

Total No. of Questions : 12]

SEAT No. :

P2986

[5059]-1

[Total No. of Pages : 2

B.E (Civil)

ENVIRONMENTAL ENGINEERING - II

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.*
- 2) *Figures to the right side indicates full marks.*
- 3) *Draw Neat figures wherever necessary.*
- 4) *Assume suitable data necessary.*
- 5) *Use of scientific calculator is allowed.*

SECTION-I

- Q1)** a) Write short note on pumping of sewage and types of pumps. [8]
b) Write types of sampling of wastewater and explain it with respect to sampling of domestic sewage and industrial wastewater. [8]

OR

- Q2)** a) Write short note on variation in sewage flow and its importance in design of sewer. [8]
b) Write significance of BOD, COD and total solids. [8]

- Q3)** a) Write short note stream sanitation. [8]
b) Write working principle of grit chamber and explain any one type. [8]

OR

- Q4)** a) Write short note on oxygen sag curve. [8]
b) Write short note on types of screen chamber. [8]

- Q5)** a) Write modification of activated sludge process and explain any one. [9]
b) Differentiate between single stage and two stage trickling filter. [9]

OR

P.T.O.

- Q6)** a) Write short note on rotating biological contractor. [9]
b) Differentiate between aerobic and anaerobic process for treatment of sewage. [9]

SECTION-II

- Q7)** a) Write short note on algae symbiosis for treatment of sewage. [8]
b) Write advantages and disadvantages for aerated lagoon. [8]

OR

- Q8)** a) Write advantages and disadvantages for oxidation pond. [8]
b) Explain mechanism of removal of impurities in phytoremediation. [8]
- Q9)** a) Design a septic tank for a population of 100. [8]
b) Explain different methods of disposal of septic tank effluent. [8]

OR

- Q10)** a) Write short note on USABR. [8]
b) Write different types of anaerobic digester and explain any one. [8]
- Q11)** a) Write short note on treatment of dairy industry wastewater. [9]
b) Write discharge standards for dairy and sugar industry. [9]

OR

- Q12)** a) Write short note equalization process in industrial wastewater treatment plant. [9]
b) Enlist different preliminary, primary and secondary treatment units in industrial wastewater treatment. [9]

✓ ✓ ✓

Total No. of Questions : 12]

SEAT No. :

P2106

[5059]-10

[Total No. of Pages : 3

**B.E.(Civil Engineering)
HYDRO INFORMATICS**

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

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right 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. [6]
- b) What are components of hydroinformatics systems? Explain in detail hardware and software components. [6]
- c) Discuss about design of hydro informatics system for information regarding availability of ground water in a particular area. [6]

OR

- Q2)** a) Discuss the role of internet in rainfall forecasting system. [6]
- b) A commercial hydroinformatics system is to be formed for managing reservoir operation with respect to release of water for an hydro electric power plant, what components you suggest, explain with justification. [6]
- c) Explain role of numerical modeling in Hydroinformatics [6]

- 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 tahsil, frame various alternative schemes. [8]
- b) You have to design a graphical user interface for flood watch 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 private sector in decision support system? [8]
- b) Name different softwares used in hydroinformatics. Explain any one of them in detail. [8]
- Q5)** a) Differentiate between physics based modeling and data driven modeling Give examples of each. [8]
- b) Discuss design of simulation model for household sewage collection system giving details of objective, scope, basic formulae used, underlying solution procedure, simulation technique used. [8]

OR

- Q6)** a) Discuss any commercial simulation model for two dimensional flow modeling. [8]
- b) 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) Define a transfer function. Discuss various types of transfer functions. [6]
- b) What is normalization? What is its need? What are typical range of normalization? [6]
- c) Define epoch, epoch size, error function. [6]

OR

- Q8)** a) What is back propagation? Why it is slow compared to conjugate gradient algorithm? [6]
- b) How artificial neural networks compare with statistics? What is the terminology used in statistics for the following terms used in ANN? Input, output, training, generalization. [6]
- c) Define cross validation. State step by step procedure for carrying out the same. [6]

- Q9) a)** What are different types of evolutionary computing? Discuss the Genetic Algorithm approach in detail. [8]
- b) What are Genetic operators? Explain any two of them in details. [8]

OR

- Q10)a)** Why Genetic Algorithm is used as an optimizing function? Can it be used to train a neural network? How? [8]
- b) What is real coded Genetic Algorithm? How it differs from standard Genetic Algorithm? [8]
- Q11)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

- Q12)a)** Discuss limitations of ANN with respect to data requirement, magnitude of data, selection of architecture and lack of physical concept. [8]
- b) Discuss a study about application of Genetic Algorithm in water Resources Engineering giving details about problem definition, objective, data, inputs, outputs and results. [8]



Total No. of Questions : 12]

SEAT No. :

P1824

[Total No. of Pages : 3

[5059] - 100

B.E. (Production Engineering) (Semster - I)

SIMULATION AND MODELING

(2008 Course) (Elective-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q. No. 1 or Q. No. 2, Q. No.3 or Q. No.4, Q. No.5 or Q. No.6 , Q. No.7 or Q. No.8, Q. No.9 or Q. No. 10, Q. No. 11. or Q. No. 12.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is allowed.*

SECTION - I

UNIT - I

- Q1)** a) State the events and activities associated with the complete product operation for spur gear. [8]
- b) Discuss any two laws of probability distribution. [8]

OR

- Q2)** a) What do you mean by system modeling? how is it developed explain with suitable example. [8]
- b) Discuss simulation concept by considering queue formed discretely in banking service. [8]

UNIT - II

- Q3)** a) Discuss the applications of simulation in shop floor activities. [8]
- b) Discuss characteristics of M/M/1 queuing model. [8]

P.T.O

OR

- Q4)** a) What is queuing model? How it is useful for Simulation? Example the simulation of single queuing system. [8]
- b) What is system and system environment? List the components of a system with example. [8]

UNIT - III

- Q5)** a) Explain any two methods for input data representation. [10]
- b) Explain meaning of one tailed test and two tailed test. [8]

OR

- Q6)** a) Discuss the methods for selecting families of input distributions when input data available. [10]
- b) Explain methods for Generation of pseudo random numbers. [8]

SECTION - II

UNIT - IV

- Q7)** a) Explain Exponential and Weibull distribution and its properties. [8]
- b) Discuss Factors considered in selecting generator. [8]

OR

- Q8)** a) Explain chi-square goodness of fit test to accept or reject a candidate distribution. [8]
- b) With illustrative example describe the output analysis for steady state simulations. [8]

UNIT - V

- Q9)** a) State the input parameters to be consider in manufacturing system for building simulation model. [9]
- b) State the need of simulation in manufacturing of product. [9]

OR

- Q10)**a) Discuss about a simulation of a automated warehouse system. [8]
- b) Discuss simulation of a season ticket issuing counter at railway station.[10]

UNIT - VI

- Q11)a)** Explain in detail important feature of Arena simulation software. [8]
- b) Compare general purpose and object oriented simulation software package. [8]

OR

- Q12)a)** State key features of simulated factory. [8]
- b) Discuss the steps for development of simulation software. [8]



Total No. of Questions : 12]

SEAT No. :

P2998

[5059]-101

[Total No. of Pages : 2

B.E.(Productin Sandwich)

**PLANT ENGINEERING & MAINTENANCE
(2008 Course)(Elective-II)(Semester-I)(411085D)**

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Explain significance of man power in plant maintenance. [8]
b) What are the principles of plant management? [8]

OR

- Q2)** a) What is significance of training in maintenance department? [8]
b) Discuss classification of maintenance. [8]

- Q3)** a) Explain PQRST analysis. [8]
b) Discuss types of layout. [8]

OR

- Q4)** a) What are basic facilities of plant? [8]
b) What is role of computer in optimization of lay out? [8]

- Q5)** a) Explain CSSDD software for classification and coding. [8]
b) Explain maintenance problem of process type industries. [10]

OR

P.T.O.

Q6) Write short notes on following: [18]

- a) Software's for classification and coding.
- b) Preventive maintenance.
- c) Brake down maintenance.

SECTION-II

Q7) a) What is life cycle costing? [8]

b) Explain mathematical model for life cycle costing model. [8]

OR

Q8) a) Explain various preventive maintenance with life cycle costing. [8]

b) What is preventive management? [8]

Q9) a) What are various types of measures taken in chemical plants related to safety? [8]

b) Explain pollution control issues in chemical plants. [8]

OR

Q10)a) What is energy audit? Explain its importance with example. [8]

b) Explain accident preventive codes and practices. [8]

Q11)a) What is SOAP? [8]

b) Discuss Reliability centered maintenance. [10]

OR

Q12)a) What is Total Productive Maintenance. [10]

b) Explain RAM analysis? [8]



Total No. of Questions : 12]

SEAT No. :

P1825

[Total No. of Pages : 4

[5059] - 102

B.E. (Production Engineering)

**COMPUTER INTEGRATED DESIGN AND
MANUFACTURING**

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt any 3 questions form 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) *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 with suitable example the following concept. Specify differences among them. **[6]**
- i) Wire frame model
 - ii) Surface model
 - iii) Solid mode
- b) A triangle formed by three points A, B, & C whose coordinates are A (30, 10), B (80, 110) & C (50, 50). Calculate the new coordinates if the triangle is reduced in size @ point B using scale factors $S_x = 0.5$ and $S_y = 0.5$. **[10]**

OR

- Q2)** a) What is inverse transformation? Show the inverse transformation for translation and rotation. **[6]**
- b) A rectangle ABCD has vertices A (5,5) B (15,5) C (15,10) and D (5,10). It has to be rotated by 45° in anticlockwise direction about point P (20, 15). Determine the new coordinates of the rectangle. **[10]**

P.T.O

- Q3) a)** State and explain various types of boundary conditions used in the engineering problems. [6]
- b)** Figure 1 shows three springs connected in parallel. One end of the assembly is fixed and at the other end force of 700 N is applied. Determine the deflection of individual spring. [12]

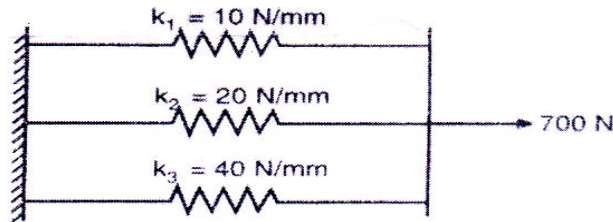


Figure 1

OR

- Q4) a)** Explain following with sketch related to FEA [6]
- Member
 - Local axis
 - Degree of freedom
- b)** A stepped bar is as shown in the figure 2 determine the displacement in each of the sections. Given $E_1 = 70 \text{ GPa}$ and $E_2 = 200 \text{ GPa}$ [12]

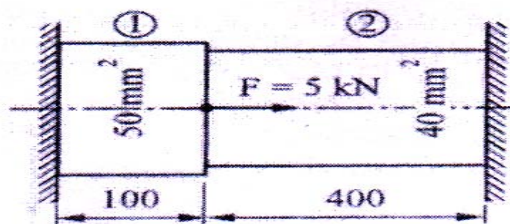


Figure 2

- Q5) a)** Write short note on Linear and Circular Interpolation in CNC. [8]
- b)** Write a CNC program in G and M codes for drilling the two holes in part as shown in the Figure 3 also write remark for each block. [8]

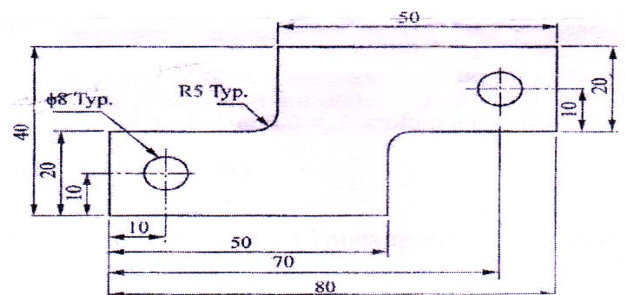


Figure 3

OR

- Q6)** a) Differentiate between Absolute & Incremental Positioning systems [8]
b) Write a CNC program in G and M codes for milling the slot 50 mm X 100mm sides of the part as shown in the Figure 4 also write remark for each block. [8]

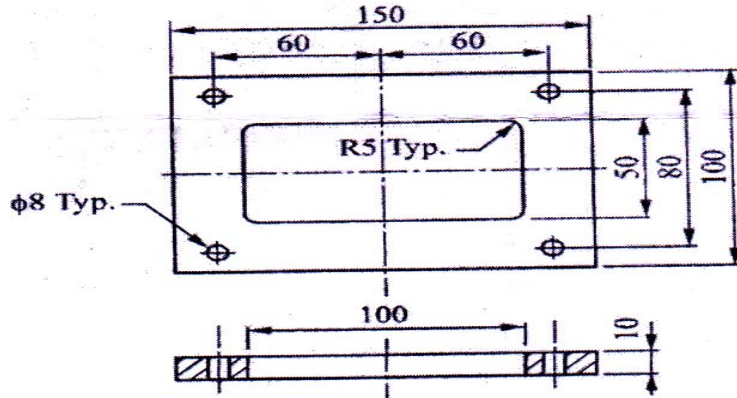


Figure 4

SECTION - II

- Q7)** a) Discuss MRP I & MRP II in modern manufacturing system with sketch [8]
b) Discuss various difficulties encountered in carrying out concurrent Engineering. [8]

OR

- Q8)** a) Explain in brief the following in relation with robot programming. [8]
i) Manual method
ii) Walk through method
iii) Lead through method.
b) Explain following terms related to Robot technology [8]
i) Work Volume
ii) Precision of movement
iii) Spatial resolution
iv) Accuracy
v) Repeatability

Q9) a) What do you mean cellular manufacturing? Explain different types of machine cells. [8]

b) Five machines constitute a GT cell. The From/To data for the machines are shown in the table below, using from/To ratio determine the most logical sequence of machines for this data.

Construct the network diagram, showing where and how parts enter and exists the cell. Also develop a feasible layout plan for the cell based on the solution. [10]

	To				
From	1	2	3	4	5
1	0	10	80	0	0
2	0	0	0	85	0
3	0	0	0	0	0
4	70	0	20	0	0
5	0	75	0	20	0

OR

Q10)a) Draw simple line sketches to indicate the following system in group technology and explain them. [8]

- i) Single machine cell
- ii) Group machine layout
- iii) Flow line design

b) Explain the different steps in Rank Order Clustering (ROC) algorithm for grouping parts and machines. [10]

Q11)a) Explain the scope of integration of CIM model of Digital Equipment corporation (DEC). [8]

b) What is Rapid Prototyping (RP)? List out different RP techniques. Write advantages of RP [8]

OR

Q12)a) Explain with flow chart the concept of NIST-AMRF hierarchical model. [8]

b) What is 3D printing? Explain how product is manufactured from it [8]



Total No. of Questions : 12]

SEAT No. :

P1826

[Total No. of Pages : 3

[5059] - 103

B.E. (Production Engineering)

PROCESS PLANNING AND TOOL SELECTION

(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 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 manufacturing system and what are the main inputs and out-puts of manufacturing system? [8]
- b) Explain the similarities and differences in Job, Batch and Mass types manufacturing. [8]

OR

- Q2)** a) What are the main functions that are incorporated into a manufacturing organization? How do these vary for organizations of different sizes?[8]
- b) Explain the functions of process engineering department in an organization. [8]
- Q3)** a) How many functional surfaces on the work-piece may be identified? What is the purpose of grouping related surfaces or areas? [8]
- b) What is a datum? What is the advantage of using a datum? Is it always possible to establish a physical datum? Explain with example. [8]

P.T.O

OR

Q4) a) What order should be followed for establishing process areas? Why should this order be followed? [8]

b) What is geometric tolerance and how it is defined? How does it relate to a dimensional tolerance? [8]

Q5) a) Explain 3-2-1 location system for a rectangular and cylindrical objects. [6]

b) List the possible causes of work-piece deflection while in the location system of a holding devices. [6]

c) Rules for adding and subtracting dimensions with tolerances. [6]

OR

Q6) Write short notes on [18]

a) Causes of work-piece variations.

b) Methods of work-piece control

c) Tolerance stacking

SECTION - II

Q7) a) Having selected both machine tool and tooling for a specific job, what are the main parameters that can influence the success of the machining? [8]

b) Give the examples of commercial tooling, Regular tooling and Special tooling. What should be the order of procurement of tools? [8]

OR

Q8) a) Suggest a suitable machine tool and cutting tool for following operations: [8]

i) T-slot

ii) Key-way

iii) Internal Gear

iv) Square slot

b) Discuss various tool holding and work holding devices on a radial drilling machine. [8]

- Q9) a)** What are major operations? How do major operations differ from principal process operations? [8]
- b) Discuss the role of computer aided process planning (CAPP) in modern manufacturing. Discuss the benefits of CAPP. [8]

OR

- Q10)a)** What is a qualifying operation? Why are qualifying operations necessary? How do requalifying operations differ from qualifying operations? [8]
- b) What are the advantages and disadvantages of combining operations?[8]

- Q11)a)** What information does the process picture provide? [6]
- b) List the possible use of the process picture. How does a process dimension differ from a part print dimension? [6]
- c) Discuss the meaning of following symbols used in process pictures. [6]

i) 

ii) 

iii) 

iv) 

v) 

vi) 

OR

- Q12)a)** What is an operation routing? Which departments in the plant makes use of operation routing? [6]
- b) What information is provided on operation routing? [6]
- c) Draw a sample operation route sheet and a process picture sheet for a component of your choice? [6]



Total No. of Questions : 12]

SEAT No. :

P2117

[5059]-104

[Total No. of Pages : 2

**B.E. (Production Engineering)
AUTOMOBILE ENGINEERING
(2008 Course) (Elective- III)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) List various types of frame and describe in brief the conventional frame. **[8]**
b) Explain the working of simple carburetor. **[8]**
c) What do you mean by articulated vehicle? **[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) What is the optimum cooling? Explain. **[6]**

OR

- Q4)** a) What is the effect of inadequate cooling and overheating of engine parts? **[8]**
b) What is a pump circulation system? Explain. **[8]**

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

OR

- Q6)** a) What are the requirements of a good ignition system? **[8]**
b) What are the different types of lubricants? **[8]**

P.T.O.

SECTION-II

- Q7)** a) Explain the operation of an epicyclic gear box. [8]
b) Explain the working of differential with the help of Diagram. [8]
c) Why is clutch pedal “free play” important? [2]

OR

- Q8)** a) With the help of neat sketch, explain the construction and operation of sliding mesh gear box. [12]
b) What is mean by double declutching? Explain? [6]

- Q9)** a) Discuss the advantages of Independent suspension over dependent suspension. [8]
b) Sketch and explain Ackermann steering mechanism. [8]

OR

- Q10)** a) What are the advantages and disadvantages of rubber spring? [8]
b) What are the components of the steering system? [8]

- Q11)** a) Write short note on [10]
i) Vacuum brake
ii) Air brake
iii) Caliper
iv) Parking brake
b) What is mean by servicing? And explain different types of servicing. [6]

OR

- Q12)** Give the troubleshooting chart for following with its complaint, cause and remedy. [16]
a) Gear box
b) Cooling system



Total No. of Questions : 12]

SEAT No. :

P2999

[5059]-105

[Total No. of Pages : 3

**B.E. (Production)
MECHATRONICS**

(2008 Course) (Elective - III) (Semester - II) (411089 - B)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right indicate full marks.*
- 4) *Assume suitable data wherever necessary.*

SECTION - I

- Q1)** a) Compare PLC's with other types of controllers. [8]
b) What are the common error checking techniques in PLCs? Explain in detail Parity. [8]

OR

- Q2)** a) Describe with neat sketch Overall PLC system. [8]
b) What are the areas where we can use PLCs? Explain in detail its use in automobile and manufacturing sectors. [8]

- Q3)** a) What are types of rack enclosures in PLCs? Explain in detail. [8]
b) Explain in detail any two electrical and environmental I/O discrete specifications of PLCs. [8]

OR

- Q4)** a) Write in short about any two Mechanical and Electrical specifications of PLC. [8]
b) Explain with neat sketch and example I/O rack and table mapping. [8]

- Q5)** a) Explain with neat sketch analog input/output data handling. [8]
b) Explain the analog input block in PLC ladder programming with details of each parameter. [10]

OR

P.T.O.

