure of Mechatronics systems with suitable example. **[8]**
- Q2)** a) State different types of chains and sprockets. Mention application of each in detail. **[8]**
- b) With suitable example, explain the step wise design procedure for any one Mechatronics System. **[8]**
- Q3)** a) What is Elastic system modeling? Explain in detail. **[8]**
- b) What is a model? Explain simple dynamic models. **[8]**
- Q4)** a) Explain any two common structures in Mechatronics in detail. **[8]**
- b) What are the different methods to model Electromechanical systems? Quote suitable example. **[8]**

P.T.O.

- Q5)** a) Explain specifications and selection criterion for different level sensors used in Mechatronic systems. [8]
b) Explain different types of mechanical actuators with suitable examples. [10]

- Q6)** a) Write short note on DC brushed motors and DC servo motors. [10]
b) Explain variable frequency drives and drive system load calculation with reference to Mechatronic systems. [8]

SECTION - II

- Q7)** a) What is integrated modeling? Explain case study of a Mobile Robot. [8]
b) Explain Hill climbing algorithm and Genetic algorithm. [8]

- Q8)** a) What are the different methods adopted for optimization of Mechatronic systems? Explain with example. [8]
b) What are the key elements of controlled Mechatronic systems? Explain in detail. [8]

- Q9)** a) Explain Universal asynchronous receiver transmitter (UART) in detail with its standard specification. [8]
b) Write a short note on RS-232, IEEE 488-GPIB. [8]

- Q10)** a) What are different communication protocols? Explain in detail. [8]
b) Explain architecture of a standard PLC with different steps used in its working. [8]

- Q11)**a) Explain multichannel data logger with neat block diagram. [10]

b) Explain a data logger for a coffee vending machine using its standard accessories. [8]

Q12)a) Discuss a data acquisition system using any three standard parameters as a Mechatronics case study. [10]

b) Write short note on [8]

i) Signal Conditioning

ii) Signal Conversion.



Total No. of Questions : 12]

SEAT No. :

P768

[Total No. of Pages : 3

B.E. (Electronic) (Semester - I)
ADVANCED COMPUTER ARCHITECTURE
(2008 Pattern) - II (a)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Why do we need high speed computing? Explain the Von-Neuman computer architecture and its limitations. **[8]**
- b) What are performance metrics and measures used for parallel computers? Explain. **[8]**
- c) What is cluster computing? **[2]**

OR

- Q2)** a) What is speedup performance law? Explain Amdahl's law for speedup performance.
- b) Discuss Flynn's classification of parallel computer architecture in detail.
- c) Explain throughput w.r.t. pipeline processing.

P.T.O.

- Q3)** a) What are the different types of hazards caused in the pipeline? How can these hazards be detected and resolved? [8]
- b) Explain the following terms w.r.t. pipeline processing. [8]
- i) Efficiency.
 - ii) Dynamic pipelining.
 - iii) Static pipelining.
 - iv) Internal forwarding.

OR

- Q4)** a) Compare superscalar & VLIW processor.
- b) What do you mean by EPIC? State & explain features of EPIC.

- Q5)** a) State advantages of vector processing over scalar processing. [8]
- b) Explain vector loop and pipeline chaining. [8]

OR

- Q6)** a) Explain the four types of vector instruction in Cray-1 in detail.
- b) Explain the bottlenecks of vector processing.

SECTION - II

- Q7)** a) What is inter - PE communications? Explain network design decisions for inter-PE communications. [10]
- b) Discuss in detail static and dynamic topologies used in interconnection N/W. [8]

OR

- Q8)** a) State parallel algorithms for array processors. Explain in detail parallel sorting on array processor.
- b) Explain cube interconnection network and hyper cube interconnection network.

- Q9)** a) Explain loosely and tightly coupled multiprocessor system with example. [8]
- b) Explain in detail chip multiprocessing. [8]

OR

- Q10)** a) Write short note on:
- i) Cross bar switch.
 - ii) Multiport memory.
- b) Explain Cache coherency and bus snooping.

- Q11)** a) Discuss in brief latency hiding techniques. [8]
- b) Explain : Data parallel programming techniques. [8]

OR

- Q12)** a) Write short note on: [8]
- i) Synchronous message passing.
 - ii) Asynchronous message passing.
- b) Explain context switching overhead w.r.t. multithreading. [2]
- c) Explain in detail shared memory programming. [6]



Total No. of Questions : 12]

SEAT No. :

P769

[Total No. of Pages : 3

[4659] - 116

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

ENTREPRENEURSHIP AND BUSINESS PLANNING

(2008 Pattern) (Elective - II (b))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) What kinds of assessments should you make to determine if entrepreneurship is right for you? [9]

b) What are the advantages, disadvantages and steps of buying an existing business. [9]

OR

Q2) a) Explain Break-even analysis with a neat graph.

b) Why are financial goals important? Name some nonfinancial goals an entrepreneur may have.

Q3) a) How does the market structure affect the price of a good or service? [8]

b) Explain the different sources of finance that are available for entrepreneurs. [8]

OR

P.T.O.

- Q4)** a) What are the different training techniques? [6]
b) Discuss the concept of supply and demand. What effect do supply and demand have on price? [6]

- Q5)** a) Explain in brief: [6]
i) Copyright.
ii) Consumer protection law.
b) Why do you think the quality of the business plan is so critical to an entrepreneur's success? [6]
c) What factors are important to consider in the physical distribution of products? [4]

OR

- Q6)** a) What are the three main purposes of a business plan? Discuss a typical business plan with a case study. [8]
b) Explain the steps involved in problem solving method with a suitable example. [4]
c) How would you decide which method of advertising is the best and most cost-effective for your business? [4]

SECTION - II

- Q7)** a) Write a note on keeping and accounting. [9]
b) What is meant by an sales transactions? Explain the four types of sales transactions. [9]

OR

- Q8)** a) State and explain the various sources of recruitments. [6]
b) What is inventory? What are different types of inventory? [6]
c) Explain different types of insurance you may need for your business. [6]

- Q9)** a) What is the role of computer technology and internet in business nowadays. [8]
- b) Explain the concept related to e-Tendering. Also specify the steps related to registering for e-Tender. [8]

OR

- Q10)** a) What are some ways you can improve your cash flow?
- b) Explain the concept of lease. Discuss the various kinds of commercial lease.
- Q11)** a) What are green business opportunities, explain in the context of Environmental Threat and Opportunity Profile. [8]
- b) What is an International trade? Discuss the barriers in international trade. [8]

OR

- Q12)** a) Explain the laws that protect the interest and right of the Employees.
- b) What do you understand by ethics? Why do you need to establish an ethical workplace?



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :3

P1196

[4659] - 117

B.E. (Electronics)

c- SYSTEM ON CHIP

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section - I and Answer 3 questions from Section - II.*
- 2) *Answers to the two sections should be written in separate 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) What are the types of MEMS? Explain the scaling issues involved in MEMS. [8]
- b) Explain in detail necessary ingredients that are involved in Microsystems Design. [8]

OR

- Q2)** a) Explain the following Processes
- i) Lithography
 - ii) CVD [8]
- b) Explain the construction and working principles of following transducers,
- i) Accelerometer
 - ii) Actuator [8]

- Q3)** a) Explain the processes used to form the Silicon wafer. How to use Silicon wafer in MEMS manufacturing? [8]

P.T.O.

- b) What are the material properties of Silicon and Gallium arsenide. List out the differences in material properties of both the materials. [8]

OR

- Q4)** a) Write a short note on “Silicon Piezoresister”. [8]
b) Explain following control techniques used in MEMS, [8]
i) Analog Control
ii) Digital Control

- Q5)** a) Write Short note on, [10]
i) Cellular Biology
ii) Cell based Biosensors
b) With respect to Transduction principle, Fabrication and Applications explain Molecule based Biosensors. [8]

OR

- Q6)** a) Write Short note on, [10]
i) Optical Transducer
ii) RF Transducer
b) What do you mean by electrophoresis? Explain working principles of the transducers used. [8]

SECTION - II

- Q7)** a) What are the differences between General Purpose Core and Reconfigurable System on Chip architectures? Explain each in detail. [8]
b) Explain SoC architecture in detail. What are the advantages of SoC design over VLSI design? [8]

OR

- Q8)** a) Write short note on “Microsystems technology and Applications”. [8]
b) What do you mean by compilation? Explain the compilation techniques used in System on Chip application. [8]

- Q9)** a) Explain the System on Chip design flow of FPGA and ASIC. What are the differences between both the design flows. [8]
b) Write short note on “Exotic Process”. [8]

OR

- Q10)**a) What are the physical design automation tools used in System on Chip designs. Explain any one in detail. [8]
b) What do you mean by wet and dry etching processes? Explain in detail any one wet and dry etching process. [8]

- Q11)**a) Write a short note on [10]
i) Testable design
ii) Testing of Microsystems
b) What do you mean by mechanical Packaging? Explain in detail micro electronics micro system packaging. [8]

OR

- Q12)**a) Write a short note on [10]
i) Microsystem packaging
ii) Embedded core based system on chip
b) What are the concepts of Hardware and software co-design? Explain in detail Hardware and software co-design. [8]



Total No. of Questions : 12]

SEAT No. :

P770

[Total No. of Pages : 3

[4659] - 118

B.E. (Electronics) (Semester - I)
ROBOTICS & INDUSTRIAL AUTOMATION
(2008 Pattern) (Theory)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) With the help of neat diagram show the components of robot system? Also explain function of each component. **[10]**
- b) Discuss various specifications of Robot system. **[8]**

OR

- Q2)** a) Classify the robot based on the type joints. Explain all the types in detail with neat sketches.
- b) Explain in detail History of robotics & three Laws of robotics. Also discuss current research in robotics.
- Q3)** a) What is Composite Transformation Matrix? Explain the rules to be followed in the formation of the same. **[8]**
- b) Explain the term robot arm dynamics explain Kane's method used for formulation of dynamical equations. **[8]**

OR

P.T.O.

- Q4)** a) What is D-H representation? Discuss D-H Algorithm. [8]
b) Explain the term inverse solutions. Explain any one approach for obtaining inverse solution.

Q5) a) Explain following mechanisms with neat diagram: [8]

- i) Gear & Gear trains.
- ii) Slider - Crank Mechanism.

b) Write short note on (any two): [8]

- i) Stepper motor & servo motors.
- ii) Touch & slip sensor.
- iii) Infrared sensors.

OR

Q6) a) Discuss Lift & Try Technique for slip detection with the help of neat diagram.

b) With the neat diagram explain the operation of proximity sensor.

SECTION - II

Q7) a) Draw the block diagram of fuzzy controller & explain. [10]

b) What is Obstacle avoidance? How it is achieved in motion planning? [8]

OR

Q8) a) Explain pick & place operations in Trajectory planning.

b) Explain feed forward control action.

Q9) a) What are different types of vision sensors used in robotics? Explain any one of them with the help of neat sketch. **[8]**

b) Explain use of object recognition with reference to industrial robots. **[8]**

OR

Q10) a) With the help of block diagram explain components of video analytics system.

b) Write short note on:

i) Object recognition.

ii) Camera calibration.

Q11) Write short note on: **[16]**

a) Automatic assembly operations.

b) Automatic part inspection system using robot.

c) Welding automation using robot.

d) Intelligence requirement of robot in glass/mirror industries.

OR

Q12) a) Write short note on roll of robotics to improve productivity of manufacturing processes.

b) Write short note on:

i) Need of feedback sensors for automation.

ii) Relationship between the robot intelligence & the product.



Total No. of Questions : 12]

SEAT No. :

P1151

[Total No. of Pages : 3

[4659]-12

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

D: EARTHQUAKE ENGINEERING

(2008 Pattern) (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 wherever 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 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? [6]
- c) Describe the difference between magnitude and intensity of an earthquake? [4]

OR

- Q2)** a) What are the lessons learnt from past earthquakes? Explain philosophy behind earthquake resistant design of structures? [8]
- b) Explain the interior of the earth with neat sketches? Classify the earthquakes based on different parameters? [8]
- 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

P.T.O.

- 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]

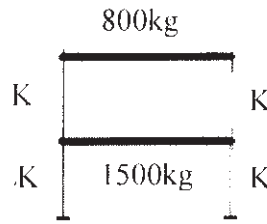


Figure 4.1

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

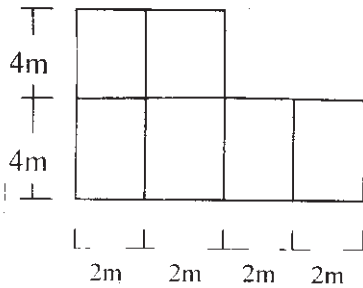


Figure 5.1

OR

- Q6)** Determine lateral forces at different storey levels for a plan of three 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 IV. [18]

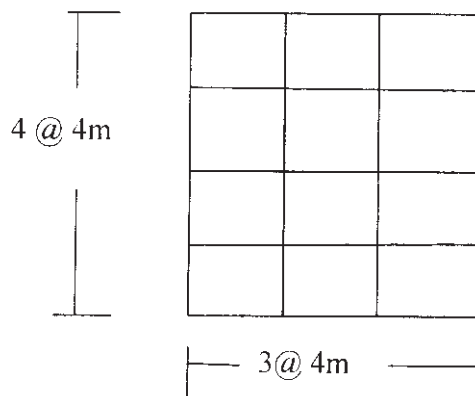


Figure 6.1

SECTION - II

- Q7)** a) What is the necessity of ductile detailing? Explain with neat sketches the detailing for flexural member as per IS 13920(1993). [9]
b) What is liquefaction of soil? Explain the effects and various methods to reduce the effects of liquefaction? [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 traditionally 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) Describe global retrofitting techniques for RC buildings? [8]
b) A 400mm×600mm column is reinforced with 14 nos. of 16mm dia. Bars. It is supported on an isolated footing. The load coming on footing is 1500kN and a moment 20kN.m. The SBC is 20kN/m². Using M25 grade of concrete and steel grade Fe250, design footing and sketch the details. [8]

OR

- Q12)** Write notes on : [16]
a) Seismographs.
b) Irregularities in buildings.
c) Response spectrum analysis.
d) Load Resisting systems as per IS 13920.



Total No. of Questions : 12]

SEAT No. :

P775

[Total No. of Pages : 2

[4659] - 125

B.E. (Electronics) (Semester - II)

A: ADVANCED COMMUNICATION SYSTEM

(2008 Pattern) (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) *Neat Diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Moillier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *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) Explain each of the following in brief. [8]
- i) Cell splitting.
 - ii) Sectoring.
- c) Explain multipath fading in cellular network. [4]

OR

- Q2)** a) Describe in detail Lee Model in cellular communication. [6]
- b) Derive the formula for mobile radio propagation over water. [6]
- c) Explain Delay spread and coherence bandwidth. [6]

- Q3)** a) Explain handoff mechanism in detail and call dropping conditions while handoff. [8]
- b) Derive the relation of free space path loss formula. [8]

OR

- Q4)** a) Describe various types of mobile antennas. [8]
- b) Explain Non fixed channel assignment algorithms. [8]

P.T.O.

- Q5)** a) Describe the various mechanism to increase the traffic capacity. [8]
b) With neat block diagram, explain GSM System Architecture. [8]

OR

- Q6)** a) Explain the various methods for reducing the interference. [8]
b) Describe Diversity concept to enhance signal to noise ratio. [8]

SECTION - II

- Q7)** a) Derive the relationship to find out period of the satellite's orbit. [8]
b) Describe attitude and orbit control system in satellite communication. [8]

OR

- Q8)** a) Explain with neat block diagram double conversion transponder. [8]
b) Describe various types of antennas which are used on satellite. [8]

- Q9)** a) Explain how TV signal transmitted in satellite broadcasting? [8]
b) Draw and describe block diagram of a QPSK system. [8]

OR

- Q10)** a) A satellite transponder has a bandwidth of 40 MHz. Earth stations use RRC filters with $\alpha = 0.4$. What is the maximum bit rate that can be sent through this transponder with [8]
i) BPSK ii) QPSK?
b) Derive the expression for Link Budget of Satellite communication system. [8]

- Q11)** a) Compare and contrast between FDMA, TDMA and CDMA systems. [10]

- b) Explain various configurations of antenna used in VSAT system. [8]

OR

- Q12)** Explain following terms w.r.t. VSAT (Any THREE) : [18]

- a) Signal Format.
b) MF- TDMA Scheme.
c) Protocols used in VSAT network.
d) Atmospheric Losses.



Total No. of Questions : 12]

SEAT No. :

P776

[Total No. of Pages : 3

[4659] - 126

B.E. (Electronics) (Semester - II)

B : AUTOMOTIVE ELECTRONIC SYSTEMS

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate books.*
- 2) *Neat diagram must be drawn whenever necessary.*
- 3) *Figure to the right indicate full marks.*
- 4) *Answer suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain different basic systems in automotives. [10]
b) With neat diagram explain four strokes of gasoline engine in automotive. [8]

OR

- Q2)** a) Draw neat schematic of ignition system and explain in detail. [10]
b) Explain basic transmission system of automotive. [8]

- Q3)** a) Write short notes on any two sensors : [8]
i) speed sensors
ii) Temperature sensors
iii) Throttle position sensor
b) Draw diagram of any two Actuators. Discuss their Characteristics and limitations. [8]

OR

- Q4)** a) Explain instrumentation amplifier using opamp. [8]
b) Explain any two circuits: [8]
i) Level shifting circuit
ii) Comparators
iii) Wave shaping circuit

P.T.O.

- Q5)** a) Explain Analog and Digital control methods. With neat block schematic explain cruise control system in automobiles. [8]
b) Draw block schematic of antilock braking system in automobiles. Explain its need in automobiles. [8]

OR

- Q6)** a) Explain 4ws electronic steering control system. [8]
b) Write short notes on any two : [8]
i) Lighting system in automobiles
ii) Air conditioning/Heating system
iii) Anti theft system

SECTION - II

- Q7)** a) What are the selection criteria for microcontroller in microcontroller based systems used in automobiles. [8]
b) Design a wiper control system using PIC microcontroller. Draw block diagram and explain the system in detail. [10]

OR

- Q8)** a) Explain Software development strategies, Compiling and linking. [10]
b) Explain Software testing and debugging technique. [8]

- Q9)** a) Explain any two buses of following : [8]
i) CAN
ii) LIN
iii) OBD-II
b) Explain GPS system in automotive environment with example. [8]

OR

- Q10)** a) Compare different series of ARM controllers and their application in automotive field. [8]
b) Compare any two : [8]
i) TTP/C and Flexray
ii) CAN and LIN
iii) OBD-I and OBD-II

- Q11)** a) Explain basic wiring system and Multiplex wiring system. [8]
b) Explain diagnostic procedure and sequence in automobiles. [8]

OR

- Q12)** a) Write short note on any two : [8]
i) Passenger comfort and security systems
ii) SAE and IEEE Standards
iii) On board and off board diagnostics in Automotive.
b) What is electromagnetic compatibility? Explain EMC standards in Automotive applications. [8]



Total No. of Questions : 12]

SEAT No. :

P777

[Total No. of Pages : 2

[4659] - 127

B.E. (Electronics) (Semester - II)

C : ARTIFICIAL INTELLIGENCE

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *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) Formulate missionaries and cannibals problem to derive solution. Draw complete state space diagram. [8]
- b) Explain problem characteristics in detail. What are the functionalities of an agent function? [8]

OR

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

- Q3)** a) What is the significance of adding alpha-beta cutoffs in min-max search? Explain with example. [10]
- b) Explain constraint satisfaction problem as an incremental formulation and need of backtracking in CSP. [8]

OR

- Q4)** a) Elaborate on games that include an element of chance. Draw and explain game tree for backgammon game position. [10]
- b) Justify relevance of game playing theory in AI with example games explored under AI domain. [8]

P.T.O.

- Q5)** a) What is first order logic? Show with an example how it is used to represent knowledge. [8]
b) Represent the following sentences in first order logic : [8]
- Some students take French in spring 2011
 - Every student who takes French passes it
 - Only one student took Greek in spring 2011
 - The best score in Greek is always higher than the best score in French

OR

- Q6)** a) State the rules and steps for converting a given well predicate logic statements to clausal form. [8]
b) Explain the working of unification algorithm with suitable example.[8]

SECTION - II

- Q7)** a) What are the different learning methods? Explain them in short. [8]
b) Which are the different ways to assess the performance of learning Algorithm? [8]

OR

- Q8)** a) Explain the decision tree algorithm with suitable example. [8]
b) Explain in detail architecture of artificial neural network. [8]

- Q9)** a) Explain Waltz algorithm with example and comment on its limitations. [10]
b) Explain the architecture of expert systems and justify expert systems.[8]

OR

- Q10)** a) How reinforcement learning differs from statistical learning. [10]
b) Explain learning by decision trees. [8]

- Q11)** a) Why use NLP? What are the phases of NLP? [8]
b) What is augmented grammar? [8]

OR

- Q12)** a) What is syntactic analysis? [8]
b) Explain ambiguity and disambiguation. [8]



Total No. of Questions : 12]

SEAT No. :

P778

[Total No. of Pages : 3

[4659] - 128

B.E. (Electronics Engineering) (Semester - II)

Nanotechnology in Electronics

(2008 Pattern) (Elective - IV (d))

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.*

SECTION - I

- Q1)** a) Define nanotechnology. Write few applications of nanotechnology. [6]
- b) Justify 'Biosystem is nothing but complex nanosystems'. [6]
- c) Comments on 'Electrical conduction and ohms law in relation with nanotechnology'. [6]

OR

- Q2)** a) Enlist the tools for measurement of nanostructures. Explain one of them. [10]
- b) What is polymerization? Explain the process of DNA hybridization with schematic. [8]

- Q3)** a) Explain the scanning probe microscopy. [8]
- b) Compare floating gate NVM and nanocrystal NVM. [8]

OR

P.T.O.

- Q4)** Write a short note on: [16]
- a) Nano CMOS.
 - b) Silicon nanocrystal.
 - c) Novel dielectric material.

- Q5)** a) Classify carbon nanotube and write four applications of carbon nanotube. [8]
- b) Explain nature of carbon bond. [8]

OR

- Q6)** Write a short note on: [16]
- a) Carbon molecule.
 - b) Cluster.
 - c) Fabrication of carbon nanotube.

SECTION - II

- Q7)** a) Explain MEMS devices used in automobile. [9]
- b) How STM can be used to build NEMS? [9]

OR

- Q8)** Write a short note on: [18]
- a) Nano devices.
 - b) Lithography.
 - c) Molecular and super molecular switches.

- Q9)** a) Explain the role of nano technology in advanced computation. [8]
- b) Enlist various limitations of silicon material technology. [8]

OR

- Q10)** a) Explain with schematic a SET in an inverter circuit configuration. [8]
b) What are the different tools used for fabrication of micro and nano structures. [8]

- Q11)** a) Enlist the applications of nanotechnology in optics. [8]
b) Write various biomedical applications in nanoelectronics. [8]

OR

- Q12)** Write a short note on: [16]
a) Transformation of storage.
b) Gates and switches.
c) Nanostructures in electronics.



Total No. of Questions : 12]

SEAT No. :

P724

[Total No. of Pages : 3

[4659] - 13

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

E : ADVANCED CONCRETE TECHNOLOGY (Elective - II)
(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) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures in the bracket indicate full marks.*
- 5) *Electronic pocket calculator is permitted.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Enlist the various characteristic of coarse aggregates. Explain Particle size and shape. **[5]**
- b) Explain coning and quartering method of obtaining laboratory sample of aggregates. **[5]**
- c) Enlist various physical laboratory tests with their practical utility. **[8]**

OR

- Q2)** a) Discuss the two problems “internal friction” and “segregation and bleeding” associated with green concrete. **[8]**
- b) What do you mean by “entrained air and entrapped air” in the concrete. How air entrainment can be achieve? How air entrainment is useful in concreting operation before setting and after hardening of concrete?**[10]**

P.T.O.

- Q3)** a) Write in detail what do you mean by light weight concrete. What are its advantages? [8]
b) Discuss the importance and effects of water absorption and moisture content of lightweight aggregate concrete. [8]

OR

- Q4)** a) What is meant by long term performance of concrete? What properties a high strength concrete should possess for long term performance? [10]
b) What are the various industrial applications of high strength concrete?[6]

- Q5)** a) Write notes on : [10]
i) Acoustic emission method
ii) Pulse echo method
b) Differentiate between cracking, spalling and staining. [6]

OR

- Q6)** Write the limitations of following non-destructive tests : [4 × 4 = 16]
a) Windsor Probe test
b) Pulse echo method
c) Radar technique
d) Radiography

SECTION - II

- Q7)** a) Write a note on self compacting concrete. Write the various ways in which it is obtained. [8]
b) What are the properties of self compacting concrete? [8]

OR

- Q8)** Write notes on : [4 × 4 = 16]
a) Fibres with respect to Volume, aspect ratio and orientation of fibres.
b) Glass fibre reinforced concrete
c) SIFCON
d) SFRC

Q9) Write notes on : **[16]**

- a) Steel fibres
- b) Glass fibres
- c) Carbon fibres
- d) Polypropylene and nylon fibres

OR

Q10) Write notes on : **[5 + 5 + 6 = 16]**

- a) Mixing of FRC
- b) Applications of FRC
- c) Behaviour of FRC in tension

Q11) a) Enlist the casting techniques of ferrocement and explain any one. **[9]**
b) Write a note on fibre reinforced polymeric meshes (FRP) along with merits and demerits. **[9]**

OR

Q12) a) Explain the constituents of ferrocement with respect to cement mortar mix, skeletal steel. **[9]**
b) Write the advantages of ferrocement. **[9]**



Total No. of Questions : 12]

SEAT No. :

P1069

[4659]-130

[Total No. of Pages : 3

B.E. (Production)
MACHINE TOOL DESIGN
(2008 Course) (411081)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) List the general recommendations for developing the gearing diagram. **[4]**
b) An eight speed gear box is to be designed for the minimum speed of 90 rpm and maximum speed of 1600 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]**
- 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

P.T.O.

- 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]
- 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 slideway 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

- 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]

- 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 gears in a gear box. Explain the difference between: [8]
i) Centralized control
ii) Selective control and
iii) Preselective control system
b) With neat sketches of circuit diagrams show the functioning of a thermal relay and an electrical braking system. [8]
- 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]

EEE

Total No. of Questions : 12]

SEAT No. :

P780

[Total No. of Pages : 5

[4659]-132

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

OPERATIONS RESEARCH

(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates :

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

SECTION - I

UNIT - I

Q1) a) Solve by Simplex method : [10]

$$\text{Maximize } Z = 4x_1 + 10x_2$$

$$\text{Subject to } 2x_1 + x_2 \leq 50$$

$$2x_1 + 5x_2 \leq 100$$

$$2x_1 + 3x_2 \leq 90$$

$$x_1, x_2 \geq 0$$

- b) A person requires 10, 12 and 12 units of chemicals A, B and C respectively for his garden. A liquid product contains 5, 2 and 1 units of A, B and C respectively per jar. A dry product contains 1, 2 and 4 units of A, B and C per carton. If the liquid product sells for ₹ 3 per jar and the dry product sells for ₹ 2 per carton. How many of each should he purchase in order to minimize the cost and meet the requirement? (Only formulate LPP. Do not solve it) [7]

P.T.O.

Q2) a) Solve by Dual Simplex method : **[10]**

$$\begin{aligned}
 \text{Minimize : } Z = & \quad 20x_1 \quad + \quad 16x_2 \\
 & \quad x_1 \quad + \quad x_2 \quad \geq 12 \\
 & \quad 2x_1 \quad + \quad x_2 \quad \geq 17 \\
 & \quad x_1 \quad \geq 2.5 \\
 & \quad \quad \quad x_2 \quad \geq 6 \\
 & \quad x_1 \quad , \quad x_2 \quad \geq 0
 \end{aligned}$$

b) Discuss ANY ONE : **[7]**

- i) Zero - One Programming
- ii) Sensitivity Analysis

UNIT - II

Q3) a) Discuss Reduced Matrix method of assignment model. **[6]**

- b)** 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.

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

[10]

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]**

| Jobs | | | | | |
|-----------|---|----|-----|----|---|
| Operators | 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]**

UNIT - III

- 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 | | |

- 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

UNIT - IV

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

| | | Player B | | |
|----------|------------|----------|----|----|
| | | b1 | b2 | b3 |
| Player A | Strategies | | | |
| | a1 | -6 | 10 | 11 |
| | a2 | -1 | -2 | -3 |
| | a3 | -1 | -2 | -4 |

UNIT - V

Q9) a) Arrival rate of the customers at the banking 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 : **[10]**

- 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.

b) Discuss : Inventory costs. **[6]**

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]**

UNIT - VI

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 | F,GH | F,GH | 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]**

Q12) a) Network is given below with three times 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) State different types of floats and discuss any three. **[4]**



Total No. of Questions : 12]

SEAT No. :

P1070

[4659]-133

[Total No. of Pages : 2

B.E. (Production)

a - PLASTIC ENGINEERING

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

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 basic chemistry of plastic material Structure. [8]
b) Explain coloring of plastic. [10]

OR

- Q2)** a) Explain common alloys and blends used in plastic. [8]
b) Explain classification of plastic. [10]

- Q3)** a) Explain injection molding cycle with suitable sketch. [8]
b) Explain use of cavity & core inserts with suitable example. [8]

OR

- Q4)** a) Explain any two ejection methods used in plastic molding. [8]
b) Explain any two cooling methods of Injection moulds. [8]

- Q5)** a) Explain vented barrel extruder with suitable sketch. [8]
b) Explain blown film extrusion with suitable sketch. [8]

OR

- Q6)** a) Explain special features of extrusion dies. [8]
b) Explain co-extrusion of films and sheets. [8]

P.T.O.

SECTION-II

- Q7)** a) Explain basic principles of blow moulding with suitable sketches. [10]
b) Explain injection blow with suitable sketches. [8]

OR

- Q8)** a) Explain extrusion blow molding processes with suitable sketches. [8]
b) Explain rotary injection blow molding with suitable sketches. [10]
- Q9)** a) Explain process factors in thermoforming. [8]
b) Explain straight vacuum forming technique. [8]

OR

- Q10)** a) Explain plug assist-forming thermoforming of PP sheets. [8]
b) Discuss maintenance required in thermoforming. [8]
- Q11)** a) Explain principle considerations for drilling and reaming operations in plastic. [10]
b) Explain i) polishing. ii) Trimming. [6]

OR

- Q12)** a) Explain trimming and routing of thermosetting and thermoplastics. [10]
b) Explain buffing and sawing in plastic. [6]

EEE

Total No. of Questions : 12]

SEAT No. :

P1071

[4659]-134

[Total No. of Pages : 4

B.E. (Production)

b - INDUSTRIAL ROBOTICS

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

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, wherever necessary.*

SECTION-I

Q1) a) What is Automation? Explain its types. Explain the role of robot in automation? **[8]**

b) Differentiate between resolution and accuracy of robot with the help of neat sketch. Also explain the repeatability of robot. **[8]**

OR

Q2) a) What is Robot Anatomy? How it is compared with human system? **[8]**

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

Q3) a) 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 | 30^0 |
| 2 | -90 | 0 | 2 | 0^0 |
| 3 | 0 | 3 | 0 | 90^0 |

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

b) Explain Denavit Hartenberg Representation. **[8]**

OR

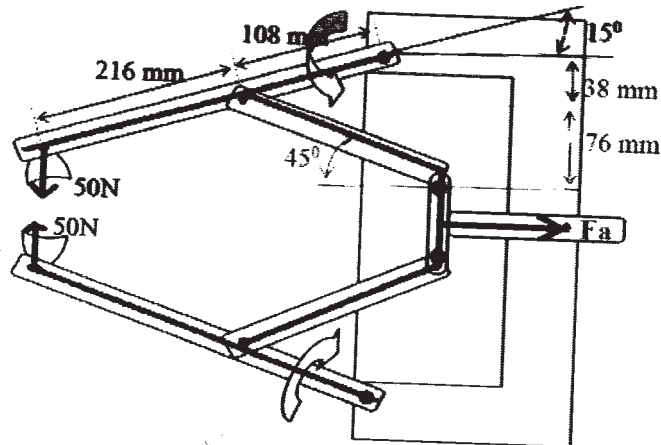
P.T.O.

- Q4) a)** Explain the Forward kinematics associated with planar 3R manipulator. [8]
- b)** For a pick and place type of robot, the link parameter 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 with respect to the base.

- Q5) a)** For the given data in the mechanical gripper design of following figure, Calculate the required actuating force if the gripper force is to be 50 N. [10]



- b)** Discuss the various considerations in gripper design and selection. List the different types of gripper. [8]

OR

- Q6) a)** Explain with neat sketch: [8]
- Gear and Rack method of actuating the gripper
 - Cam-actuated gripper
 - Screw-type gripper actuation
 - Linkage actuation
- b)** Describe: [10]
- Vacuum gripper
 - Ultrasonic gripper

SECTION-II

Q7) a) Define a Robot Sensor. Explain the basic function of Sensor. **[8]**

b) Explain: **[8]**

- i) Image acquisition
- ii) Sampling
- iii) Image Processing
- iv) Image Processing techniques

OR

Q8) a) State various Sensing devices used in Robot workcell. **[8]**

b) The given data represents 8 x 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 various methods used to enter the programming command into the controller memory. [8]
- b) Explain generations of Robot programming Language. [8]

OR

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

OR

- Q12)**a) Describe the following applications of robot stating their configurations.[9]
- i) Spot welding.
- ii) Machine loading and unloading.
- iii) Spray Painting.
- b) Write a note on current and future applications of Robot. [9]

EEE

Total No. of Questions : 12]

SEAT No. :

P1072

[4659]-135

[Total No. of Pages : 3

B.E. (Production Engg.)

c - POWDER METALLURGY

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

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 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION-I

- Q1)** a) Explain the Rotating Electrode process of powder production with a neat diagram. [6]
- b) Explain the commercial process for electrodeposition of iron powder production. [6]
- c) How is green strength promoted? [6]

OR

- Q2)** a) Explain any one method to characterize the size of powders with a neat diagram. [6]
- b) What are the factors which promote powdery deposits in electrolytic cell? [6]
- c) Explain the factors which favor fine particle size in atomizing process.[6]

- Q3)** a) What are the problems with excessive blending or mixing? Write a short note on continuous twin screw mixer. [8]
- b) Explain the phenomenon of compaction. [8]

OR

- Q4)** a) Compare the advantages of dry milling and wet milling. Explain the importance of lubrication. [8]
- b) Compare hydraulic press with mechanical press and explain any two factors which affect the tool design. [8]

P.T.O.

- Q5)** a) Explain the plastic - flow theory and surface diffusion theory in Sintering with the help of a neat diagram. [8]
- b) What are the advantages and limitations of Liquid phase sintering. [8]

OR

- Q6)** a) Write short notes on: [8]
- i) Roller hearth furnaces
- ii) Walking beam furnaces
- b) How does particle size, particle shape, particle structure, particle composition and green density affect sintering. [8]

SECTION-II

- Q7)** a) Explain the CIP process with a neat diagram. [8]
- b) Explain the benefits, limitations and applications of metal injection moulding. [8]

OR

- Q8)** a) Write short notes on: [8]
- i) Powder rolling
- ii) Powder forging
- b) Explain slip casting with a neat diagram. [8]

- Q9)** a) Write short notes on: [8]
- i) Thermal spraying
- ii) Process variables in HIP
- b) Explain the case hardening heat treatments given to P/M parts. [8]

OR

- Q10)** a) What are the advantages and limitations of the infiltration process. [8]
b) Explain the mercury porosimetry method and state the Washburn equation. [8]

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

- a) Friction materials
- b) One Automotive application
- c) One Aerospace application

OR

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

- a) Porous bearings
- b) Refractory metal components
- c) Cermets

EEE

Total No. of Questions : 12]

SEAT No. :

P1073

[4659]-136

[Total No. of Pages : 3

B.E. (Production)

d - MICROPROCESSOR APPLICATIONS

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

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

SECTION-I

- Q1)** a) With the help of block diagram, explain the microcontroller architecture. What are the essential blocks of microcontrollers? [8]
- b) Compare microprocessors and microcontrollers. [8]

OR

- Q2)** a) Differentiate the following: [8]
- i) Harvard and Von Neumann architecture
 - ii) RISC and CISC processors.
- b) What are the application areas of microprocessors and microcontrollers? [8]

- Q3)** a) What are the different phases of instruction execution? Explain the use of address bus, data bus while instruction fetch. [8]
- b) Draw schematic diagram for interfacing EPROM and RAM to 8085. Explain briefly. [8]

OR

- Q4)** a) What is the use of interrupts? Explain Hardware and Software interrupts. [8]
- b) What are different methods of I/O device interfacing? Differentiate between polling and interrupt based interfacing. [8]

P.T.O.

- Q5)** a) With the help of block diagram, explain architecture of 8051. [10]
b) Explain port structure of 8051. [8]

OR

- Q6)** a) With memory map explain internal memory organization of 8051. How external memory can be interfaced? [10]
b) What are the different modes of timers? Which SFRs are used for timer? [8]

SECTION-II

- Q7)** a) Explain different addressing modes with the help of example of one instructions explain each mode. [8]
b) Explain following instructions of 8051. [8]
i) DJNZ ii) SJMP iii) ADC iv) ANL

OR

- Q8)** a) What are the different type of Jump & call instructions. Illustrate with examples. [8]
b) Write a program to add 16 bit numbers & store the result in memory locations 40H onwards. [8]
- Q9)** a) Define PLC and state features of PLC. How PLC can be used in CNC?[8]
b) Interface 2 line, 16 character LCD display to 8051. Explain interface signals. Write assembly language program to display 'WELCOME'. [8]

OR

- Q10)**a) Interface 8 bit DAC to 8051 and write a program to generate staircase waveform. [8]
b) Interface stepper motor to 8051. Draw interfacing diagram. Write assembly program to rotate motor clockwise continuously. [8]

Q11) Design a system for Data acquisition using 8051 microcontroller for temperature, pressure and level measurement. Draw circuit diagram with suitable sensor and signal conditioning. Display the parameters on LCD. Write the algorithm. **[18]**

OR

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

b) Explain USB bus with suitable applications. **[10]**

EEE

Total No. of Questions : 12]

SEAT No. :

P781

[Total No. of Pages : 3

[4659] - 137

B.E. (Production Engg.) (Semester - I)
Ergonomics and Human Factors in Engineering
(2008 Pattern) (Elective - II (a))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section - I & 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 calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Unit - I

- Q1)** a) What are Human Machine systems? Explain its types. [6]
- b) Discuss features of human body & explain measures of physiological functions. [6]
- c) Discuss Design of MMH Task. [6]

OR

- Q2)** a) Discuss the objectives of "Human Factors in Engineering". [6]
- b) Discuss characteristics of Human Machine systems. [6]
- c) Explain various types of movements of human body members. [6]

P.T.O.

Unit - II

- Q3)** a) Discuss the considerations in designing a STANDING workplace. [8]
b) Discuss use of anthropometric data in designing of interior of passenger car for four persons. [8]

OR

- Q4)** a) What is Anthropometry and explain principles used in application of anthropometric data? [8]
b) Discuss principles of arrangement of components in various working conditions. [8]

Unit - III

- Q5)** Write short note on (any TWO): [16]
a) Hand tool design.
b) Functions of controls.
c) Concept of visibility.

OR

- Q6)** Discuss arrangement of following components at work place (any FOUR): [16]
a) Visual displays.
b) Control on panels.
c) Hand controls.
d) Two hand controls.
e) Foot controls.
f) Controls that require force.

SECTION - II

Unit - IV

- Q7)** a) Discuss the system of measurement of light. Also explain use of lamps & luminaries. [9]
b) Discuss the physiological effects of heat & cold. Explain its remedies. [9]

OR

- Q8)** a) What is Wet Bulb Globe Temperature? How do you calculate it? Explain its utility in hot humid conditions. [9]
- b) Discuss Discomfort glare & Disability glare. [9]

Unit - V

- Q9)** a) Discuss in detail Requirement of rest allowances in work and co-relate it with energy expenditure. [8]
- b) Discuss manual material handling capacity is determined considering various human factors. [8]

OR

- Q10)** Discuss effect of following conditions on energy expenditure: [16]
- a) Extreme Heat.
- b) Extreme cold.
- c) High humidity.

Also discuss measures to overcome effects of these environmental conditions.

Unit - VI

- Q11)** a) What are the characteristics of system design? How human factors are applied in system design? [10]
- b) Discuss the significance of ergonomic safety. [6]

OR

- Q12)** a) Discuss the term Accident. Explain its relationship with human errors. [8]
- b) Discuss perception of risk & describe risk evaluation process. [8]



Total No. of Questions : 12]

SEAT No. :

P1074

[4659]-138

[Total No. of Pages : 3

B.E. (Production Engineering)

b - MATERIALS AND LOGISTICS MANAGEMENT

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

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 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*

SECTION-I

Q1) a) What are the phases involved in Value Analysis? Explain each phase briefly. **[9]**

b) What are the objectives of materials management? **[9]**

OR

Q2) a) Explain Material Requirement Planning (MRP1) in detail. **[9]**

b) List the functional aspects of make or Buy decision. Demand for the component is at the rate of 12,000 per year and this demand is going to continue for next three years. The company has two options. It can get the component manufactured from outside or it can manufacture in house. It costs the company Rs. 4.2 per unit to buy the component. The in-house manufacture will incur a fixed cost to the extent of Rs. 10,000 and variable cost of Rs. 2.9 per unit. Give the decision rule for make or buy. **[9]**

Q3) a) Explain Purchase Cycle with flowchart. **[8]**

b) Explain documents used in importing: **[8]**

i) Letter of credit

ii) Bill of Lading

OR

P.T.O.

- Q4)** a) Explain different objectives of Purchasing. [8]
b) What is vendor rating? Explain any two methods of vendor rating. [8]
- Q5)** a) What are the different types of stores? Explain briefly. [8]
b) What is the importance of waste management? List various methods of waste management. Explain any one with example. [8]

OR

- Q6)** a) What is the role of Store Keeper? Differentiate Between Centralized and Decentralized Stores. [8]
b) What is stock verification? Differentiate between annual stock taking and continuous stock taking. [8]

SECTION-II

- Q7)** a) Explain functional areas of Logistics in brief. [8]
b) List the types of warehouses. Explain any two in brief. [8]

OR

- Q8)** a) Explain the economic and service benefits of warehouse. [8]
b) List economic factors of transportation. Explain any two in brief. [8]
- Q9)** a) Explain the drivers of supply chain management. [8]
b) What is the importance of demand in supply chain? How the demand risk is managed in supply chain? [8]

OR

- Q10)**a) What is supply chain? Explain the significance of three key supply chain decision phases. [8]
b) What is strategic fit in supply chain management? Explain the steps involved in achieving strategic fit. [8]

Q11)a) Explain Fixed Period system and Fixed Quantity system in brief. [9]

b) An automobile factory manufactures a particular type of gear within the factory. This gear is used in the final assembly. The particulars of this gear are presented below. [9]

Demand rate = 14,000 units/year

Production rate = 35,000 units/year

Set-up cost = Rs. 500 per set-up.

Carrying cost = Rs. 15/unit/year

Find EBQ and cycle time.

OR

Q12)a) What is safety stock? How lead time affects safety stock in finished goods inventory? [9]

b) The annual demand of a product is 36000 units. The average lead time is 3 weeks. The standard deviation of demand during the average lead time is 150 units/week. The cost of ordering is Rs. 500 per order. The cost of purchase of the product per unit is Rs. 15. The cost of carrying per unit/year is 20% of the purchase price. The maximum delay in lead time is 1 week and the probability of this delay is 0.3. Assume a service level of 0.95. [9]

i) What is the recorder level if 'Q' system is followed?

ii) If 'P' system followed, what is the maximum inventory level?

EEE

Total No. of Questions : 12]

SEAT No. :

P782

[Total No. of Pages : 4

[4659] - 139

B.E. (Production)

SIMULATION AND MODELING

(2008 Pattern) (Elective - II (c)) (Semester - I)

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) Define simulation and state what kind of problems of manufacturing industries can be solved by simulation. [8]
- b) What statistical techniques should be used to analyze the output of simulation study? Explain any one. [8]

OR

- Q2)** a) Explain the concepts in Discrete-Event Simulation. [8]
- b) State the events and activities associated with the operation of material handling department. [8]
- Q3)** a) Explain in brief the steps in a Simulation study. [8]
- b) A small grocery store has only one checkout counter. Customers arrive at this checkout counter at random from 1 to 8 minutes apart. Each possible value of interarrival time has the same probability of occurrence. The service times vary from 1 to 6 minutes with the probabilities shown in table 1. Find Average Waiting Time, Probability (wait), Probability of idle server, Average service time (minutes), Average time between arrivals (minutes) for 20 customers. [10]

P.T.O.

Table 1 Service Time Distribution

| Service Time (Min) | Probability | Cumulative Frequency | Random Digit Assignment |
|--------------------|-------------|----------------------|-------------------------|
| 1 | 0.10 | 0.10 | 01-10 |
| 2 | 0.20 | 0.30 | 11-12 |
| 3 | 0.30 | 0.60 | 31-60 |
| 4 | 0.25 | 0.85 | 61-85 |
| 5 | 0.10 | 0.95 | 86-95 |
| 6 | 0.05 | 1.00 | 96-00 |

OR

- Q4) a)** Consider a drive-in restaurant where carhops take orders and bring food to the car. Cars arrive in the manner shown in table 1. There are two carhops-Able and Baker. Able is better able to do the job and works a bit faster than Baker. The distribution of their service times are shown in tables 2 and 3. Find able and Baker busy time, Average Waiting Time, Probability (wait), Probability of idle server, Average service time (minutes), Average time between arrivals (minutes) for 26 customers.

[10]

Table 1: Interarrival distribution of Cars

| Time Between arrivals (Min) | Probability | Cumulative Probability | Random Digit Assignment |
|-----------------------------|-------------|------------------------|-------------------------|
| 1 | 0.25 | 0.25 | 01-25 |
| 2 | 0.40 | 0.65 | 26-65 |
| 3 | 0.20 | 0.85 | 66-85 |
| 4 | 0.15 | 1.00 | 86-00 |

Table 2: Service Distribution of Able

| Service Time | Probability | Cumulative Probability | Random-Digit Assignment |
|--------------|-------------|------------------------|-------------------------|
| 2 | 0.30 | 0.30 | 01-30 |
| 3 | 0.28 | 0.58 | 31-58 |
| 4 | 0.25 | 0.83 | 59-83 |
| 5 | 0.17 | 1.00 | 84-00 |

Table 3: Service Distribution of Baker

| Service Time | Probability | Cumulative Probability | Random-Digit Assignment |
|--------------|-------------|------------------------|-------------------------|
| 3 | 0.35 | 0.35 | 01-35 |
| 4 | 0.25 | 0.60 | 36-60 |
| 5 | 0.20 | 0.80 | 61-80 |
| 6 | 1.00 | 1.00 | 81-00 |

b) State the properties of Random Numbers. [8]

Q5) a) Explain briefly the steps involved in the development of a useful model of input data. [8]

b) Explain the technique for Generating Random Numbers with example. [8]

OR

Q6) a) Explain in brief the tests to check desirable properties of random numbers. [8]

b) Discuss the methods for selecting families of input distributions when input data are available. [8]

SECTION - II

Q7) a) Discuss the inverse transformation technique to sample from the exponential distribution. [8]

b) The sequence of number 0.54, 0.73, 0.98, 0.11 and 0.66 has been generated. Use Kolmogorov - Smirnov test with $\alpha=0.05$ to determine if the hypothesis that the number are uniformly distributed on the interval $[0,1]$ can be rejected. [8]

OR

- Q8)** a) Write short notes on: [8]
- i) Monte-Carlo methods.
 - ii) Chi-square goodness of fit test.
- b) Briefly explain the measure of performance of a simulation system. [8]

- Q9)** a) State the need of simulation in manufacturing and material handling systems. [8]
- b) Discuss about a simulation of a flexible manufacturing shop. [8]

OR

- Q10)** a) State the input parameters to be consider in manufacturing system for building simulation model. [8]
- b) Discuss about a simulation of a sheet metal part manufacturing systems. [8]

- Q11)** a) Performance Measures for Queuing Systems of single server system. [8]
- b) Enlist various simulation software used in simulation of discrete system manufacturing with its important characteristics. [10]

OR

- Q12)** Write a short note: [18]
- a) Advantages and Disadvantages of simulation.
 - b) Pseudo random number.
 - c) Terminating and non terminating simulation.



Total No. of Questions : 12]

SEAT No. :

P783

[Total No. of Pages : 3

[4659] - 140

B.E. (Production) (Semester - I)
PLANT ENGINEERING AND MAINTENANCE
(2008 Pattern) (Elective - II (d))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from Section - I and any three questions from Section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Use of calculator is allowed.*
- 4) *Figures to the right indicate full marks.*
- 5) *Answer one question from 1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10, 11 & 12.*

SECTION - I

- Q1)** a) Explain the scope and importance of plant engineering and principles of plant management functions. [8]
b) Explain classification of maintenance along with suitable example. [8]

OR

- Q2)** a) Explain the term productivity and its measurement techniques. [10]
b) Explain how Pareto chart technique is useful in problem solving procedure. [6]

- Q3)** a) List out different types of layouts with suitable example. [8]
b) Explain Muther's plant layout procedure in detail. [8]

OR

- Q4)** Write a short note on following : [16]
a) Group Technology
b) Types of building structure
c) Planning and estimation of auxiliary services
d) Selection of layouts

P.T.O.

- Q5)** a) Explain various types of maintenance with suitable example. [10]
b) Explain maintenance problems in product and process industry with suitable example. [8]

OR

- Q6)** Explain the following in detail : [18]
a) Spare Parts Management
b) Importance of preventative maintenance with suitable example.

SECTION - II

- Q7)** a) Explain periodic preventive maintenance management. [8]
b) What is mean by life cycle cost. Explain with reference to bath tub curve. [8]

OR

- Q8)** a) Explain :
i) Constant hazard rate [4]
ii) Linearly increasing hazard rate [4]
b) State any mathematical model for life cycle costing. Explain the significance of terms used in the model. [8]

- Q9)** In view with Plant safety explain planning for safety for the following factors : [16]
a) Mechanical and Chemical hazards
b) Sewage and water Disposal
c) Noise Safety Codes
d) Fire protection

OR

- Q10)** a) Explain different types of material handling equipments with suitable example. [8]
b) Write a short note on following : [8]
i) Recycling of waste
ii) Pollution control waste disposal

- Q11)** a) Draw and Explain Organization structure of Maintenance Department. Also Explain merits and demerits of total proactive maintenance. [10]
- b) Explain inherent availability and operational availability. [8]

OR

- Q12)** a) Explain the different steps involved in Total Productive Maintenance.[6]
- b) Write a short note on : [12]
- i) Condition based maintenance
 - ii) Overall effectiveness of equipment



Total No. of Questions : 12]

SEAT No. :

P1076

[4659]-147

[Total No. of Pages : 2

B.E.(Production)
a-WORLD CLASS MANUFACTURING
(Semester-II)(2008 Pattern) (Elective-IV)

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 right indicate full marks.*
- 4) *Assume suitable data wherever necessary.*

SECTION-I

Q1) a) Explain meaning of excellence with respect to manufacturing and business? **[8]**

b) Discuss Maskell's WCM model? **[8]**

OR

Q2) a) Discuss step by step Hall's frame work? **[8]**

b) Explain Schonberger's WCM model? **[8]**

Q3) a) Explain significance of the Bench marking in world class companies? **[8]**

b) Discuss Toyota production system? **[8]**

OR

Q4) a) How value stream mapping is used in WCM? **[8]**

b) Explain fundamental practices of WCM? **[8]**

Q5) a) Discuss push & pull JIT manufacturing systems? **[10]**

b) Explain FMS system in detail? **[8]**

OR

P.T.O.

Q6) Write short notes on following. **[18]**

- a) Kanban.
- b) 3M.
- c) Procurement & store practice of WCM companies.

SECTION-II

Q7) a) Explain organization structure of any one world class company? **[8]**

b) Discuss how root causes techniques are used in WCM? **[8]**

OR

Q8) a) How the HR department is handled in WCM? **[8]**

b) Explain various motivation techniques. **[8]**

Q9) a) What is POP system? **[8]**

b) Discuss TOPP system of WCM performance? **[8]**

OR

Q10)a) Explain AMBITE system? **[8]**

b) Discuss significance of six sigma WCM. **[8]**

Q11)a) Discuss effect of green manufacturing? **[8]**

b) Explain any one case study of MNC related to WCM? **[10]**

OR

Q12)a) Write short note on clean manufacturing? **[8]**

b) What do you understand from agile manufacturing? Explain in detail. **[10]**

□□□

Total No. of Questions : 12]

SEAT No. :

P1077

[4659]-148

[Total No. of Pages : 3

B.E.(Production)

**b-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 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) Why would a manufacturing company want to rely on a CAD system for design rather than more traditional drafting methods? What is the benefit of using a CAD system based on solid modeling rather than a wire-frame model? [9]
- b) What are the differences between a fixed automation system and a flexible manufacturing system? Under what circumstances would each of these types of systems be most appropriate? [9]

OR

- Q2)** a) What is the purpose of process planning? Why is Computer Aided Process Planning (CAPP) useful in manufacturing? Discuss some of the benefits of CAPP. [10]
- b) Define the term “feature.” Classify the manufacturing features. What are the advantages of feature-based modeling in manufacturing applications? [8]
- Q3)** a) Develop a taxonomy of the pioneering works in artificial intelligence and expert systems? [8]
- b) Discuss the differences between knowledge and ignorance with respect to artificial intelligence applications? Propose a set of criteria that must be met for machine or software to be considered intelligent? [8]

OR

P.T.O.

- Q4)** a) Define ‘Artificial intelligence’? List with reasons the ten most important manufacturing problems suitable for expert system applications? [8]
- b) Describe the system architecture of an intelligent manufacturing system? [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? [8]
- b) Why is it important to restrict an expert system implementation to a narrow problem domain. Justify the reason with an example? [8]

OR

- Q6)** a) Engineering problem solving often involves developing a general solution model with liberal tolerance specifications. Does this approach enhance or impede expert systems applications to engineering problems? Explain? [8]
- b) Explain the following with an example. [8]
- i) Inductive and deductive reasoning.
 - ii) Breadth - First search.
 - iii) Depth - First search.

SECTION-II

- Q7)** a) Discuss the differences between knowledge elicitation, knowledge extraction and knowledge acquisition? [8]
- b) What is ‘Machine Learning’? Explain with an example how neural networks are useful in machine Learning? [10]

OR

- Q8)** a) What is conceptual learning? List and characterize the basic concept learning strategies? [9]
- b) Explain how the fuzzy logic theory is useful on machine thinking? [9]

- Q9) a)** What are the decisive factors for applying the group technology concept in automated manufacturing system? Explain. [8]
- b) What is knowledge Based Group Technology (KBGT)? Explain with a neat diagram the structure of KBGT? [8]

OR

- Q10)a)** Discuss in detail the classification and cluster analysis approaches to Group Technology? [8]
- b) Write the steps involved in Clustering Algorithm? [8]
- Q11)a)** Develop a work breakdown structure for the installation of an expert system for engineering design? [8]
- b) Consider the following formation of an expert system team:

| Individual | Role |
|--------------------|--------------------------------|
| Domain expert | Source of knowledge |
| Knowledge Engineer | Channel for knowledge transfer |
| Management | Source of resources |
| AI sponsor | Source of motivation |
| Systems personnel | Integration |
| Users | Supply of application |

Suggest how the rules of the various individuals can be coordinated to facilitate an effective end product. [8]

OR

- Q12)** Explain the role of Artificial Intelligence in the following areas; [16]
- a) Job Scheduling
- b) Facility Planning

□□□

Total No. of Questions : 12]

SEAT No. :

P1181

[Total No. of Pages : 2

[4659] - 149

B.E. (Production Engineering)

C : Total Quality Management

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

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) 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 role of Senior Management in TQM. [10]
b) Explain various steps for Quality Planning. [8]

OR

- Q2)** a) Explain how to get Quality in Manufacturing. [10]
b) Explain importance of Quality Council and Quality Statements. [8]

- Q3)** a) Explain how to measure Customer Retention. [8]
b) Explain importance of Employee Involvement in TQM. [8]

OR

- Q4)** a) Explain Malcolm Baldrige National Quality Award criteria. [8]
b) Explain Juran Quality Trilogy. [8]

- Q5)** a) Explain how Quality Circles are useful in TQM. [8]
b) Explain importance of Benchmarking in TQM. [8]

OR

P.T.O.

- Q6)** a) Explain concept of Poka Yoke. [8]
b) Explain Taguchi Quality Loss Function. [8]

SECTION - II

- Q7)** a) Explain types of failures. [10]
b) Explain concept of maintainability and availability. [8]

OR

- Q8)** a) Explain methods of achieving higher reliability. [10]
b) Explain Weibull Distribution (Bath Tub curve). [8]

- Q9)** a) Explain how Quality Policy and Quality Objectives are important in TQM. [8]
b) Explain how Leadership is important for Quality. [8]

OR

- Q10)** a) Explain usefulness of Supplier and Customer Partnerships. [8]
b) Discuss various types of control charts for variables. [8]

- Q11)** a) Discuss benefits of IOS 9000 certification. [8]
b) Explain concept of CMMI. [8]

OR

- Q12)** Write short notes on the following. [16]
a) ISO14001 : 2004 standards.
b) ISO 27001 : 2005 Information Security Management System.



Total No. of Questions : 6]

SEAT No. :

P1180

[Total No. of Pages : 7

[4659] - 151

B.E. (Production Sandwich) (Semester - I)
OPERATIONS RESEARCH AND MANAGEMENT
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain in brief phases in O.R. **[4]**

b) Solve the following L.P.P. by Simplex Method. **[12]**

$$\text{To Max. } Z = 10x_1 + 20x_2$$

$$\text{S.t. } 5x_1 + 3x_2 \leq 30$$

$$3x_1 + 6x_2 \leq 36$$

$$2x_1 + 5x_2 \leq 20 \text{ \& } x_1, x_2 \geq 0$$

c) Write the dual of above problem & write the values of dual decision variables from primal simplex table. **[2]**

P.T.O.

OR

- a) A pharmaceutical company has 100 kgs of A, 180 kgs of B & 120 kgs of C available per month. The company use these to make 3 drugs namely 5-10-5, 5-5-10 & 20-5-10, where the numbers in case represents the % by weight of A, B & C respectively. The cost of the raw materials are given below :

| | | | | | |
|-----------------|---|------|------|------|-------|
| Ingradient | - | A | B | C | Inert |
| Cost / kg (Rs.) | - | 80/- | 20/- | 50/- | 20/- |

The selling prices of 3 drugs are Rs. 40.5, Rs. 43 & Rs. 45 respectively. Construct the mathematical model to maximise the profit. Do not solve further. [8]

- b) Sketch special cases in graphical solution of L.P.P. [4]
- c) Define following terms in LPP : [6]
- i) Basic solution
 - ii) Basic variables
 - iii) Non basic variable
 - iv) Feasible solution
 - v) Degenerate solution
 - vi) Redundant constraint

- Q2) a) Solve the following T.P. : [10]

| | | | | | |
|------|--|----|---|----|----|
| | | To | | | |
| | | 2 | 7 | 4 | 5 |
| From | | 3 | 3 | 1 | 8 |
| | | 5 | 4 | 7 | 7 |
| | | 1 | 6 | 2 | 14 |
| | | 7 | 9 | 18 | |

- b) Write LP form for an assignment problem. [3]
- c) What is travelling salesman problem with sub-optimal solution? [3]

OR

- a) Discuss the degeneracy in transportation problem. [4]
- b) The captain of cricket team has to allot five middle batting positions to five batsman. The average runs scored in past by each batsman at these positions are as follows :

| | | Batting Positions | | | | |
|---------|---|-------------------|----|----|----|-----|
| | | III | IV | V | VI | VII |
| Batsman | A | 40 | 40 | 35 | 25 | 50 |
| | B | 42 | 30 | 16 | 25 | 27 |
| | C | 50 | 48 | 40 | 60 | 50 |
| | D | 20 | 19 | 20 | 18 | 25 |
| | E | 58 | 60 | 59 | 55 | 53 |

- i) Find the assignment of batsman to positions which would give maximum number of runs. [6]
- ii) If E batsman is fixed for III position, how the decision get altered?[6]

Q3) a) Derive basic EOQ formula. [5]

b) A firm uses every year 12000 units of raw material costing Rs. 1.25 per unit. Ordering cost is Rs. 15 per order & the carrying cost is 5% per year of unit cost.

- i) Determine EOQ & the corresponding cost. [4]
- ii) If firm operates for 300 days per year & if lead time is 14 days with safety stock of 400 units, determine reorder point, maximum inventory level and average inventory level. [4]

c) Mention any three optimality criteria in sequencing problems. [3]

OR

- a) Find the optimal order quantity with following price-breaks : [7]

| Q | Unit cost (Rs.) |
|--------------------|-----------------|
| $0 < Q < 500$ | Rs. 10/- |
| $500 \leq Q < 750$ | Rs. 9.25/- |
| $750 \leq Q$ | Rs. 8.75/- |

Monthly demand for product is 200 units, ordering cost Rs. 100/- & Storage cost is 2% of unit cost.

- b) Find the sequence that minimise the total time required in performance of the following jobs on 3 machines in order ABC. Processing time in minutes are given below : [9]

| Jobs → | I | II | III | IV | V |
|--------|---|----|-----|----|----|
| M/c A | 8 | 10 | 6 | 7 | 11 |
| M/c B | 5 | 6 | 2 | 3 | 4 |
| M/c C | 4 | 9 | 8 | 6 | 5 |

SECTION - II

- Q4)** a) What are the advantages & limitations of simulation? [4]

- b) Maintenance work in a factory can be carried by a one-man crew or by two-men crew. One man crew is expected to take 2, 3, 3.5 or 4 hours with probabilities of 0.2, 0.3, 0.4, 0.1 respectively. Two men crew may take 1.25, 1.5, 2, 3 hours with probabilities 0.2, 0.4, 0.25, 0.15 respectively. The labour cost is Rs. 15/hr while machine idle cost is Rs. 40/hr. Using Monte Carlo simulation, decide whether one man or two men crew should be selected. Use following Random numbers (for both crews) – 39, 82, 06, 43, 29, 62, 31, 36, 23, 54. [12]

OR

- a) Two functionally identical machines P & Q are available in market with no scrap value. P costs Rs. 12000 & its annual cost is Rs. 400 in first year, progressively increases by Rs. 100/- in next 2 years, then by 200 in next years & finally by Rs. 300, 400, 600, 800 in subsequent years. Machine Q costs Rs. 13000/- & annual cost is Rs. 200, 350, 550, 750, 1000, 1300, 1800, 2400 & 3000 from year to year. If time value of money is 10%, which is better choice, P or Q? And in that case what would be the replacement policy? [12]
- b) Discuss the replacement policy for the items that fail suddenly. [4]

- Q5)** a) Goods trucks arrive randomly at a stockyard with a mean of 8 trucks/hr. A crew of 4 operatives can unload a truck in 6 minutes. Trucks waiting in queue to be unloaded are paid a waiting charge at a rate of Rs. 60/hr. Operatives are paid a wage rate of Rs. 20/hr. It is possible to increase the numbers of crews to 2 or 3 (of four operatives per crew), then the unloading time will be 4 minutes or 3 minutes respectively per truck. Find the optimal crew size. [10]
- b) Define : [6]
- Maxmini & Mini Max principle.
 - Column & Row Dominance.

OR

- a) Show MCSR in queuing graphically. [3]
- b) Transform the following game in LPP form from A's angle. [5]

| | | | | |
|---|--|----|---|---|
| | | B | | |
| | | 5 | 3 | 7 |
| A | | 7 | 9 | 1 |
| | | 10 | 6 | 2 |

c) Solve the following game by graphical method. [8]

$$\begin{vmatrix} -5 & 5 & 0 & -1 & 8 \\ 8 & -4 & -1 & 6 & -5 \end{vmatrix}$$

Q6) a) A project has following data :

| Activity → | 1-2 | 1-3 | 1-4 | 2-5 | 3-5 | 4-6 | 5-6 |
|--------------------|-----|-----|-----|-----|-----|-----|-----|
| Optimistic time - | 1 | 1 | 2 | 1 | 2 | 2 | 3 |
| Most likely time - | 1 | 4 | 2 | 1 | 5 | 5 | 6 |
| Pessimistic time - | 7 | 7 | 8 | 1 | 14 | 8 | 15 |

i) Draw the network & show critical path. [3]

ii) Find expected duration & variance for each activity. [4]

iii) What is the probability of project completion in 19 days? [2]

Given $Z = -0.67$, $P = 0.25$

b) A small project has following data :

| Activity | 1-2 | 1-3 | 1-4 | 2-4 | 2-5 | 3-6 | 4-6 | 5-6 |
|---------------------------------|------|------|------|-----|------|------|------|-----|
| Normal time - | 6 | 8 | 5 | 3 | 5 | 12 | 8 | 6 |
| Crash time - | 4 | 4 | 3 | 3 | 3 | 8 | 5 | 6 |
| Cost slope/week - (Rs./week) | 2400 | 2700 | 1500 | - | 1200 | 6000 | 1500 | - |

The cost of completing all activities in normal time is Rs. 2,00,000/-.
Indirect cost is Rs. 4,900/- per week.

i) Find out normal duration & normal cost of project. [4]

ii) Find out optimum duration & corresponding cost for project. [3]

iii) Calculate Total Float for activity 2-5. [2]

OR

a) A project data is given below :

| Activity | 1-2 | 1-3 | 1-4 | 2-5 | 2-6 | 3-7 | 4-8 | 5-9 | 6-9 | 7-8 | 8-9 |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| duration - | 2 | 2 | 0 | 2 | 5 | 4 | 5 | 6 | 3 | 4 | 6 |
| Labour requirement | 5 | 4 | 0 | 2 | 3 | 6 | 2 | 8 | 7 | 4 | 3 |

There are 11 persons employed on this project. Carry out approximate man-power levelling so that the fluctuations of work force requirement from day to day is as small as possible. **[14]**

b) Discuss fulkerson's rules for numbering the events. **[4]**



Total No. of Questions : 12]

SEAT No. :

P1079

[4659]-153

[Total No. of Pages : 4

**B.E.(Production Sandwich)
ADVANCED PRODUCTION TECHNOLOGY
(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) a)** Discuss following features of high speed machining: **[6]**
- i) Cutting tool technology.
 - ii) Type of machining operations.
- b) Discuss criteria of High speed/High velocity machining for machine spindle, tool interface cutting tools. **[6]**
- c) Compare tool life for dry and wet drilling on different workpiece materials. **[4]**

OR

- Q2) a)** Explain in detail physical aspects and application of Hard part machining. **[8]**
- b) Explain factors that need to be consider for Dry machining, Near Dry (MQL) Machining, flood cooling using circular supplying system. **[4]**
 - c) Explain characteristics and application of Minimal Quantity Lubrication [MQL]. **[4]**

P.T.O.

Q3) Explain with neat sketch following fine finishing processes: [16]

- a) Abrasive Flow Machining (AFM)
- b) Magnetic Abrasive Finishing (MAF)

OR

Q4) a) Explain with neat sketch magnetic float polishing (MFP). [8]

b) Explain 'Nano Metrology'. [8]

Q5) a) Explain Online/ In-process and online/post-process and off-line inspection methods. [10]

b) Explain Material Resource Planning. [8]

OR

Q6) Write a short note on: [18]

- a) Part classification and coding.
- b) Production flow analysis.
- c) Cellular Manufacturing system.

SECTION-II

Q7) a) Explain frame work of Toyota Production System. [8]

b) Explain Automated Storage and Retrieval System. [8]

OR

Q8) a) Write components of AGVS, Types of AGVS, AGVS guidance system, Application of AGVS, AGVS control system. [10]

b) Explain Linear transfer mechanism and Rotary transfer mechanism. [6]

- Q9)** a) A mass of 25000 N is to be accelerated from rest to a velocity of 2.5m/s over a distance of 100 mm. Calculate the bore diameter of cylinder if coefficient of friction between load and guide is 0.2. [8]
- b) Explain with neat sketch swatch plate type pump. [8]

OR

- Q10)**a) What size of accumulator is necessary to supply 4197 cm³ of fluid in a hydraulic system of maximum operating pressure of 207 bar, which drops to minimum 103.5 bar? Assume nitrogen gas precharge of accumulator as 67 bar, obtain both Isothermal and adiabatic solution. [8]
- b) Explain with neat sketch pressure compensated vane pump. [8]

Q11)A machine slide is moved by means of a hydraulic cylinder, the motion of the cylinder is as follows: [18]

- a) Initially it moves through a distance of 200 mm against a load of 15 KN in about 3 sec.
- b) It is followed by a working stroke of 100 mm against an effective load of 40 KN. The feed rate during this part of the stroke is required to be 0.5 to 1m/min. The return stroke is to be as fast as possible.

A meter out type of circuit is used. Draw a circuit which will fulfil these requirements, select different components you have used in this circuit from the data given.

OR

Q12) Explain with neat sketch and draw pneumatic circuit by using [18]

- a) OR Gate Valve
- b) AND Gate valve

Data for Question No.11

1. Suction Strainer :

| Model | Flow Capacity (/pm) |
|-------|---------------------|
| S1 | 38 |
| S2 | 76 |
| S3 | 152 |

2. Pressure Gauge :

| Model | Range (bar) |
|-------|-------------|
| PG1 | 0-25 |
| PG2 | 0-40 |
| PG3 | 0-100 |
| PG4 | 0-160 |

3. Vane Pump :

| Model | Delivery in /pm | | |
|-------|-----------------|-----------|-----------|
| | at 0 bar | at 35 bar | at 70 bar |
| P1 | 8.5 | 7.1 | 5.3 |
| P2 | 12.9 | 11.4 | 9.5 |
| P3 | 17.6 | 16.1 | 14.3 |
| P4 | 25.1 | 23.8 | 22.4 |
| P5 | 39.0 | 37.5 | 35.6 |

4. Relief Valve :

| Model | Flow Capacity (/pm) | Max Working Pressure & bar |
|-------|---------------------|----------------------------|
| R1 | 11.4 | 70 |
| R2 | 19 | 210 |
| R3 | 30.4 | 70 |
| R4 | 57 | 105 |

5. Flow Control Valve :

| Model | Working Pressure (bar) | Flow Range (/pm) |
|-------|------------------------|------------------|
| F1 | 70 | 0-4.1 |
| F2 | 105 | 0-4.9 |
| F3 | 105 | 0-16.3 |
| F4 | 70 | 0-24.6 |

6. Directional Control Valve :

| Model | Max Working Pressure (bar) | Flow Capacity (/pm) |
|-------|----------------------------|---------------------|
| D1 | 250 | 19 |
| D2 | 210 | 38 |
| D3 | 210 | 76 |

7. Check Valve :

| Model | Max Working Pressure (bar) | Flow Capacity (/pm) |
|-------|----------------------------|---------------------|
| C1 | 210 | 15.2 |
| C2 | 210 | 30.4 |
| C3 | 210 | 76 |

8. Pilot Operated Check Valve :

| Model | Max Working Pressure (bar) | Flow Capacity (/pm) |
|-------|----------------------------|---------------------|
| PO1 | 210 | 19 |
| PO2 | 210 | 38 |
| PO3 | 210 | 76 |

9. Cylinder-(Max Working Pressure-210 bar) :

| Model | Bore dia. (mm) | Rod dia (mm) |
|-------|----------------|--------------|
| A1 | 25 | 12.5 |
| A2 | 40 | 16 |
| A3 | 50 | 35 |
| A4 | 75 | 45 |
| A5 | 100 | 50 |

10. Oil Reservoirs :

| Model | Capacity (litres) |
|-------|-------------------|
| T1 | 40 |
| T2 | 100 |
| T3 | 250 |
| T4 | 400 |
| T5 | 600 |



Total No. of Questions : 12]

SEAT No. :

P2137

[Total No. of Pages : 3

[4659] - 154

B.E. (Production S/W) (Semester - I)

A : MACHINE TOOL DESIGN

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Unit - I

- Q1)** a) A nine speed gear box is to be designed for the minimum speed of 100 rpm and maximum speed of 1600 rpm. It is to be driven by an induction motor rotating at 1440 rpm. Draw best structural diagram, optimum ray diagram & gear box layout. [12]
- b) Explain the design considerations for stepless drives. [4]

OR

- Q2)** a) Explain the design considerations in the design of feed gear box. [8]
- b) Explain PIV drive with block diagram. [8]

Unit - II

- Q3)** a) Importance of rigidity & how it can be improved in existing machine tool structure. [8]
- b) What are the design considerations for design of beds, columns & housings with respect to machine tool structures. [8]

P.T.O.

OR

- Q4)** a) List the materials used for machine tool structure & what should be the material properties for making the machine tool structures. [8]
- b) Sketch the commonly used bed sections & function of bed in machine tools. [8]

Unit - III

- Q5)** a) Explain the important design consideration for power screw. [8]
- b) With neat sketch explain the function & different types of guide ways.[10]

OR

- Q6)** a) Explain different methods used for adjustments of clearance for slide.[8]
- b) What are the major requirements of guideways suitable for machine tools? Give the classification of guides and slideways used in machine tools.[10]

SECTION - II

Unit - IV

- Q7)** a) State the functions of spindle units if machine tools. What are the desirable features of spindle supports? [8]
- b) Draw & explain typical spindle end & explain the main features of spindle unit used in machine tool structure. [8]

OR

- Q8)** a) What are the recommendations for selection of material for spindle of machine tool. [8]
- b) Discuss the importance of the following in spindle design. [8]
- i) Spindle material
 - ii) Additional spindle support
 - iii) Location of bearings and drive elements
 - iv) Balancing

Unit - V

Q9) Explain (Any two) : **[16]**

- a) Control systems : Mechanical & Electrical
- b) Adaptive Control System
- c) Relays and push button control
- d) Electrical brakes

OR

Q10) a) What do you understand by self-excited vibration in machine tool and state the methods of preventing it. **[8]**

b) What is the effect of vibration on machine tool, cutting condition, work piece, tool life. **[8]**

Unit - VI

Q11) a) Explain design considerations in SPM. **[10]**

b) Explain how and where a retrofitting is done in a old milling machine tool. **[8]**

OR

Q12) a) Explain tooling requirements in CNC machine tool. **[8]**

b) Explain design layout of machine tool using matrices. **[10]**



Total No. of Questions : 12]

SEAT No. :

P1080

[4659]-155

[Total No. of Pages : 2

B.E.(Production Sandwich Engg.)
b-AUTOMOBILE ENGINEERING (Elective-I)
(2008 Pattern) (Semester-I)(411124)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Explain the working of simple carburetor. [8]
b) Classify the vehicles on the basis of different aspects. [8]
c) Why is the frame narrow at the front? [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 "Chassis" in automobile? [2]

- Q3)** a) Explain in detail the components used in water cooling system with neat diagram. [10]
b) Write a short note on anti-freeze solution. [6]

OR

- Q4)** a) Give advantage and disadvantage of Air cooled System. [8]
b) What is Pump circulation system? Explain. [8]

- Q5)** a) Explain Magneto ignition system. [8]
b) List out the various tests performed on lubricants. [8]

OR

P.T.O.

- Q6)** a) Explain the requirements of ignition system. [8]
b) What are the different types of lubricant? [8]

SECTION-II

- Q7)** a) Explain the working of clutch. [8]
b) Explain the working of differential with the help of Diagram. [8]

OR

- Q8)** a) Discuss the various components of clutch with the help of Diagram. [10]
b) What is mean by double declutching? Explain? [6]

- Q9)** a) Sketch and explain Ackermann steering mechanism. [10]
b) What is the purpose of suspension system? [6]

OR

- Q10)**a) Discuss the following properties of suspension system. [8]
i) Damping
ii) Camber
b) Discuss the advantages of Independent suspension over dependent suspension. [8]

- Q11)**a) Define the following terms. [8]
i) Brake Shoes ii) ABS
iii) Caliper iv) Parking brake
b) Why disc brakes are better than drum type brakes? [4]
c) 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 [18]
a) Gear Box
b) Cooling system
c) Ignition system

□□□

Total No. of Questions : 12]

SEAT No. :

P788

[Total No. of Pages : 2

[4659]-156

B.E. (Production Sandwich)

**C: COMPUTER INTEGRATED MANUFACTURING AND
INDUSTRIAL ROBOTICS**

(2008 Pattern) (Semester - I) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer any three questions from Section I and any three questions from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Use of calculator is allowed.*
- 4) *Figures to the right indicate full marks.*
- 5) *Answer one question from 1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10, 11 & 12.*

SECTION - I

- Q1)** a) List out the different models used in CIM? Draw the neat sketch of IBM Models and compare with various Models? [12]
b) Explain need of Models in CIM. [4]
OR
- Q2)** a) Explain the role Prototyping in CIM along with example. [8]
b) Explain the following in detail : [8]
i) Concept of Solid ground Curing.
ii) Application Rapid tooling methods to Press tool Manufacturer.
- Q3)** a) Explain the Basic Anatomy e of Robotics in detail along with example. [8]
b) Derive the equation of Kinematics using Homogeneous Transformation. [8]
OR
- Q4)** a) Explain the Principle of Denna-vati-Hartenberg s convention for dynamics Analysis of Joints along with suitable example. [12]
b) Explain the Concept of Spatial mechanism. [4]
- Q5)** a) Explain the Mechanical 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]

P.T.O.

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) Explain the role computer in gripper design. [8]
b) A 10 kg rectangular block is gripped in the middle and lifted vertically at velocity 1 m/s. If it accelerates to this velocity at 40.5 m/s^2 and the Coefficient of friction between the gripping pad and block is 0.785. Calculate minimum force that would prevent slippage. [8]

OR

- Q8)** a) Explain concept finite element analysis in grippers designs for pressure Foragile. [8]
b) Write a short note on Special purpose gripper design. [8]
- Q9)** a) What are the different types of Sensors used in Robotics? Classify. [8]
b) Explain the factors affecting the selection of Sensors for the particular Application. [8]

OR

- Q10)** a) What is Robot vision? What are the types of vision sensors used to take the image of an object? [8]
b) Explain important technique use in Robot Vision System. [8]
- Q11)** a) Explain along with sketch the application Robot in the following area.[12]
i) In Foundry Industry.
ii) Mining Industry.
iii) Packaging of Boxes.
b) Explain the application of CLIMBING Robot in detail. [6]

OR

- Q12)** Write a short note on following : [18]
a) Modular design concept in robotics.
b) Intelligent robotics.
c) Vector Assembly Languages used for programming in robot.



Total No. of Questions : 12]

SEAT No. :

P1081

[4659] - 157

[Total No. of Pages : 2

**B.E. (Production/ Sandwich)
d: PLASTIC ENGINEERING
(2008 Pattern) (411124) (Elective - I) (Semester - I)**

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) What is polymerization? Discuss commonly used thermoplastic materials. **[9]**

b) Give the classification of plastic materials. **[9]**

OR

Q2) a) Explain the commonly used alloys & blends in plastic. **[9]**

b) Discuss commonly used additives in plastic. **[9]**

Q3) a) Write a short note on cavity & core inserts used in injection moulding? **[8]**

b) Explain injection moulding design consideration? **[8]**

OR

Q4) a) Write a short notes on cooling of injection moulds? **[8]**

b) Write short notes on mould ability features & ejection of moulds. **[8]**

Q5) a) Explain blown film extrusion with a neat sketch? **[8]**

b) Explain in brief about the extrusion coating & lamination. **[8]**

OR

P.T.O.

- Q6)** a) Explain the extrusion problems & extruder performance? [8]
b) Discuss coextrusion of films & sheets? [8]

SECTION - II

- Q7)** a) Explain basic principles of blow moulding. [9]
b) What are the different materials which are used for blow moulding. [9]

OR

- Q8)** a) Explain stretch blow moulding with a suitable sketch. [9]
b) Explain bottle design concept used in blow moulding. [9]

- Q9)** a) Explain with a neat sketch vacuum forming technique. [8]
b) Discuss about various factors which effect the thermoforming process. [8]

OR

- Q10)**a) Explain twin sheet thermoforming process. [8]
b) Explain thermoforming process with suitable sketch? [8]

- Q11)**a) Write a short notes on trimming & routing of thermosetting and thermoplastics? [8]
b) Write short notes on buffing & Polishing of thermosetting & thermoplastic? [8]

OR

- Q12)**a) Discuss guide lines of tool geometry. [8]
b) Explain turning & milling with neat sketch. [8]



Total No. of Questions : 12]

SEAT No. :

P1082

[4659] - 158

[Total No. of Pages : 2

B.E. (Production/ Sandwich Engineering)

**a: ERGONOMICS AND HUMAN FACTORS IN ENGINEERING
(2008 Pattern) (Semester - I) (Elective - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is the concept of strength and endurance from a MMH task design approach? [10]
- b) Explain characteristics of human machine systems. [8]

OR

- Q2)** a) Explain the basis of ergonomics problem identification. [8]
- b) What is biomechanics? Explain in brief. [6]
- c) Describe work rest cycle in brief. [4]

- Q3)** a) Differentiate between static dimensions and dynamic dimensions. [8]
- b) Describe how workspace envelope is for seated personnel. [8]

OR

- Q4)** a) Discuss in brief mirror image arrangements. [8]
- b) Discuss any four principles of arranging components in physical space. [8]

P.T.O.

- Q5)** a) Discuss the concept of visibility in detail. [8]
b) Discuss factors affecting design of foot controls. [8]

OR

- Q6)** a) What is C/R Ratio? How to decide optimum C/R ratio? [8]
b) Explain in brief the concept of learning curves. [8]

SECTION - II

- Q7)** a) Discuss the color system in details with neat sketch. [9]
b) Discuss control along the path and control along receiver for noise exposure. [9]

OR

- Q8)** a) Discuss any three operative temperature indices. [9]
b) Discuss physiological effect of heat and cold on performance. [9]

- Q9)** a) Write a note on ergonomic safety and health management. [8]
b) What do you mean by interface design? What data is applicable in such situations. [8]

OR

- Q10)**a) Discuss in brief characteristics of system design. [8]
b) Discuss a case in which you have come across application of human factors engineering? [8]

- Q11)**a) Explain MTA in detail. [12]
b) Explain the Reach element used in MTM-1? What are its classes? [4]

OR

- Q12)**a) Explain MOST and its types in brief. [8]
b) Write a note on Mento Factor System in brief. [8]



Total No. of Questions : 12]

SEAT No. :

P789

[Total No. of Pages : 3

[4659]-159

B.E. (Production - S/W)

MATERIALS MANAGEMENT AND LOGISTICS

(Semester - I) (2008 Pattern) (Elective - II (b))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer 3 questions from Section - I & 3 questions from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Define Value Engineering. Explain Value Analysis for any one component of your choice. [9]

b) Explain with example types of values used in Value Engineering. [9]

OR

Q2) a) Explain Material Requirement Planning in detail. How it is beneficial to maintain inventory? [9]

b) Explain Make or Buy decision in brief. [9]

Q3) a) Explain Documents used in Purchasing. Explain in detail any two. [8]

b) What are the objectives of Purchasing? Explain any four in brief. [8]

OR

Q4) a) What is importing? Explain Import Cycle in detail. [8]

b) What is Vendor rating? Explain any two methods in detail. [8]

Q5) a) How study of waste management techniques helps to manage surplus and obsolete material? [8]

b) Explain LIFO and FIFO methods of material issuing. [8]

OR

Q6) a) What is the role of Store Keeper? Differentiate between Centralized and Decentralized Stores. [8]

b) What is Codification? Explain KODAK system of codification. [8]

P.T.O.

SECTION - II

- Q7)** a) Explain the functional areas of Logistics. [8]
b) Explain Economic and Service benefits of Warehouse. [8]

OR

- Q8)** a) Explain the role of Warehouse and Transportation in Logistics. [8]
b) What are the types of transportation modes? Explain in detail any four. [8]

- Q9)** a) What are the types of selective control of inventory? Explain any two in detail. [8]
b) Demand for the Desktop computer at Best Buy is 5000 units per month. Best Buy incurs a fixed, order placement, transportation and receiving cost of Rs. 4,000/- each time an order is placed. Each computer costs Best Buy Rs. 50,000 and the retailer has a holding cost of 20 percent. Evaluate the number of computers that the store manager should order in each replenishment lot. Also find optimum cost. Number of orders and period between two replenishments. [8]

OR

- Q10)** a) Derive an equation for economic order quantity when replenishment period is instantaneous. [8]
b) The demand for a product is 3600 units per annum. Inventory carrying cost amount to Rs. 1.6 per unit per year. The setup cost per run is Rs. 800. [8]
Find :
i) Economic order quantity.
ii) Minimum average inventory control.
iii) Optimum number of orders per year.
iv) Optimum period of supply per optimum order.

- Q11)** a) Explain Fixed Period system and Fixed Quantity system in brief. [9]
b) An item is produced at the rate of 128 per day. Annual demand is 6400 units. Setup cost of production run is Rs.24 and holding cost is Rs. 3/unit/annum. There are 250 working days for production each year. Develop inventory policy for this item. [9]

OR

Q12) a) What is safety stock? How lead time affects safety stock in finished goods inventory? [9]

b) Harsh Engineering buys a particular item at a cost of Rs. 5 per unit. The company is offered the discount as follows : [9]

Order quantity less than 500 units – Rs. 5.00 per unit

500-1250 – Rs. 4.80 per unit.

1250 units or more – Rs. 4.00 per unit

The cost of placing an order is Rs. 36. Annual demand is 2800 units.

Inventory carrying cost is 20 percent of average inventory investment.

Give your decision regarding the quantity to be ordered.



Total No. of Questions : 11]

SEAT No. :

P1083

[4659] - 160

[Total No. of Pages : 3

B.E. (Production -Sandwich)

c - FINANCIAL MANAGEMENT AND COST CONTROL

(2008 Pattern) (Semester - I) (Elective - II) (411125)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions form each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Based on the following information furnished by Zed Private Ltd. Calculate **[12]**

- i) Gross Profit Ratio
- ii) Net Profit Ratio and
- iii) Quick Ratio

Also give your interpretation for each ratio.

Sales-₹10,00,000 Consumption of Raw Material₹3,50,000 Wages₹1,00,000
Other Manufacturing expenses ₹1,00,000.

Indirect Expenses- ₹2,50,000 Cash in hand - ₹1,00,000 Creditors - ₹3,00,000
Debtors - ₹2,00,000 Share Capital ₹2,00,000.

b) Write the format of Balance Sheet of a Company. **[6]**

OR

Q2) a) Explain in detail the following sources of long term finance **[9]**

- i) Share Capital
- ii) Borrowed funds

P.T.O.

- b) Explain the following ratios giving formulae and stating the importance of each ratio. You may assume suitable data [9]
- i) Current Ratio
 - ii) Net Profit Ratio

- Q3)** a) Explain the terms Capital Budgeting and Capital Rationing stating their importance. [8]
- b) Explain with suitable example Pay-Back period method for evaluation of Capital Expenditure proposals. How is it different from Discounted Pay-Back period method? [8]

OR

- Q4)** a) State the features and advantages of Internal Rate of Return method. [6]
- b) A company has to make a choice between two projects viz. Project A which requires initial capital investment of ₹2,70,000 and Project B which requires initial capital investment of ₹ 4,80,000. There will be no scrap value at the end of the life of both the projects. The cost of capital of the company is @ 10%. The annual cash inflows are as follows. [10]

| Year | Project A ₹ | Project B ₹ | Discounting factor@10% |
|------|-------------|-------------|------------------------|
| 1 | NIL | 1,20,000 | 0.9091 |
| 2 | 60,000 | 1,68,000 | 0.8264 |
| 3 | 2,64,000 | 1,92,000 | 0.7513 |
| 4 | 1,68,000 | 2,04,000 | 0.6830 |
| 5 | 1,68,000 | 1,80,000 | 0.6209 |

Calculate Net Present Value and Profitability Index for both the projects. Which project will you accept? Why?

- Q5)** a) Explain the objectives and advantages of Fund Flow Analysis. [8]
- b) Explain the concept of Cost of Capital and its importance in financial decisions. [8]

OR

- Q6)** a) What is meant by Working Capital? Explain its types. [8]
b) Discuss the various factors affecting the amount of working capital. [8]

SECTION - II

- Q7)** a) What are the methods of costing? Explain elements of cost. [8]
b) What is labor turnover? What are the principles of good remuneration? [8]

OR

- Q8)** Discuss the following terms: [16]
a) Allocation of overheads
b) Apportionment of overheads.
c) Absorption of overheads.
d) Machine hour rate

- Q9)** a) What is cost reporting & what are its corrective actions? Explain standard cost. [8]
b) What are the elements of cost control programme? Explain project planning and scheduling in detail. [8]

OR

- Q10)** a) Explain material cost, usage yield, mix variance with suitable illustration. [8]
b) What is budgetary control, cost control and cost reduction? [8]

- Q11)** Write short note on: [18]
a) Marginal Costing.
b) Activity Based Costing.
c) Standard Costing.
d) Cost of Quality.



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :3

P1197

[4659] - 161

B.E. (Production s/w)

d - PRODUCT DEVELOPMENT

(2008 Course) (Elective - II)

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 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 Rapid Prototyping? Explain in detail types of rapid prototyping. **[9]**

b) Explain Standardization, Simplification & Specialization in product design. **[9]**

OR

Q2) a) Explain Product Verification & Product Validation in short with example. **[8]**

b) What is modern Product development process? Explain role of product development team in product development planning with reference to ISO standard. **[10]**

Q3) a) Explain in short the Economic Analysis of product. **[8]**

b) What are the types of customer needs, what do you mean by customer satisfaction & explain effect of customer satisfaction on product design? **[8]**

OR

P.T.O.

- Q4)** a) What are the different methods of gathering customer needs information? How will you analyze the information? [8]
- b) Write short notes on: [8]
- i) Market Segmentation
 - ii) Economic Analysis of Product

- Q5)** a) What is functional modeling? Explain decomposition in detail? [8]
- b) Explain augmentation & aggregation in short? [8]

OR

- Q6)** a) Describe Pugh's Concept in detail with example? [8]
- b) Write short notes on: [8]
- i) FMEA
 - ii) Concept selection process

SECTION - II

- Q7)** a) What is reverse engineering? What are its advantages & disadvantages? [9]
- b) What is product tear down process & explain its different methods. [9]

OR

- Q8)** a) What is indented assembly cost analysis & explain function form diagrams. [9]
- b) What is product portfolio & architecture explain with suitable example. [9]

- Q9)** a) What is design for manufacture (DFM)? Explain the general principles to be followed while designing the parts for manufacture. [8]
- b) Explain phases of product life cycle with its corresponding technologies. [8]

OR

- Q10)a)** What is product testing & explain following terms
- i) Field trials
 - ii) Virtual Trial
 - iii) Iterations [8]
- b) Explain the guidelines to be followed in the design of the parts for the following processes:
- i) Welding
 - ii) Forging [8]
- Q11)a)** What is link between product data & product workflow? Explain the PLM in detail. [8]
- b) What is product life cycle? Why it is necessary? Explain its components in detail? [8]

OR

- Q12)a)** Explain in short Reliability Concept in product development? [8]
- b) Write short notes on:
- i) Product data & Product work flow
 - ii) Importance of customer involvement. [8]



Total No. of Questions : 6]

SEAT No. :

P1158

[Total No. of Pages : 2

[4659] - 187

B.E. (Printing)

TECHNOLOGY OF GRAVURE

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Answers to two sections should be written separately.*
- 2) Draw neat diagram wherever necessary.*

SECTION - I

Q1) a) Explain in detail laser engraving process. **[10]**

b) Describe the effect of cell geometry on gravure printability. **[8]**

OR

Explain in detail electronic engraving of a Gravure cylinder. **[18]**

Q2) Describe in detail variables that affect plating of gravure cylinder. **[16]**

OR

Explain the function of Copper and Chrome in cylinder making. **[16]**

Q3) Explain in detail unit configuration of a Gravure press. **[16]**

OR

Explain different types of inks used in gravure process. **[16]**

SECTION - II

Q4) Explain in detail doctor blade system on a gravure press. **[18]**

OR

Explain in detail types of inking system on gravure press. **[18]**

P.T.O.

Q5) Explain in detail the effect of ESA on gravure print quality. [16]

OR

Explain the factors governing pressure on a gravure press. [16]

Q6) Explain in detail register control system for a Gravure press. [16]

OR

Write notes on: [16]

- a) Doctor Blade Streaks
- b) Hickeys
- c) Dot Skips
- d) Smudging



Total No. of Questions : 6]

SEAT No. :

P1086

[4659] - 189

[Total No. of Pages : 2

B.E. (Printing)

**ADVERTISING & MULTIMEDIA
(2008 Course) (Revised) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve 3 questions from each section.*
- 2) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain the general communication & advertising communication process with the neat diagram. **[8]**

b) Which are the major tools of marketing/communication mix. Explain each in brief. **[8]**

OR

a) What are 4p's of marketing? Explain each in details. **[8]**

b) How is public relations as a communication tool is complimentary to the advertising effort? Explain. **[8]**

Q2) What are the major parts of designing a message. Explain each in greater details. **[18]**

OR

Explain cognizance model for effectiveness of advtg. with neat diagram. **[18]**

Q3) What are the major types of advertising? Compare & contrast between institutional & public Relations type of advtg. **[16]**

OR

Explain in details about types of products, PLC & product advertising. **[16]**

P.T.O.

SECTION - II

Q4) What is research? Which are different areas that can be explored for business research. Explain marketing research & its salient features. **[18]**

OR

What are different market survey techniques? Explain each in details with its merits & demerits. **[18]**

Q5) What is market segmentation? Explain types of marketing. Also explain different types of segmentation with suitable case. **[16]**

OR

How does a concept of 'family life cycle/phase of life the person is in', matters to segmentation? Also explain Psychographic segmentation. **[16]**

Q6) What is branding explain **[16]**

- a) brand Positioning.
- b) brand personality.
- c) brand property.

OR

What is brand equity, explain the concept in details. **[16]**



Total No. of Questions : 6]

SEAT No. :

P1087

[4659] - 190

[Total No. of Pages : 3

B.E. (Printing)

**a - QUALITY CONTROL TECHNIQUES IN PRINTING
(2008 Course) (Elective I) (Semester - I) (408281)**

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) *Answer Any three questions from each section.*
- 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) List out Quality Characteristic in detail. **[16]**
b) Explain in short the concept of quality control considering any one printing process.

OR

- a) Explain Quality cost with suitable example of each type. **[16]**
b) Define the term quality & write down the need of Quality Inspection.

- Q2)** Eight consecutive lots of printed sheets received from a vendor were inspected by sampling process. The sample size was varied. The number of defectives in each sample recorded as under. **[18]**

| | | | | | | | | |
|------------------|-----|-----|----|-----|-----|-----|----|----|
| Sample No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Sample Size | 130 | 125 | 60 | 100 | 180 | 150 | 80 | 70 |
| No of Defectives | 4 | 3 | 0 | 2 | 4 | 1 | 2 | 3 |

Construct a control chart for Fraction defective & describe whether the printed sheets are in control or not.

OR

P.T.O.