- Q6)** a) Explain with neat sketch transformation of binary data into an analog signal. [8]
- b) An input module, which is connected to a temperature transducer, has an A/D with a 12-bit resolution. When the temperature transducer receives a valid signal from the process (0° C to 500°C), it provides, via a transmitter, a +1 to +5 VDC signal compatible with the analog input module. [10]
- i) Find the equivalent voltage change for each count change (the voltage change per degree Celsius change) and the equivalent number of counts per degree Celsius, assuming that the input module transforms the data into a linear 0 to 4095 counts, and
- ii) Find the same values for a module with a 10-bit resolution.

SECTION - II

- Q7)** a) What are positioning interfaces? Explain with neat sketch PLC system using stepper modules to control three axes. [8]
- b) With neat block diagram explain the direct action I/O interface and intelligent I/O interface. [8]

OR

- Q8)** a) Explain one-short output instruction and transitional contact instruction. [8]
- b) With neat diagrams explain any TWO types of special discrete interfaces. [8]
- Q9)** a) Write any four ladder relay instructions with associated symbol and functions. [8]
- b) Write in detail about the data transfer instructions in PLC programming. [8]

OR

- Q10)** a) Describe the function of ON-delay energize timer and ON-delay de-energize timer instruction. [8]
- b) Write in short about any two arithmetic instructions used in PLC programming. [8]

- Q11)a)** Explain with neat sketch principle of working of LVDT. [9]
- b) What is RTD? Explain its principle of operation and working in bridge circuit. [9]

OR

- Q12)a)** What are thermistors? Explain in short its types. [8]
- b) What are types of displacement transducers? Explain any one with suitable sketch. [10]



Total No. of Questions : 12]

SEAT No. :

P1827

[Total No. of Pages : 3

[5059] - 106

B.E. (Production)

METAL WORKING TRIBOLOGY

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Figures to the right indicate full marks.*
- 2) *Assume suitable data, if necessary.*
- 3) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

UNIT - I

- Q1)** a) Explain theory of Ergodicity. [6]
b) How to evaluate contact stiffness. Explain? [10]

OR

- Q2)** a) How to do characterization of any surface. [6]
b) Explain Abbot's bearing area curve with distribution of asperities heights. [10]

UNIT - II

- Q3)** a) What is the significance of friction in tribology along with examples of tribological contacts where friction is often proportional to normal load and where it is not? [8]
b) Explain stick slip motion phenomenon. [10]

OR

- Q4)** a) Differentiate between adhesive and abrasive theories of friction. [8]
b) How to measure dynamic coefficient of friction. Explain? [10]

P.T.O

UNIT - III

- Q5)** a) Define wear. Explain different forms of wear. [6]
b) Differentiate between abrasive wear and erosive wear. Elaborate erosive wear. [10]

OR

- Q6)** a) Explain lubrication used for "Wire drawing extrusion" and give other applications for the lubricants used in wire drawing extrusion. [10]
b) Explain "abrasive wear" with its applications. [6]

SECTION - II

UNIT - IV

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

OR

- Q8)** a) Elaborate different modes of lubrication. [12]
b) What are the characteristics required for lubricants? Enlist them. [4]

UNIT - V

- Q9)** a) Derive 'Petroff' equation involving concentric bearing. [12]
b) Explain significance of "Bearing power". [6]

OR

- Q10)** a) Briefly describe the principle behind hydrostatic lubrication [10]
b) Find out leakage in liters/min through a shaft of 43mm Φ which is running concentric to sleeve of 30.5 mm Φ , 43mm length using water under pressure of 6 bars. [8]

UNIT - VI

- Q11)** a) Derive an equation for two circular plates approaching each other involving squeeze film operation. [10]

- b) Two circular plates of 110 mm Π approaching each other with velocity of 11.5 cm/s in liquid of $\mu=0.045$ Pas. Find out pressure, load and time for film thickness to come down from 0.2 mm to 0.029 mm. [6]

OR

Q12)a) Derive squeeze film equation for rectangular plate approaching a rigid surface. [10]

- b) Write short notes on : [6]

- i) Metal working case tribology
- ii) Tyre - Road tribology



Total No. of Questions : 12]

SEAT No. :

P3000

[5059]-107

[Total No. of Pages : 4

B.E. (Production)

FINITE ELEMENT ANALYSIS

(Elective - III) (2008 Course) (411089) (Semester - II)

Time : 3 Hours]

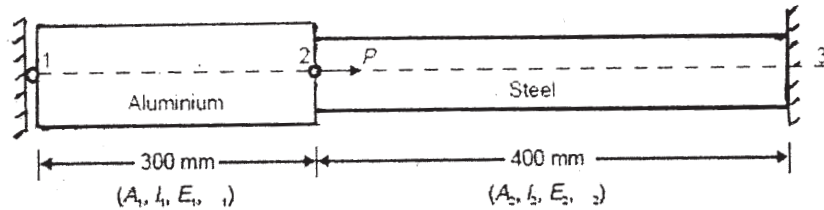
[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from Section I and any three questions from Section II.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assumptions made should be clearly stated and justified.

SECTION - I

- Q1)** a) Briefly discuss the steps of FEM and peculiarity of FEM in different engineering field. [6]
- b) Determine the nodal displacements at node 2, stresses in each material and support reactions in the bar shown in Fig. due to applied force $P = 400 \times 10^3$ N and temperature rise of 30°C . Given: $A_1 = 2400$ mm², $A_2 = 1200$ mm², $E_1 = 0.7 \times 10^5$ N/mm², $E_2 = 2 \times 10^5$ N/mm² and $\alpha_1 = 22 \times 10^{-6}/^\circ\text{C}$, $\alpha_2 = 12 \times 10^{-6}/^\circ\text{C}$, $E = 200 \times 10^5$ N/cm². [10]

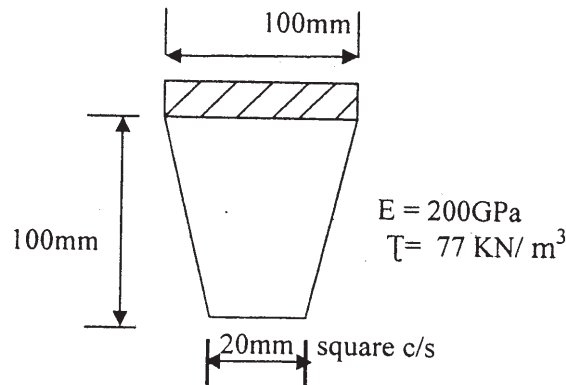


OR

- Q2)** a) Derive stiffness matrix and load vector using any one of the approach. [6]
- b) A beam of length 20 m, fixed at one end and supported by a roller at the other end carries a 20 kN concentrated load at the centre of the span. By taking the modulus of elasticity of material as 250 GPa and moment of inertia as 20×10^{-6} m⁴. Determine: [10]
- i) Deflection under load.
 - ii) Shear force and bending moment at mid span.
 - iii) Reactions at supports.

P.T.O.

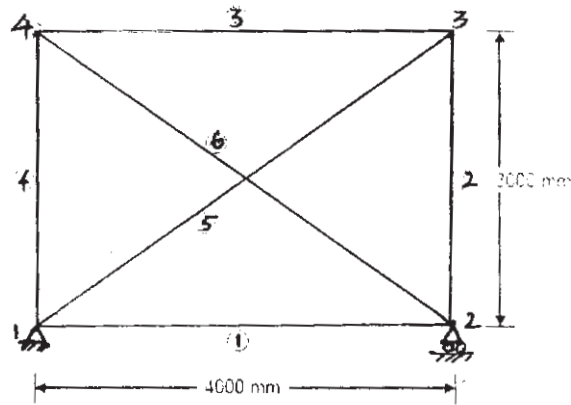
- Q3)** a) State and explain generalized Hook's law. [6]
- b) Find the deflection at free end under its own weight using 1, 2, 3 elements for taper Bolt (bar) refer fig. [10]



OR

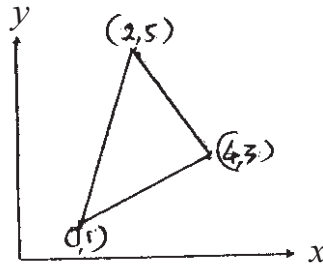
- Q4)** a) Discuss the concept of Local and Global co-ordinate system with respect to frame element. [8]
- b) Write short notes on (Any two): [8]
- Geometric isotropy / Geometric Invariance.
 - Galerkin's method.
 - Mesh generation.
 - Boundary conditions.
- Q5)** a) Briefly discuss Isoparametric representation. [6]
- b) Fig. shows an indeterminate pin connected plane stress with cross sectional area of diagonal members equal to 2000 mm^2 and all other members with cross sectional area of 1000 mm^2 . If Young's modulus $E = 200 \text{ kN/mm}^2$. [12]
- Assemble global stiffness matrix.
 - Determine load vector if temperature of member 1-3 increases by $25 \text{ }^\circ\text{C}$. Given $\alpha = 12 \times 10^{-6}/^\circ\text{C}$.

- iii) Determine load vector if member 1-3 is longer by 0.2 mm.
- iv) Introduce Boundary Conditions.



OR

- Q6)** a) Discuss problem modeling. [6]
 b) For a CST element shown in Fig.. Obtain the strain-displacement matrix. Assume Poisson's ratio is zero and Young's modulus is constant. [12]



- i) Derive stiffness matrix for a CST element by direct approach.
- ii) Differentiate between the terms 'lumped loads' and consistent loads.

SECTION - II

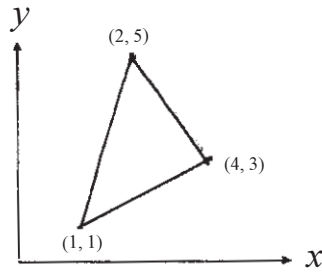
- Q7)** a) Solve the Differential equation by following methods. [12]

$$\frac{d^2u}{dx^2} + 9u - 6x = 0 \quad \text{B.C.s : } u(0) = 0 \quad u(1) = 0$$

- i) Finite Difference Method.
 - ii) Petro Galerkin method.
- b) Derive stiffness equation for a spar element oriented arbitrarily in a 2 - dimensional plane. [6]

OR

Q8) For a CST element shown in Fig. Obtain the strain - displacement matrix. Assume Poisson's ratio is zero and Young's modulus is constant. [16]



- Q9)** a) Derive the expression for consistent load vector due to self-weight in a CST element. [6]
- b) The thermal conductivity of a stainless steel rod of 0.1 m length and area of cross section of 1 cm² is 20 W/m-°C. The rate of heat generation in the rod is 10⁵ W/m³. One end of the rod is kept at 0°C and the other end at 100 °C. The rod is insulated except at the ends. Using finite element with two elements, find out the temperature at the mid-point of the rod. Also, find out the heat flow at the ends of the rod using FEM. Compare the results with the exact solution. [10]

OR

- Q10)** Attempt any two: [16]
- Skyline Storage Technique.
 - FEA Package.
 - Isoparametric elements.
 - 'Lumped loads' and consistent loads.

- Q11)** Write short notes on: [16]
- Mesh generation.
 - FEA packages.
 - Boundary conditions.
 - Quality checks.

OR

- Q12)** Make a flow chart of FEM program for solving the plane stress problem; it should have a provision for adaptively refining the mesh based on the error analysis. [16]



Total No. of Questions : 12]

SEAT No. :

P3001

[5059]-108

[Total No. of Pages : 2

B.E.(Production)

**WORLD CLASS MANUFACTURING
(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 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 manufacturing and business excellence in short. **[8]**

b) Explain Schonberger WCM model. **[8]**

OR

Q2) a) Explain Gunn's WCM model. **[8]**

b) Discuss merits & demerits of Maskell's WCM model. **[8]**

Q3) a) Explain best practices of world leading manufacturing plant. **[8]**

b) Discuss value stream mapping. **[8]**

OR

Q4) a) Explain bench marking system. **[8]**

b) What are advantages of Toyota Production system? **[8]**

Q5) a) Discuss Just In Time manufacturing system. **[8]**

b) Explain in detail Total Productive Maintenance. **[10]**

OR

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

- a) 5S
- b) Flexible Manufacturing system.
- c) Store practice of WCM.

P.T.O.

SECTION-II

- Q7)** a) Explain features of HR department of WCM organization. [8]
b) Write short note on “people are used as problem solver in WCM” [8]

OR

- Q8)** a) Explain various motivation techniques of WCM organization? [8]
b) Discuss importance of training in WCM organization [8]
- Q9)** a) Explain features of modern performance system? [8]
b) What is TOPP system of WCM performance? [8]

OR

- Q10)**a) Explain AMBIT tool of performance measurement. [8]
b) What is POP system? [8]
- Q11)**a) Write short note on “clean manufacturing system”. [8]
b) What is green manufacturing? Explain its significance. [10]

OR

- Q12)**a) Discuss agile manufacturing. [8]
b) Explain any one case study of MNC related to WCM. [10]



Total No. of Questions : 12]

SEAT No. :

P3002

[5059]-110

[Total No. of Pages : 2

B.E.(Production)

TOTAL QUALITY MANAGEMENT

(2008 Course)(Elective-IV)(Semester-II) (411090)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Describe importance of quality council. [10]
b) Explain various steps in Quality Planning. [8]

OR

- Q2)** a) Explain relation of quality and price, quality and market share with suitable examples. [10]
b) What are the various dimensions of Quality? [8]
- Q3)** a) Why customer complaints are important in organization? [8]
b) How PDCA is useful in TQM? [8]

OR

- Q4)** a) Explain concept of Taguchi Loss Function. [8]
b) Discuss Crosby s 14-point programme. [8]
- Q5)** a) Explain meaning of Nominal Group Technique. [8]
b) Explain concept of TPM. [8]

OR

- Q6)** a) Discuss advantages of QFD in TQM implementation. [8]
b) What are the reasons of Benchmarking? [8]

P.T.O.

SECTION-II

- Q7)** a) Draw and explain bath-tub curve. [10]
b) Explain stages in FEMA. [8]

OR

- Q8)** a) Discuss how to improve system reliability. [10]
b) Explain concept of maintainability and availability. [8]
- Q9)** a) Why supplier partnership is important to organization? [8]
b) Discuss the meaning of six sigma. [8]

OR

- Q10)**a) Which qualities are required for leadership in organization? [8]
b) Explain various stages of CMMI. [8]
- Q11)**a) Discuss types of control charts used for study of attributes. [8]
b) What are the expectations in ISO 14001 from organization? [8]

OR

- Q12)** Write short notes on the following: [16]
- a) Discuss Benefits of ISO 14001:2004
b) ISO 9001:2000 Quality Management system standard.



Total No. of Questions : 12]

SEAT No. :

P3760

[5059]-111

[Total No. of Pages : 7

B.E. (Production S/W)

OPERATION RESEARCH AND MANAGEMENT

(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

Q1) a) What are the advantages and limitations of Linear programming. [6]

b) Maximize $Z = 40x_1 + 100x_2$ [10]

Subjected to

$$12x_1 + 6x_2 \leq 3000$$

$$4x_1 + 10x_2 \leq 2000$$

$$2x_1 + 3x_2 \leq 900$$

$$x_1, x_2 \geq 0$$

Solve the problem by graphical method.

OR

Q2) a) A company has two plants, each of which produces and supplies two products A and B. The plants can each work up to 15 hours a day. In plant 1, it takes 4 hours to prepare and pack 1500 gallons of A, and 1.5 hours to prepare and pack a quintal of B. In plant 2, it takes 3 hours to prepare and pack 1500 gallons of A and 2 hours to prepare and pack a quintal of B. In plant 1, it costs Rs 20000 to prepare and pack 1500 gallons of A and Rs. 33000 to prepare and pack a quintal of B, whereas in plant 2 these costs are Rs. 22000 and Rs. 30000 respectively. The company is obliged to produce daily at least 15000 gallons of A and 10 quintals of B. [6]

P.T.O.

Formulate this problem as an L P model to find out as how the company should organize its production so that the required amounts of two products be obtained at the minimum cost.

b) Minimize $Z = 4x_1 + x_2$ [10]

Subjected to

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 3$$

$$x_1, x_2 \geq 0$$

Solve the problem by Big M method.

Q3) a) Distinguish between transportation model and assignment model. [6]

b) Four different jobs are to be done on four different machines. The setup and production times are prohibitively high for changeover. Following table gives the cost of producing jobs i on machine j in rupees. [10]

		Machines			
		M_1	M_2	M_3	M_4
Jobs	J_1	5	7	11	6
	J_2	8	5	9	6
	J_3	4	7	10	7
	J_4	10	4	8	3

Assign jobs to different machines so that the total cost is minimized.

OR

Q4) a) What is meant by optimality test in transportation problem? [6]

b) Find the feasible solution of following transportation problem Vogel's Approximation method (VAM) [10]

		D_1	D_2	D_3	D_4	Availability
		O_1	21	16	25	13
O_2	17	18	14	23	13	
O_3	32	27	18	41	19	
Requirement	6	10	12	15		

- Q5) a)** What are the different Inventory costs? Explain each cost in detail. [6]
- b) Find the optimal order quantity for a product for which the price breaks are as follows: [12]

Quantity	Unit Cost (Rs.)
$0 < q < 600$	Rs. 11.00
$600 \leq q < 850$	Rs. 10.00
$850 \leq q$	Rs. 8.00

The monthly demand for the product is 300 units, Storage cost is 1.5% of the unit cost and the cost of the ordering is Rs. 120.

OR

- Q6) a)** What are the various assumptions made while dealing with sequencing problems? [6]
- b) Find the sequence for following eight jobs, that will minimize the total elapsed time for the completion of all jobs. Each job is processed in same order CAB. Entries in following table give the time in hours on the machines. [12]

	Jobs	1	2	3	4	5	6	7	8
Times in machine in hours	Machine A	4	6	7	4	5	3	6	2
	Machine B	8	10	7	8	11	8	9	13
	Machine C	5	6	2	3	4	9	15	11

SECTION - II

- Q7) a)** An Airline has one reservation clerk on duty at a time. He handles information about flight schedules and makes reservations. All calls to the airline are answered by an operator. If a caller request information or reservation, the operator transfer that call to reservation clerk. If the clerk is busy, the operator ask the caller to wait, when the clerk becomes free the operator transfer him the call of person who has been waiting for the longest.

Assume that arrival and services follow Poisson and exponential distributions. Calls arrive at rate of ten per hour, and the reservation clerk can service a call in four minutes on average. [8]

- i) What is the average number of calls waiting to be connected to the reservation clerk?
- ii) What is the average time of caller must wait before reaching the reservation clerk?
- iii) What is the average time for a caller to complete the call (i.e. waiting time plus service time)?

b) Solve the game whose pay off matrix is given by [8]

		B		
		I	II	III
A	I	-2	15	-2
	II	-5	-6	-4
	III	-5	20	-8

OR

Q8) a) Solve the following game by dominance rule: [8]

		Player			
		B			
Player A		3	2	4	0
		3	4	2	4
		4	2	4	0
		0	4	0	8

Find optimal strategy for palyer A and B and game value.

- b) A repair shop attended by a single mechanic has an average of 4 customers per hour who bring small appliances for rapier. The machanic inspects them for defects and quite often can fix them right away or otherwise render a diagnosis. This takes him 6 minutes on the average. Arrivals are Poisson and service time has the exponential distribution. Find [8]

- i) the proportion of time during which the shop is empty.
- ii) the probability of finding at least one customer in shop.
- iii) average number of customers in the system.
- iv) the average time, including service, spent by customer.

Q9) a) Explain basic steps in Monte - Carlo Simulation technique. **[6]**

b) A production line turns out about 50 cars/day with the following probability distribution: **[12]**

Production/day	45	47	49	51	53	55	46	48	50	52	54
Probability	0.03	0.07	0.15	0.15	0.07	0.03	0.05	0.10	0.20	0.10	0.05

Finished cars are transported by train at the end of the day. If the train capacity is only 51, what will be the average number of cars waiting to be shipped and what will be the average number of empty spaces on the train? Simulate a 8 days operation with Random Numbers

37,35,63,25,50,71,95,16

OR

Q10)a) What is replacement problem? When does it arise? **[6]**

b) A firm is considering replacement of a machine whose cost price is Rs. 17500 and the scrap value is Rs. 500. The maintenance cost (Rs) are found from experience as follows: **[12]**

Years	1	2	3	4	5	6	7	8
Maintenance cost (Rs)	200	300	350	1200	1800	2400	3300	4500

when should be the machine replaced?

Q11)a) State the circumstances where the CPM is a better technique of project management than PERT. **[6]**

b) A research and development department is developing a new power supply for a console television set. It has broken the job down into the following: **[10]**

Job	Description	Immediate Predecessors	Time (days)
A	Determine the out put voltage	-	5
B	Determine whether to use solid state rectifiers	A	7
C	Choose rectifiers	B	2
D	Choose filters	B	3
E	Choose Transformer	C	1
F	Choose chassis	D	2
G	Choose rectifier mounting	C	1
H	Layout chassis	E,F	3
I	Build and test	G,H	10

- i) Draw a network diagram.
- ii) Tabulate earliest start, earliest finish, latest start and latest finish time for all the stages.
- iii) Find the critical path and the assembly duration.

OR

Q12)a) Explain the meaning of crashing in network techniques. **[6]**

b) A small project is composed of 7 activities whose time estimates are listed in the table below: **[10]**

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

- i) Draw a network diagram and what is expected project length?

- ii) Find the critical path after estimating the earliest and latest event times for all nodes.
- iii) What is the probability of the project will be completed at least three weeks earlier than expected? No more than 3 weeks later than expected?
- iv) If the project due date is 18 weeks, what is the probability of not meeting the due date.



Total No. of Questions : 12]

SEAT No. :

P2118

[5059]-112

[Total No. of Pages : 2

**B.E.(Production S/W)
MECHATRONICS AND ROBOTICS
(2008 Course) (402045)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section I and any Three Question 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 1or2, 3or4, 5or6, 7or8, 9or10,11or12.*

SECTION-I

- Q1)** a) Define Mechatronics & justify CNC is a mechatronic system justify. [10]
b) Explain the elements of measurement system. [8]

OR

- Q2)** Explain the following(any 3) [18]
a) Inverting & Non-Inverting OPAMP with its gain.
b) Binary Resistor based DAC.
c) Multiplexer.
d) Signal conditioning importance

- Q3)** a) Explain architecture of simple microprocessor. [8]
b) Draw the architecture of 8085 microprocessor. [8]

OR

- Q4)** a) Explain basic structure of microcomputer. [6]
b) TTL & CMOS input, output levels. [6]
c) pseudo codes [4]

P.T.O.

- Q5)** a) Importance of assembly language with example. [8]
b) Write an assembly language programme to measure minimum pressure for pressure measuring device. [8]

OR

- Q6)** a) Explain the requirements of interface. [8]
b) Explain single & double Handshaking. [8]

SECTION-II

- Q7)** a) Explain the basic structure of PLC with block diagram. [8]
b) Explain criteria for selection of PLC & specification of PLC. [8]

OR

- Q8)** a) Draw the PLC ladder circuit for traffic signal control. [10]
b) Explain concept of latching with example. [6]

- Q9)** a) Write a short note on Stepper motors. [8]
b) State & Explain sensors used to measure following. [8]
i) Temperature
ii) Force
iii) Displacement
iv) Fluid pressure.

OR

- Q10)** Explain the following. [16]
a) Relays
b) Magnetic grippers.
c) Mechanical actuators
d) PID controller

- Q11)**a) Define Robot & generations of robot. [9]
b) Explain different configurations of robot with their work volumes. [9]

OR

- Q12)** Write a short note on the following: [18]
a) Components of industrial robot.
b) Motion control in robots.
c) Applications of Robot in Military & Medical field.



Total No. of Questions : 12]

SEAT No. :

P3003

[5059]-113

[Total No. of Pages : 3

**B.E. (Production Sandwich Engineering)
ADVANCED PRODUCTION TECHNOLOGY
(2008 Pattern) (411123) (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) *Answer Three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*

SECTION - I

Q1) Explain in detail the following: **[18]**

- a) High Speed Machining.
- b) Dry machining operations.
- c) Physical aspects of Hard Part Machining.

OR

Q2) a) Differentiate between Wet, Dry and Near Dry Machining. **[9]**

- b) Discuss the basic need and applications of following: **[9]**
- i) High Speed Machining.
 - ii) Dry machining.
 - iii) Hard Part Machining.

Q3) State the basic aspects of Nano-Manufacturing. What machining operations are carried out and what kinds of products are manufactured at nano scale? **[16]**

OR

Q4) Explain with neat diagram any two Fine Finishing Processes: **[16]**

- a) Basic Principle.
- b) Manufacturing setup.

P.T.O.

Q5) Explain the following in detail: [16]

- a) Computer Integrated Production Management System,
- b) Material Requirement Planning.
- c) Part Classification and Coding for Group Technology.
- d) Machine Cell Design.

OR

Q6) a) What are the objectives of Rapid Prototyping? [6]

b) How Computer aid can facilitate the following: [10]

- i) Quality Control.
- ii) Inventory Management.
- iii) Production Management?

SECTION - II

Q7) Explain the following: [18]

- a) Continuous Transfer systems.
- b) Revolving Feeder.
- c) Non Synchronous Material Transfer.
- d) Automated Warehouse.

OR

Q8) Explain the following: [18]

- a) Vibratory Bowl Feeders.
- b) Automated Guided Vehicles.
- c) Components of FMS.
- d) Frame work of Toyota Production System.

Q9) Explain the following: **[16]**

- a) Principles of Hydraulics.
- b) Filtration Technology.
- c) Principles of Pneumatics.
- d) Pneumatic Cylinders.

OR

Q10) Explain the following: **[16]**

- a) Hydraulic Fluids.
- b) Hydraulic Pumps.
- c) Pneumatic Actuators.
- d) Air Motors.

Q11) With the help of circuits, explain how synchronizing of two linear actuators are achieved by connecting them in series and in parallel. **[16]**

OR

Q12)a) Explain the hydraulic regenerative and sequencing circuit. **[8]**

- b) Explain with neat diagrams closed loop Electro hydraulic control system and open loop hydraulic system. **[8]**

x x x

Total No. of Questions : 12]

SEAT No. :

P2119

[5059]-115

[Total No. of Pages : 2

**B.E. (Production Sandwich Engineering)
AUTOMOBILE ENGINEERING (Elective-I)
(2008 Course)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *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) Classify the vehicles on the basis of different aspects. [8]
b) Describe the working of two stroke petrol engine with neat diagrams. [8]
c) Why is the frame narrow at the front? [2]

OR

- Q2)** a) List various types of frame and describe in brief the conventional frame. [8]
b) Describe the working of four stroke petrol engine with neat diagram. [8]
c) What do you mean by articulated vehicle? [2]

- Q3)** a) What is the purpose of a radiator in an automobile? Explain its construction. [8]
b) What is the optimum cooling? Explain. [8]

OR

- Q4)** a) Explain water cooling system with the help of diagram. [8]
b) What is the effect of inadequate cooling and overheating of engine parts? [8]

- Q5)** a) What are the functions of the lubrication system in an automobile? [8]
b) Explain Battery ignition system. [8]

OR

P.T.O.

- Q6)** a) Explain in brief wet sump lubrication. [8]
b) What are the requirements of good ignition system? [8]

SECTION-II

- Q7)** a) Explain the operation of an epicyclic gear box. [8]
b) What is hydraulic clutch? How does it work? [7]
c) Why is clutch pedal “free play” important? [3]

OR

- Q8)** a) With the help of neat sketch, working of synchromesh gear box. [12]
b) What is meant by double declutching? Explain? [6]

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

OR

- Q10)** a) Write a short note on self levelling suspensions. [8]
b) What are the components of the steering system? [8]

- Q11)** a) Describe in brief the construction and working of drum brakes. [10]
b) Why disc brakes are better than drum type brakes? [6]

OR

- Q12)** a) Give the troubleshooting chart for cooling system with its complaint, cause and remedy. [8]
b) Explain different types of maintenances with example. [8]



Total No. of Questions : 12]

SEAT No. :

P2120

[5059]-116

[Total No. of Pages : 3

B.E. (Production.S/W)

COMPUTER INTEGRATED MANUFACTURING AND INDUSTRIAL ROBOTICS

(2008 Course) (Semester-I) (Elective-I) (411124C)

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 or 2,3 or 4,5 or 6,7 or 8,9 or 10,11 or 12.*

SECTION-I

Q1) a) List Out the different models used in CIM? Draw the neat sketch of Simens. **[12]**
model and compare with various Models?

b) Explain Software requirement Models in CIM. **[4]**

OR

Q2) a) Explain the Role of in Rapid Prototyping in Medical 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 Dynamic of Robotics. **[8]**

b) Derrive the equation of Kinematics using Homogeneous Transformation. **[8]**

OR

Q4) a) Explain the Principle of Dennaati-Hartenberg s convention for dynamics Analysis of Joints along with suitable example. **[12]**

b) Explain Simulation in Spatial mechanism. **[4]**

P.T.O.

- Q5)** a) Explain the drives used in Robotics. [6]
b) Using a schematics diagram represent a hydraulic circuit to explain the Drives system of bang-bang robot having waist motion.Shoulder and Arm expansion respectively. [12]

OR

- Q6)** a) Explain Electrical Actuators used in typical Robot along with sketch. [10]
b) Write a short note on Power transmission system in Robotics. [4]
c) Explain the concept of basics motion System. [4]

SECTION-II

- Q7)** a) Explain specials types Grippers used in Robotics. [8]
b) A 17.5 kg rectangular block is gripped in the middle and lifted vertically At velocity 3 m/s.If it accelerates to this velocity at 35.5 m/s^2 and the Coefficient of friction between the gripping pad and block is 0.5 Calculate minimum force that would prevent slippage. [8]

OR

- Q8)** a) Explain concept finite element analysis in grippers designs for special type of gripper. Design for Glass Industry. [8]
b) Write a short note on design consideration for gripper design. [8]

- Q9)** a) What are the different types of Sensors used in Robotics For Forming Application? [8]
b) Distinguish between tactile sensor and non Tactile Sensors. [4]
c) What do you mean by range sensors and proximity sensors? [4]

OR

- Q10)**a) What is robot vision? What are the types of vision sensors used to take the Image of an object?. [8]
b) Explain Important technique use in robot Vision System. [8]
i) Thresholding
ii) Region growing
iii) Edge detection
iv) Template Matching

- Q11)a)** Explain along with sketch the application Robot in the following Area. **[12]**
- i) Foundry
 - ii) Welding
 - iii) Paintaining
 - iv) Sugar Industry
- b) Explain the application of Robot in Mining Industry detail. **[6]**

OR

Q12) Write a short note on following. **[18]**

- a) Modular Design Concept in Robotics for Construction Work
- b) Obstacles avoidance technique in robotics.
- c) VAL Languages used for programming in robot.



Total No. of Questions : 12]

SEAT No. :

P 3004

[5059] - 117

[Total No. of Pages :2

**B.E. (Production - Sand witch)
PLASTIC ENGINEERING (411124)
(Elective -1) (2008 Course) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION -I

- Q1)** a) Discuss basic chemistry of plastic material Structure. [8]
b) Explain importance of additives used in plastics. [10]
OR
- Q2)** a) Discuss the classification of plastic. [8]
b) Explain concept of condensation in plastic. [10]
- Q3)** a) Discuss working of screw type injection moulding machine with suitable sketch. [8]
b) Discuss specifications used in injection molding machine with suitable sketches [8]
OR
- Q4)** a) Explain how to select proper parting line in mould with suitable sketches. [8]
b) Discuss use of insert in core and cavity design with suitable sketches. [8]
- Q5)** a) Explain blown film extrusion with suitable sketch. [8]
b) Explain working of single screw extruder with suitable sketch. [8]
OR

- Q6)** a) Describe single screw extruder with suitable sketch. [8]
b) Discuss various limitations observed in extrusion. [8]

SECTION -II

- Q7)** a) What are the different materials used in blow molding? [10]
b) Describe similarities and differences in injection & extrusion molding processes. [8]

OR

- Q8)** a) Explain rotary blow molding system with suitable sketches. [8]
b) Explain procedure to be used in manufacturing bottle of one liter with suitable sketches [10]

- Q9)** a) Describe plug assist-forming thermoforming of PP sheets. [8]
b) Explain vacuum forming male moulding with suitable sketches. [8]

OR

- Q10)**a) What are the problems observed in thermoforming? [8]
b) Explain thermoforming by skeleton tooling with suitable sketch. [8]

- Q11)**a) Explain tumbling and polishing operations in plastic. [10]
b) Explain important considerations in tapping and sawing operations in plastic. [6]

OR

- Q12)**a) Explain i) Filing. ii) Buffing. [10]
b) Explain milling and turning operations in plastics. [6]



Total No. of Questions : 12]

SEAT No. :

P2121

[5059]-119

[Total No. of Pages : 2

B.E. (Production) (S/W)

MATERIALS MANAGEMENT AND LOGISTICS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, & Q11 or Q12.*
- 4) *Use of electronic pocket Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

SECTION-I

- Q1)** a) What is value of a product from customers point view? Explain methods to improve the value of the product. [9]
- b) What are the objectives of materials management? [9]

OR

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

- Q3)** a) Write note on Import Substitution in Indian context. [8]
- b) Explain 5 R's in Purchasing in detail. [8]

OR

- Q4)** a) Vendor selection and Vendor development is an important step in purchasing. Justify. [8]
- b) What is Vendor development? Explain any one method of vendor rating in brief. [8]

P.T.O.

- Q5)** a) What is store identification? Explain KODAK system of codification briefly. [8]
b) Explain mechanical waste disposal system in detail. [8]

OR

- Q6)** a) Explain various causes of surplus and obsolete stock. [8]
b) Explain stores ledger and stock verification. [8]

SECTION-II

- Q7)** a) Explain various modes of transportation. What are the factors on which best transportation mode is selected? [8]
b) Explain Logistics in Detail. [8]

OR

- Q8)** a) List the types of warehouses and explain any one in detail. [8]
b) List and explain in brief economic and service benefits of warehousing. [8]

- Q9)** a) Explain, Selective inventory control is necessary in large scale industries. [8]
b) BATA industry estimates that it will sell 24000 units of the product for the forthcoming year. The ordering cost is Rs. 150 per order, and the carrying cost per unit per year is 20% of the purchase price per unit which is Rs.50. Find. [8]
i) Economic Order Quantity
ii) No. of orders per year
iii) Time between successive orders.

OR

- Q10)** Derive expression for Economic Order Quantity (EOQ) assuming instantaneous replenishment system. Give example of your choice. [16]

- Q11)** a) Explain the types of costs associated with inventory control. [6]
b) Derive the formula for Economic Manufacturing Quantity when replenishment is non instantaneous (Gradual). State the assumptions made. [12]

OR

- Q12)** a) Explain Fixed Period (P) system of inventory control in brief. [6]
b) Explain the effects of discounts on the cost of item if the quantity purchased is increased. [12]



Total No. of Questions : 12]

SEAT No. :

P2107

[5059]-12

[Total No. of Pages : 3

B.E.(Civil)

EARTHQUAKE ENGINEERING

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

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *From section I answer Q1 or Q2,Q3 or Q4,Q5 or Q6 and from section -II answer Q7 or Q8,Q9 or Q10,Q11 or Q12.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures in bold to the right, indicate full marks.*
- 4) *IS 456, IS 1893, IS 13920 are allowed in the examination.*
- 5) *Neat diagrams should be drawn where ever necessary.*
- 6) *If necessary, assume suitable data and indicate clearly.*
- 7) *Use of electronic pocket calculator is allowed.*

SECTION-I

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

OR

- Q2)** a) What do you understand by Magnitude and size of earthquake? Classify the earthquake based on magnitude. **[8]**
- b) Explain the interior of the earth with neat sketches? Define Isoleismal and describe their uses? **[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 $K=25\text{kN/m}$ [16]

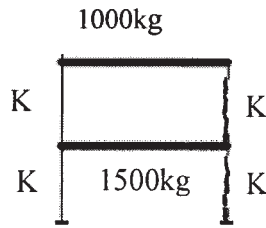


Figure 4.1

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

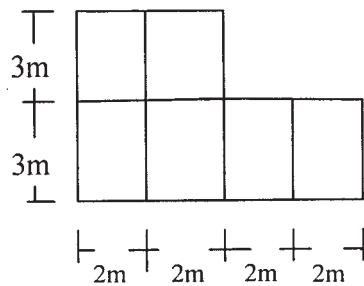


Figure 5.1

OR

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

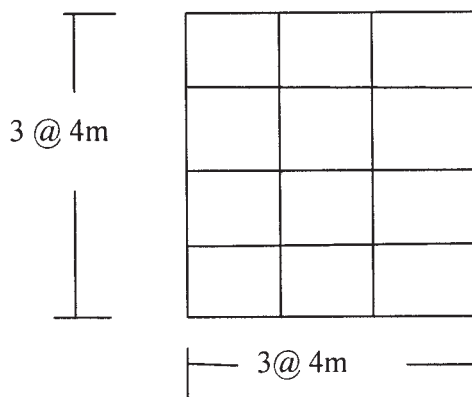


Figure 6.1

SECTION-II

Q7) a) What is the necessity of ductile detailing? Explain with neat sketches the detailing for stair case 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 Local retrofitting techniques for RC buildings? [8]

b) A 400mmX400mm column is supported on an isolated footing. The load coming on footing is 500 kN and a moment 30kN.m. The SBC is 150kN/m². Using M25 grade of concrete and steel grade Fe415, 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. :

P1828

[Total No. of Pages : 3

[5059] - 121

B.E. (Production S/W)

PRODUCT DEVELOPMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Que. No. 1 or Que. No. 2, Que. No.3 or Que. No.4, Que. No.5 or Que. No.6 from Section - I and Que. No.7 or Que. No.8, Que. No.9 or Que. No. 10, Que. No. 11. or Que. No. 12. from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

UNIT - 1

- 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]

P.T.O

UNIT - 2

- Q3)** a) What is Technology forecasting? Explain S-curve. [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

- 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

UNIT - 3

- 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) Quality function deployment
ii) Brainstorming

SECTION - II

UNIT - 4

- Q7)** a) What is reverse engineering? Explain the advantages & disadvantages of reverse engineering. [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 are the applications of product teardown? Explain force flow diagram in detail. [9]

UNIT - 5

- 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 : [8]
- i) Field trials
- ii) Virtual Trial
- iii) Iterations
- b) Explain the guidelines to be followed in the design of the parts for the following processes : [8]
- i) Welding
- ii) Forging

UNIT - 6

- Q11)a)** What is link between product data & product workflow? Explain the PLM in detail. [8]
- b) Write short notes on : [8]
- i) Different phases of Product Life Cycle
- ii) Importance of customer involvement

OR

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



Total No. of Questions : 12]

SEAT No. :

P3005

[5059]-122

[Total No. of Pages : 2

B.E. (Production Sandwich Engineering)

SUPPLY CHAIN MANAGEMENT

(2008 Pattern) (Elective - III) (Semester - II) (411130 - A)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What are the obstacles to achieving a strategic fit? [10]
b) What is Supply Chain? Explain the stages in a supply chain with a good example. [8]

OR

- Q2)** a) Describe the role of forecasting in SCM. [9]
b) Write a note on risk management in SC Forecasting. [9]

- Q3)** a) What are the characteristics of a forecast in supply chain? [8]
b) Explain in brief different scope of strategic fit across SC. [8]

OR

- Q4)** a) Identify cycles & push-pull boundary in supply chain when you are Purchasing TABLET PC from a shop in your city. [10]
b) What is the role of aggregate planning in supply chain management. [6]

- Q5)** a) Discuss the role of transportation in supply chain? Mention the various modes of transportation with their strengths and weaknesses. [9]
b) Discuss any two strategic factors and two Technological factors in network design in SC. [7]

OR

P.T.O.