For a sampling plan determine probability of acceptance of following Percentage defectives, also draw a OC Curve [18]

$N = 1000, n = 60, c = 1$

| | | | | | | |
|----------------------|------|------|----|----|----|----|
| Sr. No | 1 | 2 | 3 | 4 | 5 | 6 |
| Percentage Defective | 0.4% | 0.8% | 1% | 2% | 4% | 6% |

Q3) a) Explain in detail Job Production & Mass Production. [8]

b) Describe Lean manufacturing system in detail. [8]

OR

a) Explain in detail world class Manufacturing. [8]

b) Explain computer Integrated Manufacturing system. [8]

SECTION - II

Q4) a) Explain any two optical & physical properties of paper. [9]

b) Explain the need of checking viscosity of ink & factors on which viscosity is depending. [9]

OR

a) Explain following properties related to Ink (any three). [9]

i) Flow

ii) Color

iii) Opacity

iv) Adhesion

b) Explain Inventory management in Printing Industry. [9]

Q5) a) Explain need of monitor profile with respect to obtained quality printing. [8]

b) Explain Raster Image processing in detail. [8]

OR

- a) Explain Offset Lithography process control with help of profile creation.[8]
- b) Explain any four file formats. [8]

Q6) Explain the process of press standardization & characterization for Gravure printing. [16]

OR

Describe factors to be considered for press finger printing of Flexography Printing. [16]



Total No. of Questions : 6]

SEAT No. :

P1088

[4659] - 193

[Total No. of Pages : 2

B.E. (Printing)

a - SECURITY PRINTING

(2008 Course) (408282) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve 3 questions from each section.*
- 2) *Q1 & Q4 are compulsory.*
- 3) *Assume suitable data for Q6 if necessary.*

SECTION - I

Q1) What is Security Printing? Explain any 3 systems which need Security printing in low, medium and high security features. **[18]**

OR

Explain Optical document security with details of applications and elements.

Q2) Discuss Printing processes applied to security printing in detail. **[16]**

OR

What are Variable data printing features in security printing? Explain with examples.

Q3) What are smart cards? Describe manufacturing process and features. **[16]**

OR

Discuss RFID technology for security printing with examples.

P.T.O.

SECTION - II

Q4) What are negotiable instruments? Explain structure and detail features. Also explain CTS system. **[18]**

OR

Explain MICR/OCR/Cheque printing technology & methods of Cheque fraud prevention.

Q5) Explain types of security Inks. Explain any 2 with examples. **[16]**

OR

Explain features of currency inks. Also discuss types of inks used To print cheques and stamps.

Q6) Explain features of security elements used in currency printing in detail. **[16]**

OR

Write notes on:

- a) Holograph features
- b) Guilloche patterns
- c) Void mark.



Total No. of Questions : 6]

SEAT No. :

P1160

[Total No. of Pages : 2

[4659]-201

B.E. (Printing) (Semester - II)

FLEXIBLE PACKAGING

(2008 Pattern) (Elective - IV (a))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written separately.*
- 2) *Draw neat diagrams wherever necessary*

SECTION - I

Q1) a) Why Plastics in Packaging. Explain. **[10]**

b) Explain the role of PET in Packaging. **[8]**

OR

Write properties and applications of : **[18]**

- a) HDPE
- b) PS
- c) PP

Q2) Explain in detail Flexo Machine principles for flexible packaging. **[16]**

OR

Explain in detail unit configuration of a Gravure Press.

Q3) Explain along with diagram Wet lamination techniques. **[16]**

OR

Explain along with diagram Cast Film Extrusion process.

SECTION - II

Q4) Explain in detail Retort packaging for liquid product. **[16]**

OR

Explain in detail Aseptic Packaging.

P.T.O.

Q5) Explain in detail pouching techniques for package. **[16]**

OR

Describe in detail making of a lami-tube.

Q6) Explain the packaging methods for dairy products. **[18]**

OR

Mention deterioration factors and packaging techniques for the following :

- a) Tea.
- b) Coffee.
- c) Beer.



Total No. of Questions : 12]

SEAT No. :

P792

[Total No. of Pages : 2

[4659]-204

B.E. (Information Technology) (Semester - I)
INFORMATION ASSURANCE AND SECURITY
(2008 Pattern)

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

SECTION - I

- Q1)** a) State the Chinese Remainder Theorem with example. [8]
b) What is mean by Modular arithmetic & Exponentiation? [8]

OR

- Q2)** a) Explain the seven principles of security. [8]
b) How AES encryption does not solve an integrity problem? What is the solution? [8]

- Q3)** a) Describe the modes of operation (ECB, CBC, CFB, OFB) with the help of block diagram. [8]
b) Draw block diagram of SHA-1 and state the general step in the process. [8]

OR

- Q4)** a) Discuss and compare Linear Cryptanalysis and Differential Cryptanalysis. [8]
b) Describe the advantages and disadvantages of symmetric and asymmetric key cryptography. [8]

- Q5)** a) Discuss key management with respect to the following issues : [12]
i) Key generation.
ii) Key distribution.
iii) Key updation.
b) What is PKI? Explain the different PKI Architecture. [6]

OR

P.T.O.

- Q6)** a) Draw sequence diagram of Neeham Schroeder protocol and explain. [9]
b) How the Digital Certificate creation takes place? Enlist the contents of digital certificate. [9]

SECTION - II

- Q7)** a) What is IPSEC? How does AH and ESP differs while working under Tunnel mode and Transport mode? [12]
b) Explain Internet Key Exchange protocol? [6]

OR

- Q8)** a) Illustrate application programming level security solution for Peer to Peer chat application which should support authentication, integrity and secrecy. [12]
b) State various categories of Intrusion Detection System. [6]

- Q9)** a) Explain any four domains of ISO 27001 standard. [8]
b) Describe the types of Smart Cards? Explain the advantages and disadvantages of Smart Card. [8]

OR

- Q10)** a) Explain Electronic payment system. List the characteristics of e-payments. Explain list of requirements to evaluate e-payments system. [8]
b) Explain and draw a model for ISMS (Information security management system) of PDCA cycle (Plan, DO, Check, Act Phase). [8]

- Q11)** Write short notes on (Any Three) : [16]
a) Industrial Espionage.
b) Security by obscurity.
c) Internet Fraud.
d) Electronic Evidence.

OR

- Q12)** Write short notes on (Any Three) : [16]
a) Indian IT Act.
b) Cyber Terrorism.
c) Identify Theft.
d) Computer Forensics.



Total No. of Questions : 12]

SEAT No. :

P794

[Total No. of Pages : 4

[4659] - 206

B.E. (Information Technology) (Semester - I)
SOFTWARE TESTING AND QUALITY ASSURANCE
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is need of testing? Differentiate error, fault, defect and failure with example. [8]
- b) Give objectives, examples and when to use ANY TWO of the following testing techniques: Requirement testing, security testing, Integration testing, and recovery testing. [8]

OR

- Q2)** a) Describe the circumstances under which you would apply white-box and black-box testing techniques. [8]
- b) What are different levels of testing? Which software components are most suitable for unit testing and why? [8]
- Q3)** a) Draw and explain a defect life cycle. [6]
- b) Explain Test case design strategies. Assume you purchased new android mobile phone. How would you test it? Develop black box test cases for the android mobile phone with pass/fail criteria. [10]

OR

P.T.O.

Q4) a) Explain in detail different functions/ responsibilities to be handled in a testing life cycle or process. [8]

b) Draw control flow graph for the code given below. Clearly label each node. Calculate its cyclomatic complexity. How can this value be used to measure testability? Describe how cyclomatic complexity number and flow graph be used. [8]

to design a set of white box tests for this module.

```
{  
1) i=1;  
2) while(i<=n) {  
3) j=1;  
4) while(j<=1) {  
5)     if(a[i] < a[j]);  
6)     Swap(a[i], a[j]);  
7)     j=j+1;}  
8) i = i+1; }  
9) }
```

Q5) a) Explain GQM technique in detail. Draw a GQM tree for the quality goal of achieving better software usability. [8]

b) List and explain different types of measurement scales with example. [10]

OR

Q6) a) Spell Check Specs: The checker accepts as input a document file and an optional personal dictionary file. The checker lists all words not contained in either of these files. The user can query the number of words processed and the number of spelling errors found at any stage during processing. [18]

| Item | Weighting Factor | | |
|------------------------|------------------|---------|---------|
| | Simple | Average | Complex |
| External Inputs | 3 | 4 | 6 |
| External Outputs | 4 | 5 | 7 |
| External Inquiries | 3 | 4 | 6 |
| External Files | 7 | 10 | 15 |
| Logical Internal Files | 5 | 7 | 10 |

There are 14 technical complexity factors out of that two factors has rating as 5 and six factors has rating as 3 and remaining six has rating as 0 on a scale of 0 to 5. Where 0 means irrelevant, 3 means it is average and 5 means it is essential to the system being built

Based on the above perform the following:

- a) Draw pictorial representation of the system for FP analysis.
- b) Identify internal logical files, external I/P, O/P, Inquiries and Files.
- c) Calculate Function Count (FC)
- d) Calculate Technical Complexity Factor(TCF)
- e) Calculate Function Point (FP)
- f) Explain the importance of FP in software testing.

SECTION - II

- Q7)** a) Explain the following software reliability quality attributes in short: **[10]**
- i) Usability
 - ii) Portability.
 - iii) Maintainability
 - iv) Interoperability.
 - v) Correctness.
- b) Explain the objectives and elements of software reviews and inspections. **[8]**

OR

- Q8)** a) List ishikawa's seven basic quality tools. Explain any two in detail with example **[10]**
- b) How are code inspection and Project Planning helpful in improving the product quality? **[8]**
- Q9)** a) List the requirements of ISO 9000 and ISO 9001. **[8]**
- b) Discuss how better software quality can be assured by using quality standards. **[8]**

- Q10)a)** Explain the PDC A cycle in detail with reference to ISO 9000:9001. [8]
- b) What is six sigma? Explain the terms DMAIC and DMADV with reference to six sigma. [8]

- Q11)a)** Draw and describe the various levels of CMM along with the KPA's for different levels. [8]
- b) Describe in detail the KPA Software Project Tracking and Oversight (SPTO). [8]

OR

- Q12)a)** Explain the goals and activities performed in the following KPA's: [8]
- i) Software Product Engineering.
- ii) Organization Process Definition.
- b) Describe in detail Software Configuration Management (SCM). [8]



Total No. of Questions : 12]

SEAT No. :

P795

[Total No. of Pages : 3

[4659] - 207

B.E. (Information Technology) (Semester - I)

**A : ADVANCED DATABASE MANAGEMENT (Elective - I)
(2008 Pattern)**

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

SECTION - I

- Q1)** a) What is cursor? Explain with diagram the different types of cursor. [8]
b) Explain the PL/SQL Block structure in detail. [8]

OR

- Q2)** a) What is trigger? Write the trigger for updating the records in the database. [8]
b) Explain Embedded SQL & dynamic SQL. [8]
- Q3)** a) Explain the architecture of transaction processing monitor. [8]
b) Explain Two phase Locking with example. [10]

OR

- Q4)** a) Explain ACID properties. [4]
b) Explain Real - Time Transaction systems. [4]
c) What are the different types of concurrency control? Explain any one type in detail. [10]

P.T.O.

- Q5) a)** Discuss the table inheritance in SQL. [4]
- b) Consider the database schema with a relation University whose attributes are as shown below: [12]
- with types specified for multivalued attributes
- staff (sname, Department Set multiset (Department), subject set multiset (subjects)).
- Department = (name, joining date)
- Subjects = (type, examset set of (Exams))
- Exams = (year, place)
- i) Define the above schema in SQL : 2003 with appropriate types for each attribute
- ii) Using database schema in SQL 2003, write the following queries:
- * Find name of all staff who have joined after January 2013.
 - * List all subjects in the relation University.

OR

- Q6) a)** Explain the document type definition. Describe a DTD with suitable example for an XML. [8]
- b) Write the applications of XML. [4]
- c) Differentiate object oriented (OO) verses object Relational (OR) databases. [4]

SECTION - II

- Q7) a)** Explain in detail the data ware house architecture. [8]
- b) Write short notes on following:- [10]
- i) Online Transaction processing
- ii) Data warehouse data House
- iii) Dimentionality modeling in datawarehouse
- iv) Data warehouse using oracle.
- v) Data Marts.

OR

Q8) a) Explain the functions of Administration & management tools in data warehouse. [10]

b) Explain the approaches taken by vendor to provide data extraction, cleansing & data transformation tools. [8]

Q9) a) Write the algorithm of K - mean data mining. [8]

b) Describe the characteristics of multi - dimensional data & how this data can be represented? [8]

OR

Q10) a) Write short notes on following:- [8]

i) OLAP Benchmarks

ii) Applications and Benefits of OLAP

iii) Basian classifier

iv) Predictive modeling

b) Discuss OLAP functionality provided by ROLLUP & CUBE of SQL standard. [8]

Q11) a) Write the types of locks. [4]

b) Explain exceptional handlers in oracle. [4]

c) Explain implicit & explicit locking in oracle. [8]

OR

Q12) a) Write notes on database security & threats. [8]

b) Explain the authorization and access control for providing security for database. [8]



Total No. of Questions : 12]

SEAT No. :

P796

[Total No. of Pages : 4

[4659] - 208

B.E. (Information Technology) (Semester - I)

ARTIFICIAL INTELLIGENCE (Elective - I (b))

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the TWO sections should be written in separate sheet.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicates full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Define Artificial Intelligence? Explain how Artificial Intelligence plays role in design of Intelligent Agents? [8]
- b) What is the need of PEAS description of the task environment? Develop a PEAS description for the following task environments. [8]
- i) A computer program that given an image of a fingerprint can find the best match in a database of criminal fingerprints
 - ii) Robot Soccer Player
 - iii) A software agent that can play a computerized version of the following traditional game of solitaire

OR

- Q2)** a) Explain ant colony optimization and particle swarm optimization in brief. Explain their applications. [8]
- b) Explain structure of Utility Based Agent and Goal Based Agent and compare them. [8]

P.T.O.

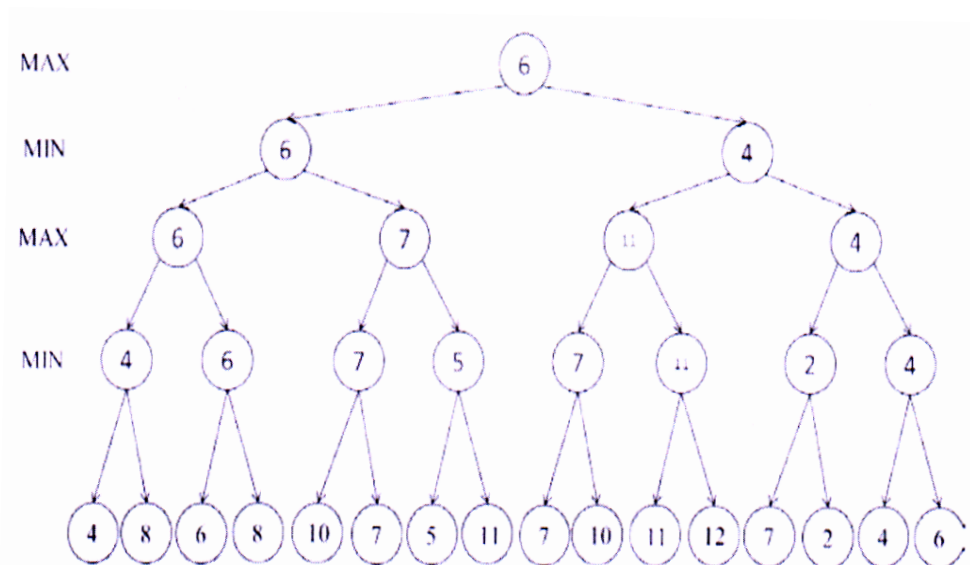
Q3) a) What is heuristics? Explain with example. Also write heuristic function for Tic-Tac toe and Travelling salesman problem. [8]

b) Describe graph coloring problem as a Constraint Satisfaction Problem. Explain how 'minimum remaining values' heuristic helps in ordering the variable values. [8]

OR

Q4) a) How to solve problem using state space search? Analyze water-jug problem as state space search. [8]

b) Explain Min-max search procedure. Use the Minimax algorithm to compute the minimax value at each node for the game tree below. [8]



Q5) a) “If it is hot, then it is humid. If it is humid then it will rain. It is hot.” Show that “It will rain.” Using resolution, Find its clausal form and draw its tree. [9]

b) Describe semantic nets and frames with suitable examples. Construct semantic net representation of the following. ‘Rajesh is Indian, Rajesh is a lecturer.’ [9]

OR

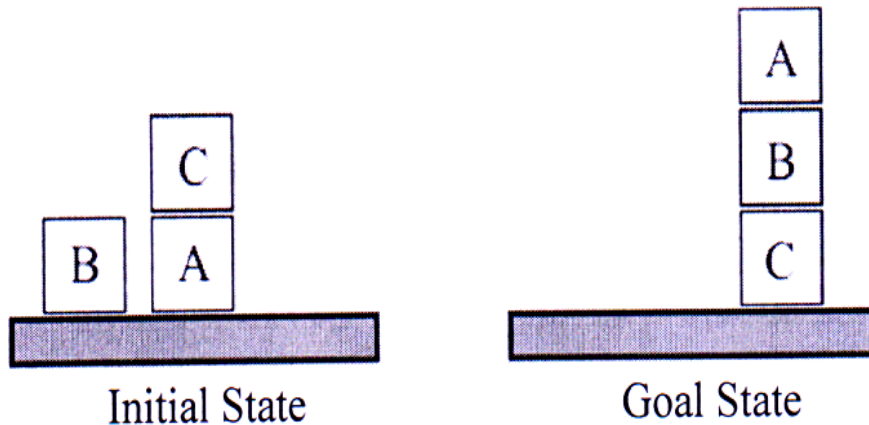
Q6) a) Explain the following steps in NLP with suitable examples. [9]

- i) Discourse Integration
- ii) Pragmatic analysis

b) What is Uncertainty? Also explain logic for Non-monotonic reasoning. [9]

SECTION - II

- Q7) a)** What is planning? Describe shortly what the “Strategy of Least Commitment” means and in which way it is used in Planning. [9]
- b)** What is “Sussman anomaly” in block world problem? Consider the following block world problem. Represent the start state and goal state using STRIPS type of operators. Using goal stack planning process, what will be the initial goal stack? What operators will be used to achieve the first goal? Specify its preconditions. [9]



OR

- Q8) a)** What are different components of a planning system? Explain. Also describe hierarchical planning in brief. [9]
- b)** How 3-dimensional information is recovered using shading, contour and texture gradients. Explain in detail. [9]
- Q9) a)** What is Supervised Learning and unsupervised Learning? Explain the benefits of Neural Networks. [8]
- b)** Write main features of an expert system. Explain expert system shell. [8]

OR

- Q10) a)** Explain the basic approach that Winston’s learning program used for concept formation. [8]
- b)** Describe general framework for explanation based learning programs and give the general learning algorithm. [8]

Q11)a) Explain each of the following constructs in PROLOG. Give suitable example of each. **[8]**

i) Relational operators

ii) Built-in data types

iii) Facts

iv) Rules

b) Explain in brief three main sections for writing PROLOG program. **[8]**

OR

Q12)a) What is the system predicate CUT? Discuss the importance use of CUT in Prolog. **[8]**

b) Write a short on coordination and cooperation in distributed reasoning systems. **[8]**



Total No. of Questions : 12]

SEAT No. :

P797

[Total No. of Pages : 3

[4659] - 209

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

COMPILER DESIGN

(2008 Pattern) (Elective - I (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 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) Write merits and demerits of compiler and interpreter. [6]
- b) Explain input buffering for lexical analyzer with example. Write FP and BP movement concept with algorithm? Also explain role of symbol table in lexical analysis. [10]

OR

- Q2)** a) Write different issues in lexical analysis. Also explain lexical errors and its recovery techniques for each error. [6]
- b) Write a lex program to display no. of character, words, lines, paragraphs, vowels and consonants and single line and multiline comments. [10]

- Q3)** a) Explain error detection and recovery for top-down and bottom-up parsing. [6]

- b) For a given grammar

$S \rightarrow iEtS \mid iEtSeS \mid a$

$E \rightarrow b$

Left factor the grammar and find First and Follow and build predictive parsing table. Is this LL (1) grammar yes or no, Justify. [12]

P.T.O.

OR

Q4) Construct LALR parsing table for the grammar [18]

$S' \rightarrow S$

$S \rightarrow CC$

$C \rightarrow cC \mid d$

Q5) a) Explain elimination of left recursion from a translation scheme with example. [8]

b) Explain syntax tree and create annotated tree with syntax tree concept and create DAG using one example. [8]

OR

Q6) a) Construct syntax tree for $a-4+c$ and directed acyclic graph for $a+a*(b-c) + (b-c)*d$ and differentiate between syntax tree and directed acyclic graph. [8]

b) Write short notes on: [8]

i) Short circuit code

ii) SDD for flow of control statement

iii) SDD for case statement

SECTION - II

Q7) a) Explain following with suitable example. [8]

i) Activation record ii) Control stack

iii) Binding and storage iv) Displays.

b) Explain types of Scope in detail. Illustrate with example. [8]

OR

Q8) a) Explain different parameter passing techniques with proper example. [8]

- b) How the records of nested procedures are maintained at run time, explain with the help of neat diagram. (Consider all cases). [8]

Q9) a) Explain Display with example, why it is used. [4]

- b) Write Quadruple, Triple and Indirect Triple representation of following expression $d = -(a-b) + (a-c) + (a-c)$ with explanation. [12]

OR

Q10) a) What is Liveness? Explain Liveness calculation with suitable example. [10]

- b) Write register allocation techniques and explain with suitable example. [6]

Q11) a) Explain implementation of single and multi-inheritance using fixed offset method and trampoline method in compiler with block diagram. [10]

- b) How the compiler handles the constructors in object oriented programming? Explain with example. [8]

OR

Q12) a) Explain implementation of class hierarchy without inheritance by compiler with block diagram. [8]

- b) Difference in class based and object based languages. Explain object oriented feature in compiler context. [10]



Total No. of Questions : 12]

SEAT No. :

P1054

[Total No. of Pages : 3

[4659]-21

B.E. (Civil Engineering)

a-INTEGRATED WATER RESOURCES AND PLANNING

(2008 Course) (401008) (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 indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) What is the difference between National water policy and National water laws? Explain the impact of National water laws on the plan of integrated water resources planning and development projects? **[8]**
- b) Explain the variability of water in 'time & space' relationship and according to it write the importance of water as a 'finite resource'. **[6]**
- c) What are the riparian rights? Why these are necessary to develop a water resource project? **[4]**

OR

- Q2)** a) Estimate the different types of costs in the economic analysis of water resources projects. **[8]**
- b) Discuss in detail the present institutional frameworks for water management. **[6]**
- c) Write any four feasibility test for a water resource project as per the Indian Government rules. **[4]**

- Q3)** a) What are the different conventional techniques which are commonly used to do the effective planning and management of water resources by the water supply division and explain one of them in detail. **[8]**
- b) Define the Regression and correlation analysis process and how it is useful in the analysis of a water resource problem. **[8]**

OR

P.T.O.

- Q4)** a) Write short notes on: [8]
- i) Application of GA in streamflow prediction.
 - ii) Use of Artificial neural Networks in water resources planning & management.
- b) Explain normal and lognormal distribution in detail. [8]

- Q5)** a) Write a note on different hard and soft methods of flood forecasting? [8]
- b) What are causes of Drought? Explain different structural and non-structural measures to control the severity of Drought? [8]

OR

- Q6)** a) What is the use of geoinformatics in flood management? State and explain general methods of flood damage assessment. [8]
- b) What are different types of Drought? Explain severity index of drought with suitable examples in India. [8]

SECTION-II

- Q7)** a) Explain 'inter-basin water transfer' with two suitable examples. [8]
- b) Explain the recycling and reuse of surface water and ground water resources in India. [10]

OR

- Q8)** a) Write a note on estimation & forecasting of water demands of domestic & industrial sector, navigation and recreational water demands. [8]
- b) What are Consumptive & non consumptive demands of water and its effect on the 'demand and supply based management system' of water resources? [10]

- Q9)** a) Explain the impact of water resources development on the management of rehabilitation & resettlement. [8]
- b) Write detail features of control of water logging problem and explain the different methods to control water logging. [8]

OR

Q10)a) Write a note on siltation of storages with suitable horizons and regions of water resources systems. [8]

b) What are the water requirements for environmental development and management projects? Explain the rules and regulations required for it. [8]

Q11)a) Write note on Decision Support System. How it can be implemented to enrich the available water resources in India? [8]

b) Explain the concept of perspective plan for basin development and management. [8]

OR

Q12)a) Write a note on Artificial Neural Network (ANN) and how it is useful in applications of water resources development as an soft tool? [8]

b) What is the role of geoinformatics in basin planning and management? [8]



Total No. of Questions :12]

SEAT No. :

P798

[Total No. of Pages : 3

[4659] - 210

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

D : ADVANCED OPERATING SYSTEMS

(2008 Pattern) (Elective - I)

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) *Figure to the right indicates full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What is mailbox? Give its significance & explain how it works.
Explain functional specification of CREATEMBOX. [8]
- b) Explain following Unix commands with suitable eg. [10]
- | | |
|------------|-------------|
| i) chown | ii) chmod |
| iii) mount | iv) unmount |
| v) useradd | |

OR

- Q2)** a) Define operating system. Discuss various architectures of O.S. [10]
- b) Discuss various system calls for process management. [8]
- Q3)** a) What is Multi tasking operating system? How it is different from multi processing operating system? Draw & explain process state transition diagram in KMOS. [8]
- b) Discuss the various lists maintained for KMOS. [8]

P.T.O.

OR

- Q4)** a) Enlist various functions of KMOS. Explain functional specifications of KMOSSTART and DISPATCH. [8]
b) Write the structure of PCB in KMOS. Discuss use of these fields. [8]
- Q5)** a) Explain different multiprocessor interconnection types with diagrams. [8]
b) Discuss UMA, NUMA and NORMA architecture. [8]

OR

- Q6)** a) Discuss different types of Multi Processor Operating Systems. [8]
b) What are differences between threads and processes? What are different ways to achieve multiprocessor synchronization? [8]

SECTION - II

- Q7)** a) Explain the concept of kmalloc, vmalloc with eg. How they are different from malloc(), calloc(). [10]
b) What is zone? Explain different zone types with diagram. [8]

OR

- Q8)** a) What is slab? Explain the concept of slab allocator and deallocator wrt Linux operating system. [10]
b) Explain the concept of High Memory mappings and its types. [8]
- Q9)** a) What is device driver? Explain various disk device driver access strategies. [8]
b) What is I/O scheduler? Explain different modes to monitor I/O. [8]

OR

- Q10)**a) Discuss different types of I/O interfaces. [8]
b) Explain buffering strategies for character devices. [8]

- Q11)**a) Explain the following system calls for the file system with eg. [8]
i) open ii) link
iii) lseek iv) close
b) Explain the role of file descriptor. Give the significance of inode structure. [8]

OR

- Q12)**a) Discuss the various strategies for file blocks allocation. [8]
b) Explain data structures for file memory mapping. [8]



Total No. of Questions :12]

SEAT No. :

P799

[Total No. of Pages : 2

[4659] - 211

B. E. I. T.

INFORMATION TECHNOLOGY

Embedded System (Elective - II(a))

(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) *Assume suitable data wherever necessary.*
- 3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a) What are the desirable typical characteristics of an Embedded processor/controller. [10]

b) What are the challenges of embedded systems? [8]

OR

Q2) a) Explain multiprocessor system in detail. [10]

b) What is an Embedded System? What are the components of embedded system? [8]

Q3) a) What is Timer? How can it be used in Embedded System? [8]

b) Explain Serial Transmission Using UARTs [8]

OR

Q4) a) What is Watchdog timer? Explain its use in embedded system. [8]

b) Explain the different types of memories used in embedded system? [8]

Q5) a) Write the notes on LCD and LED displays used in Embedded systems. [10]

b) List and brief the different technologies used in keyboard design. [6]

P.T.O.

OR

- Q6)** a) Explain null modem communication using RS232 serial communication? [10]
b) What is ISR? How is it typically executed? [6]

SECTION - II

- Q7)** a) How does the pointer work in C? How can we optimize the coding using pointers? [12]
b) Write a note on IN-Circuit emulator. [6]

OR

- Q8)** a) Write a detailed note on QUEUE data structure with its use by System. [10]
b) Discuss Requirement Analysis related to an Embedded System. [8]

- Q9)** a) What is critical section problem in RTOS? [8]
b) Discuss inter-process communication and synchronization in RTOS. [8]

OR

- Q10)**a) Explain state transition diagram of RTOS. [10]
b) What is Thread? What are the advantages of Multithreading? [6]

Q11)How will you design an application for Chocolate Vending Machine in detail?
(Write with design and code fragments.) [16]

OR

Q12)How will you design a application for sending Application Layer Byte Stream on a TCP/IP Network in detail. (Write with design and code fragment.) [16]



Total No. of Questions :12]

SEAT No. :

P800

[Total No. of Pages : 2

[4659] - 212

B. E. (I T)

MOBILE COMPUTING

(Elective - II(b)) (2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain various generations of Mobile Communication system. [8]
b) What are the three measurements used to decide handoff? What are distance dependent fading, shadow fading and Rayleigh fading? [8]

OR

- Q2)** a) Draw the general PCS architecture and explain it. [8]
b) What is soft hand off? Explain the procedure for adding and removing Base stations with MAHO soft hand off. [8]

OR

- Q4)** a) Compare the authentication procedure in IS-41 and GSM. [8]
b) How is location update done in GSM. [8]

- Q5)** a) Explain Mobile originated messaging and Mobile terminated messaging. [8]
b) Draw and explain SMS protocol stack. [8]

P.T.O.

OR

- Q6)** a) What is number portability? Describe three types of number portability. [9]
b) Explain in detail Pre Paid & Post Paid service in mobile. [7]

SECTION - II

- Q7)** a) Explain Wireless Application Protocol (WAP) model in detail. [8]
b) Write short note on Billing and Charging mechanism in GPRS. [8]

OR

- Q8)** a) Explain GPRS architecture with neat diagram. [8]
b) Compare W-CDMA and CDMA 2000. [8]

- Q9)** a) Explain in detail IP Packet delivery. [8]
b) Describe the goals and requirements of Mobile IP. [8]

OR

- Q10)**a) Explain Various features and header format of IPv6. [8]
b) Explain Dynamic source routing in MANET. [8]

- Q11)**a) Explain in detail Wireless Broad Band (WiMAX) technology. [8]
b) Define Bluetooth.
Explain in detail Bluetooth technology with protocol stack. [10]

OR

- Q12)**a) What are the advantages of Spread Spectrum technology? Explain with diagram Spread Spectrum Technology. [10]
b) Write a short note on: (4 Marks Each) [8]
i) RFID
ii) W-LAN



Total No. of Questions : 12]

SEAT No. :

P1091

[Total No. of Pages :2

[4659] - 213

B.E. (IT)

C-MULTIMEDIA SYSTEMS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I.*
- 2) *Answer Q7 or Q8, Q9 or Q 10, Q 11 or Q 12 from Section II.*
- 3) *Answers of each section should be written in separate answer books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of Calculator is allowed.*
- 7) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) What is Multimedia Presentation? Describe its important characteristics. [6]
b) State and explain the basic components of Multimedia. [6]
c) Distinguish between Huffman Coding & LZW text Compression techniques. [6]

OR

- Q2)** a) What is Steaming Media and why is it required explain in detail. [6]
b) State and Explain the characteristics of Multimedia DBMS. [6]
c) Explain the hardware and software required for multimedia production work. [6]

- Q3)** a) What is color model? Differentiate CIE lab and HSB color model. [8]
b) What is image compression? Explain in brief, the lossless image compression techniques. [8]

OR

- Q4)** a) Explain how anti-aliasing and dithering can improve image quality. [8]
b) Compare special filtering and point processing techniques. [8]

P.T.O.

- Q5)** a) What are the basic components of an audio system? Describe their functions. [8]
b) State and Explain any two audio file formats in detail. [8]

OR

- Q6)** a) Explain various fundamental characteristics of sound. [8]
b) What is MIDI? Distinguish between channel messages and system messages. [8]

SECTION - II

- Q7)** a) Distinguish between component, composite and S video signal format. [6]
b) What do you mean by Video recording system? Explain VHS in detail. [6]
c) What is meant by chroma sub-sampling? Explain how does it helps in bandwidth reduction. [6]

OR

- Q8)** a) Distinguish between H.261 and H.263. [8]
b) Explain any two Video file formats. [5]
c) What is meant by frames and frame rate in connection with motion video? [5]

- Q9)** a) Compare HMD and Data-glove. [8]
b) Differentiate between Virtual Reality and Augmented Reality. [8]

OR

- Q10)** a) What is VRML? Explain Structure of VRML. [8]
b) Explain in detail different types of peripheral devices used in Virtual Reality application. [8]

- Q11)** a) Explain Onion Skinning animation and its utility. [4]
b) How does Motion Cycling help to create compact animation sequence. [4]
c) Elaborate any two principles of animation with example. [8]

OR

- Q12)** a) Elaborate the role of animation on web. [8]
b) What is meant by Key framing and tweening? Explain their importance. [8]



Total No. of Questions : 12]

SEAT No. :

P1174

[Total No. of Pages : 12

[4659] - 22

B.E. (Civil)

B : ADVANCED TRANSPORTATION ENGINEERING

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

Time :4 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q. 8, Q.9 or Q.10, Q.11 or Q.12 from section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

- Q1)** a) Explain in brief the following projects [6]
- i) Mumbai Trans harbours link
 - ii) Pune Metro
- b) What is regression analysis? How is it useful in traffic and transportation planning? Explain with a case study. [6]
- c) Explain the travel demand forecasting process with a flow diagram. [6]

OR

- Q2)** a) Explain in brief the following projects. [6]
- i) Bharat Jodo Pariyojana
 - ii) Ports connectivity projects
- b) Explain how O-D surveys are carried out and how the data is documented and used in transportation planning. [6]
- c) Discuss the various factors affecting the modal split. [6]

P.T.O.

- Q3)** a) List the Various urban transportation systems and explain any 3 of them in brief. [10]
 b) Discuss problems of the transportation system adopted in Pune city. [6]

OR

- Q4)** a) Explain concepts of ITS and elaborate the various technologies used in it with examples. [10]
 b) Discuss various solutions to the problems of congestion in Pune City. [6]

- Q5)** The client associated with Infrastructure development has decided to evaluate two highway proposals with the following cash flows. [16]

| Option I | | | Option II | | |
|----------|-------------------|--------------------|-----------|-------------------|--------------------|
| Year | Cash Inflow (Rs.) | Cash Outflow (Rs.) | Year | Cash Inflow (Rs.) | Cash Outflow (Rs.) |
| 1 | - | 20,00,000 | 1 | - | 45,00,000 |
| 2 | - | 35,00,000 | 2 | 20,00,000 | 2,00,000 |
| 3 | - | 30,00,000 | 3 | 12,00,000 | 3,00,000 |
| 4 | 25,00,000 | 3,00,000 | 4 | 15,00,000 | 1,50,000 |
| 5 | 30,00,000 | 3,00,000 | 5 | 21,00,000 | 2,50,000 |
| 6 | 35,00,000 | 3,00,000 | 6 | 9,00,000 | 1,50,000 |
| 7 | 40,00,000 | 4,00,000 | 7 | 3,00,000 | 2,50,000 |

The decision criteria is based on NPV at 10% Work out the values and suggest.

- i) Whether both proposals are worth investing and
 ii) The better alternative, stating reason.

OR

- Q6)** Explain merits and demerits of [16]
 a) ARR and IRR
 b) BOT and BOOS
 c) NPV and B/C
 d) BT and BOO

SECTION - II

- Q7)** Explain the following methods of traffic counting with examples [18]
a) Photographic method
b) Moving vehicle method
c) Licensed plate survey method

OR

- Q8)** What are household surveys? How are they conducted? What are the advantages? Explain the standard household survey format and how data is collected using it with an example. [18]

- Q9)** a) Design a flexible pavement for the following data, as per IRC-37. [12]
i) 2 lane single carriageway
ii) Expected year of completion - 2015
iii) CVPD in one direction in year 2010 -2000
iv) Design life - 15 years
v) Traffic growth rate - 7.5%
vi) Terrain - hilly
vii) C.B.R. for subgrade - 5%

Also draw a typical cross-section showing all the basic layers

- b) Discuss advantages of flexible pavements over rigid pavements. [4]

OR

- Q10)** a) Design a flexible pavement by using IRC-37 and the data given in Problem 9a, except for the change that the road is a 4 lane dual carriageway instead of the 2 lane single carriageway. Also draw the typical cross-section. [12]

- b) Explain how pavement riding quality is measured, with an example. [4]

- Q11)** a) Explain various types of over lays and compare/contrast amongst them. [8]

- b) Explain the design procedure for any types of overlay based on the Provisions made in IRC-81. Before designing an overlay what needs to be assessed and why/ Explain. [8]

OR

- Q12)** Design a rigid pavement as per IRC-58 and draw the plan and cross-section showing correctly all relevant details with the correct nomenclature, based in the following data. [16]

- a) 2 way CVPD-3000
b) Flexural strength of concrete = 48 kg/cm²

- c) Effective modulus of subgrade reaction = 8 kg/cm^2 per cm.
- d) Elastic modulus of concrete = $3.3 \times 10^5 \text{ kg/cm}^2$
- e) Poissons ratio = 0.18
- f) Coefficient of thermal expansion of concrete = 10×10^{-6} per $^{\circ}\text{C}$.
- g) Tyre pressure = 8.2 kg/cm^2
- h) Traffic growth rate = 6%
- i) Design life = 20 years
- j) Spacing of contraction joints = 4.5 m
- k) Slab width 4.0 m.
- l) Load safety factor = 1.05
- m) Maximum temperature difference between the top and bottom of the slab = 23°C
- n) Centre to centre distance between tyres = 32 cm
- o) Axle load spectrum is as follows

| Single Axle Loads | | Tandem Axle Loads | |
|-------------------|------|-------------------|-----|
| Load in Tons | % | Load in Tons | % |
| 20 | 0.5 | 36 | 0.3 |
| 18 | 1.4 | 32 | 4.0 |
| 16 | 3.8 | 28 | 3.0 |
| 14 | 12.0 | 24 | 2.0 |
| 12 | 20.0 | 20 | 4.0 |
| 10 | 22.0 | 16 | 1.0 |
| Less than 10 | 25.0 | Less than 16 | 1.0 |

- p) Trial Thickness = 30 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.

If the pavement fails, design a suitable pavement thickness so as to withstand all the critical conditions.

PAVEMENT DESIGN CATALOGUE

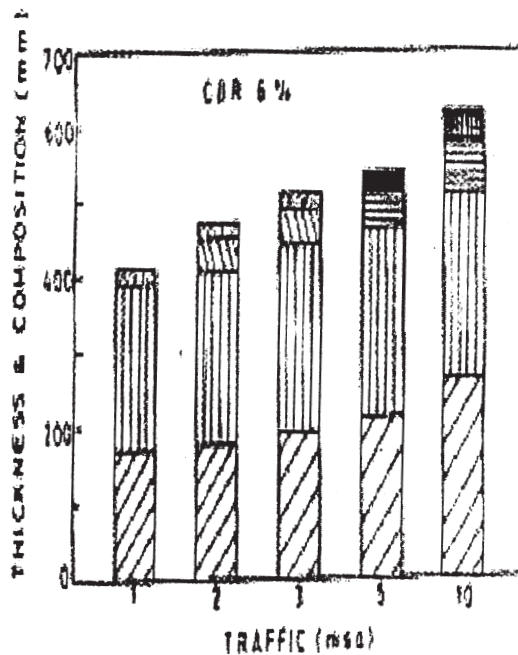
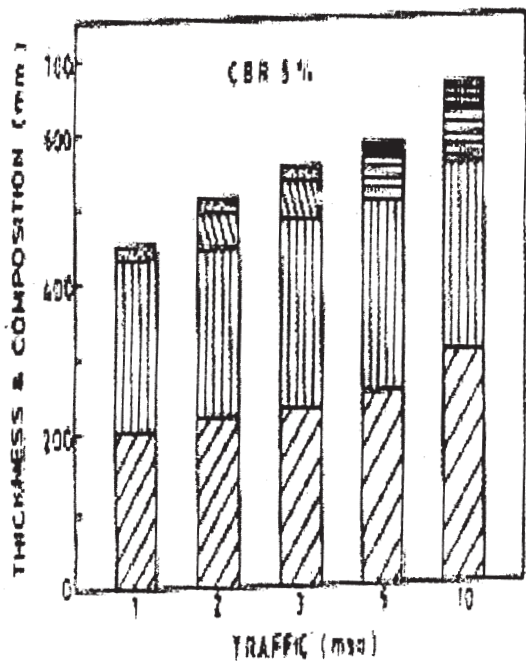
PLATE 1 - RECOMMENDED DESIGNS FOR TRAFFIC RANGE 1-10 msa

| CBR 5% | | | | | |
|--------------------------|-------------------------------|----------------------|--------------------|--------------------|------------------------|
| Cumulative Traffic (msa) | Total Pavement Thickness (mm) | PAVEMENT COMPOSITION | | | |
| | | Bituminous Surfacing | | Granular Base (mm) | Granular Sub-base (mm) |
| | | Wearing Course (mm) | Binder Course (mm) | | |
| 1 | 430 | 20 PC | | 225 | 205 |
| 2 | 490 | 20 PC | 50 BM | 225 | 215 |
| 3 | 530 | 20 PC | 50 BM | 250 | 230 |
| 5 | 580 | 25 SDBC | 55 DBM | 250 | 230 |
| 10 | 660 | 40 BC | 70 DBM | 250 | 300 |

PAVEMENT DESIGN CATALOGUE

PLATE 1 - RECOMMENDED DESIGNS FOR TRAFFIC RANGE 1-10 msa

| CBR 6% | | | | | |
|--------------------------|-------------------------------|----------------------|--------------------|--------------------|------------------------|
| Cumulative Traffic (msa) | Total Pavement Thickness (mm) | PAVEMENT COMPOSITION | | | |
| | | Bituminous Surfacing | | Granular Base (mm) | Granular Sub-base (mm) |
| | | Wearing Course (mm) | Binder Course (mm) | | |
| 1 | 390 | 20 PC | | 225 | 165 |
| 2 | 450 | 20 PC | 50 BM | 225 | 175 |
| 3 | 490 | 20 PC | 50 BM | 250 | 190 |
| 5 | 535 | 25 SDBC | 50 DBM | 250 | 210 |
| 10 | 615 | 40 BC | 65 DBM | 250 | 260 |



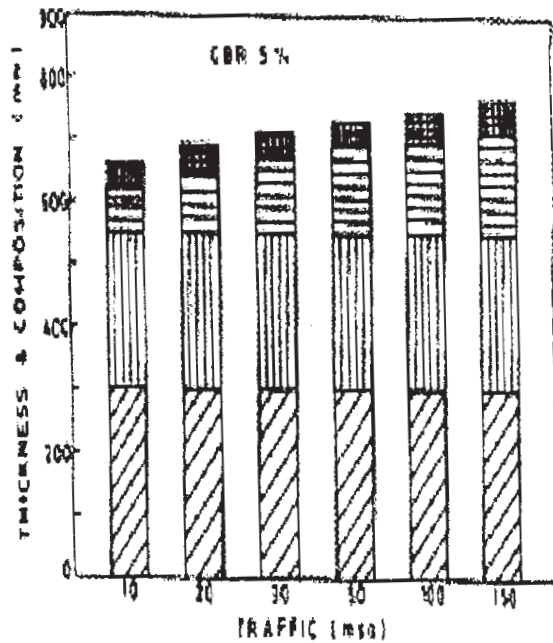
Contd.

Contd.

PAVEMENT DESIGN CATALOGUE

PLATE 1 - RECOMMENDED DESIGNS FOR TRAFFIC RANGE 10-150 msa

| CBR 5% | | | | |
|--------------------------|-------------------------------|----------------------|----------|-------------------------------|
| Cumulative Traffic (msa) | Total Pavement Thickness (mm) | PAVEMENT COMPOSITION | | |
| | | Bituminous Surfacing | | Granular Base & Sub-base (mm) |
| | | BC (mm) | DBM (mm) | |
| 10 | 660 | 40 | 70 | Base = 250 Sub-base = 100 |
| 20 | 690 | 40 | 100 | |
| 30 | 710 | 40 | 120 | |
| 50 | 730 | 40 | 140 | |
| 100 | 750 | 50 | 150 | |
| 150 | 770 | 50 | 170 | |



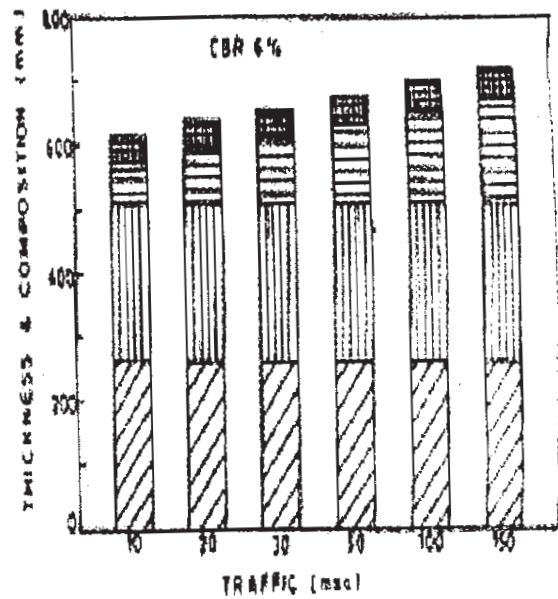
GSB
 GB
 DBM
 BC

Contd

PAVEMENT DESIGN CATALOGUE

PLATE 2 - RECOMMENDED DESIGNS FOR TRAFFIC RANGE 10-150 msa

| CBR 6% | | | | |
|--------------------------|-------------------------------|----------------------|----------|-------------------------------|
| Cumulative Traffic (msa) | Total Pavement Thickness (mm) | PAVEMENT COMPOSITION | | |
| | | Bituminous Surfacing | | Granular Base & Sub-base (mm) |
| | | BC (mm) | DBM (mm) | |
| 10 | 615 | 40 | 65 | Base = 250 Sub-base = 250 |
| 20 | 640 | 40 | 90 | |
| 30 | 655 | 40 | 105 | |
| 50 | 675 | 40 | 135 | |
| 100 | 700 | 50 | 140 | |
| 150 | 720 | 50 | 160 | |



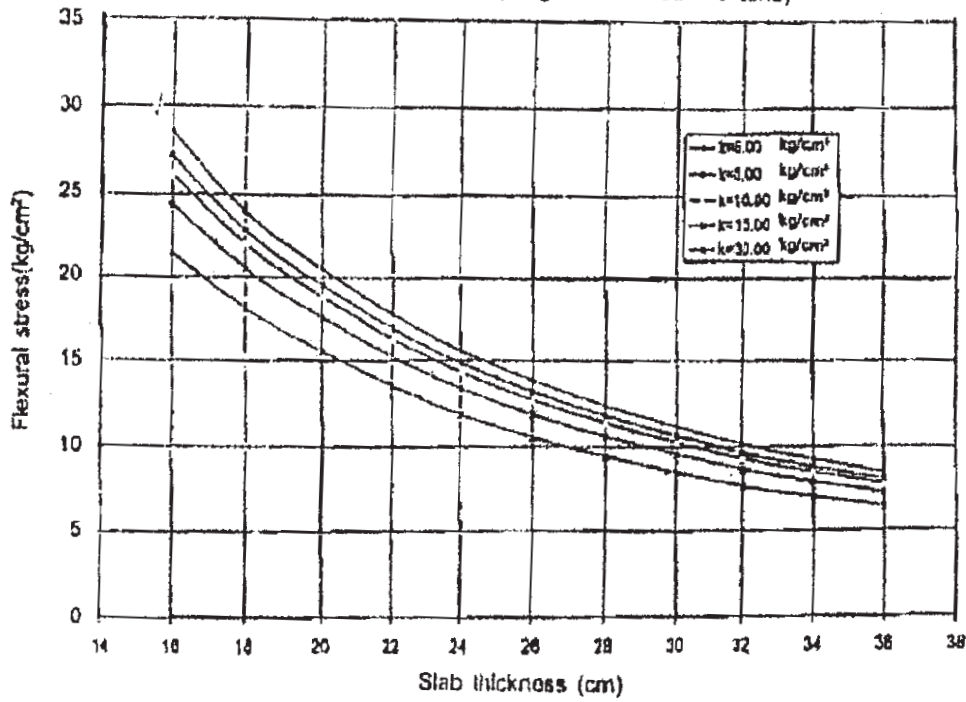
GSB
 GB
 DBM
 BC

Contd

Stresses in Rigid Pavement (Single Axle Load = 8 tons)

Appendix-1 (Contd.)

IRC:38-2002

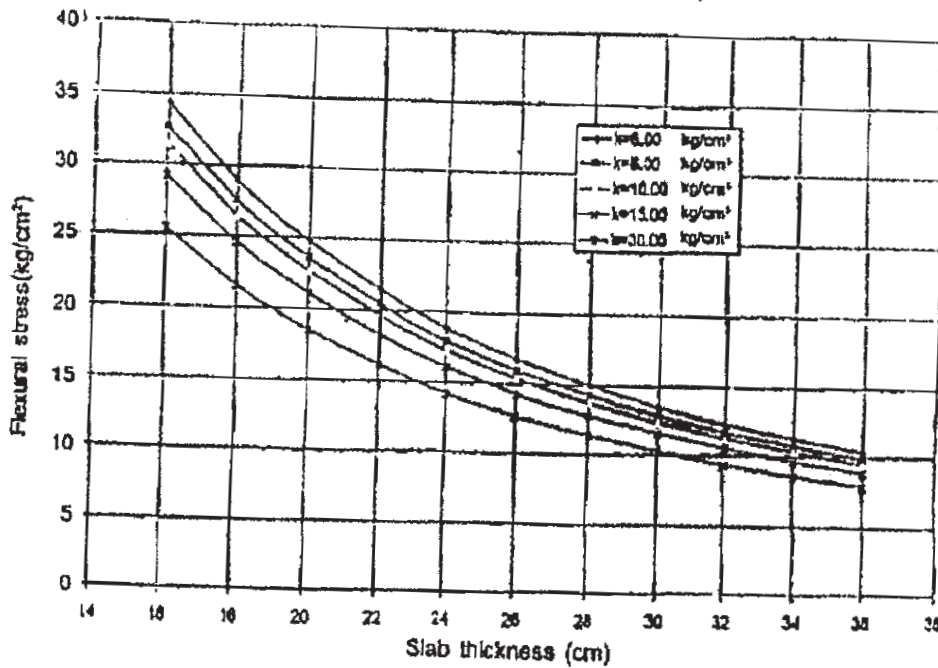


Contd..

Stresses in Rigid Pavement (Single Axle Load = 10 tons)

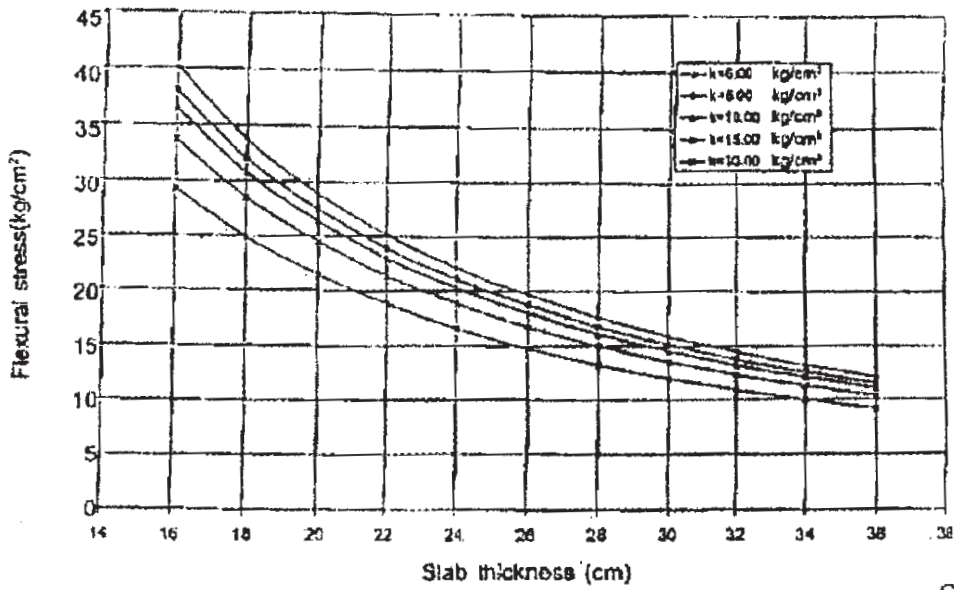
Appendix-1 (Contd.)

IRC:38-2002



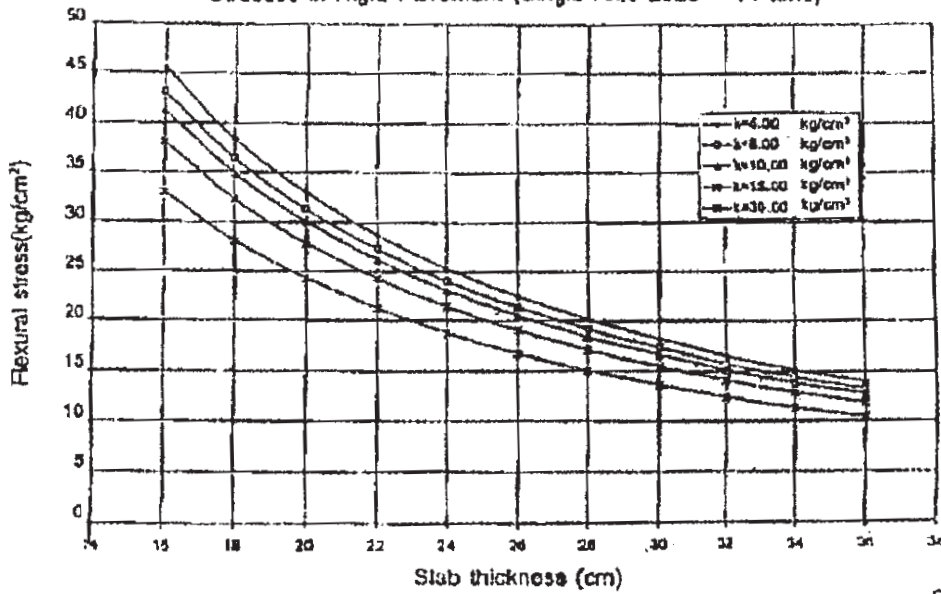
Contd..

Stresses in Rigid Pavement (Single Axle Load = 12 tons)



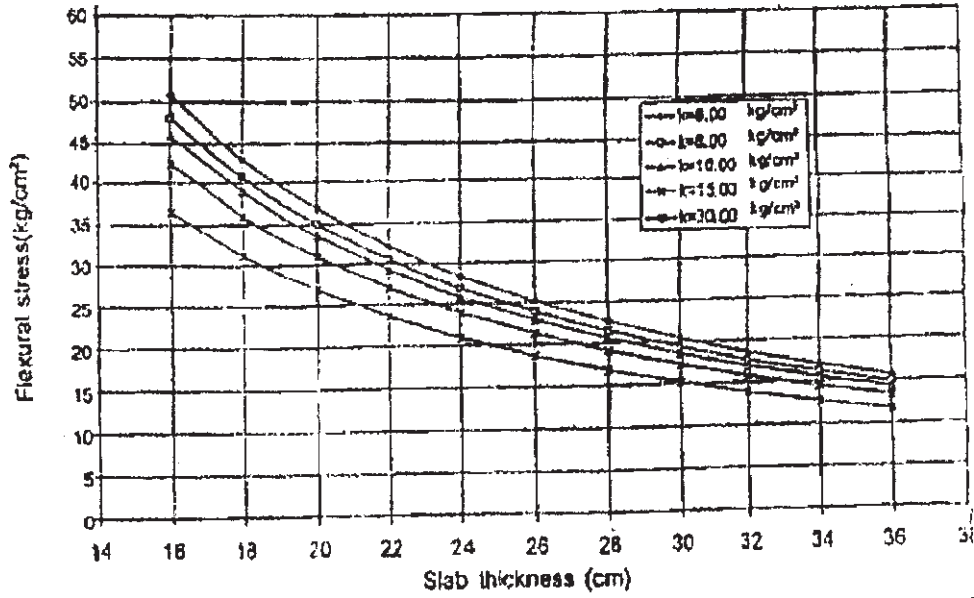
Contd..

Stresses in Rigid Pavement (Single Axle Load = 14 tons)



Contd.

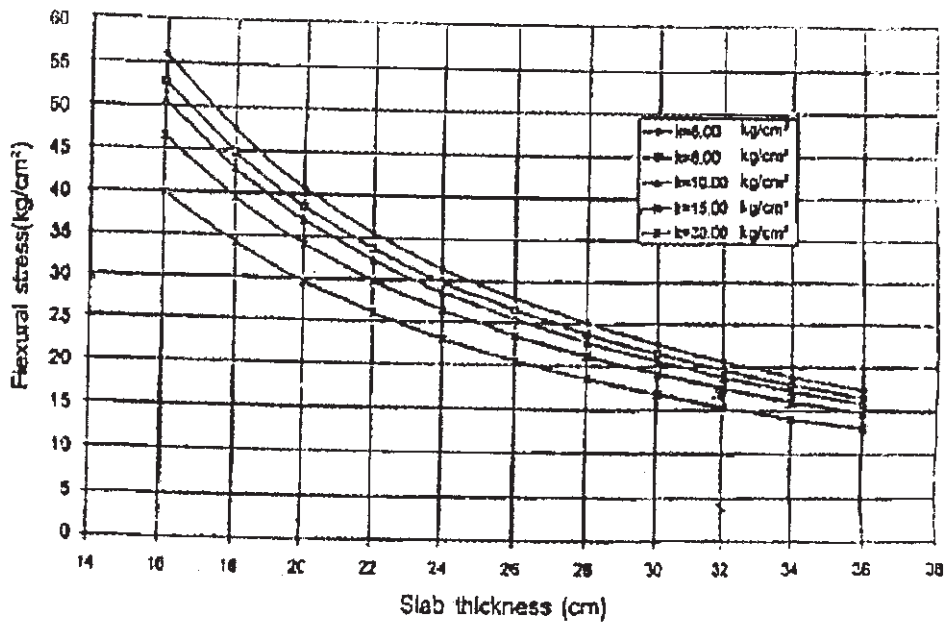
Stresses in Rigid Pavement (Single Axle Load = 16 tons)



38

Contd..

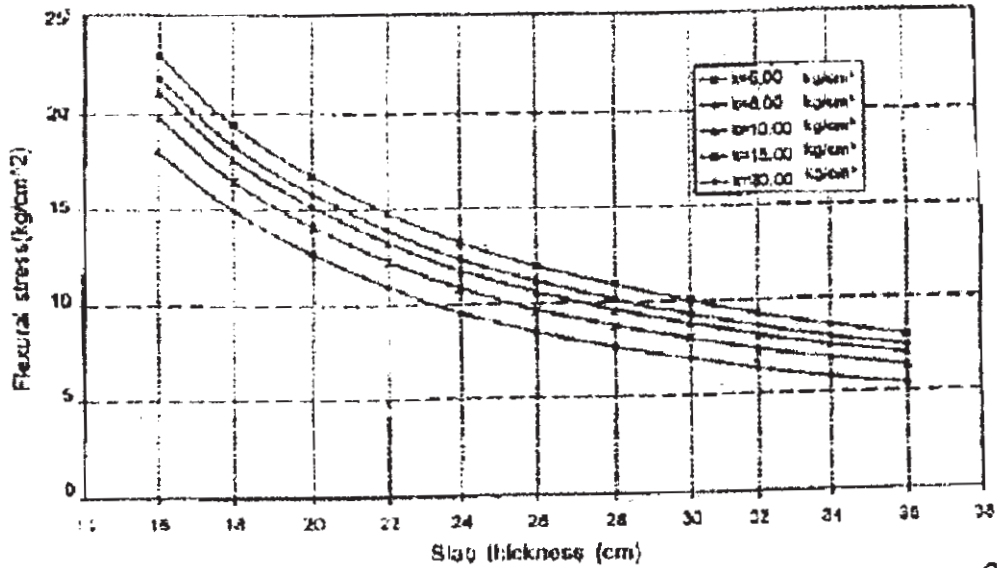
Stresses in Rigid Pavement (Single Axle Load = 18 tons)



39

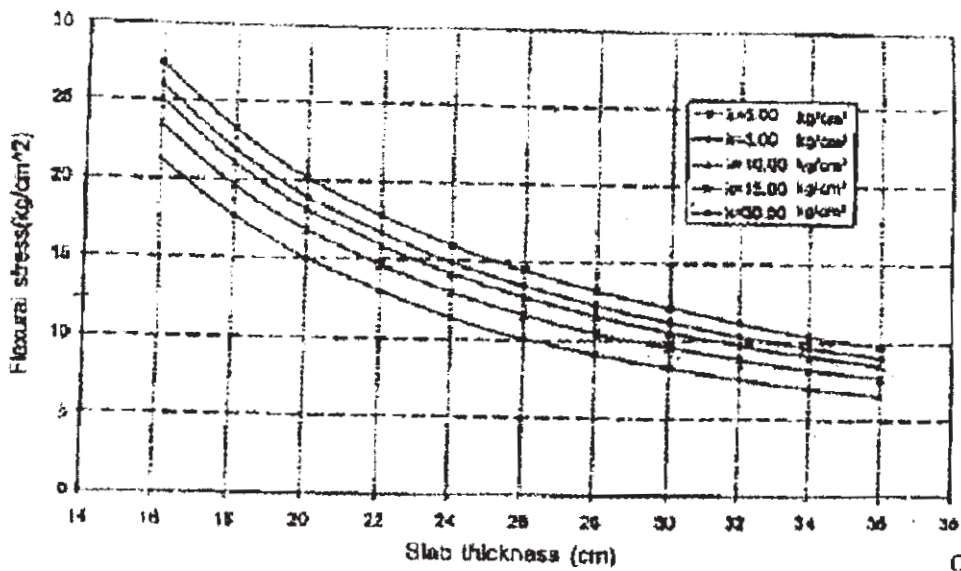
Contd..

Stresses in Rigid Pavement (Tandem Axle Load 15 tons)



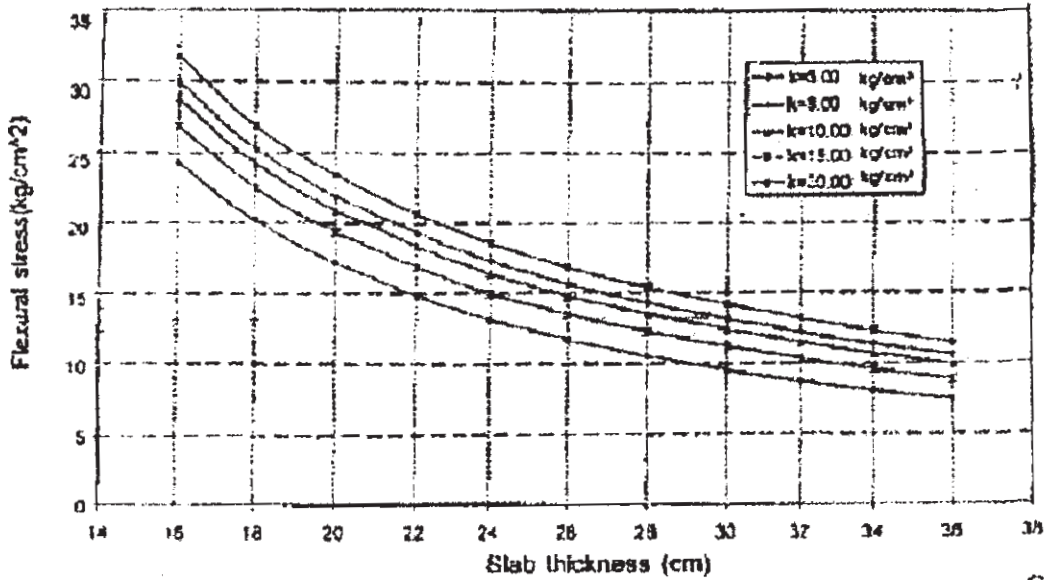
Contd.

Stresses in Rigid Pavement (Tandem Axle Load 20 tons)



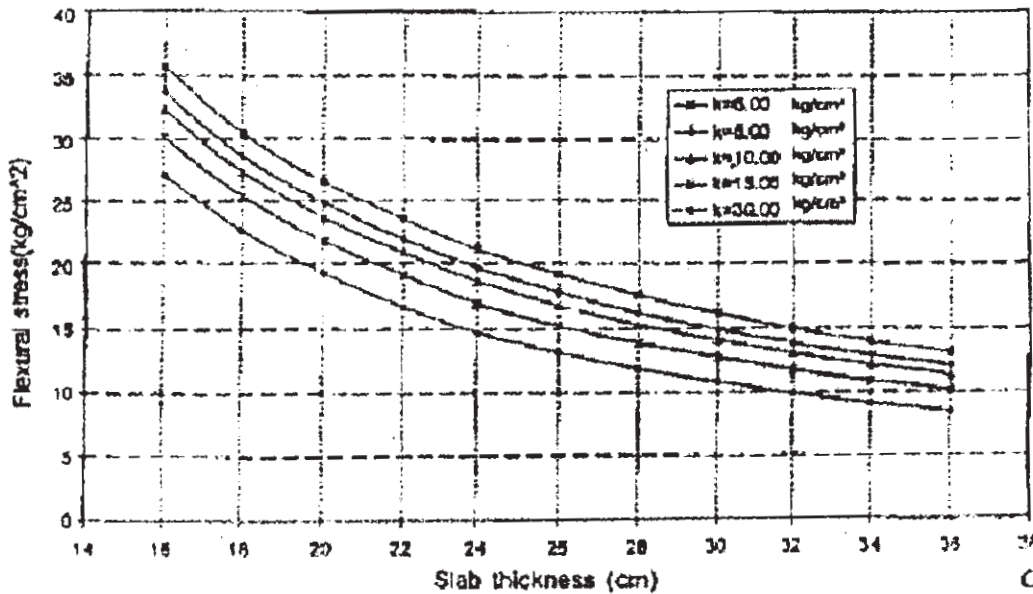
Contd.

Stresses in Rigid Pavement (Tandem Axle Load 24 tons)



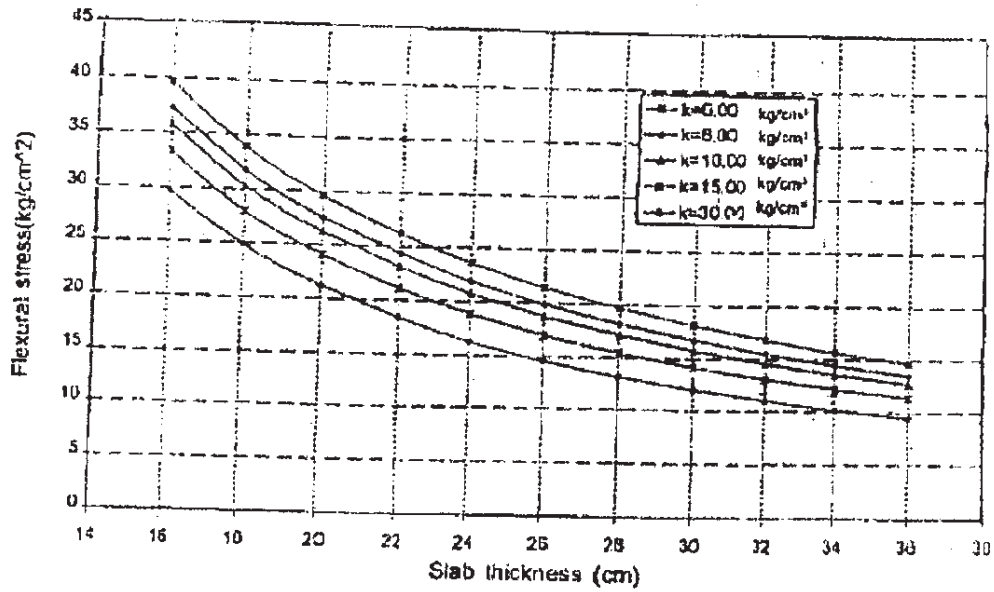
Contd.

Stresses in Rigid Pavement (Tandem Axle Load 28 tons)



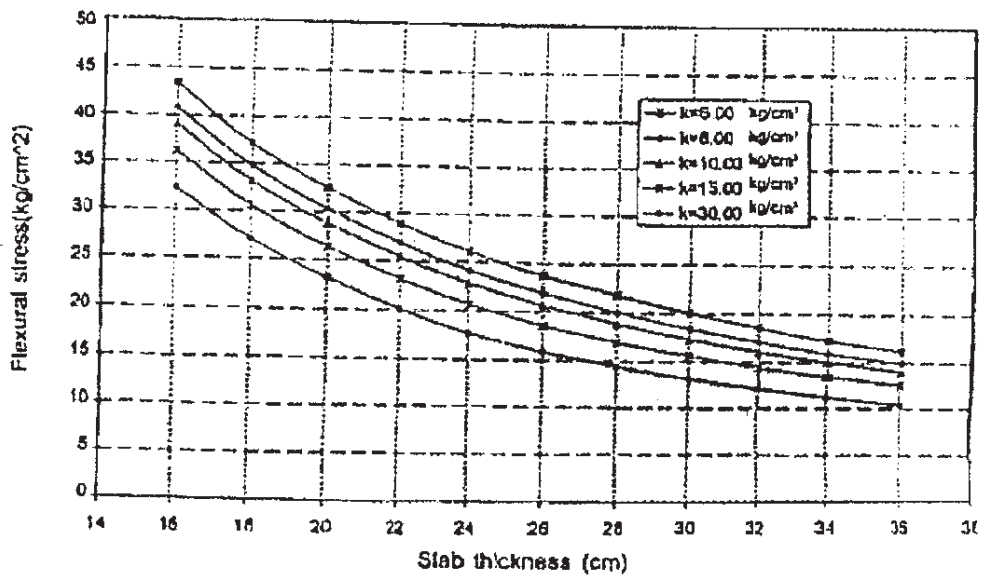
Contd.

Stresses in Rigid Pavement (Tandem Axle Load 32 tons)



Contd.,

Stresses in Rigid Pavement (Tandem Axle Load 36 tons)



Contd.,



Total No. of Questions : 12]

SEAT No. :

P807

[4659] - 220

[Total No. of Pages : 2

B.E. (Information Technology) (Semester - II)

BIO INFORMATICS

(2008 Pattern) (Elective - IV(a))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Explain what is Bioinformatics. Mention its objective and definition. [8]
b) Explain central dogma of molecular biology. [10]

OR

- Q2)** a) Define Bioinformatics. Mention and explain its various applications. [10]
b) Explain the Baye's Rule application in biological sequence analysis. [8]

- Q3)** a) Discuss and comment on resolution and accuracy of methodology and steps used to create sequence Maps. [8]
b) What is clustering? Explain two methods of gene expression data. [8]

OR

- Q4)** a) Explain biology data visualization and sequence visualization. [8]
b) Differentiate clustering and classification. [4]
c) Describe advantages of clustering in molecular biology. [4]

- Q5)** a) Describe K-mean clustering method in detail with an example. [8]
b) Enlist pattern matching techniques in bioinformatics explain any one in detail. [8]

OR

- Q6)** a) Write short notes: [9]
i) Dot Matrix Analysis.
ii) Dynamic Programming
iii) Word Method
b) How bioinformatics related with machine learning techniques. Explain any one machine learning methods with bioinformatic applications. [7]

P.T.O.

SECTION - II

- Q7)** a) Write a short notes on: [10]
i) Colloboration and communication model.
ii) Synchronous and usynchronous model.
b) Explain drug discovery in detail. How bioinformatics can help in novel drug discovery. [6]

OR

- Q8)** a) What are the component involved in modeling and simulation system? Explain the basic modeling and simulation process in regards to bioinformatics with neat diagram. [10]
b) Explain the comparative modeling process of protein structure prediction. [6]

- Q9)** a) Explain BLAST Algorithm in detail. [8]
b) Explain FASTA Algorithm. What FASTA programs are available for sequence alignment. [8]

OR

- Q10)**a) Enlist and explain different Bioinformatic tools. [8]
b) Compare FASTA and BLAST tools for sequence Alignment. What are the recommended steps for FASTA search. [8]

- Q11)**a) Discuss Application of Genetic engg. [10]
b) Define Bio-technology. Mention significance of biotechnology. [8]

OR

- Q12)**a) What is futurescope of bioinformatic in biotechnology. [8]
b) Explain the process of interchange and transformation of pollutants in atmosphere, hydrosphere and lithosphere. [10]



Total No. of Questions : 12]

SEAT No. :

P808

[Total No. of Pages : 3

[4659] - 221

B.E. (IT) (Semester - II)

B : NEURAL NETWORKS & EXPERT SYSTEMS (ELECTIVE - IV)
(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 indicate full marks.*
- 3) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Describe some attractive features of the biological neural network that make it superior to the most sophisticated Artificial Intelligence computer system for pattern recognition tasks. [9]
- b) Compare the performance of a computer and that of a biological neural network. [9]

OR

- Q2)** a) Define topology of ANN. Explain the basic structures which form building blocks for more complex neural network architectures. [9]
- b) Explain the Electrical Model of Neural Network with its three basic elements: synapse, adder and activation function. [9]
- Q3)** a) Explain the three classes of network architectures: Single layer feed forward network, Multi layer feed forward network and recurrent network [8]
- b) What are the main differences among the three models of artificial neuron, namely, McCulloch-Pitts, perceptron and adaline [8]

P.T.O.

OR

Q4) a) A neuron receives input from other neurons whose activity levels are -2,-10,3 and -2. The respective synaptic weights of neuron j are 0.8,0.2,-1.0 and- 0.9. Calculate the output of neuron j for the following two situations: [8]

- i) The neuron is linear
- ii) Activation function is sigmoid

b) What are the types of signals in Back propagation algorithm. Explain the Forward Pass of back propagation training algorithm in detail [8]

Q5) a) Draw and explain the architecture of Radial Basis Function (RBF) Networks. [8]

b) Comment on solving XOR problem using RBF. [8]

OR

Q6) a) Explain Radial basis function network for Function Approximation [8]

b) Compare RBF and MLP [8]

Q7) a) Encode three dimensional vectors {110,001} into a Hopfield CAM and completely analyze the state space. [10]

b) Define and explain [8]

- i) Feedback Neural Network
- ii) Recurrent Neural Network

OR

Q8) a) Explain architecture of a Boltzmann Machine. Illustrate it with suitable diagram [9]

b) What do you understand by following: [9]

- i) Stochastic Approach
- ii) Thermal Equilibrium
- iii) Simulated Annealing

- Q9)** a) Identify and describe an application area for an expert system within University Area [8]
b) Explain features and capabilities of expert system building tools [8]

OR

- Q10)** a) What is decision tree architecture? Explain with neat diagram. [9]
b) Explain with neat diagram knowledge acquisition process. [7]

- Q11)** a) Explain how DENDRAL determine molecular structure of an unknown compound. Write prominent features of DENDRAL. [8]
b) What do you mean by knowledge engineering? Explain various stages of knowledge acquisition. [8]

OR

- Q12)** a) Give a short note on expert tool EMYCIN [8]
b) Explain how MYCIN helps diagnoses infectious blood diseases and recommend therapy for patients. [8]



Total No. of Questions : 12]

SEAT No. :

P809

[Total No. of Pages : 2

[4659] - 222

B.E. (Information Technology) (Semester - II)

GEO INFORMATICS SYSTEM

(2008 Pattern) (Elective - IV(C))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Q1) a) Explain Image Interpretation strategy in detail? [8]

b) Explain Spatial filtering Technique in detail? [8]

OR

Q2) a) Explain the different pre-processing method in detail? [8]

b) Explain Image enhancement and Registration in detail with example. [8]

Q3) a) Explain the electromagnetic remote sensing process with diagram? [9]

b) Explain SAR and SLAR in detail with diagram? [9]

OR

Q4) a) Explain the radar principal with required formula. What are the factors affecting microwave? [9]

b) List various satellites. Describe them with example? [9]

Q5) a) Explain in detail the role of remote sensing in GIS? [8]

b) What is Map Projection? Describe different types of map projection? [8]

P.T.O.

OR

- Q6)** a) Explain the architecture of GIS in detail? [8]
b) Explain different types of scale representation? [8]

SECTION - II

- Q7)** a) Explain various methods of conversion of geoinformation? [8]
b) What are the sources and effects of errors in GIS? [8]

OR

- Q8)** a) Explain the factors that are affecting the reliability of GIS data. [8]
b) Describe in detail RMS error location error Topological error? [8]

- Q9)** a) What are different techniques of geospatial data? [9]
b) What is raster data model? Explain it with suitable example? [9]

OR

- Q10)**a) Explain various GIS modeling techniques? [9]
b) What is vector data model? Explain it with suitable example. [9]

- Q11)**a) Describe different application of GIS? [8]
b) Describe the objectives of GIS design in detail? [8]

OR

- Q12)**a) Explain issues and trends in GIS development. [8]
b) Explain how GIS can be used by municipal corporation to plan for roadmaps? [8]



Total No. of Questions : 12]

SEAT No. :

P810

[Total No. of Pages : 3

[4659] - 223

B.E. (Information Technology) (Semester - II)

BUSINESS INTELLIGENCE

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Explain usage of data warehouse in retail sales system. **[8]**
b) Data warehouse is the heart of a good BI application. Explain the characteristics of a data warehouse system and how data marts fit into the system. **[8]**

OR

- Q2)** a) How is an OLTP system useful in an organization? What are its applications? **[8]**
b) What is Data warehouse? How data warehouse is used in Insurance, Telecommunication and Transport Industries. **[8]**

- Q3)** a) Explain transaction and recurring snapshot types of dimensional modeling. Highlight two main differences between these two modeling types. **[8]**
b) What is the significance of Star schema and Snowflake schema? Explain with examples each one of them. **[8]**

OR

- Q4)** a) DW has one dimension called 'Product' with attributes like Product_ID, Product_Name, Product_Category. The product ice cream has Product_ID = 15, Product_Name="Ice Cream" and Product_Category="Dairy". On 1st Apr 2014 the product category of ice cream is changed to "Cold Storage" Elaborate 3 ways to handle this scenario. **[10]**

P.T.O.

b) Explain Partitioning. Why we need to partition. Explain the criteria for Partitioning. [6]

Q5) a) How are following scenarios handled in the ETL process: [8]

i) NULL values are present in the Operation Data Source

ii) Multiple abbreviations for the same value e.g. Pune is represented as PUN, POONA, Pune etc in Operational Data Source.

b) Explain following data transformation terms [10]

i) Data profiling

ii) Data Analysis

iii) Cleansing

iv) Enrichment

v) Householding

OR

Q6) a) What are late arriving facts? Give 2 examples and explain how to handle late arriving facts. [6]

b) Explain measures of data quality [6]

c) Explain the following term [6]

i) Data Marts

ii) Cubes

SECTION - II

Q7) a) Explain following terms with respect to OLAP: [10]

i) Slicing and dicing

ii) Drill up and drill down

iii) Multi dimensions

iv) Sparse data

b) Explain different levels of securities implemented in DW applications. Explain report level security in details. [6]

OR

- Q8)** a) Explain reporting architecture with suitable diagram. [8]
b) Compare OLTP Vs OLAP [8]
- Q9)** a) Compare Data Mining Vs Text mining [5]
b) Explain any one method of hierarchical clustering with an example. [6]
c) Given the data from the stock market it needs to be predicted that how a particular stock will perform in future. Which analysis technique can be used? Justify. [5]

OR

- Q10)**a) List different statistical techniques for data analysis. Explain any one of them. [8]
b) Given a set of input dataset of experience in year, education, and corresponding salary the person is getting. If user wants to know how much salary he can earn with the experience and education that he is having, which method of data analysis needs to be used? Justify your answers. [8]
- Q11)**a) Explain technologies that support real-time analytics. [9]
b) What are the requirements for setting up such a real-time BI system?[9]

OR

- Q12)**a) How does the real-time BI system impact the performance of other related systems depending on it?. [9]
b) What is BIG Data? List different technologies available for supporting BIG data. [9]



Total No. of Questions : 12]

SEAT No. :

P811

[Total No. of Pages : 3

[4659] - 224

B.E. (Computer Engg.) (Semester - I)
DESIGN AND ANALYSIS OF ALGORITHMS
(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) *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) Solve the recurrence relation

$$T(n) = T(n-1) + T(n-3) - T(n-4), n \geq 4 \text{ subject to } T(n) = n \text{ for } 0 \leq n \leq 3. \quad [8]$$

- b) Write an algorithm for insertion sort. State its time complexity. [6]
- c) Explain with example the notations Big - O and Omega. [4]

OR

Q2) a) Write Prim's algorithm for minimum spanning tree. Analyze the algorithm for time complexity [8]

- b) Explain Divide and conquer strategy with example of Binary search. [6]
- c) Show that the following equality is correct $5n^2 - 6n = \theta(n^2)$ [4]

Q3) a) Let $n = 4$ and $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{int}, \text{while})$, let $p(1:4) = (3, 3, 1, 1)$ and $q(0:4) = (2, 3, 1, 1)$, construct OBST using dynamic programming. [8]

- b) What is dynamic programming? Define principle of optimality and explain it for 0/1 Knapsack. [8]

P.T.O.

OR

- Q4)** a) State multistage graphs problem and explain how it can be solved using backward approach. [8]
b) Find optimal solution for 0/1 Knapsack problem using Dynamic programming
 $n = 3, (W_1, W_2, W_3) = (1,2,3) (P_1, P_2, P_3) = (1,2,4)$ and $m = 6$. [8]

- Q5)** a) Write an algorithm to solve 8-Queens problem using back tracking. [8]
b) Explain the steps of solving Travelling salesMan problem using Branch and Bound. [8]

OR

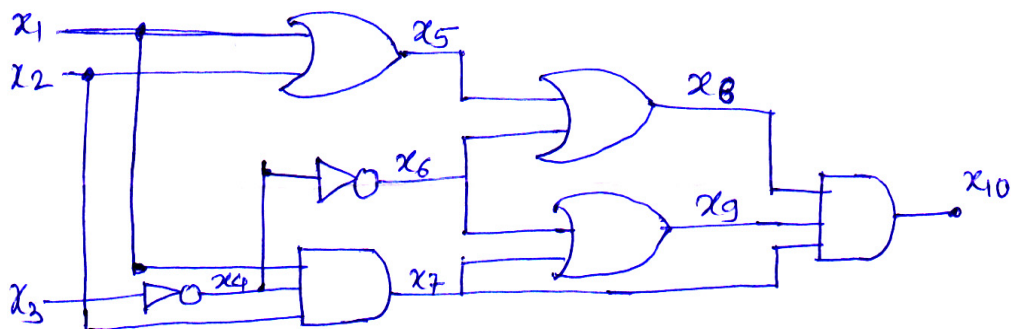
- Q6)** a) Explain Graph coloring problem with respect to backtracking. [8]
b) What is Branch and Bound method? Explain FIFO Branch and Bound algorithm. [8]

SECTION - II

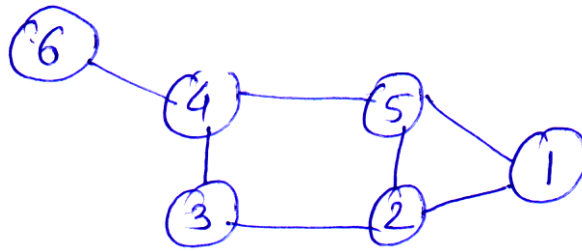
- Q7)** a) Write Cook's algorithm in pseudo C and find out its time complexity. State the significance of this algorithm. [8]
b) Consider scheduling problem where six jobs have a profit of (10, 34, 67, 45, 23, 99) and corresponding deadlines (2, 3, 1, 4, 5, 3). Obtain optimum schedule. What is time complexity of your algorithm? [8]

OR

- Q8)** a) Reduce the following circuit satisfiability to formula satisfiability. [6]



- b) Define a Clique problem. Find out all possible Cliques for following graph. Does it contains a Clique of maximum size? [6]



- c) Explain in brief AND / OR Graph decision problem [4]

- Q9)** a) Explain pointer doubling algorithm with suitable example. [8]
 b) How Quick sort can be implemented on multiprocessor system? Explain it with suitable Example. [8]

OR

- Q10)** a) State and explain different parallel computational models. [8]
 b) Write an algorithm for odd-even merge sort & Illustrate it with following set of numbers. 2, 4, 3, 5, 6, 1, 7, 8. [8]

- Q11)** a) Write an algorithm to implement Hoffman coding algorithm. [6]
 b) What do you mean by Heuristic search algorithm?
 Explain it in brief with suitable example. [8]
 c) State and explain Resource allocation algorithm [4]

OR

- Q12)** a) State and explain Image edge detection algorithm. [8]
 b) What is meaning of deadlock detection and deadlock avoidance ? what are the necessary conditions for deadlock to occur? [6]
 c) Explain convex Hulls problem. [4]



Total No. of Questions : 12]

SEAT No. :

P848

[4659] - 226

[Total No. of Pages : 4

B.E. (Computer Engineering)
OBJECT ORIENTED MODELLING AND DESIGN
(2008 Pattern) (Sem. - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Figures to right indicate full marks.*
- 2) *Answer to two sections should be written in separate answer books.*
- 3) *From section - I, answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6).*
- 4) *From section - II, answer (Q7 or Q8) and (Q9 or Q10) and (Q11 or Q12).*
- 5) *In design question you are encouraged to make further suitable assumptions on scope of the systems given wherever felt necessary and to state yours important assumptions if any.*

SECTION - I

Q1) a) Justify “Modelling is a proven and well accepted engineering technique”. **[6]**

b) Which are the aims we achieve through modelling? **[6]**

c) Explain “A model is simplification of reality” with example. **[6]**

OR

Q2) a) Justify & Explain “Every model may be expressed at different levels of precision” Inception, Elaboration, Construction and Transition phases. **[8]**

b) Justify “The best models are connected to reality”. **[5]**

c) Draw “4 +1” architecture, write down it’s importance in brief. **[5]**

Q3) a) Explain following concepts from ACTIVITY diagrams. **[8]**

i) Action states.

ii) Parameter nodes.

iii) Partitions.

iv) Activity states.

P.T.O.

- b) Consider a software system like 'Account System' Assume that there are Use Cases defined like 'View Salary', 'Input Salary parameters', 'View all the deductions', 'Optionally Send/Forward employee payslip as an Email'. Show how Use Case relationships like Includes, Generalization, and Extends can be used to appropriately model above use cases and their relationships in context of use case diagrams. [8]

OR

Q4) Draw an activity diagram for the business process describe below: [16]

A student applies for interview in the company. He can join one of the posts in the company. The student applications are sorted on merit. Top students with their screen testing are offered the job on merit order. The joining process involves students being shown available posts. Students select a posts, chooses optionally, a hostel seat, in parallel makes expected payments, select membership to gym, and select selective training to attend. On successfully appointment he enrolled, given a I-card, and is given a copy of appointment order. The students not being given job can register their interest in waitlist. Make additional assumptions about scope use advanced activity diagram 2.0 features if relevant.

Q5) a) With reference to composite structure diagram explain with example following. [8]

- i) Elements-port
- ii) Port
- iii) Connector
- iv) Collaboration

b) Explain the relation of package to sequence diagram. give the example for package diagram of sequence diagram. [8]

OR

Q6) a) What is visibility of package? Explain with examples. [8]

b) Show the generalisation among packages. Explain with example. [8]

SECTION - II

- Q7)** a) Explain the difference between sequence & collaboration diagram with examples. [9]
- b) Draw a SEQUENCE diagram for schedule a 'Examination Schedule'. Here are some of the assumptions. The Controller of examination interacts through a (GUI) form to schedule the meeting for having schedule of examination. A special control object called scheduler does the automated meeting scheduling & schedule of examination. the scheduler bases its decision on free slots in the (Entity object) timetable. The entire faculties, examiners, officers involved will get an invitation through an SMS on their mobiles for their examination, meeting & appointment by giving two-folded passwords. The system depends on an external Mobile Gateway subsystem to handle forwarding SMS's. [9]

OR

- Q8)** a) Explain the five parts of transition. [9]
- i) Source state
 - ii) Event Trigger
 - iii) Guard condition
 - iv) Action
 - v) Target state
- b) Draw a state machine diagram for an automated Coffee machine or ATM System. Make suitable assumptions and clearly state the assumptions made. [9]
- Q9)** a) Give the significant difference between class & components with example. [8]
- b) Give the relations between Components & interfaces with examples.[8]

OR

- Q10)**a) When you model & draw components in the UML & How? [8]
- b) Explain the "modelling of source code". [8]

- Q11)**a) Draw structure design pattern of Abstract Factory pattern and when to use? [8]
- b) What are the implementation issues of FACADE? What are the benefits? [8]

OR

- Q12)** Give the concept of Forward Engineering and Reverse Engineering of UML Diagrams with taking suitable examples in detail (for Coding, C++ or Java Can be used). [16]



Total No. of Questions : 12]

SEAT No. :

P849

[4659] - 227

[Total No. of Pages : 3

B.E (Computer Engineering)
a - IMAGE PROCESSING
(Elective - I) (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.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Define an image and image Processing system. Enlist and discuss the various components of a general purpose image processing systems. **[10]**
- b) Find the number of bits required to store a 512×512 image with 16 gray levels. **[4]**
- c) Explain the basic relationships between pixels. **[4]**

OR

- Q2)** Explain the following (Any three) **[18]**
- a) Human Visual System.
 - b) Digital imaging.
 - c) Matrix theory applied to images.
 - d) Usage of digital image processing.

- Q3)** a) Explain contrast enhancement and color balancing image preprocessing techniques. **[8]**
- b) Explain Hadamard transformation in detail and also discuss its properties. **[8]**

OR

P.T.O.

- Q4)** a) Discuss the image enhancement techniques in spatial and frequency domain. [8]
b) Explain with an example sampling and quantization. Explain the effects of reducing sampling and quantization. [8]

- Q5)** a) Explain in detail the process of feature extraction. [8]
b) Discuss the use of motion in segmentation. [8]

OR

- Q6)** a) Discuss about the region based image segmentation techniques. [8]
b) Discuss about texture and shape measures used in feature extraction. [8]

SECTION - II

- Q7)** a) Discuss noise models with some significant Noise probability density functions. [8]
b) What is image restoration. Discuss its techniques in brief. [8]

OR

- Q8)** Explanation. [16]
a) Blind de-convolution technique.
b) Wiener filtering.

- Q9)** a) Discuss the classification of the compression techniques and explain any one in detail. [8]
b) Explain simple boundary descriptor and regional descriptors. [8]

OR

- Q10)** a) What do you mean by object recognition. Discuss how the objects are represented. [8]
b) Compare and contrast lossy and lossless compression techniques. [8]

- Q11)** a) Define Wavelets and discuss how image compression is done using wavelets. [10]
b) Explain Principal component analysis. [8]

OR

Q12) Write a short note on (Any three) [18]

- a) Haar Wavelets.
- b) Sub-band coding.
- c) Local Component analysis.
- d) Application of Image Processing.



Total No. of Questions : 12]

SEAT No. :

P850

[4659] - 228

[Total No. of Pages : 3

B.E (Computer Engineering)

b - DESIGN AND ANALYSIS OF COMPUTER NETWORKS

(Elective - I) (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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the characteristics of queuing system and the six parameters associated with Kendall Notations. **[8]**
- b) Messages (independently) arrive to a system at the rate of 10 per minute. Their lengths are exponentially distributed with an average of 3600 characters. They are transmitted on a 9600 bps channel. A character is 8 bits long. **[10]**
- i) What is the average service time?
 - ii) What is the arrival rate?
 - iii) What is the service rate?
 - iv) What is the utilization of the server?

OR

- Q2)** a) Explain significance and applications of Little's theorem in queuing theory. **[8]**
- b) Customers arrive at a watch repair shop according to a Poisson process at a rate of one per every 10 minutes, and the service time is an exponential r.v. with mean 8 minutes. **[10]**

P.T.O.

- i) Find the average number of customers L , the average time a customer spends in the shop W , and the average time a customer spends in waiting for service W_s .
- ii) Suppose that the arrival rate of the customers increases 10 percent. Find the corresponding changes in L , W , and W_s .

- Q3)** a) Describe in brief various system design techniques available. Give the advantages of virtualization in system design. [8]
- b) Compare merits and demerits of first, second and third generation switches. [8]

OR

- Q4)** a) Explain the importance of performance metrics and systems constraints in network design. What are the common resources need to be considered while designing the networks. [8]
- b) Explain the functioning of Banyan switch. [8]

- Q5)** a) What is scheduling? Describe the best effort and guaranteed service connections scheduling. [8]
- b) Comment on the advantages and disadvantages of TCP Tahoe and TCP Reno flow control scheme. [8]

OR

- Q6)** a) Describe the functioning of Deficit Round Robin scheduling discipline with suitable example. [8]
- b) Consider ATM virtual circuits A and B with arrival rates 10 and 25 Mbps that share an OC3 link. Suppose that with FCFS, both their mean queuing delays are 0.5ms, and that with a new discipline, A's mean delay is reduced to 0.1ms. What is B's new mean queuing delay? [8]

SECTION - II

- Q7)** a) Explain Guaranteed-service and Best effort service traffic classes with suitable application. [8]
- b) Explain the Quality-of-Service (QoS) parameters used in ATM Forum and IETF approaches. [8]

OR

- Q8)** a) What is admission control strategy? Explain any one admission control strategy. [8]
- b) What is Signaling? Which are the types of signaling? Explain Signaling System No. 7 in telephone networks. [8]

- Q9)** a) What is routing? Explain the functions and responsibilities of a router. [8]
- b) Explain with block diagram Lookup operation in a classful IP addressing scheme. [8]

OR

- Q10)** a) Explain the architecture of router along with the fields in the routing table. [8]
- b) Explain the Random Early Detection packet scheduling algorithm. [8]

- Q11)** a) An organization uses a class C network decided to subnet into four different subnets calculate the appropriate subnet mask for the same. How many hosts will be supported in each subnet? [6]
- b) Explain any five network management related tools/commands used by the Network Administrator. [6]
- c) Explain the significance of WAN bandwidth management in a typical enterprise network. [6]

OR

- Q12)** Write short notes on- [18]
- a) Variable length subnet masking.
- b) Capacity Planning.
- c) Security Management.



Total No. of Questions : 12]

SEAT No. :

P851

[4659] - 229

[Total No. of Pages : 3

B.E (Computer Engineering)
c - ARTIFICIAL INTELLIGENCE
(Elective - I) (2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt three questions from Section - I and three questions from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION -I

- Q1)** a) Describe the different definitions of artificial intelligence. [8]
b) Explain a learning agent architecture and describe their components. [8]

OR

- Q2)** a) Explain the main factors for designing an intelligent agent with suitable example. [8]
b) Explain task domains of Artificial Intelligence problems. [8]

- Q3)** a) Define Search Problem? Solve 8 queens problem as a State Space Search problem. [8]
b) Prove that A-star is optimally efficient and complete. [8]

OR

- Q4)** a) Explain measuring problem solving performance for at least four search strategies. [8]
b) Explain Iterative deepening A-star search algorithm with suitable example. [8]

P.T.O.

- Q5)** a) What are limitations of MINI-MAX search algorithm? Explain the method for overcoming the limitations of MINI-MAX search procedure. [8]
- b) Define Constraint satisfaction problem? Solve SEND + MORE = MONEY using constraint satisfaction? [10]

OR

- Q6)** a) Describe various approaches for solving CSPs. [10]
- b) Explain MINI-MAX search algorithm for solving any game. [8]

SECTION - II

- Q7)** a) Differentiate between Propositional logic and FOL? Write the rules for converting the first-order logic to the Conjunctive Normal Form. [10]
- b) Explain Planning graphs with suitable example. [8]

OR

- Q8)** a) Explain Unification algorithm with a suitable Example. [8]
- b) What is classical planning? Explain the algorithm for planning state space search and backward relevant state search. [10]

- Q9)** a) Explain various forms of learning. [8]
- b) Explain fuzzy sets and fuzzy logic with a suitable example. [8]

OR

- Q10)** a) What are probability axioms? Explain Baye's rule with a suitable example. [8]
- b) Write note on Decision Trees. [8]

Q11)a) Explain Implementation aspects of Parsing in Natural Language Processing with suitable example? Also explain Discourse and Pragmatic Processing. **[8]**

b) Describe Knowledge acquisition step for building the Expert System with suitable example. **[8]**

OR

Q12)a) Explain the architecture of an Expert System with their components. **[8]**

b) Explain steps in Natural Language Processing. What are the applications of NLP? **[8]**



Total No. of Questions : 12]

SEAT No. :

P1055

[Total No. of Pages : 4

[4659]-23

B.E. (Civil Engineering)

**c-STATISTICAL ANALYSIS & COMPUTATIONAL METHODS IN
CIVIL ENGINEERING**

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Write Q. No. 1 or Q. No. 2; Q. No. 3 or Q. No. 4; Q. No. 5 or Q. No. 6 in Section-I, and Q. No. 7 or Q. No. 8; Q. No. 9 or Q. No. 10; Q. No. 11 or Q. No. 12 in 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) *Your answers will be valued as a whole.*
- 6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** The following data shows the height of 50 nano-pillars in a nano-technology setting. Determine mean, median, mode and standard deviation. **[8]**

| | | | | | |
|-----------|---------|---------|---------|---------|---------|
| X | 206-245 | 246-285 | 286-325 | 326-365 | 366-405 |
| Frequency | 3 | 11 | 23 | 9 | 4 |

- b) Define the following: **[8]**
- i) Variance
 - ii) Coefficient of variance
 - iii) Mean
 - iv) Standard deviation

OR

- Q2) a)** The BOD concentration in a river is given in the following table. Determine mean, standard deviation and Pearson's first skewness coefficient for this data. **[8]**

| | | | | | | |
|-----------|-----|-----|-----|-----|-----|-----|
| X | 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 |
| Frequency | 12 | 94 | 170 | 188 | 28 | 8 |

- b) Explain utility of statistics in engineering applications. **[8]**

P.T.O.

Q3) a) The time required to assemble a piece of machinery is a random variable having normal distribution with $\mu = 12.9$ min. and $\sigma = 2.0$ min. What is the probability that assembly will take-

i) At least 11.5 min.

ii) Anywhere from 11.0 to 14.8 min.

[6]

Use the standard normal distribution table given below:

| | | | | | | | | | |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Z | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 |
| Area | 0.000 | 0.0398 | 0.0793 | 0.1179 | 0.1554 | 0.1915 | 0.2257 | 0.258 | 0.2881 |
| Z | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 |
| Area | 0.3159 | 0.3413 | 0.3643 | 0.3849 | 0.4032 | 0.4192 | 0.4332 | 0.4452 | 0.4554 |
| Z | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | |
| Area | 0.4641 | 0.4713 | 0.4772 | 0.4821 | 0.4861 | 0.4893 | 0.4918 | 0.4938 | |

b) Test the goodness of fit for the following data for Poisson distribution at 5% level of significance with $\lambda = 3.2$. **[10]**

| | | | | | | | | | | |
|-----------|---|----|----|----|----|----|----|----|---|---|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Frequency | 9 | 43 | 64 | 62 | 42 | 36 | 22 | 14 | 6 | 2 |

Use the following chi-square distribution table for $\alpha = 0.05$.

| | | | | | | |
|----------|------|--------|--------|-------|-------|--------|
| v | 2 | 3 | 4 | 5 | 6 | 7 |
| χ^2 | 5.99 | 7.8147 | 9.4877 | 11.07 | 12.59 | 14.067 |

OR

Q4) a) Explain what do you mean by a standard normal distribution. State the properties of normal distribution. **[6]**

b) Test the goodness of fit for the following data for normal distribution at 5% level of significance. **[10]**

| | | | | | |
|-----------|-----|-------|-------|-------|-------|
| X | <50 | 50-60 | 60-70 | 70-80 | 80-90 |
| Frequency | 2 | 7 | 10 | 15 | 9 |

Use the standard normal distribution table given in Q. 3a.

Use the Chi-square distribution table for $\alpha = 0.05$ given in Q. 3 b.

- Q5) a)** Fit a second degree parabola to the following data using the method of least squares. [10]

| | | | | | |
|---|----|----|----|----|----|
| X | 10 | 12 | 15 | 23 | 20 |
| Y | 14 | 17 | 23 | 25 | 21 |

- b) Explain Newton interpolation formula. [8]

OR

- Q6) a)** If $y(75) = 246$; $y(80) = 202$; $y(85) = 118$; $y(90) = 40$; Find $y(79)$. [10]

- b) Explain single and multiple regression. [8]

SECTION-II

- Q7) a)** Solve the following by Gauss elimination method. [8]

$$2x_1 + x_2 + 3x_3 = 1;$$

$$4x_1 + 4x_2 + 7x_3 = 1;$$

$$2x_1 + 5x_2 + 9x_3 = 3.$$

- b) Solve the following using Gauss-Seidel method (3 iterations). [8]

$$2x_1 + 2x_2 + 4x_3 = 18; x_1 + 3x_2 + 2x_3 = 13; 3x_1 + x_2 + 3x_3 = 14.$$

OR

- Q8) a)** Solve the following by Gauss-Jordan method. [8]

$$x_1 + x_2 - x_3 = -3; 6x_1 + 2x_2 + 2x_3 = 2; -3x_1 + 4x_2 + x_3 = 1.$$

- b) Solve the following using Gauss-Seidel method (3 iterations). [8]

$$2x_1 + x_2 - x_3 = 1; 5x_1 + 2x_2 + 2x_3 = -4; 3x_1 + x_2 + x_3 = 5.$$

- Q9) a)** Explain: [8]

i) Bisection method.

ii) False position method.

- b) Find the root of $x^3 - 4x + 1 = 0$ which lies between 0 and 1. [8]

OR

- Q10)a)** Explain: [8]

i) Newton Raphson method.

ii) Secant Method.

- b) Find the root of $x^3 - x - 1 = 0$ using Bisection method. [8]

- Q11)a)** Explain: **[8]**
- i) Trapezoidal rule.
 - ii) Simpsons 1/3rd rule.

- b) Find area under the curve **[10]**

| | | | | |
|---|---|---|---|----|
| x | 1 | 2 | 3 | 4 |
| y | 1 | 4 | 9 | 16 |

OR

- Q12)a)** Explain need and scope of numerical integration. **[8]**

- b) Explain: **[10]**
- i) Simpsons 3/8th rule.
 - ii) Gauss - Quadrature method.



Total No. of Questions : 12]

SEAT No. :

P852

[4659] - 230

[Total No. of Pages : 3

B.E (Computer)

**d - SOFTWARE ARCHITECTURE
(Elective - I) (2008 Course) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer (Q1 or Q2) and (Q3 or Q4) and (Q5 or Q6) and (Q7 or Q8) and (Q9 or Q10) and (Q11 or Q12).*
- 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) *Your answer will be valued as whole.*
- 6) *Make suitable assumptions wherever appropriate and relevant.*

SECTION - I

- Q1)** a) Define Software Architecture. Why is Software Architecture important? [6]
- b) Which are process recommendations while designing architecture. [6]
- c) Define structure. Which are most common and useful software structures? Explain. [6]

OR

- Q2)** a) State and explain variety of sources that influences on an architecture. [6]
- b) Which are structures recommendations while designing architecture. [6]
- c) Define view. Explain three step procedure for choosing the views for a project. [6]

- Q3)** a) Draw a neat diagram to depict quality attribute 'Availability' general scenarios. How does one measure Availability. [8]
- b) Explain quality attribute 'usability'. [8]

OR

P.T.O.

- Q4)** a) Discuss two concerns of modifiability. [8]
b) State two categories of tactics for testing. Explain any one. [8]

- Q5)** a) When to use facade pattern? Explain benefits and drawbacks of Facade pattern. [8]
b) Draw consider example of compiler subsystem. Explain how facade makes Programmer's life easier, mention participants. [8]

OR

- Q6)** a) Write Short note on proxy pattern. [8]
b) Consider Example of dialog boxes in a graphical user interface and explain mediator pattern. [8]

SECTION - II

- Q7)** a) Explain in brief. [6]
i) Need for JDBC.
ii) JDBC statement.
iii) JDBC driver.
b) In context of Java what do you understand by terms RMI registry, remote object serializability. [6]
c) What is EJB? Which are the types of EJB? Explain any one type. [6]

OR

- Q8)** a) What are pros and cons of RPC as middleware? [6]
b) In short explain application scenario to illustrate need for messaging middleware like JMS. [6]
c) What is the role of following J2EE technologies-Servelets, JSP, compare the two for web development. [6]

- Q9)** a) What is AJAX? Give two examples of applications using AJAX. Explain how AJAX works. [8]
b) What is DOM? When to use DOM? Which are two nodes & how to search an element? [8]

OR

- Q10)a)** What are java applets? Explain advantages and lifecycle of java applets. [8]
- b) What is 3-tire architecture? Explain any 2 tiers in short. [8]

- Q11)a)** What is JSF? Specify advantages of JSF. Compare JSF and Struts. [8]
- b) Explain JAVA servlet life cycle. [8]

OR

- Q12)a)** Draw and explain entire process of JSP technology. [8]
- b) What are struts? Specify advantages of struts. Compare JSF and Struts. [8]



Total No. of Questions : 12]

SEAT No. :

P853

[4659]-231

[Total No. of Pages : 3

B.E. (Computer Engineering)

a - MULTIMEDIA SYSTEMS

(2008 Pattern) (Elective-II) (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) *Black figures to the right indicates full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is streaming media and why it is required? Explain in brief any one audio and video streaming Technology. [6]
- b) What is an API? Explain the role of API in multimedia Applications. [6]
- c) Explain various multimedia Building Blocks. [6]

OR

- Q2)** a) Explain the characteristics of multimedia database management systems with applications. [6]
- b) Explain various Interaction techniques and devices. [6]
- c) What is multimedia authoring tool? Explain different functions of multimedia authoring tools. [6]

- Q3)** a) What do you mean by image enhancement. Explain the concept of spatial filtering in image enhancement. [8]
- b) Explain how vector quantization is used for image processing. [8]

OR

- Q4)** a) Explain Shannon-fano algorithm used for compression with example. [8]
- b) What do you mean by image enhancement by point processing? also explain the concept of image negative and contrast stretching. [8]

P.T.O.

- Q5)** a) What are the basic components of an audio system? Describe their functions. [8]
- b) What are MIDI messages? Explain the difference between channel message & system messages. [8]

OR

- Q6)** a) Explain PCM & DM audio compression. [8]
- b) Explain with diagram how MIDI instruments can be interfaced with a PC? What is the general MIDI specification and what is its utility. [8]

SECTION-II

- Q7)** a) Explain different types of text with its features. Also explain various text file formats. [6]
- b) What do you mean by digital video? Explain HDTV standard with its features. [6]
- c) What do you mean by text compression? How Huffman coding method is used for text compression. [6]

OR

- Q8)** a) How is encoding on a DVD audio different from that on a CD - audio. Also explain DVD - RAM. [6]
- b) Explain the features of H.261 & H.263. [6]
- c) Explain LZW compression / Decompression technique with suitable example. [6]
- Q9)** a) Explain the role of linear interpolation & spline interpolation in animation? Also explain what is meant by ease-in and ease out effect. [8]
- b) What do you mean by animation on the web? Explain client pull animation. [8]

OR

- Q10)** a) Explain the architecture of open GL in detail. [8]
- b) Explain shadowing technique in open GL. [8]

- Q11)a)** When should RTP be used and when should RTSP be used? Is there an advantage in combining both protocols. [8]
- b) Explain quality of service layered model for the multimedia communication system. [8]

OR

- Q12)a)** Explain various techniques for managing resources during multimedia transmission. [8]
- b) What do you mean by media consumption. Explain with suitable examples. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P854

[4659]-232

[Total No. of Pages : 3

B.E. (Computer Engineering) (Semester - I)

b - MOBILE COMPUTING

(2008 Course) (Elective-II)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from each Sections.*
- 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)** What is FPLMTS? What are the main objectives of FPLMTS. [8]
- b)** What are different operational and technical requirements of GSM. [8]

OR

- Q2) a)** Find the spectral efficiency in bps/Hz of the GSM system assuming channel bandwidth BW to be 200 kHz and the channel data rate of 270.833 kbps. What will be the spectral efficiency if the bandwidth is increased by 50%. [10]
- b)** Discuss the interfaces: [6]
- i) air interface
 - ii) between MSC and BSS
 - iii) between MSCs.

- Q3) a)** Find the frame, multiframe, superframe and hyperframe rates. [8]
- b)** State reasons for choosing two different multiframe timings for speech and signaling channels. [8]

OR

- Q4) a)** Why it is necessary to wait a random amount of time before retransmission over RACH? Can SACCH be linked to both TCH and SDCCH simultaneously. Justify. [6]

P.T.O.

- b) What are the idle and dedicated modes of the mobile operations? [6]
- c) Why it is absolutely necessary to have a longer GP for access burst. [4]

- Q5)**
- a) Name three distinct states of mobile. What different functions must mobile perform. [6]
 - b) Name three distinct paging types. What are the main distinctions between them. [6]
 - c) Why is it necessary for the mobile to register in the system? Can one classify registration as special case of location update? [6]

OR

- Q6)**
- a) Explain the concept of off - air call setup? What are the advantages of this scheme? [6]
 - b) What are different cases of handovers? Draw the signal and response diagram for any two cases and show their differences? [8]
 - c) Discuss various types of PSTN networks. [4]

SECTION-II

- Q7)**
- a) Explain the need for ciphering key K_c must differ from one call to another? What are the various keys involved in secure communication via encryption? Discuss the steps in encryption. [8]
 - b) Discuss the characteristics of SIM. Why PIN is important in ensuring the security. [8]

OR

- Q8)**
- a) Describe the process of Authentication in detail. [8]
 - b) What is TMSI? What is significance of TMSI in call handover? Discuss the process of TMSI assignment as a result of location update. [8]
- Q9)**
- a) What is the significance of interleaving for GSM. Calculate the interleaving depth assuming the frame duration to be 4.6 ms. Can the interleaving depth be increased arbitrarily? [8]
 - b) What is the significance of constraint length K for convolutional coding? Will the system performance improve as K increases? [8]

OR

- Q10)a)** Find the speech data rate with 8000 samples /sec speech 13 bit uniform coding. [6]
- b) Why is speech processing delay a function of power consumption at mobile terminal? Why are MOS and MOPS important for speech encoding? What do they signify? [10]
- Q11)a)** What is the basic difference in LAPD_m and LAPD? What are the two different modes of LAPD_m? Explain. [6]
- b) Enumerate the functions of MM, CC and RR layers. Illustrate with suitable examples. [8]
- c) What is the difference between Connectionless and connection oriented signaling? [4]

OR

- Q12)a)** Discuss the MAP protocols in CC, MM and RR layers. [6]
- b) Discuss various MTP protocols. [6]
- c) Discuss SCCP, TCAP protocols in detail. [6]

EEE

Total No. of Questions : 12]

SEAT No. :

P855

[4659]-233

[Total No. of Pages : 3

B.E. (Computer)

c - EMBEDDED SYSTEMS

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

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *In section I, attempt: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.
In Section II, attempt: 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 indicates full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What are different categories of Embedded systems depending on the area of applications? Give examples. [6]
- b) Explain how digital signal processor and media processor are different than a normal processor. [6]
- c) Explain different steps in Embedded system design process. [6]

OR

- Q2)** a) Which characteristics of an Embedded system make it different than a general purpose system? [6]
- b) Differentiate between RISC and CISC architecture of the processors used in Embedded systems. [6]
- c) How ASIC and ASSP are different than other general purpose processors? What are the advantages of using them in the system? [6]

- Q3)** a) Discuss the interrupt and exception structure in ARM7 architecture. [6]
- b) Discuss different structural units in a processor. Mention few advanced units and their effect on performance of a processor. [6]
- c) What is the importance of a watchdog timer in an Embedded system?[4]

OR

P.T.O.

- Q4)** a) A Network Gateway is to be designed. 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
- b) Discuss various ways of power management in an Embedded system to reduce power consumption. [5]
- c) Describe architectural features of ARM7 core in brief. [5]

- Q5)** a) Discuss CAN protocol w.r.t. following points: [10]
- i) Standard data frame format
 - ii) Arbitration mechanism
 - iii) Different types of frames
 - iv) Bit stuffing mechanism
- b) Describe various optical devices commonly used in Embedded systems. Also list their applications. [6]

OR

- Q6)** a) Which topology is used by devices to communicate through USB protocol? Discuss the data transfer mechanism in details. [8]
- b) Describe I²C protocol w.r.t. following points: [4]
- i) Data transfer speed
 - ii) Arbitration
- c) Discuss the importance of data converters in Embedded systems such as process control plant. [4]

SECTION-II

- Q7)** a) Explain the process of converting a C program into a file for ROM image. [6]
- b) Explain the usage of stacks and queues in Embedded system programming. [8]
- c) How cross compilers are different than compilers? [4]

OR

- Q8)** a) How C++ is useful in Embedded system programming? Also mention its disadvantages [6]
b) What is In- Circuit - Emulator? Discuss its working in details. [6]
c) Explain software development cycle for Embedded system with the help of neat diagram. [6]

- Q9)** a) Differentiate between Embedded OS, RTOS and Desktop OS. [6]
b) Name two advanced scheduling algorithms. [2]
c) Discuss different ways of interrupt handling in RTOS environment. What care is taken while writing ISRS? [8]

OR

- Q10)**a) Discuss the following scheduling models of RTOS considering worst case latency, advantages and disadvantages. [9]
i) Co-operative Round Robin
ii) Co-operative Ordered list
iii) Co-operative Time slicing
b) Name and explain in brief any three IPC mechanisms used for process synchronization. [3]
c) Compare assembly language programming and high level language programming. [4]

- Q11)**a) Describe hardware and software architecture of Navigation system in details. [6]
b) Discuss different features of micro C / OS-II. [4]
c) Discuss features and applications of symbian OS. [6]

OR

- Q12)**a) Give details of hardware and software components of Handheld computer system. [6]
b) Explain the working of Automatic cruise control system. What are hardware and software requirements of it? [6]
c) Discuss various applications where Vx works is used. Also list its features. [4]

EEE

Total No. of Questions : 12]

SEAT No. :

P856

[4659]-234

[Total No. of Pages : 2

B.E. (Computer Engineering) (Semester - I)
d - SOFTWARE TESTING AND QUALITY ASSURANCE
(2008 Course) (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 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 software Testing? What is the need of software testing in software production cycle? **[8]**

b) Explain the phases of software testing. **[8]**

OR

Q2) a) Explain the contents of Test Plan in IEEE format. **[8]**

b) Describe the defect life cycle. **[8]**

Q3) a) Explain the following in brief: **[10]**

i) Verification and validation.

ii) Cause effect diagram.

b) Give the test case design for ATM operations. **[8]**

OR

Q4) a) What is black box testing? Explain any two methods of black box testing. **[10]**

b) Explain positive and negative testing. **[8]**

P.T.O.

- Q5)** a) Explain the purpose of white box testing and its challenges. [8]
b) How control structure testing is done with basis path testing? [8]

OR

- Q6)** a) Describe loop testing method. [8]
b) Explain the testing of object oriented system. [8]

SECTION-II

- Q7)** a) What is testing metric? Explain the Goal question metric model. [8]
b) Explain regression and acceptance testing. [10]

OR

- Q8)** a) Describe smoke testing and ad-hoc testing. [8]
b) How GUI testing is carried out? Explain in detail with tools used. [10]

- Q9)** a) How ISO quality metric is applied for the software product? [8]
b) Explain any four quality factors. [8]

OR

- Q10)** Explain the following in brief: [16]
a) Quality control
b) Quality Assurance
c) TQM.
d) Measurement tools.

- Q11)** a) Explain and compare the manual and automated testing. [8]
b) Give the features of testing tools. [8]

OR

- Q12)** a) How web based application is tested? [8]
b) Explain functional testing with a tool. [8]

EEE

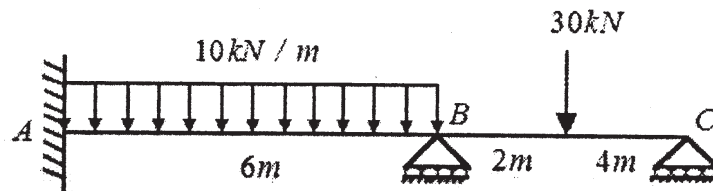
[4659] - 24

B.E. Civil Engineering (Semester - II)**A : FINITE ELEMENT METHOD IN CIVIL ENGINEERING****(Elective - IV)****(2008 Pattern) (Open Elective)***Time : 3 Hours]**[Max. Marks : 100**Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of non programmable calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

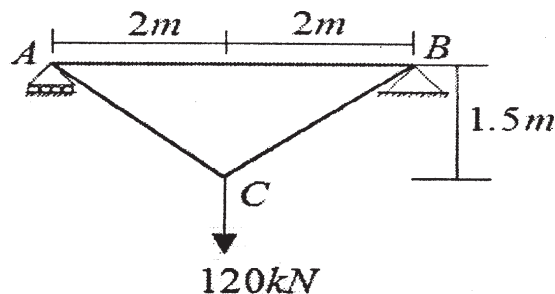
SECTION - I

- Q1)** Analyse the beam using stiffness matrix method (member approach) if support B is sink by 25mm. Take $EI = 3800 \text{ kN.m}^2$. [18]



OR

- Q2)** 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]



- Q3)** Develop stiffness matrix for two noded frame element with three degrees of freedom at each node. Take EI constant. [16]

P.T.O.

OR

Q4) Develop stiffness matrix for two noded grid Element with three degrees of freedom at each node. Take EI and GJ constant. [16]

Q5) a) Derive the differential equations of equilibrium for 3D elasticity problem. [8]

b) Derive Saint Venant's strain compatibility conditions. [8]

OR

Q6) a) Write stress strain relationship for plane stress, plane strain and axisymmetric problems. [8]

b) Derive strain-displacement relations for 3D elasticity problem in Cartesian coordinate system. [8]

SECTION - II

Q7) a) Write short note on 2D and 3D Pascale's triangle. [9]

b) State and explain principle of virtual work and minimum potential energy. [9]

OR

Q8) a) Explain step by step procedure for finite element method. [9]

b) What is effective node numbering scheme. Explain with example. [9]

Q9) a) State the convergence criteria for the choice of the displacement function in FEM. [8]

b) Explain in brief discretization with suitable example. [8]

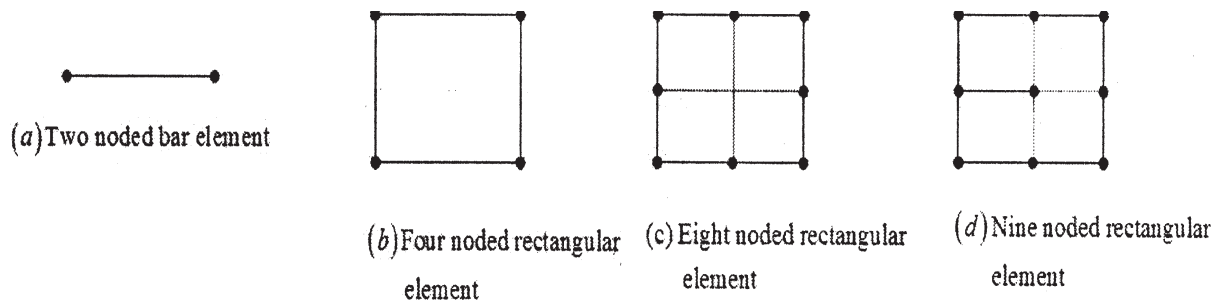
OR

Q10)a) Explain local, global and natural coordinate systems. [6]

b) Derive stiffness matrix of two noded bar element using principle of minimum potential energy. [10]

Q11) Derive shape functions of following isoparametric elements in natural coordinate system (ζ, η) . **[16]**

- a) Two noded bar element
- b) Four noded rectangular element
- c) Eight noded rectangular element
- d) Nine noded rectangular element



OR

Q12) Derive necessary matrices $[A]$, $[B]$ and $[D]$ for formulation of stiffness matrix of three noded axisymmetric triangular element. **[16]**



Total No. of Questions :12]

SEAT No. :

P860

[Total No. of Pages : 4

[4659]-240

B.E. (Computer Engineering)

d - ADVANCED DATABASES

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) For each of the three partitioning techniques, namely round- robin, hash partitioning, and range partitioning, give an example of a query for which that partitioning technique would provide the fastest response. **[6]**
- b) Write a short note on parallel hash join. **[5]**
- c) What is interquery parallelism? Explain cache coherency problem and protocol available to guarantee cache coherency. **[6]**

OR

- Q2)** a) Explain parallel External sort- merge. **[6]**
- b) Explain design issues in parallel database system. **[6]**
- c) What factors could result in skew when a relation is partitioned on one of its attributes by hash partitioning and range partitioning. In each case, what can be done to reduce the skew? **[5]**

P.T.O.

- Q3) a)** If we are to ensure atomicity, all the sites in which a transaction T executed must agree on the final outcome of the execution T must either commit at all sites or it must abort at all sites. Describe the technique or protocol used to ensure this property in detail. [7]
- b) Explain how the following differ: Fragmentation transparency, replication transparency, and location transparency. [6]
- c) Describe and compare homogeneous and heterogeneous databases with respect to distributed databases. [4]

OR

- Q4) a)** Explain the following with respect to robustness of distributed databases.
 i) Co-ordinator selection.
 ii) Majority -based approach. [8]
- b) Explain network partition problem w.r.t to distributed databases. [5]
- c) What are the different approaches to store a relation in the distributed database. Explain them in brief. [4]

- Q5) a)** Write short notes on: [8]
 i) SOAP.
 ii) Client - Server architecture.
- b) Explain the structure of XML data with example. [8]

OR

- Q6) a)** Explain the following with respect to web architecture . [8]
 i) Web server.
 ii) Common gateway interface.
 iii) Cookie.
 iv) Uniform resource locator.
- b) Explain XML parsers in detail. [8]

SECTION -II

- Q7) a)** What is data warehouse? What is the difference between data warehouse and operational database system? [9]
- b) Explain the following: [8]
 i) Data cube
 ii) OLAP

OR

- Q8)** a) Discuss the different data smoothing techniques. [8]
 b) Suppose a group of 12 sales price records has been sorted as follows: [4]
 5, 10, 11, 13, 15, 35, 50, 55, 72, 92, 204, 215
 Partition them into three bins by each of the following methods:
 i) Equal -frequency (equidepth) partitioning
 ii) Equal - width partitioning
- c) Write a short note on data mart. [5]
- Q9)** a) Explain in detail classification and prediction. [8]
 b) Explain Apriori algorithm with example. [9]

OR

- Q10)**a) Consider following training set. [9]

| Day | Out look | Temperature | Humidity | Wind | Play tennis |
|-----|----------|-------------|----------|--------|-------------|
| D1 | Sunny | Hot | High | Weak | No |
| D2 | Sunny | Hot | High | Strong | No |
| D3 | Overcast | Hot | High | Weak | Yes |
| D4 | Rain | Mild | High | Weak | Yes |
| D5 | Rain | Cool | Normal | Weak | Yes |
| D6 | Rain | Cool | Normal | Strong | No |
| D7 | Overcast | Cool | Normal | Strong | Yes |
| D8 | Sunny | Mild | High | Weak | No |
| D9 | Sunny | Cool | Normal | Weak | Yes |
| D10 | Rain | Mild | Normal | Weak | Yes |
| D11 | Sunny | Mild | Normal | Strong | Yes |
| D12 | Overcast | Mild | High | Strong | Yes |
| D13 | Overcast | Hot | Normal | Weak | Yes |
| D14 | Rain | Mild | High | Strong | No |

Write ID3 classification algorithm. Construct a decision tree based on above training set using ID3.

- b) What are Bayesian classifiers? [2]
 c) Explain K mean algorithm with example. [6]

- Q11)** a) What is relevance feedback? Explain in brief. [4]
b) Explain in detail information retrieval and structured data. [6]
c) Explain in detail popularity ranking. [6]

OR

- Q12)** a) What is the difference between a false positive and a false drop? If it is essential that no relevant information be missed by an information retrieval query, is it acceptable to have either false positives or false drops? Why? [4]
b) Explain in detail Web search Engines. [6]
c) Explain following terms with examples w.r.t to IR. [6]
i) Homonyms
ii) Synonyms
iii) Proximity

□□□

Total No. of Questions : 12]

SEAT No. :

P862

[4659] - 242

[Total No. of Pages : 4

B.E (Computer Engineering)
OPERATION RESEARCH
(2008 Pattern) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate 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) What is meant by the term 'feasible region'? Why must this be well defined boundary for the maximization problem? **[6]**

b) Solve the following LP problem graphically and state what your solution indicate. **[10]**

i) $\text{Min } Z = 4X_1 - 2X_2$
Subject to $X_1 + X_2 \leq 14$
 $3X_1 + 2X_2 \geq 36$
 $2X_1 + X_2 \leq 24$

And $X_1, X_2 \geq 0$

ii) $\text{Max } Z = 3X + 2Y$
Subject to $-2X + 3Y \leq 9$
 $3X - 2Y \leq -20$
And $X, Y \geq 0$

OR

Q2) a) Define slack and surplus variables in a linear programming problem. **[6]**

b) Solve the following LP problem graphically and state what your solution indicates. **[10]**

i) $\text{Min } Z = 20X_1 + 10X_2$
Subject to $X_1 + 2X_2 \leq 40$
 $3X_1 + X_2 \geq 30$
 $4X_1 + 3X_2 \geq 60$

And $X_1, X_2 \geq 0$

P.T.O.

ii) $\text{Max } Z = 6X - 4Y$
 Subject to $2X + 4Y \leq 4$
 $4X + 8Y \geq 16$
 And $X, Y \geq 0$

- Q3) a)** A baking company sells one of its types of cake by weight. It makes profit of Rs. 2 a kg on every Kg of cake sold on the day it is baked. It disposes of all cakes not sold on the day they are baked at a loss of Rs. 0.50 a Kg. If the demand is known to have probability density function $f(R) = 0.3 - 0.0003R$, find the optimum amount of cake the company should bake daily. **[10]**
- b)** Explain the following with respect to probability **[6]**
- i) random variable
 - ii) probability distribution function
 - iii) transition probability.

OR

- Q4) a)** The probability distribution of demand of an item is as follows **[10]**

| | | | | | | |
|----------------|-----|-----|-----|-----|-----|-----|
| Monthly demand | 0 | 1 | 2 | 3 | 4 | 5 |
| Probability | 0.1 | 0.2 | 0.2 | 0.3 | 0.1 | 0.1 |

The cost of carrying inventory is Rs. 1 per unit per month. The current policy is to maintain a stock of three items at the beginning of each month. Assuming that this is the optimum level, calculate the shortage cost of one item for one time unit.

- b)** For events A and B in the probability. **[6]**

Show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

- Q5) a)** Four counters are being opened on the border of a country for checking the passport and necessary papers of the tourists. The tourist chooses a counter at random. If arrivals at the border are Poisson at rate λ and the service time is exponential with parameters $\lambda/2$. What is the steady state average queue at each counter? **[10]**
- b)** Describe the general problem of M/M/k queuing and deduce an explicit expression for the steady state probability of the length of the queue in an M/M/1 system. **[8]**

OR

- Q6) a)** A telephone exchange has two long distance operators. The telephone company finds that during the peak load, long distance call arrive in a Poisson fashion at an average rate of 15-per hours. The length of service on these calls is approximately exponentially distributed with mean length of 5 minutes. What is the probability that a subscriber will have to wait for his long distance call during the peak hours of a day? **[10]**
- b)** State the basic axioms governing Poisson queues. Find the distribution of arrival for the Poisson queues. **[8]**

SECTION - II

- Q7) a)** Find an optimal sequence for the following sequencing problem of four jobs and five machines of which processing time is as follows: **[12]**

| Job | 1 | 2 | 3 | 4 |
|---------------|---|---|---|---|
| Machine M_1 | 6 | 5 | 4 | 7 |
| Machine M_2 | 4 | 5 | 3 | 2 |
| Machine M_3 | 1 | 3 | 4 | 2 |
| Machine M_4 | 2 | 4 | 5 | 1 |
| Machine M_5 | 8 | 9 | 7 | 5 |

Also find the total elapsed time.

- b)** What do you understand by the following terms in the context of sequence of jobs: **[6]**
- i) job arrival pattern
 - ii) number of machines
 - iii) the flow pattern in the shop
 - iv) the criteria of evaluating performance of a schedule.

OR

- Q8) a)** Five jobs have to be processed on same machine. The set up time for each job depends on the job processed earlier. A table of the set up time is shown below. Find a sequence for processing all jobs that minimizes the total set up cost. **[12]**

| Predecessor Job | Follower Job | | | | |
|--------------------|--------------|----|----|----|----|
| | A | B | C | D | E |
| A | 0 | 29 | 20 | 18 | 24 |
| B | 0 | 0 | 14 | 19 | 16 |
| C | 0 | 35 | 0 | 37 | 26 |
| D | 0 | 15 | 10 | 0 | 10 |
| E | 0 | 18 | 16 | 40 | 0 |

- b) By using appropriate notion, obtain formulae for the following. [6]
- i) waiting time of job
 - ii) mean flow time
 - iii) completion time of a job

Q9) Explain the following with respect to separable programming: [16]

- a) separable programming problem
- b) separable convex problem
- c) separable function
- d) reduction to separable form

OR

Q10) When $n > m+1$, solve the following NLP problem [16]

$$\text{Minimize } f(x) = 5x_1 x_2^{-1} + 2x_1^{-1} x_2 + 5x_1 + x_2^{-1}$$

Using the geometric programming method.

Q11)a) Use dynamic programming to find the value of: [10]

$$\text{Max } Z = y_1 \cdot y_2 \cdot y_3$$

Subject to the constraints

$$y_1 + y_2 + y_3 = 5 \text{ and } y_1, y_2, y_3 \geq 0$$

- b) Explain the concept of dynamic programming and the relation between dynamic and linear programming. [6]

OR

Q12)a) Solve the following LP problem by dynamic programming [10]

$$\text{Maximize } Z = 8x_1 + 7x_2$$

Subject to the constraints

$$\text{i) } 2x_1 + x_2 \leq 8$$

$$\text{ii) } 5x_1 + 2x_2 \leq 15 \quad x_1, x_2 \geq 0$$

- b) Discuss briefly [6]

i) The general similarities between dynamic programming and linear programming.

ii) How dynamic programming conceptually differ from linear programming?



Total No. of Questions : 12]

SEAT No. :

P863

[4659] - 243

[Total No. of Pages : 3

B.E (Computer Engineering)
c- CLOUD COMPUTING
(Elective - IV) (2008 Course) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) How do you relate cloud computing with Utility computing and Elastic Computing? [6]
- b) Enlist the characteristic of PAAS. [4]
- c) Enlist and explain service models of Cloud Computing. [8]

OR

- Q2)** a) Explain various Deployment models of Cloud Computing. [8]
- b) How the resource provisioning is done and monitored in cloud computing. [6]
- c) Enlist the characteristic of SAAS. [4]

- Q3)** a) Explain how you can develop rich web based application using AJAX in contrast of GET/POST method. [8]
- b) What is data access for enterprise application? Explain with example, how data access control can be implemented. [8]

OR

- Q4)** a) What is Desktop virtualization and application streaming? Explain in detail. [8]
- b) How do you differentiate Multi-tenancy implementation using single schema and multiple schemas? [8]

P.T.O.

- Q5)** a) Explain architecture of cloud file systems: GFS AND HDFS. [8]
b) Discuss with example how to write JOIN operation using MapReduce model. [8]

OR

- Q6)** a) Explain with suitable examples batch processing using MapReduce model. [8]
b) Explain different Parallel database architectures? Elaborate the difference between row oriented and column oriented storage. [8]

SECTION - II

- Q7)** a) Enlist and Explain Seven complementary principles that support information assurance in cloud computing. [8]
b) Discuss the necessary requirements for Secure Cloud Software. [8]

OR

- Q8)** a) Classify and explain the Security policy hierarchy that is being maintained while security policy Implementation in cloud. [8]
b) Enlist the Common Security Testing Techniques and also categorize each in white box, gray box, or black box,. Explain any one technique in detail. [8]

- Q9)** a) Explain the following terms with reference to cloud computing. [8]
i) Sky computing.
ii) Load Balancing.
b) Enlist and Explain the different category which can be used for resource optimization before opting for cloud migration. [8]

OR

- Q10)**a) What is Data Migration and which type of best practices should be used to protect data during a migration. [8]
b) Enlist and Explain the principal design issues that are to be addressed while designing a QoS-aware distributed (middleware) architecture for cloud . [8]

- Q11)a)** What is Nimbus? Discuss in detail the cloudinit.d and context broker. **[10]**
- b) Explain various components within Enomal Elastic cloud computing platform. **[8]**

OR

- Q12)a)** Describe performance evaluation functions and features of cloud platforms. **[10]**
- b) Explain different features and functions of Virtual Computing Lab. **[8]**



Total No. of Questions : 12]

SEAT No. :

P864

[4659] - 244

[Total No. of Pages : 3

**B.E (Computer Engineering)
d- INFORMATION SECURITY
(2008 Course) (Semester - II) (Elective - IV)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

SECTION - I

- Q1)** a) What are the different categories of security services defined by x.800? Discuss each in detail. [8]
- b) What are different types of cryptography? Explain Hill Ciphering developed by Lester Hill in detail with suitable example. [10]

OR

- Q2)** a) What is masquerade? Discuss it with suitable example. Is it active attack? Justify your answer. [8]
- b) What is Rotor machine? Discuss Rotor Machine with wiring representation [10]

- Q3)** a) Draw and explain the internal structure of single round of DES algorithm. [8]
- b) What is stream Ciphering? Discuss any one stream ciphering in detail. [8]

OR

- Q4)** a) What is diffusion and confusion? Differentiate diffusion and confusion. [8]
- b) Draw and explain key distribution scenario using private key cryptography. [8]

P.T.O.

- Q5)** a) What is a one way and trapdoor one way function? Explain each in detail. [8]
- b) Perform encryption and decryption using RSA algorithm for following value of keys message. Discuss each step in detail. [8]
- i) $p = 3, q = 11, e = 7, m = 5$
- ii) $p = 17, q = 31, e = 7, m = 2$

OR

- Q6)** a) How the key management is done using private key cryptography? Discuss any one method for key management. [8]
- b) What is elliptic curve? Explain zero point of elliptic curve. Consider Diffie-Hellman scheme with a common prime number $q = 1$ and a primitive root $\alpha = 2$. If user A has private key $Y_A = 9$, what is private key X_A . [8]

SECTION - II

- Q7)** a) What types of attacks are addressed by message authentication? Enlist and explain in detail. [8]
- b) What message digests? Explain all steps of MD5 algorithm for message digesting. [10]

OR

- Q8)** a) What is HMAC? Discuss different objectives of HMAC. Explain HMAC algorithm in brief. [8]
- b) What is Digital Signature? Explain DSA algorithm in detail. Enlist all algorithms which can use for digital signature. [10]

- Q9)** a) Enlist and explain the services provided IPSec. What are the benefits of IPSec? [8]
- b) Explain SSL architecture with suitable diagram. [8]

OR

- Q10)** a) What is IDS? Differentiate statistical Anomaly detection and rule base intrusion detection. [8]
- b) What is packet filtering? Differentiate packet filtering router and stateful inspection firewall. [8]

- Q11)a)** What are the different principal services provided by PGP? Discuss each service in detail. **[8]**
- b) Explain the format of text message of email defined by RFC 822 in detail. **[8]**

OR

- Q12)a)** Enlist and discuss security services provided by X.500 in detail. **[8]**
- b) Write short notes on the following (any two). **[8]**
- i) PEM
 - ii) Electronic Commerce Security
 - ii) Web and Email security.



Total No. of Questions : 8]

SEAT No. :

P1185

[Total No. of Pages : 3

[4659]-246

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

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 answerbooks.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- 5) Use of steam tables and electronic calculator is allowed.

SECTION - I

Q1) For the gas phase catalytic reaction, $A + 2B \rightarrow R$, derive any two rate laws based on Langmuir-Hinshelwood theory. [16]

Q2) A laboratory well-mixed reactor, housing 1 Kg catalyst, yields following data. Concentration of A in feed is 10 mol/m^3 . [18]

| | | | | | |
|-----------------------------|---|----|----|-----|-----|
| C_A mol/m ³ | 1 | 2 | 3 | 6 | 9 |
| V_0 lit/hr | 5 | 20 | 65 | 133 | 540 |

Reaction is $A \rightarrow R$. Find the amount of catalyst needed for 92% conversion for a flow rate of 10 kmol/hr feed stream having concentration of A as 20 mol/m^3 assuming the reactor to be:

- a) Fixed Bed Reactor with no recycle stream.
- b) Fixed Bed Reactor with very large recycle.

Q3) True kinetics of a gas phase catalytic reaction $A \rightarrow 2R$ is given as $-r_A = 0.15 C_A^2 \text{ mol/m}^3 \text{ cat.s}$. Calculate the catalyst volume needed to achieve 75% conversion of 95% pure A fed at the rate of 100 kmol/hr assuming strong pore diffusion resistance regime. Catalyst pellet diameter is 12 mm and effective pore diffusivity is $1 \times 10^{-6} \text{ m}^2/\text{s}$. [16]

P.T.O.

- Q4)** Discuss in brief **[16]**
- a) BET Method
 - b) Thiele Modulus in Fixed Bed Reactor Design
 - c) Catalyst additives
 - d) Mechanisms of catalyst poisoning

SECTION - II

- Q5)** Derive expressions for rate of absorption needed for absorption tower design in the following cases. **[16]**
- a) Reaction is infinitely rapid.
 - b) Reaction is very slow.
- Q6)** An acid gas A in a gaseous stream is to be removed so as to reduce its ppm from 5000 to 50 (total pressure is 200 KPa) by reacting it with an aqueous solution of base B in a packed tower operated in a counter-current manner. Overall gas side mass transfer coefficient is $0.009 \text{ mol/hr.m}^3\text{.Pa}$. Henry's constant is $15 \text{ Pa.m}^3\text{/mol}$. L/G ratio is 5 Kmole/Kmole Inert. Calculate minimum concentration of B needed at the top of the tower to ensure minimum height of the tower. Also calculate the height of the tower if the concentration is 70% of the minimum value. **[18]**
- Q7)**
- a) Derive expression for calculating time required for a batch of spherical particles reacting with a gas in a uniform atmosphere to a predecided level of conversion. Assume diffusion through the ash layer controlling the overall rate. State the assumptions made. **[10]**
 - b) Spherical particle of ZnS with initial diameter of 5 cm is subjected to oxidation in presence of pure oxygen at 2 bar and 700 C. Roasting reaction yields SO_2 as also the layer of ZnO. Molar density of solid may be assumed to be 0.08 mol/cm^3 . Diffusivity of gas through the product layer is $0.02 \text{ cm}^2\text{/s}$. Calculate the time required for 80% reduction in the size of the particle. **[6]**

Q8) Give a brief account of pertinent reactions, catalysts used, operating conditions and reactors employed in **[16]**

a) Hydroprocessing

b) Hydrogen Production



Total No. of Questions : 12]

SEAT No. :

P1198

[4659]-248

[Total No. of Pages : 3

**B.E.(Petrochemical Engineering)
ENVIRONMENTAL ENGINEERING
(2008 Course) (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)** Discuss five major impacts of man on environment and their effects. [6]
- b) What is procedure to claim the carbon credits? What advantage the developing countries get through the Kyoto protocol? [6]
- c) Discuss in detailed about separation, handling and transportation of Biomedical waste. [6]

OR

- Q2) a)** State various adverse effects of climate change on the environment with examples. [9]
- b) How the project is decided for CDM? What are its criteria? What are examples of projects in CDM? [9]

- Q3) a)** Flue gases from thermal power station, flowing at rate of 1000 m³/min and containing particles in size range of 1 to 100 microns, are sent to multi tray settling chamber for preliminary separation of particles. The settling unit, 5 m long and 5 m wide, contains 25 trays including bottom shelf, spaced uniformly 30 cm apart. Determine minimum particle size that can be separated in the unit. Assume stroke's law to be applicable:

Data: Temperature of gases = 200 °C

Density of gases = 0.001 g/cm³

Viscosity of gases = 0.035cp

Density of particles = 2.2 g /cm³

[12]

P.T.O.

- b) Give the detailed classification of primary and Secondary air pollutants with their adverse effects for any two each. [4]

OR

- Q4)** a) Discuss the principle, working, advantages and applications for removing specific gaseous pollutant from gas streams through Combustion, Absorption and Adsorption. [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) Discuss the principle, working, advantages and disadvantages for removing particulate matter from gas streams in a wet Scrubber. [8]

OR

- Q6)** a) Discuss Primary and Secondary Meteorological factors influencing air pollution. [8]

- b) Why ESPs – Electrostatic Precipitators mandatory for Cement Plants? Explain the principle and working of ESPs. [8]

SECTION-II

- Q7)** a) Discuss the general limits / norms specified for disposal of treated wastewater on land, in river and in sea water? [8]

- b) Discuss the detailed classification of all solids found in waste water with their average size. [8]

OR

- Q8)** a) Discuss the various operations for generation of wastewater in any process plant. [8]

- b) Name five physical and chemical characteristics of waste water. [8]

Q9) a) Discuss principle, construction, working, advantages and disadvantages of 'Activated Sludge Process' (ASP) with neat sketch. [10]

b) Differentiate between Anaerobic and Aerobic process (Minimum 5 points). [6]

OR

Q10)a) What do you mean by Suspended growth process and Attached growth process? Explain with example. What are preconditions needed to operate these processes. Which process you will recommend municipal sewage treatment and why? [8]

b) Discuss principle, construction, working, advantages and limitations of 'Up-flow Anaerobic Sludge Blanket' (UASB) process with neat sketch. [8]

Q11) a) Discuss the sources and method of treatment for paper and pulp industry waste with neat sketch. [9]

b) Discuss the sources and treatment method for wastes from Refining operation plant. [9]

OR

Q12) Write a short note on (Any four): [18]

a) Sludge volume index (with formula).

b) Trickling filter.

c) ISO 14000.

d) OSHA.

e) Significance of DO.

f) Advantages of Aerobic reactors.

g) Hazardous waste classification.

□□□

Total No. of Questions : 6]

SEAT No. :

P1186

[Total No. of Pages : 3

[4659] - 25

B.E. (Civil)

B : GEOINFORMATICS

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

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.

P.T.O.

OR

- a) Explain supervised and unsupervised classification. [8]
- b) Explain any two satellite images and its application. [8]

- 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. :

P865

[4659] - 250

[Total No. of Pages : 4

B.E. (Petrochemical Engineering)
b - NOVEL SEPARATION PROCESSES
(Elective - I) (2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** Draw concentration profiles for membrane processes for following cases: **[6]**
- i) two liquid films and a solid and,
 - ii) two gas films and a solid.
- b) Classify separation processes by giving suitable example(s). Discuss the selection criteria for the same with suitable examples. **[8]**
- c) In batch evaporation, heat is added to a solution of solutes to remove a solvent (usually Water) and concentrate the remaining solutes. After sufficient time, the concentrated solution is sent to the next unit. Would you term this process rate-based and equilibrium based? (i.e. which is the best Choice?) Explain in brief. **[4]**

OR

- Q2)** Classify the models for gas separation by membranes. Develop a complete mixing process model for membrane separation processes, mentioning important assumptions. Discuss different design cases with solution strategies in this model. **[18]**

- Q3)** An 10-micron tubular membrane is used to recover salt A from a dilute solution. The solutions to either side are at 0.025 and 0.0045 kmol/m³, with mass transfer coefficients of 3.5×10^{-5} and 2.25×10^{-5} m/s respectively. The distribution coefficient is 0.79 and the diffusivity of A in the membrane is 2.8×10^{-11} m²/s. **[16]**

P.T.O.

- a) Calculate the percentage of total resistance to mass transfer contributed by the membrane.
- b) Calculate the membrane area needed to allow recovery at 0.017 kmol/hr.
- c) Flow inside the tube is turbulent and mass transfer follows the Gilliland, Sherwood & Linton correlation. If the velocities of both solutions are doubled, what will the membrane resistance now be?

OR

- Q4)** a) Discuss various membrane modules with neat sketches for membrane separation processes by giving merits and demerits of each of them. [10]
- b) Explain equilibrium based and Rate based separation processes with suitable examples. [6]
- Q5)** a) A membrane is to be used to separate a gaseous mixture of P and Q in one of the petrochemical complex. Assuming complete mixing model, calculate the following: [12]
- i) the permeate composition
 - ii) the fraction permeated
 - iii) membrane area

Data::

| | |
|-------------------------------|---|
| Feed flow rate | = $3.5 \times 10^5 \text{ cm}^3 \text{ (STP)/s}$ |
| Feed composition of A | = 0.55 mole fraction |
| Desired composition of reject | = 0.25 mole fraction |
| Thickness of membrane | = $2.45 \times 10^{-3} \text{ cm}$ |
| Pressure on feed side | = 100 cm Hg |
| Pressure on permeate Side | = 50 cm Hg |
| Permeability of A, P_A | = $25 \times 10^{-10} \text{ cm}^3 \text{ (STP) cm/(s.cm}^2\text{.cm. Hg)}$ |
| Permeability of B, P_B | = $10 \times 10^{-10} \text{ cm}^3 \text{ (STP) cm/(s.cm}^2\text{.cm. Hg)}$ |

- b) Write a brief note on: “Hydrotopes”. [4]

OR

- Q6)** a) Draw neat sketches for: [8]
- i) Separation by phase creation.
 - ii) Separation by phase addition.
 - iii) Separation by barrier.
 - iv) Separation by force field or gradient.
- b) A heart-lung machine uses a 0.175mm silicone rubber membrane with a permeability of $6.40 \times 10^{-7} \text{ cm}^3 \text{ O}_2 \text{ (STP) mm/s.cm}^2 \text{ cm Hg}$. The machine is to supply 355 cm³/min of oxygen to a patient, where the partial pressure of oxygen in the blood is the equivalent of 30 mmHg. The machine is supplied with pure oxygen at 700mmHg, so gas film resistance can be neglected. If the resistance on the blood side were neglected also, how large would the membrane need to be? [8]

SECTION - II

- Q7)** a) Discuss in brief the process principles involved in Pressure Swing Adsorption (PSA) and Temperature Swing Adsorption (TSA) with industrial applications. [12]
- b) Explain different types of adsorbents with their properties used in industrial operations. [6]

OR

- Q8)** The data on adsorption of ethane as Linde molecular sieve 5A⁰, at 35°C is given in following table: [18]

| P, [mm Hg] | U take, V [cm ³ (STP/gm)] |
|------------|--------------------------------------|
| 0.17 | 0.059 |
| 0.95 | 0.318 |
| 5.57 | 1.638 |
| 12.09 | 3.613 |
| 111.32 | 24.236 |
| 220.87 | 34.278 |
| 300.05 | 38.340 |
| 401.25 | 41.779 |
| 500.18 | 44.037 |
| 602.74 | 45.693 |

- a) Using the data given above determine if the Langmuir equation can be used to model the data.
- b) Calculate the total surface area of solid, if density of ethane = 0.3555gm/cc.
- Q9)** Nitrogen gas contaminated with water at 920 mg per kg of N₂ is continuously fed to a pilot-scale adsorption column that contains a 0.268 m high bed packed with molecular sieve. Outlet data were as follows: [16]

| | | | | | | | | | | | | |
|------------------------------------|---|-----|-----|-----|------|------|------|-------|------|------|------|------|
| Time (hours) | 0 | 9 | 9.2 | 9.5 | 10.0 | 10.5 | 10.8 | 11.25 | 11.5 | 12.0 | 12.5 | 12.8 |
| Water conc. (mg/kgN ₂) | 0 | 0.8 | 2.8 | 25 | 95 | 240 | 425 | 635 | 720 | 850 | 910 | 920 |

If break-through is defined here as being when c/c_0 reaches 0.02, find the following:

- a) Breakthrough time.
- b) Height of “zone” of unspent (but not unused) bed in column.
- c) Fraction of total sieve capacity used by breakthrough time.
- d) Breakthrough time if an industrial column were to be built of the same cross-section, but with a bed height of 0.6m.

OR

Q10)a) Write down Van Deemter equation for Chromatography. Explain the meaning of each parameters involved in this equation. Derive an expression for optimum value of the mobile phase velocity and the plate height in terms of these parameters. [8]

b) Define the following terms in connection with chromatographic separations and give appropriate equations (Any Four): [8]

i) Partition coefficient (K).

ii) Retention Volume (V_R)

iii) Retention Ratio (R)

iv) Capacity factor (k')

v) HETP

vi) Resolution (R_s)

Q11)a) Two amino acids, glycine and alanine, were separated by liquid chromatography with the following results: [12]

| Amino Acid | T_R , (minutes) | W (minutes) |
|------------|-------------------|-------------|
| Glycine | 4.5 | 0.55 |
| Alanine | 5.2 | 0.65 |

i) Calculate the resolution of amino acids.

ii) Calculate the plate number for alanine.

iii) What is the minimum plate numbers needed to provide a resolution of 1.5?

iv) How do you get this high plate number?

b) Write a brief note on : Super Critical Fluid Extraction". [4]

OR

Q12)Write notes on: [16]

a) Reactive Separations.

b) Parametric Pumping.

c) Isoelectric Focusing.



Total No. of Questions : 12]

SEAT No. :

P1093

[Total No. of Pages :3

[4659] - 251

B.E. (Petrochemical Engineering)

C- ELEMENTS OF FLUIDIZATION ENGINEERING

(2008 Course) (Semester - I) (Elective - I) (412404)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) With help of neat sketches explain various regimes of fluidized bed. Explain their applications as well. [10]
- b) Define Fluidization Quality and elaborate all the factors affecting it. [6]

OR

- Q2)** a) Compare the relative advantages and disadvantages of fluidized bed and fixed bed systems. [8]
- b) Obtain the force balance equation for a fluidized bed to calculate minimum fluidization velocity. [8]

- Q3)** A 6 m diameter fluidized bed with $L/D = 4$ is operated for industrial operation. Superficial velocity of gas entering the bed is at 2m/s with a density = 0.8 kg/m³. Overall density of the bed can be considered to be 520 kg/m³. Design a flat plate distributor for the fluidized bed in operation. [16]

Data : C_d can be assumed to be 0.8 for the fluidized bed.

The distributor is made of SS 316L having a thickness of 0.03m.

Wall thickness of the fluidized bed is 5 cm.

OR

P.T.O.

- Q4)** a) With help of neat diagram explain any three types of distributor used in fluidized bed-Highlight their advantages and disadvantages also. [10]
- b) Write a short note on Geldart's classification of particles and their important characteristics. Provides suitable examples. [6]

- Q5)** a) Discuss the pressure drop as a function of gas velocity diagram in details. In this context explain the minimum fluidization velocity and its significance.[9]
- b) What are the difficulties in measurement of multiphase flow. In this context highlight the ideal characteristics of multiphase flow meter. [9]

OR

- Q6)** a) Discuss the effect of pressure on fluidized bed with help of representative examples. [6]
- b) With help of neat sketch explain how the hydrodynamic behaviour of fluidized bed can be mapped using radioactive tracing techniques. [8]
- c) What is agglomeration? How does it affect fluidization performance?[4]

SECTION - II

- Q7)** a) Fluidized bed provides enhanced heat transfer within the bed - Explain with help of mathematical expression. Draw neat sketches to explain the root cause. [8]
- b) Explain the similarities between fluidized bed and a bubble column. [8]

OR

- Q8)** a) Explain the means by which difficult to fluidize particles can be fluidized in better manner. [8]
- b) How can fluidized bed heat transfer be used commercially - Explain with help of suitable examples. [8]

Q9) a) Discuss qualitatively various types of 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 and bubble movement.[6]

Q11)a) With help of neat diagram explain acrylonitrile manufacturing process utilizing a fluidized bed system. Highlight key issues related with the process. [9]

b) Explain the operation of Fluidized bed Polyethylenes Manufacturing unit with help of schematic diagram - discuss its advantages over the earlier process. [9]

OR

Q12) Write short note on (any three): [18]

a) Scale up issues of Fluidized Bed Systems.

b) Modern FCC Reactors.

c) Chemical Looping Combustion.

d) Freeboard Region and its Utility.



Total No. of Questions : 8]

SEAT No. :

P1770

[4659] - 252

[Total No. of Pages : 2

**B.E. (Petrochemical Engineering)
d - GREEN CHEMISTRY
(2008 Course) (Elective - I) (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.*

SECTION - I

Q1) a) Discuss application of super critical carbon dioxide in process of extraction.

b) Write a note on environmental management systems and ecolevels.

[16]

Q2) a) Explain how biomass can be converted in to useful chemical products.

b) Write a note on photocatalysis.

[16]

Q3) a) State the twelve principles of green chemistry.

[12]

b) Mention green advantages in employing phase transfer catalysis.

[4]

Q4) a) Discuss in brief the concept of atom economy.

b) Mention challenges in photochemical synthesis as a green process.

c) Write a note on ionic liquids and their applications.

[18]

P.T.O.

SECTION - II

- Q5)** a) Discuss the process for preparation of adipic acid by green approach.
b) Write a note on organic synthesis by electrochemical method.
- [16]**

- Q6)** a) Describe the conventional process and green process for manufacturing lactic acid.
b) Write a note on process intensification with respect to a green approach.
- [16]**

- Q7)** a) Discuss utilization of green chemistry approach for prevention of pollution.
b) Discuss conventional and green methods for preparation of an aromatic amines.
- [16]**

- Q8)** Write notes. **[18]**
- a) Solar heating and photovoltaics.
 - b) Biocatalysis.
 - c) Causes of global warming.
 - d) Conversion of biological and agricultural feedstock to petrochemicals.



Total No. of Questions : 12]

SEAT No. :

P1094

[Total No. of Pages : 2

[4659] - 253

B.E. (Petrochemical Engineering)

**a: OPTIMIZATION TECHNIQUES FOR PROCESS INDUSTRIES
(2008 Pattern) (Elective - II) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) What is the key characteristic of optimization problems? Explain model based optimization. **[16]**

OR

Q2) Note the various options for solving model based optimization. Explain them in brief. **[16]**

Q3) In a refinery, a crude distillation unit is to be optimized. Explain the optimization strategy for optimizing economics using plant design and plant operations. **[18]**

OR

Q4) Explain the Newton's method of Unidimensional Search for single variable optimization. **[18]**

Q5) Minimize $f(x) = 2x_1^2 + x_2^2 - 3$ starting at $(x^0)^T = [1 \ 1]$ with the initial direction being $S^0 = [-4 \ -2]^T$. Find a conjugate direction to the initial direction S^0 . **[16]**

OR

Q6) Explain with graphical representation the steepest descent method of optimization. **[16]**

P.T.O.

SECTION - II

Q7) Transform the following linear program into standard form:

Minimize : $f = x_1 + x_2$

Subject to : $2x_1 + 3x_2 \leq 6$

$$x_1 + 7x_2 \geq 4$$

$$x_1 + x_2 = 3$$

$$x_1 \geq 0, x_2 \text{ unconstrained in sign.} \quad [16]$$

OR

Q8) Describe the optimization solution methodology for network flow problems. [16]

Q9) Using Lagrange multipliers, solve:

Minimize : $f(x) = 4x_1^2 + 5x_2^2$

Subject to : $h(x) = 0 = 2x_1 + 3x_2 - 6.$ [18]

OR

Q10) Explain methodology of optimization using penalty functions. [18]

Q11) Enlist opportunities and process of optimizing waste heat recovery for power generation using light hydrocarbons in a refinery. [16]

OR

Q12) With neat sketch and enlisting known and unknown parameters, explain optimization in a multiple effect evaporator. [16]



Total No. of Questions : 12]

SEAT No. :

P1199

[Total No. of Pages :4

[4659] - 255

B.E. (Petrochemical Engineering)

c : NATURAL GAS TECHNOLOGY

(2008 Course) (Elective - II) (Semester - I) (Regular) (412405)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q.No. 1 or 2, 3 or 4,5 or 6, 7 or 8, 9 or 10, 11 or 12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) a) Elaborate on different types of natural gas composition and regional disparities. **[8]**

b) Describe origin of natural gas. **[8]**

OR

Q2) a) Discuss unconventional reservoirs. **[8]**

b) Discuss the outlook for world gas production. **[8]**

Q3) a) Explain in detail sampling methods of natural gas. **[8]**

b) Discuss sour gas and sweet gas. **[6]**

c) Discuss measurements taken during sampling. **[4]**

OR

Q4) a) Explain in detail method for measuring interfacial tension. **[8]**

P.T.O.

- 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:

| Component | Mi | Pci | Tci | μ_i gi |
|-----------|--------|-------|-------|------------|
| C_1 | 16.043 | 667.8 | 343.1 | 0.0110 |
| C_2 | 30.070 | 707.8 | 549.8 | 0.0092 |
| C_3 | 44.097 | 616.3 | 665.7 | 0.0082 |

- c) Draw phase diagrams of a dry gas and a wet gas showing conditions in the reservoir as well as at the surface and describe the same in brief. [4]

Q5) a) Elaborate on hydrate structures. [6]

- b) Explain in detail predicting hydrate formation by equilibria chart method. [6]

- c) Write a short note on water content of natural gas. [4]

OR

Q6) a) Describe in detail nucleation step in hydrate formation. [6]

- b) Explain in detail equilibrium cell for determining hydrate formation point. [6]

- c) Write a short on hydrate inhibitors. [4]

SECTION - II

Q7) a) Explain in detail dehydration of natural gas by absorption. [8]

- b) Describe with flow sheet compression refrigeration cycle for natural gas. [8]

OR

Q8) a) A separator to be operated at 1000 psia, is required to handle a well stream with gas flow rate 7 mmscfd at GLR 40 bbl/mmscf. Determine the separator size required for [8]

- i) vertical separator
- ii) horizontal single-tube separator
- iii) spherical separator

Assume a liquid (oil+water) density of 52 lbm/ft³, ideal gas with gravity 0.8, operating temperature equal to 110 °F, a retention time 3 min and ½ full of liquid conditions.

- b) Write a short note on removal of nitrogen, helium, mercury from natural gas. [8]

- Q9)** a) Explain with flow sheet natural gas liquefaction using conventional cascade cycle. [6]
b) Explain in detail construction and working of reciprocating compressor. [6]
c) Elaborate on existing LNG terminal in India. [6]

OR

- Q10)** a) Describe in detail steady state flow in pipeline. [6]
b) Explain with flow sheet natural gas liquefaction using TEALARC process with one pressure level. [6]
c) Write a short note on design of pipeline transport installations. [6]

- Q11)** a) Describe in detail production of higher alcohols and ethers from methane. [8]
b) Write a short note on:
i) Production of synthesis gas by indirect conversion process
ii) Thermal coupling process. [8]

OR

- Q12)** a) Describe with flow sheet routes for the chemical conversion of methane. [8]
b) Describe with flow sheet Fisher - Tropsh synthesis process in fixed-bed reactors. [8]

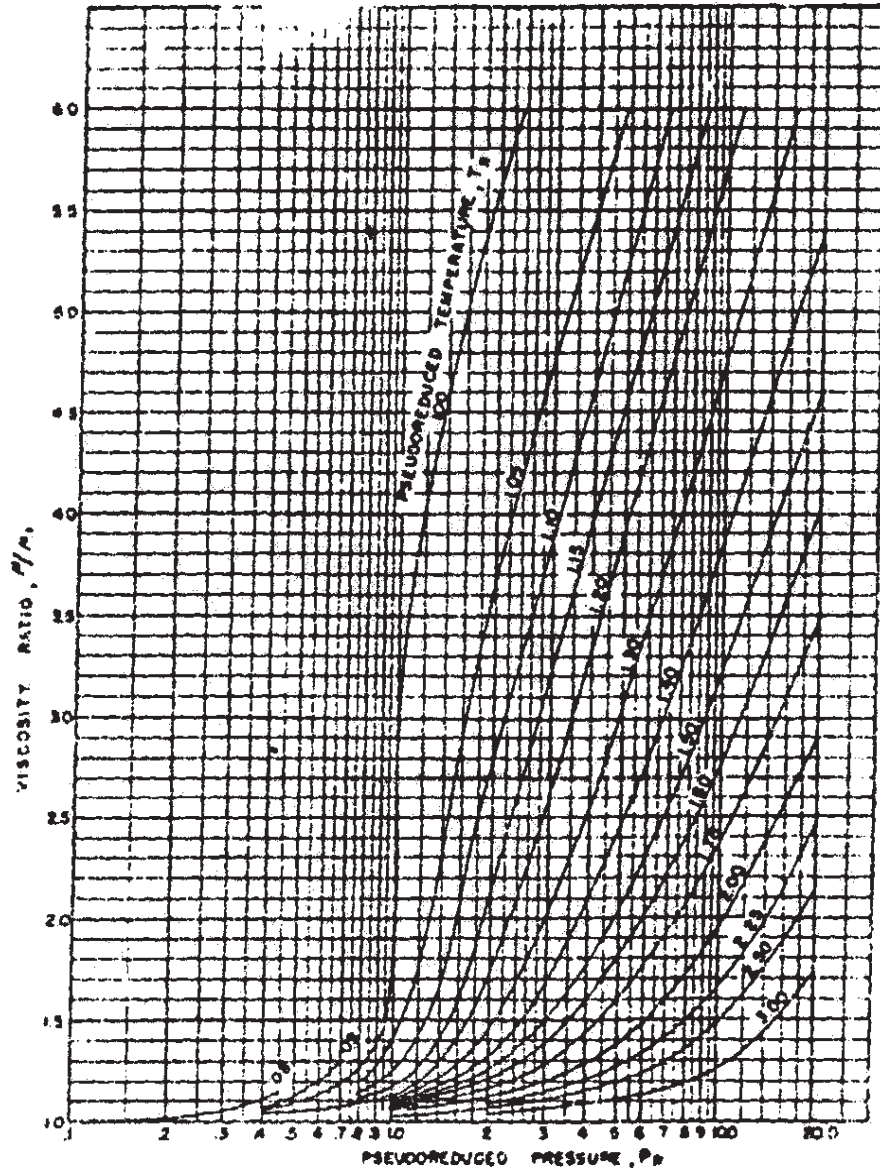


Figure 4. b Viscosity ratio versus pseudoreduced pressure



Total No. of Questions : 12]

SEAT No. :

P1154

[Total No. of Pages : 3

[4659] - 26

B.E. (Civil) (Semester - II)
HYDROPOWER ENGINEERING
(2008 Pattern) (Open Elective - (c))

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) Explain process of Nuclear power generation. Why Nuclear power is considered as positive power source of future? [8]
- b) Which are six major Hydropower potential river systems exists in India? State the example of significant Hydropower stations established these systems. Also explain the historical development of Hydropower in India. [8]

OR

- Q2)** a) Differentiate between Thermal power & Hydropower with respect to any eight points. [8]
- b) State any eight constraints on Hydropower generation. [8]
- Q3)** a) With neat sketch explain four types of Run of river plants. Also, state their components & functions briefly. [8]
- b) State classification of small & micro Hydropower developed based on (i) unit rating (ii) head. [8]

OR

P.T.O.

- Q4)** a) Based on equipment parameters, classify three types of pumped storage power plants. [8]
- b) With neat sketch explain, components, their function & working of valley power plant. [8]
- Q5)** a) A run of river plant operates as a peak load station. Its weekly load factor is 30% & its entire capacity is firm capacity for a stream flow of 25 cumecs with operating head of 15m. The rated installed capacity of peak load station is 20000kw. Determine
- i) Minimum flow in river so that the peak load station may serve as base load station.
- ii) Daily load factor. Consider efficiency= 80%. [10]
- b) What is load predicted & its significance? What are different methods of load prediction? State any two mathematical equations for load prediction. [8]

OR

- Q6)** a) A river has a constant flow of 40 cumecs with the head of 10m 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.
- b) Differentiate between Base load plant & Peak load plant. [8]

SECTION - II

- Q7)** a) Compare merits & demerits of surface power house & Underground power house. [8]
- b) With a neat layout, explain components, their functions & working of dam toe power house. Which type of turbine is preferred in dam toe power house & why? [10]

OR

- Q8)** a) Differentiate with the help of sketch the working of intermediate development underground power house & tail development underground power house. [10]
- b) State names & functions of three bays of superstructure of power house along with sketch. [8]
- Q9)** a) Derive the equation for height of draft tube so as to install reaction turbine at appropriate working of pressure. [8]
- b) With the help of sketch, explain governing of Impulse turbine. [8]

OR

- Q10)** a) State any eight formulae to design the different parameters of Impulse turbine. [8]
- b) State the classification of turbines on the basis of direction of flow, head, specific speed & hydraulic action. [8]
- Q11)** a) What are functions of state load dispatch centers as per Electricity act 2003? [8]
- b) Explain concept of carbon credits. Justify hydropower as green power. [8]

OR

- Q12)** a) As per electricity act 2003, what are the duties of transmission licensees. [8]
- b) State any four factors governing the pricing of electricity. [8]



Total No. of Questions : 10]

SEAT No. :

P1096

[Total No. of Pages : 2

[4659] - 263

B.E. (Petrochemical Engineering)

**a - PETROLEUM EXPLORATION AND PRODUCTION OPERATIONS
(2008 Course) (Semester - II) (412411) (Elective - IV)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers of each section 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) Describe different parameters of a petroleum system with the help of a cross sectional view of a sedimentary basin. **[10]**

b) How is pattern recognition helpful in seismic interpretation. **[5]**

OR

Q2) a) Explain stratigraphic traps with the help of neat sketches. **[10]**

b) What are different methods of calculation of reserves? **[5]**

Q3) How porosity is estimated using different logs? **[15]**

OR

Q4) Write in brief on reservoir drive mechanism. **[15]**

Q5) Write notes on any four of the following: **[20]**

- a) Types of subsurface water
- b) Different sources of subsurface data
- c) Oil differential
- d) Abnormal pressure
- e) Subsurface maps.
- f) Relative permeability

P.T.O.

SECTION - II

- Q6)** a) Different basic components of a rotary rig with the help of a neat diagram. [10]
b) Explain the relationship between mud weight and borehole stability. [5]

OR

- Q7)** a) Describe the following situations, [9]
Stuck pipe, fishing, and loss circulation
b) Draw and explain openhole completion with zonal isolation. [6]

- Q8)** a) What are major workover problems? [5]
b) Draw and describe typical configuration of a gas lifted well. [10]

OR

- Q9)** a) Tabulate different types of artificial lift methods. [5]
b) Explain with the help of a neat sketch Steam Assisted Gravity Drainage (SAGD) [10]

Q10) Answer in brief Any Five of the following: [20]

- a) Nodal Analysis
- b) Well Intervention
- c) Reservoir efficiency
- d) Inflow Performance Relationship, IPR
- e) Improved oil recovery
- f) In Situ Combustion
- g) Hydraulic Fracturing
- h) Simple Gathering Station
- i) CBM



Total No. of Questions : 12]

SEAT No. :

P1097

[Total No. of Pages :3

[4659] - 264

B.E. (Petrochemical Engineering)

b - 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 importance of Activity, Selectivity and Turnover Frequency for any commercial catalyst. [8]
- b) Name four important Catalyst used in Petrochemicals and Refinery Industries and mention the overall benefits attained due to their usage.[8]

OR

- Q2)** a) With help of suitable example explain the operation of Homogeneous Catalysts. Also indicate their benefits and disadvantages. [8]
- b) Discuss the important characteristics needed for a promising catalyst to be considered for actual industrial operation. [8]

- Q3)** a) Derive BET Equation for adsorption. Highlight importance of all the terms. [10]
- b) Differentiate between chemisorptions and physical adsorption. [6]

OR

- Q4)** a) With help of neat diagram explain coke deposition in the pores of catalyst. How can it be removed? In this context clearly discuss how catalyst deactivation differs from the above mentioned phenomena. [8]

P.T.O.

- b) Explain the L-H model of Catalytic Reaction. How does it differ from Riedel model-Explain with help of real life examples. [8]

- Q5)** a) Two samples of silica-alumina cracking catalysts have particle densities of 1.126 and 0.962 g/cm³ respectively as determined by mercury displacement technique. The true density of solid material in each case is 2.37 g/cm³. The surface area of first catalyst is 467 m²/g and that of the other is 372 m²/g. Which catalyst has larger pore radius? [6]
- b) Differentiate between Textural and Structural Promoters - give examples. [6]
- c) Discuss the principle of XRD. Explain its importance in Catalyst characterization. [6]

OR

- Q6)** a) With help of suitable example explain impregnation method of catalyst manufacture. [6]
- b) What are the key characteristics of Supports? Name three important supports. [6]
- c) With help of neat diagram explain the methodologies followed to obtain pore size and pore size distribution of commercial catalysts. [6]

SECTION - II

- Q7)** a) What are supported metal catalysts? Discuss the structure of these catalysts. Also indicate their synthesis and characterization issues. [10]
- b) What is shape selectivity in Zeolites? With help of neat diagram and suitable examples - discuss the importance of shape selective zeolites in petrochemical industry. [8]

OR

- Q8)** a) Define molecular sieves. With help of neat diagram discuss the special structure possessed by molecular sieves. Indicate their field applications. [9]
- b) With help of suitable diagram explain the sintering phenomena on supported metal catalyst. Discuss the methodology to be adapted to reduce sintering in case of commercial catalyst. [9]

- Q9) a)** Draw a neat diagram of trickle bed reactor. Write down important reactions occurring. Indicate process condition. Comment on the catalyst employed for the process and its regenerability issues. [8]
- b) What is reformer catalyst? Indicate its key characteristics. With help of neat diagram explain the process followed in a conventional reformer indicating the reactions occurring inside. [8]

OR

- Q10)a)** With help of suitable examples explain the importance of Zeolites in Refinery Complexes. [8]
- b) Name the catalysts used for isomerization process. Indicate the chemistry. Discuss the industrial operation with a special mention on operating conditions. [8]

- Q11)a)** Discuss ammonia manufacture with special emphasis on Catalyst and its deactivation issues. Draw neat diagram of reactor and indicate the process in brief. [8]
- b) What is Fischer Tropsch Synthesis? Write down representative reactions and the highlight importance of the process. Give a detailed analysis of the catalysts suitable for the process. [8]

OR

- Q12)a)** With help of neat diagram explain ethylene oxide manufacture from ethane. Indicate the safety issues, type of reactor to be used and catalyst employed. [8]
- b) Compare packed bed, fluidized bed and slurry bed reactors for industrial operations. [8]



Total No. of Questions : 8]

SEAT No. :

P1098

[Total No. of Pages : 4

[4659] - 267

**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) *Question 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) Explain what is meant by the diffusivity equation. What is it used for, and what are the various solutions of the diffusivity equation? Explain in detail. [6]
- b) Derive the diffusivity equation in Cartesian coordinates. How many conditions are required to solve the diffusivity equation? Explain in detail. [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) What do you mean by ETR, MTR and LTR? Explain with figures. [4]
- b) Describe the various flow regimes from a pressure standpoint. Also, write the equations for the different flow regimes. [4]
- c) Derive the continuity equation for a single phase fluid flowing through a one dimensional porous media, in Cartesian coordinates. [8]
- Q4)** a) Explain the principle of superposition in time and space, with appropriate diagrams representing flow-rates and pressures. [6]
- b) What are the objectives of a gas well test? How is a gas well test different from an oil well test? Explain in detail, the difference between an isochronal test and a modified isochronal test. [10]

SECTION - II

- Q5)** What are the various geometrics that can be encountered while testing a horizontal well? Explain in detail. Also, describe the various flow regimes that are encountered in fluid flow in a horizontal well, with appropriate figures. [16]
- Q6)** Explain the various flow regimes in a DST, with appropriate figures. How is a typical analysis done, for procured DST data, and what all are the methods for analyzing DST data? [16]
- Q7)** Write a detailed note on Horner's approximation, its significance, and why is it used. [16]
- Q8)** Explain in detail:
- a) Write down Arp's equation, and show how the empirical decline curves are derived from the equation.
- b) What are the assumptions used for Arp's equation?
- c) Show graphs which are used for estimating decline parameters for all three types of decline curves - q vs. t , N_p vs. t , q vs. N_p , all on Cartesian, semi-log and log-log plots. [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 | 3.028 | 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 | 0.688 | 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 | 0.0883 | 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 : 12]

SEAT No. :

P1099

[4659]-269

[Total No. of Pages : 7

B.E. (Petroleum)

WELL ENGINEERING AND DESIGN

(2008 Course) (412383) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Assume suitable data if necessary.*
- 4) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) Data given:

[18]

17-1/2" hole and 13-3/8" csg surface casing

| | | |
|--|------|------------|
| a) This Section Depth | 1150 | M |
| b) RT to GL Level | 10 | M |
| c) Maximum mud weight to drill this hole section | 9.8 | Ppg |
| d) Mud Weight to drill next hole Section | 11 | Ppg |
| e) Expected Pore pressure gradient in next section | 10.1 | Ppg |
| f) Influx Gradient | 0.1 | psi/ft |
| g) Fracture Gradient at Shoe - Expected | 18 | Ppg |
| h) Cement Slurry Weight (Lead) | 12.8 | Ppg |
| i) Cement Slurry Height (Lead) | 700 | M |
| j) Cement Slurry Weight (Tail) | 15.8 | Ppg |
| k) Cement Slurry Height (Tail) | 150 | M |
| l) Next Section Depth | 2630 | m (TVD) |

P.T.O.

Using graphical method find out 13-3/8" intermediate casing grade from the following:

| | | |
|----------------------------------|----------|----------|
| Nominal Size OD Inch | 13.375 | 13.375 |
| Nominal weight ppf | 54.5 | 68 |
| Grade | K55 | K55 |
| Collapse resistance (Mpa) | 7.8 | 13.4 |
| Internal yield pressure (Mpa) | 18.9 | 23.8 |
| Pipe body yield strength (daN) | 3,80,000 | 4,76,000 |
| Mpa × 145 = Psi, daN × 2.25 = lb | | |

OR

Q2) a) Data given: [6]

13-3/8" shoe = 10008 ft RKB, Next TD (12-1/4") = 14190 ft RKB

Fracture gradient at 13-3/8" shoe = 16ppg, Planned mud weight at TD of next hole 15.5 ppg, Maximum formation pressure at TD 14 ppg, gas gradient 0.15 psi/ft RKB to MSL = 85 ft.

Calculat : Maximum kick volume.

b) Discuss different casing design load cases in detail. [6]

c) Discuss pore pressure prediction by D exponent. [6]

Q3) a) Existing inclination I_1 and Required inclination $I_2 = 8$ deg., Existing Azimuth = 117 deg. [8]

Dogleg = 3.5 deg/ 100ft.

Assuming that left hand change in azimuth is required over a 100ft interval, what will be the new azimuth of the bore hole?

b) Discuss Minimum curvature method and find out ΔV , ΔN , ΔE for below survey data [8]

| Measured depth ft | Inclination deg | Azimuth deg |
|-------------------|-----------------|-------------|
| 2000 | 2.0 | 45 |
| 2090 | 4.5 | 50 |

OR

- Q4)** a) Discuss geometry of the “S” type well trajectory in detail. [8]
- b) Discuss Reactive torque in brief. [3]
- c) A directional well is to be drilled from an offshore platform to intersect a target whose horizontal displacement is 3500ft at a depth of 10,500ft. A L type profile is used with KOP = 1600ft and BUR of 1.5 deg per 100ft. Calculate: [5]
- i) Inclination at the end of the build up section.
 - ii) Horizontal displacement and TVD at the end of build up section.
 - iii) The total MD to the target.

Q5) Well data: [16]

Hole size : 12.25”, Hole depth 12,800 ft MD, 11660 ft TVD

Casing 13-3/8” set at 9000ft TVD

Drill pipe 5”, capacity 0.0176” bbl/ft

HWDP 5”, 310 ft long, capacity 0.0088 bbl/ft

Drill collars 8”, 630 feet long, capacity 0.007 bbl/ft

Mud density : 12 ppg

Capacities:

Drill collars in open hole 0.0836 bbl/ft

Drill pipe/HWDP in open hole 0.1203 bbl/ft

Drill pipe / HWDP in casing 0.1269 bbl/ft

Mud pumps : 0.103 bbl/stroke

SCR : 650 psi at 30 SPM

A leak off test was carried out at 13-3/8” casing shoe and fracture gradient recorded at the shoe was 0.87 psi/ft

The well has been shut after a kick

SIDPP 595 psi, SICP 643 psi.

Calculate:

- a) How many strokes are required to pump kill mud from surface to bit?
- b) How many strokes are required to pump kill mud from bit to surface?
- c) What is the pressure safety Margin at casing shoe with the well shut in?
- d) What is the kill mud density?
- e) ICP.
- f) FCP.
- g) What is the MAASP at the time of well shut in?
- h) What is the MAASP after circulation of kill mud?

OR

- Q6)** a) What will be the reduction in bottom hole pressure if 6 stands of drill pipes are pulled out wet without filling the hole?

One stand length 92 ft, casing capacity 0.0745 bbls/ft, drill pipe capacity 0.0176 bbls/ft,

Drill pipe steel displacement 0.0080 bbls/ft.

Mud weight 14.5 ppg. [4]

- b) Use following information [4]

Accumulator bottle capacity = 10 gal

Number of bottles 20

During a BOP function the pressure on accumulator bottle bank drops from 3000psi to 1900psi. How many gallons of fluid did that function use?

Max. operating pressure 3000 psi, minimum operating pressure 1200 psi, precharge pressure 1000psi.

- c) Discuss Driller's method of well control in detail. [8]

SECTION - II

Q7) Calculate: **[16]**

- a) Quantity of cement required in sacks and the amount of mix water required. Use 20% excess cement on liner/ open hole annulus volume.
- b) Total hook load immediately prior to setting the linear hanger (weight of block etc. 103 KN/22,000lbs).
- c) Hook load after having hung the liner and before cementing.
- d) Chase volume to displace the drill pipe wiper plug to land in liner wiper plug.
- e) Chase volume to displace the combined wiper plugs to the float collar. Top of open hole section 11,980ft.

TD 13,960 ft, Drilling fluid density 0.728 psi/ft, BF 0.787

Drill pipe 5" - 19.5ppf, casing 9-5/8" - 47 ppf - ID 8.681"

Liner 7" - 32 ppf - ID 6.094"

Liner shoe track 80 ft, Liner wiper plug 40ft below top of liner i.e. 11,690 ft.

Capacities:

Drill pipe: 0.0178 bbls/ft, liner 0.0361 bbls/ft

Annulus liner / open hole 0.0226 bbls /ft

Annulus liner / casing 0.0256 bbls/ft

Water spacer of 0.5m³ are used ahead of and behind the cement.

Slurry density 16.4 ppg (123 pcf)

Slurry yield 1.06 ft³/sack, water mix - 4.30 gals / sack

OR

- Q8) a) Discuss squeeze cementation in detail. [6]**
- b) Discuss liner setting and cementation process with suitable sketch. [10]

- Q9) a) Calculate tensile load act on top joint of drill pipe. [8]**
- Well depth 13,500 ft, Mud weight 14.3 ppg, Drill collar 8" OD, 3" ID, 540ft, 147 ppf Drill pipe 5" OD 4.276"ID, 19.5 ppf

- b) Discuss drill string design based on Tension, collapse, bending and torque. [8]

OR

- Q10)a)** Find E grade and G drill pipe length for 12.25” hole **[8]**
 Weight of 8” drill collar 150 ppf, length 9.40m
 Weight of 6.5” drill collar 83 ppf, length 9.40m
 5” E grade Drill pipe 19.5 ppf, Tensile strength 141.8T, length 9.27m
 5” G grade drill pipe 19.5 ppf, Tensile strength 197.6T, length 9.27 m
 5” HWDP 50 ppf, length 9.27m
 Bit diameter 12.25”, Hole depth 2960m, BHA length 253m, Mud weight 1.69 gm/cc, safety factor in tension 1.8, safety factor in collapse 1.125.
- b) Calculate BSR of 9-1/2” × 3” drill collar and 8-1/2” × 3’ drill collar combination. **[3]**
- c) Discuss hydrogen embrittlement phenomenon and material used in H2S environment. **[5]**

- Q11)a)** Discuss field method of optimizing bit hydraulics with flow behaviour parameters hedstrom number and Renold number. Discuss different pressure losses in the system. **[9]**
- b) Determine Pressure loss at bit and parasitic pressure loss. **[9]**
 Mud weight 9.6 ppg, Flow rate 485 gpm, Pump pressure 2800 psi, nozzle size 3 × 12/32”.

OR

Q12) Find nozzle sizes for Max. BHHP **[18]**

Pump –3423 psi max surface pressure., 1600 hp max input

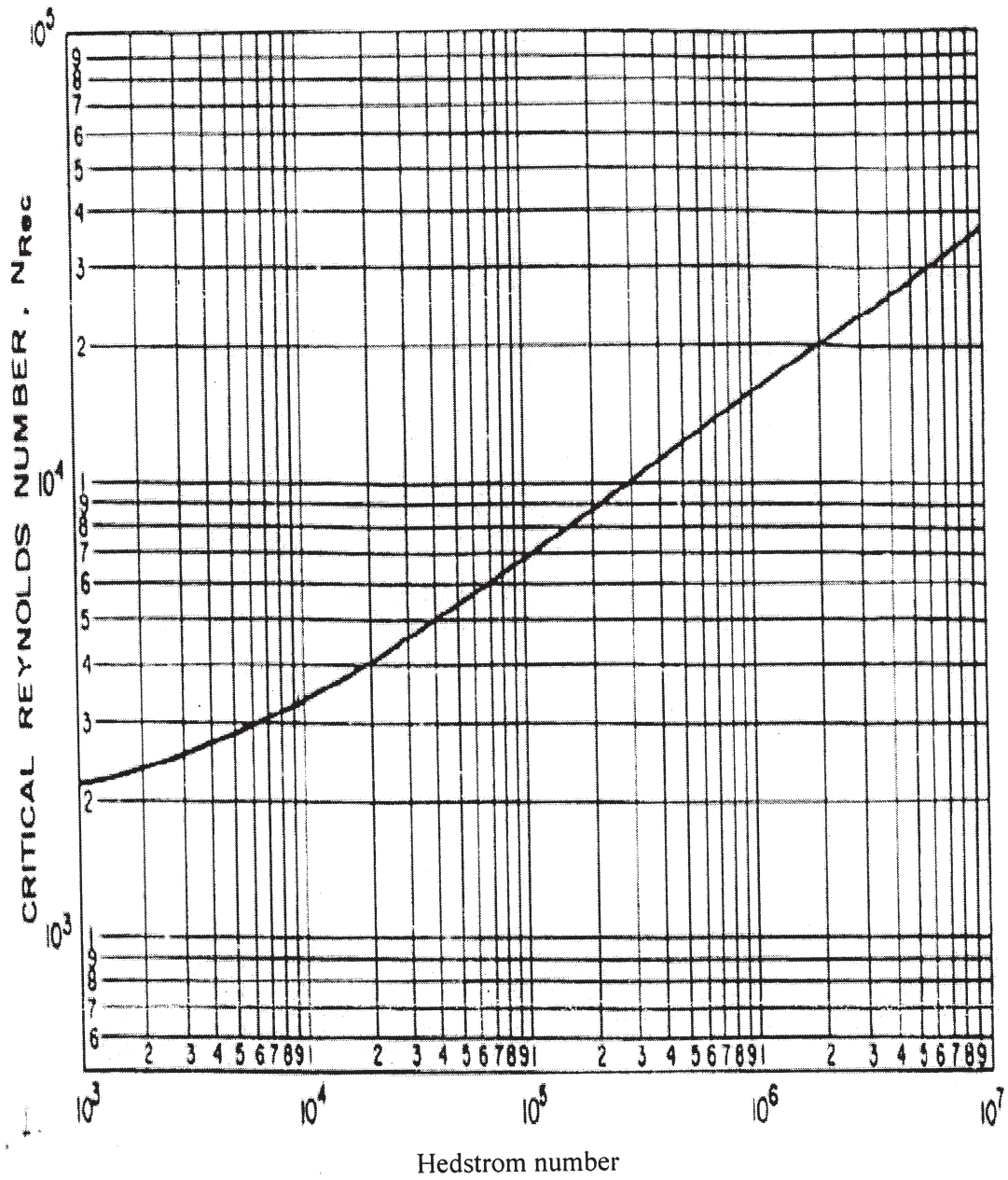
Drill pipe 4.5”, 16.6 ppf, 3.826” ID

600 ft of 7.5” OD, 2.75” ID

Surface equipment

Pressure loss 340ft of drill pipe, Hole size 10.05”, Min annular velocity 120ft/min, assume flow rate 500gpm

| Depth ft | Mud density ppg | Plastic viscosity Cp | Yield point lbs/100sq.ft |
|----------|-----------------|----------------------|-----------------------------|
| 5000 | 9.5 | 15 | 5 |



Hedstrom number Vs Renold Number



Total No. of Questions : 12]

SEAT No. :

P1056

[Total No. of Pages : 2

[4659]-27

B.E. (Civil Engineering)

d-INDUSTRIAL WASTE WATER MANAGEMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer-books.*
- 2) *Your answer will be valued as a whole.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Answer any three questions from Section-I and any three questions from Section-II.*

SECTION-I

Q1) a) Differentiate between unit operations and unit processes. [9]

b) Discuss in detail about the activated carbon filtration. [8]

OR

Q2) a) What are the different methods that are adopted in wastewater treatment? Discuss any one in detail. [8]

b) Discuss about colloidal and dissolved solids and their removal methods. [9]

Q3) a) Explain chemical unit process. What is the role of Alum in precipitation? [8]

b) Discuss in details about Biological process. [8]

OR

Q4) Explain the following:

a) Moving Bed Bio-reactor. [6]

b) De-nitrification. [4]

c) Cyclic Reactor. [6]

P.T.O.

Q5) Discuss the following:

- a) Assimilative and supportive capacity of nature. [6]
- b) Cyanides removal from wastewater. [6]
- c) Recycling of treated sewage. [5]

OR

Q6) Give note on following:

- a) Activated Sludge Process. [9]
- b) Reactor with submerged membrane. [8]

SECTION-II

- Q7)** a) What is cost benefit analysis? Discuss. [9]
b) How the waste water useful for irrigation purpose? Explain in detail. [8]

OR

- Q8)** a) Explain in details about recycling, reuse and recovery. [8]
b) What is 3R principle? How it will useful? Explain with suitable example. [9]

- Q9)** a) Discuss in brief about zero discharge. [8]
b) How zero discharge technology is useful in pulp and paper industry? Explain. [8]

OR

- Q10)** a) How the solid waste in residential complex reduces to zero? Discuss. [8]
b) Explain in details about recovery of plastic from the industries. [8]

- Q11)** a) Explain the theory of adsorption. [9]
b) Give the water requirement for following industries. [8]
i) Textile.
ii) Automobile.
iii) Food.

OR

- Q12)** a) What is reactive material? Discuss its effects. [9]
b) What is Green process? How these can be useful to the industries? [8]



Total No. of Questions : 10]

SEAT No. :

P1164

[4659] - 270

[Total No. of Pages : 5

B.E.(Petroleum Engineering)

A : Petroleum Exploration (Elective - I)

(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) *Neat diagram must be drawn wherever necessary.*
- 3) *Attempt any three questions from Section - I and Section - II.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

Q1) Answer **any three** questions of the following:

[15]

- a) Draw basic magnetic anomaly patterns and describe them in brief.
- b) Latitude and elevation corrections in gravity observations.
- c) Draw Bouger anomaly profile across a basement granite and a sedimentary basin.
- d) Vertical electrical sounding interpretation.
- e) Differentiate between Wenner and Schlumberger electron configuration, Draw neat sketches.
- f) Radioactivity in rocks and detection in field.

Q2) a) Write in brief with the help of a neat diagram important wave parameters that are applicable in seismic exploration. **[5]**

b) Define and explain different seismic data acquisition parameters. **[10]**

P.T.O.

OR

Q3) Write short answers for the following questions. **Solve any five** [15]

- a) Difference between 2D and 3D seismic mapping?
- b) Types of noise in seismic record.
- c) What is Acoustic Impedance?
- d) Deconvolution process and types.
- e) Static correction applied in seismic data acquisition.
- f) Normal Move out correction.
- g) Migration Velocity.
- h) Amplitude Versus Offset Analysis.

Q4) a) Write a note on Direct Hydrocarbon Indicators. [5]

b) How to generate a time seismic map? [5]

c) What is synthetic seismogram? [5]

d) List down the factors that affect velocity estimation in seismic. [5]

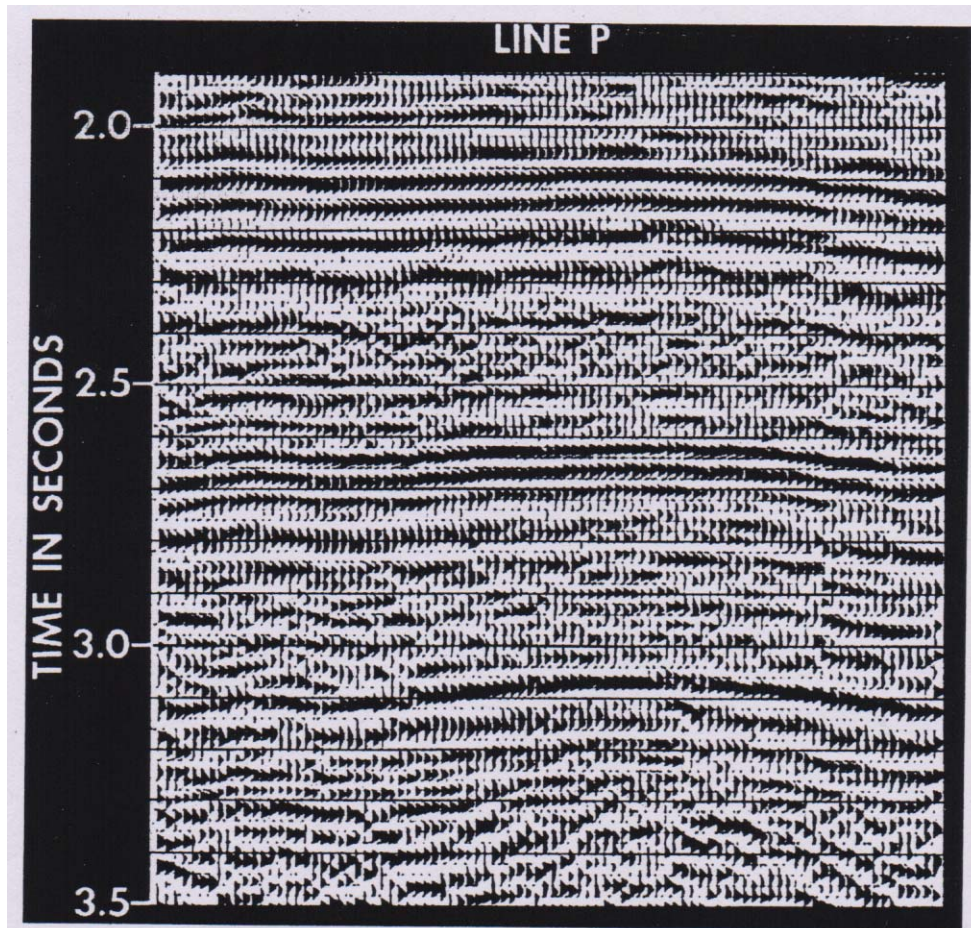
OR

Q5) a) You are given a vertical section of line P. Answer following questions using this diagram. [10]

i) What approach you will follow to read the line?

ii) What procedure is to be adopted to tie the well on this seismic section?