- Q6)** a) Discuss in brief the role of IT in Network Design. [8]
b) Discuss characteristics of information in detail with example for SC.[8]

SECTION - II

- Q7)** a) Explain the basic purchasing cycle and the role of purchasing manager in Detail. [9]
b) Write short note on facility location decisions in supply chain. [9]

OR

- Q8)** a) Discuss the role of transportation in supply chain. Mention the various modes of transportation with their strengths and weaknesses. [9]
b) Discuss various options available for designing of transportation network. [9]

- Q9)** a) What is bullwhip effect and how does it relate lack of coordination in supply chain? [8]
b) Discuss the impact of E business in customer service. [8]

OR

- Q10)**a) List the various obstacles for coordination in supply chain. [8]
b) How the design of distribution network has been effected due to evolution of E business. [8]

- Q11)**a) Enlist any five factors influencing financing decisions in SC. Describe any two. [8]
b) Write a note on decision trees. How does it help in evaluating SC requirements. [8]

OR

- Q12)**a) Write a note on impact of financial factors in supply chain decisions.[8]
b) How do you evaluate a decision using financial perspective? Explain with SC requirements. [8]



Total No. of Questions : 12]

SEAT No. :

P1829

[Total No. of Pages : 3

[5059] - 123

B.E.

PLANT ENGINEERING AND MAINTENANCE

Production s/w

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Que. No. 1 or Que. No. 2, Que. No.3 or Que. No.4, Que. No.5 or Que. No.6 from Section - I and Que. No.7 or Que. No.8, Que. No.9 or Que. No. 10, Que. No. 11. or Que. No. 12. from Section-II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

UNIT - 1

- Q1)** a) Describe the types of maintenance being practised in the present day industrial set ups? [8]
- b) Write short notes on : [8]
- i) Manpower planning for maintenance
 - ii) Training for maintenance and safety staff

OR

- Q2)** a) Briefly enumerate the challenges of maintenance department? [8]
- b) Why assessment of maintenance is important for successful working of the maintenance function? Discuss briefly. [8]

UNIT - 2

- Q3)** a) What factors should be considered while designing a factory building? Will you prefer 'L' Shaped building over rectangular building for a new plant? Why? [10]
- b) Discuss in brief main steps involved in systematic layout planning. [8]

P.T.O

OR

- Q4)** a) Explain the importance of auxiliary services while finalizing the plant layout. [10]
b) What is the use of REL Chart? How is it prepared? [8]

UNIT - 3

- Q5)** a) Write short notes on : [8]
i) The MICLASS System
ii) Breakdown maintenance
b) Discuss the factors which need to be considered for implementation of an efficient spare part system? [8]

OR

- Q6)** a) How does condition based monitoring influence the maintenance activity function? Explain. [8]
b) Describe maintenance problems occurring in product and process type industries? [8]

SECTION - II

UNIT - 4

- Q7)** a) Briefly explain the concept of life cycle costing of equipment. [8]
b) Discuss why it is essential to consider the economic aspects of the maintenance function. [8]

OR

- Q8)** a) Discuss the benefits that accrue from the periodic preventive management? [8]
b) Discuss the various distribution functions used for the estimation of reliability in performance of the maintenance function. [8]

UNIT - 5

- Q9)** a) Briefly explain two disposal methods of solid waste [8]
b) Explain in short various fire protection and prevention practices. [8]

OR

- Q10)a)** Discuss following material handling equipments. [8]
- i) Over head crane
 - ii) Conveyors
- b) Explain the duties and responsibilities of safety officer. [8]

UNIT - 6

- Q11)a)** Differentiate between the Spectrometric oil analysis procedure and the Magnetic plug inspection system. [8]
- b) How does condition based monitoring influence the maintenance activity function? Explain. [10]

OR

- Q12)a)** Briefly explain the techniques which can be used for the detection of corrosion in machinery. [8]
- b) Write short notes on : [10]
- i) Reliability centered maintenance
 - ii) RAM analysis



Total No. of Questions : 12]

SEAT No. :

P2122

[5059]-124

[Total No. of Pages : 2

B.E.(Production S/W)

**INDUSTRIAL RELATIONS & HUMAN RESOURCE MANAGEMENT
(2008 Pattern) (Elective - III) (Semester - II) (411130)**

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, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain in detail the impact of globalization and information technology on industrial relations. **[10]**
- b) What is trade union? Explain the problems faced by trade union. **[8]**

OR

- Q2)** a) What is Industrial Relation? Explain scope, objectives of industrial relations. **[10]**
- b) Define collective Bargaining. Explain the reasons for its success and failure. **[8]**

- Q3)** a) Explain role of HR manager & structure of HR department. **[8]**
- b) Discuss HR strategies and organizational strategies. **[8]**

OR

- Q4)** a) Explain Personnel Administration. State its objectives and principles. **[8]**
- b) Describe elements of HRD systems. Also discuss their goals, elements. **[8]**

P.T.O.

- Q5)** Write short notes (any two): [16]
a) Recruitment resources
b) Reward and compensation strategies
c) Succession planning

OR

- Q6)** Write short notes (any two): [16]
a) Objectives of manpower planning
b) Job Rotation
c) Promotion

SECTION-II

- Q7)** a) Discuss various methods of training. [10]
b) Explain tools & aids used for effective training. [8]

OR

- Q8)** a) Discuss need & objectives of employee training. [10]
b) What are major procedures of training? [8]

- Q9)** a) Explain in detail competency Mapping. [8]
b) Explain how performance management system can be aligned with business strategies of an organization. [8]

OR

- Q10)** a) Discuss various methods of performance appraisal. [8]
b) Explain strategic importance of 360 degrees feedback. [8]

- Q11)** Write short notes on (any two): [16]
a) Retrenchment and layoff
b) Employee Morale
c) Downsizing and project based employment.

OR

- Q12)** Write short notes on (any two): [16]
a) Industrial democracy
b) Golden handshake
c) Role of HRD in developing IR



Total No. of Questions : 6]

SEAT No. :

P3756

[Total No. of Pages : 2

[5059]-125

B.E. (Production S/W)

MARKETING MANAGEMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from Section - I and any three questions from Section - II.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assumptions made should be clearly stated and justified.*

SECTION - I

Q1) Explain marketing prospective strategy adopted by Automobile Industries.[16]

OR

Explain Understanding and monitoring the environment in marketing management. [16]

Q2) Analyze impact of Consumer decision processes In dealing with any handmade product. [16]

OR

Explain different marketing management tools for understanding consumer's decision processes. [16]

Q3) a) Explain how you will position products in defined market segment. [10]

b) Explain formulating marketing strategies. [8]

OR

a) Identify the impact planning marketing program in dealing with textile industry. [10]

b) Explain in brief Managing Product. [8]

P.T.O.

SECTION - II

- Q4)** a) Generate strategy chart used for developing of new product. [8]
b) Explain the concept Price Theory, And correlate with application. [8]

OR

- a) Write in brief marketing intermediaries. [8]
b) Compare Establishing and managing prices. [8]

- Q5)** Explain managing sales force and sales territories with suitable example. [16]

OR

Identify the scope of technological innovations and impact of it on current market scenario. [16]

- Q6)** a) Explain Marketing research and its importance. Also explain scope of marketing research. [9]
b) Explain Structure of Marketing research with suitable example. [9]

OR

Analyze the role of quantitative techniques in marketing research, and explain how tool in marketing research affecting these techniques. [18]



Total No. of Questions : 12]

SEAT No. :

P1830

[Total No. of Pages : 3

[5059] - 126

B.E. (Electrical)

PLC and SCADA Applications

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Section I and II should be written in separate papers.*

SECTION - I

- Q1)** a) What are operational sections of Central Processing unit? [9]
b) What are the functions of input output module? [8]

OR

- Q2)** a) Define programmable logic controller. [3]
b) What are different criteria for selecting PLC for various applications?[6]
c) State disadvantages of PLC. [8]

- Q3)** a) What are different rules of constructing ladder diagram? [8]
b) Draw the ladder diagram for the following function table. [8]

Inputs - I1, I2 Outputs- Q1, Q2

I1	I2	Q1	Q2
0	0	1	1
0	1	1	0
1	0	1	0
1	1	0	0

P.T.O

OR

Q4) a) Explain Linear Variable Differential Transformer (LVDT) with proper construction diagram and it's working. [8]

b) Draw and explain electromechanical relay and it's components. [8]

Q5) a) What is the effect of change in K_i and K_d parameters on the performance of PID controlled system? [9]

b) Explain any one method of PID tuning. [8]

OR

Q6) a) Draw and explain DC motor control by solid state device. [9]

b) Which are the parameters affecting the speed control of DC motor? [8]

SECTION - II

Q7) a) Draw and explain SCADA architecture. [9]

b) State applications of SCADA. [8]

OR

Q8) a) State advantages and disadvantages of SCADA. [9]

b) Which are different communication technologies used between RTU and MTU? [8]

Q9) a) What is the difference between second and third generation of SCADA system? [8]

b) Write a short note on automatic substation control. [9]

OR

Q10) a) How SCADA is used to control electric power generation? Explain with only plant control component diagram. [9]

b) Explain with block diagram use of SCADA in water purification system. [8]

- Q11)a)** Explain any two security implications of SCADA protocols. **[8]**
- b) Write a short note on DeviceNet standard. **[8]**

OR

- Q12)a)** Explain profibus protocol in detail. **[8]**
- b) Explain Flexible Function Block (FFB) process in detail. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1831

[Total No. of Pages : 3

[5059] - 127

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

Power System Operation & Control

(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) *Use of Logarithmic tables, slide rule, mollier charts electronic pocket calculator and steam tables is allowed.*
- 5) *Assume Suitable data if necessary.*
- 6) *Black figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Explain the use of equal area criterion of power system stability for the case when there is sudden increase in mechanical input to generator. [12]
b) Explain the Swing curve and its importance in power system stability. [6]

OR

- Q2)** a) Explain with mathematical equations, the use of point by point (step by step) method for the solution of swing equation. [12]
b) Explain the significance of critical clearing angle and critical clearing time [6]

- Q3)** a) Sketch and explain the loading capability curve of a synchronous generator. [8]
b) Explain in short any two ways of the reactive power management. [8]

OR

- Q4)** a) Compare series compensation with shunt compensation. [8]
b) What is the role of Synchronous condenser? [8]

P.T.O

- Q5) a)** Explain the principle of operation, circuit diagram and also give the applications of following ; **[16]**
- i) Unified Power Flow Controller (UPFC).
 - ii) Static Compensator (STATCOM).

OR

- Q6) a)** Write short note on any three: **[16]**
- i) Static VAr Compensators (SVCs)
 - ii) thyristor Controlled Series Capacitors (TCSC)
 - iii) Limitations of AC transmission system
 - iv) Advantages of FACTS technology
 - v) Sub-synchronous resonance

SECTION - II

- Q7) a)** Draw following : **[6]**
- i) Block diagram of proportional plus integral load frequency control of single area case.
 - ii) Dynamic frequency response with and without integral control
- b) Explain area control error in case of single and two area **[6]**
- c) Explain the effect of Generator rate constraint and Speed governor dead band on generation control **[6]**

OR

- Q8) a)** With neat block diagram and response, explain two area load frequency control. **[12]**
- b) Explain the advantages of Free governor mode operation of generator **[6]**

- Q9) a)** Explain unit commitment with reference to : **[8]**
- i) Definition
 - ii) Necessity
 - iii) Objective function
 - iv) Operational constraints
- b) Explain priority list method of unit commitment. **[8]**

OR

Q10)a) Explain Lagrange multiplier technique for economic load dispatch with transmission loss and including equality constraint of meeting load.[10]

b) Explain the cost curve of thermal generator. Write generalized mathematical formula of cost curve [6]

Q11)a) Write short note on any two types of power interchange mechanisms[16]

- i) Energy banking
- ii) Capacity interchange
- iii) Diversity interchange.

OR

Q12) Explain any two mode of power transaction [16]

- a) Emergency power interchange
- b) Inadvertent power exchange
- c) Power pool



Total No. of Questions : 12]

SEAT No. :

P1832

[Total No. of Pages : 4

[5059]-128

B.E. (Electrical)

CONTROL SYSTEM - II
(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.*

SECTION - I

- Q1)** a) Explain the steps to design lag network by Bode plot approach. [8]
b) Design a suitable lead compensator for unity feedback system with an
OLTF $G_f(s) = \frac{K}{s(s+1)}$ to satisfy phase margin = 40° and $K_v = 12 \text{ sec}^{-1}$.
[10]

OR

- Q2)** a) Derive the transfer function of lead compensator network. Also explain its nature of Bode plot. [8]
b) A unity feedback system has an open loop transfer function
 $G(s) = \frac{4}{s(2s+1)}$. It is desired to obtain a phase margin of 40° without sacrificing K_v of the system. Design a suitable lag network for the system.
[10]

- Q3)** a) Consider a linear time invariant system $\dot{X} = Ax + Bu$. Show that its non homogeneous solution is $X(t) = \phi(t). x(0) + \int_0^t \phi(t-\tau)Bv(\tau)d\tau$. [8]
b) Find state Transition Matrix for $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ [8]

P.T.O.

OR

Q4) a) Define STM. State & prove properties of STM. [8]

b) For the given matrix find the diagonalization matrix $A = \begin{bmatrix} 3 & -2 \\ -1 & 2 \end{bmatrix}$. [8]

Q5) a) What is need of state observer? Explain design of full order state observer with block diagram. [8]

b) The state space representation of a second order system is [8]

$$\begin{aligned}\dot{x}_1 &= -x_1 + u \\ \dot{x}_2 &= x_1 - 2x_2 + u\end{aligned}$$

State whether the system is controllable & observable

OR

Q6) a) Define controllability and observability of the system. Explain Kalman's test for them. [8]

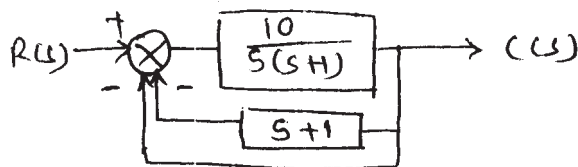
b) Design a state feedback vector K to shift pole position to a new position of poles $S = -4, -5$ for a system represented in state variable form as

$$\dot{X} = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u. \quad [8]$$

SECTION - II

Q7) a) Write short note on Tuning of PID controller. [8]

b) For the system shown find : K_p , K_v and K_a . [8]



OR

Q8) a) Explain Zigler-Nichols rules for tuning of PID controller. [8]

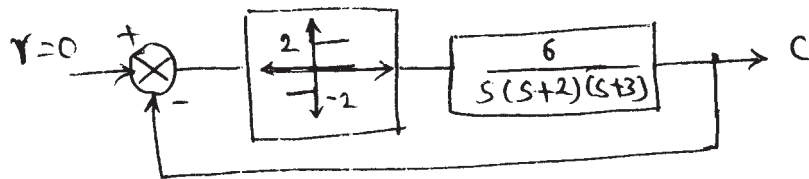
b) A unity feed back system has OLTF $G(s) = \frac{100}{(s+1)(s+2)(s+5)}$, Design PI controller in frequency domain so that phase margin of system is 60° at frequency of 0.5 rad/sec. [8]

Q9) a) State and explain the different types of nonlinearities generally observed in control systems. [8]

b) In a unity feedback system, as shown in figure, an ideal relay is connected

in series with linear transfer function, $G(s) = \frac{6}{s(s+2)(s+3)}$.

The output of the relay is ± 2 . Determine amplitude & frequency of limit cycle if it exists, using Describing Function Method. [8]



OR

Q10) a) Derive describing function of saturation nonlinearity. [8]

b) Explain following terms in connection with nonlinear control system: [8]

- i) Subharmonic generation
- ii) Asynchronous quenching
- iii) Frequency entrainment
- iv) Jump resonance

- Q11)** a) Discuss different types of singular points that occur in phase plane method. [6]
- b) How will you calculate time from phase trajectory? [6]
- c) Explain the terms : phase plane, isoclines and phase trajectory with suitable example. [6]

OR

- Q12)** a) Explain Direct Method of Liapunav to determine the stability of a nonlinear control system. [6]
- b) Describe : positive definiteness, negative definiteness, semi definiteness, regarding nonlinear control system with example. [6]
- c) Show that the following quadratic form is positive definite or not by Sylverster's criterion
- $$V(x) = 8X_1^2 + X_2^2 + 4X_3^2 + 2X_1X_2 - 4X_1X_3 - 2X_2X_3. \quad [6]$$



Total No. of Questions : 12]

SEAT No. :

P1833

[Total No. of Pages : 3

[5059]-129

B.E. (Electrical)

ROBOTICS AND AUTOMATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain types of Automation. [9]

b) Explain Work envelop and Tip Speed with neat sketch. [9]

OR

Q2) a) Explain least three reason for using a robot than human being. [9]

b) Explain the robotic laws and definition given by international standards organization. [9]

Q3) a) Explain various sensors and actuators used in robot with their selection criteria. [8]

b) Explain different types of links and end effectors. [8]

OR

P.T.O.