- iii) What may be the location for taking a well and why?
- iv) What is the resolution of the section?
- v) Write possible interpretation.



- b) What are “Seismic facies”? How are they recognized and mapped?[10]

SECTION - II

- Q6)** a) Explain different modes of transport of micro seepages of petroleum from reservoir to surface? [10]
- b) What are the different geochemical correlation methods? [5]

OR

- Q7) a)** What is biodegradation of oil? [5]
- b) Write a note on Source rock - Oil correlation. [5]
- c) What are biomarkers? [5]

Q8) Write the basic volumetric equation for the calculation of Original Oil In Place (OOIP). How to estimate different parameters quoted in the equation and what are the uncertainties associated with each parameter? [15]

OR

Q9) a) Following are the details of different parameters required in the volumetric estimation of reserves. [10]

| Parameter | Range of value |
|--------------------------|---|
| Area | 10 to 30 Km ² |
| Formation thickness | 11 to 19 m |
| Porosity | 9 to 19% |
| Water Saturation | 15 to 45% |
| Formation Volume Factor, | 1.14 to 1.26 m ³ / sm ³ |
| Recovery Factor | 20 to 30% |

What is the reason for uncertainty in different parameters? What may be the errors in the calculations? Calculate Minimum and Maximum Recoverable Reserves

- b) What are the important parameters that need to be analyzed in the mapping of petroliferous basins? [5]

Q10) Answer in brief any four of following with neat sketches. [20]

- a) Difference between conventional petroleum system and continuous accumulation system.

- b) Exploration in sand shale sequence.
- c) Elastic properties of rocks.
- d) Mapping in Structural traps.
- e) Frontier and Matured Basins.
- f) Temporal changes associated to producing fields.
- g) 4 D seismic.
- h) Multivariate maps.



Total No. of Questions : 12]

SEAT No. :

P1100

[4659]-271

[Total No. of Pages : 3

B.E. (Petroleum Engineering)

**b - ADVANCED INSTRUMENTATION AND PROCESS CONTROL
IN PETROLEUM INDUSTRY**

(Elective - I) (Semester - I) (412384) (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) *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) Give the classification of electric motors. Explain with neat diagram principle, construction and working of DC motor. [8]
- b) Describe the various types of Logic Gates with its truth table used frequently in Oil and Gas Industries. [8]

OR

- Q2)** a) Give the difference between synchronous AC motor and induction motor. [8]
- b) With help of neat diagram discuss hazardous area classification for the conventional Drilling Rig. [8]

- Q3)** a) What is transducer? Define active and passive transducer and its examples with application in measuring system. [8]
- b) Define torque. Which are the different methods of torque measurement? Explain principle, construction and working of rotating strain gauge with neat diagram. [8]

OR

- Q4)** a) With help of neat diagram explain principle, construction and working of electromagnetic flowmeter. [6]
- b) Explain with neat diagram principle, construction and working of the mud level sensor. [6]
- c) Write a short note on H₂S Sensors. [4]

P.T.O.

- Q5)** a) What is the need of Process Control in Petroleum Industries explain with help of suitable examples. [6]
- b) Discuss the need of Tuning of Controllers and explain any one methodology. [6]
- c) With help of neat diagram explain overshoot, decay ratio, response time, rise time and damping factor. [6]

OR

- Q6)** a) Provide a neat diagram of a rectangular shaped tank getting filled with liquid incoming flow-rate of F_1 m³/hr and there is a hole at bottom of the tank through which liquid is drained constantly. Using series of experiments it was observed that draining rate (in m³/hr) can be predicted by $F_2 = \frac{h}{2.3}$ where h denotes height (in meters) of liquid present in the tank. Obtain the mathematical expression of the process. Write down assumptions clearly. Comment on dynamics of the process and its controllability issues. [10]
- b) Discuss the Proportional, Derivative and Integral mode of controller action with help of diagram. Provide mathematical expression of each. Why PID mode is considered to be the best of the lot - explain. [8]

SECTION - II

- Q7)** a) Compare the DCS, PLC and PC based control systems highlighting relative advantage and disadvantages. [9]
- b) With help of schematic diagram explain Cascade Control. Discuss the master and slave controller and the control mechanism in details. [9]

OR

- Q8)** a) What are the design goals of automatic remotely controlled fracturing processes explain with help of proper sketches. [6]
- b) Discuss the merits and usefulness of Feed-forward and Feed-back Control loops. [6]
- c) Crude and water need to be separated based on their differences in density inside a two-phase separator. Develop a programmable logic control (PLC) algorithm for this important process. Provide suitable diagram. [6]

- Q9)** a) Explain the Control Scheme of a production well along with the suitable sensors and control logic. [8]
- b) Write a detailed note on Crude Custody Transfer, Briefly explain the Geo-political factor and technical factors associated with it. [8]

OR

- Q10)**a) How does SCADA strategy is implemented in the UBD operation - explain with help of suitable example. [8]
- b) Dynamic Positioning of Floating Vessels in deep sea operations is very crucial and challenging. How is it practiced - explain with help of control diagram. [8]
- Q11)**a) Write a detailed note of Multiphase Flow Control in Upstream Industry.[8]
- b) Discuss in details the subsea operations and its dependence on modern day control architecture. [8]

OR

- Q12)**a) What are ROV actuators? Briefly explain their working principle. Also highlight the design aspects of such actuators. [8]
- b) Write short notes on any two: [8]
- i) Emergency Shutdown Systems.
 - ii) Sand Control Mechanisms.
 - iii) Design and control aspects of Subsea X-mas tree Structures.



Total No. of Questions : 12]

SEAT No. :

P1101

[4659]-274

[Total No. of Pages : 3

B.E. (Petroleum Engineering)

a : PETROLEUM REFINING TECHNOLOGY

(Elective - II) (Semester - I) (412385) (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) *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) List the major refineries in India. What was the refining capacity (in MMTPA) of India in the year 2013? **[4]**
- b) Define: Cloud point, Pour point, Smoke point. **[6]**
- c) Draw a neat labelled diagram of overall refinery flow. **[6]**

OR

- Q2)** a) Write a note on the Nelson Complexity Factor. **[8]**
- b) Write a note on the methods of determining the carbon residue in crude oil. **[8]**

- Q3)** a) What is the need for desalting of crude oil? What are the secondary functions of desalting? Draw a neat diagram for single stage desalting of crude. **[8]**
- b) Describe the need for reflux in the distillation column. What are the disadvantages of top tray reflux in distillation? Explain the pump back reflux. **[8]**

OR

P.T.O.

- Q4)** a) Explain the functioning of a vacuum distillation column. [8]
b) Where is the wash water required for desalting obtained in the refinery? What are the operating conditions for desalting of crude oil? [8]

- Q5)** a) Explain with the help of a neat diagram, the role of regenerator in FCC. [6]
b) Explain the process of Flexi coking with the help of a neat labeled diagram. [8]
c) Give the uses of petroleum coke. [4]

OR

- Q6)** a) Enlist the various types of hydroprocessors. Discuss any one in detail. [9]
b) Give the composition of bitumen. Discuss the process of air blowing of bitumen. [9]

SECTION - II

- Q7)** a) Explain the semi regenerative process for catalytic reforming. [9]
b) Discuss the hydrofluoric acid process for alkylation. [9]

OR

- Q8)** a) Give the significance of isomerization process. Describe a typical isomerization process. [9]
b) Discuss the various factors affecting the alkylation process. Give two points of comparison between HF and H₂SO₄ alkylation process. [9]

- Q9)** a) List the various properties to be enhanced to obtain a good quality lubricating oil. Which processes in lube oil treatment accomplish the same? [8]
b) Explain the process of DILCHILL dewaxing of lube oil. [8]

OR

Q10)a) With the help of a neat labeled diagram, explain the process of NMP extraction for lube oil base stock. [8]

b) Explain the need for selective hydrocracking and finishing processes for lubricating oil. Discuss the same. [8]

Q11)a) Discuss the various treatment methods of waste water in a refinery. [8]

b) Discuss the importance of blending of refinery products. Hence explain the line blending process with a neat labeled diagram. [8]

OR

Q12)a) What are the various methods of recovery of hydrogen in a refinery? Discuss any one of them. [8]

b) What is the need of recovery of sulphur in a refinery? Discuss the once through claus process. [8]



Total No. of Questions : 12]

SEAT No. :

P1200

[Total No. of Pages :3

[4659] - 277

B.E. (Petroleum)

CARBON MANAGEMENT IN PETROLEUM INDUSTRY

(2008 Course) (Elective - II) (Semester - I) (412385)

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 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 neat schematic sketch of Carbon cycle in nature and write reasons for change in weather pattern. [6]
- b) Discuss the role of 'United Nations Framework Convention on Climate Change' (UNFCCC) in stabilizing green house gas concentration in the atmosphere? [6]
- c) Discuss Kyoto Protocol in brief? How it is helpful to control global warming and achieve sustainable development? Explain. [6]

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]

P.T.O.

- Q3)** a) Discuss impact of various green house gases on global warming, in brief. [8]
- b) Describe different ways and means by which Industrialized countries with a green house gas reduction commitment can invest in emission reducing projects in developing countries as an alternative to costly emission reductions in their own countries. Also write the advantages of this. [8]

OR

Q4) Give the brief of operations and sources responsible for emission and various ways of carbon management in Industrial sectors Such as power, automobile, petroleum and refining. Elaborate at least for four areas in each of these. [16]

Q5) Describe in detail, design considerations of a project in which, both 'environmental benefits by reducing CO₂ concentration in the atmosphere and economical benefits by maximizing oil recovery is an immediate option to reduce carbon emissions. [16]

OR

- Q6)** a) Discuss in brief scope, challenges, and benefits involved in carbon dioxide flooding in deep geological formations or petroleum reservoir including carbon compression, transportation. [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) Write in brief the working principle of different methods of renewable energy resources. [18]

OR

Q8) 'Industrialization and globalization have changed the context of business, accelerating economic growth and intensifying social and ecological risks and impacts,' Discuss in detail role of 'education for sustainable development' in this background. [18]

Q9) Why biomass energy is considered as a green technology? Write in brief any one method of manufacturing biofuels. State true or false and discuss 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. [16]

Q11) Describe any four of the following methods to reduce CO₂ emission. [16]

- a) Reduce dependence on hydrocarbons.
- b) Carbon sequestration.
- c) Develop new technologies to operate with cleaner and renewable fuels.
- d) Energy saving possibilities in Petroleum Industry.
- e) Minimize energy losses in transportation sector.

OR

Q12) Write short notes on, [16]

- a) One case study/ technology of emission reduction.
- b) Considerations for sustainable development.
- c) Efficiency in energy or power transmission.
- d) Clean Development Mechanism and Projects or Processes.



Total No. of Questions : 12]

SEAT No. :

P1057

[Total No. of Pages : 3

[4659]-28

B.E. (Civil Engineering)

e-MECHANICS OF WAVES

(2008 Course) (Semester-II) (401008) (Open Elective)

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 classification of waves. **[4]**
- b) Define wave number, wave period, zero cross wave period. **[6]**
- c) Write in detail about forecasting of waves in hurricanes. Give all the equations explaining the symbols used. **[8]**

OR

- Q2)** a) Discuss the process of wave generation and wave growth. **[6]**
- b) Distinguish between Sea and Swell. **[6]**
- c) Discuss the corrections to be applied in wind velocity measured 10 m above mean sea level. **[6]**

- Q3)** a) Obtain expression for pressure below sea surface. **[8]**
- b) What are assumptions for linear wave theory? Explain the boundary conditions used while derive equation for potential function. **[8]**

OR

P.T.O.

- Q4)** a) Derive expression for group velocity of waves. [4]
 b) Write short note on Stokes wave theory. [4]
 c) For a wave of 3m height and 10 sec period obtain maximum horizontal and vertical displacement of water particle with mean position at i) Still water level ii) Sea bed. Depth of sea bed, $d = 12\text{m}$. [8]

- Q5)** a) What is long term wave height statistics? Name various distribution used to achieve the same while explaining Log-Normal distribution in detail. [6]
 b) Define probability density function, probability distribution function, Joint cumulative distribution, Stationary process, Ergodic process. [10]

OR

- Q6)** a) Enlist various theoretical wave spectra. Explain any one of them in detail. [6]
 b) Prove that $s(f) = 4 \int_0^{\infty} R(\tau) \cos 2\pi f \tau d\tau$ where $s(f)$ is spectral density function, $R(\tau) =$ auto correlation. [6]
 c) Write short note on Pierson-Muskowitz Spectrum. [4]

SECTION-II

- Q7)** a) What is wave breaking? Discuss with respect to interaction with current and solitary theory. Discuss various ways of wave breaking. [8]
 b) What is wave refraction? List assumptions made in theory of refraction. Derive relation between deep water wave height and refracted wave height. [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. [10]
 b) Write short note on wave set up and set down. [8]

- Q9)** a) Draw sketches for pressure distribution of non breaking wave forces using Miche-Rundgren method. Write expressions for y_c and y_t with usual notations. [8]
- b) Discuss how the effect of non vertical wall structures on formulae used for breaking and broken wave forces is considered. [8]

OR

- Q10)**a) Draw Minikin's wave pressure diagram. State formula for total breaking force on wall and total moment about toe. [8]
- b) What is effect of angle wave approach on breaking or broken waves? Discuss effect of non-vertical walls on breaking and broken wave forces. [8]

- Q11)**a) Derive equation for variation of drag force along the total member length of vertical member. [8]
- b) Discuss effect of roughness on C_D and C_M . [4]
- c) Write short note on wave slam. [4]

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 : 8]

SEAT No. :

P1105

[4659]-284

[Total No. of Pages : 7

**B.E. (Petroleum Engineering)
a - PETROLEUM ECONOMICS
(Elective - IV) (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 books.*
- 2) Use of graph paper is allowed.*
- 3) Figures to the right indicate marks.*
- 4) Assume additional data, if necessary.*

SECTION - I

- Q1) a)** Answer the following in brief (Any Five): **[15]**
- i) P 10, P 50 and P 90 in Reserves Estimation.
 - ii) Trade movement for oil.
 - iii) Oil differential.
 - iv) UN framework classification “the EFG System”.
 - v) Peak oil theory and Hubert curves.
 - vi) Incremental Analysis.
 - vii) Standard practices for reporting of reserves.
- b) Plot the information on suitable graph and calculate the time required to decline to economic limit of 1000 BOPD. **[10]**

| Month | Bbl./month |
|-------|------------|
| 1 | 5400 |
| 2 | 5000 |
| 3 | 4800 |
| 4 | 4100 |
| 5 | 3900 |
| 6 | 3600 |
| 7 | 3300 |
| 8 | 3100 |

P.T.O.

| Month | Bbl./month |
|-------|------------|
| 9 | 2900 |
| 10 | 2650 |
| 11 | 2400 |
| 12 | 2350 |
| 13 | 2160 |
| 14 | 2050 |
| 15 | 1910 |
| 16 | 1790 |

Assuming recovered reserves are 24% of OOIP, calculate OOIP. How much is still producible taking into consideration economic limit.

OR

Q2) a) An oil property is estimated to have total reserves amounting to be 800,000 bbl. The performance prediction trend has shown a graph of an initial rate of 400 BOPD to an economic limit of 30 BOPD. Calculate the total time on production assuming successively the following values of parameter b : (a) $b = 0$, (b) $b = 0.5$ and (c) $b = 1.0\%$ [10]

b) What is reserves auditing? State the norms given by SPE/AAPG/SEC for auditing of reserves. What are the common errors committed in the calculation of oil and gas reserves? [15]

Q3) a) Explain with the help of hypothetical cash flow diagram, various concepts used in the mathematical methods of profitability evaluation. [10]

b) Assume following data: [15]

Current oil price of brand oil in international market is \$89.60. It is anticipated that the price will increase at a rate of 5.35% per year for first four years and then drop to an annual rate of 4.25% thereafter for next four years.

The producible oil has lower API than that brand oil along with higher sulphur and TAN content, thus leading to a price differential of 11.5% with respect to the oil price quoted above.

Develop a forecast for oil price each for brand oil and the oil under consideration for a span of eight years.

OR

- Q4) a)** Write in brief on any two of the following: **[10]**
- i) Oil Price elasticity.
 - ii) Tangible and In tangible costs.
 - iii) Sensitivity Analysis.
 - iv) NPV and DCFROR.
- b) The company has opportunity to invest in three mutually exclusive alternatives details of which are given below. The company's cost of capital is 15%.

Give your decision on NPV, DCFROR and PVI. **[15]**

| | A | B |
|--------------------|-------------|-------------|
| Initial Investment | \$5,00,000 | \$ 8,00,000 |
| Annual revenue | \$ 1,00,000 | \$ 1,50,000 |
| Annual expenses | \$ 10,000 | \$ 15,000 |
| Service life | 10 years | 10 years |
| Salvage value | \$ 50,000 | \$ 75,000 |

SECTION - II

- Q5) 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. **[10]**
- b) Initial cost of the completely installed reactor is \$ 20,000 and its salvage value towards the completion of useful life is \$ 2000. Service life of the reactor is 6 years. Calculate its depreciation using **Straight Line Depreciation (SLD), and Double Declining Balance (DDB) methods**. Prepare a plot of book value against number of years and compare the results obtained with different methods in your own words. **[15]**

OR

Q6) a) Explain any two of the following: [10]

- i) Depreciation and Depletion,
- ii) Meaning and interpretation of EMV.
- iii) Reserves accretion and discovery of field size scenario in past 20 years.
- iv) Profitability in projects and equivalence of field size in different countries within the framework of Production sharing contract.

b) Proposal of buying drilling rights for a block of good potential are under consideration. Following are the details of the same. [15]

- ✓ \$ 5 MM is required to secure drilling rights.
- ✓ Seismic coverage is available at \$ 2 MM.
- ✓ Two possibilities are anticipated, a large reserve with a NPV of \$ 75 MM and a smaller marginal worth a NPV of \$ 30 MM excluding development costs.

Two exploration strategies are under consideration:

- ✓ Drill exploratory wells on the basis of available geological knowledge.
- ✓ Spend on seismic and take decision after confirmation or drop acreage,
- ✓ It is also possible to drill second exploratory well if first well is dry.

Company management is uncertain about the prospect and has thus given a task for evaluation. Here are some details:

- ✓ Drilling a wildcat is \$8mm each.
- ✓ If second well is dry the field has to be abandoned.

Following is the probability of occurrence of different events:

| Outcome | One wildcat Drilled on Geological control | Second wildcat drilled on geological control | One Wildcat drilled after obtaining Seismic | Second Wildcat Drilled after obtaining Seismic |
|----------------|--|--|--|--|
| Large Field | 0.05 | 0.075 | 0.15 | 0.20 |
| Marginal field | 0.05 | 0.075 | 0.15 | 0.20 |
| Dry Hole | 0.90 | 0.85 | 0.70 | 0.60 |

Construct a suitable decision tree taking into consideration different possibilities and data available. Solve the tree using conventional approach and give solution with proper justification. Show calculations at every step.

Q7) a) You are given production data for economic analysis: **[20]**

| Year | BOPD |
|------|------|
| 1 | 1050 |
| 2 | 1170 |
| 3 | 1305 |
| 4 | 1455 |
| 5 | 1761 |
| 6 | 1761 |
| 7 | 1761 |
| 8 | 1542 |
| 9 | 1351 |
| 10 | 1183 |
| 11 | 1037 |
| 12 | 908 |
| 13 | 795 |
| 14 | 697 |
| 15 | 610 |

Following are the assumptions for the analysis:

- ✓ Oil price is \$ 85. Initial Investment is \$ 100 MM and production cost is \$ 4.00/bbl.
- ✓ Royalty is 10% on annual production, to be deducted from gross revenue.
- ✓ Rate of return is 10%.
- ✓ Cost recovery is 80% and is allowed to deduce with the commencement of commercial production. The unrecovered cost is allowed to carry forward to next year.
- ✓ Profit petroleum is to be shared between government and contractor @ 60% and 40% respectively.
- ✓ Contractor is entitled to pay 30% income tax on profit.

Prepare a tabular form giving details of annual production, cumulative production, gross cash flow, royalty, net cash flow, cost recovery, recovered cost, profit petroleum, government share and contractor share, NPV for contractor BFIT and AFIT.

How is one barrel distributed?

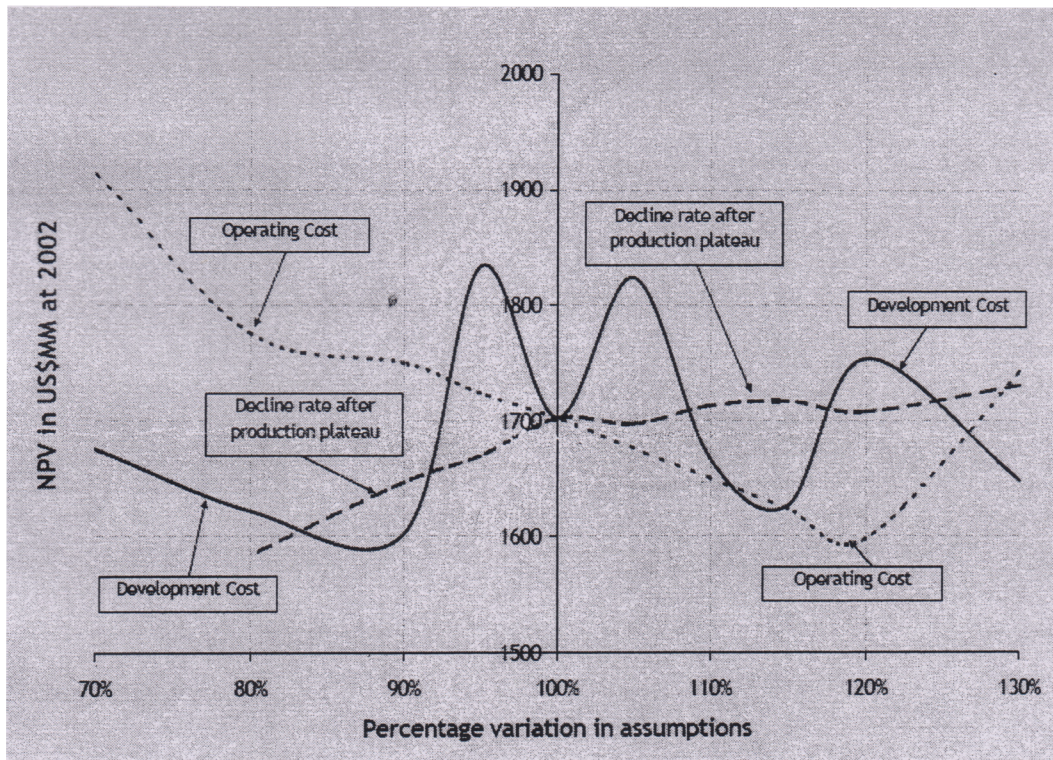
- b) An oil company has mapped a prospect and concluded that the resources may be as high as 50 million barrels and the probability of success (POS) is estimated to be 10%. **[5]**

The data acquired, the interpretations and the cost of the exploration well will amount to 25 million USD. If a discovery is made, the NPV will be 100 million USD.

- i) Calculate the expected monetary value.
- ii) Find the break even POS.

OR

- Q8) a) Refer to the following diagram to analyze sensitivity of different parameters in case of decline rate of oil after production plateau. Describe the diagram and prepare a table showing effects of production decline with comments. [10]



- b) Write a detailed note on Petroleum accounting system. [15]



Total No. of Questions : 6]

SEAT No. :

P1106

[4659]-286

[Total No. of Pages : 2

B.E. (Petroleum Engg.)

c - WELL CONTROL METHODS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** Discuss Leak off test in detail. Calculate the following with the data given below. **[12]**
Well depth = MD 15150ft, TVD 13,900ft, casing shoe measured depth = 11,100ft, Casing shoe true vertical depth = 10,100ft, casing shoe leaked with 10 ppg mud at = 1800 psi.
- i) Maximum allowable mud weight.
 - ii) New MAASP with 11 ppg mud.
 - iii) Casing shoe fracture strength.
- b) Discuss pore pressure prediction by D exponent in detail. **[6]**
- Q2) a)** Calculate mud required to fill the hole per stand when pulled dry and wet
Data given:
Drill pipe capacity = 0.0176 bbls/ft,
Drill pipe displacement = 0.0082 bbls/ft,
Average length of stand = 93 ft. **[6]**
- b) Discuss Volumetric method in detail. **[10]**
- Q3) a)** Discuss BOP accumulator system with suitable sketch.
- b) Discuss Kick indications and soft shut in procedure. **[16]**

P.T.O.

SECTION - II

Q4) a) Discuss drillers method in detail. Discuss advantages and disadvantages of driller's method and wait and weight method. **[10]**

b) Calculate Kill mud weight , ICP, FCP **[6]**

Data:

SIDPP 200 PSI, SICP = 300 Psi, Mud weight used for drilling 10 ppg, well depth 10,000ft.

Q5) Write short notes on: **[18]**

a) Snubbing.

b) Well control in Multilateral wells.

c) Unusual situations in well control.

Q6) a) Draw Subsea BOP stack and discuss pressure test. **[8]**

b) Accumulator bottle capacity = 10 gallons

Number of bottles = 15

Maximum operating pressure = 3000psi

Minimum operating pressure = 1200 psi

Pre charge pressure = 1000 psi

During function the pressure drops from 3000 psi to 1800 psi. How many gallons of fluid did that function use? **[4]**

c) Write note on Underground blow out in brief. **[4]**



Total No. of Questions : 12]

SEAT No. :

P1107

[4659]-288

[Total No. of Pages : 3

B.E. (Chemical Engineering)
PROCESS DYNAMICS & CONTROL
(Semester - I) (409343) (2008 Course)

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

SECTION - I

Q1) Derive the transfer function and the final time-response equation of a first order mercury thermometer system to a unit step input. A mercury thermometer having a time constant of 1 minute is at steady state temperature of 85°C. At time $t = 0$, thermometer is placed in a temperature bath maintained at 105°C. Determine the time required for the thermometer to read 90°C, 95°C and 100°C. Assume unit gain for the thermometer. **[16]**

OR

- Q2)** a) Derive transfer function of liquid level tank with constant outlet and find the time response equation for a unit step input. Assume linear system. **[8]**
- b) Derive the time response equation for a unit ramp input to a first order system starting from the transfer function. **[8]**
- Q3)** a) Explain linearization of nonlinear functions and linearize the nonlinear function: $F = C_D \sqrt{h}$. **[8]**

P.T.O.

- b) For a second order system with following transfer function: [8]

$$G(s) = \frac{15}{(16s^2 + 3s + 1)}$$

When a step change of magnitude 5 is introduced into the system find

- i) Rise time,
- ii) Ultimate value of response,
- iii) Decay ratio,
- iv) Overshoot.

OR

- Q4)** a) Derive transfer function of servo problem for negative feedback control system. [8]
b) Derive transfer function of two-tank liquid level non-interacting system. [8]

- Q5)** a) Explain notion of stability in terms of BIBO with some example pole placements on the complex plane. [8]
b) What is a root locus diagram and how is it used to find stability of a system? Describe all the rules of drawing a root locus diagram through an example graph. [10]

OR

- Q6)** Draw the root locus of the system with the following transfer function,

$$G(s) = \frac{12K_c(s+0.5)}{(s+1)(s+2)(s+3)}$$

Mention all the steps and comment on the stability of the system. [18]

SECTION - II

- Q7)** Give all the steps to draw a Nyquist plot through an example graph and draw nature of Nyquist plots of [16]

- a) first order system,
- b) PI controller.

Comment on the nature of plots of the systems.

OR

Q8) Sketch the Bode plots of the following system, mentioning each step in detail,

$$G(s) = \frac{(2s+1)}{(4s+1)(s+1)} \quad [16]$$

- Q9)** a) Differentiate between feed-back and feed-forward control systems. [8]
b) Explain feed-forward control of a three tank composition control system with a neat process diagram. [8]

OR

- Q10)** a) What is Smith predictor control system? Explain with the block diagram. [8]
b) Explain the override control system for a compressor with a neat diagram. [8]

- Q11)** a) Write a short note on SCADA systems for a large area control of systems. [9]
b) Explain the conversion of analog signals to digital signals in a digital control system. [9]

OR

- Q12)** a) Explain the use and working of an hold element in a digital control loop. Give the equations of a zero-order and first-order hold elements. [9]
b) Describe the details of working of PLCs and its programming procedure through a simple ladder diagram. [9]



Total No. of Questions : 12]

SEAT No. :

P1155

[Total No. of Pages : 3

[4659]-29

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

FERROCEMENT TECHNOLOGY

(2008 Pattern) (Open Elective - IV (f))

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) *Neat diagrams should be drawn wherever necessary.*
- 5) *If necessary, assume suitable data and indicate clearly.*
- 6) *Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) Explain ferrocement in respect of : **[18]**

- a) Definition.
- b) Special types of ferrocement.
- c) Merits and Demerits of ferrocement over RCC.
- d) Applications of ferrocement.
- e) Typical characteristics of ferrocement.

OR

- Q2)**
- a) Write a note on ferrocement as substitute for conventional building materials. **[4]**
 - b) What are different properties and specifications of raw materials used for Ferrocement Technology? Also write a note on proportioning of cement mortar. **[8]**
 - c) Write a note on job requirements of required skills and also the tools and plants used for ferrocement technology. **[6]**

P.T.O.

- Q3)** a) Explain in detail process of constructing ferrocement structures in respect of **[10]**
- i) planning the work.
 - ii) fabricating skeleton
 - iii) tying of wire meshes
 - iv) mortaring
 - v) curing
- b) Enlist and explain different mechanical properties and typical features affecting design of ferrocement structures. **[6]**

OR

- 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) Enlist different conventional design methods applied to ferrocement and explain the design based on equivalent area method for compression, tension, and flexural members. **[8]**
- b) Explain in detail specific surface method and crack control method. **[8]**

OR

- Q6)** a) Draw the neat sketches of various structural forms and Also give the comparative study of behaviour forms in respect of strength and design parameters with ferrocement technology. **[8]**
- b) What are the special design considerations for ferrocement and typical features of ferrocement affecting design. **[8]**

SECTION - II

- Q7)** a) State and explain factors governing cost analysis. Also compare cost of ferrocement structures with conventional structures. **[8]**
- b) Explain the role of ferrocement in building construction of following building accessories : **[8]**
- i) foundations
 - ii) walls
 - iii) floors
 - iv) roofs

OR

Q8) a) Explain the special techniques to resist shocks of ferrocement structures affected during earthquake. [8]

b) 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.[8]

Q9) a) What is ferrocement? What are its different applications with hydraulic structures. Explain in detail any one. [8]

b) Explain design and method of fabrication and casting of counterforth retaining wall. [8]

OR

Q10) a) Explain the use of ferrocement in layered form used for lining, water proofing and surfacc coating. [8]

b) Compare ferrocement container with conventional container for storage of granular materials. [8]

Q11) a) Explain role of ferrocement technology in construction of large size special purpose structures like shell, pyramids, domes etc. [9]

b) Why ferrocement is use for precasting? Give the different methods of ferrocement precasting and Explain any one in detail. [9]

OR

Q12) a) Write a note on : [6]
Ferrocement precast walling and flooring panels.

b) Explain in detail the industrial precast ferrocement concrete elements you seen with : [6]

i) raw materials of construction

ii) analysis and design principles

iii) manufacturing process

iv) testing methodology and quality control

c) What is the need of ferrocrete technology in different types of building components in todays world. [6]



Total No. of Questions : 12]

SEAT No. :

P1108

[4659]-290

[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 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)** The reactor is fitted with a flat blade disc turbine agitator 0.6m diameter, running at 120 rpm. The vessel is baffled and is constructed of stainless steel plate 10 mm thick.

The physical properties of the reactor contents are,

$\rho = 850 \text{ kg/m}^3$, $\mu = 80 \text{ mNs/m}^2$, $k_f = 400 \times 10^{-3} \text{ W/(m.K)}$, $C_p = 2.65 \text{ kJ/kg K}$.

Estimate the heat transfer coefficient at the vessel wall and the overall heat transfer coefficient in the clean condition, if the thermal conductivity of stainless steel as 16 W/(m. K) and jacket side heat transfer coefficient is $1606 \text{ W/m}^2\text{K}$. **[8]**

- b) Describe the power curve with sketch. **[6]**
- c) Explain the criteria for jacket selection in the reactor. **[4]**

OR

- Q2) a)** Discuss the factors to be considered in the selection of agitators. **[6]**

P.T.O.

- b) Design a turbine agitator shaft and blade only with the following specifications for a vessel of 1500 mm diameter. [12]

Data:

Diameter of agitator: 500 mm

Internal pressure in the vessel : 0.5 N/mm²

Speed: 200 rpm

Sp. Gravity of liquid in the vessel: 1.2

Viscosity of liquid in the vessel: 600 cp

Overhang of the agitator shaft between bearing and agitator is 1300mm

No. of Agitator blades (Flat): 6 nos.

Width of the blade: 75mm

Thickness of the blade: 8mm

No. of baffles at tank wall: 4nos.

Shaft material-commercial cold rolled steel

Permissible shear stress in the shaft: 55N/mm²

Elastic limit in tension: 246 N/mm²

Modulus of elasticity: 1.95×10^5 N/mm²

Value of Power No: 4.5

Motor rating is 10 hp.

- Q3)** a) Write short notes: [9]

i) O'Connell's Correlation.

ii) Van Winkle's Correlation.

iii) Design variables in plate distillation column.

- b) Explain determination of the total plate pressure drop for the plate column in distillation. [7]

OR

Q4) a) Calculate the plate efficiency for the plate column used for the distillation using Van Winkle's correlation with the following data: [8]

$$\rho_L = 925 \text{ kg/m}^3, \rho_v = 1.35 \text{ kg/m}^3$$

$$\mu_L = 0.34 \times 10^{-3} \text{ Ns/m}^2, \mu_v = 10.0 \times 10^{-6} \text{ Ns/m}^2$$

$$D_{LK} = D_L = 4.64 \times 10^{-9} \text{ m}^2/\text{s}, h_w = 50 \text{ mm},$$

$$\text{FA (Fractional Area)} = 0.076$$

$$\text{Superficial vapour velocity} = 1.62 \text{ m/s},$$

$$\sigma_L = \text{liquid surface tension} = 60 \times 10^{-3} \text{ N/m}$$

b) Explain the Smoker equation and derive the same. [8]

Q5) a) Explain Onda's Method for the prediction of the height of transfer units (HTU) with its correlation. [8]

b) Using Cornell's method, estimate the height of packing Z for the absorption column to absorb SO₂ in water at 20°C with the help of following data: [8]

$$\text{Number of transfer unit } N_{OG} = 8$$

$$\text{The liquid mass flow rate } (L_w^*) = 16.7 \text{ kg/m}^2\text{s}$$

$$\text{Diffusivity } D_L = 1.7 \times 10^{-9} \text{ m}^2/\text{s} \text{ and } D_v = 1.45 \times 10^{-5} \text{ m}^2/\text{s}$$

$$\text{Viscosity } \mu_v = 0.018 \times 10^{-3} \text{ Ns/m}^2 \text{ and } \mu_L = 1 \times 10^{-3} \text{ Ns/m}^2$$

$$\text{Density } \rho_L = 1000 \text{ kg/m}^3 \text{ and } \rho_v = 1.21 \text{ kg/m}^3$$

$$\text{With 60\% flooding condition, } K_3 = 0.85, H_G \text{ Factor } (\psi_h) = 80 \text{ and}$$

$$\text{At } L_w^* = 16.7, H_L \text{ Factor } (\phi_h) = 0.1 \text{ Take } Z = 8\text{m as an initial estimate.}$$

OR

Q6) a) Enlist the column internals in the packed column with their types. [6]

b) Calculate the column diameter and check the percentage flooding for a packed column for absorption using the following data: [10]

$$\text{Gas flow rate } G_m = 5000 \text{ kg/h.}, mG_m / L_m = 0.8$$

$$\text{Packing size 38 mm ceramic intalox saddles with packing factor } F_p = 170 \text{ m}^{-1}$$

$$\text{Gas density} = 1.21 \text{ kg/m}^3, \text{ liquid density} = 1000 \text{ kg/m}^3$$

$$\text{Liquid viscosity} = 10^{-3} \text{ Ns/m}^2,$$

$$\text{At Design pressure drop} = 20 \text{ mm H}_2\text{O} / \text{m of packing, Constant } K_4 = 0.35$$

$$\text{At flooding, } K_4 = 0.8.$$

SECTION - II

- Q7)** a) Describe the principle, construction and working of Decanter and its design with necessary expressions. [8]
- b) Make a preliminary design for a vapor - liquid separator to separate a mixture of steam and water. Steam; flow rate = 2000kg/hr, Density = 2.16 kg/m³ water; flow rate = 1000kg/hr, Density = 926.4/m³ Operating pressure 4 bar. [10]

OR

- Q8)** Explain the following with neat sketches. [18]
- a) Reflux Drum.
- b) Knock out Drum.
- c) Safety Devices in the process industries.

- Q9)** a) Calculate the discharge through a pipe of diameter 200mm when the difference of pressure head between the two ends of a pipe 500m apart is 4m of water. Take the value coefficient of friction ' f ' is 0.009. Use Darcy - Weisbach formula. [8]
- b) Explain the fluid dynamic parameters in pipeline design. [8]

OR

- Q10)** a) Discuss on pipeline network and Hardy Cross Method. [8]
- b) Find the head lost due to friction in a pipe of diameter 300mm and length 50m, through which water is flowing at a velocity of 3 m/s using Darcy Formula.
- Data: Kinematic viscosity of water = $\nu = 0.01 \times 10^{-4} \text{ m}^2/\text{s}$. [8]

- Q11)** a) Explain different types of pipe fittings with their sketches. [8]
- b) Discuss the piping materials for corrosive services. [4]
- c) Define Schedule Number and give its significance in piping. [4]

OR

- Q12)** a) How is proper selection of material important for piping? Explain with example. [8]
- b) Discuss common ASTM and IS specifications for pipes. [8]



Total No. of Questions : 12]

SEAT No. :

P867

[4659] - 291

[Total No. of Pages : 3

B.E. (Chemical)

**a - ENVIRONMENTAL ENGINEERING
(2008 Pattern) (Elective - I) (Sem. - 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) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Name and describe the four layers of the atmosphere. [6]
b) Name and define the two types of inversions. This type prompts the formation of fog? [6]
c) Describe in brief about Kyoto protocol? [6]

OR

- Q2)** a) Give the typical classification of solid waste. Also, explain each class in brief. [10]
b) Describe the effects of air pollutants on human health, plants and animals. [8]

- Q3)** a) Describe with schematic diagram the working and principles of electrostatic precipitator? [12]
b) Give brief account on sampling and measurement of air pollutants. [4]

OR

- Q4)** a) Draw a neat sketch of cyclone separator and explain the working principles of the same? [8]

P.T.O.

- b) The 5-day 20°C BOD of a wastewater is 250 mg/L. What will be the 10-day demand? If the bottle had been incubated at 25°C and 30°C, what would the 5-day BOD have been? [8]

Given Data:

Reaction rate constant (k) (base e, 20°C) = 0.23 per day = 1.053.

- Q5)** a) Describe the trickling filter with schematic diagram? [8]
b) With the help of neat sketch, describe catalytic oxidation method for air pollution control. [8]

OR

- Q6)** a) List and compare different particulate emission control techniques. [8]
b) Describe air pollution laws and their standards. [8]

SECTION - II

- Q7)** a) Describe types, sources and effects of water pollutants. [8]
b) What are the major types and sources of grit in municipal waste water. Describe the treatment methods used to remove grit. [10]

OR

- Q8)** Write short notes on following: (**Any Three**): [18]
a) MPCB and CPCB norms of air and water pollution.
b) Role of adsorption in advanced wastewater treatment.
c) Treatment of liquid effluent from a complex fertilizer plant.
d) Activated sludge process.

- Q9)** a) Define the term 'Coagulation' and give its significance in advanced wastewater treatment. Also enlist two coagulants. [4]
b) Explain the basic concept of the activated sludge process and indicate the advantages and disadvantages of the two major kinds of activated sludge reactors, with neat diagram. [12]

OR

Q10) List in a tabular form the advantages and disadvantages of the following methods of solid waste disposal in detail. **[16]**

- a) Incineration,
- b) Sanitary land fill,
- c) Composting and pyrolysis

Q11)a) Describe different tertiary water treatment and solid waste management with suitable examples. **[10]**

b) What is ozone depletion? What is its effect on environment? **[6]**

OR

Q12)a) Describe the sources and classification of solid waste? **[8]**

b) Describe the biological nitrification and denitrification with suitable examples? **[8]**



Total No. of Questions : 12]

SEAT No. :

P868

[4659]-292

[Total No. of Pages : 3

B.E. (Chemical Engineering)
b - MEMBRANE TECHNOLOGY
(Elective - I) (Semester - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Classify membrane separation processes and state their advantages over conventional separation processes. [8]
b) Explain the criteria for selection of a separation process. [8]

OR

- Q2)** a) State materials used for preparation of membranes and state characteristics of each. [8]
b) Explain historical background of membranes. [8]

- Q3)** Explain characteristics of the following types of polymeric membranes: Branched chain type (random copolymers, block copolymers), cross-linked polymers. [16]

OR

- Q4)** Explain the following properties of polymeric membrane materials: Chain flexibility, molecular weight, chain interactions. Also state the factors affecting these characteristics. [16]

- Q5)** Write short notes on the following: [18]
a) Phase inversion methods of preparation of membranes.
b) Wet spinning method of preparation of tubular membranes.
c) Track etching method of preparation of membranes.

OR

P.T.O.

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

- a) Composite membranes.
- b) Interfacial polymerization method of preparation of composite membranes.
- c) Plasma polymerization method of preparation of composite membranes.

SECTION - II

Q7) a) Explain the effects of pore geometry and surface porosity on flux across the membrane. [8]

- b) Explain the SEM and TEM methods of characterization of MF membranes. [8]

OR

Q8) a) Explain the following methods of characterization of UF membranes: Gas adsorption and desorption method, permoporometry method. [8]

- b) Explain permeability method of characterization of non-porous membranes. [8]

Q9) a) Distinguish between solution diffusion theory and pore flow theory of transportation through membranes. [8]

- b) Starting from the expression for change in chemical potential across non-porous membrane, derive the expression for flux of species across it under concentration gradient. [8]

OR

Q10)a) Explain use of membrane reactors for reaction and separation in esterification process. [8]

- b) What are ion exchange membranes? Explain use of these membranes in electro dialysis process. [8]

Q11) Write short notes on the following:

[18]

- a) Pervaporation.
- b) Concentration polarization and fouling of membranes.
- c) Spiral wound membrane module.

OR

Q12) Write short notes on the following:

[18]

- a) Plate and frame membrane module.
- b) Gel layer model for concentration polarization.
- c) Methods for reduction of membrane fouling.



Total No. of Questions : 12]

SEAT No. :

P869

[4659]-293

[Total No. of Pages : 3

B.E. (Chemical)

c - BIOPROCESS ENGINEERING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Write down general structure of monosaccharides and their functions. [8]
b) Explain amino acid building blocks and polypeptides? [8]

OR

- Q2)** Explain with neat sketches important cell types? [16]

- Q3)** Explain manufacturing processes for: [16]
a) Lactic acid.
b) Butanol.

OR

- Q4)** a) Explain waste water treatment by anaerobic process. [8]
b) Manufacturing process of high fructose corn syrup (HFCS). [8]

- Q5)** An enzyme was assayed at an initial substrate concentration of $10^{-5}M$. The K_m for the substrate is $2 \times 10^{-5}M$. At the end of 1 min, 2% of the substrate has been converted to the product [18]

- a) What percent of the substrate will be converted to the product at the end of 3min? What would be the product and substrate concentrations after 3min?
- b) If the initial substrate concentration were $10^{-6}M$, what percent of the substrate will be converted to the product after 3min.
- c) What is the maximum attainable velocity with the enzyme concentration used?
- d) At about what substrate concentration will V_{max} be observed.
- e) At this substrate conc., what % of substrate will be converted to product?

OR

P.T.O.

- Q6) a)** Write a brief note on Enzyme Immobilized Technology. [8]
b) What are the factors of which influence the enzyme activity? Explain each factor in detail. [10]

SECTION - II

- Q7) a)** Ethanol formation from glucose is accomplished in a batch culture of *saccharomyces cerevisiae* and the following data were obtained [12]

| Time(h) | Glucose(s)g/l | Biomass(X)g/l | Ethanol(P)g/l |
|---------|---------------|---------------|---------------|
| 0 | 100 | .5 | 0.0 |
| 2 | 95 | 1.0 | 2.5 |
| 5 | 85 | 2.1 | 7.5 |
| 10 | 58 | 4.8 | 20.0 |
| 15 | 30 | 7.7 | 34.0 |
| 20 | 12 | 9.6 | 44.0 |
| 25 | 5 | 10.4 | 47.0 |
| 30 | 2 | 10.7 | 49.0 |

- i) By fitting the biomass data to the logistic equation determine the carrying capacity coefficient k .
 ii) Determine yield coefficient $Y_{p/s}$ & $Y_{x/s}$
b) A strain of mould was grown in a batch culture on glucose and the following data were obtained. [6]

| Time(h) | Cell conc.(g/l) | Glucose conc. (g/l) |
|---------|-----------------|---------------------|
| 0 | 1.25 | 100 |
| 9 | 2.45 | 97 |
| 16 | 5.1 | 90.4 |
| 23 | 10.5 | 76.9 |
| 30 | 22 | 48.1 |
| 34 | 33 | 20.6 |
| 36 | 37.5 | 9.38 |
| 40 | 41 | .63 |

- i) Calculate the max. net specific growth rate.
 ii) Calculate the apparent growth yield.
 iii) What max cell conc. could one expect if 150g of glucose were used with the same size in column.

OR

- Q8)** a) Explain the typical growth curve for bacterial population? [8]
b) Derive an expression for maximum possible dilution rate and also state its significance? [10]

- Q9)** a) Explain immobilized biocatalyst with suitable example and there application. [8]
b) Explain bubble column bioreactor. [8]

OR

- Q10)**a) Discuss and compare mechanically agitated contactor and bubble column reactor and fermenter. [8]
b) What is mean by critical oxygen concentration and its significance with respect to cell growth? [8]

Q11) Write short notes on: [16]

- a) Ultra filtration.
- b) Electro dialysis.
- c) Electrophoresis.
- d) Crystallization.

OR

- Q12)**a) Write Short notes on bioprocess economics. [8]
b) Discuss solvent extraction with examples used in bioseparations. [8]



Total No. of Questions : 12]

SEAT No. :

P1165

[4659] - 295

[Total No. of Pages : 2

B.E.Chemical (Semester - I)
CHEMICAL PROCESS SYNTHESIS (Elective - II (a))
(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 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) Explain the concept of Onion Model. **[10]**

b) Write in brief about various considerations in process design. **[8]**

OR

Q2) a) Discuss idealized reactor model. **[9]**

b) Explain in short different parameters in choice of reactor. **[9]**

Q3) Explain the effect of following parameters on choice of reactor: **[16]**

a) Temperature.

b) Catalyst.

OR

Q4) a) Explain idealized reactor model for ideal batch reactor, mixed and plug flow reactor. **[10]**

b) Explain various parameters which govern reactor performance. **[6]**

Q5) a) Discuss various types of dryers. **[8]**

b) Explain extractive distillation with suitable example. **[8]**

OR

P.T.O.

Q6) Write notes on: [16]

- a) Absorption.
- b) Centrifugal separation.

SECTION - II

Q7) Explain with sketches the concept of heat integration of sequences of simple distillation column. [16]

OR

Q8) a) Discuss integration of refrigeration cycle. [8]

b) Explain threshold problems in heat exchanger network. [8]

Q9) a) What are composite curves? How you will obtain them? [8]

b) How a problem table algorithm is formed? [8]

OR

Q10)a) Explain the concept problem table algorithm. [8]

b) Explain graphically heat recovery pinch. [8]

Q11)a) Explain the intensification of hazardous materials. [8]

b) Write in brief on: [10]

i) Toxic releases from processes.

ii) Fire hazards.

OR

Q12) Write short notes on. [18]

a) Unconfined vapour cloud explosion.

b) Hazard triangle.



Total No. of Questions : 12]

SEAT No. :

P2129

[Total No. of Pages : 2

[4659] - 296

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

B : ADVANCED MATERIALS

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions :-

- 1) Answer any 3 questions from Section - I and 3 questions from Section - II.*
- 2) Answers to the two sections should be written in separate books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Your answers will be valued as a whole.*
- 6) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Q1) What is advanced materials? Explain with proper example and compare with the normal materials. **[16]**

OR

Q2) Discuss the types of steels in detail also explain their particular usages in chemical process industries. **[16]**

Q3) Define polymeric materials - List out advanced polymeric material with uses in industries. **[18]**

OR

Q4) How to prepare new polymeric material? Discuss it with flow chart and explain what are the engineering problems encountered during manufacturing. **[18]**

Q5) What is powder synthesis technique? Explain in detail. **[16]**

OR

Q6) Discuss on. **[16]**

- a) Ceramic materials
- b) Microstructural design.

P.T.O.

SECTION - II

Q7) What do you mean by composite materials? Discuss the factors affecting the properties of composite materials. **[16]**

OR

Q8) What is reinforcing mechanism? Discuss it with proper example. **[16]**

Q9) How to prepare ceramic composite? Explain in detail with figure. **[18]**

OR

Q10) Discuss : **[18]**

- a) Crack propagation
- b) Mechanical behaviour of ceramics.

Q11) What is carbon composite? Discuss their properties and explain fabrication method of it. **[16]**

OR

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

- a) Nanomaterials with example.
- b) Applications of nanomaterial in Chemical Engineering.



Total No. of Questions : 12]

SEAT No. :

P1109

[4659]-297

[Total No. of Pages : 2

**B.E. (Chemical Engineering)
c - POLYMER TECHNOLOGY**

(2008 Course) (Semester - I) (Elective - II) (409342)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

Q1) a) Explain in detail six different factors which need to be considered for determining polymer properties. [12]

b) Explain "Thermoplastics" with three examples. [6]

OR

Q2) a) Distinguished between Linear and Branch polymers. [6]

b) Write a note on Classification of polymers. [12]

Q3) a) Differentiate with one example each between Addition and Condensation Polymerization. [10]

b) Write a note on Interfacial Polymerization. [6]

OR

Q4) a) Explain in detail with two examples Bulk Polymerization Technique. [10]

b) Write a note on Suspension Polymerization. [6]

Q5) Explain effect of Molecular weight and Molecular weight Distribution on the properties of polymers. Explain Polydispersity Index and its importance. [16]

OR

P.T.O.

- Q6)** a) Explain Gel Permeation Chromatography. [10]
b) Find the polydispersity Index of the mixture composed of 20 molecules of 1000 monomer lengths and 380 molecules of 1 monomer lengths. [6]

SECTION - II

- Q7)** a) Discuss in detail all technical conclusions from Free Radical Kinetics Studies. [8]
b) Discuss the necessary equation of the total rate of the disappearance of the monomer M via Initiation, Propagation, and the termination reaction by monomer transfer. [10]

OR

- Q8)** a) Explain kinetics of copolymerization. [10]
b) Write a note on Coordination Polymerizations. [8]

- Q9)** a) Explain with neat sketch, working of Rotational molding. [10]
b) Discuss any three additives used in polymer compounding. [6]

OR

Q10) Explain with neat sketch, working of Injection and Extrusion molding. [16]

Q11) Explain manufacturing of PS and Butyl Rubber with flow diagram. [16]

OR

Q12) Explain manufacturing, Properties and applications of Epoxy and Unsaturated Polyester. [16]



Total No. of Questions : 12]

SEAT No. :

P1201

[4659] - 298

[Total No. of Pages : 3

B.E. (Chemical Engineering)
d - PIPING DESIGN AND ENGINEERING
(2008 Course) (Elective - II) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** Discuss the procedure in determining pipe diameter for specified height of pipe wall roughness and the discharge? **[8]**
- b) A concrete pipe 2m inside diameter is used to transport water from a pumping facility to a storage tank 5km away. Neglecting any difference in elevations, calculate the friction factor and pressure loss in kPa/km due to friction at a flow rate of 34,000 m³/h. Assume a pipe roughness of 0.05mm. If a delivery pressure of 4kPa must be maintained at the delivery point and the storage tank is at an elevation of 200m above that of the pumping facility, calculate the pressure required at the pumping facility at the given flow rate.

Data: Darcy friction factor (f) = 0.01 **[10]**

OR

- Q2) a)** Derive the following, $\Delta Q = \frac{-\sum r \cdot Q_o^n}{\sum r \cdot n \cdot Q_o^{n-1}}$. **[8]**
- b) Explain the different types of major and minor losses occurring in piping system? **[10]**

- Q3) a)** Discuss the different sections of ASME B31 Code for Pressure Piping? **[8]**

P.T.O.

- b) State and explain the different material standards for metallic piping components? [8]

OR

- Q4)** a) Explain the various types of pipe fittings in detail? [8]
b) Discuss the various types of gasket according to ASME B 16.5 and B16.47 for flanges? [8]

- Q5)** a) Write down the different types of butterfly valve along with neat sketch? Also state the merits and demerits along with the applications. [8]
b) Explain the steps used for sizing of pressure relief valves as per API RP 520? [8]

OR

- Q6)** a) Discuss the working principle and applications of Rupture Disks? [8]
b) Write down the general guidelines used for positioning safety valve along with the example of pressure-reducing station? [8]

SECTION - II

- Q7)** a) Discuss the significance of Churchill and Swamee-Jain equation for calculation of friction factor in Compressed-Air Piping Systems? A pipe is to be designed to carry 150 CFM free air at 100 psig and 80 °F. If the pressure loss must be limited to 5 psi per 100 ft of pipe, what is the minimum pipe diameter required? [10]
b) Discuss the concept of Deposition Velocity? Calculate the deposition velocity of a heterogeneous slurry with a solid specific gravity of 3.0 in water, for a pipeline with an 8-in internal diameter. The particle size = 1mm, and volume concentration = 15 percent.
Data: Froude number $F_L = 1.45$ [8]

OR

- Q8)** a) A steam piping system transports 20,000 lb/h of dry saturated steam at 150 psia. If the velocity is limited to 3000 ft/min, what size pipe is required? Calculate the pressure loss due to friction in 500 ft of pipe using the Unwin and Darcy equations, and compare the answers obtained.
Data: $\nu_s = 3.015 \text{ ft}^3/\text{lb}$. [10]

- b) Calculate the friction factor and transmission factor using the Colebrook-White equation for a 16-in (0.250-in wall thickness) gas pipeline at a flow rate of 100 MMSCFD. Flowing temperature = 80 °F, gas gravity = 0.6, viscosity = 0.000008 lb/(ft.s), base pressure = 14.73 Psia, and base temperature = 60 °F. Assume a pipe internal roughness of 600 microinches. [8]

- Q9)** a) Which are the factors considered while locating the equipment in the plot plan? [8]
- b) Discuss the different types & approval, engineering and construction issues involved in the development of P& IDs? [8]

OR

- Q10)**a) Which data is required for establishing the pipe rack width, number of levels, elevations and bent spacing? [8]
- b) Develop the typical layout considerations for reactor and pump? [8]

- Q11)**a) Determine the minimum insulation thickness required for a pipe carrying steam at 180 °C. The pipe size is 8" and the maximum allowable temperature of outer wall of insulation is 50 °C. Thermal conductivity of the insulation material for the temperature range of the pipe can be taken as 0.04 W/m. K. The heat loss from steam per meter of pipe length has to be limited to 80W/m.? [8]
- b) Write down the different insulation material classifications mostly used in the industrial and commercial piping industry? [8]

OR

- Q12)** Write short notes on [16]
- a) Responsibilities of piping engineer.
- b) Two design criteria's for insulation system design in piping.
- c) Critical and Optimum thickness of insulation.
- d) List of documents for preparation of layout for a process plant.



Total No. of Questions : 12]

SEAT No. :

P2128

[Total No. of Pages : 3

[4659] - 299

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

E : ADVANCED SEPARATION PROCESSES

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the details of chromatography column design and fiddling. [6]
b) Explain in detail 'Adsorption Cycle' with neat sketches. [12]

OR

- Q2)** a) Explain the basic concept of chromatography process. [6]
b) Give the application of chromatography in separation of enzymes and proteins. [6]
c) Explain adsorption mechanism in separation of fluid-solid system. [6]
- Q3)** a) Give the advantages of membrane separation process over other separation technique. [8]
b) Describe four basic types of Reverse Osmosis module currently manufactured. [8]

P.T.O.

OR

- Q4)** 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 process. [6]
c) Explain the following terms : [4]
i) Rejection
ii) Permeate

Q5) Discuss the following in detail :

- a) Characteristics of the complexing agent used in chemical - complexation. [8]
b) Reactive distillation process. [8]

OR

- Q6)** a) Give the solution characteristics of chemical complexation process. [8]
b) Write short note on 'Reactive crystallization' process. [8]

SECTION - II

- Q7)** a) Give the flotation techniques classification on the basis of mechanism of separation and size of material separated. [9]
b) Explain 'Collapse and drainage phenomena'. [9]

OR

Q8) Discuss the following :

- a) Design and development of flotation equipment. [9]
b) Application of flotation technique. [9]

- Q9)** a) Explain the adsorption properties and applications of molecular sieve. [8]
b) Explain Zone refining process in detail. [8]

OR

Q10) Write short notes on : **[16]**

- a) Zone Electrophoresis
- b) Adductive Crystallization

Q11) Explain the classification of unit operations based on the property difference. **[16]**

OR

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

- a) Exchange Reaction
- b) Ring oven technology application



Total No. of Questions : 8]

SEAT No. :

P718

[Total No. of Pages : 4

[4659] - 3

B.E. (Civil) (Semester - I)
STRUCTURAL DESIGN - III
(2008 Pattern)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Two questions from Section I and Two 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) *Assume suitable data, if necessary.*
- 7) *Use of IS 1343, IS 456, IS 3370 & non programmable calculator is allowed.*
- 8) *More reproduction from IS code as answer, will not be given full credit.*

SECTION - I

- Q1) a)** Explain with sketch, why eccentric prestressing is preferable to concentric prestressing. **[8]**
- b) A beam of unsymmetrical I-Section is used to support a live load of 10 kN/m over a span of 15 m. The beam is prestressed by a parabolic cable with an eccentricity of 150 mm at the centre and zero at the supports with an effective force of 1100 kN. The I-Section has top flange 750 mm wide and 200 mm deep, bottom flange 400 mm wide and 300 mm deep and web 500 mm deep and 150 mm wide. Calculate extreme fiber stress in concrete at mid-span for the following condition : **[17]**
- i) Prestress + Self weight.
 - ii) Prestress + Self weight + Live Load. Take mass of concrete as 25 kN/m³. Assume 15% loss of prestressing.

P.T.O.

OR

- Q2)** a) What is load balancing concept? Explain with sketch. [8]
- b) A post tensioned prestressed concrete beam of 16 m span is subjected to prestressing force by 5 Nos. of 12/5 Freyssinet parabolic cables with their C.G. at 130 mm from extreme bottom fiber, stressed one at a time from only one end at 800 MPa. Calculate total loss of prestress at the age of 90 days for the following data : Top flange 525 mm × 200 mm, bottom flange 350 mm × 250 mm and web 150 mm × 650 mm, $E_s = 210$ GPa, $E_c = 0.382$ GPa, coefficient of friction = 0.25, Wobble correction factor = 0.0015 per meter, anchorage slip = 2.5, creep coefficient = 2.4. [17]

- Q3)** Design a post tensioned prestressed concrete beam to carry a live load of 15 kN/m over simply supported span of 18m only for flexure. The characteristic strength of concrete is 35 MPa. Use Freyssinet cables of 12/5 with $f_y = 1750$ MPa. Also design end block. Draw cable profiles at various sections. Check fiber stresses in concrete and deflection at mid-span. [25]

OR

- Q4)** a) State the step by step procedure used in design of prestressed concrete flanged beam. [7]
- b) A post tensioned prestressed concrete slab of size 7m × 10m with discontinuous edges is subjected to live load of 3.5 kN/m². Use three strands, each having cross sectional area 100mm² having $f_y = 1900$ MPa. Use M35 grade of concrete. Check the safety of slab against collapse and deflection at working load. [18]

SECTION - II

Q5) Analyse the multistoried building frame of shown in fig. 1 for vertical load by substitute frame and for horizontal load by cantilever method. The frames are spaced 3.5 m c/c. The dead load and live load acting on panels with GH and HI are 3.6 kN/m² and 3.5 kN/m² respectively. The relatives stiffness of each member is marked on the figure. Also design continuous beam GHI for combined effect of vertical and horizontal loads. 15% redistribution of moments is permitted for vertical load moments. Use M20 and Fe415 materials. [25]

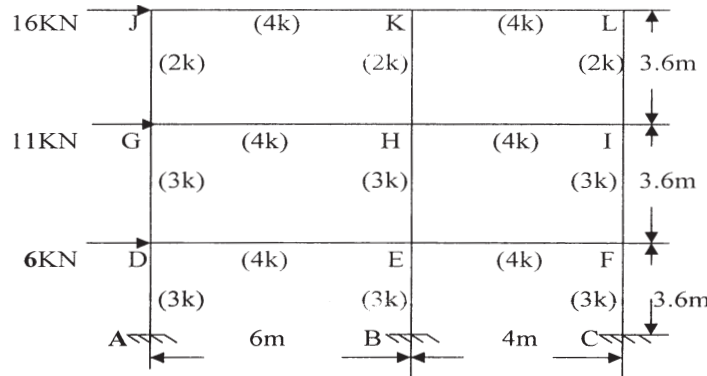


Fig. 1

OR

Q6) a) Explain Seismic coefficient method. [8]

b) Analyse the multistoried building frame as shown in fig. 2 by portal method for lateral loads. The dead load and total design load acting on beam AB are 13 kN/m and 28 kN/m respectively and 19 kN/m and 42 kN/m over beam BC. The relative stiffness of beam is double than the column stiffness. Analyse the beam ABC for vertical load by substitute frame method. Calculate maximum span moment at BC and support moment at B. Design beam section (BC) for combined effect of vertical and horizontal loads. 10% redistribution of moments is permitted for vertical load moments. Use M20 & Fe415. [17]

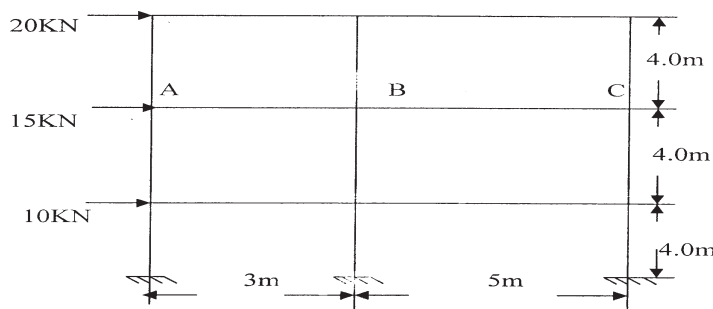


Fig. 2

- Q7)** a) At what situation, combined footing is recommended than isolated footing. [5]
- b) Design an open circular water tank with rigid joints rest on ground. The capacity of tank is 5.5×10^5 liters. The height of tank is restricted to 4.25 m. Use M20 & Fe415 materials. Also design the bottom slab of a tank if S.B.C. of soil is 200 kN/m^2 . Show pressure distribution diagram along the wall and reinforcement details. [20]

OR

- Q8)** Design a cantilever T-shaped retaining wall to retain soil, 4m above the ground. The surcharge angle is 14° at the top of retaining wall. The unit weight of the soil is 17.5 kN/m^3 , angle of repose is 35° and S.B.C. of soil is 180 kN/m^2 at 1.2 m below ground level. Show the pressure distribution at base of wall and reinforcement details at toe slab, heel slab and vertical wall. Use M20 concrete and Fe415 steel. [25]



Total No. of Questions : 12]

SEAT No. :

P1110

[4659] - 300

[Total No. of Pages : 2

B.E. (Chemical Engineering)
f: PETROLEUM REFINING
(2008 Course) (Elective - II) (Semester - I) (409342)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer to two sections should be written in separate answer book.*
- 2) *Answer three questions from section I and three questions from section II.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

Q1) How evaluations of petroleum are done and explain true boiling point distillation (TBP). **[18]**

OR

Q2) Describe the Specification with important test method of following petroleum products.

- a) Diesel **[9]**
- b) Gasoline **[9]**

Q3) Describe in details with sketch the vacuum distillation unit (VDU). **[16]**

OR

- Q4)** a) Explain desalting methods of crude oil. **[8]**
b) Describe with diagram working of pipe still heater. **[8]**

Q5) What do you understand by cracking? Explain various cracking operation used in industry? Explain hydrocracking in detail. **[16]**

OR

Q6) Explain with process flow diagram, reaction and effect of operating parameters on Reforming. **[16]**

P.T.O.

SECTION - II

Q7) Describe in detail various hydrotreatment used in petroleum processing and explain any one process in detail. [18]

OR

Q8) a) Explain Acid refining in detail. [8]

b) Write a note on HDS. [10]

Q9) a) Explain different methods of blending. [8]

b) Explain effect of additives addition on product quality. [8]

OR

Q10)a) Explain different methods used for storage of petroleum products. [8]

b) Discuss in details transportation of petroleum products in India. [8]

Q11) Write in details about recent trend in distillation and catalyst used in refining operation. [16]

OR

Q12) Describe Equipments used in pollution control for petroleum refining industry. [16]



Total No. of Questions : 12]

SEAT No. :

P1112

[4659] - 309

[Total No. of Pages : 2

B.E. (Chemical)

c- NANOTECHNOLOGY

(2008 Course) (Elective - IV) (409350)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *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 purification methods used for carbon nanotubes? [10]
b) What are the properties of fullerenes? [8]

OR

- Q2)** a) Explain growth mechanism of CNT's? [8]
b) Explain the different routes used for chemical modification of carbon nanotubes? [10]

- Q3)** a) Why electro-deposition process is needed to grow nano-rods/wires through alumina nano-pores? [8]
b) Explain the difference between ALD and CVD? [8]

OR

- Q4)** a) "Template-assisted synthesis is a very efficient tool to grow highly ordered nanowires/rods"-Explain. [9]
b) "Bottom-up technique is more convenient for nano fabrication"-Explain. [7]

P.T.O.

- Q5) a)** Discuss in detail Bragg's law of diffraction and Scherrer expression in X-ray diffraction? [8]
- b) How do the cantilever deflections in AFM analysis affect the passage of laser beams from excitation source to the specimen to the detector? [8]

OR

- Q6) a)** With neat sketch explain principle and operation of scanning electron microscope (SEM)? [8]
- b) Explain scanning tunneling microscope (STM) in brief? [8]

SECTION - II

- Q7) a)** What are effective masses of charge carriers in semiconductor. Derive expression for it? [10]
- b) What is doping? Explain types of dopants used in extrinsic semiconductor? [8]

OR

- Q8) a)** What is de Broglie's hypothesis? [8]
- b) Derive Schrodinger's equation? Also explain any two applications of Schrodinger's equation? [10]

- Q9) a)** What are the factors affecting contact angles and wetting? [8]
- b) Write a short note on van der waals forces between colloidal particles? [8]

OR

- Q10) a)** Explain experimental procedure for finding out contact angles. Explain with neat sketch? [8]
- b) Discuss in detail about Self-assembly and Catalysis? [8]

- Q11) a)** Explain in detail nanostructured photocatalysis? [8]
- b) Discuss biological applications of nanoparticles. [8]

OR

- Q12) a)** Explain how nanotechnology can be used for environmental pollution abatement? [8]
- b) Discuss different nanocoatings? Explain its applications and benefits? [8]



Total No. of Questions : 12]

SEAT No. :

P872

[4659] - 308

[Total No. of Pages : 3

B.E (Chemical Engg.)

CATALYSIS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the homogenous catalysis with an example. [8]
b) Explain the application of the catalysis to industrial processes in the fine organic chemical and biochemical industries. [8]

OR

- Q2)** a) Give the characteristics of the catalysis in detail. [8]
b) Explain the heterogenous catalysis with an example. [8]

- Q3)** a) Explain the mechanism of solid-catalysed reaction with suitable example. [8]
b) Give the experimental methods to determine the rate of solid-catalysed reactions. [8]

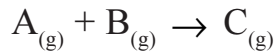
OR

- Q4)** The catalytic reaction $A \rightarrow 4R$ is run at 3.2 atm and 100°C in tubular reactor which contains 0.01 kg of catalyst and uses a feed consisting of partially converted product of 20 lit/hr of pure A and following data was recorded. Determine the rate equation for this reaction. [16]

P.T.O.

| | | | | |
|-----------------------|-------|-------|-------|-------|
| $C_{A, in}$ mol/lit- | 0.1 | 0.08 | 0.06 | 0.04 |
| $C_{A, out}$ mol/lit- | 0.084 | 0.070 | 0.055 | 0.038 |

Q5) The following mechanism has been proposed for a catalytic reaction.



- $A_{(g)} + X \rightleftharpoons AX$
- $AX + B_{(g)} \rightleftharpoons CX$
- $CX \rightleftharpoons C_{(g)} + X$

when, X indicates an active site on the catalyst. Derive an expression for the rate of reaction if surface reaction is a rate controlling. [18]

OR

Q6) Write short notes on the following. [18]

- Mass transfer in the catalyst.
- Langmuir adsorption isotherm.

SECTION - II

Q7) Explain the following terms in detail. [16]

- Catalyst deactivation.
- Void volume and solid density of the catalyst.

OR

Q8) Write the short notes on the following. [16]

- BET method.
- Pore volume distribution.

Q9) Explain the structure of the zeolites and industrial applications in details. [16]

OR

- Q10)a)** Explain the templated molecular sieves in detail with application. [8]
b) Explain in detail 'ZSM-5'. [8]

- Q11)a)** Give the kinetics of non competitive inhibition of enzyme reaction. [9]
b) Explain the method to determine the M-M kinetics constants using the data taken in MFR. [9]

OR

- Q12)a)** Explain the enzyme and microbial fermentation in detail. [9]
b) Explain inhibition in biocatalyst. [9]



Total No. of Questions : 12]

SEAT No. :

P1112

[4659] - 309

[Total No. of Pages : 2

B.E. (Chemical)

c- NANOTECHNOLOGY

(2008 Course) (Elective - IV) (409350)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *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 purification methods used for carbon nanotubes? [10]
b) What are the properties of fullerenes? [8]

OR

- Q2)** a) Explain growth mechanism of CNT's? [8]
b) Explain the different routes used for chemical modification of carbon nanotubes? [10]

- Q3)** a) Why electro-deposition process is needed to grow nano-rods/wires through alumina nano-pores? [8]
b) Explain the difference between ALD and CVD? [8]

OR

- Q4)** a) "Template-assisted synthesis is a very efficient tool to grow highly ordered nanowires/rods"-Explain. [9]
b) "Bottom-up technique is more convenient for nano fabrication"-Explain. [7]

P.T.O.

- Q5) a)** Discuss in detail Bragg's law of diffraction and Scherrer expression in X-ray diffraction? [8]
- b) How do the cantilever deflections in AFM analysis affect the passage of laser beams from excitation source to the specimen to the detector? [8]

OR

- Q6) a)** With neat sketch explain principle and operation of scanning electron microscope (SEM)? [8]
- b) Explain scanning tunneling microscope (STM) in brief? [8]

SECTION - II

- Q7) a)** What are effective masses of charge carriers in semiconductor. Derive expression for it? [10]
- b) What is doping? Explain types of dopants used in extrinsic semiconductor? [8]

OR

- Q8) a)** What is de Broglie's hypothesis? [8]
- b) Derive Schrodinger's equation? Also explain any two applications of Schrodinger's equation? [10]

- Q9) a)** What are the factors affecting contact angles and wetting? [8]
- b) Write a short note on van der waals forces between colloidal particles? [8]

OR

- Q10) a)** Explain experimental procedure for finding out contact angles. Explain with neat sketch? [8]
- b) Discuss in detail about Self-assembly and Catalysis? [8]

- Q11) a)** Explain in detail nanostructured photocatalysis? [8]
- b) Discuss biological applications of nanoparticles. [8]

OR

- Q12) a)** Explain how nanotechnology can be used for environmental pollution abatement? [8]
- b) Discuss different nanocoatings? Explain its applications and benefits? [8]



Total No. of Questions : 12]

SEAT No. :

P1058

[Total No. of Pages : 3

[4659]-31

B.E. (Civil Engineering)

h-GREEN BUILDING TECHNOLOGY

(2008 Pattern) (Open 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) *Your answer will be valued as a whole.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*
- 6) *Answer any three questions from Section-I and any three questions from Section-II.*

SECTION-I

- Q1)** a) Discuss site selection and explain building envelop. [7]
b) Discuss about natural ventilation with suitable example. How it is effectively utilize. [5]
c) Give note on Fresnel Lens and Fiber optic. [5]

OR

- Q2)** a) Discuss direct and indirect lighting. [8]
b) How you can use solar energy? Explain with suitable example. [9]

- Q3)** a) Explain hybrid system of active and passive refrigeration. [8]
b) What is passive and active architecture? Discuss. [9]

OR

- Q4)** a) Discuss the procedure for the Energy audit of building. [8]
b) What are the selection criteria of material for thermal comfort? Explain. [9]

P.T.O.

- Q5)** a) What is environmental clearance of building? Explain. [8]
b) Give explanatory note on Green building and Rating of building. [8]

OR

- Q6)** Explain the followings: [16]
a) LEED criteria.
b) USGBC.
c) CDM.
d) Carbon Trading.

SECTION-II

- Q7)** a) What the ways to minimize the water use? Explain about smart controllers. [8]
b) What is water recharge? What are the methods available for the recharge of water sources? Explain in details. [9]

OR

- Q8)** a) Explain with suitable example and sketch: [9]
i) Anaerobic filter.
ii) Reverse Osmosis.
iii) Ion Exchanger.
b) How treated wastewater is useful for non-potable purpose? Explain with suitable example. [8]

- Q9)** a) Discuss the importance of Indoor Environmental Quality. [8]
b) Explain VOC Emitting materials and their uses in green building. [9]

OR

- Q10)a)** Discuss followings: [9]
- i) Composite Wood.
 - ii) Carpet System.
 - iii) Agro Fiber.
- b) Discuss and give your comment on the interiors of Green buildings. [8]

- Q11)a)** Discuss in the importance of interior of non-structural elements. [8]
- b) What is recycling of material? Why it is important? [8]

OR

- Q12)a)** How the life cycle analysis is important? Explain. [8]
- b) Discuss the impacts of construction activities on the Environment. [8]



Total No. of Questions : 12]

SEAT No. :

P873

[Total No. of Pages : 3

[4659]-310

B.E. (Chemical)

d-FUEL CELL TECHNOLOGY

(2008 Pattern) (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 books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Describe the Phosphoric acid fuel cell with respect to processing, catalyst and fuel. **[9]**
- b) Describe the Solid oxide fuel cell with respect to processing, catalyst and fuel. **[9]**

OR

- Q2)** a) Discuss the advantages and limitations of fuel cell operating at low and high temperature respectively, taking the example of PEM and SOFC. **[9]**
- b) State the difference between fuel cell vehicle vs combustion engine vehicles. **[9]**

Q3) Gibbs free energy for the formation of water vapor is -55.14 cal/mol at STP. In the typical SOFC, pure methane is fed at the pressure of 3 atm. Total pressure of gases on anodic side of fuel cell is observed to be 3.5atm. Air is supplied at 1.2 atm. Fuel and air are supplied at the same operating temperature of 900 C. $F = 96486$ J/mol. Calculate, **[16]**

- i) Standard open circuit potentials.
- ii) Open circuit potential at the operating condition.
- iii) What will be the effect if the operating temperature is increased to 1000 C?

OR

P.T.O.

Q4) a) A current density of 15 A/m^2 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 factors for hydrogen, oxygen and water vapor are 95, 70 and $55 \text{ C/s.m}^2 \text{ atm}$, respectively. Calculate concentration overpotentials across anode and cathode. [8]

b) Calculate the fuel utilization factor, air ratio, power output and fuel efficiency of SOFC using the following data: [8]

Average Current density = 15 A/m^2

Active anode surface area = 0.4 m^2

Fuel flow rate = 25 mol/h

Fuel composition = H_2 : 70% and CO: 30%

Air flow rate = 20 mol/h

Output potential = 230 V

Lower heating value of the fuel = $2,50,000 \text{ kcal/kg}$.

Q5) Derive the Nernst equation for calculating open circuit potential of SOFC using air as an oxidizer for the following conditions. [16]

i) Pure butanol as fuel,

ii) H_2 as a fuel.

OR

Q6) Calculate material balance for SOFC generating 400 kW power at 80% CHP efficiency, using methane as fuel and 40% theoretical excess air as an oxidizer. [16]

SECTION-II

Q7) a) Discuss in detail defects in materials, Frenkel defects, Schottky defects. [7]

b) Explain the defect equilibrium in solid structures. [7]

OR

- Q8)** a) Explain the mechanism of charge transfer in TPB. [7]
- b) What is steam reforming? What is its importance in SOFC? [7]

- Q9)** a) Design a tubular SOFC stack to generate 500 kW power for methane as a fuel. Single tube has anodic diameter of 18mm and active length of 1.5m. [8]
- b) Derive correlation to calculate defect mole fraction for pure solids at thermal equilibrium. [8]

OR

- Q10)**a) Derive the Butler-Volmer form of the charge transfer rates. [8]
- b) Explain the mechanism of Direct oxidation of hydrocarbons in fuel cell. [8]

Q11) Develop a mathematical model for SOFC system using the anodic system of Ni, H₂-H₂O/YSZ. Hydrogen is used as a fuel and air as an oxidizer. Explain the: [20]

- i) Approach
- ii) Assumption
- iii) Flow chart and
- iv) Reaction

OR

- Q12)**a) Explain the required characteristics of materials of construction of electrode, electrolyte, and interconnect for SOFC. [10]
- b) Design a planar SOFC to generate 400 kW power for ethanol as fuel. [10]



Total No. of Questions : 12]

SEAT No. :

P874

[Total No. of Pages : 2

[4659]-311

**B.E. (Chemical Engineering)
e-PETROCHEMICAL ENGINEERING
(2008 Pattern) (Elective-IV) (Sem.-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) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Write in brief: present growth and future prospectus of petrochemical industry in India. **[12]**

b) Define petrochemicals with examples. **[6]**

OR

Q2) a) Write a note classification of petrochemical with examples. **[8]**

b) Enlist and explain the basic raw material for petrochemical synthesis and their sources. **[10]**

Q3) Explain one method for production of aromatics. Also explain BTX separation and purification with schematic diagram. **[16]**

OR

Q4) Explain olefin manufacture with neat flow sheet and operating parameters. **[16]**

Q5) a) What is cracking? What are the different types of cracking? **[8]**

b) What are the effects of operating variables on thermal cracking? **[8]**

OR

Q6) Describe the process for production of low molecular weight olefins by hydrocarbon cracking. Draw necessary diagram. **[16]**

P.T.O.

SECTION-II

- Q7)** a) What are the different available processes for glycol manufacture? Explain ethylene glycol manufacture. [10]
b) With neat diagram describe about the production of maleic anhydride from benzene? [8]

OR

Q8) With suitable diagrams, explain the production of amines. [18]

Q9) What are various polymeric products? Describe any two bulk polymerization products along with manufacturing process. [16]

OR

- Q10)**a) Explain types of polymerization process with suitable industrial examples. [8]
b) With neat sketches explain in details about production of PVC. [8]

Q11) Discuss various pollution control equipments for petrochemical plant. Explain any two of equipments in detail with construction and working. [16]

OR

- Q12)** Write a note on: [16]
a) Safety consideration in petrochemical plants.
b) Recent advances in petrochemical plant & refineries in India.
c) Explain methodology for integration of refinery and petrochemical power plant for power generation.



Total No. of Questions : 12]

SEAT No. :

P1168

[4659] - 312

[Total No. of Pages : 3

B.E. (Chemical Engineering)

F : COMPUTERAIDED PROCESS CONTROL (Elective - IV)

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain role of digital computer in process control. [6]
- b) With suitable block diagram explain basic components of computer control system. [6]
- c) Write short note on MMI [6]

OR

- Q2)** Explain the following process control architectures - centralized, distributed, heirarchical. [18]

- Q3)** a) Define controllability and observability of MIMO system. State mathematical conditions for the same. [8]
- b) Define RGA for 3×3 system and state its properties. [8]

OR

P.T.O.

Q4) a) How will you design non-interacting control tools for a 2×2 MIMO process? [8]

b) Explain interaction analysis and 100p pairing for a 3×3 system based on RGA analysis. [8]

Q5) a) Explain discretization of continuous time signals with relevant equations. [8]

b) How will you reconstruct original continuous - time signal from its discrete - time version using hold elements (ZOH and FOH) [8]

OR

Q6) a) Derive digital approximations of classical P, PI and PID controllers. [8]

b) Explain Z - domain stability criteria for discrete - time system. [8]

SECTION - II

Q7) a) Explain PC-based data acquisition system. [8]

b) Explain organization of general purpose computer used for process control. [8]

OR

Q8) a) Explain data transfer techniques between computers. [8]

b) Write short note on process control softwares. [8]

Q9) a) Write short note on distributed control system (DCS) [8]

b) Explain basic structure of PLC. [8]

OR

- Q10)** a) Explain integration of DCS With PLC and Computers. [8]
b) Explain communication and networking in DCS. [8]

Q11) Write short notes on the following. [18]

- a) Supervisory control.
b) Distillation column control system.
c) Process decomposition for control purpose.

OR

Q12) Write short notes on the following. [18]

- a) Ladder logic of PLC.
b) Heat exchanger control system.
c) Temporal heirarchy of plantwide control system.



Total No. of Questions : 12]

SEAT No. :

P1113

[4659] - 314

[Total No. of Pages : 3

**B.E. (Polymer Engineering)
POLYMER COMPOUNDING**

(2008 Course) (Regular) (409361) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is the significance of striation thickness in mixing? [4]
b) Write a note on Rheology of Filled Polymers. [7]
c) Give at least two mixing indices and give significance of the same. [7]

OR

- Q2)** a) For a particular compounding operation, it was desired to mix dough in 95 kg batches and then at a later time to blend in 5kg of additive. For product uniformity it is important that the additive be well distributed and so an experiment was set up to follow the course of the mixing. It was desired to calculate the mixing index after 5 and 10 min mixing. Sample compositions, expressed as the percentage of additive in 100 g samples were found to be: [9]

| | | | | | | | | | | |
|---------------|-----|------|-----|-----|------|-----|-----|-----|-----|-----|
| After 5 min, | | | | | | | | | | |
| (%) | 0.0 | 16.5 | 3.2 | 2.2 | 12.6 | 9.6 | 0.2 | 4.6 | 0.5 | 8.5 |
| After 10 min, | | | | | | | | | | |
| (%) | 3.4 | 8.3 | 7.2 | 6.0 | 4.3 | 5.2 | 6.7 | 2.6 | 4.3 | 2.0 |

- b) Write a note on Dispersive and Distributive Mixing. Give requirements of good mixing. [9]

P.T.O.

- Q3)** a) Explain the characteristics of polymer blend with one example. [3]
b) Discuss with example “Reactive Compatibilization”. [5]
c) Explain miscible and immiscible polymer blends with examples. [8]

OR

- Q4)** a) State and explain two functions of Compatibilizers. [8]
b) Write a note on- [8]
i) Filler Surface Modification
ii) Nano Clay Composites

- Q5)** a) Write a note on the followings: [10]
i) Compounding of any one Polyolefin.
ii) Natural Fiber Filled Polymers.
b) Explain the mechanism of at least one type of UV stabilizer. [6]

OR

- Q6)** a) List various Flame Retardants used and explain the mechanism of working of Flame Retardants. [8]
b) Explain the action of Plasticizers and flow promoters with one example each. [8]

SECTION - II

- Q7)** a) List the various additives used in SBR and EPDM compounding. Explain the function of each additive. [8]
b) List the disadvantages of reactive extrusion. [4]
c) List at least two heat stabilizers used in PVC formulations. Discuss the mechanism of heat stabilizers. [4]

OR

- Q8)** a) What is reactive extrusion? Explain at least two applications of reactive extrusion in details along with the reaction mechanism. [8]
b) Mention the formulation of a low cost dough molding compound using polyester resin. Write down the sequence of addition of the various ingredients. [8]

- Q9)** a) Discuss in details attributes of a good dispersive mixing section. Describe the construction and mixing mechanism of Dray® and Zorro® mixing sections. [9]
- b) Discuss the constructional features and mixing action in variable depth mixing sections with neat figures. [5]
- c) Explain constructional features and mixing action in pin barrel mixing section. [4]

OR

- Q10)** a) Discuss in details the construction and mixing action obtained in planetary gear mixers. [8]
- b) Explain mixing action of blockhead mixing section with neat figure. [5]
- c) Discuss the various flight geometries used to create elongational flow in CRD mixers with neat figures. [5]

- Q11)** a) Explain the following terms with reference to twin screw extruders with neat figures. [8]
- i) conjugated
 - ii) non-conjugated
 - iii) intermeshing and
 - iv) non-intermeshing
- b) Compare single screw extruders and twin screw extruders with reference to [8]
- i) melting mechanism
 - ii) mixing action
 - iii) forward conveying mechanism

OR

- Q12)** a) Discuss in details construction of an internal mixer with a neat figure. Give at least blade designs. Explain how dispersive and distributive mixing is achieved in an internal mixer. [8]
- b) Discuss the mixing mechanism obtained with kneading blocks used in twin screw extruders. [5]
- c) Explain the constructional features of a two roll mill. [3]



Total No. of Questions : 12]

SEAT No. :

P1202

[4659]-316

[Total No. of Pages : 4

B.E. (Polymer)

POLYMER PROCESSING OPERATIONS-II

(2008 Course) (Semester-I) (409363)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answers 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 the right indicate full 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) Write in short about die shaping. How does it help in thickness distribution in case of continuous extrusion blow molding? **[4]**
- b) How acetaldehyde content can be controlled in blow moulding of PET bottles using single stage as well as two stage injection stretch blow moulding? **[6]**
- c) Draw a cycle time chart for single station continuous extrusion blow molding and explain the major operations and their function. **[8]**

OR

- Q2)** a) A narrow neck bottle with high blow ratio is to be blow moulded. Discuss the relative merits of convergent or divergent die/ mandrel design in this case. **[5]**
- b) Explain radial flow die head assembly design. Draw a neat sketch and explain the functioning of major parts. **[8]**
- c) Why accumulator type extrusion blow moulding is used in case of moulding of large containers? **[5]**

P.T.O.

Q3) a) Discuss any four defects in thermoformed articles and suggest remedies for the same. [8]

b) Discuss the following terms w.r.t thermoforming. [8]

i) Heat reversion.

ii) Soaking time

iii) Equilibration

OR

Q4) a) Discuss the various mold materials used for thermo forming. Discuss how the mold material parameters affect the cooling time. [8]

b) Discuss any two methods of thermoforming:- [8]

i) Drape forming.

ii) Plug assisted vacuum forming .

iii) Matched die forming.

Q5) a) Discuss any two of the following w.r.t calendaring. [8]

i) Drive systems

ii) Types of bearings

b) Derive an equation for maximum pressure and point of maximum pressure in case of calendaring. [8]

OR

Q6) a) Discuss all the post calendaring equipments used in the process of calendaring. [8]

b) Differentiate between the different calendar designs giving their advantages and disadvantages. [8]

SECTION-II

Q7) a) Explain the effect of following on rotational molding: [6]

i) Mould release agents.

ii) Mould materials.

b) Explain the method of heat inclusion and heat exclusion used in rotational moulding to control product wall thickness. [5]

c) Explain the effect of particle size distribution and shape on the rotational molded article. [5]

OR

- Q8)** a) Bubbles are integral part of rotational moulding. Explain various techniques by which the bubbles can be eliminated. Write with reference to mould material and process control. [5]
- b) Explain how kiss-off ribs and kiss of points can be rotational moulded without bridging. [5]
- c) Write in detail about rotational molding features of poly amides. [6]
- Q9)** a) Discuss various types of binders and debind mechanisms with respect to powder metal injection molding. [5]
- b) Write short notes with reference to gas injection moulding (any one): [5]
- i) Gas dissolution into polymer.
- ii) Benefits of gas injection moulding over conventional process.
- c) Write in short about applications of micro-injection molding. [4]
- d) Write in short about morphological structure development during injection moulding of polyamides. [4]

OR

- Q10)** a) With reference to water injection molding discuss at least two processes with neat sketches:- [8]
- i) Full shot process with over spill.
- ii) Core pulling process.
- iii) Short shot process.
- b) Give features and characteristics of structure development in injection moulded slowly crystallising polymers and fast crystallising polymers. Give suitable examples. [8]
- c) Compare in short, gas assisted injection moulding and water injection moulding. [2]

Q11) a) Discuss the process of laser machining in polymers. [8]

b) Discuss the types of printing techniques on plastic products. [8]

OR

Q12) a) Write short notes on any two of the following w.r.t plastics. [8]

i) Vacuum metallising

ii) Hot stamping

iii) Electroplating

b) How does machining of plastics differ from machining of metals?
Discuss. [8]

□□□

Total No. of Questions : 12]

SEAT No. :

P1203

[Total No. of Pages :3

[4659] - 317

B.E. (Polymer)

FIBER TECHNOLOGY

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *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) Briefly explain Criteria for fiber forming polymers. [6]
- b) Among silk, cotton, nylon and polyester (PET) which one are natural fibers and synthetic fibers? Justify your answer. [6]
- c) Comment on characteristics and uses of silk fiber. [6]

OR

- Q2)** a) Tri-functional monomers are not suitable to synthesize fiber grade polymers. Is statement true or false? Justify. [6]
- b) Explain in detail why two-stages are preferred over single step while polymerizing fiber grade PET. [6]
- c) Write down the raw materials, their chemical structures and reactions involved in synthesis of fiber grade PET and Nylon 66 polymers. [6]

- Q3)** a) What are various types of quench system used in melt spinning operation? Draw appropriate schematic diagram and, alongwith merits and demerits explain any one system. [8]
- b) Write a short note On Dry - jet wet spinning technique used to manufacture fibers. [8]

OR

P.T.O.

Q4) a) With schematic diagram explain how shear and elongational flow velocity gradients vary with the distance from spinneret exit. [8]

b) Why orientation of molecules due to shear flow is in effective compared to that due to elongational flow in case of melt spinning? [8]

Q5) a) Briefly comment on the functions of spin finish. [8]

b) What are chemical constituents present in spin finish formulation? What are their functions? [8]

OR

Q6) a) Write a short note on Dipping roller technique used in coating spin finish during spinning operation. [8]

b) With schematic diagram explain the concept of textured and non-textured filament. What is texturing process? [8]

SECTION - II

Q7) a) With examples explain classification of natural and synthetic fibers. [9]

b) Why identification is necessary for fibers. Explain in detail with few test required. [9]

OR

Q8) a) What are the advantages of synthetic fibers over natural fibers? [9]

b) Explain what are staple fibers and give method used for obtaining either natural or synthetic staple yarn. [9]

Q9) a) What is the difference between dyeing and mass coloration. Explain techniques used for mass coloration for any one polymer. [8]

b) What are acid and basic dyes. Explain the terms chromophore and vat dye. [8]

OR

Q10)a) Explain disperse dyeing and also carrier dyeing with their advantages and disadvantages. [8]

b) Explain high temperature and thermosol dyeing techniques. [8]

Q11)a) Explain what are microfibers and what is their speciality. [8]

b) Write a note on Spandex and give the reason behind the properties attained by this fiber. [8]

OR

Q12)a) Explain why fibers are modified and explain with few examples. [8]

b) Explain the terms bi-component fibers, Also explain the modified fiber obtained from Nylons. [8]



Total No. of Questions : 12]

SEAT No. :

P1204

[4659]-318

[Total No. of Pages : 7

B.E. (Polymer)

b-MECHANICS OF COMPOSITES

(Semester-I) (409364)(2008 Course)(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) *Neat diagrams must be drawn, wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Explain the term coefficient of mutual influence. Prove that apparent engineering constant $\eta_{xy,y}$ for an orthotropic lamina stressed in non-principal material direction in terms of engineering constants in given by- [7]

$$\eta_{xy,y} = E_y \left[\left[\frac{2}{E_1} + \frac{2\nu_{12}}{E_1} - \frac{1}{G_{12}} \right] \sin^3 \theta \cos \theta - \left[\frac{2}{E_2} + \frac{2\nu_{12}}{E_1} - \frac{1}{G_{12}} \right] \sin \theta \cos^3 \theta \right]$$

b) An unidirectional lamina oriented at 45° has following properties: [7]

$$E_1 = 135\text{GPa}, E_2 = 7\text{GPa}, G_{12} = 5\text{GPa}, \nu_{12} = 0.28.$$

If a stress of 9 MPa is applied in the x-direction and 6 MPa in the y-direction, Determine the strains in local directions and global directions.

c) Write down the stiffness matrix and compliance matrix in terms of engineering constants for an orthotropic lamina for plane stress condition. [4]

OR

P.T.O.

Q2) a) Prove the condition of symmetry for stiffness matrix for orthotropic material $C_{ij} = C_{ji}$. [5]

b) A unidirectional lamina has fibers at $+45^\circ$ to the coordinate axis. The lamina properties in the principal material directions are given below. Determine the invariants of the lamina. [9]

$$E_1 = 120\text{GPa}, E_2 = 10\text{GPa}, G_{12} = 5\text{GPa}, \nu_{12} = 0.28$$

c) Write stiffness matrix and compliance matrix in terms of engineering constants for anisotropic (21 constants) and isotropic lamina (2 constants). [4]

Q3) a) A lamina has following engineering properties: [8]

$$E_{11} = 207\text{GPa},$$

$$E_{22} = 19\text{GPa},$$

$$\nu_{12} = 0.21,$$

$$G_{12} = 6.4\text{GPa}$$

Failure strengths are:

Tensile Failure strength in direction 1=1500MPa

Tensile Failure strength in direction 2=50MPa

Compressive failure strength in direction 1=500MPa

Compressive Failure strength in direction 2=400MPa

Shear failure strength =5GPa

Fibers are oriented at 45 degrees and following loads in non-principal directions are applied

$$\sigma_x = 5\text{MPa}$$

$$\sigma_y = 2\text{MPa}$$

$$\tau_{xy} = -2\text{MPa}$$

Check failure by any two failure criteria.

- b) Determine the coefficients of thermal expansion α_1 and α_2 of a uniaxial lamina with. [8]

$$E_{\text{fiber}} = 80 \text{ GPa}, E_{\text{matrix}} = 5 \text{ GPa}, \nu_{\text{Fiber}} = 0.25, \nu_{\text{matrix}} = 0.38,$$

$$\alpha_{\text{fiber}} = 5 \times 10^{-6}/^{\circ}\text{C}, \alpha_{\text{matrix}} = 85 \times 10^{-6}/^{\circ}\text{C}$$

Volume fraction of fiber = 0.5.

OR

- Q4)** a) Show that uniaxial off-axis Tsai-Hill criteria reduces to [8]

$$\frac{\cos^4 \theta}{X^2} + \left[\frac{1}{S^2} - \frac{1}{X^2} \right] \cos^2 \theta \sin^2 \theta + \frac{\sin^4 \theta}{Y^2} = \frac{1}{6X^2}$$

where X and Y are tensile or compressive strengths in direction 1 or 2 and s is shear strength in 1-2 plane.

- b) Write a detailed note on Tsai-Wu failure criteria. Explain the significance of the fourth order tensor used. [8]

- Q5)** a) Write in short about significance of parameters ξ and η in Halpin -Tsai equations which are dependent on the fiber geometry and fiber packing geometry. Show also that Halpin-Tsai equations reduce to upper bound and lower bound of the composite modulus in extreme situations. [9]

- b) For a lamina following things are know- [7]

$$E_1 = 2E_2 \text{ and } G_{12} = E_2 \nu_{12} = 0.3$$

Find ν_{xy} at 45°

OR

- Q6) a)** Following data about a lamina with 50% fibers is known-
 $E_{fibers} = 20\text{GPa}$, $E_m = 2\text{GPa}$, $\nu_m = 0.2$ Estimate composite modulus E_2 by
 Mechanics of Materials approach and by Halpin-Tsai equations assuming
 factor $\xi = 1$ [7]
- b) Derive an equation for prediction of E_1 , modulus in fiber direction, using
 mechanics of materials approach. [9]

SECTION-II

- Q7) a)** A single layer Specially Orthotropic laminate having 1 mm thickness has
 following engineering constants [6]

$$E_{11} = 207\text{GPa}$$

$$E_{12} = 19\text{GPa}$$

$$\nu_{12} = 0.21$$

$$G_{12} = 6.4\text{GPa}$$

Calculate [A], [B] and [D] matrix for the laminate

- b) Write in short about laminate design procedure with a neat flow chart for
 the design procedure. [5]
- c) Give example of symmetric laminate with multiple specially orthotropic
 layers and write force and moment relationship for the same. Explain
 also regular symmetric cross ply laminates and comment on elements-
 A_{16} , A_{26} , D_{16} and D_{26} [7]

OR

- Q8) a)** A quasi- isotropic laminate having configuration $[-60/0/+60]$ with each lamina having thickness of 0.2 mm has [A], [B] and [D] matrix element as follows: [7]

$$[A] = \begin{bmatrix} 36.22 & 10.88 & 0 \\ 10.88 & 36.22 & 0 \\ 0 & 0 & 12.67 \end{bmatrix} \text{GPa} - mm$$

$$[B] = \begin{bmatrix} 0 & 0 & -1.22 \\ 0 & 0 & -3.32 \\ -1.22 & -3.32 & 0 \end{bmatrix} \text{GPa} - mm^2$$

$$[D] = \begin{bmatrix} 0.442 & 0.447 & 0 \\ 0.447 & 1.482 & 0 \\ 0 & 0 & 0.497 \end{bmatrix} \text{GPa} - mm^3$$

Calculate midplane strains and curvatures if $N_{xx} = 100 \text{KN} / \text{meter}$ is applied to the laminate.

- b) Discuss the assumptions of classical lamination theory and obtain expressions for force per unit width and moment per unit width in terms of [A],[B] and [D] matrix. [7]
- c) Calculate the elements of [A], [B] and [D] matrix for a single layer isotropic laminate having thickness “t” in terms of engineering constants. [4]
- Q9) a)** A hybrid laminated beam is to be designed having carbon-epoxy layer with each ply having 0.1mm thickness and boron-epoxy layer with each ply having 0.2 mm thickness. The arrangement of layers each having thickness t_0 in the hybrid laminate is as shown in fig below. Assume that fibers in the laminate are parallel to beam axis and this is to replace a steel beam having bending stiffness equal to $30 \text{KN} \cdot \text{m}^2$. Assume width of beam to be 25.4 mm. Given that $E_{\text{carbon}} = 200 \text{GPa}$ and $E_{\text{boron}} = 150 \text{GPa}$

- i) Calculate thickness of hybrid laminated beam.
- ii) Calculate the number of plies in carbon layers and number of plies in boron layers.

| |
|--------------|
| Carbon-epoxy |
| Boron-Epoxy |
| Carbon-epoxy |
| Boron-Epoxy |
| Carbon-epoxy |

[10]

- b) Write basic restrictions assumptions and consequences of these restrictions and assumptions in deriving the governing equations for bending, buckling and vibrations of laminated plates. [6]

OR

- Q10)a)** A pressure vessel is to be designed having 500 mm as diameter with E-glass-epoxy laminate. The internal design pressure for the vessel is 2 bar. It is proposed to have symmetric laminate structure with $[+45/-45]_s$ configuration with each lamina 6 mm thick. Calculate the strain in the laminate Given- [9]

$$[A] = \begin{bmatrix} 962.6 & 806.6 & 0 \\ 806.6 & 962.6 & 0 \\ 0 & 0 & 829.6 \end{bmatrix} \times 10^6 \text{ N / m}$$

$$[D] = \begin{bmatrix} 46.2 & 38.7 & 27 \\ 38.7 & 46.2 & 27 \\ 27 & 27 & 39.8 \end{bmatrix} \times 10^3 \text{ N / m}$$

- b) With neat figures, explain in details adhesive joints and bolted joints for laminated composites. Also explain failure modes in bolted joints. [7]

- Q11) a)** Explain Celanese compression test and Sandwich edgewise compression testing of composites. [8]

- b) Explain Laser shearography and X-radiography as non destructive test methods for fiber reinforced composites. [8]

OR

- Q12)** a) Write in short about two fatigue test methods for fiber reinforced composite materials. [6]
- b) Write in short about shear-out, bearing, net tension and cleavage failure modes in fiber reinforced composites. [5]
- c) Explain test configuration for a two rail and three rail shear test and explain test strain gauge arrangement for determining the shear modulus. [5]

□□□

Total No. of Questions : 12]

SEAT No. :

P1115

[4659] - 319

[Total No. of Pages : 3

B.E. (Polymer Engineering)
c - POLYMER REACTION ENGINEERING
(2008 Course) (Elective - I) (409364)

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 the following quantities **[8]**
- i) First moment of P_j 's
 - ii) Zeroth moment of P_j 's and show that First moment of P_j 's = M^0 -M.
- b) Discuss the importance of molecular weight and Molecular weight distribution of polymer. Explain the distinctive features of Polymer Reaction Engineering. **[10]**

OR

- Q2) a)** Explain the following quantities to be used in the Characterization of Long Chain Molecules: **[12]**
- i) Weight Fraction,
 - ii) First moment of P_j 's
 - iii) Number Average Degree Of Polymerization
 - iv) Weight Average Degree Of Polymerization
 - v) Number Average Molecular Weight
 - vi) Weight Average Molecular Weight

P.T.O.

- b) Find the Number average, weight average Molecular weight and polydispersity Index of the given mixture which is composed of 1 molecule of 10,000 monomer lengths and 19 molecules of 20,000 monomer lengths and 25 molecules of 2000 monomer lengths. [6]

Q3) a) Discuss the mechanism of Ionic polymerization and derive the necessary expression for Instantaneous Fractional Degree of Polymerization and Instantaneous weight Degree of Polymerization by using Ionic polymerization. [10]

- b) Discuss all the mechanism steps to be used in Free radical polymerization. [6]

OR

Q4) In a batch reactor by using Benzoyl peroxide as an Initiator polymerization of monomer (styrene) is carried out at 60°C. The initial concentration of monomer is 18 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 $K_0 = 5 \times 10^{-7} \text{ sec}^{-1}$, $k_p = 106 \text{ lit/gmole.sec}$, $k_c = 2.6 \times 10^7 \text{ lit/gmole.sec}$, $f = 0.6$. Find the percentage conversion, Instantaneous Number Degree of Polymerization, Number Average molecular weight for a reaction time of 4800 sec. [16]

Q5) a) Describe with neat diagram role of Critical Micelles Concentration. [6]

- b) Describe the Three Stages of Emulsion Polymerization needed to understand the kinetics. [10]

OR

Q6) a) Discuss the necessary equation for the steady state population balance equation for the particles having 'n' radicals in the Emulsion polymerization. [10]

- b) Differentiate between Bulk, Solution, Suspension and Emulsion Polymerization. [6]

SECTION - II

Q7) Describe with neat process sheet the reactor systems used for HDPE, Nylon 6 polymers. [18]

OR

- Q8)** a) Discuss with neat diagram the German Tower process for polymerization of styrene. [9]
b) Discuss the process flow sheet for the manufacture of PVC by suspension polymerization. [9]

- Q9)** a) Derive the suitable model to understand the step growth kinetics at higher conversion. [8]
b) In step growth polymerization distribution function in terms of degree of polymerization is given by $W_{DP} = DP (\ln p)^2 p^{DP}$ find number average and weight average degree of polymerization. Where, DP = Degree of polymerization and p = percentage conversion. [8]

OR

- Q10)** a) Discuss the role of mass transfer in step growth polymerization. Explain how to control of molecular weight in Step growth polymerization. [10]
b) Write a note on types of metallocene Catalyst. [6]

Q11) Write a short note on Reactor Selection for carrying out polymerization reaction and Role of control engineering in Polymerization reactor. [16]

OR

- Q12)** a) Write a note on Safety of Polymerization reactors. [8]
b) Explain with neat sketch process variable used in polymerization process. [8]



Total No. of Questions : 12]

SEAT No. :

P731

[Total No. of Pages : 4

[4659] - 32

B.E. (Mechanical Engineering) (Semester - I)

CAD / CAM & AUTOMATION

(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 Q. No. 1 OR Q.No.2, Q.No.3 OR Q.No. 4, and 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 12 from section - II.*
- 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 and mention it clearly.*

SECTION - I

- Q1)** a) Explain co-ordinate systems used in geometric transformations [6]
b) Find a transformation matrix that transforms the given square ABCD to half with its size still remaining at the same position. The co-ordinates of the square are: A(1,1), B(3,1), C(3,3) and D(1,3) and centre at (2,2). Also find the resultant co-ordinates of square [10]

OR

- Q2)** a) Explain types of perspective projections used to project views in different forms. [6]
b) A triangle with vertices A (2,2), B (5,2) and C(4,7) is to be reflected about the line $y = 0.5x + 3$. Determine, [10]
i) Composite transformation matrix.
ii) New vertices of triangle ABC.

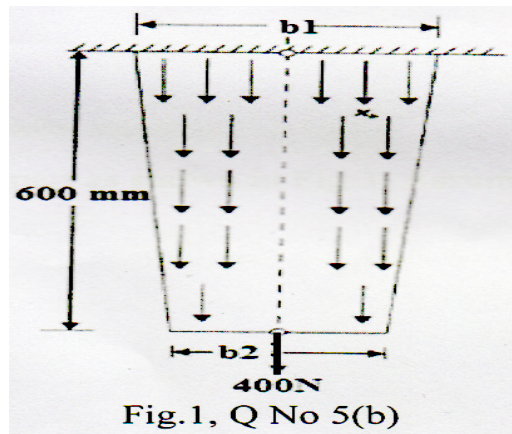
- Q3)** a) Compare between parametric and non parametric representation of curves[6]
b) Explain boundary representation modeling technique and enlist its advantages over other modeling techniques [10]

P.T.O.

OR

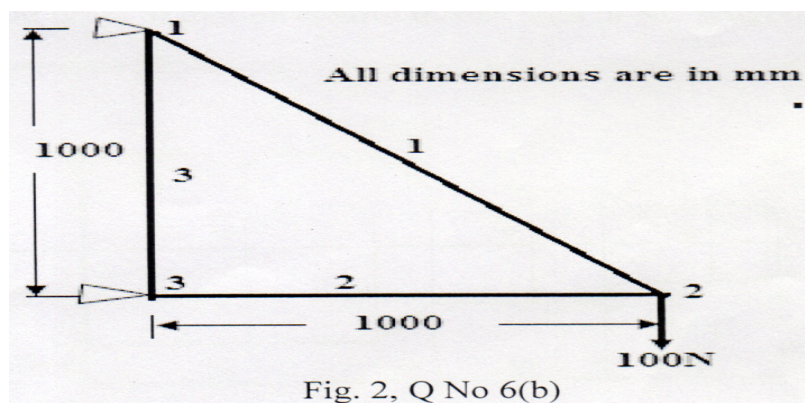
- Q4)** a) Explain briefly parametric representation of analytical surfaces [8]
b) Find the co-ordinates points of the Hermite cubic curve at $u = 0.25$, when curve start from points $A(0,3)$ and ends at $B(4,2)$. The tangents makes an angle of 45° and 90° with respect to horizontal from points A and B respectively [8]

- Q5)** a) Derive an elemental stiffness matrix for 1D bar element [6]
b) The thin plate of uniform thickness 20mm is as shown in fig 1. In addition to the self-weight, the plate is subjected to a point load of 400N. The young's modulus $E=2 \times 10^5 \text{N/mm}^2$ and density $\rho=0.8 \times 10^{-4} \text{N/mm}^3$. Find the stresses, displacement in the element and also determine the support reactions. Take $b_1 = 150\text{mm}$ and $b_2 = 75\text{mm}$. [12]



OR

- Q6)** a) Explain Plane stress and strain conditions with suitable Examples [6]
b) Fig. 2 shows truss consisting of three elements, where EA/L is equal to 1000 N/mm. Determine displacements at node 2 and reaction supports. [12]



SECTION - II

- Q7)** a) Explain G28, G03 and G13 with suitable examples. [6]
 b) Write CNC program for the part as shown in Fig. 3. Assume suitable data. [12]

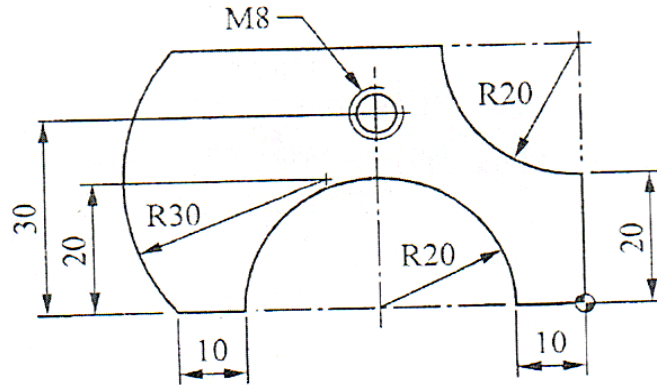


Fig. 3, Q No 7(b)

OR

- Q8)** a) Explain different types of motion control modes used in NC programming. [6]
 b) Write NC part program for the part shown in Fig.4. Assume suitable data. [12]

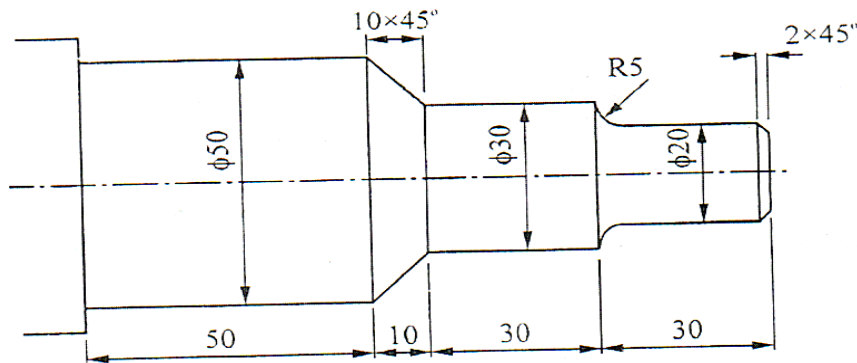


Fig. 4, Q No 8(b)

- Q9)** a) Define automation ? Explain different types of automation. [8]
 b) Explain part classification and coding systems used in Group Technology [8]

OR

- Q10)** a) Differentiate between CNC and DNC [8]
 b) Write a note on Adaptive control system [8]

Q11)a) Explain various factors to be considered during selection of end effectors. [8]

b) Explain vacuum gripper with the help of neat sketch and enlist its merits and demerits [8]

OR

Q12)a) Enlist classification of robots and explain servo controlled robot in brief. [8]

b) Explain the applications of robots in industries [8]



Total No. of Questions : 12]

SEAT No. :

P1116

[4659] - 320

[Total No. of Pages : 7

B.E. (Polymer Engineering)

a - PRODUCTION PLANNING AND CONTROL
(2008 Course) (Elective - II) (Semester - I) (Regular) (409365)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** A Company has 6 jobs which go through 3 machines X, Y, Z in the order XYZ. The processing time in minutes for each job on each machine is as follows. [9]

| Job | 1 | 2 | 3 | 4 | 5 | 6 |
|-----|----|----|----|----|----|----|
| X | 18 | 12 | 29 | 36 | 43 | 37 |
| Y | 7 | 12 | 11 | 2 | 6 | 12 |
| Z | 19 | 12 | 23 | 47 | 28 | 36 |

Find the optimal sequence of the jobs. Find the minimum elapsed time and the idle time for each machine.

- b) A project network consists of the following activities with corresponding time duration. [9]

| Activity | Duration in days |
|----------|------------------|
| 1-2 | 6 |
| 1-3 | 5 |
| 2-4 | 10 |
| 3-4 | 3 |
| 3-5 | 4 |
| 4-5 | 6 |
| 4-6 | 2 |
| 5-6 | 9 |

Draw the network and find the critical path and project completion time. Find also the total, free and independent floats for each activity.

OR

P.T.O.

- Q2) a)** A Company has six jobs on hand, coded “A” to “F”. All the jobs have to go through two machines M1 and M2. The time required for each job on each machine, in hour, is given below: [9]

| Job | A | B | C | D | E | F |
|-----|---|----|----|----|----|----|
| M1 | 3 | 12 | 18 | 9 | 15 | 6 |
| M2 | 9 | 18 | 24 | 24 | 3 | 15 |

Determine the optimal sequence of jobs that will minimise the total time. Find the minimum elapsed time and the idle time for each machine, by preparing the time-in and time-out table for both the machines.

- b)** A project consists of following activities and time estimates: [9]

| Activity | Duration | | |
|----------|------------|------------|-------------|
| | Optimistic | Mostlikely | Pessimistic |
| 1-2 | 1 | 1 | 7 |
| 1-3 | 1 | 4 | 7 |
| 2-3 | 2 | 2 | 8 |
| 2-4 | 1 | 1 | 1 |
| 3-5 | 2 | 5 | 14 |
| 4-5 | 2 | 5 | 8 |
| 5-6 | 3 | 6 | 15 |

- i) Draw the network.
- ii) Find the expected time and variance for each activity.
- iii) Find the probability that the project will be completed one week earlier than the expected time. Given area under the normal curve from $z = 0$ to $z = 0.32$ is 0.1255.

- Q3) a)** The annual requirement of machine parts for the company is 16,000 units and the cost of one unit is Rs 20. The cost for placing the order is Rs 15 and the holding cost is 15% of the cost per unit, per year. The company is at present placing orders every month. If the company decides to adopt the EOQ model, how much would it save and what would be the optimal period? [8]

- b) Annual demand for a product is 2,400 units. Ordering cost is Rs100, inventory carrying cost 24% of the purchase price per year. Discount on the purchase price is offered as follows: [8]

| Order quantity, Q | Purchase price per unit |
|----------------------|-------------------------|
| $0 \leq Q_1 < 500$ | Rs.10 |
| $500 \leq Q_2 < 750$ | Rs.9.75 |
| $750 \leq Q_3$ | Rs.8.75 |

Determine the optimum purchase quantity.

OR

- Q4) a)** An automobile factory manufactures a particular type of gear within the factory. This gear is used in the final assembly. The demand rate of gears is 14,000 units/year and production rate is 35,000 units/year. Set up cost is Rs 500 per set up and carrying cost is Rs 15/unit/year. Find the economic batch quantity and the number of runs per year. Find also the minimum annual inventory cost during each run. For how many days in the year there is no production? Assume that the number of working days for year is 250. [8]
- b) The demand of an items is uniform at a rate of 25 minutes per month. The fixed cost is Rs 15 each time an production run is made. The production cost is Rs 1 per item. An inventory carrying cost is Rs 0.3 per item per month. If the shortage cost is Rs 1.5 per unit item per month, what should be the optimum lot size? What would be the optimum inventory total cost? What quantity of the item should be back ordered? Also determine the cycle time. [8]

- Q5) a)** Write short notes on following process capability indices. Give significance and limitations. [8]

- i) C_{pk} index
- ii) C_p index
- iii) P_{pk} index
- iv) C_{pm} index

- b) For a sampling plan- $N = 2000$, $n = 50$, Acceptance number $c = 1$. [8]
- 1) Determine probability of acceptance of following lots
 - i) 0.5%
 - ii) 1%
 - iii) 2%
 - iv) 4%
 - v) 5%
 - vi) 8%
 - vii) 10%
 - 2) Draw operating characteristics.

OR

- Q6)** a) Surface roughness of extruded sheet is measured and Mean Roughness was found to be 0.02 units. The design specification mentions that the surface roughness cannot exceed 0.04 units. The standard deviation was found to be 0.003 units. Compute C_p index. [4]
- b) Electric switches made of polycarbonate by injection moulding are inspected for defect of black spots. The inspection of first 10 samples of size 50 from a lot reveals following data: [6]

| | | | | | | | | | | |
|----------------------|---|---|---|---|---|---|---|---|---|----|
| Sample number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Number of defectives | 4 | 3 | 2 | 5 | 1 | 7 | 2 | 4 | 2 | 1 |

Draw p-chart and comment whether the process is under control.

- c) Write in short, about control chart for standard deviation or σ -chart. Compare also with R-Chart. [6]

SECTION - II

- Q7)** a) The cost of assigning any one operator to any one machine is given in the following table. [9]

| | | Machines | | | |
|-----------|---|----------|----|----|----|
| | | M1 | M2 | M3 | M4 |
| Operators | A | 18 | 26 | 17 | 11 |
| | B | 13 | 28 | 14 | 26 |
| | C | 38 | 19 | 18 | 15 |
| | D | 19 | 26 | 24 | 10 |

Find the optimal assignment and the total cost.

- b) A company has three plants A, B, C and three warehouses X, Y, and Z. The number units available at the plant are 60, 70 and 80. The demand at X, Y and Z are 50, 80 and 80 respectively. The unit cost of transportation is given in the following table. [9]

| | X | Y | Z |
|---|----|---|---|
| A | 8 | 7 | 3 |
| B | 3 | 8 | 9 |
| C | 11 | 3 | 5 |

Using Vogel's approximation method, find the optimum allocation to minimise the cost.

OR

- Q8) a) Solve the following transportation problem: [9]

| | A | B | C | D | Supply |
|--------|----|----|----|----|--------|
| 1 | 11 | 20 | 7 | 8 | 50 |
| 2 | 21 | 16 | 20 | 12 | 40 |
| 3 | 8 | 12 | 8 | 9 | 70 |
| Demand | 30 | 25 | 35 | 40 | |

- b) A marketing manager has to assign 4 salesmen to 4 districts. Considering the capabilities of the salesmen and the sales potential of each district, the manager estimates the sales per month (in thousand Rs) for each salesmen in each district as follows. [9]

| Salesmen | Districts | | | |
|----------|-----------|-----|----|-----|
| | A | B | C | D |
| P | 140 | 112 | 98 | 154 |
| Q | 90 | 72 | 73 | 99 |
| R | 110 | 88 | 77 | 121 |
| S | 80 | 64 | 56 | 88 |

Find the assignment of salesmen to districts that will result in maximum sale.

- Q9) a) The arrival rate of the customers at the banking counter follows Poisson's distribution with a mean rate of 30 per hour. The time required to serve a customer has an exponential distribution with a mean of 40 per hour. Find- [8]

- The probability that a customer has to wait for service.
- The average number of customer in the queue.
- The average time a customer has to wait for service in the queue, as well as in the system.

- b) Cars arrive at a drive-in hotel with a mean arrival rate of 24 cars per hour and the service rate is 20 cars per hour. The arrival rate and service rate follows Poisson's distribution. The number of parking space for cars is only 4. Find- [8]
- The probability that on arriving, a car finds parking space.
 - Average waiting time per car in the parking space, as well as in the system.

OR

- Q10)a)** Trucks arrive at a loading dock at an average rate of 4 trucks per hour. The loading of a truck takes 10 minutes on the average by crew consisting of three load men. The operating cost of a truck is Rs 50 per hour, and the load men are paid at the rate of Rs 12 each per hour. Is it advisable to add another crew of three load men? [7]
- b) There are two clerks in university office to receive dues from the students. If the service time for each student is exponential with mean 6 minutes, and the students arrive in Poisson's fashion at the rate of 15 per hour, find- [9]
- The probability that there are at least two students in the system.
 - Expected percentage of idle time for each clerk.
 - Average waiting time for each student in the queue as well as in the system.

- Q11)a)** A company is bringing out a new product. The company needs to decide whether to bring out a full, partial or minimal product time. The company has three levels of product acceptance and has estimated their probability of occurrence. The company will decide on the basis of maximum expected profit from the first year of production. The relevant data is given below: [8]

| Product acceptance | Probability | Product line | | |
|--------------------|-------------|--------------|---------|---------|
| | | Full | Partial | Minimal |
| Good | 0.2 | 80 | 70 | 50 |
| Fair | 0.4 | 50 | 45 | 40 |
| Poor | 0.4 | -25 | -10 | 0 |

Construct the conditional profit and opportunity loss tables. Calculate EMV and EVPI. Determine the optimal product line and its expected profit.

- b) Transform the following pay-off matrix into an equivalent linear programming and solve it, using simplex method. [8]

| | | | |
|----------|----------|---|---|
| Player A | Player B | | |
| | 2 | 2 | 3 |
| | 4 | 3 | 2 |

OR

- Q12)a) Define the terms. [8]
- Saddle Point.
 - Value of the game.
 - Fair game

Solve the game whose pay-off matrix is given below:

| | | | | |
|----|----|----|----|----|
| 3 | -1 | 4 | 6 | 7 |
| -1 | 8 | 2 | 4 | 12 |
| 16 | 8 | 6 | 14 | 12 |
| 1 | 11 | -4 | 2 | 1 |

- b) A company is considering the following courses of action with regard to newly invited electronic device- [8]
- Manufacture the device by the company itself.
 - Be paid a royalty by handing over to another manufacturer,
 - Sell the right for a lump Sum.

The profit (in thousand Rs) which can be expected in each case and the associated probabilities with the level of sales are given below:

| Outcome | Probability | Manufacture by company | Royalties | Sell Rights |
|-------------|-------------|------------------------|-----------|-------------|
| High Sale | 0.1 | 75 | 35 | 15 |
| Medium sale | 0.3 | 25 | 20 | 15 |
| Low sale | 0.6 | -10 | 10 | 15 |

Draw a decision tree to represent the situation and find the most preferred decision and the corresponding expected value.



Total No. of Questions : 12]

SEAT No. :

P1772

[Total No. of Pages : 3

[4659]-322

**B.E. (Polymer Engineering)
c-PACKAGING TECHNOLOGY
(2008 Course) (Elective-II) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Enlist various materials used for packaging purpose. With appropriate application example explain these in detail. [8]
- b) Polymers have secured significant share in packaging sector. Do you agree? Justify your answer. [3]
- c) Briefly explain the purposes of packaging. [5]

OR

- Q2)** a) With suitable examples explain in detail concept of primary-, secondary- and tertiary-packaging. [8]
- b) Explain the concept of packaging and comment on the characteristics of packaging. [8]
- Q3)** a) What is 3-R technology? Explain in detail its significance. [8]
- b) What are various inspection methods used in packaging field? Explain any two in detail. [8]

OR

- Q4)** a) Write a short note on Legislation followed in packaging sector. [8]
- b) What do you understand by Shelf Life of Packaging? Briefly explain various factors affecting it. [8]

P.T.O.

- Q5) a)** Explain the terms Permeability, Diffusivity and Solubility. Derive the equation to explain their relationship. [9]
- b) A multilayer structure was made up of HDPE and PP with 50 μ m and 75 μ m thickness respectively. Calculate the overall permeability constant of this structure for oxygen. The oxygen permeability constants of HDPE and PP are $4.0 \times 10^4 \text{ cm}^3 \mu\text{m}/\text{m}^2\text{d.atm}$ and $5.0 \times 10^4 \text{ cm}^3 \mu\text{m}/\text{m}^2\text{d.atm}$ respectively. [9]

OR

- Q6) a)** Explain in detail the stages involved in design and development of plastic bottle. [8]
- b) A packaging material had 3-layered structure-2 mil PC, 0.6 mil PVDC, and 4 mil PC. Calculate the overall WVTR. [Given data: WVTR for PC is 11.0 g mil/100 in² 24h at 37.8°C, 90%RH, while that for PVDC is 0.40g mil/100 in² 24h at 37.8°C, 90% RH]. [8]
- c) Enlist the advantages of MAP. [2]

SECTION-II

- Q7) a)** Explain in detail following tests-Puncture Resistance and Torsion Resistance. [10]
- b) Comment on significance of burst strength in packaging. Explain in detail Mullen burst test. [6]

OR

- Q8) a)** Write a short note measurement of tensile strength of packaging structure. [8]
- b) Explain in detail the method to find out chloride content. Give at least one example where this test will be necessary. [8]
- Q9) a)** Comment on importance of stiffness in packaging. With schematic diagram explain how it is measured. [8]
- b) Write a short note on Chemical properties and Flammability of packaging material. [8]

OR

- Q10)a)** Write short note on-Sulphate Content and Elmendor tear strength. [10]
- b) Comment on the micro-organism sensitivity of packaging material and its importance. [6]

- Q11)a)** Alongwith the significance explain the concept of Eco-friendly packaging. [6]
- b) Comment on the importance of labeling in packaging. [6]
- c) Explain the process of VFFS. Draw suitable diagram. [6]

OR

- Q12)a)** Write a short note on Tetrapack® process. [8]
- b) Discuss in detail pre-wash and wash cycles used in cleaning packaging bottles. [4]
- c) With suitable schematic, explain various considerations to be taken into account while exporting the packaging material. [6]



Total No. of Questions : 12]

SEAT No. :

P1121

[4659]-328

[Total No. of Pages :2

B.E. (Polymer)

**a - APPLIED POLYMER RHEOLOGY
(2008 Course) (Elective - IV) (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 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) Define stress tensor and also strain tensor with one eg.each. [9]
b) Explain uniaxial extension and simple shear in non hookean solids. [9]

OR

- Q2)** a) Give viscosity models for general viscous fluids and explain visco-plastic models. [9]
b) Explain polar decomposition theorem. [9]
- Q3)** a) Explain General linear viscoelastic model. [8]
b) Explain stress relaxation and creep with diagram. [8]

OR

- Q4)** a) Explain non-linear viscoelasticity as well as normal stress difference with egs in shear. [8]
b) Explain shear thinning effect and also shear thickening effect and reason behind it. [8]
- Q5)** a) List different types of rheometers and explain concentric cylinder rheometer. [8]
b) Explain sliding plates and falling ball rheometer in detail. [8]

OR

P.T.O.

- Q6)** a) Explain cone and plate rheometer and derive equation for viscosity. [8]
b) Explain parallel disks rheometer and also explain squeezing flow behaviour. [8]

SECTION-II

- Q7)** a) Write note on : simple extension in Extensional rheometry with egs. and its significance. [9]
b) Write note on: [9]
i) rotating clamps,
ii) buoyancy bath

OR

- Q8)** a) Explain multiaxial extension and fiber spinning with rheology generated. [9]
b) Explain tubeless siphon, bubble collapse, and stagnation flow. [9]
Q9) a) Explain polymer chain conformation, zero shear viscosity. [8]
b) Explain rheology of dilute polymer solutions with egs. [8]

OR

- Q10)** a) Explain Reptation Model and its significance. [8]
b) Give effect of long chain branching and effect of molecular weight distribution on flow properties. [8]
Q11) a) Why rheology is to be known while processing. Explain with egs. [8]
b) Explain rheology developed during Calendaring and two roll mill. [8]

OR

- Q12)** a) Explain rheology developed with Twin screw extruders. [8]
b) Explain rheology developed during Thermoforming as well as in internal mixers. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P1169

[4659] - 329

[Total No. of Pages : 3

B.E. (Polymer Engineering)

B : RUBBER TECHNOLOGY (Elective - IV)

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Write a short note on shortage hardening and crystallization of natural rubber. [6]
- b) What are the molecular requirements for a material to exhibit rubbery characteristics? [6]
- c) Discuss the thermodynamic theory of rubber elasticity. [6]

OR

- Q2)** a) What is rebound resilience w.r. t rubbers? How is it measured? Describe the test to measure the same. [6]
- b) What are the different stages in raw rubber technology? [6]
- c) Discuss any two rubbers w. r. t. preparation, structure, properties, compounding and applications. [6]

P.T.O.

Q3) a) Comment on the mixing machineries used for rubbers. Discuss with neat figures. [8]

b) Discuss the types of mix cycles used with rubbers. [8]

OR

Q4) a) Write note on any two additives used with rubbers. [8]

b) Discuss the basics of adhesion of rubbers to metal. [8]

Q5) a) Discuss the kinetics of rubber vulcanization. [8]

b) List the various methods of vulcanization and discuss. [8]

OR

Q6) a) Write a note on the Oscillating Disc Rheometer with a neat sketch of the rheograph. [8]

b) Discuss the various non-sulphur vulcanization systems. [8]

SECTION - II

Q7) a) Discuss extrusion of rubbers. [9]

b) Write a note on calendaring of rubbers. State some faults in calendaring with reasons and remedies. [9]

OR

Q8) a) Differentiate between injection molding of rubbers and thermoplastic polymers. [9]

b) Discuss in details compression molding of rubbers. State its advantages. [9]

Q9) a) Comment on the various components of a rubber tyre. State the role of each component. [8]

b) Discuss the steps in making of natural rubber latex gloves. [8]

OR

Q10)a) How are rubber hoses manufactured? [8]

b) With a neat flow chart explain the manufacture of rubber conveyor belts.[8]

Q11)a) Discuss two tests for testing of raw rubber. [8]

b) Discuss a test for determination of low temperature properties of rubbers.[8]

OR

Q12)a) How is permeability tested in rubber samples? Discuss. [8]

b) Discuss the method to find compression set in rubbers. [8]



Total No. of Questions : 12]

SEAT No. :

P1122

[4659]-330

[Total No. of Pages : 3

B.E. (Polymer Engineering)

POLYMER THERMODYNAMICS AND BLENDS

(2008 Course) (Elective - IV) (Semester - II) (409371 - C)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 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 calculator is allowed.*

SECTION-I

Q1) a) Explain the following terms: **[12]**

- i) Steady State
 - ii) Equilibrium State
 - iii) Phase Rule
 - iv) Intensive Properties
- b) Describe first law of thermodynamics and State Limitations of The First Law of Thermodynamics. **[6]**

OR

Q2) a) Explain in detail Entropy term and State the Third Law of Thermodynamics. **[9]**

- b) Explain thermodynamic criteria of polymeric dissolution. Describe the condition under which it is not a spontaneous process. **[9]**

Q3) a) Define the excess properties and derive the relation for S^E , G^E , H^E , V^E (S=Entropy, G=Gibbs free energy, H=enthalpy, V=volume and suffix E for excess). **[8]**

- b) Write a short note on effect of molecular weight distribution on phase equilibrium. **[8]**

OR

P.T.O.

- Q4)** a) Write a short note on phase diagram. [8]
b) Describe assumptions of Hildebrand in explaining regular solutions. State its limitations of the theory. [8]

- Q5)** a) Explain with one example: [8]
i) Effect of Hydrogen bonding interaction.
ii) Effect of specific interaction like dipole- dipole interaction.
b) Explain miscibility of blend on the basis of thermodynamic principles. [8]

OR

- Q6)** a) Explain and derive 'Flory Huggins equation for polymer blends'. [8]
b) Explain the role of Hildebrand solubility parameter. [8]

SECTION-II

- Q7)** a) Discuss the advantages and Disadvantages of the following engineering Polymeric modifier: [10]
i) Polycarbonate (PC)
ii) Acrylonitrile Butadiene Styrene (ABS)
iii) Polyethylene Terephthalate (PET)
b) Discuss the following terms with suitable examples: [8]
Ease of processing, Economy, Enhanced Property, Ecology via Polymer Blend Technology.

OR

- Q8)** a) Explain any two methods of preparation of Polymer Blends with suitable example. [9]
b) With the help of two commercial examples, Property advantages and Applications discuss the term Miscible Blends. [9]
Q9) a) Discuss with examples Rubber Toughening of Brittle and Ductile Polymer matrix. [10]
b) Discuss the importance of Maleated Polymer in Polymers Blend Technology. [6]

OR

Q10)a) Discuss Equilibrium Morphology and phase inversion concept in polymer blends. [8]

b) Explain any two methods of characterization (Thermal and Microscopic) of polymer Blends. [8]

Q11) Write a note on: [16]

a) Semi-IPN of PU/PMMA.

b) Compatibilized Blend of PS/PP.

OR

Q12) Explain applicable Rheological models to explain Miscible and Immiscible Polymer Blends. [16]

EEE

Total No. of Questions : 12]

SEAT No. :

P875

[Total No. of Pages : 3

[4659]-332

B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION
(2008 Course) (Semester-I)

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 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) Clarify the following terms: [8]
- i) Proportional Element.
 - ii) Degrees of freedom.
- b) Differentiate clearly with suitable example multi capacity and single capacity process. [8]

OR

- Q2)** a) Explain in brief Dead time or transport delay processes. Discuss on controller design for deadtime dominant processes. [8]
- b) Clarify the following terms: [8]
- i) Self Regulating and Non Self Regulating Processes.
 - ii) Capacitance Element.

- Q3)** a) What is the need of analyzing process control loops? With the help of necessary diagrams and equations explain the procedure to test a typical Flow Control Loop. [10]
- b) Explain in brief: [8]
- i) Process gain
 - ii) Transmitter gain
 - iii) Valve gain
 - iv) Loop Gain

OR

P.T.O.

Q4) a) Apply Scaling & find out normalized (Scaled) equation for distillation column, following data is available: [10]

- i) Internal reflux rate (L_i) = 0 to 15000 GPM
- ii) External reflux rate (L) = 0 to 10000 GPM
- iii) Temperature of overhead vapors (T_o): 150–250°F
- iv) External reflux temperature (T_r): 125–225°F
- v) ΔT max: 50°F
- vi) C_p : 0.65 BTU/lb°F
- vii) ΔH : 250 BTU/hr

$$\text{Equation for distillation column is } \frac{L_i}{L} = \left[1 + \frac{C_p}{\Delta H} (T_o - T_r) \right].$$

b) Compare SLPC and MLPC. [8]

Q5) a) Discuss in brief three goals to evaluate the control performance. [8]

b) Draw a schematic of feedback control system and describe the necessary components of feedback control system. [8]

OR

Q6) a) What do you mean by Fine Tuning? Explain with suitable example. [8]

b) Explain in brief purpose of Correlations for Tuning Constants. [8]

SECTION-II

Q7) a) What is Auctioneering control? Explain with suitable application. [8]

b) Explain in brief Limiters & Negative Resistance. [8]

OR

Q8) a) What is cascade control system? Comment on selection of final control element for particular application. [8]

b) Explain the working of a Feedforward control with suitable application. Explain in brief importance of adding Feedback to it. [8]

Q9) a) Explain necessity of decoupling control. Determine RGA matrix for a system having process gain matrix, $K = \begin{bmatrix} 0.025 & -0.075 \\ 1 & 1 \end{bmatrix}$ [8]

b) Explain in brief procedure for calculating Relative Gain Array for 2 x 2 systems. List important properties of RGA. [10]

OR

Q10)a) In-line blending of two streams outlet flow F and composition X are to be controlled. The available manipulated variables are the inlet flow F1 with composition X1 & F2 with composition X2. The desired steady state for operational purposes is [10]

F = 200 moles/hr,

X = 60%

X1 = 80%

X2 = 20%

i) By using steady state mass balance, calculate the RGA.

ii) How would you pair the input-output variables for this process? Why?

b) Discuss in brief Influence of Interaction on Feedback Control. [8]

Q11)a) Explain with suitable block diagram “Internal Model Control”. Also discuss design steps. [8]

b) Explain with suitable block schematic Self Tuning Controller. [8]

OR

Q12) Write short notes on any two: [16]

a) Fuzzy Logic Controller.

b) Dynamic Matrix Controller.

c) Back Propagation Algorithm.



Total No. of Questions : 12]

SEAT No. :

P877

[Total No. of Pages : 2

[4659]-334

**B.E. (Instrumentation and Control)
PROJECT ENGINEERING AND MANAGEMENT
(2008 Pattern) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) a) Explain the co-ordination activities between electrical, mechanical and safety department with instrumentation department in a project. [8]

b) What is project management? Explain role of project manager. [8]

OR

Q2) a) What is organizational structure? Draw an organizational structure for any consultancy firm. [8]

b) Write a short note on the various agencies involved in instrumentation type of projects and their interaction involved in Project statement. [8]

Q3) a) Write the differences between PERT and CPM methods. In R & D types of project which method is preferred? [8]

b) Steps for project planning and control system. [8]

OR

Q4) a) Write a short note on project management software Primavera. [8]

b) What are the various project life cycle phases. Explain Divestment phase in detail. [8]

Q5) a) Prepare Technical specification sheet in s-20 format (any two): [10]

i) Pressure Guage.

ii) Turbine flowmeter.

iii) Oxygen analyser.

P.T.O.

- b) Explain what is P & I diagram. Draw the P & I diagram for boiler with: [8]
- i) Three element level control.
 - ii) Fuel air ratio control.
 - iii) Steam temperature control.

OR

- Q6)** a) What is material balance sheet? Explain with example. [9]
b) What are the various standards used in instrumentation project. Explain in detail. [9]

SECTION-II

- Q7)** a) What are the selection criteria of cables for various applications? [8]
b) Draw installation sketch of thermowell. [8]

OR

- Q8)** a) List different types of cables and write their specifications. [8]
b) What is loop wiring diagram? Draw a loop wiring diagram of level control loop. [8]

- Q9)** a) What is purchase order? Explain with example. [4]
b) What is commissioning? Explain in detail. What are the various documents required during commissioning? [12]
c) What is cable tray? [2]

OR

- Q10)** a) What is final bid package? Explain in detail. [9]
b) What are the procurement activities involved in project? Explain step by step. [9]

- Q11)** a) Prepare inquiry, quotation, Purchase order and inspection report for a control panel (for a process three element drum level control). [12]
b) Write a short note on breakfront control panel. [4]

OR

- Q12)** a) Prepare a FAT for a control panel (for a process three element drum level control). [8]
b) Write a short note on consoles. [8]

Total No. of Questions : 12]

SEAT No. :

P878

[Total No. of Pages : 2

[4659]-335

B.E. (Instrumentation and Control)
a-BIOMEDICAL INSTRUMENTATION
(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 answer books.*
- 3) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Draw the equivalent circuit for two electrodes connected to skin for biopotential measurement. What is the role of electrolyte jelly while coupling electrode with body. **[8]**

b) Explain the amplitude, frequency and electrodes for ECG, EMG, EEG biopotentials. Explain the various properties that bio electrode should possess. **[8]**

OR

Q2) a) Explain typical amplitude and duration of ECG wave. **[8]**

b) Define Ergonomics and explain ergonomic design in Operation table. **[8]**

Q3) a) Explain different chambers of heart. Explain an electrical conduction system of heart. **[8]**

b) Design analog heart rate meter for rate & rhythm measurement. **[8]**

OR

Q4) a) Draw and explain Einthoven triangle. **[8]**

b) State the specifications of ECG recorder. **[8]**

Q5) a) Design and explain Photoplethysmography. **[8]**

b) Explain dye dilution techniques for cardiac output measurement. **[10]**

OR

Q6) a) Describe in brief various techniques used for BP measurement. **[10]**

b) Explain phonocardiography. **[8]**

P.T.O.

SECTION-II

- Q7)** a) Explain EEG amplitude and frequency bands. [8]
b) Explain and draw 10-20 EEG electrode placement system. [8]

OR

- Q8)** a) Explain neuron membrane potential. [8]
b) Explain block diagram of eight channel EEG system. [8]

- Q9)** a) Enlist various ophthalmic Instruments. [8]
b) Design instrument used for measurement of loss in the peripheral vision of the subject. [8]

OR

- Q10)**a) What are three main sections of Human auditory system? Explain the impedance matching in human hearing phenomenon. [10]
b) Explain pure tone audiometer. [6]

- Q11)**a) Explain various types of flow Spirometer. [10]
b) Explain the following terms with respect to respiratory measurement. [8]
i) RV
ii) ERV
iii) TLC
iv) TV

OR

- Q12)**a) Explain safety codes and standards. [10]
b) Define let-go-current and hold-on current and discuss precautions to minimize shock hazards. [8]



Total No. of Questions : 12]

SEAT No. :

P1123

[4659]-336

[Total No. of Pages : 2

B.E. (Instrumentation & Control)

b - LASER APPLICATIONS IN INSTRUMENTATION

(2008 Course) (Elective - I) (Semester - I) (406264)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from section I and section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Calculate the ratio of rates of spontaneous and stimulated emissions for a tungsten filament lamp operating at temperature of 1030K with average frequency to be 5.4×10^{14} Hz. [5]
- b) Estimate the relative populations of two energy levels such that a transition from the higher to the lower will give visible radiations of 560 nm at room temperature ($T = 300K$). [5]
- c) Discuss any three the properties of Laser? [6]

OR

- Q2)** a) Write a short note on the process of absorption, spontaneous and stimulated emissions of radiation. [8]
- b) Discuss the significance of Einstein relations in emissions of radiation. [8]
- Q3)** a) Explain the construction and working of any gas laser. [9]
- b) Classify the laser products for safety standards? [9]

OR

- Q4)** a) What are different laser system components? Explain each in short. [12]
- b) Estimate the efficiency of GaAs laser operating well above threshold. The refractive index of material is 3.5 and laser cavity length is 0.1 mm. The loss coefficient is 600 per meter length and the internal quantum efficiency is 0.8. [6]

P.T.O.

- Q5)** a) Classify the basic optical interferometers? [8]
b) Describe subjective and objective speckles in detail. [8]

OR

- Q6)** a) Describe the electronic speckle pattern interferometer (ESPI) for displacement measurement. [8]
b) Describe the speckle in single point interferometers. [8]

SECTION-II

- Q7)** a) Explain the performance parameters of Laser Velocimeter. [8]
b) Differentiate between time domain and frequency domain processing of the Doppler signal? [8]

OR

- Q8)** a) Explain the time domain processing of Doppler signal in detail. [8]
b) Discuss the performance parameters of operation of laser velocimeter? [8]
- Q9)** a) Write short note on Sagnac effect. [8]
b) Describe the all fiber FOG configuration. [8]

OR

- Q10)** a) Write short note on Ring Laser Gyroscope. [8]
b) Explain in detail the Fiber Optic Gyroscope. [8]
- Q11)** a) A thin strip of the hologram undergoing stress parallel to the x-axis is illuminated by a He-Ne laser. The fringes are localized in a plane having slope of 1.5 per unit length in x-direction and the fringe spacing is found to be 1 mm. Hence find the strain. [8]
b) Explain the any one applications of holographic interferometer that you know. [10]

OR

Q12) Write a short notes on:

- a) Holographic Interferometer. [9]
b) Applications of holographic interferometer. [9]

EEE

[4659]-337

B.E. (Instrumentation and Control Engineering)
c-ADVANCED CONTROL SYSTEMS
(2008 Pattern) (Semester-I) (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 different types of Singular points. [6]
 b) Define describing function. Obtain the describing function for saturation nonlinearity. [12]

OR

- Q2)** a) What is phase plane method and what are the characteristics of phase plane method? [6]
 b) Obtain the stability of a system shown in figure by using describing function method. [12]

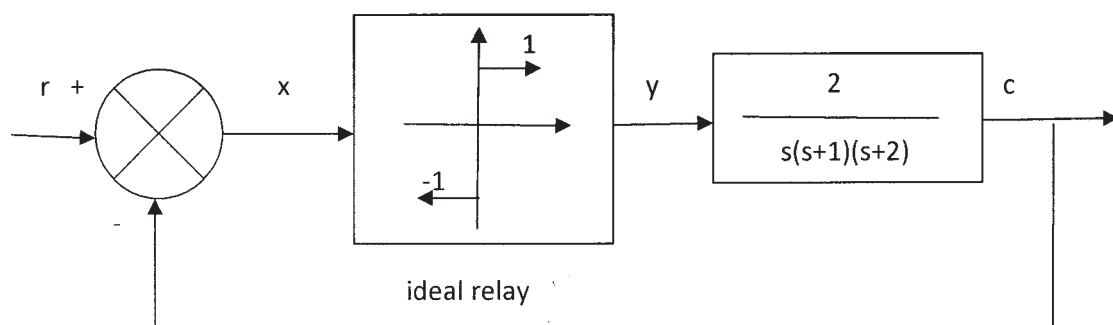


Figure: Q.2b.

- Q3)** a) Explain with neat diagram of Jump resonance. [8]
 b) Determine whether following quadratic form is positive definite or not

$$Q(x) = 10x_1^2 + 4x_2^2 + x_3^2 + 2x_1x_2 - 2x_2x_3 - 4x_1x_3 \quad [8]$$

OR

P.T.O.

- 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]

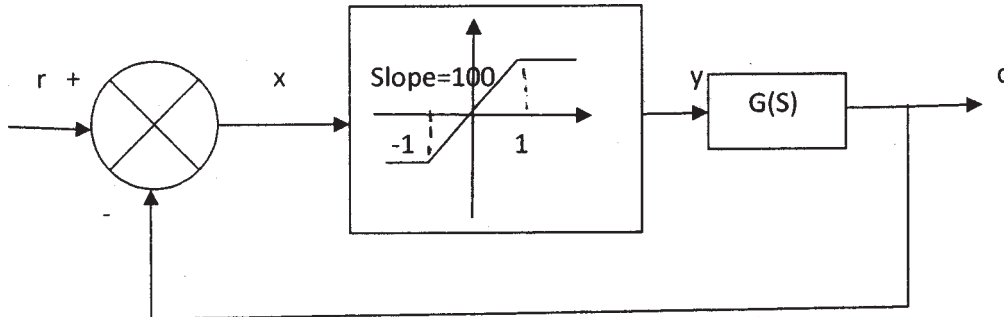


figure :Q 4

- Q5)** a) Explain in detail Discrete time MRAC systems. [8]
 b) Explain with neat diagram of MIT rule for continues time MRAC system. [8]

OR

- Q6)** Explain with neat diagram of Direct and indirect model reference adaptive controller. [16]

SECTION-II

- Q7)** a) Explain in detail Linear Quadratic self tuning regulator. [8]
 b) Explain with neat diagram of Implicit and explicit self tuning regulator. [8]

OR

- Q8)** a) Explain with neat diagram of Recursive parameter estimation of STR. [8]
 b) Explain design of STR using Minimum variance method. [8]

- Q9)** a) Explain in detail robustness studies of multivariable system. [9]
 b) Explain adaptive control technique for control of pulp and dryer control. [9]

OR

- Q10)** a) Explain the recent trends in adaptive control system. [9]
b) Explain in detail the general purpose adaptive regulator. [9]

Q11) Obtain the control law that minimize the performance index $J = \int_0^{\infty} (x_1^2 + u^2) dt$.

For the system given below: $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$. Explain in brief

State Regulator Problems. [16]

OR

- Q12)** a) Explain the performance measures for the optimal control problems. [8]
b) Explain in detail of Matrix Riccati equations. [8]



Total No. of Questions : 12]

SEAT No. :

P880

[Total No. of Pages : 2

[4659]-338

**B.E. (Instrumentation and Control)
d-BUILDING AUTOMATION-I
(2008 Course) (Semester-I) (Elective-I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) a) What is fire? Explain various stages of fire. **[10]**

b) Explain Fire alarm control panel and describe Conventional FACP. **[8]**

OR

Q2) a) Enlist types of FAS architecture. Explain any one. **[8]**

b) Draw the block diagram of building life safety system & explain each block. **[10]**

Q3) a) Explain SLC Communication Protocol. **[6]**

b) What is IDC. Explain class A IDC with alarm open and trouble condition. **[10]**

OR

Q4) a) Give classification FAS loops. Explain any one. **[8]**

b) Discuss voltage drop calculations of FAS. **[8]**

Q5) a) Explain Types of smoke detector. Elaborate photoelectric type. **[8]**

b) Explain relays and contacts used in FAS. **[8]**

OR

P.T.O.

- Q6) a)** Explain purpose of NFPA. Discuss Origin and development of NEPA. [8]
- b) The Panel has 70 detectors each consuming $50\mu\text{A}$, 20 sounders consumes 20 ma each. Required stand by time is 24 hrs and required alarm time is 0.5 hrs. Quiscent Current through control panel is 0.025 A. Calculate Stand by Battery size (Ah). [8]

SECTION-II

- 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 need of security system with suitable examples. [8]
- b) Draw and explain biometrics for security system. [10]

- Q9) a)** Discuss classification of camera in CCTV systems and explain any 2. [8]
- b) Explain general specification for camera selection and explain any 2. [8]

OR

- Q10)a)** What are different activities carried out in CCTV control room. [8]
- b) Explain technologies used for perimeter intrusion detection system. [8]

- Q11)a)** List various types of Intrusion detection system and explain any one. [8]
- b) Explain different types of intrusion detectors. [8]

OR

- Q12)a)** Discuss advantages and disadvantages of various biometrics. [8]
- b) Explain Object/Spot protection System with Capacitance Proximity sensor. [8]



Total No. of Questions : 12]

SEAT No. :

P881

[Total No. of Pages : 2

[4659]-339

B.E. (Instrumentation and Control Engineering)

a-ENVIRONMENTAL INSTRUMENTATION

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Explain the operating principle of the flame ionization detector with the help of neat diagram. Also explain applications of flame ionization detector in measurement of total hydrocarbon concentrations. [8]
- b) List the different types of measurement techniques used in ultraviolet analyser. Explain the emissive technique in detail. [8]

OR

- Q2)** a) List the different detectors used in Gas chromatography. Explain photoionization detector in detail. [8]
- b) Elaborate the need and importance of instrumentation and control system in environment instrumentation. [8]
- Q3)** a) Explain the different Sensors used thermal conductivity measurement. [8]
- b) Explain briefly different elements of water treatment facilities. [8]

OR

- Q4)** a) Describe the single pass opacity with the help of neat diagram. [8]
- b) What are the different conductivity measurement techniques in conductivity analyser. Explain the electrode conductivity measurement techniques. [8]
- Q5)** a) What is sedimentation? What is criteria for sizing of settling basins? Also describe the circular and rectangular basin. [9]
- b) Discuss any three methods used in ground water monitoring. [9]

OR

P.T.O.

- Q6)** a) Explain the different level measurement techniques in ground water monitoring wells. [9]
- b) Explain any three commonly used instruments in laboratory for analysis of groundwater samples. [9]

SECTION-II

- Q7)** a) What is water sampler? What are different elements of automatic sampling system? Explain them briefly. [8]
- b) Explain any two level measuring instruments used in waste water treatment. [8]

OR

- Q8)** a) Elaborate clearly which locations should be avoided in waste water sampling. [8]
- b) Explain any two types of waste water sampling system. [8]
- Q9)** a) Classify the air pollutants in detail. Also explain their properties and ill effects on human beings. [9]
- b) Explain the typical air sampling set up. Explain briefly methods available for collection of gaseous air pollutants from atmosphere. [9]

OR

- Q10)**a) List basic methods for removing particulate matter from gas stream. Explain electrostatic precipitator in detail. [9]
- b) Explain the analytic method for measurement sulphur dioxide. [9]
- Q11)**a) What is open channel flow metering? Explain secondary devices used for the open channel flow meters. [8]
- b) What is necessity of rain water harvesting? Explain different rain water harvesting techniques. [8]

OR

- Q12)**a) List different types air flow measurement techniques. Explain any two in detail. [8]
- b) How does gas flow measuring devices are categorized? Explain the spirometer in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P733

[Total No. of Pages : 4

[4659] - 34

B.E. (Mechanical)
INDUSTRIAL FLUID POWER
(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate 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 a simple hydraulic circuit showing all its essential components. State the function of each component. [6]
- b) List important properties of fluid. [6]
- c) What are additives and inhibitors used in the hydraulic circuit. [6]

OR

- Q2)** a) What is a bypass filter? State its advantages and disadvantages. [6]
- b) Explain different types of seal. Explain any one in detail. [6]
- c) Explain the difference between flared and flareless fitting. [6]
- Q3)** a) What are the functions of reservoirs ? Draw a neat sketch of a standard reservoir showing all its features. [6]
- b) Explain with a sketch the operation of a vane pump. [6]
- c) Explain any two applications of an accumulator. [4]

P.T.O.

OR

- Q4)** a) Compare characteristics, advantages and applications of gear pumps and vane pumps. [8]
b) Explain with a neat sketch a axial piston pump. How do you compensate for pressure variations. [8]

- Q5)** a) Compare the advantages and disadvantages of the three methods of flow control used in Fluid power systems. [8]
b) What is a pilot operated check valve? Draw a circuit to explain its application. [8]

OR

- Q6)** a) What is a unloading valve. With a neat sketch explain its working and application. [8]
b) Differentiate direct operated and pilot operated Relief valve. [4]
c) When open centre and closed centre position direction control valves are used. [4]

SECTION - II

- Q7)** a) What do you mean by 'cushioning of cylinders'? Explain with a neat sketch. [8]
b) Draw a regenerative circuit used in hydraulic system. Discuss. [10]
i) When the speed of extension stroke will be equal to the speed of retraction stroke.
ii) When the speed of extension stroke will be greater than the retraction stroke.

OR

- Q8)** a) A hydrostatic transmission operating at 70 bar pressure has the following characteristics. [10]

| <u>Pump</u> | <u>Motor</u> |
|-------------------------|-----------------------|
| $V_D = 82 \text{ cm}^3$ | $V_D = ?$ |
| $\eta_v = 82\%$ | $\eta_v = 92\%$ |
| $\eta_m = 88\%$ | $\eta_m = 90\%$ |
| $N = 500 \text{ rpm}$ | $N = 400 \text{ rpm}$ |

Find the

- i) Displacement of the motor.
ii) Motor output torque.
b) Draw and explain Hi - Lo (double - pump) circuit. [8]

- Q9)** a) Explain the working of FRL unit used in pneumatic systems. Also discuss the purpose of providing the same in pneumatics. [8]
- b) Explain with a neat sketch working of a shuttle valve with a typical application. [8]

OR

- Q10)**a) Explain working of a Time delay valve with a typical application. [8]
- b) Draw and explain Two handed safety circuit used in pneumatics. [8]

Q11)a) The piston rod of a DAC is to extend when a 3×2 way push button valve is actuated. The cylinder is to remain extended until a second push button is actuated and if the first push button has been released. The cylinder is to then return to the initial position. It is to remain in the initial position until a new start signal is given. Develop a suitable pneumatic circuit for the given application. [6]

- b) Develop a simple hydraulic circuit which will operate a hydraulic cylinder of a machine. The load during forward stroke is 15 kN and that during return stroke is 8.5 kN. The forward and return speeds are about 3.0 m/min and 5.5 m/min respectively. Total stroke of the cylinder is 300mm. Provision is required to hold the cylinder any where between the end positions. Select different components from the data given, and specify ratings in case not available in given data. [10]

Q12)A hydraulic actuator is used to operate a machine tool slide. The motion of the cylinder is as follows :- [16]

- a) The load during the first 250 mm is 10 kN. The piston moves through this distance in 5 seconds.
- b) It then follows a working stroke of 120 mm against an effective load of 35 kN. The feed rate required is between 0.5 to 1.5 m/min.
- c) The return stroke is to be as fast as possible. Propose a meter - out circuit for speed control. Draw the circuit and select different components used, from the data given. Specify ratings in case the components are not available in given 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 ₃ | 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. :

P1124

[4659]-340

[Total No. of Pages : 3

B.E. (Instrumentation Engineering)

b - NANO INSTRUMENTATION

(2008 Course) (Elective - II) (Semester - I) (406265)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three question from each section.*
- 2) *Answers to the two sections should be written in seperate books.*
- 3) *Neat diagrams must be drawn wherever necessary*
- 4) *Figure to the right indicate full marks.*

SECTION-I

- Q1)** a) Explain the electron tunneling through potential barrier and give the parameters on which electron transport depends at Nano scale. [6]
- b) Explain qualitatively the energy subbands structure and state expressions for the density of states for an electron confined in [6]
- i) 2- D ii) 1- D iii) 0- D
- c) Explain the self-assembly techniques viz. [6]
- i) L- B technique
- ii) Electrostatic

OR

- Q2)** a) Give the two approaches of making Nano materials and explain the Nano-lithography. [6]
- b) Explain the PVD for the synthesis of Nano materials. [6]
- c) Explain the various types of Nano materials with their characteristics and applications. [6]
- Q3)** a) State and explain the important types of interatomic forces involved in the tip sample interaction of an AFM with different modes of operation.[8]
- b) Explain the origin of tunneling current and discuss the various modes of operation of a STM. [8]

OR

P.T.O.

- Q4)** a) Explain the principle, working of an SNOM. [8]
b) Describe Micro and Nano cantilevers or MEMS & NEMS cantilevers. [8]
- Q5)** a) What are CNTs? Give the structure and explain the parameters- Chiral vector (or chirality), chiral angle. How it leads to metallic or semiconducting behavior with base structure. [8]
b) Give the unique characteristics of CNTs that makes them ideal candidates for numerous device applications. [8]

OR

- Q6)** a) Describe the principle, working of a CNT based FET. [8]
b) Explain SWCNT based RTD in detail. [8]

SECTION-II

- Q7)** a) What is spin polarization and magnetic moment? Explain the primary processes involved in the spintronic devices. [8]
b) Explain the TMR effect with the help of FM materials and spin filtering device. [8]

OR

- Q8)** a) In spin diode, explain spin polarization, its operation when biases applied, energy band diagram and application. [8]
b) Describe the Bloch sphere representation of quantum states of an electron. Explain how spin based computer are different from computers based on regular transistors. [8]
- Q9)** a) Describe qualitatively the construction and working of an FET as a genuine switch. How does the downscaling of MOSFETs affect their functioning? [8]
b) Explain the concept of resonant tunneling and describe the resonant tunneling diode. [8]

OR

- Q10)** a) Write short notes on single electron transistor and coulomb blockade effect along with conditions required for discrete nature of the single electron charge transfer. [8]
b) What are mesoscopic devices? Explain the ballistic rectifier with its structure & operation the device working at room temperature. [8]

- Q11)**a) Write a note on electrically controlled Nano actuators. [6]
b) Describe magnetic nanotransducers. [6]
c) Write a note on chemical Nano scale sensors. [6]

OR

- Q12)**a) Describe CNT based IR detector. [6]
b) Explain CNT based Nano Laser. [6]
c) Describe CNT based LED. [6]

EEE

Total No. of Questions : 12]

SEAT No. :

P882

[Total No. of Pages : 2

[4659]-341

B.E. (Instrumentation and Control)
c-ADVANCED DIGITAL SIGNAL PROCESSING
(2008 Pattern) (Elective-II) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) Write a short note on: **[16]**

- a) Decimation by 2.
- b) Polyphase filter structure.
- c) Interpolation by 2.
- d) Sampling rate conversion by I/D.

OR

Q2) a) Evaluate the z-transform for the following operations. **[8]**

- i) Decimation by a factor D.
- ii) Interpolation by a factor I.
- b) Explain the effect of down-sampling and up-sampling of time-domain signal in frequency-domain representation. **[8]**

Q3) a) Explain the Levinson-Durbin Algorithm in detail. **[8]**

- b) An AR(3) process is characterized by the prediction coefficients as:

$$a_3(1) = -1.5, a_3(2) = 1.5, a_3(3) = -3/2$$

Hence determine reflection coefficients. **[8]**

OR

Q4) a) Explain that the forward prediction coefficients and backward prediction coefficients are in reverse order. **[8]**

- b) Obtain the reflection coefficients of the lattice filter corresponding to the FIR filter described by the system function as

$$H(z) = A_2(z) = 1 + 2z^{-1} + 0.333 z^{-2}. \quad \text{[8]}$$

P.T.O.

- Q5)** a) Determine and draw the periodogram for the following signal
 $x[n] = \{3, 2, 1, -2\}$. Use DTFT. [9]
- b) Explain the estimation of power spectra with the help of averaging periodogram method. [9]

OR

- Q6)** Explain the following: [18]
- a) Bartlett method of power spectrum estimation.
- b) Welch method of power spectrum estimation.
- c) Parametric methods of power spectrum estimation.

SECTION-II

- Q7)** a) Explain the process of recursive computation for filter coefficients in recursive least square Algorithm. [9]
- b) Explain the concept of adaptive filter with the help of neat diagram. List out the application of adaptive filters. [9]

OR

- Q8)** a) List out the application of adaptive filters. Explain any one in detail. [9]
- b) Explain the least-mean-square (LMS) algorithm for the optimization of FIR filter coefficients. [9]

- Q9)** a) Compare the general purpose processor and digital signal processor in detail. [8]
- b) Write an ALP to compute the output of the FIR filter to an input sequence using on-board units of digital signal processor. [8]

OR

- Q10)** a) State the salient features of TMS 320 C 6713. [8]
- b) Explain and draw the Harvard architecture of digital signal processor in detail. [8]

- Q11)** a) Explain the step-wise computation of STFT. Also state the advantages of STFT over Fourier Transform. [8]
- b) Write a short note on Wavelet Transform. [8]

OR

- Q12)** a) Write a short note on Discrete Wavelet Transform (DWT). [8]
- b) State the properties of FT, STFT and CWT. [8]



Total No. of Questions : 12]

SEAT No. :

P883

[Total No. of Pages :3

[4659] - 342

B.E. (Instrumentation & Control)

D : AUTOMOBILE INSTRUMENTATION

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt 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) *Your answers will be valued as a whole.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

- Q1)** a) Explain the role of electronics in automobile. [6]
b) How the petrol/diesel engine works? [10]

OR

- Q2)** a) What are the current trends in automobile? [6]
b) Explain engine management system in automobile? [10]

- Q3)** a) How does the electronic ignition system works? [10]
b) What is multi port or point fuel injection system in regards with automobile Engine operation? [6]

OR

- Q4)** a) What are the advantages of electronic injection system? [6]
b) What are the types of solid state ignition systems? [2]

P.T.O.

- c) Explain principal of operation of solid state ignition systems principle of operation, [5]
- d) Electronic spark timing control system (steps involved). [3]

- Q5)** a) Explain following modes of engine control.
- i) Engine Cranking
 - ii) Engine Warm-up
 - iii) Open loop control
 - iv) Close loop [12]
- b) Write a short note on integrated engine control system with neat diagram?[6]

OR

- Q6)** a) Explain importance of exhaust gas emission control system and explain its operation? [10]
- b) What are the parameters to be considered for engine performance testing? [8]

SECTION - II

- Q7)** a) Explain the principle of Electronic Braking? [8]
- b) Explain automatic transmission electronic control circuit? [8]

OR

- Q8)** a) What is ESP? Explain its role and operation in brief? [8]
- b) What is ASR? Explain it in brief? [8]

- Q9)** a) What is instrumentation involved w.r.t automobile applications in
- i) Automotive central locking and [5]
 - ii) Anti theft system control technology [5]
- b) Instrumentation involved in electronically controlled doors and windows.[6]

OR

- Q10)**a) Explain the importance of an air bag technology in automobile? [6]
- b) List out various components involved in auto body control technology? [3]
- c) Explain in brief principle control circuit components and characteristics of any two of them in brief? [7]

- Q11)**a) Explain the role of Instrumentation in driver information system? [6]
- b) Write a short note on automatic gearing control system? [6]
- c) Write a short note on emission standards in automobile sector? [6]

OR

Q12) Explain in brief Ergonomics and safety aspect in automobile w.r.t following points [18]

- a) Lighting system components
- b) Steering control techniques
- c) Battery monitoring and control



Total No. of Questions : 12]

SEAT No. :

P889

[4659]-349

[Total No. of Pages : 2

B.E. (Instrumentation and Control)
a- INSTRUMENTATION IN AGRICULTURE
(Semester - II) (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) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Explain Index properties of soil. [8]

b) Explain the Mohr's circle of stress. [10]

OR

Q2) a) Explain various hygrometers. [10]

b) Explain with neat diagram sonic anemometer. [8]

Q3) a) Draw & explain Instrumentation set up for Dairy industry. [8]

b) Draw & explain flow diagram of juice extraction control process. [8]

OR

Q4) a) Explain instrumentation of Sugar industry. [8]

b) Explain instrumentation of fermenter & control (batch process). [8]

Q5) a) Compare different types of irrigation systems. [8]

b) Explain Resistance based soil moisture measurement methods. [8]

OR

Q6) a) Explain irrigation scheduling and Irrigation efficiencies. [8]

b) Explain design considerations in irrigation channels. [8]

P.T.O.

SECTION - II

- Q7)** a) Explain irrigation control management of up stream & down stream control system. [8]
b) Explain with SCADA for dam automation. [10]

OR

- Q8)** a) Explain instrumentation for green house control. [10]
b) Explain humidity, wind speed, ventilation system for green house. [8]

- Q9)** a) Explain implementation of hydraulic control circuit use in harvesters cotton pickers. [8]
b) Explain implementation of electronic control circuit use in harvesters cotton pickers. [8]

OR

- Q10)**a) Explain selection criteria for pump in detail. Explain installation of pump. [8]
b) Explain characteristics of Pump. [8]

Q11) Write short notes on:

- a) Soil water content measurement using TDR. [8]
b) Electromagnetic radiations photosynthesis & UV bio sensor methods in agriculture. [8]

OR

Q12) Write short notes on:

- a) Agrometrological instrumentation weather stations. [8]
b) Ground water occurrence confined & unconfined aquifers. [8]



Total No. of Questions : 12]

SEAT No. :

P734

[Total No. of Pages : 3

[4659] - 35

B.E. (Mechanical)

ENERGY AUDIT AND MANAGEMENT

(Semester - I) (2008 Pattern) (Elective - I (a))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Figures to the right indicate full marks.*
- 2) *Solve questions 1 or 2, 3 or 4, 5 or 6 from Section - I and 7 or 8, 9 or 10, 11 or 12 from Section - II.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables and time value of money factor table is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Describe sector wise energy consumption pattern of India. Also draw pie chart for it. [8]

b) Describe the energy saving opportunities in cooling tower. [8]

OR

Q2) a) Write a short note on Indian energy scenario and energy security. [8]

b) List the energy saving opportunities in HVAC systems. [8]

Q3) a) What are the equipments used for energy audit? Also write which parameter is to be measured by equipment. [8]

b) Which are the types of energy audit? Describe the steps to carry out energy audit of small scale industry. [8]

OR

Q4) a) Explain need of energy audit and write structure of report of energy audit. [8]

b) Which information is to be collected during detailed energy audit? [8]

P.T.O.

Q5) a) Explain the following terms **[10]**

- i) Simple Payback Period
- ii) Time Value of money
- iii) Net Present Value
- iv) Return on Investment
- v) Internal Rate of Return

b) Describe the factors influencing costing and typical cost of following **[8]**

- i) Steam
- ii) Compressed air
- iii) Natural gas
- iv) Electricity

OR

Q6) a) Calculate Net Present Value and Internal rate of return for the project which has following cash flow **[10]**

| Investment | Rs. 1000000 |
|----------------|----------------|
| Saving in year | Cash flow (Rs) |
| 1 | 200000 |
| 2 | 200000 |
| 3 | 300000 |
| 4 | 300000 |
| 5 | 350000 |

Discount rate is 10%

b) Write a note on risk and sensitivity analysis **[8]**

SECTION - II

Q7) a) Calculate the efficiency of the boiler by direct method with the data given below: **[8]**

- i) Type of boiler: Oil fired
- ii) Quantity of dry and saturated steam generated: 6000kg/hr
- iii) Quantity of fuel consumed: 410kg/hr
- iv) Steam pressure and temperature: 10kg/m² and 180°C
- v) Feed water temperature: 70°C
- vi) Gross Calorific Value of oil: 43500kJ/kg
- vii) Enthalpy of saturated steam at 10kg/m² and 180°C: 2776 kJ/kg

- b) What are the different heat losses occurring in oil fired furnace ? Explain in brief. [10]

OR

- Q8)** a) List the energy saving opportunities in pumping system. [8]
b) What are different types of fans? Draw system and fan curve and show operating point. Explain different flow control strategies of fan. [10]

- Q9)** a) Explain the terms [8]
i) Power Factor
ii) Maximum Demand
iii) Copper losses
iv) Luminous efficiency
b) List the type's motors and explain the different losses occurring in electric motor. [8]

OR

- Q10)** a) The lighting connected load for the small industry consisting of 150 Fluorescent tubes of 55W each with magnetic ballast. In first option, the magnetic ballast of fluorescent tubes is replaced by electronic ballast and power consumption of same fluorescent tubes reduces to 40W. Calculate the Simple payback period of above replacement if cost of electronic ballast is Rs 150. In second option, fluorescent tubes are replaced by energy efficient fluorescent tubes of 20W and cost of Rs. 400 each. Calculate simple payback period. Which energy saving option is better and Why? Consider usage of 16 hours per day and an electrical tariff of Rs. 4 per KWh. [8]
b) Explain the different maximum demand (MD) control methods. [8]

- Q11)** a) Explain the topping cycle and the bottoming cycle of cogeneration with two examples. [8]
b) What are the different waste heat sources? Explain in brief. [8]

OR

- Q12)** a) Describe factors influencing cogeneration choice. [8]
b) Write a short note [8]
i) CDM projects.
ii) Carbon Credit



Total No. of Questions : 12]

SEAT No. :

P1126

[4659]-350

[Total No. of Pages :2

B.E. (Instrumentation & Engineering)

b - MICRO - ELECTRO MECHANICAL SYSTEMS

(2008 Course) (Elective - IV) (Semester - II) (406270)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Explain advantages of miniaturization with suitable examples. [8]
b) Explain with neat diagram Integrated radio frequency transceivers. [8]

OR

- Q2)** a) Explain working of ADXL 50 accelerometer with neat sketch. [8]
b) What are the advantages of MEMS sensors over the conventional sensors? [8]
- Q3)** a) Explain Piezoresistive sensor with neat diagram. Give their applications and materials used to form these devices. [8]
b) Explain the role of Micro actuator in MEMS field. [8]

OR

- Q4)** a) Explain working of Electrostatic Comb drive & list materials used for making the same. [8]
b) Explain working principle of portable blood analyzer with neat diagram. [8]
- Q5)** a) What is lithography? What are different steps involved in it. [9]
b) What are the process-steps used in the fabrication of micro system? [9]

OR

- Q6)** Explain following micromachining Technique with neat diagram. [18]
a) Chemical vapor deposition
b) Sputtering

P.T.O.

SECTION-II

- Q7)** a) Explain with neat sketch Transversely Deformable Beam. [8]
b) i) Define Hook's Law [8]
ii) Young's modulus of elasticity

OR

- Q8)** a) Define stress & strain. What is the relation between stress and strain. [8]
b) What is difference between Straight Beam in pure bending & initially Curved Beam in pure bending? [8]

- Q9)** a) Compare Finite Difference Method and Finite Element Method. [8]
b) How the Finite element method used in MEMS field. [8]

OR

- Q10)** a) Compare Finite element Method over analytical method. [8]
b) Describe in detail the steps involved in solving structural problem using Finite Element method. [8]

- Q11)** a) Explain working of PNP transistor with neat diagram. [9]
b) Draw and Explain Wheatstone Bridge for measurement of Change in Resistance. What is bridge balance condition. [9]

OR

- Q12)** a) Draw and Explain working of Instrumentation amplifier. [9]
b) What is difference between half wave and full wave rectifier in MEMS. [9]

EEE

Total No. of Questions : 12]

SEAT No. :

P1127

[4659]-351

[Total No. of Pages :2

B.E. (Instrumentation & Control)
c - DIGITAL IMAGE PROCESSING
(2008 Course) (Elective IV) (Semester - II)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

Q1) Explain in detail the hardware components of image processing system. **[18]**

OR

Q2) a) Explain image resolution with suitable example. **[10]**

b) List applications of Digital Image processing. Explain any one with suitable diagram. **[8]**

Q3) a) Explain the structure of human eye with respect to digital image capturing phenomenon. **[8]**

b) Explain Histogram with suitable example. **[8]**

OR

Q4) Describe various mathematical operations on digital image. **[16]**

Q5) Explain 2D DFT and explain it properties. **[16]**

OR

Q6) Explain 2D DCT and explain it properties. **[16]**

P.T.O.

SECTION-II

Q7) Explain image enhancement using average and weighted average filter with suitable example. [18]

OR

Q8) a) Explain image enhancement in frequency domain using Butterworth low pass filter. [10]

b) Compare time domain and frequency domain image enhancement. [8]

Q9) a) What is image restoration? Explain the process of image restoration. [8]

b) Explain image restoration using wiener filter. [8]

OR

Q10) Explain image restoration using inverse filter and its digital implementation. [16]

Q11) a) Define Pattern and pattern classification. [8]

b) List pattern classifiers. Explain any one pattern classifier with suitable example. [8]

OR

Q12) a) Define image segmentation. Explain need and applications of image segmentation. [8]

b) Explain Sobel operator for edge detection. [8]

EEE

Total No. of Questions :11]

SEAT No. :

P1128

[Total No. of Pages :4

[4659] - 353
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)** a) Explain the “Three Phase Strategy” for the application of downstream processing techniques. **[6]**
- b) How will you design strategy for purification of any biological product? What are the basic requirements to design strategy? **[10]**

OR

- Q2)** Following is the Purification profile of α -amylase produced by *Aspergillus flavous*; using information provided in the table find out: **[16]**

- a) Purity b) Specific Activity c) %Yield d) Fold Purification

| Purification Step | Sample Volume (ml) | Enzyme Activity (units/ml) | Protein Content (mg/ml) | Total Activity (units/ml) | Total Protein (mg) |
|--|--------------------|----------------------------|-------------------------|---------------------------|--------------------|
| Cell free filtrate | 200 | 266.07 | 0.41 | 53214 | 82 |
| Ammonium Sulphate Fractionation (60% saturation) | 200 | 660.69 | 0.18 | 132138 | 36 |
| Dialysis against sucrose crystals | 15 | 2213.09 | 0.55 | 33196.35 | 8.25 |
| Sephadex G-200 chromatography | 5 | 3235.8 | 0.5 | 16179 | 2.5 |

P.T.O.

Q3) A polypeptide has the sequence: **[16]**

Leu-Leu-Trp-Tyr-Ser-Glu

- a) Using the data in the table below and assuming a molar absorptivity for Trp and Tyr of 5000 and 1500L/cm.mol, respectively, estimate the extinction coefficient, ϵ (units: cm²/mg) for this peptide at a wavelength, λ of 280 nm.

| Amino Acid | MW |
|------------|--------|
| Leu | 131.10 |
| Trp | 204.23 |
| Tyr | 181.20 |
| Ser | 105.04 |
| Glu | 147.14 |

- b) A solution of this peptide is placed in a 1cm thick cuvette and its absorbance is found to be 1.3 at 280nm. What is the concentration of the polypeptide in mg/ml?

OR

Q4) What is Spectrofluorometry? Write short note on fluorescence and phosphorescence. Explain instrumentation of Spectrofluorometer along with its application. **[16]**

Q5) a) Write short note on “Linking Chromatography Techniques into a Purification Protocol - General Rules”. **[4]**

b)

[14]

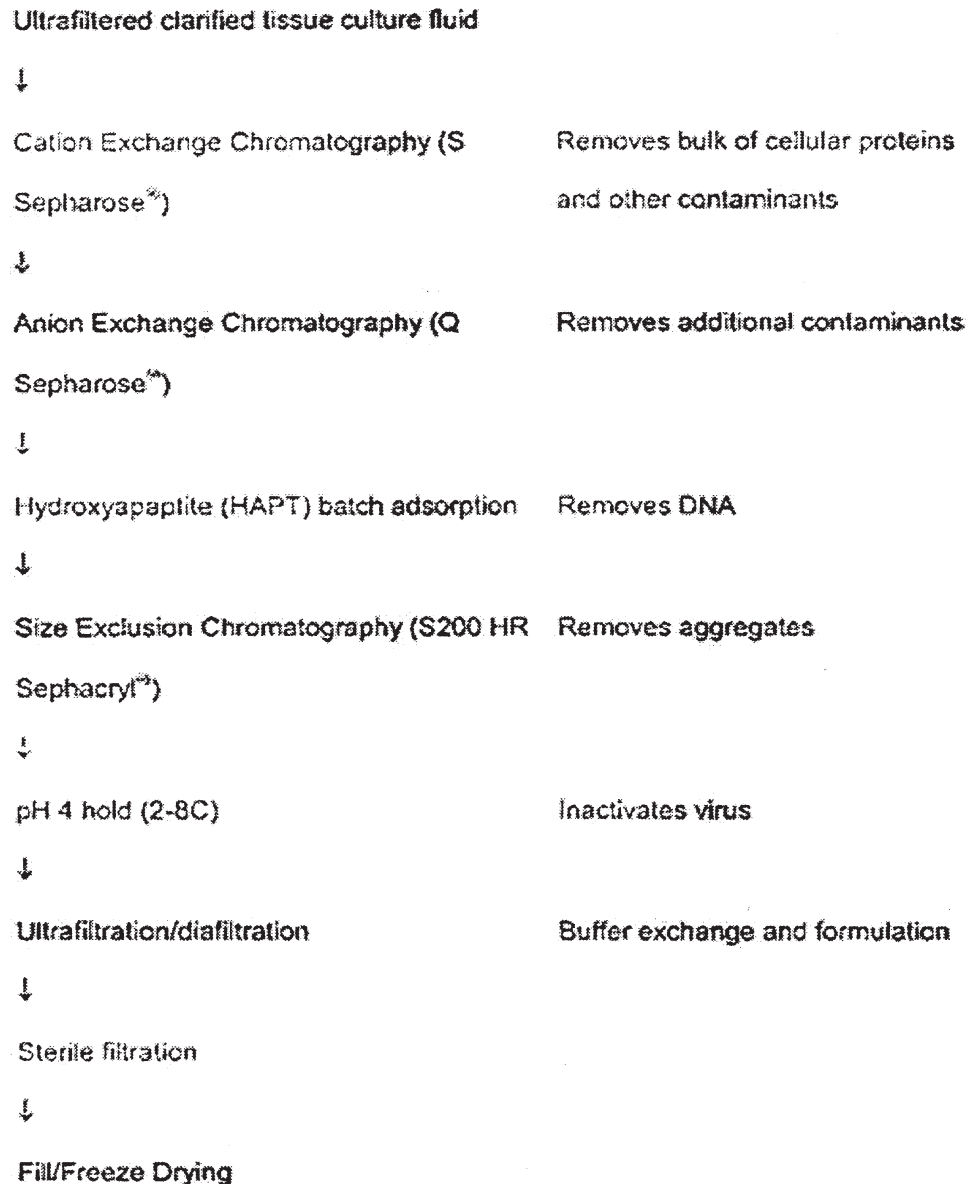


Figure 1 TNF MAb purification flow chart.

Study the provided flow sheet and enlist the bioseparation techniques mentioned in it. Explain any one chromatography technique from mentioned in above flow sheet. Design new strategy for purification of the same molecule with proper reasoning.

OR

Q6) Write short note on:

[18]

- a) Reversed Phase HPLC
- b) Affinity Chromatography

SECTION-II

- Q7)** a) Explain chromatographic process in liquid chromatography with 'Differential Migration' and 'Molecular Spreading'. [8]
- b) Explain the following in relation with HPLC. [8]
- i) Sample Reservoir
 - ii) Solvent Pumping System
 - iii) Sample Injectors
 - iv) Guard Column

OR

- Q8)** a) Draw schematic diagram of Gas Chromatography system and explain how chromatography machine works. [8]
- b) Write requirements of ideal detectors for Gas chromatography. Describe four detectors of Gas chromatography system. [8]

- Q9)** Write principle of Mass spectrometry. How does Mass spectrometer works explain, with different types of MS. [16]

OR

- Q10)** Write short note on: [16]
- a) Super critical fluid extraction
 - b) MALDI-TOF

- Q11)** Explain any two case studies for the application of Downstream Processing from following. Write at least two different protocols for the separation of given biomolecules and discuss the processes in detail. (Any 2, 9M Each) [18]
- a) Peptide Antibiotics
 - b) Beer Production
 - c) Commodity Acids
 - d) Xanthan or Dextran



Total No. of Questions :12]

SEAT No. :

P1130

[Total No. of Pages :3

[4659] - 355

B.E. (Biotechnology)

BIOPROCESS EQUIPMENT DESIGN (415465)

(2008 Pattern) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from Section I 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 side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Draw and explain Stress strain curve for **[8]**
i) Ductile material and ii) Brittle material.
b) Explain Maximum distortion energy and Maximum shear stress theory. **[8]**

OR

- Q2)** a) Describe the general design procedure for process equipment. **[4]**
b) Define and explain Design Stress, Polar Moment of Inertia, and Young's Modulus. **[12]**

- Q3)** a) Describe the design of plain head, shallow head and hemispherical head with neat sketches. **[12]**
b) A vessel having 1.59 m outside diameter is to operate at a pressure of 5 Kg/cm². The permissible stress of the material used for fabrication is 1021 Kg/cm². Welded joint efficiency is 85%. Calculate the thickness required for a cylindrical vessel and Spherical vessel? Which vessel should be selected for operation? Operating pressure is 5Kg/cm². **[6]**

OR

P.T.O.

- Q4)** a) The inside diameter of cylinder is 25cm and subjected to an internal pressure of 600kg/cm². Allowable tensile stress of the material is 1400 Kg/cm². What should be the minimum thickness of the vessel? [9]
- b) A high pressure vessel is to be operated at 100MN/m². The inside diameter of vessel is 30.5cm. Steel having yield stress 466MN/m² is selected for fabrication. Estimate the wall thickness required by maximum shear stress theory with a factor of safety 1. [9]
- Q5)** a) Give classification and selection criteria of agitators. [8]
- b) Explain various types of jackets with neat sketches. [8]

OR

- Q6)** A toluene is continuously nitrated to mononitrotoluene in a cast iron vessel, 1 meter in diameter, fitted with propeller agitator 0.3 m diameter, rotating at 2.5 Hz. The temperature is maintained at 310 K by circulating 0.5 kg/sec cooling water through a stainless steel coil 25 mm outer diameter and 22 mm inner diameter in the form helix 0.8 m in diameter. The conditions are such that the reacting material may be considered to have some physical properties as 75% H₂SO₄. If the mean water temperature is 290 K, what is the overall heat transfer co-efficient for desired heat transfer co-efficient. [16]

Properties of water

$K = 0.59 \text{ W/mk}$

$C_p = 4180 \text{ J/kg.K}$

$\mu = 1.08 \times 10^{-3} \text{ NS/m}^2$

$\rho = 998 \text{ kg/m}^3$

Properties of 75% H₂SO₄

$K = 0.40 \text{ W/mk}$

$C_p = 1880 \text{ J/kg.K}$

$\mu = 6.5 \times 10^{-3} \text{ NS/m}^2 \text{ at } 310\text{K}$

$\rho = 1666 \text{ kg/m}^3$

$\mu_s = 8.6 \times 10^{-3} \text{ NS/m}^2$

Thermal conductivity of stainless steel is 15.9 W/mk. Dirt resistance at inside and outside surface are 0.0002 & 0.0004 m²K/w.

SECTION-II

- Q7)** 12000 kg/hr of water available at 93°C is to be cooled to 50°C in a shell and tube heat exchanger. This heat is to be utilized for preheating of water from 15°C to 45°C, Cold water is to be circulated through the tubes, while hot water on shell side. Tubes of inside diameter 20 mm are to be used and the maximum velocity through the tubes should not be more than 0.5 m/sec. Due to space limitations the tube length is to be restricted to 3.2m. Overall heat transfer coefficient for the heat exchanger is 1450 w/m²K. Fouling resistance and metal wall resistance may be neglected. Suggest a suitable design for the shell and tube heat exchanger. [16]

OR

- Q8)** a) What are the different types of heat exchanger? Discuss about Codes and Standards for heat exchanger. [8]
b) Explain the procedure with equations to calculate the tube side heat transfer coefficient and pressure drop. [8]

- Q9)** a) Explain the optimum sieve plate performance diagram. [8]
b) Discuss various feed arrangements to be considered for distillation column along with neat sketches. [8]

OR

- Q10)** a) Write short note on AIChE method for calculation of plate efficiency. [8]
b) Define Murphree plate, Overall plate (column) efficiency. [8]

- Q11)** a) State the advantages of high performance thin layer chromatography. [6]
b) State the need of downstream processing in biological processes. [8]
c) Write short note on Tangential Flow Filtration (TFF). [4]

OR

- Q12)** a) Write short notes on: [9]
i) Filter integrating testing
ii) Commissioning and validation of filter
b) Describe downstream processing operation used in fermentation process. [9]



Total No. of Questions : 12]

SEAT No. :

P1131

[4659]-356

[Total No. of Pages : 2

B.E.(Biotechnology)

ENVIRONMENTAL BIOTECHNOLOGY (415461)

(2008 Pattern)(Elective-I) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the Candidate:

- 1) *Answers 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 diagrams must be drawn wherever necessary.*

SECTION-I

Q1) Describe in detail the different methods of waste water characterization. Explain importance of characterization in treatment of waste water. **[18]**

OR

Q2) Answer the following :(9 marks each) **[18]**

- a) Explain the physical and chemical processes for treatment of waste water.
- b) Deduce the equation for first stage BOD.

Q3) Discuss the following: (8 marks each) **[16]**

- a) Low cost waste water treatment methods.
- b) Photocatalytic reactor and its disadvantages.

OR

Q4) With the help of neat labeled diagram explain activated sludge system and biological film system in details. **[16]**

Q5) Describe the various pollutants in waste water. Discuss in detail the following methods of industrial waste water treatment: **[16]**

- a) Neutralization
- b) Equalization and proportioning

OR

P.T.O.

- Q6)** Explain manufacturing process, sources of waste and its treatment methods for the following industries: [16]
- a) Distillery industry
 - b) Dairy industry

SECTION-II

- Q7)** Explain the following types of particulate collectors used in industry: [18]
- a) Electrostatic precipitators
 - b) Fabric filters
 - c) Venture scrubbers

OR

- Q8)** Answer the following: (9 marks each) [18]
- a) Different scales for measurement of air pollution.
 - b) Ambient and Stack air sampling.

- Q9)** Explain in detail the different methods of solid waste disposals. Add a note on its merits and demerits. [16]

OR

- Q10)** Discuss different types of biomedical waste and recommend their treatment options. Add a note on waste minimization. [16]

- Q11)** Describe the following: (8 marks each) [16]
- a) Liquid bioremediation.
 - b) Biodegradation of herbicides and pesticides.

OR

- Q12)** Write short notes on (4 marks each) [16]
- a) Recycling of wastes.
 - b) Vermicomposting
 - c) Insitu bioremediation
 - d) Bioventing and biosparging

□□□

Total No. of Questions : 11]

SEAT No. :

P1132

[4659]-358

[Total No. of Pages : 2

B.E.(Biotechnology)

C-BIO-THERAPEUTICS TECHNOLOGY (415461)

(Elective I) (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 Q1 or 2, Q3 or 4, Q5 or 6 from section I and Q7 or 8, Q9 and Q10 or Q11 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) Giving examples give an account of biotherapeutics products. [18]

OR

Q2) Give comparative account of traditional drugs and Biopharmaceuticals. [18]

Q3) a) Giving examples explain how the insect cell lines are used for production of biotherapeutics. [8]

b) Enlist 5 recombinant proteins and briefly write on the applications and host used for production. [8]

OR

Q4) a) With the help of flow chart give outline of hybridoma technique for production of MAb. [8]

b) Describe ADME of monoclonal antibody given by parenteral route. [8]

Q5) Describe in detail advantages and disadvantages of various sources of Biotherapeutic proteins. [16]

OR

P.T.O.

Q6) What are the methods of production of recombinant biotherapeutic proteins using plants and animals. [16]

SECTION-II

Q7) Describe the process of decontamination, sanitation and Generation of water for biopharmaceutical manufacturing. [18]

OR

Q8) Give an overview of range and significance of biopharmaceutical product impurities like microorganisms, viruses, contaminant proteins, DNA and pyrogens. [18]

Q9) Write short notes on any two- [16]

- a) QC of final biopharmaceutical product,
- b) Stability of biopharmaceuticals,
- c) Biopharmaceutical validation,
- d) Nano drug delivery.

Q10) Give an account of various types of clinical trials and role of DCGI. [16]

OR

Q11) Write notes on any TWO: [16]

- a) IPR and Patents,
- b) GMP,
- c) Toxicity studies,
- d) Pre-clinical studies.

□□□

Total No. of Questions : 12]

SEAT No. :

P1170

[4659] - 359

[Total No. of Pages : 3

B.E. (Biotechnology) (Semester - I)
A : BIOENERGY AND RENEWABLE RESOURCES
(2008 Pattern) (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, Q9 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) *Answer to the two sections should be written in separate answer books.*

SECTION - I

Q1) Describe the following.

[18]

- a) Energy intensity and energy - GDP elasticity.
- b) Environmental impacts of the conventional energy sources.
- c) Advantages and disadvantages of geothermal energy.

OR

Q2) Write down the principle, advantages and disadvantages of

[18]

- a) Wind energy
- b) Solar thermal energy
- c) Hydrogen energy system

P.T.O.

Q3) Wind at 1 standard atmospheric pressure and 15°C has velocity of 15m/s calculate: **[16]**

- a) The total power density in the wind stream.
- b) The maximum obtainable power density.
- c) A reasonably obtainable power density.
- d) The total power.
- e) The torque and axial thrust.

Given : turbine diameter = 120 m, and turbine operating speed = 40 r.p.m. at maximum efficiency. Propeller type wind turbine is considered. For air the value of gas constant $R = 0.287\text{kJ/kg K}$.

OR

Q4) What is geo thermal energy? Give the applications of geothermal energy. Enlist the general categories of geothermal resources and describe any two in detail. **[16]**

Q5) Explain the principle of conversion of solar energy into heat? What are the main components of flat-plate solar collector, explain the function of each. **[16]**

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]**

SECTION - II

Q7) What is microalgae? Describe in detail about microalgae biomass production by . **[18]**

- a) Raceway ponds and
- b) Photobioreactors.

OR

Q8) What is biodiesel? What are the advantages of biodiesel? Enlist the various steps involved in the preparation of biodiesel from *Jatropha* and describe any one in detail. **[18]**

Q9) Describe the process of biobutanol production. What are the different methods for removal of butanol from the broth? **[16]**

OR

Q10) Describe in detail about. **[16]**

- a) Ethanol production from lignocellulosic materials.
- b) Challenges in ethanol production.