- Q4)** a) With the help of a neat diagram, explain : [8]
i) Cylindrical Robot
ii) Articulated Robot.
- b) Write short note continuous path and point to point path trajectory. [8]

- Q5)** a) The coordinates of the point 'P' on the body are given by $\{2, -3, 1.5\}^T$. The point is rotated about x axis by 30° and then about y axis by 30° and then z axis by 30° . Find the final coordinates of the point 'P' w.r.t. the fixed frame. [8]
- b) Explain the difficulties occurred in via point in trajectory planning. [8]

OR

- Q6)** a) The point P with co-ordinate $\{1, 2, 1\}^T$ is travel by 6 unit on x axis and then by 4 unit on z axis. Find the final point. Also discuss on homogeneous matrix. [8]
- b) Explain Rotational translation in detail with example. [8]

SECTION - II

- Q7)** a) Explain D-H criteria used in robotic manipulator with example. [9]
b) Explain concept of geometric approach in inverse kinematics. [9]

OR

- Q8)** a) Explain : [9]
i) Geometric approach with co-ordinate transformation.
ii) Direct approach
- b) Draw a neat diagram of 'SCARA Robot' in detail. [9]

- Q9)** a) Explain Newtons Method in detail. [8]
b) Explain Jacobean in terms of DH matrices. [8]

OR

- Q10)** a) Explain resolved motion Position Control for robot motion. [8]
b) What do you mean by resolved motion rate Control. [8]

- Q11)** a) Write a note on online programming and offline programming. [8]
b) Explain how a robot can be used for underwater welding application.[8]

OR

- Q12)** a) Write a note on programming languages. [8]
b) Explain 'Painting Robot' with details of selection criteria and methods of control. [8]



Total No. of Questions : 12]

SEAT No. :

P1777

[Total No. of Pages : 3

[5059]-13

B.E. (Civil)

ADVANCED CONCRETE TECHNOLOGY (Theory)
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures in the bracket indicate full marks.*
- 5) *Electronic pocket calculator is permitted.*

SECTION - I

- Q1)** a) What are the different grades of ordinary Portland cement? Name few brands available in the market. **[5]**
- b) Explain coning and quartering method of obtaining laboratory sample of aggregates. **[5]**
- c) Explain aggregate crushing value test in detail. **[8]**

OR

- Q2)** a) Explain completely the significance, importance of particle size analysis of coarse and fine aggregates in connection with strength and durability of concrete. **[8]**
- b) Write any five types of cement with their suitability. **[5]**
- c) Explain third point loading test on concrete beam. **[5]**
- Q3)** a) Write various ways for making light weight concrete. Write note on any one. **[6]**
- b) Write in detail note on No fines concrete. **[5]**
- c) What do you mean by light weight concrete. **[5]**

P.T.O.

OR

- Q4)** a) What is meant by long term performance? Explain how it differs from compressive strength of concrete. [8]
- b) Explain step by step procedure of concrete mix design. [8]

- Q5)** a) What is the difference between Non destructive and destructive tests on materials? [8]
- b) Enlist various non-destructive methods with their utility in brief. [8]

OR

- Q6)** Write notes on : [5 + 5 + 6 = 16]
- a) Probe penetration
- b) Pulse echo method
- c) Infrared thermography

SECTION - II

- Q7)** a) What properties a high strength concrete should possess for long term performance? How particle packing is effective in high strength concrete? [8]
- b) Write note on: Relative fibre matrix stiffness. [5]
- c) Write note on: Fibre matrix interfacial bond. [5]

OR

- Q8)** a) Write a note on self compacting concrete. Name few properties of this concrete. [8]
- b) Explain the various properties of hardened SCC. [5]
- c) Write a note on: SIFCON [5]

Q9) a) Explain how behaviour of SFRC in tension differs from that in compression. [8]

b) Explain: Quality control tests to ensure good performance of polymer concrete. What are the applications of polymer concrete. [8]

OR

Q10)a) Explain Stress strain property and compressive strength Properties of FRC. [8]

b) Explain in detail “Polymer impregnated concrete”. [8]

Q11)a) Explain skeletal armature method for ferrocement with merits and demerits. [8]

b) Write a note on cement mortar mix and reinforcement as constituents of ferrocement. [8]

OR

Q12)a) Explain how ferrocement differs than concrete. Write about tensile property of ferrocement. [8]

b) Explain centrifuging and gunitting techniques for ferrocement with merits and demerits. [8]



Total No. of Questions : 12]

SEAT No. :

P1834

[Total No. of Pages : 3

[5059]-130

B.E. (Electrical)

POWER QUALITY

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *In Section I, attempt Q1 or Q2, Q3 or Q4, Q5 or Q6. In section II, attempt Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of non-programmable electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Define and explain the following terms as per IEEE Std. 1159, such as (i) Voltage interruption (ii) Voltage Swell (iii) Waveform Distortion (iv) Notching (v) Voltage flicker. **[10]**

b) What are the various problems due to poor grounding? Explain. **[8]**

OR

Q2) a) Explain various grounding practices as per IEEE standard for better operation of electronic equipments. **[9]**

b) Explain various definition of power quality with reference to each stake holder. Why power quality is called voltage quality? **[9]**

Q3) a) State the principle of regulating the voltage. Explain various devices used for voltage regulation. **[8]**

b) Define flicker and explain various means to reduce voltage flicker. **[8]**

P.T.O.

OR

- Q4)** a) Explain : [8]
i) Short term(P_{st}) and
ii) Long term(P_{lt}) voltage flicker.
- b) Explain impact of reactive power management on voltage profile. What are the causes of under-voltages? [8]
- Q5)** a) Explain the concept of an area of vulnerability. How fault location and fault level influences on voltage sags. [8]
- b) Explain economic impact of voltage sag and its consequences. [8]

OR

- Q6)** a) Define sag and interruptions and explain in detail following voltage sag mitigation measures. DVR, SMES and CVT. [8]
- b) Explain voltage sag characteristics such as magnitude, phase angle jump, point on wave initiation and point on wave recovery. [8]

SECTION - II

- Q7)** a) Explain in brief impacts of harmonics on following power system equipments : [8]
i) Transformers
ii) Energy and Demand metering
- b) Explain in detail stepwise procedure as per IEE 519-1992 for harmonic analysis. [10]

OR

- Q8)** a) Explain design of tuned passive filter for mitigation of harmonics. [8]
- b) Explain harmonics series and parallel resonances. What are its consequences? [10]

- Q9)** a) Explain various computer tools used for transient's analysis? [8]
b) Explain capacitor switching transient and magnification of capacitor switching transient. [8]

OR

- Q10)** a) Explain transients, their sources and its effects on power system operation. [10]
b) Explain impulsive transients due to lightning. [6]

- Q11)** a) What are the objectives of power quality monitoring? Also state selection criteria of power quality assessment equipments. [8]
b) Explain procedure of selection of transducers for power quality monitoring. [8]

OR

- Q12)** a) Explain the role of intelligent systems in power quality monitoring. [8]
b) Why analysis of data is required? Explain various data collection techniques. [8]



Total No. of Questions : 12]

SEAT No. :

P1835

[Total No. of Pages : 3

[5059]-131

B.E. (Electrical)

ILLUMINATION ENGINEERING

(2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) In Section I, attempt Q1 or Q2, Q3 or Q4, Q5 or Q6. In section II, attempt Q7 or Q8, Q9 or Q10, Q11 or Q12.
- 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 is allowed.
- 6) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) State and explain the laws of illumination. Hence explain plane angle and solid angle. [8]
- b) Explain the important parts of the eye with the help of neat diagram. [10]

OR

- Q2)** a) Explain the terms : [10]
- i) Production of light
 - ii) Physics of generation of light
 - iii) Quantification and measurement of light.
- b) What is Good and bad effects of lighting. State the various methods of controlling natural light. [8]

- Q3)** a) Explain High Pressure Sodium vapour lamp. [8]
- b) Write short note on – LASER and LEDs. [8]

P.T.O.

OR

- Q4)** a) Draw the circuit diagram of fluorescent tube. Explain its working. [8]
b) Explain Metal Halide Lamp. [8]

- Q5)** a) What is ballast? State its functions. Also list the various types of ballasts in fluorescent tube. [8]
b) Explain Dimming. [8]

OR

- Q6)** a) Write in detail about various optical control schemes. [8]
b) Classify the light fittings according to the way light reaches the object. [8]

SECTION - II

- Q7)** a) Explain Zonal Cavity method for indoor lighting design. [10]
b) What are different factors that are to be considered while designing lighting. [8]

OR

- Q8)** a) Write a short note on : [10]
i) Office lighting
ii) Home lighting
b) State selection criteria for selection of lamps and luminaries for indoor lighting. [8]

- Q9)** a) Explain road lighting code in India. [8]
b) Discuss the various problems in energy efficient lighting. [8]

OR

- Q10)** a) Explain Isolux diagram. [8]
b) Explain the arrangement of illuminaries with respect to the type of road. [8]

- Q11)** a) Explain Emergency lighting. [8]
b) Write a note on Day Lighting. [8]

OR

- Q12)** a) Explain photovoltaic lighting. [8]
b) Explain Optical Fibre Cable (O.F.C) and give its applications. [8]



Total No. of Questions : 12]

SEAT No. :

P1836

[Total No. of Pages : 4

[5059]-132

B.E. (Electrical)

PROJECT MANAGEMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.

UNIT - I

- Q1)** a) Define Project Management. Explain its characteristics and importance. [8]
b) Explain Project life cycle with a well labeled diagram. State its phases. [9]

OR

- Q2)** a) Explain various characteristics of project management. How is project appraisal carried out? [8]
b) Explain various phases of Project life cycle. What is the need for Project management? [9]

UNIT - II

- Q3)** Project is faced with evaluation of two alternatives A and B. The company cost of capital is 15%. 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	20	-	05	15	20	20
Project B	35	10	15	23	30	35

P.T.O.

OR

- Q4)** a) State that why Project selection is important? Explain the probable causes of project failure. [8]
- b) What are the costs which are associated with a project? How are they estimated? How will you carry out the financial evaluation of a particular project? [8]

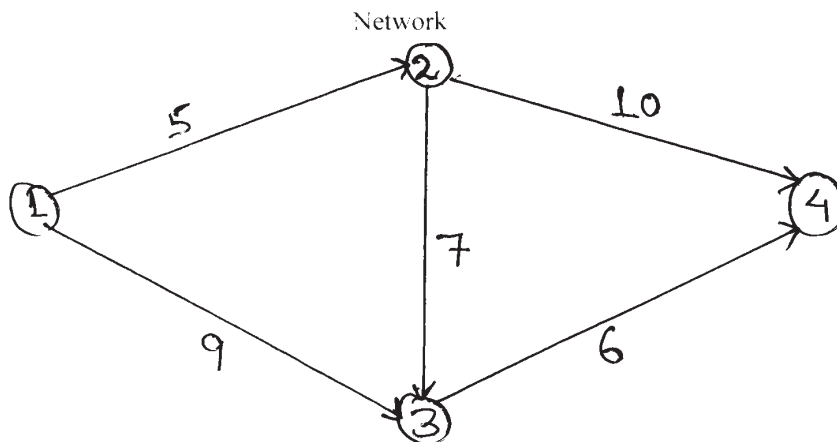
UNIT - III

- Q5)** a) Write the differences between PERT and CPM. What is the significance of critical path? State the concept of crashing, with a well labeled diagram. [8]
- b) Write short notes on : [8]
- i) Network Analysis Technique in Project Management
 - ii) Deployment of Resource

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	5	2	400
1-3	9	6	200
2-3	7	5	100
2-4	10	7	200
3-4	6	3	300



UNIT - IV

- Q7)** a) State the factors for cost escalation. How to take care of them during planning? [8]
- b) Why budget is required? State the elements to be considered for making a budget? Describe the advantages of budgetary control. [9]

OR

- Q8)** a) Define direct cost, indirect cost & prime cost. What are different cost factors? [9]
- b) Write short notes on : [8]
- i) Factors of cost escalation.
- ii) Budgetary control.

UNIT - V

- Q9)** a) Explain in detail quality planning, assurance and control. [8]
- b) Name the factors which are important in international project management and how to control them? [9]

OR

- Q10)** a) Explain short notes on : [9]
- i) International project Management
- ii) Quality of procured items.
- b) What are the different methods for maintaining the quality of procured items? Describe in detail. [8]

UNIT - VI

- Q11)** a) The expected cash inflows from a project and their probability are as under : [9]

Expected cash inflow (Rs.)	Probability
30,000	0.40
40,000	0.50
50,000	0.20
20,000	0.30

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 in flow (Rs.)
1	1,00,000
2	2,00,000
3	3,00,000
4	2,00,000
5	1,50,000

The initial investment required for the project is Rs. 5,50,000/-. The risk adjusted discount rate is 15%. 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) Monitoring and controlling.



Total No. of Questions : 12]

SEAT No. :

P1837

[Total No. of Pages : 3

[5059]-133

B.E. (Electrical)

RESTRUCTURING & DEREGULATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.
- 5) 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 institutional structures of Indian power sector before and after restructuring. [8]

b) Explain key objectives of “Electricity Act 2003” with reference to generation, transmission and distribution sector. [8]

OR

Q2) a) Explain the working of Indian Energy Exchange for day ahead market. [8]

b) Explain functions of Ministry of power and PFC. [8]

Q3) a) Explain the tariff setting principle. [8]

b) Explain following economic terms of power sector. [8]

- i) Fixed cost and variable cost
- ii) Capital cost
- iii) Depreciation
- iv) Profitability indices

P.T.O.

OR

Q4) a) Explain any two methods to assess the financial feasibility of any project. [8]

b) What do you mean by : [8]

i) Subsidy and cross subsidy

ii) O and M expenses

Q5) Explain following methods of regulations : [18]

a) Incentive regulation

b) Rate of return regulation

c) Benchmarking Regulation

OR

Q6) Write short note on : [18]

a) CERC.

b) Structure of regulatory process in India.

c) Role of State Electricity regulatory Commission.

SECTION - II

Q7) Explain following models based on industry structure and contractual arrangements : [16]

a) Wholesale Competition.

b) Retail Competition.

c) Pool and Bilateral trade.

OR

Q8) a) Compare between 'Competition for the market' and 'Competition in the market'. [8]

b) Explain in detail "The California Crisis". [8]

- Q9)** a) Explain various methods of transmission pricing. [9]
b) Explain power exchange in India. [9]

OR

Q10) Write short note the following electricity trading models : [18]

- a) Integrated
- b) Wheeling
- c) Decentralised

Q11) a) Explain working of ISO. [8]

- b) Explain the three parts of availability based tariff, how they are implemented. [8]

OR

Q12) a) State the key features of Indian Grid code. Also explain transmission congestion issues. [8]

- b) Explain the concept of open access and transmission rights. [8]



Total No. of Questions : 10]

SEAT No. :

P2123

[5059]-134

[Total No. of Pages : 2

B.E. (Electrical)

EMBEDDED SYSTEM

(403144) (2008 Course) (Semester-I) (Elective-II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answer question Nos 5&10 are compulsory. Out of remaining. Attempt any two questions from section- I & any two questions from section-II*
- 2) *Figures to the right indicate full marks.*

SECTION-I

- Q1)** a) What is an Embedded System. What are its main components? Elaborate. [6]
b) Give the main characteristics and features of a microcontroller. [10]

OR

- Q2)** a) Explain how software is incorporated in an embedded system. Give details of the various software tools used. [8]
b) Define the design metrics in an embedded system. What are the different competing design matrices. [8]

- Q3)** a) Explain the various types of ADC and give their advantages. [10]
b) How is a solenoid controlled using a relay in an embedded system? Explain the need of the clamping diode. [6]

OR

- Q4)** a) With the help of a diagram, explain the interfacing of 4×4 matrix keypad to a microcontroller. [8]
b) Explain the working of a Stepper motor and show how it is interfaced with a microcontroller. [8]

- Q5)** Write notes on any three. [18]
a) RTOS
b) LED ripple
c) Interfacing a Motion Sensor with microcontroller
d) Motor control ICs
e) RISC and CISC

[5059]-134

P.T.O.

SECTION-II

- Q6)** a) In the context of embedded system explain the term Task. What are the various states of a task. [8]
b) What is interrupt latency? ISR? Interrupt recovery time? [6]
c) What is device driver and explain device drivers for embedded devices. [4]

OR

- Q7)** a) Explain in detail following scheduling algorithms. [10]
i) First in first out
ii) Round robin with priority
iii) Shortest job first
iv) Non-preemptive multitasking
v) Preemptive multitasking
b) Explain the concept of semaphores as an event signaling variable. [8]

- Q8)** a) What is kernel? Explain architecture of kernel. [8]
b) Explain how memory management is done in RTOS. [8]

OR

- Q9)** a) What are differences between General purpose operating systems and RTOS? [8]
b) Explain the features of Vxworks. [8]

- Q10)** With the help of a neat diagram explain how an embedded system is incorporated in any two of the following applications. [16]
a) Digital Camera
b) Smart Card
c) Aircraft attitude control



Total No. of Questions : 12]

SEAT No. :

P2124

[5059]-135

[Total No. of Pages : 3

B.E. (Electrical)

EHVAC TRANSMISSION

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two Sections should be written in separate 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) Derive travelling wave equations and their solution caused due disturbance on transmission line. Also prove that it consists of two waves travelling in opposite direction. **[12]**
- b) Write note on spacen and dampers. **[6]**

OR

- Q2)** a) Explain why are transmission lines required. State the standard transmission line voltages with their maximum limits derive equation for power handling capacity of circuit, line current, No. of circuits and % power loss in terms of line length, parameters and voltage. **[12]**
- b) A power of 11000 MW is required to be transmitted over a distance of 1000 km. At voltage level of 400 kv determine power handling capacity and line current and number of circuits required. Also find % power loss. The reactance and resistance of this 3 phase line is 0.327 ohm/km and 0.031 ohm/km length of line. Assume $\tan \delta$ value as 0.5. **[6]**

P.T.O.

- Q3)** a) For 3 phase ehv transmission line with horizontal configuration derive the expression for inductance matrix and capacitance matrix. [12]
- b) A bundle conductor has two subconductors each of radius 1.59 cm and bundle spacing 45.72 cm. Calculate GMR of bundle conductors. [4]

OR

- Q4)** a) Derive the expression for GMR of bundle conductor in terms of number of subconductors and radius of bundle R. [8]
- b) For 3 phase ehv transmission line L_s is self inductance. L_m is mutual inductance. Line is transposed. Derive the expression for negative sequence component of inductance in terms of L_s & L_m for each line. [8]
- Q5)** a) For a bundle conductor of two subconductors derive the expression for maximum and minimum surface voltage gradient, neglecting the effect of charges of image conductors and charges of subconductors of other phases. Show location for maximum & minimum voltage gradient. [8]
- b) Derive the condition for maximum charge on the conductors. [8]

OR

- Q6)** a) Draw neat sketch and derive Mangolt formula for maximum voltage gradient on outer phases and on central phase. [10]
- b) Compare line charge with point charge. [6]

SECTION-II

- Q7)** a) Find out the voltage on any one conductor of uncharged circuit due to voltages of charged circuit of double circuit line draw sketch. [10]
- b) Write note on biological effects of electrostatic field on human, animals and plants. [8]

OR

Q8) a) Explain what is meant by primary and secondary shock currents write effects on human being for different magnitudes of shock current. Also write equations relating shock current and time duration of shock currents.

Also write what is meant by threshold current and let go current. [10]

b) Write note on harmful effects of magnetic field on human health. [8]

Q9) a) Explain the function of each component of bipolar HVDC system draw neat sketch of HVDC system with labeling. [10]

b) For three phase full wave bridge rectifier derive the expression for output dc voltage with and without ignition delay angle α . [6]

OR

Q10) a) Explain operation of converter as inverter. Explain transition angle explain ignition advance angle and extinction advance angle. [10]

b) Draw the power flow diagram showing voltages at different points in bipolar HVDC system. Also write equations for dc power. [6]

Q11) a) Write note on actual VI characteristics of converter of HVDC system. Also write note on current limits. [10]

b) Derive expression for rectifier side transformer rating in terms of dc voltage and dc current. [6]

OR

Q12) a) Write note on individual firing control system of converter. [8]

b) Discuss problems associated with weak ac system in operation of dc system. [8]



Total No. of Questions : 12]

SEAT No. :

P1838

[Total No. of Pages : 2

[5059]-136

B.E. (Electrical Engineering)

SMART GRID

(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) *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) High light on evolution of electric Grid and the Concept of Smart Grid.[10]
b) Give CDM opportunities in Smart Grid. Also explain Carbon Credits.[8]

OR

- Q2)** a) High light on present development and International policies in Smart Grid. [8]
b) Write a note on present development in Smart Grid considering any one case study. [10]

- Q3)** a) Explain how Smart Meters can be play an important role to make a system Smart. [8]
b) Explain how Smart Appliances can be the part of Smart Grid. [8]

OR

- Q4)** a) High light on Home & Building automation. [8]
b) Explain Phase Shifting Transformers. [8]

P.T.O.