Q11) What is biogas? Describe the anaerobic process of biogas production. Illustrate the advantages of anaerobic digestion and the factors affecting generation of gas. **[16]**

OR

Q12) Describe in detail about following biogas plants. **[16]**

- a) Continuous and batch types.
- b) The dome and the drum types.
- c) Different variations in the drum type



Total No. of Questions : 12]

SEAT No. :

P735

[Total No. of Pages : 2

[4659] - 36

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

PRODUCT DESIGN AND DEVELOPMENT (Elective - I (b))

(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 books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide, rule, mollier charts, electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain morphology of product design? [10]
b) Discuss the various factors in product design? [8]

OR

- Q2)** a) What is product design? Write its evolution and innovation? [10]
b) Distinguish between product verification and product validation?[8]

- Q3)** a) What is Technology forecasting? Write in detail technology S curve?[8]
b) Explain in detail customers needs and satisfaction? [8]

OR

- Q4)** a) What is product design? Explain in detail steps involved in it? [8]
b) Why there is need of market analysis? [8]

P.T.O.

- Q5) a)** Distinguish between product development and process development?[8]
b) Write in detail product development with suitable example? [8]

OR

- Q6) a)** What is product benchmarking? Explain steps involved in product benchmarking? [8]
b) Explain in detail functional modeling and decomposition? [8]

SECTION - II

- Q7) a)** What is Reverse Engineering? Write its advantages and limitations? [10]
b) Explain in detail step involved in product teardown process? [8]

OR

- Q8) a)** Write in detail benchmarking approach and tools used in benchmarking? [10]
b) Explain the need of product portfolio and architecture? [8]

- Q9) a)** What is design for manufacturing? Write its steps in detail? [8]
b) Explain in detail DFE method and its application [8]

OR

- Q10) a)** What is concept of life cycle assessment? Explain its types in detail?[8]
b) Explain various methods to reduce environmental impact? [8]

- Q11) a)** Write short notes on [8]
i) Concept of Product life cycle
ii) Concept of PLM
b) Write in detail different phases of product life cycle [8]

OR

- Q12) a)** Distinguish between product data and product workflow [8]
b) What is importance of product data management in industry? [8]



Total No. of Questions : 12]

SEAT No. :

P1133

[4659]-360

[Total No. of Pages :2

B.E. (Biotechnology)

b - BIOMATERIALS

(2008 Pattern) (Elective - II) (Semester -I) (415462)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers 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 whenever necessary.*

SECTION-I

Q1) Enlist the different mechanical properties of materials and describe their importance for the application in biomaterials. **[18]**

OR

Q2) Explain in detail the curing methods in silicone elastomer. Add a note on oxidative addition and reductive elimination of Pt in silicone elastomers. **[18]**

Q3) Write short notes on the following: **[16]**

- a) Smart polymers.
- b) Nanobiomateria.

OR

Q4) Explain the preparation, properties and biomedical applications of Xanthan and Pullulan. **[16]**

Q5) Explain the properties and functions: (8 marks each) **[16]**

- a) Polydioxanone
- b) Polycaprolactone

OR

Q6) Answer the following in details: **[16]**

- a) Different types of degradable implants.
- b) Factors influencing the rate of Bioerosion.

P.T.O.

SECTION-II

Q7) Write short notes on: **[16]**

- a) Properties of PHA
- b) Application of biocatalysts.

OR

Q8) Describe in detail the production and purification of L-Homophenylalanine. Add a note on membrane bioreactor. **[16]**

Q9) Write short notes on (4 marks each): **[16]**

- a) Artificial organs
- b) PTFE
- c) PVC
- d) PMMA

OR

Q10) Answer the following (8 marks each): **[16]**

- a) Discuss any two biodegradable polymers.
- b) Define biocompatibility and host response with examples.

Q11) Explain in details the following applications of hydrogels in detail: **[18]**

- a) Tissue scaffolding
- b) Drug delivery system
- c) Contact lenses

OR

Q12) Enlist the different type of biomaterials which can be used in the cardiac implants. Explain any two in details. **[18]**

EEE

Total No. of Questions : 12]

SEAT No. :

P1134

[4659]-361

[Total No. of Pages :3

B.E. (Biotechnology)

**c - STEM CELLS AND REGENERATIVE MEDICINES
(2008 Course) (Elective -II) (Semester - I) (415462)**

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4 Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Use of lagarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is allowed.*

Q1) Answer the following (9 marks each): **[18]**

- a) Explain the properties of Embryonic stem cells important for regenerative medicine.
- b) Define the following with examples:
Progenitor cells, Transit amplifying cells, Totipotent cells.

OR

Q2) Answer the following (9 marks each): **[18]**

- a) What are stem cells? Explain the general properties of stem cells in details.
- b) What are the potential advantages of Embryonic stem cells as compared to adult stem cells for therapeutic application?

Q3) Discuss the following techniques used in stem cell biology in details: **[16]**

- a) Chromatin immunoprecipitation.
- b) DNA sequencing.

OR

Q4) Describe briefly the principle, working and application of fluorescence activated cell sorting. **[16]**

P.T.O.

Q5) Briefly explain the following: [16]

- a) Blood cells differentiation from Hematopoietic stem cells.
- b) Types of multipotent cells present in nervous system.

OR

Q6) Briefly explain the following: [16]

- a) Mechanisms of liver regeneration.
- b) Somatic cell nuclear transfer.

SECTION-II

Q7) With the help of neat labeled diagram explain the isolation and culture of human ESCs from blastocysts. [16]

OR

Q8) Discuss the following: [16]

- a) Guidelines for translational stem cell research for cell processing and manufacturing.
- b) Clinical application of umbilical chord blood stem cells.

Q9) Describe the causes, symptoms, diagnosis and treatment for Parkinson's disease. Add a note on difficulties to develop stem cell based novel therapies for many serious disease and injuries. [18]

OR

Q10) Describe the following: [18]

- a) Stem cells for gene therapy.
- b) What are the potential risks associated with the use of ESCs in regenerative medicines.

Q11) Explain with the help of flow chart the tissue engineering process in detail.
Add a note on its importance as regenerative medicine. **[16]**

OR

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

- a) Induced pluripotent stem cells.
- b) Stem cells growth and differentiation factors.
- c) Therapeutic cloning.
- d) Cell regeneration and cell replacement.

EEE

Total No. of Questions : 12]

SEAT No. :

P1171

[4659] - 368

[Total No. of Pages : 4

B.E (Biotechnology)

**B:IPR, BIOETHICS AND REGULATIONS
(2008 Pattern) (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, Q9 or Q-10, Q-11 or Q-12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Answer to the two sections should be written in separate answer books.*

SECTION - I

Q1) Define ethics. What are the rights and responsibilities of researcher? Describe the functions of institutional ethics committee. **[18]**

OR

Q2) What is ICMR code? What does it consist of? Explain in short about 12 principles laid down under statement on general principles? **[18]**

Q3) What is bioethics? What are basic bioethics principles? Discuss any one in detail with one example. **[16]**

OR

Q4) Read the following case study and answer the questions. **[16]**

Confirmed fish kills in North Carolina were observed in 1994 in the Pamlico and Neuse Estuaries. Fish losses were reported to be in the millions. Reports of dead fish found floating in North Carolina tidal waters caused a great deal of concern. In the summer of 1997, thousands of fish were killed in the Pocomoke River on Maryland's Eastern Shore. Consequently, the public was

P.T.O.

banned from a five-mile stretch of the scenic waterway. Local watermen had begun reporting gaping red sores on fish almost a year previously but the fish kills and public ban brought this issue to national attention.

Research has shown that *Pfiesteriapiscicida*, a single-cell microorganism, is responsible for the fish kills in North Carolina, and is suspected to be the cause of fish kills in Maryland as well. *Pfiesteriapiscicida* has a complex life cycle that may include 24 flagellated, amoeboid, and encysted stages or forms. *Pfiesteria* may live for years in tiny, cyst-like shells buried in river bottom sediment, then hatch when conditions are right. Conditions supporting and / or encouraging *pfiesteria* are a combination of warm water temperatures (70F); increased levels of phosphorous, ammonium, and suspended solids; moderate to low salinity levels; and increased rainfall or runoff. When large numbers of fish swim into an area where *Pfiesteria* are present their excreta triggers encysted cells to emerge and become toxic. Other stages of *Pfiesteria* can also become toxic in the presence of fish excreta (amoeboid and flagellated cells). The small cells swim toward the fish prey and give off potent toxins which make the fish lethargic and often cause bleeding sores and hemorrhaging. Once fish are incapacitated, *Pfiesteria* feeds on the sloughed epidermal tissue, blood, and other substances that leak from the sores. When the fish are dead, flagellated stages transform to amoeboid stages and feed on the fish remains or, if conditions become unfavorable for the *Pfiesteria*, the *Pfiesteria* cells make protective outer coverings and sink to the bottom of the river as dormant cyst stages. All of these changes can take place in a matter of hours.

Pfiesteria outbreaks in North Carolina were shown to occur in waters that were heavily nutrient enriched. Possible sources of nutrients flowing into the water include sewage treatment plants, fertilizer runoff, chicken and hog manure, phosphate mines, and municipal wastewater treatment plants where effluents are rich in phosphorus and nitrogen.

The primary contributor to the problem in North Carolina, however, seems to be the state's large confinement hog-farming operations. After the outbreak in Maryland, a leading environmental group called for reforms in the handling of manure from the Eastern Shore's millions of chickens. Chicken waste is often applied to fields as fertilizer. Rain washes the nitrogen and other nutrients in the manure into the surrounding waters. The Pocomoke River, at its headwaters, drains the largest chicken -producing country in the nation. Maryland's Delmarva peninsula houses some 625 million chickens. Governor Glendening of Maryland has announced that farmers may soon be subject to regulations on animal waste disposal.

Maryland's top farm official has been quoted as saying that poultry farmers have been responsible in their handling of chicken waste. A spokesman for the poultry industry rejects the suggestion that chicken manure is responsible for the Pfiesteria outbreak, saying bird waste is well-managed. Farming advocates also note that if regulatory measures target only one possible source, the regulations might unfairly cause producers to go out business. Farmers work on small profit margins under current management practices.

Questions:

- a) Do you think that news reports, researchers, and politicians unfairly blame farmers without looking at other possible causes?
- b) If large poultry or hog operations are shown to be the primary cause of the pfiesteria outbreaks, should the producers be required to get rid of these animals? or reduce them to a certain number that will produce less waste?
- c) The chicken industry spokesman said that "bird waste is well-managed", implying that there is no cause for concern. Do you believe this statement? Can you think of assurances from another industry that were later proven false? How much of the public perception is formed by what we read and see and how much is formed by previous experiences?
- d) Should large, corporate, farms be allowed only in less populated states? Does a land owner have the right to use their land as they wish? Where should we set the boundaries between personal rights and the rights of society?

Q5) What do terms patent pending and patent applied for means? Can computer software and business methods be patented? What is the difference between non obviousness and inventive step? **[16]**

OR

Q6) What are the conditions for patentability? Describe any two conditions in detail. What are the different types of patents which are not patentable in India. **[16]**

SECTION - II

Q7) Define copyright, trademark and domain name. Describe in detail about the requirements for registration for a trademark? [18]

OR

Q8) What is trade mark act 1999? What does trademark indicate? What does a trademark guarantees? What is the significance of trademark? [18]

Q9) Answer the following.

a) Draw a schematic showing the hierarchal structure in Indian biotechnology. [10]

b) Enlist any six functions of drugs controller general (India) DCGI [6]

OR

Q10) Describe the current good manufacturing practices for drugs. [16]

Q11) What is clinical research? What are the different types of clinical research? Describe the various phases in Clinical Research in detail. [16]

OR

Q12) What is quality assurance and quality control. What is the difference between QA and QC? Explain in detail about the steps involved in QC of any one biotech product assurance and quality control? [16]



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :3

P1138

[4659] - 369

B.E. (Biotechnology)

INDUSTRIAL ORGANIZATION AND MANAGEMENT

(2008 Course) (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) Define and explain in brief the following:

[16]

- a) Management
- b) Functions
- c) Authority
- d) Responsibility
- e) Decision Making
- f) Unity of command and Direction
- g) Administration
- h) Growth of management

OR

Q2) a) Explain Management by Objectives.

[8]

b) Explain the following terms:

[8]

- i) Line Organization
- ii) Staff Organization

P.T.O.

- Q3)** a) Discuss the objectives and functions of wage and salary administration. [8]
b) Write short note on [8]
i) Industrial Fatigue
ii) Trade Unions

OR

- Q4)** a) Discuss the role of Trade unions in maintaining industrial peace. [8]
b) Explain the steps in selection procedure and types of tests in selection procedure. [8]

- Q5)** a) Discuss various types of costs associated with inventory and store management. [10]
b) Write short notes on: [8]
i) Functions of Storekeeper
ii) Inspection and quality control

OR

- Q6)** Write short notes on: [18]
a) VED analysis
b) SDE analysis

SECTION - II

- Q7)** a) Explain different functions of sales department. [8]
b) Explain the importance of marketing management for the growth of industrial organization. [8]

OR

- Q8)** a) What is forecasting? Explain two types of forecasting. [6]
b) Define market research. What are the different methods of market research? Explain with case study. [10]

Q9) Why exporting is important for the country? Explain cost involved in exporting a product. Enlist government aids for export promotion. [16]

OR

Q10)a) State and explain factors affecting International Trade. [6]

b) Write Short Notes on: [10]

i) Patents

ii) ISO Systems

Q11)a) Explain in detail the concept of contract act. [9]

b) What is the provision for penalty under payment of Gratuity act? [9]

OR

Q12)a) What is flow diagram and flow process chart? Explain with an example. [9]

b) Discuss the provision in MRTP Act. [9]



Total No. of Questions : 12]

SEAT No. :

P1059

[Total No. of Pages : 4

[4659]-37

B.E. (Mechanical Engineering)

c-DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2008 Course) (402044) (Semester-I) (Elective-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1) a)** Explain the following terms: **[8]**
- | | |
|------------------|--------------------------------|
| i) Flow Machines | ii) Turbines |
| iii) Pumps | iv) Compressible Flow Machines |
- b) A turbo blower develops 750mm W.G. at a speed of 1480 rpm and a flow rate of 38 m³/s. It is desired to build a small model which develops the same head at a higher speed (2490 rpm) and low discharge. Determine the specific speed and the flow rate through the model. **[8]**

OR

- Q2) a)** Explain the performance characteristics of pumps, compressors, fans and blowers. **[10]**
- b) Write equations of energy transfer between fluid and rotor. **[6]**
- Q3) a)** The impeller of a centrifugal pump has 1.4 m outside diameter. It is used to lift 1800 liters of water per second against a head of 10m. Its Vanes make an angle of 45° with the direction of motion at outlet and runs at 400 rpm. If the radial velocity of flow at outlet is 3.5 m/s, find the manometric efficiency. Also find the power required if the overall efficiency is 82%. **[8]**
- b) Explain various efficiencies of centrifugal pump. **[8]**

OR

P.T.O.

- Q4) a)** Explain various types of characteristic curves usually prepared for centrifugal pumps. [8]
- b) What is NPSH? Derive the expression of the same. Find the height from the water surface at which a centrifugal pump may be installed in the following case to avoid cavitation: Atmospheric pressure = 1.01 bar; vapour pressure = 0.022 bar; losses in suction pipe = 1.42m; effective head of pump = 49m; and cavitation factor = 0.115. [8]

- Q5) a)** Explain the following terms: [8]
- i) Static Suction Head ii) Static Discharge Head
- iii) Total Static Head
- b) Explain the design procedure of centrifugal pump. [10]

OR

- Q6) a)** Explain various forms of corrosion occurred in hydraulic machines. [8]
- b) A centrifugal pump running at 1450 rpm has the characteristic as given below: [10]

| | | | | | | | |
|------------------------|------|------|------|------|------|------|------|
| Discharge (Lit/sec) | 11.3 | 16.9 | 22.6 | 28.3 | 34 | 39.6 | 45.2 |
| Head (m) | 25.8 | 25 | 24.1 | 23.2 | 21.4 | 18.9 | 15.8 |
| Efficiency % | 65 | 70 | 73 | 74 | 72 | 69 | 62 |

Draw the operating characteristic of the pump and determine its specific speed. The pump lifts water against a static head of 12m through a long pipeline in which the loss of head in meters, due to friction is given by the expression, $h_f = 0.012 Q^2$, where Q is the discharge in liters/sec. The minor losses in the pipe may be neglected. Determine the power required to drive the pump.

SECTION-II

- Q7) a)** Explain the different applications of compressors, fans and blowers. [8]
- b) An axial fan stage consisting of rotor and UGVs for-ve inlet swirl and to eliminate outlet swirl, has the following data: [10]

Rotor blade air angle at inlet = 86° Tip diameter = 60 cm
 Hub diameter = 30 cm Rotational speed = 960 rpm
 Power required = 2 kW Flow coefficient = 0.245

(Inlet flow conditions $P_1 = 1.02$ bar, $T_1 = 316$ K)

Determine the rotor blade angle at exit, the flow rate, stage pressure rise, overall efficiency, degree of reaction and specific speed.

OR

Q8) a) Explain functions of an airfoil and discuss the characteristic curves of airfoils. [8]

b) Prove the following relations for an axial fan stage with UGVs and DGVs:

$$(\Delta p)_{st} = 2\rho u^2 (\Phi \tan \beta_2 - 1), \quad \psi = 4(\Phi \tan \beta_2 - 1) \text{ and } R = 1. \quad [10]$$

Q9) a) What are the main causes of noise generation? What are the methods of reducing fan noise? [8]

b) A centrifugal blower takes in $180 \text{ m}^3/\text{min}$ of air at $P_1 = 1.013$ bar and $T_1 = 43^\circ\text{C}$, and delivers it at 750 mm of W.C. Taking the efficiencies of the blower and drive as 80% and 82% respectively, determine the power required to drive the blower and the state of air at exit. [8]

OR

Q10) a) Explain briefly what is the purpose of inlet guide vanes and inducer blades. Why is the radial-tipped impeller most used in centrifugal compressor stages? [8]

b) Write a short note on: [8]

i) Surge and stall ii) Cascade variables

Q11) a) State design considerations and empirical relations used to determine various fan design parameters. [6]

b) An axial compressor stage has the following data: [10]

Temperature and pressure at entry 300 K, 1 bar

Degree of reaction = 50% Mean blade ring diameter = 36 cm

Rotational speed = 18000 rpm Blade height at entry = 6 cm

Air angle at rotor and stator exit = 25°

Flow coefficient = 0.53 Work-done factor = 0.88

Stage efficiency = 85% Mechanical efficiency = 96.7%

Determine:

- i) Air angles at rotor and stator entry.
- ii) The mass flow rate of air.
- iii) The power required to drive the compressor.
- iv) The loading coefficient.
- v) The pressure ratio developed.
- vi) The Mach number at stator entry.

OR

- Q12)a)** What is “slip factor”? What is its effect on the flow and the pressure ratio in the stage? **[6]**
- b) The impeller tip speed of a centrifugal compressor is 370 m/s, slip factor is 0.90 and the radial velocity component at the exit is 35 m/s. If the flow area at the exit is 0.18 m² and compressor efficiency is 0.88, determine the mass flow rate of air and the absolute Mach number at the impeller tip. Assume air density = 1.57 kg/m³ and inlet stagnation temperature is 290K. Neglect the work input factor. Also, find the overall pressure ratio of the compressor. **[10]**



Total No. of Questions : 12]

SEAT No. :

P748

[Total No. of Pages : 4

[4659] - 370

B.E. (Automobile Engineering) (Semester - I)
AUTOMOTIVE REFRIGERATION AND AIR CONDITIONING
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section - I & 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 logarithmic tables slide rule, Mollier charts, electronic pocket calculator, steam tables and psychrometric chart is allowed .*

SECTION - I

- Q1)** a) Explain Reversed Brayton cycle. **[4]**
- b) Derive an expression for COP of Bell Coleman cycle. **[6]**
- c) In a Bell - Coleman cycle, environment temperature is 320K and refrigerant temperature is 120K. The minimum temperature of the cycle is 80K. The pressure in the refrigerator is 1 bar. Find the following : **[8]**
- i) Maximum pressure and temperature of the cycle.
 - ii) Refrigerating effect and heat rejected per kg of air.
 - iii) Net work required per kg of air.
 - iv) Compressor and expander swept volume per kg of air.
 - v) COP of the cycle.

OR

- Q2)** a) Sketch actual vapor compression cycle on P-V and T-S diagram and explain all processes briefly. **[8]**
- b) A dense air refrigeration machine operates on reversed Brayton cycle and used for 10 tonnes refrigeration capacity. The cooler pressure is 4.2 bar and refrigerator pressure is 1.4 bar. The air is cooled in the cooler to a temperature of 50°C and the temperature of air at inlet to the compressor is – 20°C for in ideal cycle, determine following.

P.T.O.

- i) COP of the system.
- ii) Mass of air circulated per minute.
- iii) Theoretical piston displacement of the compressor.
- iv) Net power per ton of refrigeration.

Show the cycle on P-V & T-S diagram.

Take $C_p = 1.07$ kJ/kg-K (for dense air).

[10]

- Q3)** a) Explain four important thermodynamic & two important each of physical and chemical requirements of refrigerant. [8]
- b) Describe any two types of expansion devices used in refrigerating system. [8]

OR

- Q4)** a) Explain : GWP, ODP and TEWI. [6]
- b) Explain different air conditioning system components. [6]
- c) Explain the refrigerant charge capacity determination. [4]

- 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 any one Automatic temperature control device. [6]
- b) Explain recycle operation modes and cool-down performance. [6]
- c) Write short note on : [4]
- i) Air filter
 - ii) Blower fans

SECTION - II

- Q7)** a) Explain following psychrometric properties of air. [8]
- i) Dry air
 - ii) Moist air
 - iii) Dry bulb Temp.
 - iv) Wet Bulb Temp.
 - v) Dew point Temp.
 - vi) Dalton's Law of partial pressure
 - vii) Specific humidity
 - viii) Relative humidity

- b) The DBT and WBT of atmospheric air are 35°C and 23°C respectively when the barometer reads 750 mm of Hg. Determine [8]

- i) Relative humidity
- ii) Humidity ratio
- iii) Dew point temperature
- iv) Density and
- v) Enthalpy of atmospheric air.

Use the carrier equation as given below.

$$P_v = (P_{us})_{wb} - \frac{[P_t - (P_{us})_{wb}][T_{ab} - T_{wb}] \times 1.8}{[2800 - 1.3(1.8T_{ab} + 32)]}$$

pressure in mm of Hg.

OR

- Q8)** a) Explain sling psychrometer used for DBT and WBT measurement. [4]
b) Explain Cooling and Humidification psychrometric process with diagram. [4]
c) 30 m³/min of a stream of moist air at 15°C DBT and 13°C WBT are mixed with 12 m³/min of a second stream at 25°C DBT and 18°C WBT. Barometric pressure is one standard atmosphere. Determine the dry bulb and wet bulb temperature of the resulting mixture. [8]

- Q9)** a) Explain different types of heat source which contribute to sensible and latent heat for an automobile car. [8]
b) The following data were collected in connection with the design of air conditioning a small theatre. [10]

Total seating capacity = 350 persons

Atmospheric conditions = 34°C DBT and 70% R.H.

Comfort condition required = 22°C DBT and 50% R.H.

Sensible heat given per person = 320 kJ/hr.

Latent heat given per person = 100 kJ/hr.

Sensible heat due to solar gain and infiltrated air = 16,00,000 kJ/hr.

Latent heat due to infiltrated air = 80,000 kJ/hr.

Quantity of fresh air supplied = 0.4m³/person/min.

Desirable temp rise in theatre = 8°C.

Assume the re-circulated air is mixed with the fresh air after leaving conditioner.

Using above data, compute the followings.

- i) Percentage of total air recirculated.
ii) Refrigeration capacity of the conditioner coil.

Assume air leaves the conditioner coil with 100% R.H.

OR

- Q10)a)** Define following with neat sketch [6]
i) RSHF
ii) ERSHF
iii) GSHF

- b) The following data were collected to design an air conditioning system for restaurant in city. [12]

Outside condition = 34°C DBT and 28°C WBT.

Inside design condition = 24°C DBT and 50% R.H.

Solar heat gain through walls, roof & floor = 16,160 kJ/hr.

Solar heat gain through glass = 15,200 kJ/hr.

Occupant = 13 smoking and 12 non - smoking.

Latent heat gain per person = 360 kJ/hr.

Sensible heat gain per person = 300 kJ/hr.

Internal lighting load = 15 lamps of 100 watts capacity each and 100 fluorescent tubes of 80 watt each.

Sensible heat gain from other sources = 40,000 kJ/hr.

Infiltrated air = 14m³/min.

If 40% fresh air and 60% recirculated air mixed and passed through the conditioner coil then find the followings.

- i) Amount of total air in m³/hr.
- ii) Dew point temperature of the coil.
- iii) The condition of supply air to the room.
- iv) The capacity of the conditioner in tonns of refrigeration.

Assume bypass factor of the coil 0.35.

Q11)a) Explain : [8]

- i) Initial recycle inspection
- ii) Odour removal

b) Explain leak detection test [8]

OR

Q12)a) What are the classification of sight glass and briefly explain need of sight glass? [8]

b) Write a short note on refrigerant recovery recycle and charging. [8]



Total No. of Questions : 12]

SEAT No. :

P750

[Total No. of Pages : 4

[4659] - 372

B.E. (Automobile Engineering) (Semester - I)

AUTOMOBILE SYSTEM DESIGN

(2008 Pattern)

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 diagram 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 optimum and adequate design. [4]
b) Explain in brief Johnson's method of optimum design. [6]
c) A hollow shaft is required to transmit 600 kw at 110 r.p.m., the maximum torque being 20% greater than the mean. The shear stress is not to exceed 63 Mpa and twist in a length of 3 metres not to exceed 1.4 degrees. Find the external diameter of the shaft ,if the internal diameter to external diameter is 3/8. Take modulus of rigidity as 84 GPa. [8]

OR

- Q2)** a) What are the aesthetic and ergonomic consideration in design. [6]
b) Explain optimization techniques in design. [6]
c) Write a short note on Design for natural tolerances. [6]

- Q3)** a) State and explain friction materials used in clutches. [4]
b) A single dry plate clutch is to be designed to transmit 10HP at 900 RPM. [12]

Find-

- i) Diameter of the shaft
- ii) mean radius and face width of the friction lining assuming the ratio of the mean radius to the face width as 4.
- iii) outer and inner radii of the clutch plate
- iv) Axial force required to engage the clutch

P.T.O.

OR

Q4) a) What is the requirement of a clutch? [4]

b) A centrifugal clutch is to be designed to transmit 20HP at 900 rpm. The shoes are four in number. The speed at which the engagement begins is $\frac{3}{4}$ 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) Explain gear boxes with different speed gears. [4]

b) Design a 3 speed constant mesh gear box having a gear ratio of 3.6 in bottom and reverse gear. The main shaft and lay shaft are 12cm apart approximately. Take the module 3.25mm. The top gear has got unity gear ratio. Find the exact gear ratio. [12]

OR

Q6) a) Explain the selection of gearboxes bearing in gearboxes. [6]

b) A four speed gear box is to have the following gear ratios, 1.0, 1.5, 2.48 and 3.93. The centre distance between the layshaft and the main shaft is 73.12 mm and the smallest pinion is to have at least 12 teeth with a diametral pitch of 3.25mm. Find the number of teeth of the various wheels. Find the exact gear ratios. [10]

SECTION - II

Q7) a) State and explain the types of live axle. [6]

b) A hollow propeller shaft of a car with outside diameter 75 mm transmits 22.5 kw at 1500 rpm. to the wheels which are 90 cm in the diameter. If the allowable shear stress is 60 N/mm², find out the cross-section of shafts. Take gear box reduction 5. [10]

OR

OR

- Q8)** a) What should be characteristics of a propeller shaft? [3]
- b) Why propeller shafts are made hollow? [3]
- c) The rear axle shaft connecting differential to side wheel is required to transmit 30 Kw at 1500 rpm. If maximum torque is two times average torque and $f_s = 80 \text{ N/mm}^2$ for axle material, find out diameter of axle shaft if,
- i) Shaft is solid.
- ii) Shaft is hollow with outside diameter 1.5 times the inside diameter. [10]

- Q9)** a) Explain braking of a vehicle on a curved path. [4]
- b) A motor cycle has wheel base 1.44m apart. The centre of gravity of the cycle and the rider is 0.76m above ground level 0.61m in front of the rear axle the coefficient of friction between the tyre and road is 0.75. If the rear wheel is brake, find the greatest deceleration that can be obtained.
- i) If the cycle is moving in a straight path
- ii) If it is going round a curve of 45.7m radius at 48km/hr
- Assume a level road and neglect air resistance. Neglect rotational inertia and obliquity when turning. [12]

- Q10)** a) Calculate the mean lining pressure and heat generated during braking operation. [8]
- b) Prove that when a passenger with a wheel base equal to 5 times the height of centre of gravity about the ground point is brake to utilize all the road friction availability ($\mu = 0.6$) the weight transferred from rear to front wheels amounts to approximately 12% of the weight of the car. [8]

Q11)a) Explain in brief understeer and oversteer. **[8]**

b) A truck spring has 12 no. of leaves 2 of which are full length leaves. The spring supports are 1.05 m apart and the central band is 85 mm wide. The central load is to be 5.4 kN with a permissible stress of 280 N/m^2 . Determine the thickness and the width of steel spring leaves. The ratio of the total depth to the width of the spring is 3. Also determine the deflection of the spring. **[10]**

OR

Q12)a) Explain components of steering system. **[12]**

b) State and explain any one steering gear mechanism. **[6]**



Total No. of Questions : 11]

SEAT No. :

P751

[Total No. of Pages : 2

[4659] - 373

B.E. (Automobile Engineering)
AUTOMOTIVE AERODYNAMICS & STYLING
(2008 Pattern) (Elective - I (a)) (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 Logarithmic tables, slides, rule, electronic pocket calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Classify various types of flows with examples for each type. [6]
b) Derive continuity equation in three dimensions for unsteady compressible flow. [10]

OR

- Q2)** a) Define convective and local acceleration. Determine the velocity and acceleration of a particle at position $x = 1$, $y = 2$ and $z = 5$ at time $t = 0.1$ in velocity field represented by $v(x, y, z) = 10 \times 2i - 20y \times j + 100tk$. [10]
b) Explain velocity potential and stream function. [6]

- Q3)** a) Explain flow around circular cylinder and flow around an aerofoil. [8]
b) Give the significance of mach number and what is critical mach number. [8]

OR

- Q4)** a) Explain flow separation over car and aerofoil and wake formation with the help of neat sketch. [8]
b) Explain transonic area rule and drag divergence. [8]

P.T.O.

- Q5) Explain in detail (Any Three) :** [18]
- a) Types of drag force
 - b) Stream line, streak line & path line
 - c) Lift divergence
 - d) Drag car as bluff body
 - e) Optimization of car bodies for low drag

SECTION - II

- Q6) a) Explain front end modification for cars.** [8]
b) What are the source of dirt accumulation on vehicle? [8]

OR

- Q7) a) Explain hatch back, fast back and square back dust flow pattern for Automobile with neat sketch.** [8]
b) Explain CFD methodology to vehicle Aerodynamics. [8]

- Q8) a) Describe in details wind tunnel testing.** [8]
b) Explain flow visualisation techniques for Automobiles. [8]

OR

- Q9) a) Explain road test method.** [8]
b) Explain full scale wind tunnel. [8]

- Q10) a) Describe in details head light shapes of vehicle.** [9]
b) Explain in details various type cars. [9]

OR

- Q11) Write a short note (Any Three) :** [18]
- a) Vehicle colour and colour codes.
 - b) Front grill shapes of vehicles.
 - c) Computer - aided design system.
 - d) Effect of gap configuration.



[4659] - 375

B.E. (Automobile Engineering) (Semester - I)**CAD /CAM & AUTOMATION****(2008 Course) (Elective - I (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) *Answer Q.No. 1 OR Q.No.2, Q.No. 3 OR Q.No. 4, and 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.*
- 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 and mention it clearly.*

SECTION - I

- Q1)** a) Explain the different types of coordinate systems used in CAD system and How the coordinates are mapped from one coordinate system to another. [4]
- b) A triangle ABC represented as A (10, 10), B (40, 30) and C (10, 50). It is to be scaled by a factor of 0.8 about a point P (30, 30). Determine the composite transformation matrix and the new coordinates of the triangle. Plot the graph. [12]

OR

- Q2)** a) Write OpenGL syntax for the following commands. [5]
i) Rotation ii) Translation iii) scaling iv) Vertex and v) Color.
- b) The co-ordinates of the center of circle are C (3, 4, 5) in WCS. Find the co-ordinates of Centre of circle with respect MCS. The orientation of MCS and WCS is shown in Fig.01. [6]

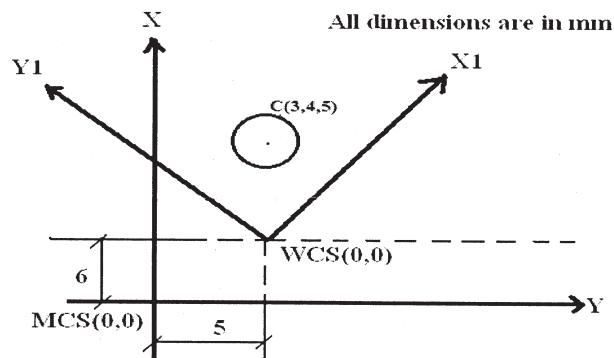


Fig.01: Q. No. 2(b)

P.T.O.

- c) Explain homogeneous transformation matrices to represent orthographic projections. [5]

Q3) a) Compare between B_rep and C_rep modeling techniques. [8]

- b) Write a parametric equation for a circle having end points of diameter as $P_1(2,3,6)$ and $P_2(8,7,6)$. Calculate the coordinates of circle. [8]

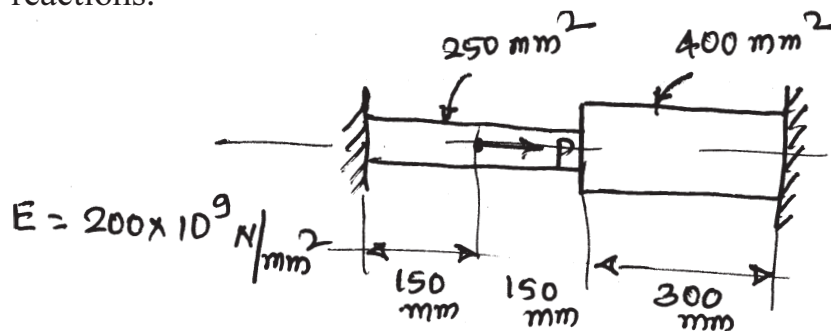
OR

Q4) a) Explain the different types of surface entities provided by the CAD/CAM systems. [8]

- b) The coordinates of four data points P_0, P_1, P_2 and P_3 are $(2,2,0)$, $(2,3,0)$, $(3,3,0)$ and $(3,2,0)$ respectively. Find the equation of the Bezier curve and determine the coordinates of points on curve for $u = 0.0, 0.25, 0.5, 0.75$ and 1.0 . [8]

Q5) a) Write short notes on mesh generation with suitable example. [6]

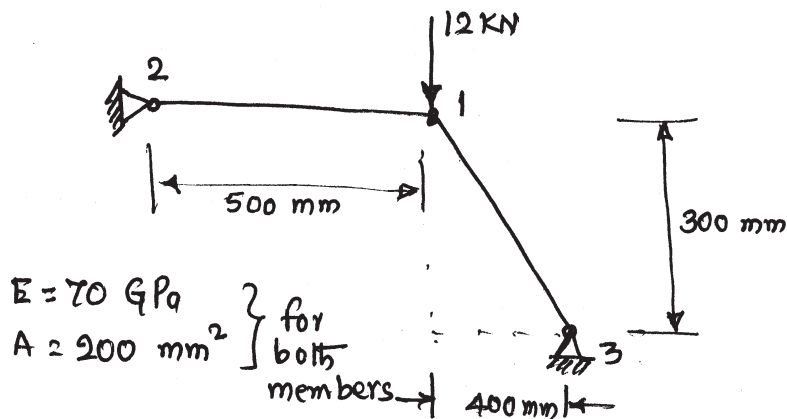
- b) An axial load $P = 300 \times 10^3 \text{ N}$ is applied at 20°C to the rod as shown in fig.1. Determine the nodal displacements elemental stresses and support reactions. [12]



OR

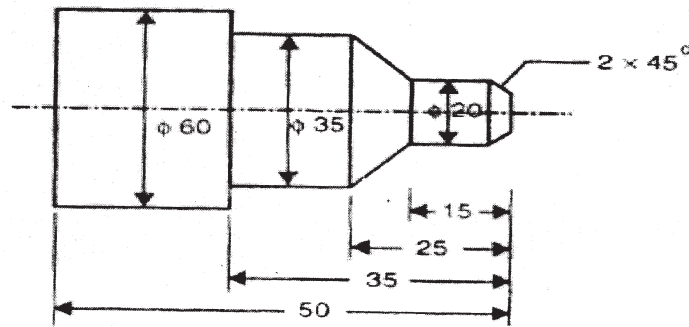
Q6) a) Derive the elemental stiffness matrix for truss element. [6]

- b) For the two-bar truss shown in fig.2, determine the displacement of node 1 and the stress in element 1-3. [12]



SECTION - II

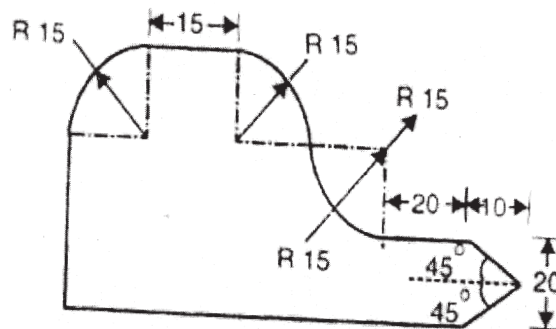
- Q7) a)** Explain in detail motion control modes used in CNC machines. [6]
- b) Write a CNC part program to turn a MS bar of size and shape as shown in following figure. Use canned cycles only for both rough turning and finish cut. Assume feed rate(0.8mm/rev.) and spindle speed(1000 RPM). [12]



All dimensions are in mm

OR

- Q8) a)** Explain different types of zeros used in NC programming. [6]
- b) Write a CNC part program to machine the end profile for the component as shown in fig. 3, assume suitable data for feed and speed. Also use left cutter radius compensation and incremental programming mode. Take thickness of plate 10mm. [12]



All dimensions are in mm

- Q9) a)** Explain the general configuration and functions of CNC system. [8]
- b) Explain retrieval type of process planning with the help of flow charts.[8]

Q10)a) Enlist part classification and coding systems used in group technology and explain any one in detail. **[10]**

b) What are the limitations and advantages of flexible automation. **[6]**

Q11)a) Differentiate between Vacuum and adhesive type grippers. **[6]**

b) Write short notes on lead through programming methods. **[5]**

c) Explain SCARA robot configuration. **[5]**

OR

Q12)a) Explain the criteria for selection of gripper design. **[6]**

b) Explain the terms payload, precision and accuracy related to the robotics. **[6]**

c) Compare between hydraulic and pneumatic drives used in robots. **[4]**



Total No. of Questions : 12]

SEAT No. :

P753

[Total No. of Pages : 3

[4659] - 376

B.E. (Automobile Engg.) (Semester - I)

AUTOMOTIVE NVH

(2008 Pattern) (Elective - I (d))

Time : 3 Hours]

[Max. Marks : 100

Instructions to 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 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)** a) Enlist the source of noise and vibration in automotive vehicle and discuss in brief. **[10]**
- b) Why NVH is important in consideration with vehicle integrity and driver comfort. **[6]**

OR

- Q2)** a) Explain the physiological effect of noise and vibration. **[10]**
- b) Write a short Note:- **[6]**
- i) Noise
 - ii) Vibration
 - iii) Harshness

- Q3)** a) Explain co-ordinate coupling. **[8]**
- b) Explain only static coupling. **[8]**

P.T.O.

OR

Q4) a) An aircraft ratio weighing 118N is to be isolated from engine vibration ranging in Frequencies From 1600 to 2200 cpm. What static deflection must the isolator For 80% isolation ? [10]

b) Explain generalized co-ordinates. [6]

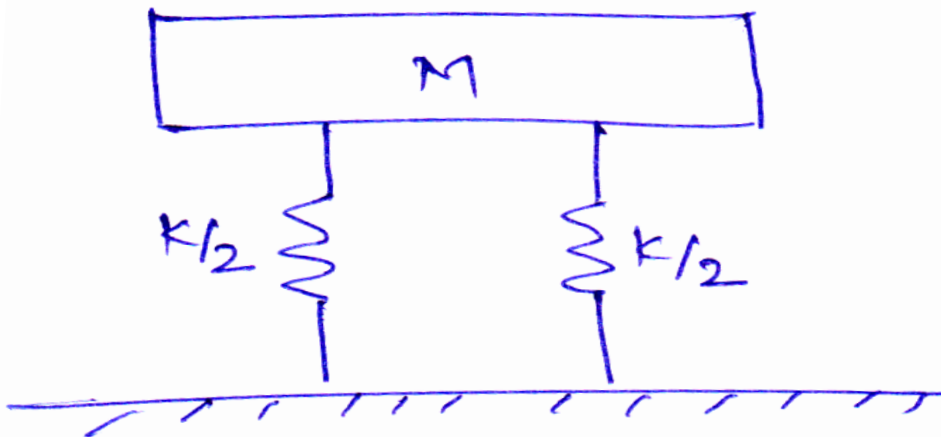
Q5) a) Describe in details untuned viscous damper and draw it's Frequency responce curve. [9]

b) Write short note on vibration isolation method of vibration isolation. [9]

OR

Q6) a) Enlist the types of damping and explain any two. [8]

b) Derive the equation of transmissibility ratio for isolation using spring as shown in Fig. [10]



SECTION - II

Q7) a) Define and write formula for:- [6]

i) Sound pressure

ii) Sound intensity

iii) Sound power

b) Relation between sound pressure, sound intensity and sound power level. [4]

c) Explain the weighting network. [6]

OR

- Q8)** a) Write a short Note. [4]
i) Structure borne noise
ii) Air borne noise
b) Determine the frequency of sound wave with a wavelength of 0.035m at room temperature, in air. [6]
c) Write a note on octave band analysis. [6]
- Q9)** a) Explain accelerometer as a NVH measuring tool. [8]
b) Write a Note on Frequency measuring instrument. [8]

OR

- Q10)**a) Explain with the help of neat sketch pass/noise measurement test. [10]
b) Explain with help of neat sketch construction and working of condenser microphone [6]
- Q11)**a) Describe various method to control automobile vehicle noise. [9]
b) Explain four Noise control techniques. [9]

OR

- Q12)**a) Explain method of control of noise for following:- [10]
i) Engine Noise
ii) Tyre Noise
iii) Aerodynamic Noise
iv) Transmission Noise
b) Write a short note on. [8]
i) Isolation
ii) Damping treatment



Total No. of Questions : 11]

SEAT No. :

P754

[Total No. of Pages : 3

[4659] - 378

B.E. (Automobile Engineering)

VEHICLE SAFETY

(Elective - II (b)) (2008 Pattern) (Semester - I)

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 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)** a) Enlist the safety systems used in Automobile? Explain any two of them in detail with layout. **[8]**
- b) What are the ergonomic considerations required at the time of safety system design. **[8]**

OR

- Q2)** a) Explain in detail characteristics of vehicle structure. **[8]**
- b) Explain the role of safety in an Automobile. **[8]**
- Q3)** a) Enlist the impact test and explain any two types of impact test. **[8]**
- b) Write a short note on **[8]**
- i) Crashworthiness
 - ii) Crash testing

P.T.O.

OR

- Q4)** a) Explain with the help of neat sketch movable barrier test and give its significance. [8]
- b) Write a short note on [8]
- i) Roll over impact test
- ii) Crumple zone
- Q5)** a) Explain the necessity of ergonomics in automobile? Justify your answer.[8]
- b) Enlist the different types of Dummy's and explain each one of them.[10]

OR

- Q6)** a) Explain in brief vehicle ergonomics with respect to location of controls.[8]
- b) What are the types of sensors used for impact test & for dummy. [10]

SECTION - II

- Q7)** a) Explain active and passive safety systems. [8]
- b) Write a short note on [8]
- i) Head restraint system and seat anchorage.
- ii) Seat belt and its types.

OR

- Q8)** a) Explain with layout Airbag system and give its advantages & disadvantages.[8]
- b) Explain the different types of energy absorbing systems used in vehicle.[8]
- Q9)** a) Enlist different types of automotive head lamp & explain any two of them in brief. [8]
- b) What are the requirements of reverse lamp and fog lamp? Justify it. [8]

OR

Q10)a) Discuss the recent trends in automotive lighting system. **[8]**

b) Explain with the help of neat sketch sealed beam type of head lamp with its advantages. **[8]**

Q11)a) Explain safety considerations according to central motor vehicle rule. **[6]**

b) Write a short note on: **[12]**

- i) Safety glasses
- ii) Types of mirrors
- iii) Recent trends in traffic system



Total No. of Questions : 12]

SEAT No. :

P755

[Total No. of Pages : 3

[4659] - 379

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

OFF-ROAD VEHICLES

(2008 Pattern) (Elective - II (C))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Discuss the History and construction layout of Off-Road Vehicles. [8]
b) Classify the off-road vehicles and give atleast 2 application of each. [8]

OR

- Q2)** a) What do you mean by off-road vehicle? Explain Aggregate mixing plant with neat sketch. [8]
b) Discuss the chassis and transmission considerations in off-road vehicles.[8]
- Q3)** a) Determine the Horse power of the tractor required to pull the 30cm bottom plough with working depth 15cm. Number of plough is 4, speed of tractor 6kmph and soil resistance is 0.7 kg/cm². [9]
b) Explain the types of dozer blades with neat sketch and their application.[9]

OR

P.T.O.

- Q4)** a) Explain the 2 types of Dump trucks with neat sketch and their application. [9]
b) Explain the construction and working of wheeled-bull dozer with neat sketch. [9]

- Q5)** a) Compare the shovel with loaders with neat sketches. [8]
b) Explain the working of scrapper with neat sketch. [8]

OR

- Q6)** a) Explain the construction and working of motor graders with neat sketch. [8]
b) Explain the construction layout of the Draglines with its purpose. [8]

SECTION - II

- Q7)** a) Distinguish between continuous running drive P.T.O and Independent drive P.T.O. [10]
b) Explain with a neat sketch disc plough and rotary plough. [6]

OR

- Q8)** Explain any two [8 + 8 = 16]
a) Design aspects of Dumper body
b) Types of Farm Equipments with neat sketch
c) Gun carriers
d) Pulverizers and rollers

- Q9)** a) Explain OCDB and dry disc calliper brake system of vehicle with neat sketch. [8]
b) What are the safety features and safe warning systems in Dumpers. [8]

OR

Q10)a) Explain the power steering system of vehicle in brief. **[8]**

b) Describe the hydraulic components of the system in off-road vehicles with neat sketch. **[8]**

Q11)a) Explain the layers of soil diagrammatically with all horizons. **[10]**

b) Discuss the types of soils with its characteristics. **[8]**

OR

Q12) Explain any three: **[18]**

a) Mean maximum pressure

b) Mobility Index (MI)

c) Vehicle Cone Index (VCI) and Rated Cone Index (RCI)

d) Soil properties (Minimum 5 properties)



Total No. of Questions : 12]

SEAT No. :

P736

[Total No. of Pages : 7

[4659]-38
B.E. (Mech. / Auto.) (Semester - I)
TRIBOLOGY
(Elective - I (b)) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Write only Exam seat No. on question paper.*
- 2) *Attempt one question from each unit.*
- 3) *Use of Electronics Calculator, Design Data book is allowed.*
- 4) *Draw neat sketches whenever necessary and assume suitable data if necessary.*
- 5) *Answer must be written to the points; irrelevant matter will be marked as zero.*

SECTION - I

Unit - I

- Q1)** a) Discuss Application and Limitation of Extreme Pressure Additives. [8]
b) Explain Physical and Chemical properties of lubricant. [8]

OR

- Q2)** a) What is lubricant? Explain basic mode of lubrication. [8]
b) Describe Tribology in metal cutting specific reference to coolant, action of coolant, types of coolant. [8]

Unit - II

- Q3)** a) Explain the quantitative law of sliding friction. Explain different methods to measure friction. [8]
b) A Hard steel surface consist of an array of conical asperities of an average semi-angle 70° slides on soft lead surface ($H=85\text{MPa}$) under load of 15 N. Calculate Volume of lead displaced in unit slide distance. The volume of lead material is 10^{-6}m^3 for sliding distance of 1kM. Calculate wear coefficient of Lead. Assume H is Hardness. [8]

P.T.O.

OR

- Q4)** a) Explain 1) Stick slip vibration phenomena. 2) Abrasive wear theory. [8]
- b) Describe causes of friction. [2]
- c) A flat strip of 450 mm × 600 mm × 25 mm is rolled between the roll of Diameter 550 mm. If final thickness of strip is 18 mm. Calculate arc length of contact and also Calculate Maximum Possible reduction in single pass. If coefficient of friction is 0.3. [6]

Unit - III

- Q5)** a) What is tilting pad bearing? Compare Tilting pad bearing with fixed pad bearing. [6]
- b) The following data related to a Hydrodynamic tilting pad bearing.
- Dimension of pad in the direction of motion = 100 mm
 - Dimension across the direction of motion = 425 mm
 - Minimum oil film thickness = 0.04 mm
 - Viscosity of oil = 0.02×10^{-6} N-s/mm²
 - Sliding velocity = 3 m/s.

Calculate at optimum condition:

- i) The location of pivot.
- ii) Maximum pressure.
- iii) Maximum pressure location.
- iv) Average pressure.

Assume $dW/dn=0$ $n=2.18=\frac{h_i}{h_o}$ [12]

OR

Q6) a) Explain Raimondi and Boyd method used for design Hydrodynamic journal bearing. **[6]**

b) The following data is given for 360° Hydrodynamic bearing.

- Journal Diameter = 100 mm.
- Bearing length = 50 mm.
- Journal speed = 1500 rpm.
- Minimum oil film thickness = 15 microns.
- Viscosity of oil = 30×10^{-9} N-s/mm².
- Specific gravity of oil = 0.86.
- Specific heat of oil = 2.09 kJ/kg°C

Fit between journal and bearing is normal fit H7e7.

Calculate :

- i) Load carrying capacity of bearing.
- ii) Co-efficient of friction.
- iii) Power lost in friction.
- iv) Total flow rate of oil.
- v) Side leakage.
- vi) Temperature rise. **[12]**

Table No: 1

| Diameter, mm | Tolerance, mm | |
|--------------|---------------|--------|
| | 100 | H7 |
| +0.035 | | -0.072 |
| +0.00 | | -0.107 |

SECTION - II

Unit - IV

- Q7)** a) Derive expression for fluid flow through Annular Area between piston and cylinder. [8]
- b) What is function of compensator & Explain action of compensator in detail. [8]

OR

- Q8)** a) Derive expression for load carrying capacity and time of approach in case of two parallel square plates separated by a fluid film. [8]
- b) Design a Hydrostatic squeeze film bearing for constant approach velocity as 0.015 m/s and load to be 4.5 kN. Using lubricating oil having viscosity as 45×10^{-9} N-s/mm².
Initial film thickness is uniform = 0.015 mm.
For 75% efficiency final film thickness is 0.009 mm. Assume plate is circular.
Whether bearing will support load OR not. [8]

Unit - V

- Q9)** a) Derive expression of Ertel-Grubin equation for Elastohydrodynamic lubrication. [8]
- b) Briefly explain desirable properties of bearing material. (Minimum 05). [8]

OR

- Q10)** a) Why lubrication is required in metal working? Explain the type of lubrication in metal working. [8]
- b) State and Discuss the lubricant and lubricating method for following Applications. [8]
- i) Gears.
 - ii) Refrigerator Compressor
 - iii) Gas Turbines
 - iv) Rope and Chains.

Unit - VI

- Q11)** a) Explain desired characteristics of surface engineering component in detail. [6]
- b) Discuss surface treatment/Coating type and their primary benefits (any 4) [6]
- c) What is tribological surface??. Explain with neat sketches different tribological surface layers. [6]

OR

- Q12)** a) Write short notes on : [12]
- i) Method to control corrosion
- ii) Method to control wear in tribo system
- b) Compare plasma Arc Spraying and Flame Spraying. [6]

| $\frac{l}{d}$ | $\frac{h_0}{c}$ | ϵ | S | $\left(\frac{r}{c}\right)_f$ | $\frac{Q}{r c n_s l}$ | $\frac{Q_s}{Q}$ | $\frac{p_{max}}{p}$ |
|---------------|-----------------|------------|----------|------------------------------|-----------------------|-----------------|---------------------|
| | 0.4 | 0.6 | 0.121 | 3.22 | 4.33 | 0.680 | 2.409 |
| | 0.6 | 0.4 | 0.264 | 5.79 | 3.99 | 0.497 | 2.066 |
| | 0.8 | 0.2 | 0.631 | 12.8 | 3.59 | 0.280 | 1.890 |
| | 0.9 | 0.1 | 1.33 | 26.4 | 3.37 | 0.150 | 1.852 |
| | 1.0 | 0.0 | ∞ | ∞ | 3.142 | 0 | - |
| 1/2 | 0.0 | 1.0 | 0 | 0 | - | 1.0 | ∞ |
| | 0.03 | 0.97 | 0.0061 | 0.610 | 5.88 | 0.980 | 7.936 |
| | 0.1 | 0.9 | 0.0313 | 1.60 | 5.69 | 0.939 | 4.854 |
| | 0.2 | 0.8 | 0.0923 | 3.26 | 5.41 | 0.874 | 3.745 |
| | 0.4 | 0.6 | 0.319 | 8.10 | 4.85 | 0.730 | 2.739 |
| | 0.6 | 0.4 | 0.779 | 17.0 | 4.29 | 0.552 | 2.267 |
| | 0.8 | 0.2 | 2.03 | 40.9 | 3.72 | 0.318 | 1.976 |
| | 0.9 | 0.1 | 4.31 | 85.6 | 3.43 | 0.173 | 1.912 |
| | 1.0 | 0.0 | ∞ | ∞ | 3.142 | 0 | - |
| 1/4 | 0.0 | 1.0 | 0 | 0 | - | 1.0 | ∞ |
| | 0.03 | 0.97 | 0.0101 | 0.922 | 6.12 | 0.984 | 9.259 |
| | 0.1 | 0.9 | 0.0736 | 3.50 | 5.91 | 0.945 | 5.555 |
| | 0.2 | 0.8 | 0.261 | 8.8 | 5.60 | 0.884 | 4.166 |
| | 0.4 | 0.6 | 1.07 | 26.7 | 4.99 | 0.746 | 2.994 |
| | 0.6 | 0.4 | 2.83 | 61.1 | 4.37 | 0.567 | 2.409 |
| | 0.8 | 0.2 | 7.57 | 153.0 | 3.76 | 0.330 | 2.045 |
| | 0.9 | 0.1 | 16.2 | 322.0 | 3.45 | 0.180 | 1.941 |
| | 1.0 | 0.0 | ∞ | ∞ | 3.142 | 0 | - |

Table 2.2 : Dimensionless Parameters for Full Journal bearings

| $\frac{l}{d}$ | $\frac{h_0}{c}$ | ϵ | S | $\left(\frac{r}{c}\right)_f$ | $\frac{Q}{r c n_s l}$ | $\frac{Q_s}{Q}$ | $\frac{P_{max}}{p}$ |
|---------------|-----------------|------------|----------|------------------------------|-----------------------|-----------------|---------------------|
| ∞ | 0.0 | 1.0 | 0 | 0 | 0 | 0 | ∞ |
| | 0.1 | 0.9 | 0.0115 | 0.756 | 0.411 | 0 | 2.793 |
| | 0.2 | 0.8 | 0.021 | 0.961 | 0.760 | 0 | 2.020 |
| | 0.4 | 0.6 | 0.0389 | 1.20 | 1.56 | 0 | 1.499 |
| | 0.6 | 0.4 | 0.0626 | 1.52 | 2.26 | 0 | 1.309 |
| | 0.8 | 0.2 | 0.123 | 2.57 | 2.83 | 0 | 1.228 |
| | 0.9 | 0.1 | 0.240 | 4.80 | 3.03 | 0 | 1.210 |
| | 1.0 | 0.0 | ∞ | ∞ | 3.142 | 0 | - |
| 1. | 0.0 | 1.0 | 0 | 0 | - | 1.0 | - |
| | 0.03 | 0.97 | 0.00474 | 0.514 | 4.82 | 0.973 | 6.579 |
| | 0.1 | 0.9 | 0.0188 | 1.05 | 4.74 | 0.919 | 4.048 |
| | 0.2 | 0.8 | 0.0446 | 1.70 | 4.62 | 0.842 | 3.195 |



Total No. of Questions : 12]

SEAT No. :

P756

[Total No. of Pages : 2

[4659] - 380

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

AUXILIARY ENGINE SYSTEMS

(2008 Pattern) (Elective - II (d))

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) *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 Exhaust Gas Turbocharger along with it's applications. [8]
b) With the help of P - V graph, explain gas exchange process in case of 4 stroke engines. [8]

OR

- Q2)** a) What is the necessity of variable value timing? Explain it in brief. [8]
b) Explain in detail combination supercharging. [8]

- Q3)** a) Write a brief note on turbine used in turbocharging. [10]
b) Explain mechanical centrifugal supercharger and write its applications. [8]

OR

- Q4)** a) Write a note on Ram tube supercharging along with its working principle diagram. [8]
b) Explain Turbocharging and enlist advantages and disadvantages of mechanical turbocharging system. [10]

P.T.O.

- Q5) a)** What is the necessity of cooling the charge air? [8]
b) Differentiate between mechanical supercharger and exhaust supercharger. [8]

OR

- Q6) a)** Explain compressor power in terms of mean piston power. [8]
b) How the exhaust turbocharger affects the efficiency. [8]

SECTION - II

- Q7) a)** Explain in detail transient response. [8]
b) What are the effects of supercharging on exhaust emissions of Diesel and Petrol engines? [8]

OR

- Q8) a)** Explain the exhaust manifold arrangement for various firing sequences of engine. [8]
b) Explain advantages and disadvantages of constant pressure Vs pulse turbocharging. [8]

- Q9) a)** Write a note on Hyprex supercharger. [8]
b) Write a note on comprex supercharger. [8]

OR

- Q10) a)** Write a note on bearing system of exhaust gas turbocharger. [8]
b) Write brief discription about material used for turbine of the supercharger. [8]

- Q11) a)** What is mean by EGR? Explain in detail with neat sketch. [8]
b) Enlist the engine cooling system and explain any one in detail. [10]

OR

- Q12) a)** Explain in brief engine coolants. [8]
b) What is cooling Module Technology? Explain in detail. [10]



Total No. of Questions : 12]

SEAT No. :

P1141

[Total No. of Pages : 3

[4659]-387

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) *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)** Define the terms: **[9]**
- i) Good vehicle
 - ii) Public place
 - iii) Transport place
- b) State particulars that have to be collected for the purpose of preparing a accident report. **[9]**

OR

- Q2) a)** Detail out responsibility of driver in case of accident. **[9]**
- b) List out the document detail procedure for the licensing of driver and conductor. **[9]**
- Q3) a)** Describe the taxation and objective of taxation in detailed. **[6]**
- b) Give brief discussion on taxes on motor vehicles. **[4]**
- c) Short note: **[6]**
- i) One time tax on Non-Transport vehicles.
 - ii) One time tax on Transport vehicle.

OR

P.T.O.

- Q4)** a) Why Road Tax is laid on vehicle. [6]
b) Under what circumstances the motor vehicle tax is refundable? How do you get the refund? [6]
c) Explain the taxation structure for passenger and goods transport vehicles. [4]

- Q5)** a) Give detailed about insurance and type of insurance. [6]
b) Give detailed difference between Insurance and Assurance. [4]
c) Detailed description about motor vehicle insurance. [6]

OR

- Q6)** a) Explain in details accident claim procedure. [6]
b) What are the duties of surveyor and loss assessor. [6]
c) What is third party insurance? What are the advantages and disadvantages. [4]

SECTION-II

- Q7)** Attempt Any Three: [18]
a) Passenger transport operation.
b) Classification of transport operation.
c) Scheduling of transport operation.
d) Modes of Road Transport.

OR

- Q8)** a) Give the details about theory of fares in passenger transport operation. [6]
b) How do you select a vehicle for particular operation? [6]
c) What is the use of computer in passenger transport operation? [6]

- Q9)** a) Explain in brief Good transport operation. [6]
b) Give function of good transport organisation and also explain the structure. [6]
c) Describe the schedule structure of good transport organisation. [4]

OR

- Q10)** Describe the following: [16]
a) Management information system.
b) Storage and transportation of petroleum product.

- Q11)** Write a short note on (Any Two): [16]
a) "Control of traffic".
b) Advance techniques in traffic control.
c) Alternative fuel for vehicle.

OR

- Q12)** Describe in brief: [16]
a) Global position system.
b) Traffic control in Towns.



Total No. of Questions : 12]

SEAT No. :

P760

[Total No. of Pages : 2

[4659]-388

B.E. (Automobile Engineering)

ENERGY ENGINEERING AND MANAGEMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer any three questions from each section.*
- 2) *Answer three questions from Section - I and three questions from Section - II.*
- 3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Unit - I

- Q1)** a) Detailed out Indian Energy policy and pricing. [9]
b) Explain Indian Energy needs for growing economy and Demand site management. [9]

OR

- Q2)** a) Give global Energy consumption pattern and effect of energy on environment. [9]
b) Brief discussion on Energy Conservation Act 2001. [9]

Unit - II

- Q3)** a) Explain Renewable Energy sources and discuss any one application in detailed with working. [8]
b) Brief discussion on Need of Renewable energy sources and explain Hydro Electric power plant. [8]

OR

- Q4)** a) Explain in detailed recent trends in Renewable energy technologies. [8]
b) Explain Bio-Energy and application of Bio-Energy with neat sketch. [8]

Unit - III

- Q5)** a) Write down stepwise Energy Audit Methodology in detailed? [6]
b) What are the energy conservation opportunities in Air compressor? [4]
c) Gives out Energy conservation opportunities in process industries. [6]

OR

P.T.O.

- Q6)** a) Explain different instrument used in Energy Audit detailed out any 5. [10]
b) Short Note : [6]
i) Energy Balance.
ii) Energy Surveying.

SECTION - II

Unit - IV

- Q7)** a) What are the different Energy conservation opportunities in Boiler system. [8]
b) Explain steam turbine working and losses in steam turbine. [8]

OR

- Q8)** What are different Energy conservation opportunities in
a) Chillers [6]
b) Cooling Tower [4]
c) Furnaces [6]

Unit - V

- Q9)** a) Explain principles of Energy Management. [6]
b) Energy consumption study of furnace. [4]
c) Explain lightning system and Energy conservation opportunities in that system. [6]

OR

- Q10)** a) Explain co-generation system and type of co-generation system in detailed. [10]
b) Detailed out case study of Ice factory with ECM. [6]

Unit - VI

- Q11)** a) What is Internal Rate of Returns (IRR) and Sensitivity Analysis. [9]
b) Distinguish between Sensitivity analysis and Risk analysis of energy financing. [9]

OR

- Q12)** Write any 3 short note : [18]
a) Energy project forecasting and Management.
b) Various technique use in financial analysis of energy sector.
c) Energy Economics.
d) Investment needs in energy sector.



Total No. of Questions : 11]

SEAT No. :

P762

[Total No. of Pages : 2

[4659]-389

B.E. (Automobile Engineering) (Semester - II)

C: HYBRID, ELECTRIC AND FUEL CELL VEHICLES

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer any three questions from each section.*
- 2) *Question No. 11 is compulsory. Out of the remaining attempt 3 questions from Section - I and 2 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) Why hybrid vehicle concept comes in picture? Draw simple layout & explain the simple working. [8]
b) Explain construction and working of DC series and series motor with the help of neat sketch. [8]

OR

- Q2)** a) Advantages and disadvantages of hybrid vehicle? [8]
b) Explain construction and working of AC motor used in hybrid vehicle. [8]

- Q3)** Explain in details performance characteristic of hybrid vehicle? [16]

OR

- Q4)** a) Compare hybrid vehicle and road vehicle with help of power & torque. [8]
b) Write a Short Note on grid connected hybrid. [8]

- Q5)** a) Explain continuously variable transmission (CVT) in detail. [9]
b) Explain in detail series configuration of locomotive drive? [9]

OR

- Q6)** a) Explain in detail load tracking architecture of hybrid vehicle? [9]
b) What is mean by tracking and energy recuperation. Explain it in brief? [9]

P.T.O.

SECTION - II

- Q7)** a) Define the term sizing power electronics? [8]
b) What is the procedure for matching electric drives and ICE? [8]

OR

- Q8)** Write a brief note on battery with the help of following parameter : [16]
battery basics, different type of batteries, battery parameter.

- Q9)** a) Discuss fuel cell characteristic? [8]
b) Explain hydrogen storage system. [8]

OR

- Q10)** Write a short note on : [16]
a) Proton exchange membrane.
b) Reformers.
c) Fuel Cell EV.
d) Super and ultra capacitor.

- Q11)** Give brief introduction of any three from following : [18]
a) Accumulators.
b) CVT.
c) Hydraulic pump & motor.
d) Pneumatic hybrid engine.



Total No. of Questions : 12]

SEAT No. :

P737

[Total No. of Pages : 3

[4659]-39

B.E. (Mechanical) (Semester - I)
A: AUTOMOBILE ENGINEERING (Elective - 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) *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

Unit - I

- Q1)** a) Write note on different types of materials used for chassis frame. [8]
b) What are vehicle specifications? Describe specification of any one medium vehicle of your choice. [8]

OR

- Q2)** a) State different types of vehicle bodies and explain any one in detail. [8]
b) Sketch a neat layout of a four wheel drive & explain its working. [8]

Unit - II

- Q3)** a) Explain Fluid flywheel with neat sketch? [8]
b) Describe with neat sketch function & working of multi-plate clutch. [8]

OR

- Q4)** a) Explain the working of synchromesh gear box with the help of neat sketch. Also state its advantages & disadvantages. [8]
b) With the help of neat sketch explain differential unit in the back axle of a vehicle. [8]

P.T.O.

Unit - III

- Q5)** a) Define front end geometry for steering including Caster, camber, toe, steering axis Inclination & turning radius. [10]
b) Explain how the wheel alignment & its balancing performed in a service station. [8]

OR

- Q6)** a) Explain with neat sketch construction of stub axle & wheel mounting. [10]
b) Explain with neat sketch construction & working of collapsible steering. [8]

SECTION - II

Unit - IV

- Q7)** a) Distinguish between independent suspension and conventional suspension system. [10]
b) Sketch and describe disc brakes. What are their advantages? [8]

OR

- Q8)** a) Explain self leveling suspension system. [8]
b) Explain Hydro gas suspension system in detail. Also state its advantages over other brake system. [10]

Unit - V

- Q9)** a) Explain starting system used in automobile vehicle. [5]
b) Explain in brief electrical car layout. [6]
c) Explain with neat sketch lead acid battery. [5]

OR

- Q10)** Write short notes on any four: [16]
a) Electronic stability control
b) Sensors and actuators
c) Electronic Control Unit
d) Hybrid drives
e) Electric Horn

Unit - VI

Q11) Write short notes on any four:

[16]

- a) Vehicle ergonomics
- b) Air bags
- c) Vehicle performance curves
- d) Seat belt
- e) Types of Collisions

OR

Q12) a) Sketch and explain the following performance characteristics for a petrol engine driven vehicle : **[8]**

- i) variation of tractive effort against vehicle speed in first, and top gear;
 - ii) total resistance against vehicle speed on level road.
- b) The coefficient of rolling resistance for a truck weighing 62293.5 N is 0.018 & the coefficient of air resistance is 0.00281 in the formula $R = K w + K_a A V^2 N$, where A is m^2 of frontal area and V. The speed in km/h. The transmission efficiency in the top gear of 6.2:1 is 90% and that in second gear of 15:1 is 80%. The frontal area is 5.574 m^2 . If the truck has to have a minimum speed of 88 km/h in the top gear calculate.
- i) The Engine b.p. required.
 - ii) The Engine speed, if the driving wheels an effective diameter 0.8125m.
 - iii) The max grade the truck can negotiate at the above engine speed in second gear.
 - iv) The max drawbar pull, available on level road above engine speed in second gear. **[8]**



Total No. of Questions : 8]

SEAT No. :

P719

[Total No. of Pages : 3

[4659] - 4

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

A : STRUCTURAL DESIGN OF BRIDGES

(2008 Pattern) (Elective - I)

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 and from Section - II answer Q.5 or Q.6; Q.7 or Q.8.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures in bold to the right indicate full marks.*
- 4) *IS 456, IS 800, IS 1343 and Steel table are allowed in the examination.*
- 5) *Neat diagrams should be drawn wherever necessary.*
- 6) *If necessary, assume suitable data and indicate clearly.*
- 7) *Use of electronic pocket calculator is allowed.*

SECTION - I

- Q1)** a) Explain the various live loads specified for highway bridges situated on national highways. **[10]**
- b) Explain the effect of longitudinal forces and centrifugal forces on a highway bridge. **[10]**
- c) What are bridge bearings? **[5]**

OR

- Q2)** a) Explain Courbon's method adopted in the analysis of girders. **[10]**
- b) Derive the expression for economic span of a bridge. **[10]**
- c) Explain the classification of bearings. **[5]**

P.T.O.

Q3) Design the cantilever slab and an interior panel of the deck slab of a R.C. T - Beam deck slab bridge with the given details and also sketch the details of reinforcement. **[25]**

- a) Carriage way = 2 lanes.
- b) Footpath on either sides = 1.5 m.
- c) Thickness of railings - 90 mm.
- d) Thickness of footpath - 150 mm.
- e) Thickness of wearing coat - 80 mm.
- f) Span of main girder - 24.0 m.
- g) Spacing of cross - beams - 3.0 m c/c
- h) Live load - IRC Class AA Tracked Vehicle.
- i) Materials - M 40 grade of concrete and Fe 415 grade of steel.
- j) Adopt $m_1 = 0.06$ and $m_2 = 0.04$.

OR

Q4) For the R.C. T - Beam deck slab bridge given in Q.3, design the intermediate post - tensioned girder along with the end block. Use M 50 grade of concrete and high tension strands of 7 ply 15.2 mm diameter having an ultimate tensile strength of 1800 N/mm². Use Fe 415 steel for supplementary reinforcement. Consider loss ratio as 0.80. Sketch the cable profile. **[25]**

SECTION - II

Q5) a) Enlist the advantages of steel bridges. **[10]**

b) Explain with neat sketches through type, semi-through type and deck type steel bridges. **[15]**

OR

Q6) a) Design a rocker and roller bearing for the given data and also sketch the details. **[18]**

- i) Reaction from the girder = 1750 kN.
- ii) Allowable pressure on bearings = 5 N / mm².
- iii) Allowable pressure on bearing plate = 2000 N / mm².
- iv) Allowable pressure on concrete bed = 7 N / mm².

b) Explain elastomeric pad bearings. **[7]**

Q7) Design the members $U_1 - U_2$, $U_2 - U_3$ and $U_2 - L_2$ for the railway steel truss bridge shown in Fig. 1. Also draw a neat sketch of the connection of members at U_2 [25]

- Weight of stock rail - 0.65 kN/m.
- Weight of check rail - 0.35 kN/m.
- Timber sleepers of size - $(0.25 \times 0.25 \times 2.5)$ m @ 0.45 m c/c.
- Unit weight of timber - 7.1 kN/m³.
- Spacing of truss - 7.0 m c/c
- The bridge supports a eudl of 2950 kN.

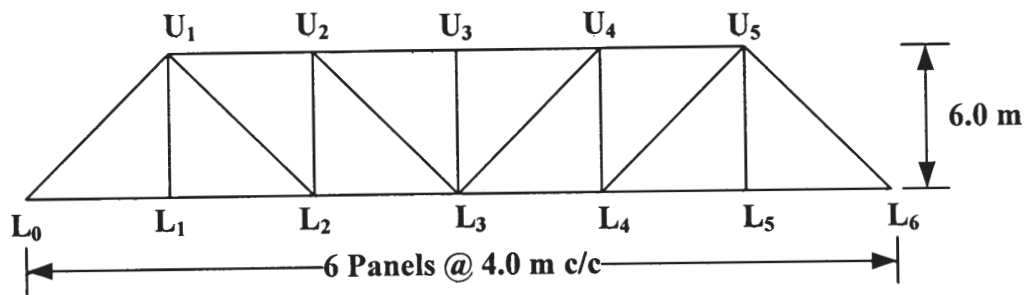


Fig. 1

OR

- Q8)** a) Explain with neat sketches the functions of bracings in steel bridges. [15]
 b) What are mechanical bearings? Explain in brief. [10]



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :3

P1191

[4659] - 40

B.E. (Mechanical)

b - MACHINE TOOL DESIGN

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any three questions form each Section - I and Section - II.*
- 2) *Answer to the questions should be written in separate books.*
- 3) *Draw neat diagram wherever necessary.*
- 4) *Assume Suitable data if required.*

SECTION - I

- Q1) a)** Design a six - speed gear box for a machine tool having a minimum speed 60 rpm. G.P ratio = 1.55, speed of motor = 1500 rpm. Draw the best possible Structural diagram, ray diagram, speed chart and gear layout. **[14]**
- b) Discuss the selection of motor for the drive. **[6]**

OR

- Q2) a)** Explain why cis used for calculating speed? Show value of geometric progression.lies between 1 and 2. **[8]**
- b) Discuss the designs features of feed gear box with Norton drive. **[8]**
- c) Write a Short note on selection of best Ray diagram. **[4]**

- Q3) a)** What the design criteria for beds? How these are applied to for welded and cast beds. **[8]**
- b) Why stiffness is important consideration in machine tool structure? How stiffness is improved explain with figures. **[7]**

OR

P.T.O.

- Q4)** a) What are the functions of machine tool structures? Show the different types of cross sections used for machine tool beds and columns. [8]
- b) Discuss bed materials along with required properties. [7]

- Q5)** a) Estimate the total error in pitch of a lead screw working on sliding friction and show that it could be expressed as [10]

$$\Delta_1 \left(1 + \frac{P^2}{2\eta D^2} \right) \text{ Where } \Delta_1 = QP / AE \text{ Q - Axial load, P - Pitch,}$$

A - Cross section area, D - Effective diameter, η - Efficiency.

- b) Write a note on aerostatic slide ways. [5]

OR

- Q6)** a) Discuss briefly the merits and demerits of Recirculating power screw in comparison to conventional lead screw. State its specific field of uses and application. [7]
- b) Discuss the design consideration in guideways. [8]

SECTION - II

- Q7)** a) Explain the design consideration of machine tool spindle. [8]
- b) Explain different methods for preloading of ball bearing. [6]
- c) Describe the different types of bearing employed in machine tools. Give the importance of each. [6]

OR

- Q8)** a) Describe the various elements of a spindle unit used in a drilling machine. Draw the neat sketch of the arrangement. [7]
- b) Explain optimum spacing of support in spindle for good rigidity. [8]
- c) State and explain the functions of machine tool spindle. What are the desirable features of spindle units. [5]

- Q9)** a) What do you understand by regenerative chatter in machine tool? State its causes and effects. [8]
- b) How vibrations of boring bar are damped. [7]

OR

- Q10)**a) Explain how electrical braking system is used for control in machine tool. [8]
- b) Compare hydraulic control system with mechanical control system with reference to performance, cost, reliability considerations. [7]

Q11) Write a short note on following : [15]

- a) Layout of machine tool by matrices
- b) Feed back devices used in CNC
- c) For flat disc drive, derive the equation for frictional torque.

OR

- Q12)**a) Explain how and where a retrofitting is done in a old lathe machine tool. [8]
- b) Differentiate stepped and stepless drive and explain Epicyclic stepless drive. [7]



Total No. of Questions : 12]

SEAT No. :

P1060

[Total No. of Pages : 4

[4659]-41

B.E. (Mechanical)

c-QUANTITATIVE AND DECISION MAKING TECHNIQUES

(Semester-I) (2008 Course) (402045) (Elective-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All the questions are compulsory.*
- 2) *Two separate answer books are used for Section-I and Section-II.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator is permitted.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain: [6]

- i) Pure and Mixed strategies.
- ii) Dominance rule.

b) Reduce the following game by dominance and find the game value. [10]

Player B

| | | I | II | III | IV |
|----------|-----|---|----|-----|----|
| Player A | I | 3 | 2 | 4 | 0 |
| | II | 3 | 4 | 2 | 4 |
| | III | 4 | 2 | 4 | 0 |
| | IV | 0 | 4 | 0 | 8 |

OR

Q2) a) What are various Game theory Methods? Explain any one method in detail. [6]

b) Explain the steps in Decision-Making. [6]

c) Define: [4]

- i) Operations Research.
- ii) Minimax and Maximin principle.

P.T.O.

- Q3) a)** Explain Hungarian Method of solving assignment problem. [6]
b) Five different machines can do any of five required components with different profit resulting from each assignment as shown in table below. Find out maximum profit possible through optimum assignment. [12]

| | | Machine | | | | |
|-----------|---|---------|----|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 |
| Component | A | 30 | 37 | 40 | 28 | 40 |
| | B | 40 | 24 | 27 | 21 | 36 |
| | C | 40 | 32 | 33 | 30 | 35 |
| | D | 25 | 38 | 40 | 36 | 36 |
| | E | 29 | 62 | 41 | 34 | 39 |

OR

- Q4) a)** Solve the following cost minimizing transportation problem. [12]

| | | I | II | III | IV | V | VI | Available |
|----------|---|----|----|-----|----|----|----|-----------|
| Required | 1 | 2 | 1 | 3 | 3 | 2 | 5 | 50 |
| | 2 | 3 | 2 | 2 | 4 | 3 | 4 | 40 |
| | 3 | 3 | 5 | 4 | 2 | 4 | 1 | 60 |
| | 4 | 4 | 2 | 2 | 1 | 2 | 2 | 30 |
| | | 30 | 50 | 20 | 40 | 30 | 10 | 180 |

- b)** Discuss travelling salesman problem as an assignment problem with Sub-optimal solution. [6]

- Q5) a)** Discuss the concept of sensitivity analysis in LPP. [6]

- b)** Solve LPP by Simplex Method. [10]

Maximize $Z = 3X_1 + 4X_2$

Subject to $X_1 + X_2 \leq 450$

$2X_1 + X_2 \leq 600$

Where $X_1, X_2 \geq 0$.

OR

- Q6) a)** Define Linear Programming. Give applications of Linear Programming. [6]

- b)** A firm manufactures two products P_1, P_2 on which the profits earned are Rs. 5 and Rs. 8 respectively. Each product is prepared on two machines M_1 and M_2 . The machine time required for these products on the two machines and their availability is as shown below.

| | Product P ₁ | Product P ₂ | Availability of machines (mins.) per day |
|------------------------|------------------------|------------------------|---|
| Machine M ₁ | 2 | 1 | 400 |
| Machine M ₂ | 4 | 1 | 600 |

Find the number of units of products P₁ and P₂ to be manufactured per day to get maximum profits. [10]

SECTION-II

Q7) a) Define: [8]

- i) Queue Length.
- ii) Service in priority.
- iii) Traffic intensity.
- iv) Service channels.

b) A fast moving item has a demand of 18000 units/year. The cost of one procurement is Rs. 50 and inventory carrying or holding cost is Rs. 1.20 per unit per year. It is assumed that supply is received as soon as the order is placed and no shortage or stock permitted. Cost of one unit is Rs. 8.

Determine:

- i) EOQ.
- ii) Number of orders/year.
- iii) Total cost per year. [8]

OR

Q8) a) Explain Single Channel Poisson Arrival with exponential service, infinite population method. [8]

b) Derive the EOQ relation with instantaneous stock replenishment. [8]

Q9) a) Give merits and demerits of Average (Accounting) Rate of Return method. [4]

b) A firm is thinking of replacing a particular machine whose cost price is Rs. 12,200. The scrap price of this machine is only Rs. 200. The maintenance cost are found to be as follows.

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|------------------------|-----|-----|-----|------|------|------|------|------|
| Maintenance cost (Rs.) | 220 | 500 | 800 | 1200 | 1800 | 2500 | 3200 | 4000 |

Determine when the firm should get the machine replaced. [12]

OR

Q10)a) Explain Break Even Analysis and Margin of safety with neat sketch. [6]

b) Following figures are related to toy manufacturing company.

Variable cost per unit = 8 Rs.

Sell price per unit = 14 Rs.

Total units sold = 50,000

Fixed cost = 12,000 Rs.

Calculate:

i) P/V ratio,

ii) B.E.P. in units,

iii) B.E.P. in sales,

iv) Margin of safety,

v) Total profit.

[10]

Q11)a) Explain different types of floats. [6]

b) The following table lists the jobs of a network along with their time estimates: [12]

i) Draw the project network.

ii) Calculate the length and variance of the critical path.

iii) What is approximate probability that the job as per critical path will be completed in 24 hours?

| Activity | To | Tm | Tp |
|----------|----|----|----|
| 1-2 | 1 | 3 | 5 |
| 2-3 | 2 | 5 | 6 |
| 2-4 | 4 | 6 | 7 |
| 2-5 | 8 | 10 | 12 |
| 3-5 | 0 | 0 | 0 |
| 3-6 | 4 | 8 | 9 |
| 4-7 | 5 | 7 | 14 |
| 5-7 | 7 | 10 | 16 |
| 6-7 | 0 | 0 | 0 |
| 6-8 | 6 | 9 | 12 |
| 7-9 | 1 | 3 | 7 |
| 8-9 | 3 | 5 | 7 |

OR

Q12)a) Write difference between PERT and CPM. [6]

b) Find critical path, TF, FF, IF. [12]

| Activity | 1-2 | 1-3 | 2-4 | 2-6 | 3-4 | 4-5 | 4-6 | 5-7 | 6-7 | 7-8 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| NT | 10 | 11 | 13 | 14 | 10 | 7 | 17 | 13 | 9 | 1 |



Total No. of Questions : 12]

SEAT No. :

P744

[Total No. of Pages : 7

[4659] - 48

B.E. (Mechanical) (Semester - II)

INDUSTRIAL HEAT TRANSFER EQUIPMENTS

(2008 Pattern) (Elective - IV (a))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer both sections on separate answer books.*
- 2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 3) *Assume suitable additional data if necessary.*

SECTION - I

- Q1)** a) Classify heat exchangers according to flow pattern of fluid. [5]
b) What is hydraulic diameter? Explain its calculation for shell side with an example. [5]
c) State general steps for thermal design of heat exchanger LMTD method. [6]

OR

- Q2)** a) Explain parallel arrangement of hairpin heat exchangers with figure and state advantages of arrangement. [5]
b) State advantages of double pipe heat exchangers. [5]
c) What will be the hydraulic diameter of an annulus with following specification?

Inner diameter of shell 0.0525m

Outer diameter of tube 0.0266m

Number of tubes in a shell is one.

- Q3)** a) Describe effect of variable physical properties of fluid on heat exchanger design. [8]
b) Explain selection criteria for tube pitch. [4]
c) What is baffle cut orientation? Explain its type with figures. [4]

P.T.O.

OR

- Q4)** a) Draw block diagram and temperature profile for 'E' Shell 1-2 heat exchanger: Two Nozzles are at opposite ends, segmental baffles, Hot fluid enters from shell whereas cold fluid passes from tube. [5]
- b) Explain effect of spacing of baffle on flow distribution. [5]
- c) State disadvantages of Kern's method of heat exchanger design. [6]
- Q5)** a) State salient features of compact heat exchanger. [5]
- b) Compare 'Fin tube Heat Exchanger' and 'plate heat exchanger'. [5]
- c) Determine the area required for a shell and tube heat exchanger with two tube passes to cool oil at rate of 10 kg/s from 60°C to 30°C flowing in the shell using water at 20°C passing through the tubes and heated up to 26°C. The specific heat of the oil is 2200 J/kg K. The value of overall heat transfer coefficient is 300 W/m² K. Use LMTD methods. Use graphs attached. [8]

OR

- Q6)** a) Draw sketch showing plate fin heat exchanger (PFHE) flow arrangement:
a) crossflow; b) counter flow; and
c) cross-counter flow [5]
- b) What are Constructional types of compact HEX. [5]
- c) The inlet and outlet temperature of hot and cold fluids in a double pipe heat exchanger are 220°C, 100°C and 80°C and 120°C respectively. Determine whether the exchanger is parallel flow or counter flow. Also determine the LMTD and effectiveness of the exchanger and the capacity ratio. [8]

SECTION - II

- Q7)** a) Explain horizontal in tube condenser with figure. [5]
- b) Write note on air cooled condenser with their disadvantages. [5]
- c) Draw sketch and explain in brief spiral condenser. [6]

OR

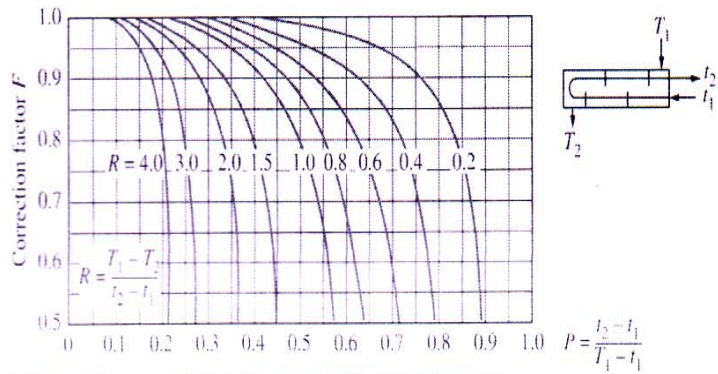
- Q8)** a) Explain vertical shell side condenser. [5]
b) Why condenser operations fail? State any five reasons. [5]
c) Define and describe direct contact type Spray condenser. [6]
- Q9)** a) Write a note on constructional material of cooling tower. [5]
b) What is 'fill' and its use in the cooling tower. [5]
c) Explain hyperbolic cooling tower and its principle of working. [6]

OR

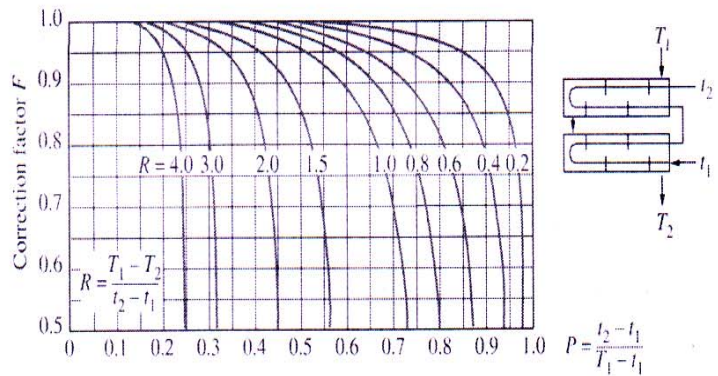
- Q10)** a) Compare forced and induced draft cooling tower. [5]
b) Explain Horizontal Spray cooling tower with figure. [5]
c) How cooling tower is to be maintained in good working condition? [6]
- Q11)** a) Describe heat pipe start up process. [6]
b) How heat balance is performed and useful in electronics cooling? [6]
c) Electronics cooling effectiveness will help for improving life of a component, Explain. [6]

OR

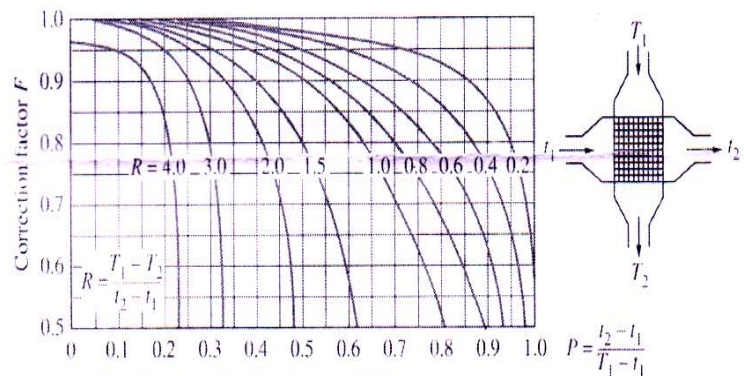
- Q12)** a) What is thermoelectric cooling? [6]
b) Write note on: working fluid in heat pipe. [6]
c) Compare natural and forced electronics cooling. [6]



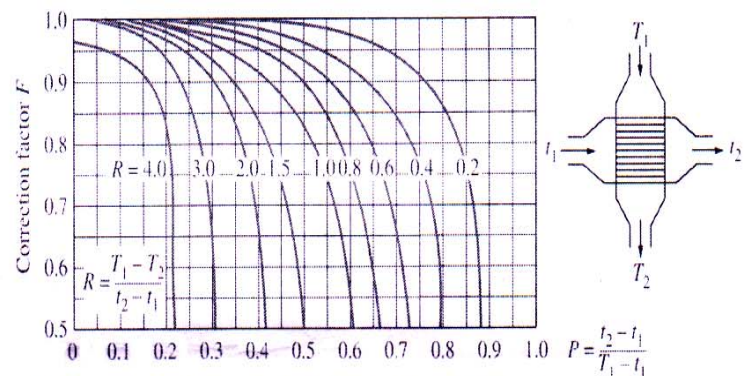
(a) One-shell pass and 2, 4, 6, etc. (any multiple of 2), tube passes



(b) Two-shell passes and 4, 8, 12, etc. (any multiple of 4), tube passes

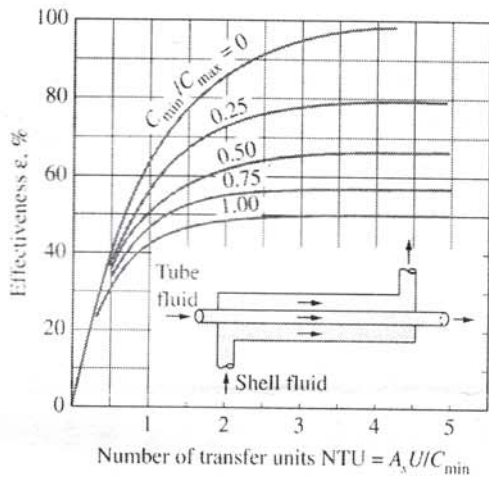


(c) Single-pass cross-flow with both fluids *unmixed*

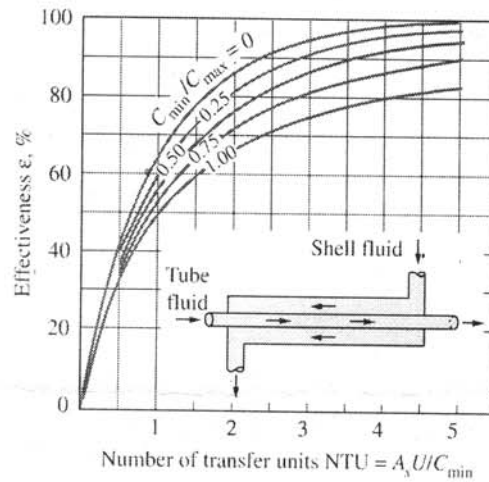


(d) Single-pass cross-flow with one fluid *mixed* and the other *unmixed*

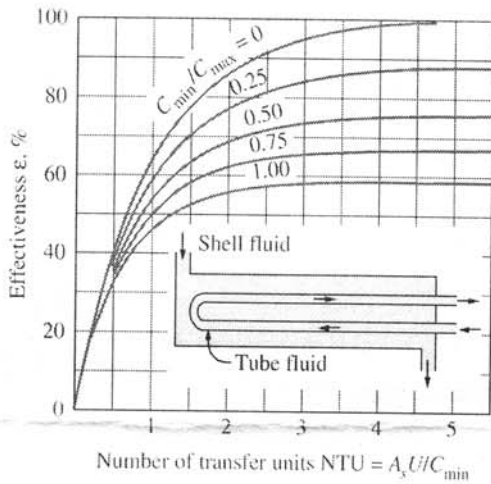
FIGURE
Correction factor F charts
for common shell-and-tube and
cross-flow heat exchangers (from
Bowman, Mueller, and Nagle, Ref. 2).



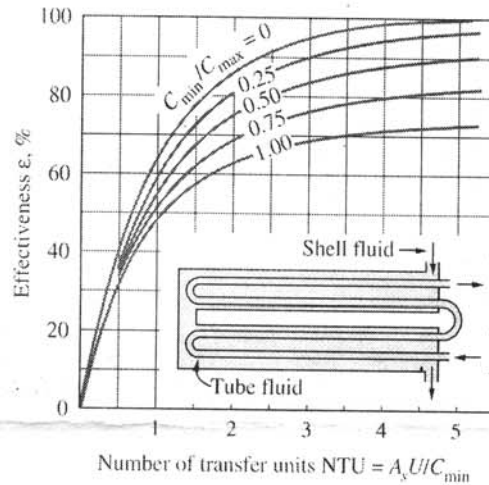
(a) Parallel-flow



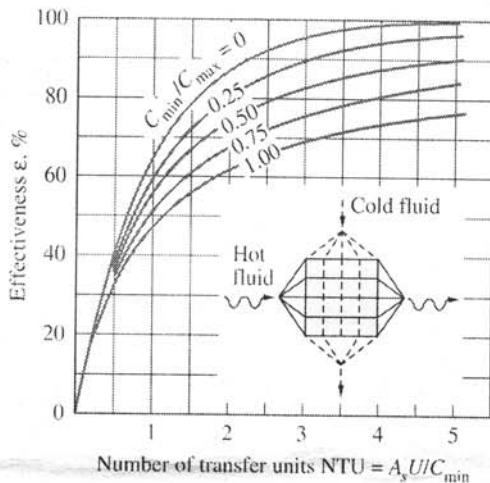
(b) Counter-flow



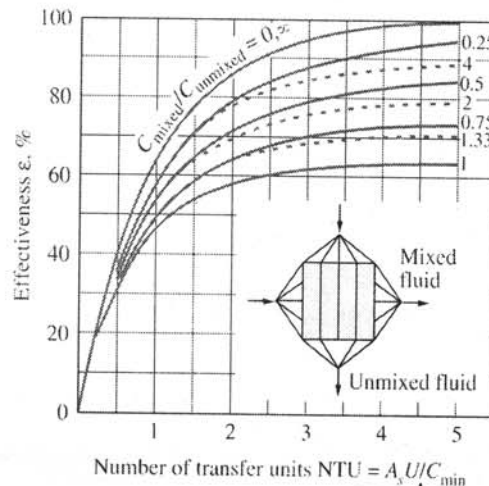
(c) One-shell pass and 2, 4, 6, ... tube passes



(d) Two-shell passes and 4, 8, 12, ... tube passes



(e) Cross-flow with both fluids unmixed



(f) Cross-flow with one fluid mixed and the other unmixed

FIGURE

Effectiveness for heat exchangers (from Kays and London, Ref. 5).