- Q5)** a) Write a note on Substation Automation. [8]
b) Explain the concept SMES. [8]

OR

- Q6)** a) Explain Wide Area Measurement System. [8]
b) Explain Phase Measurement Unit. [8]

SECTION - II

- Q7)** a) Describe the concept and formation of Micro Grid [10]
b) Discuss different issues of micro grid when interconnected. [8]

OR

- Q8)** a) Explain Plastic & Organic solar cells. [8]
b) High light on Variable speed wind generators. [10]

- Q9)** a) Why power quality is considered to be an important issue especially in smart grid. [8]
b) Describe the EMC and how it is role in smart grid. [8]

OR

- Q10)** a) Explain Power Quality Conditioners for Smart Grid. [8]
b) High light on Web based Power Quality monitoring. [8]

- Q11)** a) Explain Concept of AMI. [8]
b) High light on Broadband over power line. [8]

OR

- Q12)** a) High light on Wi-Fi and Wi-Max based communication. [8]
b) Write short note on Broadband over Power line (BPL) [8]



Total No. of Questions : 12]

SEAT No. :

P1839

[Total No. of Pages : 3

[5059]-137

B.E. (Electrical)

SWITCHGEAR & PROTECTION

(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) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain high and low resistance principles of arc interruption in case of circuit breakers. **[8]**
- b) A 3 phase 11 KV 50 Hz generator with earthed neutral has reactance of 5Ω /phase and is connected to a busbar through a circuit breaker. The distributed capacitance upto circuit breaker between phase & neutral is $0.01 \mu\text{F}$. Determine : **[8]**
- i) Peak restriking voltage across CB contacts.
 - ii) Frequency of oscillations
 - iii) Average rate of rise of restriking voltage upto first peak.

OR

- Q2)** a) Explain current chopping phenomenon. In which CB this phenomenon occurs? How current chopping can be prevented? **[8]**
- b) With neat diagram explain Capacitor current switching. **[8]**

P.T.O.

- Q3)** a) Write a short note on Auto reclosing. [8]
b) With neat diagram explain construction & working of buffer type SF₆ circuit breaker. [8]

OR

- Q4)** a) Explain different ratings of High voltage circuit breakers. [8]
b) With neat diagram explain construction & working of Air Blast Circuit Breaker (ABCB). [8]
- Q5)** a) Explain with neat sketch, construction & working of nondirectional Induction disc type over current relay. [10]
b) What do you mean by 'Zones & protection'. Explain primary & back up protection. [8]

OR

- Q6)** a) What is protective relaying? What is its need? What are the causes of fault & its effects? [10]
b) What are the essential qualities of protective relaying. Explain in detail. [8]

SECTION - II

- Q7)** a) Write a short note on :
i) Sampling theorem.
ii) Anti Aliasing Filter [10]
b) Draw and explain block diagram of Phaser Measurement Unit (PMU). [8]

OR

- Q8)** a) Draw a neat block diagram of static relays and explain function of each block, merits & demerits. [10]
b) Explain least square method for estimation of phaser. [8]

- Q9)** a) Explain the phenomenon of over fluxing in transformer & protection against it. [8]
- b) An 11 KV, 100 MVA alternator is provided with differential protection. The percentage of winding to be protected against phase to ground fault is 85%. The relay is set to operate when there is 20% out of balance current. Determine the value of the resistance to be placed in the neutral to ground connection. [8]

OR

- Q10)** a) A 3 phase 33/3.3 KV star/delta connected transformer is protected by differential protection. CTs on LT side have a ratio of 400/5. Determine the CT ratio on HT side. [8]
- b) Explain in detail loss of excitation of generator with protection against it. [8]

- Q11)** a) Explain time graded & current graded system of protection of three phase feeder using over current relay. [8]
- b) Explain the concept of distance relaying applied to protection of transmission lines. Compare impedance relay, reactance relay and mho relay. [8]

OR

- Q12)** a) Discuss wide area measurement system. [8]
- b) Explain the effect of arc resistance and power swings on the performance of distance relay. [8]



Total No. of Questions : 12]

SEAT No. :

P1840

[Total No. of Pages : 4

[5059]-138

B.E. (Electrical)

INDUSTRIAL DRIVES AND CONTROL

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) A drive has the following parameters $T = 100 - 0.1N$, N-m where N is the speed in rpm. Load torque $T_l = 50$, N-m. Initially the drive is operating in steady-state. The characteristic of the torque are changed to $-100 - 0.1N$, N-m. Calculate initial and final equilibrium speeds. For given drive also calculate the time from initial speed to final speed, if $J = 10 \text{ kgm}^2$ [8]
- b) What are the advantages of electrical drives? Also explain the selection of drive for a particular application. [8]

OR

- Q2)** a) Explain nature and classification of load torques. [8]
- b) Explain multi-quadrant operation of electrical drives with suitable example. [8]
- Q3)** a) A 220V, 970 rpm, 100A DC separately excited motor has an armature resistance of 0.05Ω . It brakes by plugging from an initial speed of 1000 rpm. Calculate [8]

P.T.O.

- i) Resistance to be placed in armature circuit to limit braking current to twice the full load value.
 - ii) Braking torque
 - iii) Torque when the speed has fallen to zero
- b) Explain dynamic method for braking operation with characteristic of following drives. [10]
- i) Three phase induction motor
 - ii) DC shunt motor

OR

- Q4)** a) A 400V, star connected 3-phase 6-pole, 50Hz, induction motor has following parameters referred to stator: $R_s = R'_r = 1\Omega$, $X_s = X'_r = 2\Omega$
For regenerative braking operation of this motor determine : [8]
- i) Maximum overhauling torque it can hold and range of speed for safe operation.
 - ii) Speed at which it will hold an overhauling load with a torque of 100 N-m.
- b) Explain regenerative braking operation of following drives. [10]
- i) DC shunt motor
 - ii) Three phase induction motor

- Q5)** a) Explain operation of three-phase fully controlled converter fed separately DC motor drive with suitable waveforms and derive relation between speed and firing angle. [8]
- b) A 230V, 1500 rpm, 50A separately excited DC motor has armature resistance 0.5Ω and assumes that motor is operating in continuous conduction mode. The motor is controlled by three phase fully controlled converter with source voltage of 440V, 50Hz. A star delta connected transformer is used to feed the armature so that motor terminal voltage equals rated voltage when converter firing angle is zero. [8]
- i) Calculate transformer turns ratio
 - ii) Determine when firing angle when a motor current is 1200 rpm and rated torque.

OR

- Q6)** a) Explain operation of chopper controlled DC series motor drive with suitable waveforms. [8]
- b) A 230V, 1000 rpm, 100A separately excited DC motor has armature resistance 1Ω and assumes that motor is operating in continuous conduction mode. The motor is controlled by single phase fully controlled converter with source voltage of 230V, 50Hz. Calculate motor torque [8]
- i) At $\alpha = 30^\circ$ and speed 900 rpm
- ii) At $\alpha = 120^\circ$ and speed -900 rpm

SECTION - II

- Q7)** a) A delta-connected squirrel cage induction motor has following ratings and parameters. [8]
- 400V, 50Hz, 4-pole, 1420 rpm,
 $R_s = 0.35\Omega$, $R'_r = 0.4\Omega$, $X_s = 0.7\Omega$, $X'_r = 0.8\Omega$.
 The motor is fed from a voltage source inverter. The drive is operated with a constant v/f control up to 50Hz and at rated voltage above 50Hz. Calculate
- i) Frequency for motoring operation at 950 rpm and full load torque
- ii) Torque for frequency 40Hz and speed of 1100 rpm.
- b) With neat diagram, explain $\frac{V}{f}$ constant speed control method for induction motor. [8]

OR

- Q8)** a) A 400V, 50Hz, 4-pole, 1400 rpm star-connected squirrel cage induction motor is fed from a voltage source inverter. The drive is operated with a constant v/f control form 10 to 50Hz. By assuming speed-torque curve for various frequencies to be parallel lines, calculate [8]
- i) Speed for frequency of 40Hz and 80% of full load torque
- ii) Frequency for a speed of 650 rpm and full load torque
- iii) Torque for frequency of 40Hz and speed of 1000 rpm as percentage of full load torque.
- b) Explain regenerative braking of VSI fed induction motor drives. [8]

- Q9)** a) How variable speed drives allows saving of energy in pump drives? [8]
b) Explain energy conservation using static rotor resistance control in induction motor. [8]

OR

- Q10)** a) What are different losses in electrical drives? Enlist energy conservation measures. [8]
b) Explain components used for obtaining signals for interlocking and sequencing operations and protection. [8]

Q11) Write short note on : [18]

- a) Flux oriented vector control of induction motor.
- b) Electrical Drives in Traction.
- c) Electrical Drives in Paper Mills.

OR

Q12) Write short note on : [18]

- a) Commutatorless DC motor drive
- b) Electrical Drives in Sugar Mills.
- c) Electrical Drives in Cement Industry.



Total No. of Questions : 12]

SEAT No. :

P3006

[5059]-139

[Total No. of Pages : 2

B.E. (Electrical)

VLSI DESIGN

(2008 Course) (Elective - III) (Semester - II) (403149)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 03 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data, if necessary.*

SECTION - I

- Q1)** a) What is a difference between latch & flip flop? Explain. [8]
b) Explain the race-around condition of JK flip-flop. [8]

OR

- Q2)** a) Design FSM for traffic light controller. [8]
b) Explain SISO, SIPO, PISO, PIPO using block-diagram & No. of clock pulses required. [8]

- Q3)** a) Explain EDA tool design flow. [10]
b) Develop 16:1 multiplexer using only 2:1 Mux. [8]

OR

- Q4)** a) Explain different types of architectures used in VHDL coding with one example. [10]
b) Explain component and its over loading. [8]

- Q5)** a) Explain various sequential statements used in VHDL coding. [8]
b) What is package? Explain with suitable example. [8]

OR

- Q6)** a) Explain synthesizable & Non-synthesizable statements of VHDL. [8]
b) Explain any 2 attributes, 2 data-types, 2 objects in VHDL. [8]

P.T.O.

SECTION - II

- Q7)** a) Define: [8]
i) FAN-IN
ii) FAN-OUT
iii) FOM
iv) Noise Margin w.r.t. CMOS
b) Compare PMOS, NMOS & CMOS. [8]

OR

- Q8)** a) Explain voltage transfer characteristics of CMOS inverter. [8]
b) Give standard specifications of CMOS device. [8]

- Q9)** a) Differentiate between CPLD & FPGA. [8]
b) Explain the architecture of PAL & PLA. [8]

OR

- Q10)**a) Explain the terms: [8]
i) Simulation
ii) Synthesis
iii) Floor planning
iv) P & R
b) Explain: [8]
i) Configuration of FPGA
ii) Boundary Scan

- Q11)**a) Write VHDL code & explain fixed point division operation. [10]
b) Write VHDL code for 8×8 RAM. [8]

OR

- Q12)**a) Write VHDL code for parallel to serial converter. [10]
b) Write VHDL code to design seven segment display. [8]



Total No. of Questions : 12]

SEAT No. :

P1778

[Total No. of Pages : 5

[5059]-14

B.E. (Civil Engg.)

QUANTITY SURVEYING CONTRACTS AND TENDERS
(2008 Pattern)

Time : 4 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 must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

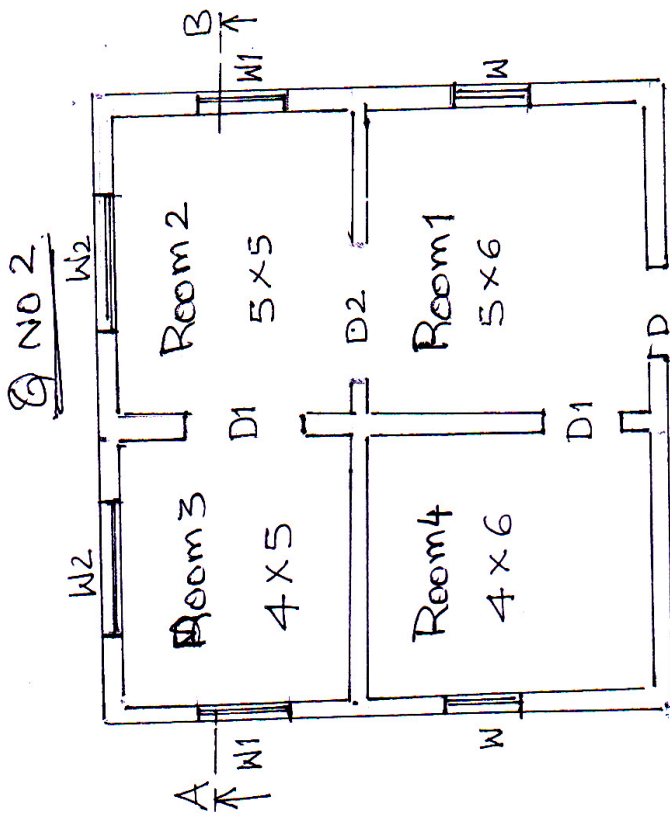
SECTION - I

- Q1)** a) What are the methods of estimate? Briefly explain about preliminary Estimate and explain preliminary estimate for any 2 civil engineering works. [8]
- b) Explain the different information required for preparing detailed estimate. [6]
- c) Define quantity surveyor and how is he different from estimator. [4]

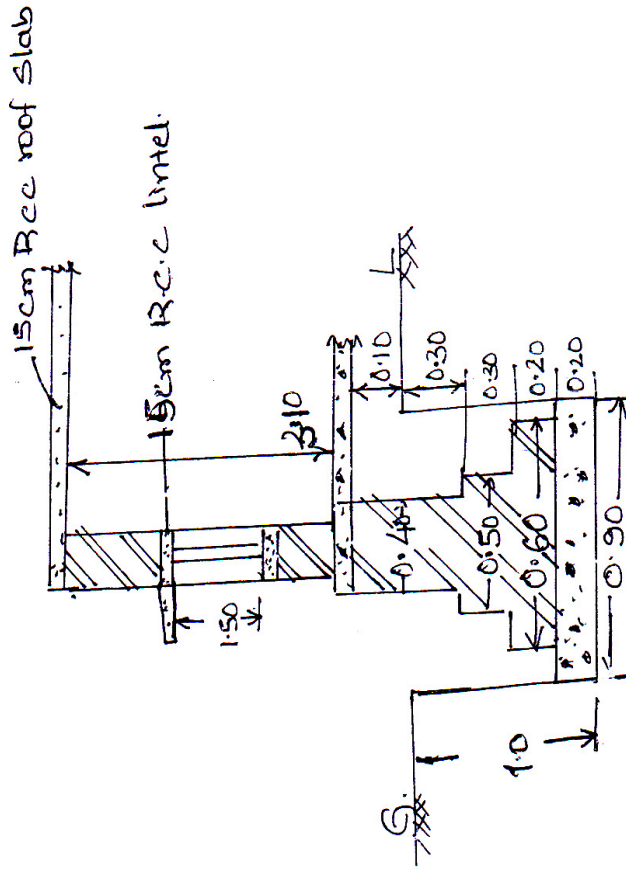
OR

- Q2)** a) Workout the quantity for the following item of work for the building shown in fig 1 & fig. 2 by long and short wall method. All walls are 30cm thick. Floor to roof height may be taken as 3.10m.
- i) Earthwork in excavation for foundation. [3]
 - ii) Brickwork for superstructure in CM 1:6 [4]
 - iii) Internal plastering in CM 1:6 [4]
 - iv) RCC work 1:2:4 in roof slab with quantity of steel assume 1% by vol of C.C. [3]

P.T.O.



fig(1)- Plan.



fig(2)- Section along AB

Schedule of Opening

Door D = 0.90 x 2.10

D1 = 0.60 x 1.80

D2 = 1.20 x 2.10

Window

W1 = 1.20 x 1.50

W2 = 1.50 x 1.80

W = 1.05 x 1.20

(Note: All Dimensions in metre.)

- b) Explain how you will account for deduction for an arch over an opening having height, width, L and rise R. [4]

Q3) a) Explain under what situations approximate estimate is made. What are the different types of approximate estimate? Explain Bay method of approximate estimate. [6]

- b) Prepare [6]

i) Measurement form and

ii) Abstract of Estimate form for a detailed estimate.

- c) The total carpet area of 3 storey building is 3000 sq-m. It is required to provide 25% of the carpet area for corridor and 15% for walls. Considering plinth area rate to be Rs. 300/sq-m. Prepare an approximate estimate. Take [4]

i) Water supply and sanitary expenditure = 7.5%

ii) Electrification = 5%

iii) Contingencies = 8%

OR

Q4) a) Explain briefly the estimation for road work, and explain the different methods to find the quantity of earthwork. [6]

- b) Explain the terms lead and lift. How is lead and lift considered in estimation of excavation work. [6]

- c) Explain the need to develop bar bending schedule and explain how steel quantity is worked out using bar bending schedule. [4]

Q5) a) Explain the necessity of drafting a specification for different item of works. and what are their different types? Describe detailed specification. [6]

- b) Write a detailed specification for RCC works for beams and column. [6]

- c) Explain the various factors that affect the rate of an item of work. [4]

OR

Q6) a) Prepare the general specification for a second class building. [6]

- b) Explain how unit rate of any item of work for a given construction is worked out. [6]

- c) Work out the quantity of material required for constructing brick wall, super structure only, including plastering, of 10m in length and 2.5m height. The wall is 30cm thick. Plastering is 12mm thick in cm1:6. Brick masonry is in cm1:6. [4]

SECTION - II

- Q7) a)** State two differences each between : **[10]**
- i) Gross Income from a Property — Net Income from a Property
 - ii) Speculative Value — Distress Value
 - iii) Development method of valuation — Depreciation method of valuation.
 - iv) Assessed Value — Sentimental Value
 - v) Occupation Lease — Building Lease
- b) Determine the book value of a construction equipment *for each year* using **[8]**
- i) Straight line method, and
 - ii) Constant percentage method.
- Assume the cost of purchase Rs. 50,000/- and the salvage value after 5 years is Rs. 5,000/-

OR

- Q8) a)** Calculate capitalized value of the following property in year 2015. **[10]**
- i) Year of construction of the Building (*with First Class Specifications*) = 1995
 - ii) Plot Area = 1000 m²
 - iii) Built-up Area = 300 m²
 - iv) Scrap Value = 10%
 - v) Rate of interest on Government Securities = 6%
 - vi) Land Cost in the year 2015 = Rs. 100/- per m²
 - vii) Rate of Built-up Area for a similar Building in the year 2015 = Rs. 2000/- per m²
- b) What is meant by 'Value' of a property? Briefly explain seven purposes of valuation. **[8]**
- Q9) a)** Explain the terms briefly: Administrative approval and technical sanction for a Construction work. **[4]**
- b) State various PWD methods of executing the minor works. Clearly explain the merits and demerits of any one method. **[4]**
- c) Discuss the pre-requisites the architect or engineer needs to get completed before inviting a tender. **[4]**
- d) In how many ways can a tender for Civil Work can be invited? **[4]**
Clearly explain any one way with example.