TABLE A2
Water at Sea-Level Atmospheric Pressure

| Temp. T | °F | °C | Density ρ kg/m ³ | Coef. Exp. $\beta \times 10^3$ 1/K | Specific Heat c_p J/kg K | Thermal Cond. k W/m K | Absolute Viscosity $\mu \times 10^6$ N s/m ² | Kinematic Viscosity $\nu \times 10^6$ m ² /s | Prandtl Number Pr |
|------------|-----|-----|--|--|----------------------------------|-------------------------------|---|---|----------------------|
| | | | | | | | | | |
| 32 | 0 | 0 | 999.9 | -0.068 | 4217.5 | 0.5580 | 1794 | 1.794 | 13.56 |
| 41 | 5 | 5 | 1000 | 0.018 | 4202.7 | 0.5677 | 1530 | 1.530 | 11.33 |
| 50 | 10 | 10 | 999.7 | 0.095 | 4192.4 | 0.5774 | 1296 | 1.296 | 9.410 |
| 59 | 15 | 15 | 999.1 | 0.16 | 4185.8 | 0.5870 | 1136 | 1.137 | 8.101 |
| 68 | 20 | 20 | 998.2 | 0.22 | 4181.7 | 0.5967 | 993 | 0.995 | 6.959 |
| 77 | 25 | 25 | 997.1 | 0.26 | 4179.5 | 0.6064 | 880.6 | 0.883 | 6.069 |
| 86 | 30 | 30 | 995.7 | 0.31 | 4178.6 | 0.6155 | 792.4 | 0.796 | 5.380 |
| 95 | 35 | 35 | 994.1 | 0.35 | 4178.5 | 0.6243 | 719.8 | 0.724 | 4.818 |
| 104 | 40 | 40 | 992.2 | 0.39 | 4179.0 | 0.6325 | 658.0 | 0.663 | 4.348 |
| 113 | 45 | 45 | 990.2 | 0.42 | 4179.9 | 0.6401 | 605.1 | 0.611 | 3.951 |
| 122 | 50 | 50 | 988.1 | 0.45 | 4181.1 | 0.6472 | 555.1 | 0.562 | 3.586 |
| 131 | 55 | 55 | 985.8 | 0.48 | 4182.6 | 0.6536 | 512.6 | 0.520 | 3.280 |
| 140 | 60 | 60 | 983.5 | 0.51 | 4184.5 | 0.6594 | 470.0 | 0.478 | 2.983 |
| 149 | 65 | 65 | 980.8 | 0.54 | 4186.8 | 0.6643 | 436.0 | 0.445 | 2.748 |
| 158 | 70 | 70 | 978 | 0.57 | 4189.5 | 0.6686 | 402.0 | 0.411 | 2.519 |
| 167 | 75 | 75 | 974.9 | 0.60 | 4192.9 | 0.6724 | 376.6 | 0.386 | 2.348 |
| 176 | 80 | 80 | 971.7 | 0.63 | 4196.6 | 0.6753 | 350.0 | 0.361 | 2.175 |
| 185 | 85 | 85 | 968.5 | 0.66 | 4201.0 | 0.6778 | 330.5 | 0.341 | 2.048 |
| 194 | 90 | 90 | 965 | 0.69 | 4205.7 | 0.6797 | 311.0 | 0.322 | 1.924 |
| 203 | 95 | 95 | 961.7 | 0.72 | 4210.6 | 0.6811 | 294.3 | 0.306 | 1.819 |
| 212 | 100 | 100 | 958.4 | 0.75 | 4215.5 | 0.6822 | 277.5 | 0.290 | 1.715 |

TABLE A1
Air at Sea-Level Atmospheric Pressure

| Temp. T | | Density ρ kg/m ³ | Coef. Exp. $\beta \times 10^3$ 1/K | Specific Heat c_p J/kg K | Thermal Cond. k W/m K | Absolute Viscosity $\mu \times 10^6$ N s/m ² | Kinematic Viscosity $\nu \times 10^6$ m ² /s | Prandtl Number Pr |
|------------|-----|--|--|----------------------------------|-----------------------------|---|---|----------------------|
| °F | °C | | | | | | | |
| 32 | 0 | 1.293 | 3.664 | 1003.9 | 0.02417 | 17.17 | 13.28 | 0.7131 |
| 41 | 5 | 1.269 | 3.598 | 1004.3 | 0.02445 | 17.35 | 13.67 | 0.7127 |
| 50 | 10 | 1.242 | 3.533 | 1004.6 | 0.02480 | 17.58 | 14.16 | 0.7122 |
| 59 | 15 | 1.222 | 3.470 | 1004.9 | 0.02512 | 17.79 | 14.56 | 0.7118 |
| 68 | 20 | 1.202 | 3.412 | 1005.2 | 0.02544 | 18.00 | 14.98 | 0.7113 |
| 77 | 25 | 1.183 | 3.354 | 1005.4 | 0.02577 | 18.22 | 15.40 | 0.7108 |
| 86 | 30 | 1.164 | 3.298 | 1005.7 | 0.02614 | 18.46 | 15.86 | 0.7103 |
| 95 | 35 | 1.147 | 3.244 | 1006.0 | 0.02650 | 18.70 | 16.30 | 0.7098 |
| 104 | 40 | 1.129 | 3.193 | 1006.3 | 0.02684 | 18.92 | 16.76 | 0.7093 |
| 113 | 45 | 1.111 | 3.142 | 1006.6 | 0.02726 | 19.19 | 17.27 | 0.7087 |
| 122 | 50 | 1.093 | 3.094 | 1006.9 | 0.02761 | 19.42 | 17.77 | 0.7082 |
| 131 | 55 | 1.079 | 3.048 | 1007.3 | 0.02801 | 19.68 | 18.24 | 0.7077 |
| 140 | 60 | 1.061 | 3.003 | 1007.7 | 0.02837 | 19.91 | 18.77 | 0.7072 |
| 149 | 65 | 1.047 | 2.957 | 1008.0 | 0.02876 | 20.16 | 19.26 | 0.7067 |
| 158 | 70 | 1.030 | 2.914 | 1008.4 | 0.02912 | 20.39 | 19.80 | 0.7062 |
| 167 | 75 | 1.013 | 2.875 | 1008.8 | 0.02945 | 20.60 | 20.34 | 0.7057 |
| 176 | 80 | 1.001 | 2.834 | 1009.3 | 0.02979 | 20.82 | 20.80 | 0.7053 |
| 185 | 85 | 0.986 | 2.795 | 1009.8 | 0.03012 | 21.02 | 21.32 | 0.7048 |
| 194 | 90 | 0.972 | 2.755 | 1010.3 | 0.03045 | 21.23 | 21.84 | 0.7044 |
| 203 | 95 | 0.959 | 2.718 | 1010.7 | 0.03073 | 21.41 | 22.33 | 0.7041 |
| 212 | 100 | 0.947 | 2.683 | 1011.2 | 0.03101 | 21.58 | 22.79 | 0.7038 |

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Total No. of Questions : 12]

SEAT No. :

P745

[Total No. of Pages : 3

[4659] - 49

B.E. (Mechanical Engineering) (Semester - II)

**B : MANAGEMENT INFORMATION SYSTEMS (Elective - IV)
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) Attempt any three questions with selectable OR options from Section I and Section II.*
- 2) Answer to the questions should be written in separate answer books.*
- 3) Figures to the right indicate full marks.*
- 4) Draw neat diagrams wherever necessary.*

SECTION - I

- Q1) a) Explain: [6]**
- i) Elements of MIS
 - ii) Management Process / Elements.
- b) Discuss the relationship between MIS and Management Process. [4]
- c) Define Management. Explain management functions at various organization levels. [6]

OR

- Q2) a) Define Management, Information and system. Write short note - Structure of MIS. [8]**
- b) Discussion about operational support systems and explanations about following types: [8]
- i) Transaction processing systems
 - ii) Process control systems
 - iii) Enterprise collaboration systems.

P.T.O.

- Q3)** a) Explain what are the Building Blocks of Information System? [6]
b) Write a short note on behavioral decision making. [6]
c) Explain Spiral model of SDLC with diagram. State its advantages and disadvantages. [6]

OR

- Q4)** a) Explain Herbert Simon model of Decision process. [6]
b) Explain Spiral Shape SDLC Model. [6]
c) Compare MIS and DSS. [6]
- Q5)** a) Defining the term Knowledge Management System and explain about elements of Knowledge Management System using block dig. and example. [8]
b) Explain waterfall model of SDLC with diagram. State its advantages and disadvantages. [8]

OR

- Q6)** a) Explain with a block diagram system development life cycle. [8]
b) Write note on Data Flow Diagrams and ER Diagrams. [8]

SECTION - II

- Q7)** a) What is Verification? What are the terms involved in verification. [6]
b) Write a short note on software matrix & software model? [6]
c) Explain UML design methodology. [6]

OR

- Q8)** a) State various Modern Software Design Methodologies. [4]
b) Differentiate between Validation & verification? [6]
c) What are the different levels of CMM? Explain any three. [8]

- Q9) a)** Write a short note on: **[8]**
- i) Reliability
 - ii) Availability
 - iii) Maintenance.
- b) Explain the types of software maintenance. **[8]**

OR

- Q10)a)** What is the need of software testing? Explain software testing approaches with one application each. **[8]**
- b) Explain various software qualities attributes. **[4]**
- c) What is the difference between audit and inspection. **[4]**
- Q11)a)** How do you achieve material management in an industry with use of MIS explain with block diagram and flow chart. **[8]**
- b) Explain the case study on 360° Feedback system. **[8]**

OR

- Q12)a)** Explain the application of MIS in automobile industry with reference to marketing management with block diagram and flow chart. **[8]**
- b) Explain the case study of SAP implementation in business management. Its implications and advantages and disadvantages. **[8]**

❧❧❧

Total No. of Questions : 12]

SEAT No. :

P720

[Total No. of Pages : 6

[4659] - 5

B.E. (Civil)

SYSTEMS APPROACH IN CIVIL ENGINEERING

(Semester - I) (2008 Pattern) (Elective - I (b))

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) *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)** A block making firm manufactures 2 products A & B. The profits are Rs. 3 and Rs. 4 per piece respectively. The firm has two machines and below is the required processing time in minutes for each machine for each product. **[4]**

| | | |
|---|---|---|
| | A | B |
| X | 4 | 3 |
| Y | 2 | 2 |

Machine X & Y have 200 and 300 machine minutes per day respectively. The firm must manufacture 150 A's and 250 B's but no more than 200 A's. Set up a Linear Programming Problem to maximize profit.

- b) Solve the above problem using graphical method. **[8]**
- c) What is Linear Programming? Discuss the applications of LP to managerial decision making. **[6]**

P.T.O.

OR

Q2) a) Solve following problem : **[10]**

$$\text{Maximise } Z = 4X_1 + 10X_2$$

Subject to

$$X_1 + X_2 \leq 2$$

$$5X_1 + 2X_2 \leq 10$$

$$-2X_1 - 8X_2 \geq -12$$

$$X_1, X_2 \geq 0$$

b) How will you solve a LPP graphically? What are its limitations? Explain with example an LP Problem which has **[8]**

i) Infinite solution

ii) No feasible solution

Q3) a) There are three RMC plants which supplies concrete to 4 sites. The capacities of the sources and the demands are as given below. **[8]**

$$R1 = 150 \text{ cu.m.}; \quad R2 = 200 \text{ cu.m.}; \quad R3 = 120 \text{ cu.m.}$$

$$S1 = 160 \text{ cu.m.}; \quad S2 = 80 \text{ cu.m.}; \quad S3 = 110 \text{ cu.m.}; \quad S4 = 120 \text{ cu.m.}$$

The cost of transporting concrete per cu.m. from plants to sites is as given below :

| | S1 | S2 | S3 | S4 |
|----|-----|-----|-----|-----|
| R1 | 320 | 280 | 360 | 550 |
| R2 | 210 | 550 | 450 | 750 |
| R3 | 230 | 600 | 350 | 650 |

Find out the optimal solution by U-V method for transporting the product at minimum cost. Use VAM method.

b) A corporation has floated four tenders of repair of road. The repairs must be done at lowest cost and quickest time. Also, corporation has decided to award one road to only one contractor. Five contractors have sent their bids as follows. **[8]**

Cost of repairs on roads (Rs. in lakhs)

| Contractors | R1 | R2 | R3 | R4 |
|-------------|----|----|----|----|
| C1 | 10 | 12 | 13 | 16 |
| C2 | 8 | 10 | 10 | 15 |
| C3 | 9 | 10 | 9 | 12 |
| C4 | 11 | 13 | 15 | 18 |
| C5 | 10 | 11 | 11 | 13 |

Decide the best way of assigning the repairs to the contractors and the costs. Which contractor does not get the work?

OR

- Q4)** a) Solve the following maximization assignment problem. The estimated sales per month in four different cities by 5 different managers are as follows : **[8]**

| | A | B | C | D |
|---|----|----|----|----|
| P | 13 | 15 | 12 | 14 |
| Q | 12 | 14 | 10 | 12 |
| R | 16 | 18 | 14 | 14 |
| S | 15 | 15 | 13 | 13 |
| T | 14 | 15 | 14 | 12 |

Find out the assignment of managers to cities in order to maximize sales.

- b) Solve following transportation problem & optimize the transportation cost using least cost method. **[8]**

| | E | F | G | H | J | Supply |
|--------|----|----|----|-----|----|--------|
| A | 15 | 10 | 8 | 14 | 13 | 50 |
| B | 9 | 13 | 10 | 20 | 19 | 75 |
| C | 13 | 20 | 12 | 6 | 7 | 125 |
| D | 12 | 19 | 17 | 10 | 6 | 100 |
| demand | 50 | 75 | 75 | 100 | 50 | |

- Q5)** a) What is definition of Dynamic Programming? What are the main characteristics of DP? **[8]**

- b) Solve following DP problem : **[8]**

A firm has divided its marketing area into 3 zones A, B & C. The amount of sales depends upon the number of salesman in each zone. The firm has been collecting the data regarding sales and salesman in each area over a number of past years. The information is summarized as follows:

| Areas → No. of Salesman ↓ | A | B | C |
|------------------------------|-----|-----|-----|
| 0 | 32 | 36 | 45 |
| 1 | 47 | 48 | 50 |
| 2 | 65 | 72 | 65 |
| 3 | 75 | 72 | 70 |
| 4 | 82 | 80 | 74 |
| 5 | 95 | 90 | 86 |
| 6 | 98 | 95 | 92 |
| 7 | 100 | 105 | 108 |
| 8 | 100 | 108 | 110 |
| 9 | 90 | 110 | 115 |

Allocate the salesman to the zones so that the total sales are maximum.

OR

Q6) a) Explain the following in the context of DP : [6]

- i) Principle of optimality
- ii) State
- iii) Stage

b) Find the shortest path from 1 to 14 with the durations given as [10]

| | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|----|-----|----|-----|
| act | 1- | 1- | 1- | 2- | 3- | 4- | 2- | 5- | 6- | 7- | 5- | 7- | 10- | 13- | 8- | 11- | 9- | 12- |
| | 2 | 3 | 4 | 6 | 6 | 7 | 5 | 9 | 9 | 9 | 8 | 10 | 13 | 14 | 11 | 14 | 12 | 14 |
| du | 5 | 4 | 6 | 3 | 9 | 8 | 2 | 4 | 5 | 3 | 6 | 5 | 5 | 4 | 8 | 4 | 7 | 7 |

SECTION - II

Q7) a) Define Global and Local optima maxima & minima, concave & convex functions. Show with the help of neat sketches. [4]

b) Give definitions of following : [4]

- i) unconstrained optimization
- ii) constrained optimization

b) Find maximum and minimum of the function : [8]

$$F(X) = 2X_1^2 + X_2^2 + 4X_3^2 - X_1 - 6X_2 - 8X_3$$

OR

Q8) a) Use the method of Lagrangian Multiplier to solve the following : [8]

$$\text{Minimize } Z = 2X_1^2 + X_2 + 3X_3^2 + 10X_1 + 8X_2 + 6X_3 - 100$$

Subject to

$$X_1 + X_2 + 3X_3 = 0$$

$$5X_1 + 2X_2 + X_3 = 5$$

$$X_1, X_2, X_3 \geq 0$$

- b) Give the steps to solve problems using one Dimensional Search technique : Dichotomous search, Fibonacci method & Golden Section rule. [8]

Q9) a) What are the types of problems that can be solved using queuing models (waiting line problem)? [6]

b) Give various elements of queuing systems. [4]

c) A new project is launched by a builder. One marketing manager is employed on site office to answer the queries. Five customers arrive in an average every 20 minutes while the manager can attend 5 customers every 15 minutes. Assume poisons distribution for arrival rate and exponential distribution for service time, find : [8]

i) average number of customers in the system.

ii) average number of customers in the queue.

iii) average time a customer spends in system.

iv) average time a customer waits before being attended.

OR

Q10) a) What is simulation? Describe its advantages in solving the problems. Give its main limitations with suitable examples. [6]

b) Explain the importance of sequencing problems. What are various methods of solving sequencing problems? [4]

b) Solve the following sequencing problem if the order of processing is C-A-B. Find the idle time of the machines & jobs. [8]

| Jobs | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----------|---|---|----|---|---|----|---|----|----|
| machines | A | 4 | 6 | 7 | 4 | 5 | 3 | 6 | 3 |
| | B | 5 | 10 | 7 | 8 | 11 | 8 | 13 | 13 |
| | C | 5 | 6 | 3 | 4 | 4 | 9 | 15 | 11 |

- Q11) a)** A company has machine whose cost is Rs. 50,000/- its maintenance cost at the end of different years is given below : **[8]**

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------|-------|-------|-------|-------|-------|-------|-------|
| Maintenance cost | 5000 | 5200 | 5500 | 6000 | 6700 | 7400 | 8800 |
| Resale value | 48000 | 47000 | 45500 | 44000 | 42000 | 39500 | 36500 |

What is the economic life of the machine & what is the minimum average cost?

- b) Explain in brief the types of environment under which the decisions are made? Also write a short note on application of Game theory. **[8]**

OR

- Q12) a)** Explain how the theory of replacement is used in replacement of items whose maintenance cost varies with time. Explain with suitable example considering constant scrap value and ignoring time value of money. **[6]**

- b) Following is the payoff matrix for player A **[10]**

| | | Player B | | | | |
|----------|---|----------|---|---|---|---|
| | | 2 | 4 | 3 | 8 | 4 |
| Player A | 5 | 5 | 6 | 3 | 7 | 8 |
| | 6 | 6 | 7 | 9 | 8 | 7 |
| | 4 | 4 | 2 | 8 | 4 | 3 |
| | 2 | 2 | 4 | 3 | 8 | 4 |

Using dominance property, obtain the optimum strategy for both the players & determine value of game.



Total No. of Questions : 12]

SEAT No. :

P746

[Total No. of Pages : 4

[4659] - 50

B.E. (Mechanical) (Semester - II)

RELIABILITY ENGINEERING

(2008 Pattern) (Elective - IV(c))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the 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) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain the following terms: **[8]**

- i) MTTF
- ii) Maintainability
- iii) Availability
- iv) MTBF

b) 100 components are put under test. After every hour number of failures are recorded. Find the failure density, hazard rate & reliability from the given data & plot these functions against time. **[8]**

| | | | | | | | | | | |
|---------------------|----|----|---|---|---|---|---|---|----|----|
| Time interval (hrs) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| No. of failures | 21 | 13 | 9 | 7 | 6 | 6 | 5 | 7 | 11 | 15 |

OR

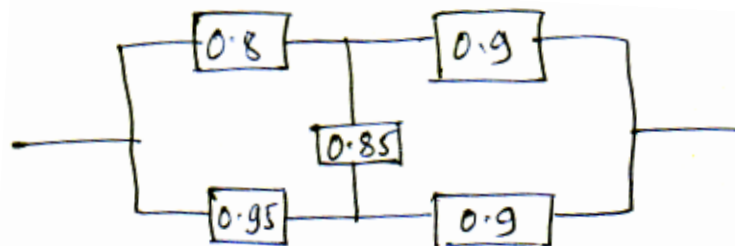
P.T.O.

- Q2) a)** Draw "Bath tub curve" & explain in detail the three regions involved in it. [8]
- b) A total number of 50 components. Whose MTTF is known to be 200hrs, are placed on a test continuously. Estimate the number of components which would fail in the time intervals
- 0 to 50 hrs.
 - 50 to 100 hrs.
 - 100 to 150 hrs.
 - 150 to 200hrs.
- [8]

- Q3) a)** A delicate recorder mounted on the platform, exposed to a random vibration is likely to fail when the horizontal acceleration exceeds 0.05g. The platform experiences an exponentially distributed horizontal vibrations with mean acceleration of 0.035g. What is the probability that the recorder will not fail? If the reliability of recorder is to be 0.9 or above, determine the limit for mean acceleration. [6]
- b) Prove that component redundant structure is more reliable than unit redundant structure. [4]
- c) Explain theorem of total probability. [6]

OR

- Q4) a)** Explain conditional probability method. [6]
- b) Explain system reliability model in parallel configuration. [4]
- c) A system is operating from the time $t = 0$. Prove that the probability of system functioning properly between times t_2 & t_1 ($t_2 > t_1$) is $R_{t_2-t_1} = 1 - R_{t_1} + R_{t_2}$ [6]
- Q5) a)** Find the reliability of the system shown below using Delta star method. [6]



- b) A system consists of three components connected in series with reliabilities $R_1 = 0.8$, $R_2 = 0.7$ & $R_3 = 0.9$. It is desired that the reliability of the system be 0.65. How should this be apportioned in three units using minimum effort method? [6]
- c) Explain AGREE apportionment technique. [6]

OR

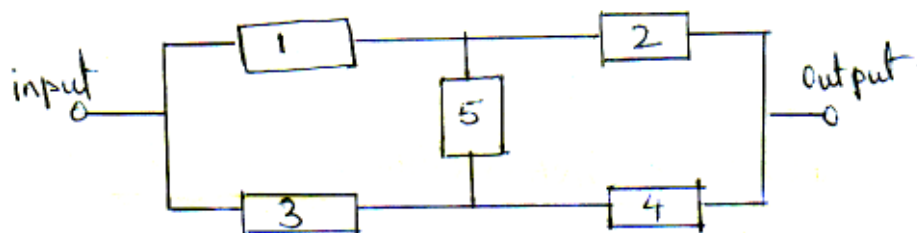
- Q6)** a) A system consist of four subsystems A, B, C & D having failure rates 0.005, 0.002, 0.004, 0.008 failures per hour respectively. If the mission time is 50 hours & the system reliability required is 0.95. Find the reliability & failure rate of each subsystem for the entire mission using ARINC method. [6]
- b) Write a note on node removal matrix method. [6]
- c) Five components are connected in series having reliabilities 0.99, 0.995, 0.989, 0.994, 0.996 respectively. For the given system reliability goal has been set to 0.96. Allocate the reliabilities to each component using reliability allocation based on unreliability. [6]

SECTION - II

- Q7)** a) Explain reliability, maintainability and availability. What are the types of availabilities? [8]
- b) If the inherent availability of a system is 0.92, when the MTBF is 220hrs, what is the maximum value of MTTR? Assuming logistic time for administrative support as 30% of the total down time, find out the operational availability. [8]

OR

- Q8)** a) What is meant by "Reliability Centered Maintenance"? Explain the part played by "CBM" [Condition Based Monitoring] in achieving specific level of reliability. [8]
- b) If the repair rate μ (t) is a constant and is equal to ' μ '. Show that MTTR is a constant repair time z. [8]
- Q9)** a) Explain the methodology of constructing Fault tree diagram. What are the various symbols used while constructing the fault tree diagram? [8]
- b) What is meant by Tie sets and Cut sets? State their application in determining the reliability of a system shown in the figure below. [8]



OR

Q10) a) How Boolean Algebraic principles can help in simplifying the FMEA diagram, so that the estimation of overall failure probability becomes easier? [8]

OR

b) If in a system we need atleast one out of '3' units to operate for the successful working of the system, then prove that the system reliability can be written as

$$R_s(t) = 3e^{-\lambda t} - 3e^{-2\lambda t} + e^{-3\lambda t} \text{ where } \lambda = \text{constant failure of 't' mission time.} \quad [8]$$

Q11) a) Derive reliability equation when strength and load follow normal distribution. [8]

b) The following data refers to a certain test of equipment.

| | | | | | | | | |
|------------------------------------|----|----|----|----|----|----|----|----|
| Failure No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Operating time to failures (hours) | 10 | 22 | 12 | 16 | 15 | 24 | 28 | 32 |

Find out the reliability by

- i) Mean method and
- ii) Median method and compare the two by plotting.

[10]

OR

Q12) a) Explain

- i) Accelerated Life Testing
- ii) DTMC & CTMS models.

[8]

b) Find the reliability and the corresponding control factor of safety of a system for which $\mu_s = 15,000 \text{ kg / cm}^2$ and $\mu_l = 10,000 \text{ kg / cm}^2$, $\sigma_s = 3,000 \text{ kg / cm}^2$ and $\sigma_l = 1,000 \text{ kg / cm}^2$ and s & l follow normal distribution.

Table shows normal variant (z) and $\phi(z)$.

| | | | |
|-----------|--------|--------|--------|
| z | 1.56 | 1.58 | 1.60 |
| $\phi(z)$ | 0.9406 | 0.9429 | 0.9452 |

[10]



Total No. of Questions : 12]

SEAT No. :

P1143

[Total No. of Pages : 2

[4659] - 501
B.E. (Mechanical) (Semester - I)
GAS TURBINES & JET PROPULSION
(2003 Pattern)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

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

SECTION - I

Unit - I

- Q1)** a) Discuss Fanno lines and Fanno relations for perfect gases. [10]
b) Explain shocks in converging and diverging lines. [8]

OR

- Q2)** a) Explain the following terms. [10]
i) Stagnation temperature and pressure
ii) Mach number, Mach cone and Mach angle.
b) Discuss operations of nozzles under varying pressure ratios. [8]

Unit - II

- Q3)** a) Derive expression of thermal efficiency of Brayton cycle of gas turbine. [6]
b) Discuss Gas turbine with reheat and inter cooling. [10]

OR

- Q4)** a) Compare gas turbine with steam turbine. [6]
b) Discuss gas turbine with intercooling and regeneration. [10]

Unit - III

- Q5)** Discuss choking and stalling characteristics of centrifugal and axial compressors. [16]

P.T.O.

OR

Q6) Write short notes on the following :

- a) Slip factor.
- b) Prewhirl losses and
- c) Surging for centrifugal compressors.

SECTION - II

Unit - IV

- Q7)** a) What do you understand by blade and stage efficiency? Derive an expression for blade efficiency for simple impulse turbine. [10]
- b) Explain briefly the performance graphs of a reaction turbine. [8]

OR

- Q8)** a) Discuss compounding of multistage impulse turbine with the help of neat diagrams. [10]
- b) Discuss losses in impulse turbines. [8]

Unit - V

- Q9)** a) Explain in detail combustion theory applied to a gas turbines combustion system. [8]
- b) Describe briefly the factors affecting the combustion chamber design. [8]

OR

- Q10)** Write short notes on : [16]
- a) Flame tube cooling
 - b) Fuel injection
 - c) Ignition
 - d) Fuel
 - e) Pollution

Unit - VI

- Q11)** a) Explain clearly the various efficiencies associated with a propulsion device. [8]
- b) Write a note on rocket propellants. [8]

OR

- Q12)** a) Write a short note on turbojet engines. [8]
- b) Write a short note on turboprop engines. [8]



Total No. of Questions : 12]

SEAT No. :

P2162

[Total No. of Pages : 3

[4659] - 502

B.E. (Mechanical) (Semester - I)
ALTERNATIVE ENERGY SOURCES
(2003 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is collection efficiency of a flat plate collector? Discuss the parameters on which it depends. **[8]**
- b) Discuss how solar radiations are measured on horizontal and tilted surface. **[8]**

OR

- Q2)** a) Explain the followings:
- i) Direct solar radiation.
 - ii) Diffuse solar radiation.
 - iii) Solar radiation intensity.
- b) Discuss the potential of solar energy in India.

P.T.O.

- Q3)** a) With neat diagram explain the working of solar drying system. [8]
b) Compare the flat plate collectors and concentrated collectors stating its advantages and disadvantages. [8]

OR

- Q4)** a) With neat diagram, explain principle of solar space heating system.
b) What is the selection criteria for flat plate solar collector? Discuss the energy balance for this.

- Q5)** a) Explain the different types of flat plate collectors. What are its limitations? [9]
b) Discuss the various solar stills and its selection criteria. [9]

OR

Q6) Write short notes on:

- a) Solar Pond.
b) Types of solar concentrators.

SECTION - II

- Q7)** a) How do you get power from the windmill? Derive an expression for the power. [8]
b) What are solar cells? List the important solar cell materials. Explain their V-I characteristics. [8]

OR

- Q8)** a) Explain power duration and velocity duration characteristics of wind.
b) Explain the various applications of photovoltaic systems (PVS). What are the limitations of PVS?

- Q9)** a) Explain the different sources of geothermal energy. [8]
b) What are tidal waves? What are the difficulties in tidal power developments? [8]

OR

- Q10)** a) With neat schematic, discuss the principle open cycle OTEC system.
b) Write short note on : Solid oxide fuel cells.

- Q11)** a) Explain the factors affecting the generation of biogas. [9]
b) Discuss the environment protection norms in India. What is ISO 14000? [9]

OR

- Q12)** a) Discuss the direct and indirect methods of obtaining energy from biogas.
b) Explain the followings:
i) Future prospectus of solar energy.
ii) CDM.



Total No. of Questions : 12]

SEAT No. :

P1144

[Total No. of Pages : 2

[4659] - 503
B.E. (E & TC)
Voice Network
(2003 Pattern) (Semester - I)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Draw and explain the principles of circuit switched and packet switched network. [8]
b) Compare in channel signaling with common channel signaling. [6]
c) Calculate the availability of dual processor system for a period of 12 years having MTBF = 2200 Hrs and MTTR = 5 Hrs. [4]

OR

- Q2)** a) What is SPC organization? Explain the types of SPCs in brief. [10]
b) Explain the design considerations of DTMF dialer. [8]

- Q3)** a) State and explain various measurement units used in traffic engineering. [8]
b) What is blocking probability? Define and explain the “Erlang C” formula for blocking probability. [8]

OR

- Q4)** a) The data collected from a customer line during a period of 100 minutes show a total of 12 active calls with call holding times as 87, 75, 54, 96, 48, 64, 12, 60, 47, 78, 99, 120 seconds respectively. Calculate the traffic capacity in Erlangs and CCS. [8]
b) Define and explain the following terms : [8]
i) Grade of service.
ii) Unavailability.

P.T.O.

- Q5)** a) With the help of neat diagram explain different services supported by ISDN. [8]
b) Describe the significance of B & D channel in ISDN. [8]

OR

- Q6)** a) What are the devices used in order to provide ISDN services? Explain each in detail. [8]
b) Explain in detail ISDN interfaces. [8]

SECTION - II

- Q7)** a) Compare various multiplexing technologies used in cellular networks. [8]
b) List different interfaces used in GSM system. Explain any two types. [8]

OR

- Q8)** a) Draw the architecture of GSM network and explain its functional entities. [8]
b) Explain what are the data services used in GSM system. [8]

- Q9)** a) State and explain in brief the orthogonal and pseudorandom codes used for CDMA. [8]
b) Compare GSM and IS - 95 CDMA architecture. [8]

OR

- Q10)** a) Write short notes on “Walsh Code”. [8]
b) Explain the significance of Pilot and Sync channel. [8]

- Q11)** a) Explain in detail DTMF generation and detection. [10]
b) Differentiate between H.323 and H.248 protocols. [8]

OR

- Q12)** a) What is VOIP? Explain any two applications of VOIP. [10]
b) Write short notes on voice over frame relay. [8]



Total No. of Questions : 12]

SEAT No. :

P2163

[Total No. of Pages : 3

[4659] - 504

B.E. (E & TC)

ADVANCED DIGITAL SIGNAL PROCESSING

(2003 Pattern) (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) Answer to the two sections should be written in separate books.
- 3) Figures to the right indicate full marks.
- 4) Use of electronic calculator is allowed.
- 5) Assume suitable data, if necessary.
- 6) Draw neat diagrams wherever necessary.

SECTION - I

- Q1)** a) Explain and differentiate between decimation and interpolation. [6]
b) Explain sampling - rate conversion by non - integer factors, with the help of a neat block diagram and waveforms. [12]

OR

- Q2)** a) Define random signals. Explain the characteristics of random signals. [6]
b) Explain multi-stage approach to sampling rate conversion. [6]
c) Explain poly-phase filter structures. [6]

- Q3)** a) Explain concept of adaptive filtering with the help of noise - canceller. [6]
b) The estimate of the desired signal at the output of an adaptive noise canceller is given as, $\hat{S}_k = S_k - \hat{n}_k = s_k + n_x - \hat{n}_k$. Show that minimizing the total power at the output of the canceller, maximizes the output SNR. [10]

OR

P.T.O.

Q4) a) Starting from the basic Wiener filter theory, derive the Wiener - Hopf equation, $W_{opt} = R^{-1}P$. What are its limitations? [8]

b) Derive the basic LMS algorithm and explain the implementation. [8]

Q5) a) Define and explain AR, MA and ARMA processes. [8]

b) Explain innovations process with the help of a neat sketch. [8]

OR

Q6) a) What do you mean by forward prediction? Explain Levinson-Durbin algorithm. [8]

b) Explain optimum filter along with the common algorithm and applications. [8]

SECTION - II

Q7) a) Explain power spectrum estimation (PSE). Enlist the limitations of traditional methods of PSE. [8]

b) Explain the periodogram method and its properties. [8]

OR

Q8) Explain the Welch and Blackman - Tukey method of PSE. [16]

Q9) a) Explain the hardware architecture used for signal processing with the help of block diagram. Compare it with general purpose microprocessor architecture. [10]

b) Explain the concept of pipelining with the help of an example. [8]

OR

Q10) Explain the implementation of FIR and IIR filter with a digital signal processor. [18]

- Q11)** a) Describe the mechanism of human speech production with a neat sketch. **[10]**
- b) Explain channel vocoders and sub-band coding. **[6]**

OR

- Q12)** Explain the following terms in the context of speech processing: **[16]**
- a) Cepstrum.
- b) Pitch and Pitch detection.
- c) Formants.
- d) Vowels, consonants and nasals.



Total No. of Questions : 12]

SEAT No. :

P1145

[Total No. of Pages : 4

[4659] - 505

B.E. (EATC)

Optical and Microwave Communication

(2003 Pattern) (Semester - II)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

- 1) Solve Q. 1 or Q. 2, Q.3 or Q.4, Q.5 or Q.6 from Section - I and Q.7 or Q.8 , Q.9 or Q.10, Q.11 or Q.12 from Section - II.
- 2) Figures to the right indicate marks.
- 3) Use of non programmable calculators is permitted.

SECTION - I

- Q1)** a) Define numerical aperture of an optical fiber and derive an expression for the same. [8]
- b) A graded index fiber has following parameters : [8]
- i) Radius of core = 42 μM .
 - ii) Refractive index of core = 1.55.
 - iii) $\Delta = 0.062$
 - iv) Power law coefficient (α) = 2
 - v) Wave length (λ) = 15 μM .

Calculate

- 1) Number of modes
- 2) Refractive index of cladding.

OR

- Q2)** a) Explain stimulated emission as applied to laser diodes. What are advantages of laser diodes over light emitting diodes (LED) when used for light emission over fibers. [8]
- b) A double hetro junction InGaAsP LED emitting at a peak wavelength of 1310 nm has radiative and non radiative recombination times of 30 n sec and 100 n sec respectively. The drive current is 40 mA. Determine total recombination life time, internal quantum efficiency and internal power level of the source. [8]

P.T.O.

- Q3)** a) What is dispersion? Explain intramodal and intermodal dispersion. [8]
b) When the optical power launched into 10 km length, fiber is $100 \mu\text{w}$, the optical power at fiber output is $5 \mu\text{w}$ calculate [8]
i) overall signal attenuation in dB
ii) signal attenuation per Km.
iii) The overall signal attenuation for 12 km optical link using same fiber splices at 1 km interval, each giving attenuation of 0.5 dB

OR

- Q4)** a) Explain with neat diagrams the working of an OTDR. What are two important performance parameters of an OTDR. [8]
b) A multimode graded index fiber exhibits total pulse broadening of $0.1 \mu\text{ sec}$ over the distance of 12 km Calculate : [8]
i) The maximum possible band width on the link assuming no inter symbol interference.
ii) Pulse broadening per unit length.
iii) Band width length product of fiber.

- Q5)** a) Describe concept of wavelength division multiplexing and state key system features of WDM. [9]
b) Explain link power budget with the help of power loss model for point to point link. Give the graphical representation of a link loss budget. [9]

OR

- Q6)** a) Explain with neat diagram basic structure of STS - 1 SONET frame. [9]
b) How does photonic switching differ from electro optic switching? Discuss different types of switch used in fiber optical communication systems. [9]

SECTION - II

- Q7)** a) What are wave guides. Explain following terms as applied to waveguides [9]
i) Phase velocity
ii) Group velocity
iii) Cutoff wavelength
iv) TE_{Mn} and TM_{Mn} modes

- b) A rectangular cavity resonator has dimensions $a = 7.5$ cm, $b = 4$ cm and $c = 16$ cm, calculate [9]
- Resonance Frequency of dominant mode.
 - cutoff wave number
 - Phase constant.

OR

- Q8)** a) Define 'S' parameters and list different properties of the same along with physical interpretation. [9]
- b) What is directional coupler? Draw and explain two hole directional coupler. Explain the terms. [9]
- coupling factor.
 - directivity.

- Q9)** a) Explain the following : [8]
- Velocity modulation in two cavity klystron.
 - Negative resistance property of reflex klystron.
- b) A Reflex klystron operates under following conditions $V_0 = 600$ V,
 $L = 1$ mm, $R_{sh} = 15$ Kv, $P_r = 96$ Hz, $\frac{e}{m} = 1.759 \times 10^{11}$ [8]

The tube is oscillating at f_r at the peak of $n = 2$ mode of $1\frac{3}{4}$ mode.

Assume that transit time through the gap and beam loading can be neglected find

- Value of repeller voltage "V".
- direct current required to give microwave voltage gap of 200 V.
- What is electric frequency under this condition.

OR

- Q10)** a) Explain the working of TWT. State the expressions for the roots of propagation constant and gain of tube used as an amplifier. [8]
- b) Explain the following : [8]
- Amplifying action in travelling wave tube
 - Oscillating action in magnetron.

- Q11)** a) Explain how tunnel diode can be used as microwave oscillator. [8]
- b) Compare the negative resistance channel concept of following devices operating in microwave range. [8]
- i) Tunnel diode
 - ii) GUNN Diode
 - iii) IMPATT diode.

OR

- Q12)** a) Explain in detail the working of TRAPTT diode and draw its performance characteristics. [8]
- b) What is GUNN effect. Sketch GUNN diode construction and explain its working. [8]



Total No. of Questions : 12]

SEAT No. :

P1146

[Total No. of Pages : 3

[4659] - 506

B.E. (Semester - II)

ELECTRONICS AND TELECOMMUNICATION
System Programming and Operating System (Elective - II)
(2003 Pattern)

Time : 3 Hours]

[Maximum Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Enlist and explain all phases of compiler with neat and labeled diagram. [6]
b) Explain the term back patching. [2]
c) Define the following terms : [8]
i) Compiler
ii) Loader
iii) Interpreter
iv) Macro processor

OR

- Q2)** a) Explain the role of Lexical Analyzer in compiler design. List the types of errors reported during lexical analysis phase of compiler. [6]
b) What are different language processing activities? [6]
c) Explain in brief software development tools : [4]
i) LEX
ii) YACC

- Q3)** a) How one pass assembler can handle forward references? [4]
b) Write an algorithm for second pass of a two pass assembler. Which searching technique improves the performance of algorithm and how? [10]
c) What are the features provided by the MACRO facility? [4]

OR

P.T.O.

Q4) For the following assembly language code, show the contents of macro name table, macro definition table. Finally write down the code after macro expansion. **[18]**

```
MACRO
EVAL & X, &Y, &Z
AIF (&Y EQ & Z). ONLY
LOAD & X
SUB & Y
ADD & Z
AGO.OVER
.OONLY LOAD & Z
.OOVER MEND
MACRO
MAJOR & W1, & W2, & W3, & W4, &W5, & W6
EVAL & W1, & W2, & W3
STORE & W6
EVAL & W4, &W5, & W6
MEND
START
MAJOR A, B, C, D, E, F
END
```

Q5) a) Compare following : **[4]**

- i) Dynamic loading Vs dynamic linking.
- ii) Compile and go loader Vs absolute loader.

b) Give the flow chart for pass I of direct linking loader. **[12]**

OR

Q6) a) What is a loader? What are its basic functions? **[6]**

b) Explain following terms : **[6]**

- i) Overlays.
- ii) Dynamic Linking

c) Write true or false : **[4]**

- i) In absolute loader scheme allocation is done by loader.
- ii) In absolute loader scheme linking is done by programmer.
- iii) In BSS loader scheme relocation is done by loader.
- iv) In BSS loader scheme linking is done by programmer.

SECTION - II

- Q7)** a) What is the meaning of the term busy waiting? What other kinds of waiting are there in an operating system? Can busy waiting be avoided altogether? [8]
- b) State any one classical problem of synchronization and give the remedial technique to overcome it. [8]

OR

- Q8)** a) What is the role of process control block? Explain the function of each attribute in PCB. [8]
- b) State and explain different operating system services in detail? [8]

- Q9)** a) Explain the following terms : [6]
- i) Compaction
 - ii) Thrashing
- b) Compare and explain paging and segmentation. [6]
- c) Differentiate the contiguous and non - contiguous memory allocation. [6]

OR

- Q10)** a) Write a short note on virtual memory management. [6]
- b) Explain in detail variable partitioning memory management. [6]
- c) Explain key features of windows file system. [6]

- Q11)** a) Explain mechanism and policies in file system and IOCS layers. Explain steps involved in I/O operations. [8]
- b) Based on what criterion I/O devices are classified? How I/O time of record is calculated? Explain Magnetic Tape and Magnetic Disk in short. [8]

OR

- Q12)** a) What is the purpose of physical IOCS? Explain data structure of physical IOCS with diagram. Explain Organization of physical IOCS. [8]
- b) What is device driver? Explain device driver for USB and parallel port. [8]



Total No. of Questions : 12]

SEAT No. :

P1147

[Total No. of Pages : 2

[4659]-507

B.E. (Production) (Semester - II)

MATERIALS AND FINANCIAL MANAGEMENT

(2003 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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain various functions and objectives of materials management. [9]
b) Rate of return can be increased by proper inventory decisions. Justify. [9]

OR

- Q2)** a) Derive an equation for economic batch quantity of finished goods inventory when stock outs are permitted. [9]
b) Explain the following : [9]
i) V-E-D Analysis.
ii) F-S-N Analysis.

- Q3)** a) Explain supply chain of agriculture industry. State the factors to be improved for effective supply chain. [8]
b) Explain various factors that affect transportation cost. [8]

OR

- Q4)** a) Explain Logistical information system (LIS). State the principle of LIS. [8]
b) Explain following terms of warehouse management. [8]
i) Consolidations.
ii) Break Bulk.
iii) Cross Docking.
iv) Stock Pilling.

P.T.O.

- Q5)** a) Explain waste disposal system. [8]
b) Explain phases of Value Analysis with suitable example. [8]

OR

- Q6)** a) Explain use of computers/internet in materials management. [8]
b) Explain any two documents of importing in brief. [8]

SECTION - II

- Q7)** a) Explain various objectives of financial management. [8]
b) Define Ratio Analysis. Explain and state the advantages and limitations of financial ratios. [8]

OR

- Q8)** a) Explain and differentiate between fixed and working capital with suitable illustration. [8]
b) Explain Break Even analysis. How does the use of financial leverage affect the break-even-point? Illustrate. [8]

- Q9)** Explain methods of depreciation. [16]

OR

- Q10)** Explain any four methods of incentive plans with illustration. [16]

- Q11)** a) Explain types of overheads. Explain Primary and Secondary apportionment. [9]

- b) Explain the following : [9]

- i) Primary apportionment.
ii) Secondary apportionment.

OR

- Q12)** Write short note on : [18]

- a) Variance analysis.
b) Capital budgeting.
c) Marginal costing.



Total No. of Questions : 12]

SEAT No. :

P1148

[Total No. of Pages : 3

[4659]-508

B.E. (Production Sandwich) (Semester - I)

MECHATRONICS & ROBOTICS

(2003 Pattern)

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 each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) State the situation in which the closed loop control system or open loop control system is better. Discuss with an example. [8]
- b) Explain the following with an example: [10]
- i) Measurement System.
 - ii) Display System.
 - iii) Sequential Controller.
 - iv) Comparison element of a closed system.

OR

- Q2)** a) State and explain the signal conditioning processes. [6]
- b) Discuss the following with neat sketches: [12]
- i) Instrumentation amplifier.
 - ii) Optoisolators.
 - iii) Comparators.
- Q3)** a) Explain the following for a Microprocessor : [9]
- i) Accumulator
 - ii) Assembler
 - iii) Instruction Pointer
- b) Explain the following : [7]
- i) Karnaugh maps
 - ii) D flip-flop

P.T.O.

OR

- Q4)** a) What is Sequential Logic? Explain the Synchronous Systems. [6]
b) Draw a neat block diagram of Microcomputer and explain each block. [10]
- Q5)** a) Prepare an algorithm/flowchart and write a program in assembly language to determine the maximum marks obtained from a list of given marks. [8]
b) State and explain the commonly used instructions that may be given to a microprocessor. [8]

OR

- Q6)** a) Explain the following with neat figures: [8]
i) Polling and interrupts.
ii) Peripheral interface adapters.
b) Explain the requirements of Interface. [8]

SECTION - II

- Q7)** a) Explain the following, with the help of a ladder diagram: [8]
i) Latching.
ii) Internal Relays
b) Explain the following with neat figure: [8]
i) Tachogenerator.
ii) Seebeck Effect.
iii) PVDF Tactile Sensor.
iv) Capacitive transducers.

OR

- Q8)** a) Explain the following with respect to PLC: [8]
i) Timers
ii) Mnemonics
b) Explain the following terms w.r.t. Fluid Pressure Sensors: [8]
i) Diaphragms.
ii) Capsules.
iii) Bellows.
iv) Tube Pressure Sensors.

- Q9)** What are the types of drives used for robotic applications? State the particular applications of each. [16]

OR

- Q10)** Explain following with neat diagram: [16]
- a) Accumulator.
 - b) Pressure Control Valve.
 - c) Plug shapes.
 - d) Vane motor.

- Q11)** a) What are the various controllers used in Robots? Explain. [6]
- b) Discuss the role of Robot in following applications : [12]
- i) Quality Inspection.
 - ii) Welding.

OR

- Q12)** Explain the following terms : [18]
- a) Spatial Resolution.
 - b) Roll, pitch, yaw.
 - c) Compliance.



Total No. of Questions : 6]

SEAT No. :

P1149

[Total No. of Pages : 2

[4659]-509

B.E. (Production Sandwich)

SUPPLY CHAIN MANAGEMENT

(2003 Pattern) (Elective - II) (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) *All questions are compulsory.*
- 3) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Identify cycles and push-pull boundary in supply chain with suitable example. [9]
b) What are competitive and supply chain strategies. [7]

OR

- a) Discuss roll of sourcing in supply chain. [8]
b) Explain supply chain uncertainty. [8]

- Q2)** a) Explain steps involved in forecasting demand. [12]
b) What are aggregate planning decisions. [4]

OR

Discuss different methods of forecasting. [16]

- Q3)** Explain : Lot size and volume based quantity discounts. [18]

OR

Explain roll of safety inventory in supply chain & how to improve supply chain profitability. [18]

SECTION - II

- Q4)** Explain factors affecting design of supply chain & role of transportation in SC Network. [16]

OR

Discuss the role of IT in forecasting and in Inventory Management with at least two case studies. [16]

P.T.O.

Q5) What is bull-whip effect? Explain details of obstacles for coordination in supply chain. [16]

OR

Explain distribution network & evolution of E-business. [16]

Q6) Explain changing distribution network & decision tree & decision tree analysis. [18]

OR

Explain following : [18]

- a) Revenue Management in supply chain.
- b) Better Network design decisions.
- c) DCF Analysis.



Total No. of Questions : 12]

SEAT No. :

P1150

[Total No. of Pages : 2

[4659]-511

B.E. (Computer Engineering)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2003 Pattern) (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) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain in detail three measurement scale types: Nominal, ordinal and interval scales. Give examples related to software domain. [8]
b) Discuss four principles of investigation in detail. [8]

OR

- Q2)** a) How to define, collect, store and extract data? Explain with example. [12]
b) Define measurement and explain in detail the representation condition for measurement. [4]

- Q3)** a) What are the different attributes which capture the key aspects of software size? Explain in detail with examples. [8]
b) What is cyclomatic complexity? When it is used? Explain. [8]

OR

- Q4)** a) What are the different metrics used in object oriented methodology. [8]
b) Explain Halstead's software science method to measure the size of a program. [8]

- Q5)** a) What are typical origins of defects? Explain Defect Life Cycle. [10]
b) Explain in detail White Box test case design approach. [8]

OR

- Q6)** Write short note on : [18]
a) Positive and negative testing.
b) User documentation testing.
c) Domain Testing.

P.T.O.

SECTION - II

- Q7)** a) Enumerate all the components of test plan. Explain test environment and test deliverables in detail. [8]
b) What is integration testing? What are its types? Explain in brief. [8]

OR

- Q8)** a) Explain “Challenges in Software Test Automation”. What are the various criteria for selecting automated test tools. [8]
b) Write short note on any two : [8]
i) Usability Testing.
ii) Ad hoc Testing
iii) Scenario testing.

- Q9)** a) Explain with example Six Sigma measure of software Quality. [8]
b) Explain with example : [8]
i) Checklists.
ii) Run charts.

OR

- Q10)** a) Define the terms: Quality, Quality Control, Cost of quality, SQA. [8]
b) Discuss Edward Deming’s principles. [8]

- Q11)** a) Explain in detail all the activities involved in Fix Distribution. [10]
b) Explain the role of customer repository, defect repository and customer support repository in problem reporting. [8]

OR

- Q12)** a) What are the challenges, best practices and pitfalls in problem resolution. [8]
b) What is software maintenance? Why is it necessary? Explain the role of support analyst. [10]



Total No. of Questions : 12]

SEAT No. :

P747

[Total No. of Pages : 4

[4659] - 53

B.E. (Mechanical) (Semester - II)

INDUSTRIAL AUTOMATION

(Open Elective) (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 each section should be written in separate books.*
- 3) Draw neat suitable diagrams, wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of electronic pocket calculator is allowed.*
- 6) Assume suitable data, if required.*

SECTION - I

Unit - I

- Q1)** a) Explain types of automation and benefits of automation? [8]
- b) How control system is designed for industrial automation? Explain step by step procedure for control design? [7]

OR

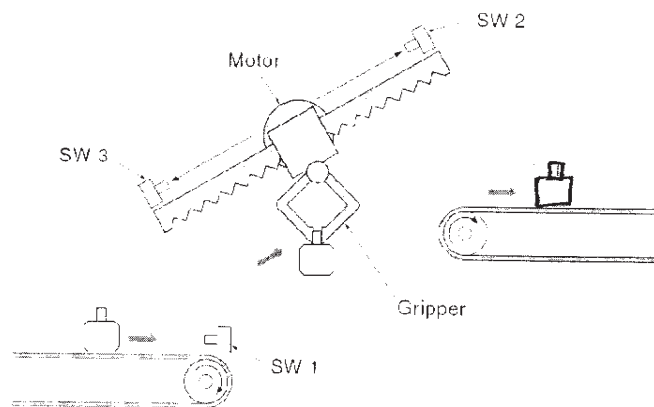
- Q2)** a) Explain types of automation and benefits of automation? [8]
- b) Explain Industrial Automation Types [7]
- i) Fixed Automation
 - ii) Programmable Automation
 - iii) Flexible Automation

P.T.O.

Unit - II

Q3) a) Explain 7 step method for ladder development? **[5]**

b) A simple pick - and - place robot picks up parts from one conveyer belt and placethem on another belt, as shown in Figure (a). When a part moving along the lower conveyer belt activates Switch 1, a solenoid - powered gripper clamps on the part and carries it toward the upper conveyer belt. When the gripper reaches Switch 2, it releases the part and moves back (empty) to receive the next part. When the gripper reaches Switch 3, it halts and waits for the next part to start the cycle all over again. Draw the relay logic ladder diagram to control this operation. **[10]**



OR

Q4) a) Short Notes on: **[5]**

- i) DCS Architecture
- ii) DCS Function levels

b) In a certain bank, each of three bank officers has a unique key to the vault. The bank rules require that two out of the three officers be present when the vault is opened. Draw the ladder diagram for a relay logic circuit that will unlatch the door and turn on the light when two of the three keys are inserted. **[10]**

Unit - III

Q5) a) What makes the FMS flexible? Define types of flexibility and explain its dependent factors. **[12]**

b) Write a note on ASRS (Automated storage and retrieval system) Material Storage system? **[8]**

OR

- Q6)** a) Explain with neat sketch simple data communication structure? And Define
- i) Communication
 - ii) Protocol [8]
- b) Explain Automated guiding systems used in manufacturing systems. [7]
- c) What are components of manufacturing system? [5]

SECTION - II

Unit - IV

- Q7)** a) Explain Necessity of SCADA system over simple Automation and explain components of SCADA system? [8]
- b) Explain : [7]
- i) Stepper Motor
 - ii) Induction Motor
 - iii) VFD

OR

- Q8)** Write short note on (Any three) [15]
- a) Compare SCADA and HMI
 - b) Alarm Management System
 - c) Historical database management
 - d) Security and user access management

Unit - V

- Q9)** a) Explain working of stepper motor with neat sketch. [8]
b) Factors to be consider for selection of drives? [7]

OR

- Q10)** a) Explain working of Geneva Mechanism and its use in automation with neat sketch . [7]
b) Short Note on [8]
i) DC servo systems
ii) BLDC and their control system

Unit - VI

- Q11)** a) What are the general considerations in robot material handling? [12]
b) What are the types of assembly system configuration and explain any one? [8]

OR

- Q12)** Write a short Notes on [20]
a) Universal Hand
b) Automation for drilling machine
c) Automation in Conveyor Belts
d) Automation Machine Loading and Unloading



Total No. of Questions : 12]

SEAT No. :

P1061

[4659]-54

[Total No. of Pages : 4

B.E. (Mechanical Sandwich)
MACHINE AND COMPUTERAIDED DESIGN
(2008 Course) (Semester - I) (402061)

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)** Derive relation for Beam strength of bevel gears. **[8]**
- b) A pair of Bevel gear transmits 7.5 kW at 300 rpm. The pressure angle is 20°. Pitch circle diameter for the pinion and the gear is 150 mm and 200 mm respectively. Face width is 40 mm. Determine the components of gear tooth force and draw a free body diagram of forces acting on the pinion and the gear. **[10]**

OR

- Q2) a)** Discuss the thermal considerations in worm-gear drive. **[6]**
- b) A worm gear pair 2/40/10/4 is having phospher-bronze gear with ultimate tensile strength 300 MPa. The worm is made of steel with ultimate tensile strength of 740 MPa. The coefficient of friction between the worm and worm-gear is 0.03 and normal pressure angle is 20°. For the worm gear, wear factor is 0.9 N/mm². The overall heat-transfer coefficient for the gear box is 18 W/m²°C. The permissible temperature rise for the lubricating oil is 50°C. The worm rotates at 720 rpm and service factor is 1.5. Determine input power rating based on Beam strength, wear strength and thermal consideration. Assume effective surface area of the gear box as 0.8 m² and factor of safety as 1.5. **[12]**

P.T.O.

Q3) a) Define pressure vessel and explain general design considerations for the design of unfired pressure vessel. [8]

b) A high pressure vessel is to be operated at 150 N/mm^2 . The inside diameter of the vessel is 30 cm. Vessel is fabricated from high tensile steel having permissible tensile stress 500 N/mm^2 . Determine the wall thickness on the basis of the maximum tangential stress at inner surface. [8]

OR

Q4) a) Derive the expression for the thickness of thick cylinder subjected to internal pressure on the basis of maximum shear stress theory. [8]

b) A hydraulic cylinder with closed ends is subjected to an internal pressure of 15 MPa. The inner and outer diameters of the cylinder are 240 mm and 300 mm respectively. The cylinder is made of Cast Iron FG300. Determine the factor of safety in the design. If the cylinder pressure is increased by 25%, what will be the factor of safety? [8]

Q5) a) Explain the general guidelines for design for casting and forgings. [8]

b) Discuss the significance of Ergonomics. [8]

OR

Q6) a) Distinguish between quality of design and quality of conformance. Explain the economics of quality of design. [8]

b) Explain following terms (any four): [8]

- i) Natural tolerances
- ii) Aesthetic design principles
- iii) Principles of Design for assembly
- iv) Mechanical Reliability
- v) Factor of Safety

SECTION-II

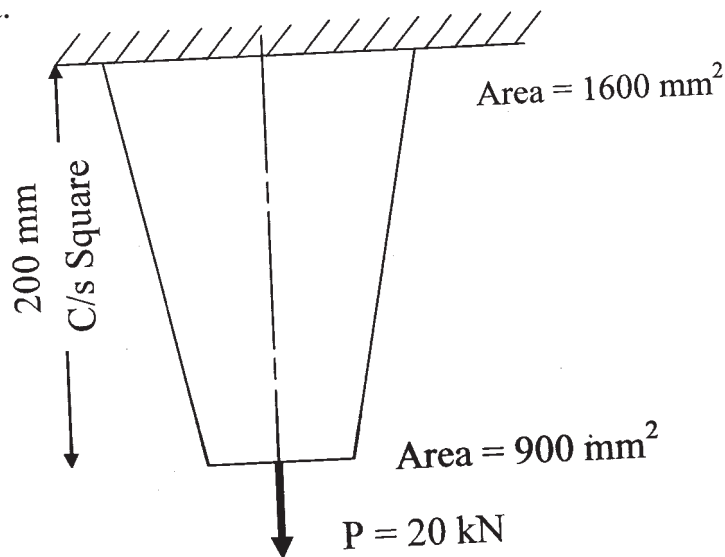
Q7) a) What do you understand by conveying equipment? With the aid of a neat labelled sketch explain various components of Belt conveyor system. [6]

b) A flat horizontal belt conveyor is used for transporting crushed rock having a mass density of 2 t/m^3 . The belt is 800 mm wide and has a speed of 1.75 m/s. Determine the capacity of conveyor in t/hr. [10]

OR

- Q8)** a) Explain conveyor belt sag in belt conveyors. State equations for carrying and return idlers. [6]
- b) State the important properties to be considered in the design of material handling equipment for unit loads. [4]
- c) State for what applications the following material handling equipment is used. Justify your answer with sketch. [6]
- Fork lift truck
 - Jib crane
 - Belt conveyor
 - Roller conveyor

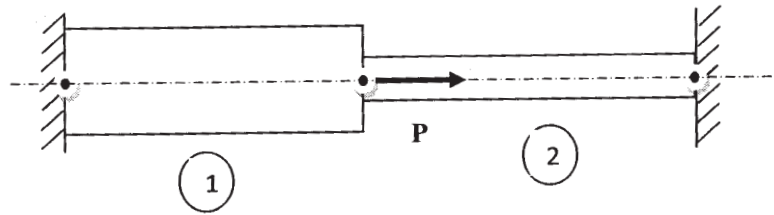
- Q9)** a) Explain solution of 2-Dimensional problems using Constant Strain Triangle (CST). [6]
- b) Find the stresses and reaction at the support by modeling following system in two finite elements. Assume Modulus of Elasticity (E) = 210 GPa. [10]



OR

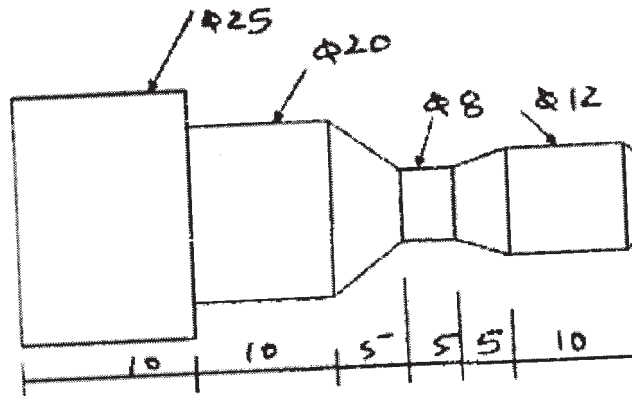
- Q10)** a) Define the term FEM. Explain its general applications in brief. [4]
- b) An axial load $P = 200$ kN is applied as shown in fig. Using penalty approach for handling boundary conditions, determine: [12]
- Nodal displacements
 - Stresses in each element

iii) Reaction forces



| Element No. | Material | Modulus of Elasticity | C/s Area | Length |
|-------------|----------|----------------------------------|---------------------|--------|
| 1 | Aluminum | $70 \times 10^9 \text{ N/mm}^2$ | 2400 mm^2 | 300 mm |
| 2 | Steel | $200 \times 10^9 \text{ N/mm}^2$ | 600 mm^2 | 400 mm |

Q11)a) 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 1mm material is to be removed radially from external diameter. [10]



b) Compare fixed, programmable and flexible automation. [8]

OR

Q12)a) What are the features of CNC machines as compared to NC machines. [6]

b) Explain following with the help of neat sketches (Any two): [12]

- Flexible Manufacturing system (FMS).
- Automatic Storage and Retrieval System (ASRS).
- Automated Guided Vehicles (AGV).

EEE

Total No. of Questions : 12]

SEAT No. :

P1192

[4659]-55

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

SECTION-I

- Q1)** a) Compare Fluid power system with other systems. [6]
b) What are the criterias for selection of oils for a hydraulic system. [6]
c) Explain static and dynamic seals. [6]

OR

- Q2)** a) Explain types of contamination. How contamination can be avoided in hydraulic system? [6]
b) What are quick connecting and disconnecting type of couplings used in Fluid power systems. [6]
c) State type of filters and where they are located in hydraulic system. [6]

- Q3)** a) Explain with a sketch the different parts of a typical reservoir assembly. [8]
b) Sketch an balanced vane pump and explain its working. [8]

OR

P.T.O.

- Q4)** a) The displacement of a pump operating at 1000 rpm at a pressure of 70 bars is 100cm^3 . The input torque from the prime mover is 120Nm. If it delivers $0.0015\text{ m}^3/\text{s}$ of oil, determine [8]
- i) Volumetric efficiency
 - ii) Mechanical efficiency
 - iii) Overall efficiency
 - iv) Theoretical torque required to operate the pump.
- b) Draw the characteristics curves for a positive displacement pump and explain them. [8]

- Q5)** a) What is an accumulator? State different types of accumulators. Explain any one accumulator with a sketch. [8]
- b) What are the different centre positions used in DCV. Give advantages and disadvantages of each. [8]

OR

- Q6)** a) Explain the difference between direct and pilot operated pressure relief valve. [8]
- b) Sketch and explain a pressure compensation type of flow control valve. [8]

SECTION-II

- Q7)** a) Explain any four types of Linear actuators with neat sketch. [8]
- b) Draw a regenerative circuit and state its applications. [8]

OR

- Q8)** a) Explain with a circuit the hydraulic braking circuit. [8]
- b) Draw a hydraulic motor circuit with meter-out flow control. The flow control is required for both directions of rotation. [8]

- Q9)** a) Explain typical compressed air generation and distribution system. [8]
- b) Compare hydraulic and pneumatic systems. [5]
- c) Why is pneumatic control system termed as low cost automation. [5]

OR

- Q10)** a) What is the purpose of quick exhaust valve? Where are these valves installed? [6]
- b) Draw a sketch of a 'Regulator' used in pneumatic system. Explain its working and purpose in the system. [6]
- c) State different compressors used in pneumatic system. What is the selection criteria of compressor. [6]

Q11) a) What is a manufacturer's catalogue. How it helps to design a Fluid Power system? [6]

- b) Sequential operations of two pneumatic cylinders are required as follows:
- i) Cylinder 'A' extends
 - ii) Cylinder 'B' extends
 - iii) Cylinder 'B' retracts
 - iv) Cylinder 'A' retracts

Develop a pneumatic circuit using starting valve, pilot operated 4/2 direction control valve and cam/roller operated valves to maintain the above sequence. Do not use solenoid-operated valves. [10]

OR

- Q12)** a) Explain with an example the steps involved in designing a hydraulic circuit. [8]
- b) Draw a circuit for a high capacity hydraulic press. Discuss how you will choose the different components used in the above circuit. [8]

□□□

Total No. of Questions : 12]

SEAT No. :

P813

[Total No. of Pages : 6

[4659]-56

B.E. (Mechanical) (Sandwich)

a-REFRIGERATION AND AIR CONDITIONING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right 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) Write a note on vortex refrigeration. [4]
- b) What is the necessity of air craft refrigeration? [4]
- c) Explain Boot strap system with a neat sketch and T-S diagram. [8]

OR

- Q2)** a) Write a note on evaporative refrigeration. [4]
- b) Explain the concept of 'DART'. [4]
- c) Explain Reduced Ambient System with a neat sketch and T-S diagram. [8]

- Q3)** a) How refrigerants are classified? [4]
- b) Explain GWP and ODP of a refrigerant. [6]
- c) Write a note on desirable properties of refrigerants. [6]

OR

P.T.O.

- Q4)** a) Write a note on 'Nomenclature of Refrigerants'. How organic substances used as refrigerants are designated? [4]
- b) What are selection criteria of a refrigerant? [6]
- c) Discuss Montreal protocol and Kyoto protocol. [6]
- Q5)** a) Explain cascade system with a neat sketch. [6]
- b) Derive an expression for cop of an ideal vapour absorption cycle. [4]
- c) Calculate power required by two compressors in an ammonia system which serves a 250 kW evaporator at -25°C and uses flash intercooler in between two compression stages. The condenser pressure is 14 bar. Find cop of the system. [8]

OR

- Q6)** a) Explain with neat sketch and p-h diagram 'two stage compression with flash gas removal'. [8]
- b) Write a note on 'Electrolux Refrigeration System'. [6]
- c) An aqua ammonia absorption cycle has a generator temperature of 120°C and evaporator temperature of -20°C . The ambient temperature is 30°C . Estimate the maximum possible cop. Also find the capacity in TR per kW of heat supplied. [4]

SECTION-II

- Q7)** a) What are the factors that one has to keep in mind while selecting an air-conditioning system? Explain unitary or central air-conditioning system. [8]
- b) A building has the following calculated cooling loads:

$$\text{RSH gain} = 310 \text{ kW}$$

$$\text{RLH gain} = 100 \text{ kW}$$

The space is maintained at the following conditions:

$$\text{Room DBT} = 25^{\circ}\text{C}$$

$$\text{Room RH} = 50\%$$

Outdoor air is at 28°C and 50% RH. And 10% by mass of air supplied to the building is outdoor air. If the air supplied to the space is not to be at a temperature lower than 18°C , find:

- i) Minimum amount of air supplied to the space in m^3/s .
- ii) Capacity, ADP, BPF and SHF of the cooling coil. [8]

OR

Q8) Write short notes on the following: [16]

- a) Automobile air conditioning system.
- b) All air system.
- c) All water system.
- d) Room Sensible Heat Factor.

Q9) a) List the various controls necessary for a modern air conditioning system. Describe the working of any one type of control used for-

- i) flow of air,
 - ii) bacteria. [6]
- b) Write short note on duct design methods. [6]
 - c) Write a short note on humidistat. [6]

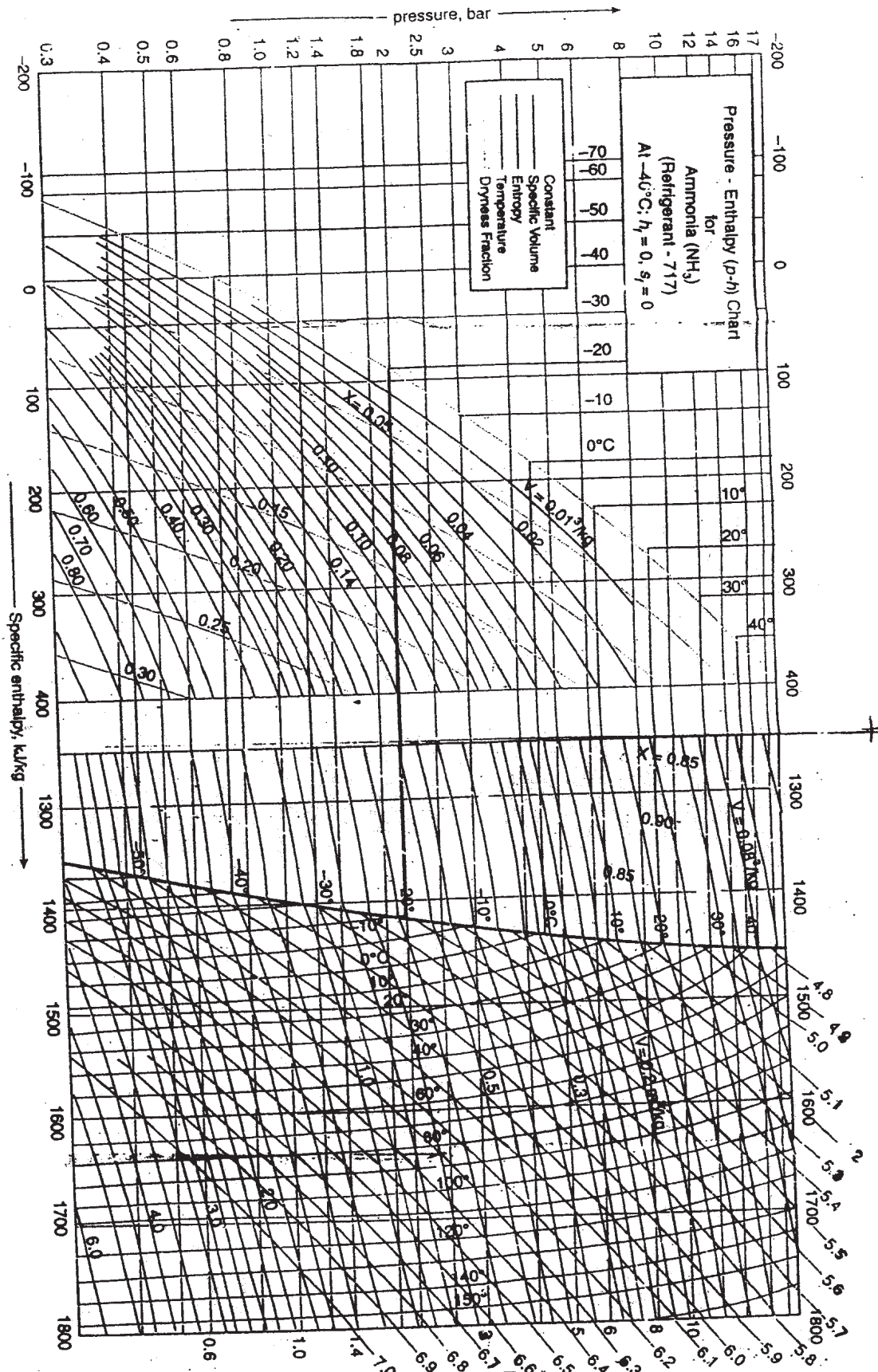
OR

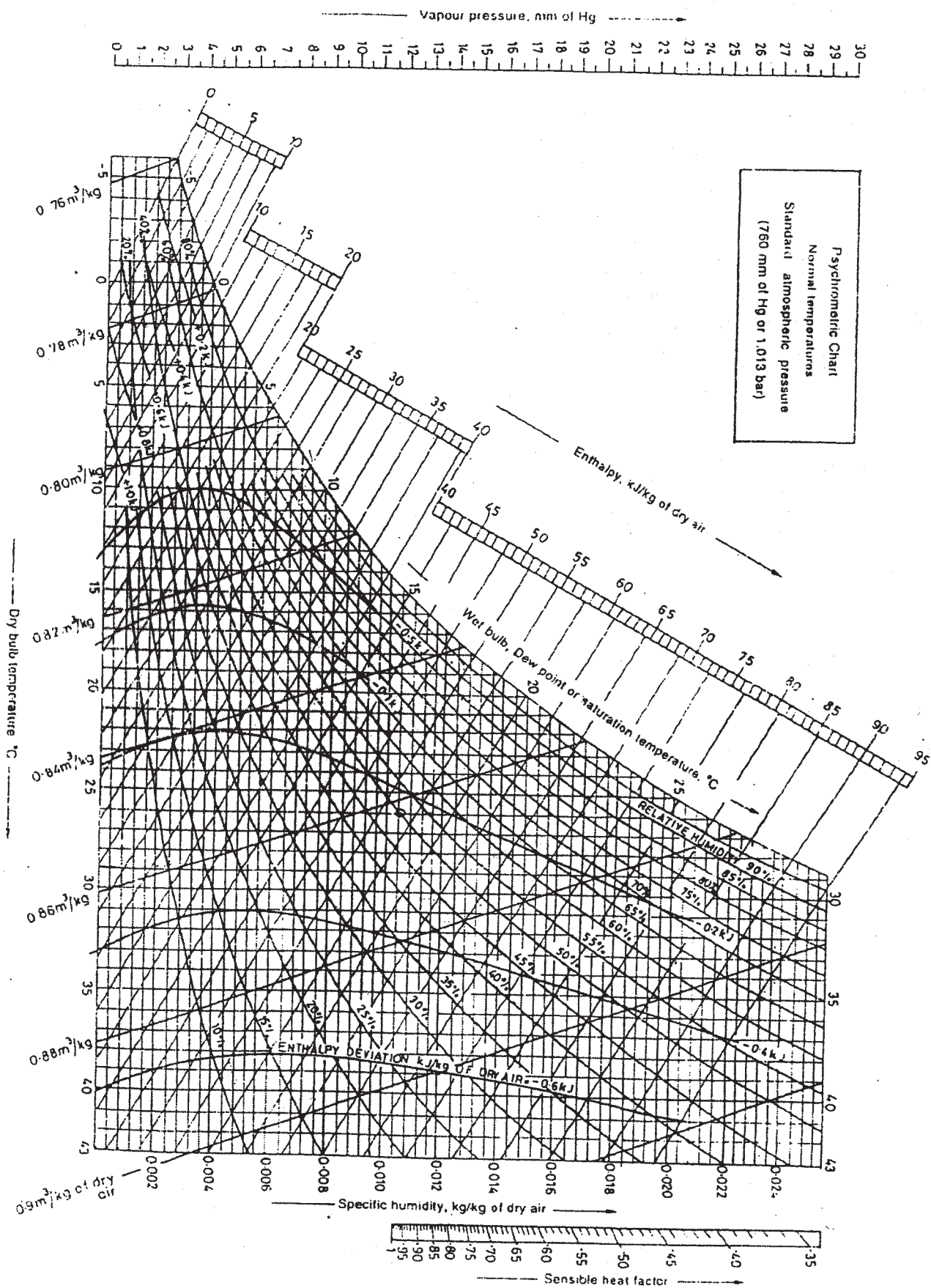
- Q10)a)** What are the desirable properties of an ideal duct material? Name some commonly used duct materials. [6]
- b) Explain the meaning of (i) throw (ii) drop (iii) spread. [6]
- c) What is basic refrigeration control? Explain any one controlling element with a neat sketch. [6]

- Q11)a)** Explain briefly the following
i) Bacteria ii) Molds & iii) Yeast
with reference to the food preservation. [6]
- b) Why do you require to preserve food and vegetable products? [4]
- c) Explain the ideal liquefaction cycle for a gas. [6]

OR

- Q12)a)** What are the limitations of vapour compression systems for the production of low temperature? [6]
- b) Write a short note on cold storage. [6]
- c) Explain various applications of cryogenics. [4]





[4659] - 57

B.E. (Mechanical Sandwich)

b - COMPUTATIONAL FLUID DYNAMICS

(2008 Pattern) (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) *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 and mention it clearly.*

SECTION - I

Q1) a) Consider a 2D infinitesimally small control volume of size dx and dy. With neat diagram show all body and surface forces and derive the momentum equation in differential conservative form. **[10]**

b) Classify and identify the following PDEs **[6]**

i) $\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} = 0$ ii) $\frac{\partial T}{\partial t} = \alpha \frac{\partial^2 T}{\partial x^2}$ iii) $\frac{\partial^2 \phi}{\partial t^2} = a^2 \frac{\partial^2 \phi}{\partial x^2}$

OR

Q2) a) Explain the physical significance of divergence of velocity and Substantial derivative. **[8]**

b) Derive the equation for conservation of mass in differential form for infinitesimally small fluid element fixed in space. **[8]**

Q3) a) Discuss in detail explicit and implicit approaches for obtaining solution in CFD. Also discuss the advantages and disadvantages of these methods over each other. **[10]**

P.T.O.

- b) Solve the system using Runge - Kutta method [6]

$$\frac{dy}{dx} = x + y, \frac{dz}{dx} = x^2 - y^2 \text{ subject to } x_0 = 0, y_0 = 1 \text{ and } z_0 = 0.5 \text{ to find } y \text{ and } z \text{ at } 0.20 \text{ taking } h = 0.20.$$

OR

- Q4)** a) Find the forward difference approximation of $O(\Delta x)$ for $\left(\frac{\partial^4 u}{\partial x^4}\right)$

Using both Taylor's series expansion and Backward difference formula. [10]

- b) Explain : convergence and stability of numerical solution. [6]

- Q5)** a) Explain the followings: [10]

i) Crank Nicolson's scheme

ii) Artificial viscosity

- b) Consider 4×4 tridiagonal matrix. Outline the procedure to solve using Thomas algorithm. Give one example where you will get a tridiagonal matrix. [8]

OR

- Q6)** a) Given function $f(x) = \cos(\pi x)$, find $f'(0.25)$ using FDS and BDS of order $(\Delta x)^2$ and $(\Delta x)^4$. Use step size 0.01 and 0.1. [10]

- b) Discuss the various types of boundary conditions with one example of each. [8]

SECTION - II

- Q7)** Consider the first order wave equation [16]

$$\frac{\partial u}{\partial t} + C \frac{\partial u}{\partial x} = 0$$

Write above equation in discretized form and obtain condition for stability of its numerical solution.

OR

Q8) Develop the solution algorithm for one dimensional transient heat conduction problem using [16]

- a) Implicit scheme and
- b) Explicit scheme

Q9) Consider inviscid Burger equation [16]

$$\frac{\partial u}{\partial t} + \frac{\partial f}{\partial x} = 0$$

Where $f = u^2 / 2$

Compute the solution for this equation for first step using Lax-Webdroff scheme with initial condition

$$u(x, 0) = x^{0.5}, 0 \leq x \leq 1$$

OR

Q10) Write short note on: [16]

- a) Finite volume method
- b) Navier Stokes equations

Q11)a) Write down step by step procedure for SIMPLE algorithm. [12]

- b) List the two types of errors encountered in numerical methods and indicate how the error occurs? [6]

OR

Q12) With suitable example explain CFD methodology by giving steps in a CFD simulation. Discuss the preprocessing, post processing, boundary conditions in detail. [18]



Total No. of Questions : 12]

SEAT No. :

P1062

[4659]-58

[Total No. of Pages : 4

**B.E. (Mechanical - Sandwich)
c -FINITE ELEMENT METHOD**

(2008 Course) (Elective - II) (Semester - I) (402063)

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.*

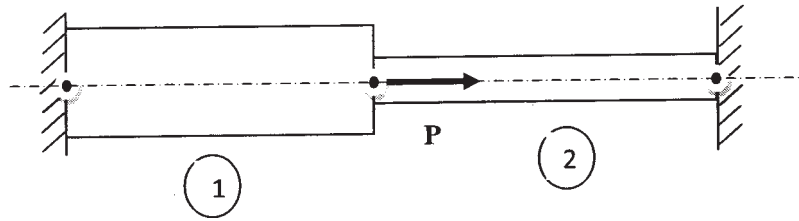
SECTION-I

- Q1)** a) Explain in details difference between Finite Element Method and Finite Difference Method. **[8]**
- b) Explain following terms (any two): **[8]**
- i) Penalty approach
 - ii) Rayleigh-Ritz Method
 - iii) Von-Mises stress

OR

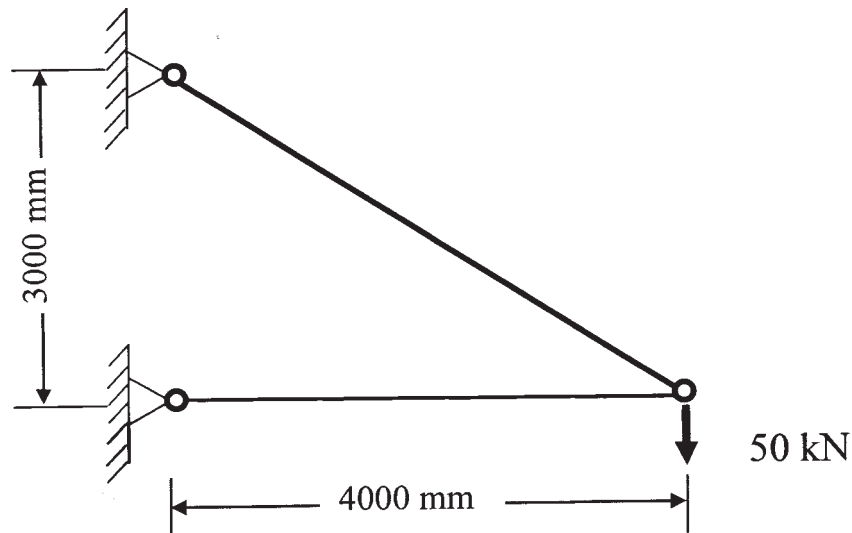
- Q2)** a) Explain the principal of Minimum potential energy used in deriving element stiffness matrix and equations. **[8]**
- b) Write short note on (any two): **[8]**
- i) Stress-strain-temperature relations
 - ii) Plain stress and plain strain problem
 - iii) Elimination approach
- Q3)** a) Discuss characteristics of Global Stiffness Matrix. **[6]**
- b) An axial load $P = 200$ kN is applied as shown in fig. Using penalty approach for handling boundary conditions, determine: **[12]**
- i) Nodal displacements
 - ii) Stresses in each element
 - iii) Reaction forces

P.T.O.



OR

- Q4)** a) Describe in details the concept of Cholesky's decomposition, the banded skyline solutions to solve simultaneous equations. [6]
- b) A two member truss is as shown in fig. the cross sectional area of each member is 200 mm^2 and modulus of elasticity is 210 GPa . Determine the deflection, reactions and stresses in each of the members. [12]



- Q5)** a) Explain the concept of Plane Stress and Plane Strain in Finite Element Method. [8]
- b) Discuss the problem Modeling and Boundary Conditions for the following cases: [8]
- A cylinder of infinite length subjected to external pressure.
 - Belleville spring.

OR

- Q6)** a) Explain the term Quadratic Strain Triangles (QST). [6]
- b) A CST element is defined by nodes at I (30, 40), J (140, 70), and K (80, 140) and the displacements at these nodes are (0.1, 0.5), (0.6, 0.5) and (0.4, 0.3) respectively. Determine the displacement the natural coordinates and the shape function at point P (77, 96) within the element. [10]

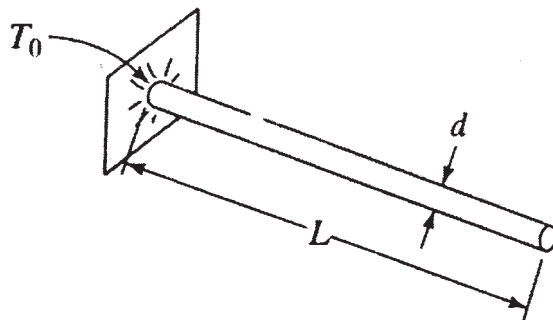
SECTION-II

- Q7)** a) Derive an equation of potential energy for individual beam element. [6]
- b) A beam of length 10 m, fixed at one end and supported by a roller at the other end carries a 20kN concentrated load at the centre of the span. By taking the modulus of elasticity of material as 200 GPa and moment of inertia as $24 \times 10^{-6} \text{ m}^4$, determine: [10]
- i) Deflection under load
 - ii) Shear force and bending moment at mid span
 - iii) Reactions at supports

OR

- Q8)** a) Derive stiffness matrix for beam element. [6]
- b) The beam of 4.5 m length is fixed at each end. A downward force of 12 kN and moment of 10 kN - m (ccw) act at the center of the beam. Let $E = 200 \text{ GPa}$ and $I = 4 \times 10^{-4} \text{ m}^4$ throughout the beam. Determine the displacement and rotation under applied loads. [10]

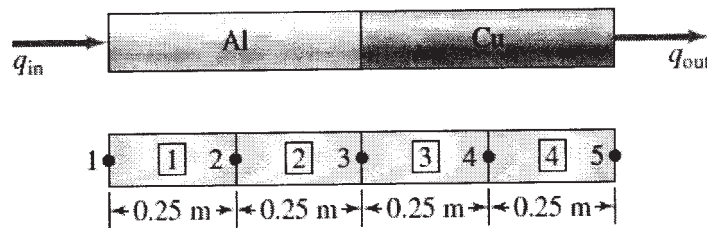
- Q9)** A circular fin of 40 mm diameter (d) is fixed to a base maintained at 50°C (T_0) as shown in fig. the fin is insulated on the surface except end face which is exposed to air at 25°C . The length of the pin is 1000 mm (L), the fin is made of metal with thermal conductivity of 37 W/mK . If the convection heat coefficient with air is $15 \text{ W/m}^2\text{K}$. Find the temperature distribution at 250, 500, 750 and 1000 mm from base. [16]



OR

Q10)a) Write short note on one dimensional heat conduction analysis. [6]

b) The circular rod depicted in Figure 4 has an outside diameter of 60 mm, length of 1 m, and is perfectly insulated on its circumference. The left half of the cylinder is aluminum, for which $k_x = 200 \text{ W/m-}^\circ\text{C}$ and the right half is copper having $k_x = 389 \text{ W/m-}^\circ\text{C}$. The extreme right end of the cylinder is maintained at a temperature of 80°C , while the left end is subjected to a heat input rate 4000 W/m^2 . Using four equal-length elements, determine the steady-state temperature distribution in the cylinder. [10]



Q11)a) Explain the different types of non-linearity encountered in structural analysis. [6]

b) Explain the necessity of crash analysis? What are its advantages and disadvantages. [6]

c) Differentiate between static and dynamic analysis. [6]

OR

Q12) Write short notes on (any three): [18]

- a) FEA packages
- b) NVH analysis
- c) Pre and post processors
- d) Quality checks in meshing
- e) Model analysis

EEE

Total No. of Questions : 12]

SEAT No. :

P1063

[4659]-59

[Total No. of Pages : 3

B.E. (Mech. - Sandwich)

a - AUTOMOBILE ENGINEERING

(2008 Course) (Elective - III) (Semester - I) (402064)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt three questions from Section-I and three from Section-II.*
- 2) *Answers to the two sections must be written in separate answer books.*
- 3) *Figures to the right side of questions indicate full marks.*
- 4) *Use of pocket calculator is permitted.*
- 5) *Draw neat diagrams to support your answers.*

SECTION-I

Q1) a) Explain with sketch (only) the following layouts: **[8]**

- i) Four wheel drive.
- ii) Rear engine and rear wheel drive.

What are the advantages and disadvantages of above layouts?

b) What is chassis? What are the various components of chassis? Explain their functions. **[8]**

OR

Q2) a) Compare the merits and demerits of the frameless construction with those of the conventional framed construction chassis. **[6]**

b) A passenger car travelling at 80.45 km/hr is accelerated up a gradient of 1 in 20. The gross vehicle weight is 11026.4 N. It has a frontal area of 1.858 m² and the air resistance coefficient may be assumed as 0.0167. The rolling resistance is 221.7N. At the above speed, the engine develops 58.88 kW at engine speed of 4000 RPM. Rear axle ratio is 5:1 and transmission efficiency = 95%. **[10]**

Calculate:

- i) The total tractive resistance.
- ii) The tractive effort available at the wheels.
- iii) The acceleration while ascending the above gradient.

P.T.O.

- Q3)** a) Explain construction and working of synchromesh gear box with the help of neat sketch. [8]
- b) Write a short note on: [8]
- i) Propeller shaft
- ii) Rear drive axle

OR

- Q4)** a) Draw labelled diagrams of fluid coupling and torque converter and give out their differences. [8]
- b) Explain characteristics and advantages of diaphragm spring over the coil springs for applications in automobile clutch. [8]
- Q5)** a) Enumerate different types of steering gear mechanisms. Explain working of a recirculating ball type steering gear. [6]
- b) What are requirements of automobile air conditioning system and explain how they are achieved? [6]
- c) Explain following terms in relation to the riding comfort in an automobile: Pitching, Rolling and Bouncing. [6]

OR

- Q6)** a) What are the objectives of suspension system? What are the advantages of independent suspension system? [6]
- b) Explain the following terms with the help of neat sketches only:
Caster, Camber, King pin inclination. [6]
- c) Write a short note on air distribution in air-conditioning system in automobile. [6]

SECTION-II

- Q7)** a) What is the purpose of maintenance in automobile? Explain different types of maintenance required for vehicles? [8]
- b) Write short notes on anti-corrosive additives and anti-freezing solutions. [8]

OR

Q8) a) Name various types of tyres available in market. Explain construction of tubeless tyres with neat diagram. [8]

b) Explain briefly wheel balancing and wheel alignment from maintenance point of view. [8]

Q9) a) What is active and passive safety? Name all devices and explain any two briefly. [8]

b) Explain automotive lighting and light signaling devices. [8]

OR

Q10) Write short note on the following: [16]

a) Ergonomics in automotive safety.

b) Air bags.

c) Safety belts.

d) Day light running lamp.

Q11)a) List the various types of actuators used in electronic control system of vehicle. Explain any two. [10]

b) Explain in detail electronic antilock braking system. [8]

OR

Q12)a) Explain oxygen sensors, cranking sensors, speed sensors and fuel metering sensors in vehicle. [8]

b) Explain with the help of block diagram the electronic engine control system used in automobile. [10]

EEE

Total No. of Questions : 12]

SEAT No. :

P721

[Total No. of Pages : 3

[4659] - 6

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

C : AIR POLLUTION & CONTROL (Elective - I)

(2008 Pattern)

Time : 3 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 books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the role of meteorological parameters in the dispersion of air pollutants in the atmosphere? [9]
- b) Describe with neat sketches how different atmospheric conditions give rise to different kinds of plumes? [9]

OR

- Q2)** a) Explain the terms : [12]
- i) Temperature lapse rate
 - ii) Estimation of plume rise
 - iii) Gaussian diffusion model
 - iv) Zones of atmosphere
- b) A factory uses 2,00,000 litres of furnace oil (Specific density 0.97) per month. If for one million litres of oil used per year the particulate matter emitted is 3.0 tonnes per year, SO₂ emitted is 59.7 tonnes per year, NO₂ emitted is 7.5 tonnes per year, hydrocarbons emitted are 0.37 tonnes per year, calculate the height of the chimney required to be provided for safe dispersion of pollutants. [6]

P.T.O.

- Q3)** a) What are the objective of sampling the atmosphere & how are the sampling stations located for an air pollution survey? [8]
b) List out various methods of sampling & describe any one in detail? [8]

OR

- Q4)** a) Enumerate the various analytical methods available for monitoring air pollution? [6]
b) Describe the following methods of analyzing sample in details : [10]
i) Chemical methods
ii) Continuous recording instrumental methods

- Q5)** a) Explain briefly the various methods of odour control? [10]
b) Explain how the odour intensity is measured? [6]

OR

- Q6)** a) Define & explain indoor air pollution. What adverse effects are caused by indoor air pollution? [8]
b) Write in brief about : [8]
i) Natural & artificial ventilation of building
ii) Air conditioning of building

SECTION - II

- Q7)** a) What are the methods available to control air pollution by process changes? Illustrate with examples? [9]
b) With neat sketch explain the principal, construction & working of cyclone separator? [9]

OR

- Q8)** a) Briefly discuss the recent development in the automobile industry to reduce air pollution? [9]
b) Explain the mechanism of working of scrubbers for particulate removal? [9]

Q9) Explain about :

- a) Air act 1981 (India) [8]
- b) The Environmental protection act 1986 [8]

OR

- Q10)** a) Explain the tangible & intangible economic losses due to air pollution. [8]
b) How air pollution control is done by zoning? What should be the criteria for zoning? [8]

- Q11)** a) Discuss the role of general public in Environmental clearance? [8]
b) Explain the environmental impact of thermal power plants. [8]

OR

- Q12)** a) Explain the environmental impact of water resources projects? [8]
b) Discuss the environmental rules 1999 (sitting of Industries)? [8]



Total No. of Questions : 12]

SEAT No. :

P814

[Total No. of Pages : 7

[4659]-60

B.E. (Mechanical-Sandwich)

b-OPERATIONS RESEARCH

(2008 Pattern) (Semester-I) (Elective-III) (Theory)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All the questions are compulsory.*
- 2) *Two separate answer books are used for Section-I and Section-II.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is permitted.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Distinguish between Slack, Surplus and Artificial variable. **[6]**

b) Solve LPP by Suitable Method **[12]**

Maximize:

$$Z = X_1 - 3X_2 + X_3$$

Subject to:

$$3X_1 - X_2 + 2X_3 \leq 7$$

$$-2X_1 - 4X_2 \leq 12$$

$$-4X_1 + 3X_2 + 8X_3 \leq 10$$

Where, $X_1, X_2, X_3 \geq 0$

OR

Q2) a) Define following terms of Linear Programming: Basic Solution, Feasible Solution and Artificial Variables. **[6]**

b) Two products P_1 and P_2 are to be manufactured by a firm. Profits on P_1 and P_2 are Rs. 30 and 20 respectively. The products are to be processed on two machines, i.e., first on milling machine and other on surface grinder. The capacities and the time required to produce a unit are as follows:

P.T.O.

| | P_1 | P_2 | Capacity |
|-----------------|---------|--------|------------------------|
| Milling machine | 3 hours | 1 hour | 1500man hours/month |
| Surface machine | 1 hour | 1 hour | 1000man hours/month |

How many products of type P_1 and P_2 should be manufactured to get maximum profit (Use simplex method)? [12]

Q3) a) Explain with a suitable example ‘Degeneracy in Transportation Problem’. [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]

| | I | II | III | IV | V | VI | Available |
|----------|----|----|-----|----|----|----|-----------|
| 1 | 2 | 1 | 3 | 3 | 2 | 5 | 50 |
| 2 | 3 | 2 | 2 | 4 | 3 | 4 | 40 |
| 3 | 3 | 5 | 4 | 2 | 4 | 1 | 60 |
| 4 | 4 | 2 | 2 | 1 | 2 | 2 | 30 |
| Required | 30 | 50 | 20 | 40 | 30 | 10 | 180 |

OR

Q4) a) What is unbalanced assignment problem? How is it solved by the Hungarian Method? [6]

b) A company is faced with the problem of assigning six Machines to five different Jobs. The costs estimated in hundreds of rupees are given in the table below. Solve the problem assuming that the objective is to minimize the total cost. [10]

| | | Jobs | | | | |
|----------|---|------|-----|-----|----|-----|
| | | 1 | 2 | 3 | 4 | 5 |
| Machines | 1 | 2.5 | 5 | 1 | 6 | 2 |
| | 2 | 2 | 5 | 1.5 | 7 | 3 |
| | 3 | 3 | 6.5 | 2 | 8 | 3 |
| | 4 | 3.5 | 7 | 2 | 9 | 4.5 |
| | 5 | 4 | 7 | 3 | 9 | 6 |
| | 6 | 6 | 9 | 5 | 10 | 6 |

- Q5) a)** Explain payback period method. [6]
- b) A company requires 16000 units of raw material costing Rs. 2 per unit. The cost of placing an order is Rs. 45 and carrying costs are 10% per year per unit of average inventory. Determine: [10]
- i) The economic order quantity.
 - ii) Cycle time.
 - iii) Total variable cost of managing the inventory.