OR

- Q10)**a) Discuss the important and necessary contents of a tender notice. [4]
- b) State eight precautions to be taken at the time of scrutiny of the received tenders. [4]
- c) Explain the circumstances in which the authority may award the tender to the higher / highest bidder. [4]
- d) State the meaning of an 'unbalanced tender' and give its details with an appropriate example. [4]

- Q11)**a) Briefly explain the contents of a typical valid civil engineering contract.[4]
- b) State the necessity of arbitration related to civil engineering works and the matters that can be settled through an arbitrator. [4]
- c) Under which circumstances a contract is terminated? Clearly explain with examples. [4]
- d) Enlist the responsibilities and liabilities of a Civil engineering contractor.[4]

OR

- Q12)**a) Give advantages and disadvantages of 'pre-qualification' of contractors. [4]
- b) Clarify the reasons (situations) which lead to the breach of a contract.[4]
- c) Explain: [4]
- i) Global Tender, and
- ii) FIDIC Document
- d) Discuss the qualifications (eligibility) of a person if he/she wants to be an arbitrator for settling disputes in a construction work. [4]



Total No. of Questions : 12]

SEAT No. :

P1841

[Total No. of Pages : 3

[5059]-140

B.E. (Electrical)

HIGH VOLTAGE ENGINEERING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section I and three questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use 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) Define ionization. Explain Townsend's current growth equation in presence of secondary processes? Derive Townsend's criterion for breakdown. **[8]**
- b) In an experiment in a certain gas, it was found that the steady state current is 5.5×10^{-7} A at 8kV at a distance of 0.4 cm between plane electrodes keeping the field constant and reducing the distance to 0.1 cm result in a current of 5.5×10^{-9} A. Calculate Townsend's primary ionization coefficient α . If the breakdown occurred when the gap distance was increased to 0.9 cm what is the value of secondary ionization coefficient γ . **[8]**

OR

- Q2)** a) What is Paschen's law? Explain significance of existence of minimum sparking potential in Paschen's curve. **[8]**
- b) Compare Townsend's Theory and Streamers theory of breakdown for gaseous dielectrics. **[8]**

P.T.O.

- Q3)** a) Explain any two of the following breakdown mechanisms in solid insulating materials. [9]
i) Thermal breakdown
ii) Intrinsic breakdown
iii) Electromechanical breakdown
- b) Differentiate between treeing and tracking phenomenon. [8]

OR

- Q4)** a) What are the different theories to explain the breakdown in liquids? Explain any 2 theories of breakdown in commercial liquid dielectrics. [9]
b) What is a composite dielectric? Explain mechanisms of short term breakdown in composite dielectric [8]
- Q5)** a) What are the mechanisms by which lightning strokes develop and induce overvoltage's on overhead power lines? [8]
b) What is function of lightning arrester? Compare horn gap lightning arrester with ZnO metal oxide arrester. [9]

OR

- Q6)** a) What is meant by insulation co-ordination? How are the protective devices chosen for optimal insulation level in a power system? [8]
b) State and explain the causes of over voltages due to switching surges and system fault. [9]

SECTION - II

- Q7)** a) Explain Marx circuit of impulse waveform generation. [8]
b) What is principle of operation of resonant transformer? How it is advantageous over cascade connected transformer? [8]

OR

- Q8)** a) Explain one method of controlled tripping of impulse generator. Why controlled tripping is necessary? [8]
b) Draw a neat diagram of Van de Graff generator and explain its working. [8]

- Q9)** a) Explain principle of operation, working of sphere gap voltmeter used for Measurement. [8]
- b) Draw a circuit diagram of voltage double circuit and explain it. [8]

OR

- Q10)** a) Explain method of peak reading voltmeter used for impulse measurement. What are the sources of errors produced in it? [8]
- b) An electrostatic voltmeter has two parallel plates. The movable plate is 12 cm in diameter with 12 kV between the plates, the pull is 6×10^{-3} N. Determine the charge in capacitor for a movement of 1.5 mm of movable plate. [8]

Q11) Explain following : [18]

- a) Any two tests on Power cables.
- b) Any two tests on surge arresters.
- c) Earthing of High voltage Laboratory.

OR

- Q12)** a) Describe following : [10]
- i) Design and planning and layout of High Voltage laboratory.
- ii) Classification of H.V. laboratories.
- b) Describe method of Radio interference measurement. [8]



Total No. of Questions : 12]

SEAT No. :

P1842

[Total No. of Pages : 4

[5059]-141

B.E. (Electrical) (Semester - VIII)
DIGITAL SIGNAL PROCESSING
(2008 Pattern) (Elective - III(C))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain with suitable examples following types of Discrete time systems: **[6]**
- i) Linear and Nonlinear
 - ii) Causal and non causal
 - iii) Time (shift) variant and invariant
- b) Obtain $y(n)$ using linear convolution, given that $x(n) = \{1, \underset{\uparrow}{-3}, 5, -2\}$ and $h(n) = \{1, 4, \underset{\uparrow}{-1}, 2, -3\}$ use matrix (tabulation) method. **[6]**
- c) Given that $x(n) = 2^{-n}$ for $-2 \leq n \leq 1$ **[6]**
 $= 0$ otherwise
- Sketch :
- i) $x_1(n) = x(2 - n)$
 - ii) $x_2(n) = x(n + 1)$
 - iii) $y(n) = x_1(n) + x_2(n)$

P.T.O.

OR

- Q2)** a) Explain process of Analog to Digital conversio & sampling theorem. [9]
b) Explain following terms with respect to discrete time signals. [9]
i) Energy & power signals.
ii) Periodic & aperiodic signals
iii) Even & odd signals.

- Q3)** a) State and prove following properties of DTFT. [8]
i) Time shifting
ii) Differentiation
iii) Convolution theorem
b) Determine one sided Z-transform of [8]
i) $x(n) = e^{-anT} \cos \omega n$
ii) $x(n) = [3(4)^n - 5(3)^n] u(n)$ sketch ROC

OR

- Q4)** a) Determine inverse Z-transform using long division method, given that -
$$x(z) = \frac{1}{1 - 4.5z^{-1} + 3.5z^{-2}} \text{ ROC } |z| < 1.0$$
 [8]
Compute first five terms.
b) Find the impulse response of the system described by the equation -
 $y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$ using ZT & IZT method. Assume zero initial conditions. [8]

- Q5)** a) Explain concept of frequency selective filtering. Draw magnitude & phase characteristics of various types of ideal filters. [7]
b) The impulse response of an LTI system is given by $h(n) = 1.2^n u(n)$. Find its frequency response (magnitude & phase function). [9]

OR

- Q6)** a) Write a short note on Generalized Linear Phase Systems. [7]
b) Derive expressions for frequency response (magnitude & phase functions) of first order system. [9]

SECTION - II

- Q7)** a) State the circular shift property of DFT. [4]
b) Perform circular convolution of the two sequences by concentric circle method : [6]
 $x_1(n) = \{2, 1, 2, 1\}$ and $x_2(n) = \{1, 2, 3, 4\}$
c) Obtain the 4 point DFT using DIT FFT algorithm for $x(n) = \{1, 1, 1, 1\}$ [6]

OR

- Q8)** a) State the cyclic or periodicity property of Twiddle factor. [4]
b) Determine linear convolution using circular convolution of the sequence $x_1(n) = \{2, 1, 2, 1\}$ $x_2(n) = \{0, 1, 2\}$ [6]
c) Draw the flow graph of an 8 point DIF FFT algorithm & mention different expressions. [6]

- Q9)** a) Differentiate IIR filters and FIR filters. [4]

- b) The Analog Transfer function $H(s) = \frac{1}{(s+1)(s+2)}$. Determine H(z) using

impulse invariant Transformation. Assume $T = 1$ sec

- c) Design a Butterworth filter using bilinear transformation for a given specifications of the desired low pass filter given below : [8]

$$0.707 = |H(\omega)| \leq 1.0, 0 \leq \omega \leq 0.2\pi$$

$$|H(\omega)| \leq 0.08, 0.4\pi \leq \omega \leq \pi.$$

OR

- Q10)** a) Compare bilinear transformation with impulse Invariant Transformation. [4]

- b) The Analog Transfer function $H(s) = \frac{2}{(s+3)(s+2)}$. Determine H(z) using

Bilinear Transformation. Assume $T = 0.1$ sec. [6]

- c) Design low pass FIR filter for which the desired frequency response is expressed as :

$$H_d(\omega) = 1.e^{-j\omega\tau} \text{ for } |\omega| \leq \omega_c \\ = 0 \text{ elsewhere}$$

The length of filter should be 5 & $\omega_c = 1$ rad/sample. Use Rectangular window.

Q11) a) Determine the cascade realization of the system characterized by the

$$\text{transfer function } H(z) = \frac{\left(1 + \frac{1}{3}z^{-1}\right)}{\left(1 - \frac{3}{4}z^{-1} + \frac{1}{8}z^{-2}\right)} \quad [8]$$

b) Write short note on Applications of DSP in (any two) : [8]

- i) Spectrum Analysis
- ii) Power factor correction
- iii) Harmonic Analysis & measurement.

OR

Q12) a) Determine the Direct form realization of the following system function [8]

$$H(z) = 1 + 2z^{-1} - 3z^{-2} - 4z^{-3} + 5z^{-4}$$

b) Write short note on Applications of DSP to [8]

- i) Machine control
- ii) DSP based vibration analysis system.



Total No. of Questions : 12]

SEAT No. :

P1843

[Total No. of Pages : 2

[5059]-142

B.E. (Electrical)

ANN AND ITS APPLICATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain Biological inspiration of artificial neural network with neat sketch. [9]

b) Explain classification of intelligent tools. [9]

OR

Q2) a) Explain Single neuron model with neat sketch and its mathematical formulation. [9]

b) Explain basic MC-Lock pitts model. [9]

Q3) a) Explain multilayer perceptron model with neat sketch. [8]

b) Explain learning and training methods for ANN. [8]

OR

Q4) a) Draw and explain Hebbian learning based neural network. Explain its activation function. [8]

b) What is Error - correction learning for artificial neural network. [8]

P.T.O.

- Q5)** a) Explain Perceptron architecture with neat sketch. [8]
b) What is LMS algorithm used in ANN. [8]

OR

- Q6)** a) What is Perceptron training algorithm? Explain with OR gate [8]
b) Explain linear separability. [8]

SECTION - II

- Q7)** a) Explain feed forward Neural Network with neat sketch. [9]
b) What is Back propagation algorithm and its error evaluation. [9]

OR

- Q8)** a) Give step by step procedure of Back propagation method. [9]
b) Explain momentum coefficient needed in neural network. [9]

- Q9)** a) What is Kohonen Organizing Maps? [8]
b) Explain Associative Resonance Theory. [8]

OR

- Q10)** a) Explain ART1 with neat sketch. [8]
b) Explain theory of Adaptive Response Theory. [8]

- Q11)** Explain reactive power management using ANN. [16]

OR

- Q12)** Use ANN to solve the risk assessment in power system network. [16]



Total No. of Questions : 12]

SEAT No. :

P1844

[Total No. of Pages : 3

[5059]-143

B.E. (Electrical)

MODELING OF ELECTRICAL SYSTEMS

(2008 pattern) (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.*

SECTION - I

- Q1)** a) Explain per unit system and normalization with reference to modeling of synchronous machine. [8]
- b) Write short note on Park's transformation. [8]

OR

- Q2)** Enlist the following used in modeling of synchronous machine. [16]
- a) Flux linkage equations.
 - b) Voltage and current equations.
 - c) Electrical and mechanical equations.

- Q3)** a) Explain the formulation of state space equations in modeling of synchronous machine. [8]
- b) Explain in brief determination of machine parameters from manufactures data. [8]

P.T.O.

OR

- Q4)** a) Explain in detail the simplified model of synchronous machine. [8]
b) Write short notes on following : [8]
i) Equivalent circuit of synchronous machine.
ii) Sub transient and transient inductances.
iii) Time constants.

Q5) Explain in detail modeling of excitation system components. [18]

OR

Q6) Explain in detail modeling of complete excitation system. [18]

SECTION - II

- Q7)** a) Describe the circuit model of a three phase induction motor. [8]
b) Explain in detail linear transformation and phase transformation used in modelling of induction motor. [8]

OR

- Q8)** a) Write short notes on two axis models for induction motor. [8]
b) Explain the transformation to a reference frame in context with modeling of induction motor. [8]

Q9) Describe the procedure of finding voltage and current equations in stator reference frame and equation in rotor reference frame. [16]

OR

- Q10)** a) Explain the procedure of finding equations in synchronously rotating frame used in modeling of induction motor. [8]
b) Derive the torque equation to be used in modeling of induction motor. [8]

Q11) Write short notes on (Any 2) :

[18]

- a) Three Winding Transformer Model.
- b) Load Modelling.
- c) Transformer model.

OR

Q12) Write short notes on :

[18]

- a) Voltage dependence of equivalent loads.
- b) Derivation of equivalent load powers.
- c) Static load modelling for load flow studies.



Total No. of Questions : 12]

SEAT No. :

P1845

[Total No. of Pages : 2

[5059]-144

B.E. (Electrical) (Semester - II)
RENEWABLE ENERGY SYSTEM
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate 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) Write a note on, Energy Conservation Supply Curves and Combined Heat and Power (CHP). [8]
- b) Highlight on Integrated Resource Planning (IRP) and Demand Side Management (DSM). [8]

OR

- Q2)** a) Describe Concentrating Solar Power Technologies. [8]
- b) Write a note on, "Demand side Management". [8]

- Q3)** a) Highlight on Wind Turbine Economics and Simple Estimates of Wind Turbine Energy. [10]
- b) Write a note on, Change in wind pattern and forecasting the power generation based on the wind pattern. [8]

OR

- Q4)** a) Write a note on, Historical Development of Wind Power. [8]
- b) Explain how variation in Tower Height varies the different parameters in Wind Energy System. [10]

P.T.O.

- Q5)** a) Write a note on, Solar Radiation Measurements and Average Monthly Insolation. [8]
b) Explain Direct and diffused radiation and effect on power generation-PV and Thermal. [8]

OR

- Q6)** a) Explain the concept, “Altitude Angle of the Sun at Solar Noon”. [8]
b) Explain the Solar Position at any Time of the Day. [8]

SECTION - II

- Q7)** a) Write a note on, Crystalline Silicon Technologies and Single-Crystal Czochralski Silicon. [8]
b) How Shading impacts on I-V curves. [8]

OR

- Q8)** a) Explain the impacts of Temperature and Isolation on I-V curves. [8]
b) Write a note on, Ribbon Silicon Technologies and Cast Multicrystalline Silicon. [8]

- Q9)** a) Explain the Grid-Connected PV System Economics. [8]
b) Write a note on, PV systems - off grid systems and scope for inclusive growth of rural India. [10]

OR

- Q10)** a) High light the concept, Bi-directions metering. [8]
b) Write a note on Grid autonomy. [10]

- Q11)** a) Explain the Geo-Thermal energy harvesting, Biomechanical energy harvesting. [8]
b) Write a note on, Carbon trading and concept of Carbon credits. [8]

OR

- Q12)** a) Explain Nulear energy power plant. [8]
b) Explain Biomechanical energy harvesting. [8]



Total No. of Questions : 12]

SEAT No. :

P1846

[Total No. of Pages : 3

[5059]-145

B.E. (Electrical)

DIGITAL CONTROL SYSTEMS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any one question from each pair of questions : Q.1 & Q.2, Q.3 & Q.4, Q.5 & Q.6, Q.7 & Q.8, Q.9 & Q.10, Q.11 & Q.12.*
- 2) *Answers to the two sections must be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss the advantages and limitations of Digital Control System. [8]
- b) Check whether the following systems are [8]
- i) Static or Dynamic
 - ii) Linear or Non linear
 - iii) Time variant or Time invariant
 - iv) Causal or Non causal
- 1) $Y(n) = X(n) + n X(n + 1)$
 - 2) $Y(n) = nX^2(n)$

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]

P.T.O.

- Q3)** a) State and prove important properties of Z-transform. [6]
 b) Find the Z-transform of the sequence:
 i) $X(t) = e^{-at} \sin \omega t$
 ii) $F(k) = (1/2)^k$, for $k = 0, 1, 2, \dots$ [12]
 OR

- Q4)** a) Explain different methods of obtaining Inverse Z-transform. [6]
 b) Determine Inverse Z-transform of the following : [12]
 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 S-plane into Z-plane. [8]
 b) Examine the stability of system by Jury's test. [8]
 $F(z) = Z^3 + 3Z^2 + 2Z - 3 = 0$
 OR

- Q6)** a) Explain the effect of sampling period on the transient response and on the stability of discrete time system. [8]
 b) Describe the general rules for constructing the Root Loci in designing LTI discrete time control system. [8]

SECTION - II

- Q7)** a) Explain discretization of continuous-time state space equation. [8]
 $X^\circ = Ax + Bu; Y = Cx + Du$
 b) Obtain STM of the following difference equation [8]
 $X(k+1) = GX(k) + Hu(k)$
 where $G = \begin{bmatrix} 0 & 1 \\ -0.2 & -1 \end{bmatrix}; H = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$
 OR

- Q8)** a) Explain clearly with neat diagrams, the Direct, Cascade and Parallel decompositions of Discrete Time Pulse Transfer Function. [8]
 b) By using any one method, determine the discrete time state space model for a system having pulse transfer function [8]

$$\frac{Y(Z)}{R(Z)} = \frac{Z + 0.1}{(Z - 1)(Z - 0.8)}$$

- Q9)** a) What is the principle of duality? Also explain effect of pole zero cancellation on the system with suitable example. [8]
 b) Consider a system with matrices [8]

$$G = \begin{bmatrix} 0 & 1 \\ 0.16 & -1 \end{bmatrix}; H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

Determine a suitable state feedback gain matrix K such that a system will have closed loop poles at $Z = 0.5 + j0.5$ and $Z = 0.5 - j0.5$

OR

- Q10)** a) What is Full order observer? With the help of a block diagram explain it. [8]
 b) For the system $X(K + 1) = GX(k) + H U(K)$; $Y(k) = C X(k)$ where

$$G = \begin{bmatrix} 0 & 20.6 \\ 1 & 0 \end{bmatrix}, H = \begin{bmatrix} 1 \\ 0 \end{bmatrix} \text{ and } C = [1 \ 0]. \quad [8]$$

Design a full order state observer for the desired eigen values of observer matrix.

$$\text{As } Z_1 = -1.8 + j2.4 \ \& \ Z_2 = -1.8 - j2.4$$

- Q11)** a) Draw neat diagram of Digital temperature control scheme and explain it. [8]
 b) Consider the pulse transfer function of discrete time system given as

$$\frac{Y(Z)}{U(Z)} = \frac{b_0 Z^n + b_1 Z^{n-1} + b_2 Z^{n-2} + \dots + b_n}{Z^n + a_1 Z^{n-1} + a_2 Z^{n-2} + \dots + a_n}$$

Determine its Controllable canonical form & Observable canonical form. [10]

OR

- Q12)** a) Explain stepper motor with proper block diagram. [8]

b) Consider the system defined by $G(z) = \frac{z^3 + 8z^2 + 17z + 8}{(z + 1)(z + 2)(z + 3)}$.

Obtain the space representation for this system in Jordan canonical form. [10]



Total No. of Questions : 12]

SEAT No. :

P1779

[Total No. of Pages : 4

[5059]-15

B.E. (Civil)

TRANSPORTATION ENGINEERING - II

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q. 3 or Q.4, and Q.5 or Q.6 from Section-I Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 from section-II.
- 2) Answer to the two sections should be written in separate books.
- 3) Figures to the right indicate full marks
- 4) Use of logarithmic tables, slide rule, Molli's charts, electronics pocket calculator and steam tables is allowed.
- 5) Assume suitable data if necessary.
- 6) Neat diagrams must be drawn wherever necessary.