OR

- Q6) a)** What is Dynamic programming? Explain procedure to solve problem by Dynamic programming. [6]
- b) There are five jobs, each of which must go through machines A, B and C in order ABC. Processing time (in hours) are given in the following table: [10]

| Machines | Jobs | | | | |
|----------|------|----|---|---|----|
| | 1 | 2 | 3 | 4 | 5 |
| A | 8 | 10 | 6 | 7 | 11 |
| B | 5 | 6 | 2 | 3 | 4 |
| C | 4 | 9 | 8 | 6 | 5 |

Determine the optimal sequence of jobs that minimizes the total elapsed time. Also find the idle time for the machines A, B and C.

SECTION-II

- Q7) a)** Explain how the theory of replacement is used in the following situations.
- i) Replacement of items whose maintenance cost varies with time.
 - ii) Replacement of item that completely fail. **[6]**
- b) Two breakfast food manufacturers ABC and XYZ are competition for an increased share. The pay off matrix the following table, describes the increase in market share for ABC and decrease in market share of XYZ. **[10]**

| | | XYZ | | | |
|-----|---------------------------|--------------|----------------|---------------------------|----------------------|
| | | Give Coupons | Decrease Price | Maintain Present Strategy | Increase Advertising |
| ABC | Give Coupons | 2 | -2 | 4 | 1 |
| | Decrease price | 3 | 1 | 12 | 3 |
| | Maintain Present Strategy | -6 | 2 | 0 | 6 |
| | Increase Advertising | 2 | -3 | 7 | 1 |

Determine the optimal for both the manufacturers and the value of game.

OR

- Q8) a)** Explain how principle of dominance is used for simplifying solution of a rectangular game. **[6]**
- b) A company has option of buying one of two computers: ABC and XYZ. ABC costs Rs. 5 lakh and its running and maintenance costs are Rs. 60,000 for each of first five years, increasing by Rs. 20,000 in sixth and every subsequent year. XYZ has the same capacity as that of ABC but costs only 2.5 lakh. However its maintenance and running costs are 1,20,000 for first five years and increases by Rs. 20,000 per year thereafter. If the money is worth 10 percent per year, which computer should be purchased? What are the optimal replacement periods for each computer? Assume that there is no salvage value for either of computers. **[10]**

- Q9)** a) Discuss dynamic programming with suitable examples. Write step by step procedure to solve a general problem by dynamic programming approach. [4]
- b) Write short note on Integer programming. [4]
- c) A road transport company has one reservation clerk on duty at a time. He handles the information of bus schedules and makes reservations. Customers arrive at the rate of 8 per hour and the clerk can arrange, service 12 customers per hour. After stating your assumptions answer the following:
- i) What is the average number of customers waiting for the service?
- ii) What is the average time a customer has to wait before being served?

The manager is contemplating to install a computer system for handling information and reservations. This is expected to reduce the service time from 5 minutes to 3 minutes. The additional cost of having new system is Rs. 50/ day. If the cost of goodwill of having to wait is estimated to be 12 paise per minute spent waiting, before being served, should company install the computer system. Assume an 8 hour working day. [10]

OR

- Q10)**a) What is the concept involved in Gomory's cutting plane method. [4]
- b) Write a short note on various assumptions made in single channel queuing theory. [4]
- c) A plant has a large number of similar machines. The machines breakdown or failure is random and independent. The shift in-charge of the plant collected the data about various machines breakdown time required on hourly basis, and the record for the past 100 observations. This is shown in the table.
- For each hour that one machine is down being, or waiting to be, repaired, the plant loses Rs. 70 by way of lost production. A repairman is paid at Rs. 20 per hour
- i) Simulate his maintenance system for 15 breakdowns.
- ii) How many repairman the company hire for the repair work.

| Time between recorded machine breakdown (hours) | Probability |
|---|-------------|
| 0.5 | 0.05 |
| 1 | 0.06 |
| 1.5 | 0.16 |
| 2 | 0.33 |
| 2.5 | 0.21 |
| 3 | 0.19 |

| Repair time required (Hours) | Probability |
|------------------------------|-------------|
| 1 | 0.28 |
| 2 | 0.52 |
| 3 | 0.20 |

Use the following random numbers

for breakdown time: 61, 85, 16, 46, 88, 08, 82, 56, 22, 49, 44, 33, 77, 87, 54

for repair time: 87, 39, 28, 97, 69, 87, 52, 52, 15, 85, 41, 82, 98, 99, 23

[10]

Q11) Consider the project having following activities and their time estimates: [16]

| Job | A | B | C | D | E | F | G | H | I | J | K | L | M |
|------------------------|---|----|---|------|---|------|------|------|---|------|---|----|---------|
| Optimistic Time | 3 | 4 | 5 | 9 | 4 | 3 | 5 | 1 | 2 | 7 | 4 | 8 | 6 |
| Most likely Time | 4 | 8 | 6 | 15 | 6 | 4 | 6 | 3 | 4 | 8 | 5 | 9 | 7 |
| Pessimistic Time | 5 | 10 | 8 | 10 | 8 | 5 | 8 | 4 | 5 | 10 | 6 | 13 | 8 |
| Immediate Predecessors | – | – | B | A, C | B | D, E | D, E | D, E | G | F, I | G | H | J, K, L |

- Draw the network for the project.
- Compute the expected project completion time.
- What should be the due date to have 0.9 probability of completion. Use $z = 1.29$.

Find the E & L values for all events.

OR
6

Q12)a) Compare CPM and PERT. Under what conditions would you recommend the scheduling by PERT? Justify your answer with reasons. **[4]**

b) An insurance company has decided to modernize and refit one of its branch offices. Some of the existing office elements will be disposed of but remaining will be returned to the branch after the completion of renovation work. Tenders are invited from a number of selected contractors. The contractors would be responsible for all the activities in connection with the renovation work expecting the prior removal of the old equipment and subsequent replacement. The major element of project work has been identified along with its durations and immediately preceding elements.

| Job | A | B | C | D | E | F | G | H | I | J | K | L | M |
|------------------------|----|---|---|---|---|---|---|---|------|----|---------|---|------|
| Time (Weeks) | 14 | 4 | 2 | 1 | 2 | 3 | 2 | 4 | 3 | 12 | 4 | 2 | 2 |
| Immediate Predecessors | – | A | B | C | A | E | E | E | H, L | K | D, F, G | J | H, L |

- i) Draw the network showing interrelationship between activities of project.
- ii) Calculate minimum time required for project completion.
- iii) Locate the critical path. **[12]**



Total No. of Questions : 12]

SEAT No. :

P815

[Total No. of Pages : 2

[4659]-61

B.E. (Mechanical-Sandwich)

c-ROBOTICS

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

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 side indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of non-programmable electronic calculator is allowed.*

SECTION-I

- Q1)** a) What is the shape of workspace in each of the following configurations.
i) Post type, ii) Polar, iii) Gantry robot, iv) Joint arm. [8]
b) Explain socio-economic aspects of robotisation. [8]

OR

- Q2)** a) Explain various generations of robots in brief. Also state the generation to which today's industrial robot belongs. [8]
b) Sketch and explain the motions of 3 DOF wrist can perform. [8]

- Q3)** a) A vacuum gripper is used to lift flat steel plates 8mm x 650mm x 950mm. The gripper uses two suction cups, 140mm in diameter each and they are located 500mm apart for stability. Assume a factor of safety of 1.8 to allow for acceleration of the plate. Determine the negative pressure required to lift the plates if the density of the steel is 8.0543×10^{-6} kg/mm³. [8]
b) Explain following types of proximity sensors
i) Capacitive sensors ii) Ultrasonic sensors. [8]

OR

- Q4)** a) Explain remote center compliance device. [8]
b) Write a note on: [8]
i) Criteria of gripper design.
ii) Rules for gripper design.

P.T.O.

- Q5)** a) Discuss advantages, disadvantages and characteristics of stepper motors. [9]
b) Explain control law partitioning for second order system. [9]

OR

- Q6)** a) A rotary arm of a manipulator is to rotate from 23° to 117° in 9 seconds. Determine coefficients of cubic polynomial to interpolate the smooth trajectory. Plot the position velocity and acceleration variation against time. [10]
b) Discuss geometric problems with Cartesian path. [8]

SECTION-II

- Q7)** a) Write short notes on:
i) Kinematic Redundancy ii) D-H parameters. [12]
b) Describe the concept of acceleration of rigid body. [6]

OR

- Q8)** a) Explain with suitable sketch, the different between forward and inverse kinematics. [12]
b) Explain with suitable example, the concept of Newton-Euler's dynamic formulation. [6]

- Q9)** a) What are the different considerations in the efficient transmission systems? [8]
b) Write short notes on Image Processing Techniques. [8]

OR

- Q10)** a) Explain the concept of solid modeling for robot using simulation. [8]
b) What is need of vision system in robot? Classify the robotic vision system. [8]

- Q11)** a) Explain and compare the different method of robot programming. [8]
b) State and explain in brief, the different robot languages. [8]

OR

- Q12)** a) Write short notes on 'Artificial Intelligence'. [8]
b) Write short notes on Future of Industrial robots. [8]



Total No. of Questions : 12]

SEAT No. :

P816

[4659]-62

[Total No. of Pages : 4

B.E. (Mechanical) (Sandwich)
a-COSTING AND COST CONTROL
(2008 Pattern) (Semester-II) (Elective-IV)

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

SECTION-I

- Q1)** a) Define cost and explain how the costs are classified. [8]
b) State objective and importance of 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 | 1,000 |
| Direct wages | 50,000 | Telephone charges | 250 |
| Direct Expenses | 10,000 | Postage & telegrams | 500 |
| Electric power | 1,000 | Travelling expense | 1,000 |
| Wages of foreman | 5,000 | Salesmen's salary | 2,500 |
| Lighting factory | 3,000 | Repairs & renewal | 7,000 |
| Office | 1,000 | Office premises | 1,000 |
| Store keeper's wages | 2,000 | Carriage outward | 750 |
| Oil & water | 1,000 | Transfer to reserves | 1,000 |
| Rent: | | | |
| factory | 10,000 | Discount on shares | 1,000 |
| Office | 5,000 | written off | |
| | | 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 |
| Manager salary | 10,000 | Dividend | 4,000 |
| | | Directors fees | 2,500 |

P.T.O.

b) State & explain limitations of financial accounting. [8]

Q3) a) Explain different methods of costing used in Manufacturing Industries. [8]

b) What do you understand by direct expenses? What are their characteristics. [8]

OR

Q4) a) State the meaning and scope of cost accounting. With an example. Explain. [8]

b) Define and explain in details of the following with suitable examples: [8]

i) Manufacturing overheads.

ii) Indirect labour cost.

iii) Sales and distribution overhead.

Q5) a) What do you understand by classification, allocation and apportionment in relation to overhead expenses? [10]

b) State the method of allocation of administration overhead to cost centers or products. [8]

OR

Q6) A company has three production departments (M_1 , M_2 , A_1) and three service departments. One of which Engineering services department, servicing the M_1 & M_2 only. The relevant information is as follows: [18]

| Production Department | Product X | Product Y |
|-----------------------|----------------|------------------------|
| M_1 | 10 Machine hrs | 6 Machine hrs |
| M_2 | 4 Machine hrs | 14 Machine hrs |
| A_1 | 14 Machine hrs | 18 Direct Labour hours |

The annual budgeted over head cost for the year are

| Production Department | Indirect wages Rs. | Consumable supplier Rs. |
|-----------------------|--------------------|-------------------------|
| M_1 | 46,520 | 12,600 |
| M_2 | 41,340 | 18,200 |
| A_1 | 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.) = | 7,20,019 |
| 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 dept. Is located in a building owned by the company).
It is valued at Rs. 6,000 and is charged into cost at national value of 8% per annum. This cost is additional to the rent shown above. The value issues of materials to the production dept. are in the same proportion as shown above for the consumable supplies.

| Department | Book value Machinery (Rs.) | Area (sq.ft) | Effective H.O Hours | Production Direct labour hours | Capacity Machine hours |
|---------------------|----------------------------|--------------|---------------------|--------------------------------|------------------------|
| M ₁ | 1,20,000 | 5,000 | 50 | 2,00,000 | 40,000 |
| M ₂ | 90,000 | 6,000 | 30 | 1,50,000 | 50,000 |
| A ₁ | 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 | — | | |

- Prepare a overhead analysis sheet, showing the bases of apportionment of overhead to departments.
- Allocate service department overhead to production dept. ignoring the apportionment of service dept. coast among service depts.
- Calculate suitable overhead absorption rate for the productions.
- Calculate the overheads to be absorbed by two products, X and Y.

SECTION-II

- Q7)** a) Discuss the distinguishing features of process cost system. [9]
b) What are the methods of apportioning joint costs? Explain any one brief. [9]

OR

- Q8)** a) What is by-product and how is it different from joint product? [18]
b) What are the various methods of accounting for by-product? Explain each of the methods.

- Q9)** a) State the limitations of breakeven analysis. [8]
b) A company produces a single article and sells it at Rs. 10 each. The marginal cost production is Rs. 6 each & total fixed cost of the concern in Rs. 400/annum. [8]
i) Calculate increase in selling price if BEP down to 80 units &
ii) Margin of safety at sale of @ Rs. 1,500.

OR

- Q10)**a) Explain the concept of contribution & contribution to sales ratio in marginal costing. [8]
b) Difference between Adsorption Costing & marginal costing. [8]

- Q11)**a) State the basis of standard costing. [8]
b) State the need for standard costs. [8]

OR

- Q12)** Write a short note (Any Two): [16]
i) Activity Based Costing.
ii) Techniques of marginal costing.
iii) Basis of standard costing.



Total No. of Questions : 12]

SEAT No. :

P817

[Total No. of Pages : 2

[4659]-65

B.E. (Electrical)

PLC AND SCADA APPLICATION

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

SECTION-I

- Q1)** a) Write various advantages and disadvantages of PLC. [10]
b) Write a short note on Power supplies used in PLC. [8]

OR

- Q2)** a) Explain in detail block diagram of PLC. [9]
b) What are Input and output module of PLC system? [9]

- Q3)** a) Explain Up counter and Down counter along with their timing diagrams. [8]
b) Develop the ladder diagram for traffic light controller. Switch I1 is used to start and I2 is used to stop the cycle. There will be three lamps Red, Yellow and Green lamps as output. [8]

OR

- Q4)** a) Explain Output Analog devices. [8]
b) Explain ON/OFF Output devices. [8]

- Q5)** a) Explain the effect of varying only Ki and Kd of PID controller on the output. [8]
b) Explain 'Adjust and observe' method of PID tuning. [8]

OR

- Q6)** a) Explain V/F control of an ac motor. [8]
b) Write a short note on AC motor overload protection. [8]

P.T.O.

SECTION-II

- Q7)** a) Define SCADA. [2]
b) Draw block diagram of SCADA and explain in detail. [8]
c) Define and explain SCADA server. [6]

OR

- Q8)** a) What are SCADA system desirable properties? [8]
b) State advantages and disadvantages of SCADA system. [8]

- Q9)** a) Explain operation and control between various control centers of power system. [8]
b) Explain with block diagram use of SCADA in chemical plant. [8]

OR

- Q10)** a) Draw and explain SCADA in Automation substation control. [8]
b) Explain with block diagram use of SCADA in petroleum refining process. [8]

- Q11)** a) Explain seven layers of OSI model and their functions. [9]
b) Draw and explain DNP3 protocol. [9]

OR

- Q12)** a) Explain the communication architectures of the Profibus versions. [9]
b) Explain Flexible Function Block process (FFB). [9]



Total No. of Questions :12]

SEAT No. :

[Total No. of Pages :4

P819

[4659] - 67

**B. E (Electrical)
CONTROL SYSTEM-II
(2008 Pattern) (Sem.-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) *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.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain with neat block diagram following types of compensation. [9]

- i) Series compensation
- ii) Feed back compensation
- iii) Load compensation

b) Design a log compensating network for [9]

$$G(S) = \frac{K}{S(S+2)(S+20)}$$

with given specifications

$$K_V = 20 \text{ sec}^{-1} \quad P.M >_1 35^\circ$$

Take margin of safty for PM 5°

OR

P.T.O.

Q2) a) Explain design procedure for phase lead compensation and its effect on overall performance of the system. Also give limitations of phase lead compensation. [9]

b) The open loop transfer function of a unity feed back is $G(S) = \frac{5K}{S(S+5)}$

It is required that $K_v=20$ and $PM=44^\circ$ Design compensating network if system does not satisfy the required specification. Take margin of safety for $PM 4^\circ$ [9]

Q3) a) Explain the concept of diagonalization and discuss how this is achieved [8]

b) The system equations are given by matrices

$$A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \quad B = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \quad C = [1 \ 0] \quad [8]$$

Find transfer function of the system

OR

Q4) a) Derive solution of nonhomogeneous state equation. [8]

b) Compute the STM when $A = \begin{bmatrix} -1 & 1 \\ 0 & -2 \end{bmatrix}$ [8]

Q5) a) Define controllability and observability of the system. Also explain controllability and observability matrices by Kalman's test [8]

b) The closed loop poles are to be located at $S=-2, S=-1$ Design state variable feed back when given that [8]

$$A = \begin{bmatrix} 0 & 1 \\ -2 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \quad C = [1 \ 0]$$

OR

- Q6)** a) Explain pole placement design by state feed back. [8]
 b) Consider the following system.

$$\mathbf{X} = \begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} U(+)$$
 [8]

$$Y(+)= [0 \ 1] \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$$

Test controllability and observability of the system.

SECTION-II

- Q7)** a) Explain design specifications in Time domain and Frequency domain. [8]
 b) Derive an expression of k_d and K_p to design Cascade PID controller in Frequency domain. [8]

OR

- Q8)** a) Explain P,PI and PID control mode with their characteristics. [8]
 b) Consider a unity feedback system with open loop transfer function,

$$G(S) = \frac{5}{S(S+0.5)(S+1)}$$

Design a PD controller so that the phase margin of system is 30° at frequency of 1.2 rad/sec. [8]

- Q9)** a) Give comparison between linear and non-linear control system. [8]
 b) With proper diagrams derive describing function of relay with dead zone. Also state clearly the assumptions made. [8]

OR

Q10) a) Discuss the peculiarities of non-linear systems which can not be explained on the basis of linear theory. [8]

b) In a unity feedback system on ideal relay with out put ± 1 unit is connected in cascade with $G(S) = \frac{50}{S(S+1)(S+2)}$ Determine amplitude and frequency of limit cycle if it exists. [8]

Q11) a) Discuss the different types of singular points that occur in the phase plane trajectories. [9]

b) Explain the procedure to draw phase plant trajectories by Delta Method. [9]

OR

Q12) a) Explain terms: [6]

i) Stability

ii) Asymptotic Stability and

iii) Instability

b) Describe Krosovskil Method of Constructing Lyapunov function for non linear systems. [6]

c) Using sylvester's Criterion, show that following quadratic form is positive definite. [6]

$$V(x) = 8X_1^2 + X_2^2 + 4X_3^2 + 2X_1X_2 - 4X_1X_3 - 2X_2X_3$$

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Total No. of Questions : 12]

SEAT No. :

P1064

[4659]-68

[Total No. of Pages : 3

B.E. (Electrical)

a : ROBOTICS AND AUTOMATION

(2008 Course) (Elective - I) (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) *Your answers will be valued as a whole.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables in allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION-I

- Q1) a)** Compare fixed, flexible and programmable automation. **[8]**
- b) Explain laws of Robotics. **[8]**

OR

- Q2) a)** Explain different methods for rotary to linear motion conversion. **[8]**
- b) Explain the following terms: **[8]**
- i) Spatial resolution
 - ii) Compliance
 - iii) Work Envelope
 - iv) Roll, Yaw & Pitch

- Q3) a)** With the help of a neat diagram, explain following types of robots: **[8]**
- i) Cartesian Robot
 - ii) SCARA Robot
- b) Explain different types of grippers used in robot manipulator. **[8]**

OR

P.T.O.

Q4) a) Explain different types of electrical drives used in robots with their comparative analysis. [8]

b) Explain selection criteria of actuators for robot design. [8]

Q5) a) Explain the concept of homogeneous transformation matrix. [10]

b) A point P in space is defined as $P = [2 \ 3 \ 1]$ relative to frame B which is coincident with frame A. Apply the following transformations to frame B and hence find coordinates of point P with respect to frame A. [8]

i) Rotate 30° about Z-axis.

ii) Translate (2) units along new X-axis and (-3) units along new Y-axis.

iii) Rotate 60° about new X-Axis.

OR

Q6) a) Explain the concept of hand matrix with the effect of pre and post multiplication of a hand matrix by basic homogeneous matrix. [9]

b) Explain different Euler angle systems used in Robotics. [9]

SECTION-II

Q7) a) Explain rules for establishing coordinate frames at different joints for D-H representation. [8]

b) The link parameter table of a θ - R manipulator, working in a horizontal plane with its θ - axis parallel to the plane of paper, is given as - [10]

| Joint | θ | d | a | α |
|-------|------------|-------|---|------------|
| 1 | θ_1 | d_1 | 0 | 90° |
| 2 | 0 | R | 0 | 0 |

θ_1 - Rotary joint variable

R - Prismatic joint variable

i) Draw the diagram showing link coordinate system and robot manipulator.

ii) Derive hand matrix of the manipulator.

OR

- Q8) a)** Explain following methods for solution of inverse kinematics- [10]
 i) Geometric Method.
 ii) Direct Method.
- b) Draw a neat diagram of 'PUMA Robot' explaining the degrees of freedom. Also show all the coordinate frames attached to the robot. [8]

- Q9) a)** Explain Lagrangian analysis for deriving dynamic equations for a single revolute joint. [8]
- b) Explain manipulator Jacobean, inverse Jacobean and singularities in Jacobean analysis. [8]

OR

- Q10)a)** Explain the method of Resolved Motion Position Control (RMPC) for robot motion. [10]
- b) Find the effect of a differential rotation of 0.05 radians about X-axis followed by a differential translation of [0.2 0.1 0] on a frame [6]

$$T = \begin{bmatrix} 0 & 0 & 1 & 5 \\ 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

- Q11)a)** Write a note on - [8]
 i) Teach Pendant
 ii) Online and Offline Programming
- b) Explain how a robot can be used for part sorting application. [8]

OR

- Q12)a)** Write a note on robot specific languages. [8]
- b) Explain 'Spray Painting Robot' with details of selection criteria, selection of drives and actuators, methods of control and peripheral devices used. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P1065

[4659]-69

[Total No. of Pages : 3

B.E. (Electrical)

b - POWER QUALITY

(2008 Course) (Elective - I) (Semester - I) (403143)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Define and explain various power quality terms as per IEEE standard 1159. **[10]**
- b) Explain in detail EMC, immunity and emission in connection with power quality. **[8]**

OR

- Q2)** a) What is grounding? With suitable diagram explain how power quality can be improved by effective grounding system. **[10]**
- b) Explain why power quality problems are becoming very important in today's context. **[8]**
- Q3)** a) Explain and derive complex power relation and factors governing RMS voltage variations and voltage regulation of line. **[8]**
- b) Define voltage flicker and explain various voltage flicker mitigation methods. **[8]**

OR

- Q4)** a) Differentiate between voltage sags and voltage swells as per IEEE 1159 standard. Also explain effect of voltage imbalance. **[8]**
- b) Explain impact of reactive power management on RMS voltage variation and different techniques used for reactive power management. **[8]**

P.T.O.

- Q5)** a) Explain voltage sag characteristics such as magnitude, phase angle jump, point on wave initiation and point on wave recovery. [8]
- b) Explain area of vulnerability and critical distance and procedure to determine area of vulnerability. [8]

OR

- Q6)** a) Explain in detail the procedure for assessment of sensitivity of various equipments to voltage sags. [8]
- b) Explain influence of fault location and fault level on voltage sags. [8]

SECTION-II

- Q7)** a) Define harmonics, inter harmonics. Explain effects of harmonics on power system equipment's. [10]
- b) Explain series and parallel resonances. [8]

OR

- Q8)** a) Explain harmonic study procedure and computer tools for harmonic analysis as per IEEE 519-1992. [10]
- b) Explain various harmonics mitigation methods. [8]

- Q9)** a) Explain the following terms concerned with transient overvoltage. [8]
- i) Capacitor switching
- ii) Ferroresonance
- b) Explain the basic principles of overvoltage protection. Enlist devices used for overvoltage protection. [8]

OR

- Q10)** a) Explain impulsive transients due to lightning. [8]
- b) What are transients? Explain transient velocity, surge impedance and the effect of line terminations. [8]

- Q11)a)** Explain selection procedure of transducers for power quality monitoring. [8]
- b) Explain need of power quality monitoring. What is reactive and proactive approach? [8]

OR

- Q12)a)** Explain the procedure of connection of power quality monitor, monitoring locations and its time period. [8]
- b) Explain use of various equipment's required for power quality monitoring. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P1051

[Total No. of Pages : 2

[4659]-7

B.E. (Civil)

d-ARCHITECTURE AND TOWN PLANNING

(2008 Course) (401004) (Elective-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Use separate answer sheets for Section-I and Section-II.*
- 2) *Assume suitable data if necessary.*
- 3) *Solve 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. 12 from Section-II.*

SECTION-I

- Q1)** a) Why it is essential to adopt an integrated approach of planning? Explain the same while dealing with an area about 5000 sq ft and while dealing with 500 Ha. [9]
- b) Enlist different garden styles and explain any two considering following points: layout, pathways, water body locations, soft materials and hard materials, aesthetics, example. [8]

OR

- Q2)** a) Explain in detail different elements of design and mention the effectivity of the same on architectural composition giving suitable examples. [9]
- b) Explain the differences in water body creation and conservation and its importance in today's context. [8]
- Q3)** a) Explain the concept: enriching the spaces as per functional needs within an area to be developed in relation with different byelaws. [9]
- b) Explain the differences between URBAN DESIGN & URBAN RENEWAL with appropriate examples. [8]

OR

- Q4)** a) Explain the necessity of Built environment in urban areas. [8]
- b) Enlist the parameters on which Quality of Life is based and establish the relation of the same with Urban Renewal proposal. [9]

P.T.O.

- Q5) a)** Enlist different components of a building and mention the sustainable material used for individual component and the advantages of the same. [8]
- b) What aspects contribute for designating a building as a “Green Building”? [8]

OR

- Q6) a)** Enlist different sustainable technologies and explain the advantages and usage of sustainable technologies. [8]
- b) Write a short note on any “Green build case study”. [8]

SECTION-II

- Q7) a)** Explain about the contribution of different town planners for deciding different levels of development. [9]
- b) Write short notes on: town planning schemes and garden city with appropriate examples. [8]

OR

- Q8) a)** Explain the concept in detail which makes TPS sustainable. Elaborate the same by drawing an appropriate sketch. [9]
- b) Explain the concept new towns; giving suitable example. [8]

- Q9) a)** Explain various levels of Planning and which is the common thread between them as regards execution is concerned. [9]
- b) Explain various junctions in road network and elaborate importance of traffic management. [8]

OR

- Q10)a)** Elaborate different types of surveys and the importance of the same while finalizing DP Proposal when you are working as a planner. [9]
- b) Explain in detail the ‘functions of an Arbitrator and Tribunal’ during execution process under MRTTP Act, 1966. [8]
- Q11)a)** Write a short note on: SEZ, giving its status in India. [8]
- b) Elaborate applicability of modern tools for i) Land Use Analysis ii) Traffic management. [8]

OR

- Q12)a)** Write short notes on i) LAA ii) MHADA. [8]
- b) Elaborate applicability of modern tools for i) disaster management b) traffic regulation. [8]

Total No. of Questions :12]

SEAT No. :

P820

[Total No. of Pages :3

[4659] - 70

B.E. (Electrical)

**c- ILLUMINATION ENGINEERING
(Elective-I)(2008 Pattern) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 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) How quantification of light is made? Elaborate your answer with suitable diagram. [9]
- b) Explain- Production of light and physics of generation of light. [9]

OR

- Q2)** a) Define: [9]
- i) MHCP
 - ii) Illumination
 - iii) Depreciation factor
 - iv) Plane angle and solid angle.
- Derive the relationship between them.
- b) Explain the laws of illumination. Also deduce the relation to find illumination at any point on the surface due to light source suspended at height 'h' from the plane surface. [9]

- Q3)** a) Explain the operating characteristics of Gaseous discharge lamps. [8]
- b) Write a short note on stroboscopic effect of fluorescent lamps. [8]

OR

P.T.O.

- Q4)** a) What are the different materials used in manufacturing of lamps? Explain any four materials in brief. [8]
b) Explain Metal Halide Lamp in detail. [8]

- Q5)** a) Define luminaire as per IEC. What are the different design factors for the luminaire? [8]
b) State different accessories of control gear circuit for gaseous discharge lamps. Explain ignitors in detail. [8]

OR

- Q6)** a) State and explain different phenomena used for optical control. [8]
b) Classify the light fittings according to the way the light reaches the object. [8]

SECTION-II

- Q7)** a) Elaborate the steps involved in design of illumination scheme for indoor installation Hospital. [8]
b) What is glare? Explain in detail about the types of glare and remedies to reduce the effect of glare. [8]

OR

- Q8)** a) Explain the various factors to be considered while designing lighting of a place. [8]
b) Explain Zonal Cavity Method for indoor lighting design. [8]

- Q9)** a) What are the objectives of road lighting? Give the details of road lighting code in India. [8]
b) Elaborate the various arrangements of luminaires for straight roads. [8]

OR

- Q10)** a) Define: [8]
- | | |
|-----------------------------|------------------------|
| i) Light Output Ratio (LOR) | ii) Utilisation factor |
| iii) Tilt angle | iv) Overall Uniformity |
| v) Throw | vi) Spread |
| vii) Control | viii) Surround Ratio |

- b) Explain flood lighting wrt the types of projectors and the location of projectors. [8]

Q11) Write short note on: [18]

- a) Day lighting.
b) Emergency lighting.

OR

Q12) a) Explain photovoltaic lighting with suitable diagram. [9]

b) Write a short note on Optical Fibre. [9]



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :4

P1194

[4659] - 71

B.E. (Electrical)

d : PROJECT MANAGEMENT

(2008 Course) (403143) (Elective - I) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q 1 or Q 2, Q 3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q 10, Q 11 or Q 12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary.*

- Q1) a)** Explain Project life cycle and draw a well labeled diagram. State its phases. **[8]**
- b) Define project Management. Explain its characteristics and importance. **[9]**

OR

- Q2) a)** Explain various characteristics of project management. How is project appraisal carried out? **[8]**
- b) What is the need for Project management? Explain various phases of Project life cycle. **[9]**

- Q3)** Project is faced with evaluation of two alternatives A and B. The company cost of capital is 10%. Use Net present value, profitability index and payback period methods to arrive at a suitable decision. **[16]**

| Immediate cash out flows (in Rs. lacs) | | cash inflows (in Rs. lacs) at the end of | | | | |
|---|----|---|------|-------|------|-----|
| | | Iyr | IIyr | IIIyr | IVyr | Vyr |
| Project A | 30 | - | 10 | 20 | 14 | 14 |
| Project B | 45 | 10 | 15 | 15 | 17 | 15 |

OR

P.T.O.

Q4) a) What is the importance of Project selection? Explain the probable causes of project failure. [8]

b) What costs are associated with a project and how are they estimated? How will you carry out the financial evaluation of a project? [8]

Q5) a) Explain PERT and CPM. What is the significance of critical path? Explain the concept of crashing. [8]

b) Write short notes on: [8]

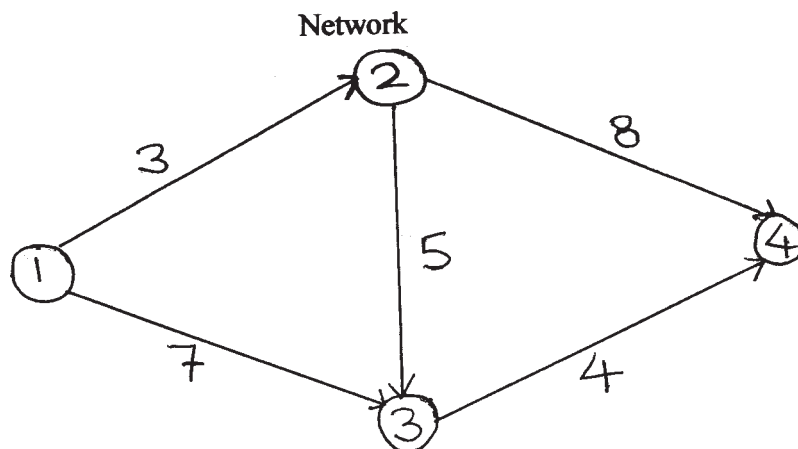
i) GERT

ii) Resource allocation

OR

Q6) The following data pertains to the network given below. It is desired to compress the project to the least possible duration day by day and estimate the extra cost. [16]

| i-j | Normal Time (days) | Crash Time (days) | Cost slope (Rs. per day) |
|-----|-----------------------|----------------------|-----------------------------|
| 1-2 | 3 | 2 | 500 |
| 1-3 | 7 | 4 | 200 |
| 2-3 | 5 | 3 | 100 |
| 2-4 | 8 | 6 | 200 |
| 3-4 | 4 | 2 | 300 |



- Q7) a)** What are the probable factors for cost escalation? How to take care of them in planning stage? [8]
- b) What is the importance of a budget? What are the elements to be considered for making a budget? Describe the advantages of budgetary control. [9]

OR

- Q8) a)** What are different cost factors? Define direct cost, indirect cost & prime cost. [9]
- b) Write short notes on:
- i) Budgetary control
- ii) Factors of cost escalation. [8]

- Q9) a)** Name the factors which are important in international project management and how to control them? [9]
- b) Explain in detail quality planning, assurance and control. [8]

OR

- Q10)a)** Explain short notes on:
- i) International project Management
- ii) Quality of procured items [9]
- b) What are the different methods for maintaining the quality of procured items? Describe the detail. [8]

- Q11)a)** The expected cash inflows from a project and their probability are as under. [9]

| Expected cash inflow (Rs.) | Probability |
|----------------------------|-------------|
| 20,000 | 0.30 |
| 30,000 | 0.40 |
| 40,000 | 0.10 |
| 10,000 | 0.20 |

The cash inflow acceptable for the project sponsor is Rs. 30,000. What is the certainty equivalent coefficient?

- b) The expected cash inflows of a project are estimated as under. [8]

| Year | Cash inflow(Rs.) |
|------|------------------|
| 1 | 1,50,000 |
| 2 | 2,50,000 |
| 3 | 3,50,000 |
| 4 | 2,50,000 |
| 5 | 2,00,000 |

The initial investment required for the project is Rs. 6,50,000/-. The risk adjusted discount rate is 10%. Evaluate as to whether the project proposal is worthwhile.

OR

- Q12)a)** Write short notes on: [8]

- i) Computer Aided Project Management.
- ii) Portfolio risks

- b) Write short notes on: [9]

- i) Diversible and Non-diversible risks.
- ii) Capital Asset pricing model.



Total No. of Questions :12]

SEAT No. :

P821

[Total No. of Pages :2

[4659] - 72

B.E. (Electrical)

RESTRUCTURING & DEREGULATION

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

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 questions from Section I and Q.7 or Q.8 & Q.9 or Q.10 & Q.11 or Q.12 questions from Section II.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 6) Assume suitable data, if necessary.

SECTION-I

- Q1)** a) Explain the objectives of “Electricity Act 2003”. Also explain the guidelines under this act. [8]
- b) Explain the structure and working of Indian Energy Exchange (IEX). [8]

OR

- Q2)** a) Explain the functions of following institutions: [8]
- i) PFC
 - ii) Ministry of Power
- b) Why the reformation has taken place in electrical power system. [8]

- Q3)** a) Explain different methods to assess the financial feasibility of any project. [8]
- b) Explain average, marginal and avoided cost. [8]

OR

- Q4)** a) Explain following basic concepts of power sector economics: [12]
- i) Life cycle cost.
 - ii) Net present Value.
 - iii) Variable cost.
 - iv) Profitability Indices.
- b) Explain O and M expenses [4]

P.T.O.

- Q5)** a) Explain role of regulation and evolution of regulatory commissions in India. [10]
b) What are the regulation externalities. [8]

OR

- Q6)** With respect to the regulatory process in India explain: [18]
a) Composition of R.C.
b) Authority.
c) Decision Making Process.

SECTION-II

- Q7)** a) Explain electricity reforms in Latin America and China. [8]
b) Write a short note on the following trading models based on industrial structure. [8]
i) Pool and bilateral trades.
ii) Multi lateral trades.

OR

- Q8)** Explain in brief following structural models. [16]
a) Monopoly.
b) Single Buyer.
c) Wholesale competition
d) Retail competition

- Q9)** Write a short note of following models of trading. [18]
a) Integrated
b) Wheeling
c) Decentralized

OR

- Q10)** a) What are the impact of market reform on regulation and externalities. [8]
b) Explain in detail Retail competition. [10]

- Q11)** a) Explain how with the implementation of Availability based tariff the grid operation is improved in Indian power sector. [8]
b) Explain the key features of Indian Grid Code and also explain transmission congestion issues. [8]

OR

- Q12)** a) Explain the necessity of transmission planning with reference to market structure. [8]
b) Explain the working of Independent System Operator {ISO} and Load Dispatch Center (LDC). [8]

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Total No. of Questions : 12]

SEAT No. :

P1066

[4659]-73

[Total No. of Pages : 3

B.E. (Electrical)

b: EMBEDDED SYSTEM

(2008 Course) (Elective - II) (Semester - I) (403144)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any three questions from Section-I and three from Section-II.*
- 2) *Figures to the right indicate full marks.*

SECTION-I

Q1) a) What is an Embedded System? Explain challenges faced in embedded system. What are different categories of embedded system? Give example of each category. **[8]**

b) Explain RISC and CISC processor with examples and explain the characteristics and features of ARM7 processor. **[8]**

OR

Q2) a) What is digital signal processing processor, its application and architecture of any DSP processor family with block diagram? **[8]**

b) Differentiate General purpose operating system and Embedded systems. Explain Design process in Embedded system with waterfall model. **[8]**

Q3) a) Explain types of ADC, its microprocessor interfacing with diagram. **[6]**

b) Explain strain gauge and their interfacing with micro controller through ADC. **[6]**

c) Explain motion sensor. **[6]**

OR

Q4) a) Explain interfacing of 4 x 4 matrix keypad to microcontroller with diagram. **[6]**

b) Explain interfacing of switches to the microcontroller. **[6]**

c) Explain working of Temperature sensor with diagram. **[6]**

P.T.O.

- Q5)** a) Define solenoids and relays. Explain relay control and clamping. [8]
b) Explain BLDC motor and its driving. [8]

OR

- Q6)** a) Explain stepper motors and its bipolar versus unipolar operation of stepper motors. [8]
b) Explain the LED with constant - current drive. [8]

SECTION-II

- Q7)** a) Explain in detail following scheduling algorithms [8]
i) First in first out
ii) Round robin
iii) Round robin with priority
iv) Shortest job first
b) What is semaphores & explain in detail different types of semaphores. [6]
c) What is ISR? And it's interrupt latency? [4]

OR

- Q8)** a) Explain Difference between process, tasks and threads with example. [8]
b) What is device driver and explain device drivers for embedded devices. [6]
c) What is difference between mailbox and message queues? What is application of each? [4]
- Q9)** a) What is kernel? Explain architecture of kernel. [8]
b) Explain Real time operating system services. Explain types of RTOS. [8]

OR

- Q10)**a) Explain memory management functions of RTOS. [4]
- b) When is an RTOS necessary and when is it not necessary in the Embedded system? [4]
- c) Explain the features of RT Linux. What are the application areas where it is used? [8]

Q11)With respect to block diagram, memory processor explain a smart card design. [16]

OR

- Q12)**a) Explain Digital camera with functional block diagram. [8]
- b) Design a control system for a prototype aircraft attitude control. [8]

EEE

Total No. of Questions : 12]

SEAT No. :

P1195

[Total No. of Pages :3

[4659] - 74

B.E. (Electrical)

EXTRA HIGH VOLTAGE TRANSMISSION

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answer three questions from Section I and three 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) *Black figures to the right side indicate full marks.*
- 6) *Use of logarithmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

- Q1)** a) Find power handling capacity of 400 kv three phase ac lines over a transmission distance of 800 km. Take phase difference between sending and receiving end voltage as 30 degree. The reactance and resistance of line are 0.327 ohm/km and 0.031 ohm/km respectively. Also find line current and % power loss. If total power to be transmitted is 1850 MW find the number of circuits required. **[8]**
- b) Discuss the causes of oscillations and vibrations of ehv transmission line. **[8]**

OR

- Q2)** a) Derive equations for travelling waves due to transients set up in the line. Also derive expression for solution of travelling wave equations. Write equation for characteristic impedance and velocity of propagation for loss free line. **[10]**
- b) The total inductance of transmission line is 265 microhenry/km and capacitance 0.165 microfarad/km. Find the velocity of surge voltage in the line. Also find the surge impedance. Assume loss free line. **[6]**

P.T.O.

- Q3)** a) For ehv ac three phase transmission line considering image charges derive expression for flux linkage matrix, inductance matrix and capacitance matrix. Indicate self and mutual inductances. [10]
- b) State and explain the advantages of bundled conductors. [6]

OR

- Q4)** a) Considering sequence components of currents find the expression for zero sequence and positive sequence inductances of the transposed three phase ac transmission line. [10]
- b) Write note on diagonalization of inductance matrix. [6]

- Q5)** a) The conductors of single phase ac line are of diameter 'd' meter and length 1 meter and '2d' meter apart. They have charges +q and -q coulombs. Derive expression for potential difference and capacitance between the two conductors. What changes will be there in these expressions if image charges of these conductors are considered. [10]
- b) The charge +Q1 coulomb is placed at the centre of sphere 1 of radius 'R' meter.

Another sphere 2 of same radius is placed on the right side of sphere 1. The centre to centre distance is 'S' metre. the surface potential of sphere 1 is $V = Q1 / (4\pi\epsilon_0 R)$. Explain the procedure of placing charges in the spheres to have surface potentials of spheres 1 and 2 as V and zero volts respectively. Draw the labelled neat sketch. [8]

OR

- Q6)** a) Derive expressions for maximum and minimum potential gradients on bundle of two sub conductors. Draw the neat sketch and indicate locations of maximum and minimum potential gradients. State the assumptions made in deriving these expressions. Also write expressions for maximum and minimum potential gradients when 'n' sub conductors are there. What is meant by stress doubling effect? [12]
- b) Compare electric fields of point charge and line charge. [6]

SECTION - II

- Q7)** a) Explain the steps for calculating the electrostatic ally voltage induced in the conductors of unenergised circuit of double circuit line. [10]

- b) Draw labelled sketch of truck parked parallel to ehv transmission line under it at distance 'L' meter. The height of conductor above ground is 'H' metre, height of truck body is 'v' meter, width and length of truck are 'b' and 'a' respectively. The truck body is 't' meter above the ground. [6]

OR

Q8) a) Write note on biological effects of electrostatic field on human, animals and plant life. [8]

b) Write note on shock currents. [8]

Q9) a) Draw the neat sketch showing the various main components of HVDC system. Explain the function of each component. [8]

b) With neat diagram explain the operation of three phase full wave bridge rectifier. State the effects of ignition angle delay and commutation overlap angle on the magnitude of dc voltage. [8]

OR

Q10)a) Draw the neat sketch showing rectifiers and inverters of three phase circuit of HVDC system. Explain how the inverter operation takes place. [10]

b) The line voltage of three phase bridge rectifier circuit is 120 kv, ignition delay angle is 120 degree. Find the magnitude of dc voltage. [6]

Q11)a) Write note on converter ideal and actual control characteristics. [10]

b) State and explain the requirements of satisfactory operation of HVDC link. [8]

OR

Q12)a) What is meant by converter firing control system. Explain individual phase control system. State its advantages and drawbacks. [10]

b) Write note on problems associated with operation of a dc system when connected with weak ac system. State remedial actions to overcome problems. [8]



Total No. of Questions :12]

SEAT No. :

P822

[Total No. of Pages :2

[4659] - 75
BE (Electrical Engg.)
SMART GRID
(2008 Pattern) (Sem.-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 electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Define and explain the Smart Grid concept and also give its need. [8]
b) Consider a Grid with utility power supply integrated with different renewable energy sources so that it becomes a Smart Grid. [10]

OR

- Q2)** a) Explain National and International policies of Smart Grid. [8]
b) Differentiate between conventional Grid and Smart grid. [10]

- Q3)** a) What do you mean by Real time pricing and why it should be implemented. [8]
b) Explain the phase shifting transformer. [8]

OR

- Q4)** a) Explain smart sensors and how it will reduce the stress on system and make it smart. [8]
b) Give list of different Smart Appliances and explain how they can enhance the system. [8]

- Q5)** a) Write a note on Feeder Automation. [8]
b) Highlight on geographic information system in Smart Grid and also give its function. [8]

OR

- Q6)** a) Explain Wide Area measurement system and how it helps utility. [8]
b) Write a note on phase measurement unit. [8]

P.T.O.

SECTION-II

- Q7)** a) Write a note on formation of Smart grid. [8]
b) Write a note on “plastic and organic Solar cells”. [8]

OR

- Q8)** a) Explain the protection and control strategy implemented in Smart grid. [8]
b) Write a note on Fuel cells its need and applications. [8]

- Q9)** a) Explain the importance of Power Quality and role of EMC in Smart grid. [10]
b) Write a note on Power Quality Audit. [8]

OR

- Q10)** a) Explain how power Quality can be improved in Smart grid by monitoring with the help of web based technology. [10]
b) Explain Power Quality issues of grid connected Renewable Energy Sources. [8]

- Q11)** a) Explain role of AMI in Smart grid. [8]
b) Write a note on “IP based protocols”. [8]

OR

- Q12)** a) Write a note on Neighborhood Area Network. [8]
b) Why cyber security is of prime importance in Smart grid and how it can be achieved. [8]



Total No. of Questions : 12]

SEAT No. :

P722

[Total No. of Pages : 4

[4659] - 8

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

ADVANCED GEOTECHNICAL ENGINEERING

(2008 Pattern) (Elective - I(e))

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) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed & IS codes are not allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) Explain the following :

[4 × 4 = 16]

- a) USCS
- b) ISCS
- c) PRA classification
- d) Diffuse Double layer

OR

Q2) a) Following data is obtained from a proposed foundation site :

[8]

- i) Total soil sieved = 250 gms
- ii) Cum. mass retained on 4 mm sieve = 40 gms
- iii) Cum. mass retained on 75 μ sieve = 200 gms
- iv) $D_{10} = 0.07$ mm, $D_{30} = 0.12$ mm, $D_{60} = 1.95$ mm.
- v) LL = 40% & PL = 30%

Classify the soil & comment, whether the soil is suitable for foundation?

- b) Enlist different 'soil structures' & 'clay minerals' and explain the role of 'Montmorillonite'.

[8]

P.T.O.

- Q3)** a) A vertical retaining wall 4m high, supported a backfill with $\beta = 0$, $\gamma = 18 \text{ kN/m}^3$, $\phi = 30^\circ$, $\delta = 10^\circ$. A footing running parallel to the wall & carrying a load of 18 kN/m is to be constructed. Find the safe distance of the footing from the face of the wall, so that there is zero pressure increase, on the wall. [10]
- b) Explain, K_a , K_p & K_o giving field examples. [7]

OR

- Q4)** a) Design a gravity retaining wall, 6m high, with, $\theta = 0$, $\gamma = 18 \text{ kN/m}^3$, $\phi = 30^\circ$, dry soil as backfill. Also find the Fos against sliding, assuming $\delta' = 30^\circ$, the wall is made up of concrete with $\gamma = 24 \text{ kN/m}^3$ & top width of 1m. Use Rankine's theory. [8]
- b) Compute the embedment depth & pull in anchor rod for the sheet pile 6 m high backfill with anchor rod 1.5m below the top. The soil of backfill & below the dredge line are same, with following properties, $\phi = \phi' = 30^\circ$, $C = 0$, $\gamma_{\text{sat}} = 22 \text{ kN/m}^3$, $\gamma = 19 \text{ kN/m}^3$, GWT = 3 m above D.L.
Use 'Free Earth Support' method. [9]

- Q5)** a) Explain the different types of Geosynthetics, with their functions. [6]
- b) Explain the properties & functional requirements of geogrid. [6]
- c) Discuss the 'Binquet & Lee' theory for reinf. foundations. [5]

OR

- Q6)** a) Explain components of 'RE wall' with sketch. [6]
- b) Explain 'Soil nailing' with situations applicable. [5]
- c) Discuss the user of 'Geosynthetics in Geoenvironment. [6]

SECTION - II

- Q7)** Explain the following : [4 × 4 = 16]
- a) Free & Forced vibrations.
- b) Pressure Bulb concept of Balakrishna & Nagraj.
- c) Barken's method
- d) Pauw's Analysis

OR

- Q8)** a) Resonance occurred at a frequency of 25 cycles/sec in a vertical block vibration test on a block of $1\text{ m} \times 1\text{ m} \times 1\text{ m}$. Determine C_u if the wt. of oscillator is 700 N & the force produced by it at 15 cycles/sec is 1200 N. Also compute the amplitude in vert. direction at 15 cycles/sec. [8]
- b) Discuss the design criteria for impact type machines as per IS - 2974 (pt - II) - 1966. [8]

Q9) Explain the following :

- a) Multi under-reamed pile. [5]
- b) Bored compaction pile. [4]
- c) Vibrofloatation. [4]
- d) Sand drains. [4]

OR

- Q10)** a) Explain the stages of inserting reinforcement in Vibro-expanded pile. [7]
- b) A clay layer 5m thick is consolidated with the help of sand drains of dia. 30cm & spaced at 2.7 m c/c. Determine the influence of the drain wells on the Av. degree of consolidation at the time when the degree of consolidation in the clay without wells (U_z) would be 20%.

Arrange the sand drains in square pattern & compute the improvement in U , for the following cases. [10]

- i) $K_r = K_z$
- ii) $K_r = 5 K_z$. Use following data,

for $U_z = 20\%$, $T_v = 0.031$,

$$T_r = 0.070, U = 30\%$$

$$T_r = 0.085, U = 35\%$$

$$T_r = 0.373, U = 85\%$$

$$T_r = 0.455, U = 90\%$$

Q11) Explain the following :

- a) Hookean & Newtonian model. [5]
- b) Kelvin model. [4]
- c) Burger's model. [4]
- d) Bingham's model. [4]

OR

- Q12)** a) Explain 'Rheology' & simple Rheological models. [7]
- b) Explain 'Saint - Venant's' model. [5]
 - c) Discuss 'secondary consolidation' & 'creep', with the help of Rheological models. [5]



Total No. of Questions : 12]

SEAT No. :

P826

[Total No. of Pages :2

[4659] - 83

B.E. (Electrical Engineering)

b - RENEWABLE ENERGY SYSTEM

(Elective - IV) (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) *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, Q.11 or Q.12, from section - II.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable additional data, if necessary.*

SECTION - I

- Q1)** a) Explain with neat diagram Micro combustion Turbines Gas Turbine for fossil fuel. [8]
- b) Write a note on "Economics of Distributed Resources". [8]

OR

- Q2)** a) List different types of fuel cells and explain any one. [8]
- b) Explain with neat diagram stirling Engine used for solar technology.[8]

- Q3)** a) Write a note on Historical Development of wind power. [8]
- b) Explain maximum rotor efficiency with the help of sketch and derivation.[10]

OR

- Q4)** a) What are different types of wind turbine electrical generators. Explain in detail. [10]
- b) Explain the specific wind turbine performance calculations. [8]

P.T.O.

- Q5)** a) Explain, Total clear sky Insolation on a collecting surface with different types of Radiations. [8]
b) Write a short note on solar position at any time of day. [8]

OR

- Q6)** a) How the sun path diagrams can be used for shading analysis. [8]
b) Write a note on monthly clear sky insolation. [8]

SECTION - II

- Q7)** a) Explain from cells to a module and from module to arrays. [8]
b) Explain the impacts of Temperature and Isolation on I-V curves. [8]

OR

- Q8)** a) Explain the PV I-V curve under standard test conditions. [8]
b) Write a note on Thin-Film photovoltaic. [8]

- Q9)** a) Write a note on Major photovoltaic system types. [10]
b) Write a note on Grid-connected PV system Economics. [8]

OR

- Q10)**a) Explain the Maximum Power Point trackers and hourly I-V curves. [10]
b) Explain the stand alone PV systems with example. [8]

- Q11)**a) Write a note on clean coal power plants. [8]
b) Write a note on carbon trading and concept of carbon credits. [8]

OR

- Q12)**a) Write a note on Wave Energy Conversion Systems. [8]
b) Write a note on Kyoto Protocol. [8]



Total No. of Questions : 12]

SEAT No. :

P1157

[Total No. of Pages : 4

[4659] - 84

B.E. (Electrical)

DIGITAL CONTROL SYSTEMS

(2008 Pattern) (Semester - II) (Elective - IV (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 Q.1 or Q.2 Q.3 or Q.4 Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.
- 3) Figures to the right side indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) Discuss the advantages and limitations of Digital control system. [8]
- b) A discrete system is given as: [8]
- $$Y(n) = x(n) + 3u(n+1);$$
- with proper justification determine whether the system is
- i) Static or Dynamic
 - ii) Linear or Nonlinear
 - iii) Shift invariant or shift variant
 - iv) Stable or Unstable

OR

- Q2)** a) Which are the standard discrete input test signals? Explain them with diagrams. [8]
- b) Explain the sampling and reconstruction process, state the sampling theorem and give its importance. [8]
- Q3)** a) Derive the Z - transform of: i) Unit impulse; ii) Delayed unit impulse and iii) Unit ramp. [8]
- b) Determine the Z-transform and ROC of the following signals. [8]
- i) $X(n) = [3(4)^n - 5(3)^n] u(n)$, using Linearity property
 - ii) $X(n) = (\cos \omega_0 n) u(n)$ ----- use Euler's identity

P.T.O.

OR

- Q4)** a) Explain different methods of obtaining inverse Z - Transform [8]
b) Determine inverse Z-transform of the following. [8]

i) $X(z) = \frac{z-4}{(z-1)(z-2)^2}$ by partial fraction expansion

ii) $X(z) = \frac{4z}{(z+0.5)^2}$ for $|z| > 0.5$

- Q5)** a) Show with proper diagrams mapping of Left Half of the S-plane is into Z-plane. [9]
b) Examine the stability of the system by Jury's test, whose characteristic equation is: [9]

$$F(z) = Z^4 - 1.2Z^3 + 0.07Z^2 + 0.3Z - 0.08 = 0$$

OR

- Q6)** a) Describe the general rules for constructing the Root Loci in designing LTI discrete time control system. [9]
b) The characteristic equation of discrete time unity feedback control system is given by : [9]

$$Z^3 + (3K)Z^2 + (K+2)Z + 4 = 0$$

Determine the range of gain K for stability of the system by use of Jury's stability test.

SECTION - II

- Q7)** a) Discuss the various methods used for computation of state transition matrix (STM) from the given state difference equation $x(k+1) = Gx(k) + Hu(k)$. [8]
b) Evaluate the pulse transfer function $\frac{Y(z)}{U(z)}$ from the state variable model of a discrete time system with usual notation. [8]

$$x(k+1) = \begin{bmatrix} 0.8 & 1 \\ 0 & 0.5 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 0.5 \end{bmatrix} u(k)$$

$$y(k) = \begin{bmatrix} 1 & 0 \end{bmatrix} x(k)$$

OR

Q8) a) Explain clearly with neat diagrams, the direct, cascade and parallel decompositions of discrete time pulse transfer function. [8]

b) Obtain STM & its solution of the difference equation $x(k+1) = Gx(k)$
Where [8]

$$G = \begin{bmatrix} 0 & 1 \\ -0.2 & -1 \end{bmatrix}; X(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

Q9) a) What is principle of duality? Explain the effect of pole - zero cancellation on controllability & observability. [8]

b) Given

$$x(k+1) = \begin{bmatrix} 0.1 & 0.1 & 0 \\ 0.3 & -0.1 & -0.2 \\ 0 & 0 & -0.3 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} u(k)$$

$$\& y(k) = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix} x(k)$$

Determine controllability and observability of the system. [8]

OR

Q10) a) Explain full order observer with proper block diagram. [8]

b) Design a full state observer for the system having [8]

$$G = \begin{pmatrix} 0 & 20.6 \\ 1 & 0 \end{pmatrix}; H = \begin{pmatrix} 1 \\ 0 \end{pmatrix}; C = [0 \ 1]$$

Desired eigen values of observer matrix are $Z = -1.8 + j2.4$, and $Z = -1.8 - j2.4$.

Q11)a) Draw a neat block diagram of digital position control scheme and Explain the function of each block. **[8]**

b) Consider the pulse transfer function of discrete time system given as **[10]**

$$\frac{Y(z) = b_0 z^n + b_1 z^{n-1} + b_2 z^{n-2} + \dots + b_n}{U(z) = z^n + a_1 z^{n-1} + a_2 z^{n-2} + \dots + a_n}$$

Determine its controllable canonical form & observable canonical form.

OR

Q12)a) Explain stepper motor control with proper block diagram. **[8]**

b) Consider the system defined by **[10]**

$$\frac{Y(z)}{U(z)} = \frac{4z^2 - 3z + 0.5}{z^3 + z^2 - z - 0.75}$$

Determine state space representation in controllable canonical form.



Total No. of Questions : 12]

SEAT No. :

P827

[Total No. of Pages :4

[4659] - 86

B.E. (E. & TC)

ELECTRONICS PRODUCT DESIGN

(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is failure rate? What are the different types of failure? Write the phases at which the respective failure occurs. [8]
- b) What are the factors responsible for unreliability of Electronic product (any four). [4]
- c) What is exponential law of reliability? How to improve the reliability of electronic product. [6]

OR

- Q2)** a) Define ergonomics. Explain man machine environment (MME) system as a close loop system with appropriate diagram. [6]
- b) A sawtooth wave generator circuit uses following components with failure rates per 10^6 hours mention against them in table. Calculate total FR & MTBF of total circuit. [8]

| <u>Components</u> | <u>Quality</u> | <u>FR $\times 10^6$hr</u> |
|-----------------------|----------------|--------------------------------------|
| Resistors | 10 | 0.61 |
| Capacitors | 5 | 0.60 |
| Diodes | 4 | 0.20 |
| Transistors | 2 | 0.65 |
| Pulse transformer | 2 | 0.15 |
| Step down transformer | 1 | 0.18 |

- c) Explain the different stages of electronic product development. [4]

P.T.O.

- Q3)** a) An 8-channel ADC reads data using LM35. This data is to be logged in system RAM & a plot is drawn using a plotter. [10]
- i) Draw the block schematic of suggested DAS for above design requirement.
 - ii) Draw the flow chart for acquiring data & displaying it on a sixdigit multiplexed LCD display and print the output in plotter or printer.
 - iii) Explain the steps necessary to develop the s/w for proposed DAS.
- b) Explain IA with an important four specifications (Draw 3 - OPAMP configuration IA). [8]

OR

- Q4)** a) What are the different I/o devices interfaced with microcontroller? Explain any one I/f with 8051 MC. [8]
- b) Compare any three microcontrollers (8 bit) on the basis of ROM, RAM, I/o pins & ports. State the main features of HB LED. [10]

- Q5)** a) Discuss the different topologies of touch screen.
State the advantages & disadvantages of each.
Explain any one technology in detail. [8]
- b) Explain & specify the following protocols & buses used in microcontroller based project design.
- i) I2C
 - ii) RS232 [4]
- c) Discuss the criterion for LCD selection w.r. to microcontroller (any) in short. [2]

OR

- Q6)** a) What parameters are to be considered while selecting high speed OPAMPS? Give any two applications of such OPAMPS. [4]
- b) For the mini project that you designed justify [8]
- i) Selection of microcontroller.
 - ii) Selection of I/P & O/P devices.
 - iii) Type & size of memory.
 - iv) Controlling element if any.
- c) Explain different factors considered while selecting ADCs for any microcontroller based product in short. [2]

SECTION - II

- Q7)** a) Classify the different software development approaches. Explain with blocks the water fall model. [6]
- b) What is the role of simulator in software design? List the different simulation tools with their application domain. [6]
- c) What is an emulator? Explain with block diagram the ICE. [6]

OR

- Q8)** a) What is the necessity of hardware test programs? Explain POST, Inquisitor, HLL as H/W test utilities. [6]
- b) Compare the following (any two)
- i) High level language & low level language. [6]
 - ii) Assembler & compiler.
 - iii) Flow chart with pseudo code.
- c) Write short note on (any two) [6]
- i) UMPS or IDE
 - ii) Dibugger or OCD.
 - iii) Top down approach.

- Q9)** a) What problems are avoided while designing PCBs for digital circuits? What is cross talk? How to minimise the cross talk in designing PCBs. [8]
- b) In a multilayer PCB, signal & ground plane is separated by 0.5 inch, common area of two planes is 5.25 inch². Then find the parasitic capacitor for relative permittivity & substrate $r = 2.5$. [4]
- c) What methods are used to minimise the EMI/RFI effects from compliance testing point of view. [6]

OR

- Q10)**a) Define the following terms w.r.to printed circuit board (any four) [8]
- i) Copper clad laminate
 - ii) Photo resist
 - iii) Vias
 - iv) Etching
 - v) Solder mask

- b) Compare between single sided & double sided PCBs. [4]
- c) Explain the PCB design considerations for digital circuits. [6]

Q11)a) Explain the following parameters & also indicate their importance in case of RF link design. [8]

- i) SINAD
- ii) Fade margin

b) Explain the detail working of Digital PLL. [6]

OR

Q12)a) With reference to RF link analysis explain path loss & free space loss. [6]

b) Discuss the design considerations of the following blocks of communication systems

i) Interleaver

ii) Equalizer. [8]



Total No. of Questions : 12]

SEAT No. :

P829

[Total No. of Pages :2

[4659] - 88
B.E. (E & TC)
COMPUTER NETWORK
(2008 Course) (Semester - I)

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) Explain TCP/IP reference model with suitable diagram. Compare OSI reference model with TCP/IP. **[10]**
- b) Give classification of transmission media. Explain any two guided transmission media. **[8]**

OR

- Q2)** a) Explain cable TV network. How cable TV network is used for data transmission with neat diagram. **[10]**
- b) Explain the terms ADSL, VDSL, HDSL and SDSL technology. **[8]**

OR

- Q3)** a) Explain simplest protocol and stop & wait ARQ protocol for noiseless channels with suitable diagram. **[8]**
- b) What are the different types of multiple access protocols? Explain controlled access protocol. **[8]**

OR

- Q4)** a) What are the common standard Ethernet implementations? Explain. **[8]**
- b) What are the different functions of data link layer? Explain different types of framing techniques in detail. **[8]**
- Q5)** a) Draw the layer architecture and explain the functions of each layer in Bluetooth. **[8]**
- b) What is backbone network? What are the types of backbone networks? Explain in detail. **[8]**

P.T.O.

- Q6)** a) What is virtual LAN? Explain VLAN with suitable diagram. [8]
b) Draw the layer architecture and explain in detail the function of each ATM layer. [8]

SECTION - II

- Q7)** a) For a given Classful IP address, how will you extract network address and host address? Explain with suitable example? [8]
b) Explain in details ARP, RARP and BOOTP? [8]

OR

- Q8)** a) What is connecting devices? Explain, compare hub & switch. [8]
b) What are advantages of ICMP over IP protocol? Explain ICMP with general frame format. [8]

- Q9)** a) What are the main objectives of transport layer? Explain with neat diagram process to process delivery in transport layer. [8]
b) Compare TCP and UDP. Under what circumstances you will use them? [8]

OR

- Q10)** a) List the various open loop and closed loop congestion control techniques. Explain the policies that can prevent the congestion in a network. [8]
b) List the typical QoS parameters in the Transport Layer and explain each one. [8]

Q11) Write a short note on [18]

- a) Role of SMTP & POP - 3 server in E-mail.
b) DNS
c) FTP

OR

- Q12)** a) What are the main responsibilities of Application layer? Explain in brief. [9]
b) How symmetric key & public key is used in cryptography. [9]



Total No. of Questions : 12]

SEAT No. :

P830

[Total No. of Pages :4

[4659] - 89

B.E. (E & TC) (Semester - I)

DIGITAL IMAGE PROCESSING

(404184) (Elective - I) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Write prescriptions where indicated and in the use of drugs their doses should be given.*

SECTION - I

- Q1) a)** Explain with neat diagrams, the various mechanisms for image acquisition. **[8]**
- b) Explain the following in context of human vision.
- i) Luminance & Brightness
 - ii) MTF **[8]**

OR

- Q2) a)** Explain the following w.r.t. digital image. **[8]**
- i) Spatial and Gray level resolution.
 - ii) Profile and standard deviation.
- b) Given below is 5×5 image. Find out distance between p and q by methods: **[8]**
- i) City Block
 - ii) Chess Board

| | | | | | |
|----|---|---|---|---|----|
| | 2 | 3 | 4 | 2 | ①q |
| | 1 | 4 | 3 | 2 | 4 |
| | 3 | 2 | 1 | 0 | 2 |
| | 2 | 2 | 2 | 2 | 2 |
| p② | 1 | 1 | 3 | 4 | |

- Q3) a)** Briefly explain the following image enhancement methods with their applications: **[8]**
- i) Power law transform
 - ii) Unsharp Masking

P.T.O.

b)

[10]

- i) Determine the third bit plane of the image $\begin{bmatrix} 3 & 4 \\ 1 & 5 \end{bmatrix}$.
- ii) Can two different images have the same histogram? Justify your answer with example.
- iii) A 2×2 image $f(m,n) = \begin{bmatrix} 4 & 2 \\ 5 & 8 \end{bmatrix}$ is passed through the linear filter

$$h(m,n) = \frac{1}{2} \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}, \text{ what is the resultant image?}$$

(Assume zero padding).

- iv) What should be the value of 'X' if the following mask is used as high pass filter.

$$\begin{array}{ccccc} -1 & -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & -1 \\ -1 & -1 & X & -1 & -1 \\ -1 & -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & -1 \end{array}$$

- v) Below are the pixel values in a 5×5 gray level image:

| | | | | |
|----|----|----|----|----|
| 11 | 11 | 12 | 13 | 15 |
| 12 | 12 | 10 | 11 | 12 |
| 14 | 15 | 85 | 10 | 11 |
| 11 | 12 | 10 | 11 | 12 |
| 12 | 13 | 10 | 11 | 13 |

What is value of the masked pixel after applying 3×3 Median filter.

OR

- Q4)** a) Explain how image smoothing can be achieved using frequency domain filtering. [8]

- b) Image 1 is an image with gray levels in the range 0 to 7. Plot the histogram of the Image1. Equalize the histogram and plot the equalized histogram and give equalized image. Comment on the results. [10]

Image.1

```

5 5 3 4 4
4 4 4 4 4
4 4 3 3 3
4 4 3 3 3
5 5 5 3 3

```

- Q5) a)** Compute DCT of the following 2×2 image: [8]

$$\begin{bmatrix} 8 & 4 \\ 2 & 1 \end{bmatrix}$$

- b) Explain the following properties of 2D Fourier Transform: [8]
- i) Translation
 - ii) Rotation & scaling
 - iii) Convolution

OR

- Q6) a)** Compute DFT of the following 2×2 image. [8]

$$\begin{bmatrix} 1 & 4 \\ 2 & 8 \end{bmatrix}$$

- b) Compare following image transformation techniques on the basis of energy compaction, simplicity, computational efforts and applications. [8]
- i) DFT
 - ii) DCT

SECTION - II

- Q7) a)** What is RLC? Which type of redundancy is explicated by RLC? Derive RLC codes considering an 4×4 binary Image. [9]
- b) Calculate the efficiency of Huffman code for the following symbols whose probability of occurrence is given below. [9]

| Symbol | Probability |
|--------|-------------|
| a_1 | 0.9 |
| a_2 | 0.06 |
| a_3 | 0.02 |
| a_4 | 0.02 |

OR

Total No. of Questions : 12]

SEAT No. :

P1052

[Total No. of Pages : 3

[4659]-9

B.E. (Civil Engineering)

a-MATRIX METHODS OF STRUCTURAL ANALYSIS

(2008 Pattern) (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 books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain need of Computer Algorithm & Programming aspects. **[6]**

b) Solve the following equations by Gauss Elimination Method. **[10]**

$$2.5X_1 - X_2 + 2X_3 = 2.5$$

$$-6X_1 + 3X_2 + 3X_3 = 3$$

$$12X_1 + 3X_2 = 18$$

OR

Q2) a) Write a note on Gauss Elimination Method. **[6]**

b) Solve following equations by Gauss Seidel Method **[10]**

$$2.5X_1 - X_2 + 2X_3 = 2.5$$

$$-6X_1 + 3X_2 + 3X_3 = 3$$

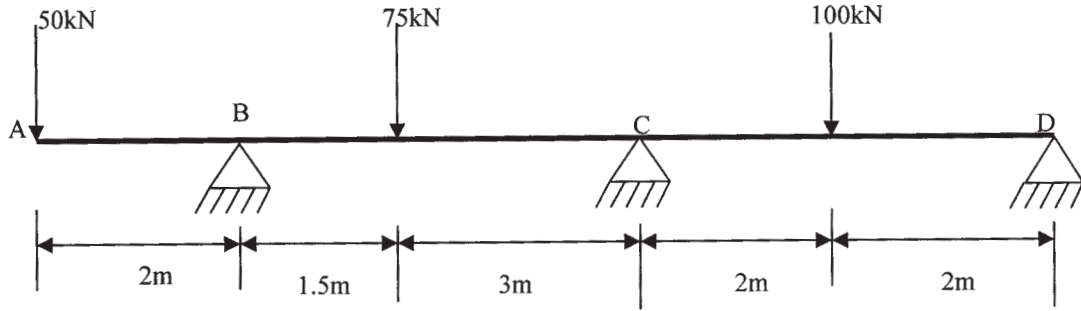
$$12X_1 + 3X_2 = 18$$

Q3) A two span continuous beam ABC is fixed at A and C & simply supported at B. AB = BC = 5m. It carries concentrated load of 100 kN at centre of AB and uniformly distributed load of 30 kN/m over BC. EI is uniform & it is 12,000 kN/m². Find redundants using flexibility method. **[18]**

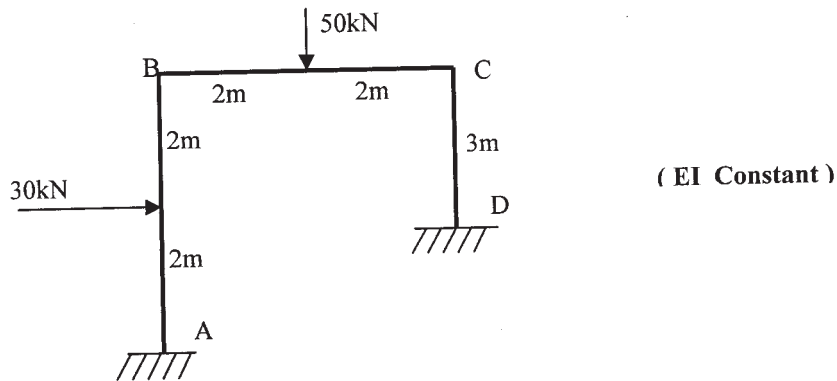
OR

P.T.O.

Q4) Analyze the beam shown below by flexibility method (EI is constant). [18]



Q5) Analyse the portal frame using flexibility method. [16]



OR

Q6) Analyse above portal frame by stiffness method. [16]

SECTION-II

Q7) Explain: [18]

- a) Member approach and structure approach.
- b) Force Method of structural analysis.
- c) Local and global stiffness matrix.

OR

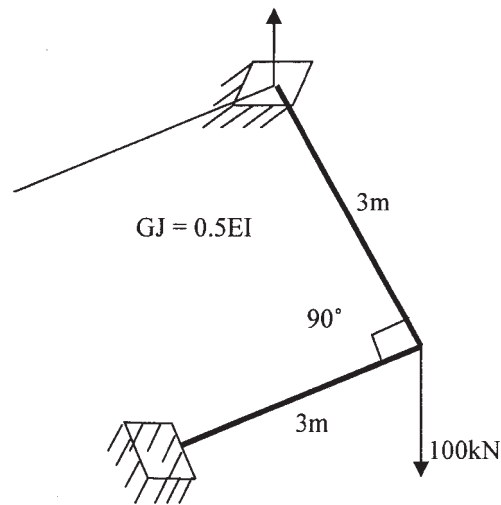
Q8) a) Show that stiffness matrix of a member of a structure, in structure co-ordinate system is obtained by transformation. [10]

$[S_m] = [R]^T [S_m] [R]$; where, $[S_m]$ is member stiffness matrix in member co-ordinate and $[R]$ is rotation matrix of the member. [10]

b) Explain properties and special characteristics of stiffness matrix of a structure. [8]

Q9) a) Using proper DOFs, write clearly stiffness matrix equation for a member of orthogonal grid structure. Explain various terms involved in matrix equation. [8]

- b) Using structure approach, develop only stiffness matrix of grid structure shown in figure 5. $GJ = 0.4 EI$. & Uniform for all members. [8]



OR

- Q10)** Analyse & draw bending moment diagram for grid structure shown in Q. 9b. Use stiffness matrix method. [16]

- Q11)** Explain input data, input file and results in output file in case of software solution of plane truss problem. Take a suitable example of truss & write details as per the format of software you have used. [16]

OR

- Q12)** A single bay two storied frame is to be analyzed by computer programme of stiffness matrix method. [16]

- Prepare the flow chart for the programme and state input required for the same.
- How will you input support conditions of the structure.



Total No. of Questions : 12]

SEAT No. :

P831

[4659]-90

[Total No. of Pages : 2

B.E. (E&TC)

**b-EMBEDDED SYSTEMS AND RTOS
(2008 Pattern)(Elective-I)(Semester-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) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is the time to market design metrics? Draw and explain simplified revenue model and calculate the losses if product is delayed by 12 weeks. Assume product life to be 52 weeks. **[10]**
- b) Explain features of Android operating system and its two applications. **[8]**

OR

- Q2)** a) Mention currently available processors from various manufacturers and compare them for embedded applications. **[10]**
- b) Write short Notes on: **[8]**
- i) GPRS
 - ii) CAN Protocol

- Q3)** a) Explain the pipeline concept and various characteristics of pipeline. **[8]**
- b) Interface LPC 2148 to seven segment display and also write "C" code. **[8]**

OR

- Q4)** a) With the help of different applications, Explain requirement of memory and its selection criteria. **[8]**
- b) Compare ARM 7, ARM 9 and ARM 11 family members. **[8]**

- Q5)** a) Explain the following Task synchronization Issues **[10]**
- i) Racing
 - ii) Dead lock
 - iii) Priority Inversion
- b) Explain mutual exclusion through semaphore. **[6]**

OR

P.T.O.

- Q6)** a) Compare multiprocessing and multitasking. Explain different techniques of multitasking. [8]
- b) What do you mean by task communication and Explain various IPC techniques. [8]

SECTION -II

- Q7)** a) State and explain the various development tools required for ARM applications. [10]
- b) Explain tool utilities. [6]
- i) Minicomp
- ii) MTD

OR

- Q8)** a) Explain linux kernel architecture and configuration. [10]
- b) Write short notes on. [6]
- i) Ethernet
- ii) TCP/ IP
- by considering embedded linux.

- Q9)** a) Explain difference between waterfall and spiral model of software development and its applications. [8]
- b) Compare various commercial RTOS which is applicable for embedded applications. [8]

OR

- Q10)**a) Write the features of “WIN CE” operating system used in smart mobile phones. [8]
- b) Explain features of commercial RTOS “ Vxworks”. [8]

- Q11)**a) Explain hardware and software requirement for the implementation of ATM system. [10]
- b) Draw block diagram of digital camera and explain it. [8]

OR

- Q12)**a) Explain memory requirements, Input /Output requirements and processors requirements for the engine control in automobile. [10]
- b) Explain different RTOS services used in points of sales terminals. [8]

□□□

Total No. of Questions :12]

SEAT No. :

P832

[4659]-91

[Total No. of Pages : 3

B.E. (E&TC)

C- INDUSTRIAL DRIVES & CONTROL

(Semester-I) (2008 Course)(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.*
- 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) For the 3 phase full controlled converter operating from 415V, 50Hz with inductive load. Derive average output voltage. **[8]**
- b) A 3 ϕ Full controlled converter is connected to the armature of a DC Motor. The motor runs at 1000 rpm at no - load, if connected to 220V DC source , $R_a = 1\Omega$ find: **[10]**
- i) Line to line voltage of the converter so that maximum output voltage of converter is equal to rated voltage of the motor.
 - ii) The speed of motor for $\alpha = 45^\circ$, & $I_a = 20A$.

OR

- Q2)** a) What are reversible drives? Explain with circuit diagram & waveforms, working of 3 phase dual converter with circulating current mode operation with heavy loads. **[8]**
- b) What is chopper? Explain with circuit diagram and waveforms working of 2 Quadrant step -down chopper. **[6]**
- c) Explain the effect of "L_s" source inductance on performance on full controlled converter. **[4]**

P.T.O.

- Q3) a)** What is the need of 3 phase inverters in industries ? Explain with circuit diagram & w/F's, working of 3 ϕ VSI operating in 120° mode of conduction with R- load. State its advantages & dis- advantages. [10]
- b) Explain Harmonic reduction technique.Used in Inverters. Comment on p.f. [6]

OR

- Q4) a)** What are resonant converters? Explain with circuit diagram & waveforms working of ZVS. [10]
- b) What is single resonant & multiresonant converter. State its advantages & disadvantages. [6]
- Q5) a)** What is the principle of DC motor? Explain with circuit diagram, working of 1 ϕ Separately excited DC motor operating with semi converter with highly inductive load. [10]
- b) What are DC motor performance characteristics? Explain. [6]

OR

- Q6)** Write short notes on any three: [16]
- Cycloconverter.
 - Multilevel converters.
 - Protection circuits for DC motors.
 - Speed control technique of series motor.
 - Regenerating braking techniques.

SECTION -II

- Q7) a)** What is slip - power recovery? Explain with circuit diagram,working of Scherbius system for slip -Power recovery. [8]
- b) What is acceleration & Deceleration ? Explain. [4]
- c) What is soft start? Explain in brief. [4]

OR

- Q8)** a) What is static krammer Drive? Explain with diagram [8]
b) Explain how will you improve the slip power. State its subsynchronous & super synchronous modes. [8]

- Q9)** a) Explain speed control technique of 3 ϕ Induction motor by using $\frac{V}{f}$ technique. Comment on T_q , N characteristics. [8]
b) What are brushless motors? Explain with block diagram working of 3 ϕ brushless DC motor. [8]

OR

- Q10)**a) What is Micro- stepping? Explain with circuit diagram working of microprocessor based stepper motor control state its advantages. [10]
b) What is synchronous motor? Explain in brief. [6]

- Q11)**a) What is power quality? Mention various types of power line disturbances & suggest preventive & nullifying measures for these disturbances. [12]
b) What is the need of Energy audit? Explain. [6]

OR

- Q12)** Write short notes on any three: [18]
a) Traction drives.
b) Fuzzy logic based Induction motor drive
c) LCI
d) ZCS
e) Universal motors.

□□□

Total No. of Questions : 12]

SEAT No. :

P833

[4659]-92

[Total No. of Pages : 3

B.E. (E & TC)

d - MICROWAVE COMMUNICATION AND RADAR

(Elective - I) (2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *In Section - I : Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6. In Section - II: Attempt 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 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 waveguides? Explain the following terms as applied to the waveguides: **[10]**
- i) Cut off wavelength.
 - ii) Guide wavelength.
 - iii) Phase velocity and Group Velocity.
 - iv) Characteristics wave impedance.
- b) Design a rectangular waveguide to propagate 10GHz signal under dominant mode. **[4]**
- c) What is re-entrant Cavity? Explain where it is used. **[4]**

OR

- Q2) a)** Discuss the Power losses and Power transmitted in rectangular waveguide. **[8]**
- b) Differentiate between TE and TM modes in rectangular waveguides. **[4]**
- c) With the help of diagram, explain the need of coupling probes and loops. **[6]**

P.T.O.

- Q3)** a) With the help of diagram, explain the operation of two-hole directional coupler. State its uses. [8]
- b) Write short notes on: [8]
- i) Microwave attenuator.
 - ii) S-matrix and its properties.

OR

- Q4)** a) Explain the working of E-plane and H-plane tees. [6]
- b) Explain working of microwave isolator and give its applications. [4]
- c) What is a slotted line used for? Briefly describe the steps to be followed for measuring VSWR of a given device using a slotted line. [6]

- Q5)** a) Explain the frequency limitation of the conventional tubes. How can it be overcome with microwave tubes. [8]
- b) Explain the principle of working of a Reflex Klystron. Where it is used? [8]

OR

- Q6)** a) What is magnetron? List the different types of magnetron. Explain how oscillations sustained in magnetron. [8]
- b) Compare TWT and Klystron. [4]
- c) A helical TWT has diameters of 2mm with 50 turns per cm. Calculate: [4]
- i) Axial Phase Velocity.
 - ii) The anode voltage at which the TWT can be operated for useful gain.

SECTION - II

- Q7)** a) Explain various modes of Operation of Gunn diode. Explain LSA mode and give limitation of this mode. [10]
- b) Explain power frequency limitations of a microwave bijunction transistor. [8]

OR

- Q8)** a) What is Varactor diode? Give its construction, working principle and explain any one application. [10]
- b) Describe how Tunnel diode can be used as an amplifier and oscillator. [8]

- Q9)** a) What is Network Analyser? Differentiate between a scalar and a vector network analyser. Which parameters can usually be measured effectively with a vector analyser. [8]
- b) Compare Power ratio and RF substitution methods of measuring attenuation provided by a microwave component. [8]

OR

- Q10)**a) Explain any two methods of measuring impedance of a terminating load in a microwave system. [8]
- b) Describe a technique of measuring the phase shift provided by network. [8]

- Q11)**a) What is a pulse radar? What are the effects of transmitting a long pulse? Explain all the stages of a pulse radar. [8]
- b) Explain A-scope and PPI displays with reference to radars. What are their limitations. [8]

OR

- Q12)**a) Explain the action of [10]
- i) CW doppler radar.
- ii) FMCW doppler radar.
- Discuss their applications and limitations.
- b) Explain the principle and working of an MTI radar. [6]



Total No. of Questions : 12]

SEAT No. :

P834

[4659]-93

[Total No. of Pages : 3

B.E. (E & TC)

a - ENTREPRENEURSHIP DEVELOPMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 03 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) *Use of logarithmic tables, slide rule, Mollier Charts, Electronic pocket calculator is allowed.*
- 5) *Neat diagrams must be drawn whenever necessary.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Compare Entrepreneur : Present & Past with suitable example. [8]
b) What is Business Opportunity? Entrepreneurship for Engineer, explain. [4]
c) Explain the qualities of an Entrepreneur. [4]

OR

- Q2)** a) Define Entrepreneurship. Explain different kinds of Entrepreneurial business. [8]
b) Enlist Entrepreneurs skills? Explain in detail all skills required for Entrepreneurship. [8]

- Q3)** a) Explain "Concept of Cost" & Comment on "Entrepreneurs in Market economy". [9]
b) State advantages & disadvantages of running an existing Business. [9]

OR

- Q4)** a) Define Franchise? What rules & regulations must be followed for Owning a Franchise. [9]
b) Define Ownership? Explain all types of Ownership in detail. [9]

P.T.O.

- Q5)** a) Explain the necessity of a business plan? What goes into Business Plan? Create an effective business plan for a milk Shop / retail Shop. [8]
- b) What is the value of market research? How to perform market research in five steps. [8]

OR

- Q6)** a) How to obtain financing for business? With proper example choose a location for non retail business, obtain space & design the physical layout. [8]
- b) Explain the following terms with reference to Market Business: The Marketing mix-product & Marketing mix-promotion & how to set marketing goals. [8]

SECTION - II

- Q7)** a) What are different techniques for hiring & managing the employees. [8]
- b) How to create Compensation package for managing the staff. [4]
- c) How to set up a record keeping system for business. [4]

OR

- Q8)** a) What are different rules which must be followed in understanding the Basic accounting System. [8]
- b) What is meant by journal & explain the types. [4]
- c) What is inventory? What are different methods for tracking inventory?[4]
- Q9)** a) Explain the term Financial Management? How to analyse financial performance by using various systems. [8]
- b) What is Internet? How use of technology is beneficial for the growth of Business. [8]

OR

- Q10)**a) How purchase technology is used for business, explain. [8]
b) What are different types of Expert? How experts help the company. [8]

- Q11)**a) How growth in today's Marketplace depends on legal, ethical issues. [6]
b) Write a short note on Business ethics. [6]
c) What are the advantages & disadvantages of competing globally. [6]

OR

- Q12)**a) What are Social responsibilities of Entrepreneurs. [6]
b) Define 'Strategy'? Explain the strategy for the growth of business. [6]
c) What are global opportunities for business. [6]



Total No. of Questions : 12]

SEAT No. :

P835

[4659]-94

[Total No. of Pages : 3

B.E. (E & TC)

b - JOINT TIME FREQUENCY ANALYSIS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 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) Verify Parsevals theorem for the given signal

$$x(t) = e^{-15t} \cdot u(t). \quad [8]$$

b) Find the time bandwidth product of $f(t) = e^{-|t|}$. [10]

OR

Q2) a) Explain with example that signal cannot be timelimited and bandlimited Simultaneously. [6]

b) Discuss the concept of Hilbert Spaces. [6]

c) If $f_1(n) = \{1, 2, -1, 1\}$ [6]

↑

$$f_2(n) = \{2, 1, 3, 1\}$$

↑

Find

i) $\langle f_1(n), f_2(n) \rangle$

ii) $\langle f_1(n), f_1(n) \rangle$

P.T.O.

- Q3)** a) Explain with tiling diagram difference between Fourier, STFT & wavelet transform. [8]
- b) Explain the importance of Analytic signal. Also find instantaneous frequency of $x(t) = \cos 100t \cdot \cos 50t$. [8]

OR

Q4) Given

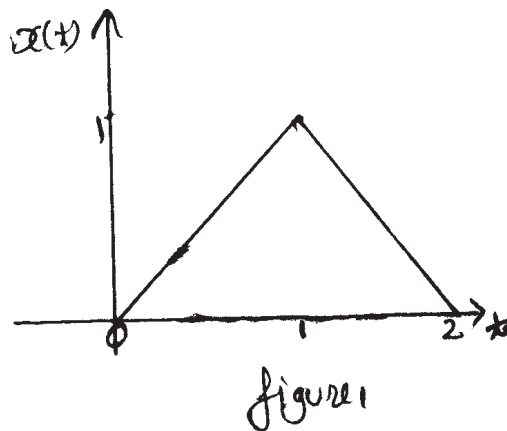
$$x[n] = \{2, 1, 3, 2, 1, 5, 2, 4\} \in V_3.$$

Develop complete wavelet Packet tree till V_0 and calculate the coefficients along with the corresponding bases. Prove perfect reconstruction. [16]

- Q5)** a) Discuss the MRA axioms. [8]
- b) Explain Wavelet delation equation in time and frequency domain. [8]

OR

Q6) Find out the projection of signal $x(t)$ shown in figure 1 on subspace V_0 & V_1 . Prove that $V_1 = V_0 \oplus W_0$. Sketch the projection on V_0 , V_1 & W_0 subspace. [16]



SECTION - II

- Q7)** a) Discuss the properties of wavelet function. [6]
- b) Show that convolution of two Harr Scaling functions produces a hat function (triangular function). Show that the scaling functioning $\phi(t) \in V_0$ follow the relation $\hat{\phi}(w) = H(w/2)\hat{\phi}(w/2)$. [10]

OR

Q8) a) If $\phi(t)$ is a Harr scaling function and

$$\begin{aligned}x(t) &= 4\phi(2t) + 3\phi(2t-1) + 6\phi(2t-2) \\ &+ 5\phi(2t-3) + 4\phi(2t-4) + 6\phi(2t-5) \\ &+ 7\phi(2t-6) + 4\phi(2t-7).\end{aligned}$$

Project $x(t)$ down the ladder and show that

$$V_j = V_{j-1} \oplus W_{j-1}$$

Sketch the projections on the corresponding V & W subspaces. [16]

Q9) Given $x[n] = \{6, 3, 2, 1\} \in V_2$. Develop wavelet lifting scheme. Decompose $x[n]$ upto V_0 subspace. Clearly show ‘split’, ‘Update’ and ‘predict’ stages. show perfect reconstruction. [16]

OR

Q10) Given $x[n] \in V_3$. Derive and sketch wavelet packet tree till O^{th} subspace. [16]

Q11) Write notes on (any two): [18]

- Image Compression using JPEG.
- Speech Compression.
- Nested Subspaces.

OR

Q12) Given $x[n] = \{16, 5, 20, 8, 36, 5, 13, 0\} \in V_3$ perform MRA using Harr filters. Clearly find out projections in V_2, W_2, V_1, W_1, V_0 & W_0 . Reconstruct after suppressing (making zero) coefficients in W_j subspaces, and show denoising (smoothing) effect on reconstructed signal $x_d[n]$ when compared with $x[n]$. [18]



Total No. of Questions : 12]

SEAT No. :

P836

[4659]-95

[Total No. of Pages : 2

B.E. (Electronics & Telecommunication)

c - MICROELECTROMECHANICALSYSTEMANDSYSTEMONCHIP

(2008 Course) (Sem. - I) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt 03 questions from each section.*
- 2) *Attempt from Section I: Q1 or Q2, Q3 or Q4, Q5 or Q6, and from Section - II: Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 3) *Draw neat diagram.*
- 4) *Assume suitable data if necessary.*
- 5) *Figures to the right indicate marks.*

SECTION - I

Q1) a) What are the applications of MEMS and Microsystems in consumer products? **[8]**

b) Describe basics of Gyroscope with necessary sketch. **[8]**

OR

Q2) a) What is MEMS? Why MEMS are used for sensors? **[8]**

b) Explain with suitable example working of pressure sensor. **[8]**

Q3) a) State advantages of silicon as material used for MEMS. **[8]**

b) Point out difference between GaAs and silicon material for MEMS. **[8]**

OR

Q4) a) What is “conductive polymers”? How polymers can be made conductive? **[8]**

b) Is quartz is useful for MEMS technology? Explain in short. **[8]**

Q5) a) How Microcantilever sensors works? Explain it with suitable example. **[9]**

b) Justify “MEMS will play major role for medical applications”. **[9]**

OR

P.T.O.

- Q6)** Write short note on: [18]
- a) Magnetic actuators.
 - b) Chemical sensors.
 - c) Micro acclerometers.

SECTION - II

- Q7)** a) Draw and explain block diagram of basic system on chip model. [8]
b) How chip complexity makes impact into production? [8]

OR

- Q8)** a) Draw a typical flow chart used for microsystem development at CSEM. [8]
b) Justify “CAD Tools for Microsystem are Must”. [8]

- Q9)** Explain IC Fabrication Technology in detail for [18]
- a) Silicon bulk micromachining.
 - b) LIGA.
 - c) Surface micromachining.

OR

- Q10)** Write short note on: [18]
- a) Design for testability.
 - b) Built in self test.
 - c) Fault and fault simulation.

- Q11)** a) Issues in testing core based system chips. [8]
b) Explain any two routing techniques for IC Design. [8]

OR

- Q12)** a) What reliability issues are crop up in packaging? What factors leads failures in packaging? [8]
b) Explain generic test generation procedure with flow chart. [8]



Total No. of Questions : 12]

SEAT No. :

P837

[4659]-96

[Total No. of Pages : 3

B.E. (E & TC)

MOBILE COMMUNICATION

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 03 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Explain with neat diagram concept of cell splitting and cell sectoring. **[8]**
- b) If a total of 33 MHz of bandwidth is allocated to a particular FDD system (cellular) which uses two 25 kHz simplex channel to provide full duplex voice & control channels. Compute the number of channels available per cell if a system uses.
- i) 4 cell reuse
 - ii) 7 cell reuse
 - iii) 12 cell reuse
 - iv) 19 cell reuse

If 1MHz of allocated spectrum is dedicated to control channels. Determine number of voice and control channels in each cell for each system. **[10]**

OR

- Q2) a)** Explain Handoff mechanism in detail. With neat illustration explain handoff strategies. **[10]**
- b) Define following terms in detail **[8]**
- i) Co - channel interference.
 - ii) Adjacent channel interference.
 - iii) Grade of Service.

P.T.O.

- Q3)** a) Explain three basic propagation mechanism that impact propagation in mobile communication system. [8]
- b) A mobile is located at 2.5 km away from a base station and uses a verticle λ_{14} monopole antenna with a gain of 2.5 dB to receive signals. The E field at 500 meters from transmitter is measured to be 10^{-3} volts/meter. The carrier frequency is 900 MHz. Find [8]
- Length of receiving antenna.
 - Find received power using two ray ground reflection model assuming transmitting antenna height 50 meters & receiving antenna height is 1.5 meter above ground.

OR

- Q4)** a) Explain the terms wrt. small scale fading: [8]
- Flat fading.
 - Freg selective fading.
 - Fast fading.
 - Slow fading.
- b) A transmitter is transmitting signal at a frequency of 900 MHz for a vehicle moving 75 km/hr. Calculate the received carrier frequency if mobile is moving. [8]
- directly towards transmitter.
 - Directly away from transmitter.
 - In a direction which is perpendicular to the direction of arrival of transmitted signal.

- Q5)** a) Give comparison between QPSK & MSK digital modulation techniques. [8]
- b) Explain the concept of frequency & time diversity. [8]

OR

- Q6)** a) Explain following factors wrt to algorithms for equalization. [8]
i) Rate of convergence.
ii) Computational complexity & Numerical properties.
b) Explain Band width efficiency bit rate & constellation diagram of BPSK, QPSK and 16 QAM. [8]

SECTION - II

- Q7)** a) Explain the working principal of SDMA with neat diagram. [8]
b) Explain the techniques used by channel and Formant Vocoders. [8]

OR

- Q8)** a) Explain TDMA frame structure and state formula for efficiency of TDMA. [8]
b) List the criterion for selection of speech codec in mobile communication system. [8]

- Q9)** a) Define Handover. With neat diagram explain steps involved in Intra-MSC handover. [8]
b) Explain steps involved in call Termination from mobile to mobile. [10]

OR

- Q10)**a) With a neat diagram explain GSM frame structure. [8]
b) Describe following term wrt. GSM. [10]
i) Air - interface.
ii) Physical and logical channels.

- Q11)**a) Explain in detail IS 95 forward channel structure. [8]
b) Explain with neat block diagram the working of IS - 95 architecture. [8]

OR

- Q12)**a) Explain different logical channels for CDMA. [8]
b) Explain evolution of CDMA 2000 from IS-95. [8]