SECTION - I

- Q1)** a) What are the uses of fact finding surveys? [4]
b) What are the characteristics of road transport in comparison with other systems? [6]
c) Explain in brief PCU and factors affecting PCU. [3 + 3 = 6]

OR

- Q2)** a) Write a short on Traffic Signs. [4]
b) Discuss the scope of Aerial survey in preliminary survey for highway location. What are the steps to be followed [3 + 3 = 6]
c) Discuss the second twenty year road plan of 1961-1981 and its salient features. [3 + 3 = 6]

- Q3)** a) Calculate the maximum allowable speed on a horizontal curve of radius 350 m if the maximum allowable value of lateral coefficient of friction is 0.15 and rate of super elevation is 0.07. [6]
b) Derive an expression for calculating the stopping sight distance. [2 + 4 = 6]
c) List the various types of transition curves used in highway. What is an ideal transition curve? Explain. [6]

P.T.O.

OR

- Q4)** a) Draw the typical cross section of the National Highway in embankment in rural area. [6]
b) Write a short note on construction of WBM road. [6]
c) Define gradient. State and explain various types of gradients. [1 + 5 = 6]

- Q5)** a) State the various desirable properties of aggregates used in road construction. Explain in brief the stepwise procedure of determining Flakiness Index of Aggregate in the laboratory. [2 + 4 = 6]
b) State comparison between rigid and flexible pavement. [6]
c) Explain in brief the Following : [2 + 2 = 4]
i) Tack Coat
ii) Seal Coat

OR

- Q6)** a) Explain in brief Laboratory CBR Test. [6]
b) Write a short note on Equivalent Single Wheel Load. [4]
c) State comparison between Tar and Bitumen. [1 + 5 = 6]

SECTION - II

- Q7)** a) Explain in brief the following : [1.5 × 4 = 6]
i) Calm Period
ii) Ground speed
iii) Air speed
iv) Runway
b) Enumerate the various factors which you would keep in view while selecting a suitable site for an airport. [4 + 2 = 6]
c) How Runway orientation should be done? Discuss. [4]

OR

- Q8)** a) What is Basic runway length? Explain in brief the various corrections to be applied. [2 + 4 = 6]
b) Explain the following terms : [2 × 3 = 6]
i) Apron
ii) Terminal Building
iii) Finger system
c) Draw a neat labeled sketch of an aeroplane. [2 + 2 = 4]

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

OR

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

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

OR

Q12)a) How will you account for the following in the design of Highway Bridge

i) Live Load

ii) Buoyancy

iii) Longitudinal force **[2 + 2 + 2 = 6]**

b) Define Bridge bearing. State the types of bearings. Why Bearings are necessary in bridges. **[2 + 2 + 2 = 6]**

c) Explain the following with a neat sketches : **[2 + 2 + 2 = 6]**

i) Abutment pier

ii) Bascule Bridge

iii) Transporter bridge



Total No. of Questions : 12]

SEAT No. :

P1847

[Total No. of Pages : 3

[5059]-151

B.E. (Electronics)

ELECTRONICS SYSTEM DESIGN

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section I and three question 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) Explain the steps of electronic product design. Also explain the need of documentation. [8]
- b) Differentiate between Quality and reliability [6]
- c) Explain the bath tube curve indicating all its regions. [4]

OR

- Q2)** a) A communication system is to be designed to work at RF range. Discuss the considerations in design as far as reliability of the system is concerned. [8]
- b) Define and explain the following terms in mathematical way. [6]
- i) MTBF
 - ii) MTTF
 - iii) Failure Rate
- c) Explain different reliable soldering practices. State their advantages & limitations. [4]

P.T.O.

- Q3)** a) Explain error budget analysis with one example of an electronic product. [8]
- b) Explain following terms for ADC & DAC. [8]
- i) Resolution
 - ii) Full scale o/p voltage
 - iii) Accuracy
 - iv) Linearity

OR

- Q4)** a) Explain instrumentation amplifier with proper circuit diagram. Explain its need in analog signal conditioning. [8]
- b) Explain the need of V_{ref} in ADC. Explain the factors to be considered while selecting V_{ref} . Discuss on error budget depending on V_{ref} and no. of output bits. [8]

- Q5)** a) Determine the hardware design considerations for a load based weighing machine to display weight, rate and price information on digital display. [8]
- b) Design and explain four channel temperature scanner using AD7817 with any microcontroller. [8]

OR

- Q6)** a) What are the factors affecting on selection of buses and protocols in high speed electronic product. [8]
- b) Explain the selection of microcontroller to particular application based on : [8]
- i) I/O pins
 - ii) Counters
 - iii) RAM & ROM
 - iv) Architecture

SECTION - II

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

OR

- Q8)** a) What are the different factors affecting on the choice between Assembly & High Level language? [10]
b) Write short notes on : [8]
i) Structured Programming
ii) Real time software

- Q9)** a) Explain different termination schemes for avoiding reflections in high speed PCB design [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. [4]

OR

- Q10)** a) Define crosstalk? What should be the remedy to minimize crosstalk?[8]
b) What is the signal integrity? Justify the significance of SI. [4]
c) Why bare board testing of PCB is important. [4]

- Q11)** a) What are the features & limitations of analog CRO, DSO, Logic Analyzer & Mixed signal Oscilloscopes in finding hardware/software faults? [10]
b) Why environmental testing is necessary? How it is carried out? [6]

OR

- Q12)** a) Explain following equipment for circuit testing : [10]
i) Digital storage oscilloscope
ii) Mixed signal oscilloscope
b) Explain Transient Sensitivity & Monte Carlo method. [6]



Total No. of Questions : 12]

SEAT No. :

P1848

[Total No. of Pages : 2

[5059]-152

B.E. (Electronics Engineering)

VLSI DESIGN

(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain MOS transistor and its characteristics in detail. Also explain effect of Channel length modulation over characteristics. [8]

b) Draw transmission gate and how it is advantageous? [8]

OR

Q2) a) Explain Power delay product? What is noise margin? Significance? [8]

b) Explain DRC (Design Rule Check) in detail. [8]

Q3) a) What is RAM? How it is important in VLSI Design? [8]

b) What are the timing and refresh circuits in memories? [8]

OR

Q4) a) Explain DRAM cells in detail. [8]

b) What is the role of memories in PLDs? Explain in detail. [8]

P.T.O.

- Q5)** a) Write a VHDL code for ALU. [9]
b) What are packages? Explain how it is implemented in VHDL code for any one circuit. [9]

OR

- Q6)** a) Explain with example different modeling styles in VHDL programming. [9]
b) Write a VHDL code for Full adder by behavioural modeling. [9]

SECTION - II

- Q7)** a) How ASIC differs from PLD design approach. [8]
b) Compare PLA, PAL. [8]

OR

- Q8)** a) How logic is getting implemented in CPLD? Explain with example. [8]
b) Compare CPLD and FPGA. [8]

- Q9)** a) Write short note on Boundary scan check. [8]
b) Write short note on BIST. [8]

OR

- Q10)** a) Explain TAP Controller in detail. [8]
b) Write short note on Design for testability? [8]

- Q11)** a) Enlist and explain interconnect routing techniques. [9]
b) Give different power distribution techniques in detail. [9]

OR

- Q12)** a) What are wire paracitics? [9]
b) Write short note I/O pad design. [9]



Total No. of Questions : 12]

SEAT No. :

P1849

[Total No. of Pages : 3

[5059]-153

B.E. (Electronics)

EMBEDDED SYSTEMS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section - I and three questions from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a) Define embedded system. Explain various software architectures of embedded systems. [9]

b) Explain recent trends in embedded system design. [9]

OR

Q2) a) Explain with example how design metrics compete with each other. Suggest methods to trade off these competing design metrics. [9]

b) What is IDE? Explain it's components. [9]

Q3) a) Why RISC architecture is considered as better choice for design of embedded system? [8]

b) With suitable application explain necessity of RAM, ROM & EEPROM memory in embedded system. [8]

OR

P.T.O.

- Q4)** a) State and explain criteria for processor selection in Embedded systems. [8]
- b) Explain following processor technologies [8]
- i) GPP
 - ii) SPP
 - iii) ASIP

- Q5)** a) With neat diagram explain register banking in ARM-7 processor. [8]
- b) Explain data flow model of ARM-7 processor. [8]

OR

- Q6)** a) Explain CPSR and SPSR register in ARM-7 processor. Also state usage of them. [8]
- b) Explain operating modes in ARM-7 processor. [8]

SECTION - II

- Q7)** a) What is re-entrant function? What are rules for reentrant function? [8]
- b) With neat interfacing diagram explain 16×2 LCD interfacing with LPC-2148. [8]

OR

- Q8)** a) What is shared data problem? Explain solution to shared data problem with an example. [8]
- b) Explain with neat interfacing diagram UART communication with LPC-2148. [8]

- Q9)** a) State and explain features of μ cos-II. [8]
- b) What is semaphore? Explain types of semaphores and any one usage of it. [8]

OR

- Q10)** a) Explain multitasking in $\mu\text{cos-II}$ with the help of state diagram. [8]
b) Explain different scheduling algorithms? Which scheduling algorithm is used in $\mu\text{cos-II}$. [8]

- Q11)** a) What is mailbox and message queue? How $\mu\text{cos-II}$ uses them. [9]
b) Explain cruise control system in automobiles. [9]

OR

- Q12)** Write short note (any three) : [18]
a) Priority inversion problem.
b) Memory management in $\mu\text{cos-II}$
c) Interrupt management in $\mu\text{cos-II}$
d) On chip ADC interfacing with LPC-2148.



Total No. of Questions : 12]

SEAT No. :

P1850

[Total No. of Pages : 3

[5059]-154

B.E. (Electronics)

ADVANCED MEASUREMENT SYSTEMS

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION - I

Q1) a) What is signal integrity? Explain signal integrity issues in testing high frequency analog circuits. **[8]**

b) Write important specifications of DSO and MSO, also give typical application of each. **[8]**

OR

Q2) a) With suitable application explain working of DPO. **[8]**

b) Write important specifications for Arbitrary Signal Generator and explain how it helps in addressing signal integrity issues. **[8]**

Q3) a) Write important specifications of Spectrum analyzer and explain working of Spectrum Analyzer with neat diagram. **[8]**

b) Explain selection of an instrument for following applications. **[8]**

- i) To verify frequency spectrum of the output signal of antenna
- ii) To measure VSWR & reflection coefficient of transmission line
- iii) To measure parameters of frequency Modulated wave.
- iv) To measure S-parameters for micro strip resonator circuit

P.T.O.

OR

- Q4)** a) Explain selection of an instrument for following applications. [8]
i) Verification of software execution for a microcontroller kit
ii) Measurement of timing violation of read/write signal on microcontroller kit
- b) Describe working of Logic Analyzer with basic block diagram. Also give typical specifications of logic analyzer. [8]
- Q5)** a) What is role of Electronic measurements for Electronic Central Unit (ECU) in an Automotive system? [8]
- b) Describe testing equipments required for testing of serial bus signals. [6]
- c) Explain Interfacing techniques for touch screen with PIC controller. [4]

OR

- Q6)** Write short notes on : [18]
- a) GSM modem and AT command
- b) Role of RF modules in Automotive System.
- c) Role of USB and Can bus in Embedded System

SECTION - II

- Q7)** a) Explain in detail the test set up for measurement of VSWR and attenuation. [8]
- b) Draw a scheme for microwave network analyzer and explain the method of measuring s parameters. [8]

OR

- Q8)** a) Draw and elaborate the test setup for Advanced Radar Measurement System. [8]
- b) Explain in detail the EMI/EMC test set up for conducted and radiated interference measurement. [8]

- Q9)** a) Name and explain any four applications of Virtual Instrumentation. [8]
b) Explain role of software and Hardware in virtual instrumentation. [8]

OR

- Q10)** a) Elaborate in detail application of the virtual instrumentation for the wave analyzer. [8]
b) Explain the desired features of software used for virtual instruments. [8]

- Q11)** a) Discuss the different errors in measurement of frequency/time period. How to encounter these errors? [10]
b) Explain the purpose of sample and hold circuit in digital instruments. Also explain suitable of sample and hold circuit. [8]

OR

- Q12)** a) Give the important specifications of ADC. Also give types of ADCs with important specifications and explain any one in detail. [10]
b) Elaborate auto polarity, auto ranging and auto zeroing in digital equipments. [8]



Total No. of Questions : 12]

SEAT No. :

P2125

[5059]-155

[Total No. of Pages : 2

B.E. (Electronics)
ADVANCED POWER ELECTRONICS
(2008 Course) (Elective- I) (404204)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *All questions carry equal marks.*
- 6) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) What are converters? Explain with circuit diagram and waveforms, working 3 ϕ IGBT based PWM rectifier. Comment on P.F. [10]

b) Explain the need of 12 pulse converter in industrial application. [8]

OR

Q2) a) Compare SCR based converters with chopper based converters. [8]

b) Explain double sided PWM converter system with its circuit diagram, simplified block diagram. [10]

Q3) a) What is PLL? Explain with the block diagram, speed control of DC motor using PLL for varying load conditions. State its advantages & disadvantages. [8]

b) Explain with a block diagram, the speed control fo DC motor using microcontroller. [8]

OR

Q4) a) What are cycloconverters? Explain with principle, circuit diagram & waveform working of cyclo converter. State its advantages & disadvantages. [8]

b) What are DC drives? Explain with circuit diagram, working of DC motor speed control technique by using microcontroller. comment on P.F. Torque-Speed characteristics. [8]

P.T.O.

- Q5)** a) What are multilevel inverters? Explain the circuit diagram, switching of multilevel inverter. State its advantages & disadvantages. [8]
b) Explain the need of selective harmonic elimination technique in multilevel inverters. [8]

OR

- Q6)** Write a short note on any two: [16]
a) Sliding mode bi-directional controlled boost inverter
b) DC link inverter
c) Adaptive control technique
d) Z-source inverter

SECTION-II

- Q7)** a) What is resonant converter? Explain with circuit diagram and waveform working of ZCS. Comment on P.F. State its advantages & disadvantages. [10]
b) What is soft switching? Explain. [4]
c) Explain with diagram synchronous rectifier. [4]

OR

- Q8)** a) Explain with diagram SLR resonant converter. [10]
b) Explain low dropout regulator. [4]
c) Compare linear, switched mode and resonant converter. [4]
- Q9)** a) Explain in brief photovoltaic energy conversion system. [8]
b) Explain in brief wind energy conversion system. [8]

OR

- Q10)** a) What are the limitations of back to back converter in wind power plants? Explain. [8]
b) Explain the need of battery for photovoltaic systems. [8]
- Q11)** a) What is HVDC ? Explain in detail. [10]
b) Explain FACTS in detail. [6]

OR

- Q12)** Write short note on: [16]
a) Energy Audit
b) Power quality problems
c) Traction Drives.



Total No. of Questions : 12]

SEAT No. :

P1851

[Total No. of Pages : 3

[5059]-156

B.E. (Electronics)

BIOMEDICAL INSTRUMENTATION

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Discuss Ten important factors to be consider in design of medical instrument. **[10]**
- b) Explain different types of Electrodes for measurement of Bio-Signal with their properties and the material used for the same? **[8]**

OR

- Q2)** a) Write short note on active and passive transducer used for measurement of Bio-Signal? **[10]**
- b) Explain action potential, nesting potential, depolarization, and polarization of cell with sketch and characteristics. **[8]**
- Q3)** a) Explain various EEG waveforms with their frequency and its significance. **[8]**
- b) What is the role of Nervous system in living Organism? Draw a neuron structure and explain it in detail. **[8]**

P.T.O.

OR

- Q4)** a) Draw and explain 10-20 electrode system for EEG recording. [8]
b) Why safety measures are to be considered while designing Bio Electronic Product? Draw Block Schematic of EEG and explain in detail. [8]
- Q5)** a) Write a short note on Stress Test System? [8]
b) The distance between two consecutive R wave is 30 mm and paper speed is 60 mm/sec what is heart rate and comment on heart rate. [8]

OR

- Q6)** a) Explain with neat diagram Cardio Vascular system. [8]
b) Fill in the Blanks : [4]
• The Upper Chamber of the heart is called as _____.
• The _____ is the middle layer of the heart.
• The Ventricular contraction is known as _____.
• The Pulmonary valve is located at _____.
c) Explain the Electro Conduction of Heart. [4]

SECTION - II

- Q7)** a) Explain basic requirement of implantable Pacemaker, types of Pacemaker. Explain one in detail. [8]
b) Explain the working of DC Defibrillator with the circuit diagram and waveform? [8]

OR

- Q8)** a) Explain the working principle of MRI. How does the MRI Scanner work? Explain with block Diagram. [8]
b) Draw and explain Echocardiography. [8]
- Q9)** a) Draw block diagram of Central Monitoring system. [8]
b) Explain grounding and shielding techniques used in hospital. [8]

OR

Q10) a) What is Electronic Stethoscope? What are its advantages and disadvantages? [8]

b) Explain Doppler shift blood flow velocity meter with expression. [8]

Q11) a) Compare MRI and CT scan. [10]

b) PO₂, PCO₂, PH electrodes are to be used in blood gas Analysis. Discuss the complete Scheme. [8]

OR

Q12) Write short note (Any Three) : [18]

a) Amalgamator.

b) Vitro Oximeter.

c) Shadow Less Light.

d) Orth Pentamo graph.



Total No. of Questions : 12]

SEAT No. :

P1852

[Total No. of Pages : 2

[5059] - 157

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

MECHATRONICS

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What are the different functions of mechatronics systems? Explain the key elements of mechatronics systems. **[10]**
- b) What are different mechanical components? explain any two components. **[8]**

OR

- Q2)** a) Define gears and explain any two types of gears with their applications. **[8]**
- b) State and explain the step wise design procedure for any one mechatronics system. **[10]**

- Q3)** a) Explain Elastic system modelling in detail **[8]**
- b) Explain LVDT for pressure measurement in detail. **[8]**

OR

- Q4)** a) Explain in detail proximity sensor. **[8]**
- b) Explain in detail DC motors and servo motors **[8]**

P.T.O

- Q5)** a) Explain different types of mechanical actuators with suitable example. [8]
b) Write the specifications of ADC and DAC. [8]

OR

- Q6)** a) Explain in detail pulse width modulation and programmable electro hydrolic valves. [8]
b) Explain variable freqⁿ drives. in detail. [8]

SECTION - II

- Q7)** a) Explain in detail the design of a mobile robot as a case study. [10]
b) Explain UART in detail. [8]

OR

- Q8)** a) Explain Rs 232 and IEEE 488 - GPIB Standard. [8]
b) Explain principle and working of magnetic recorder with the help of suitable diagram. [10]

- Q9)** a) Draw and explain block diagram of CNC machine [8]
b) Explain architecture of PLC in detail. [8]

OR

- Q10)**a) What are different types of communication protocols. explain it. [8]
b) Explain in detail general purpose bus standard. [8]

- Q11)**a) Explain a data logger for a coffee wending manchine using its standard accessories. [8]
b) Write short notes on signal conditioning and signal conversion. [8]

OR

- Q12)**a) Draw and explain multichannel data logger. [8]
b) Explain in detail working of copying machine. [8]



Total No. of Questions : 12]

SEAT No. :

P1853

[Total No. of Pages : 3

[5059] - 158

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

ADVANCED COMPUTER ARCHITECTURE

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain feng's classification of parallel computer Architecture. [8]
- b) Why do we need high speed computing? Explain von-neuman computer architecture [8]
- c) State following terms w.r.t. pipeline processing. [2]
- i) Clock period
 - ii) Speedup

OR

- Q2)** a) What are performance matrices and measures used for parallel computers? Explain. [8]
- b) Explain Amdahl's and Gustafason's speedup performance laws. [8]
- c) Explain instruction level parallelsim. [2]
- Q3)** a) State the following terms w.r.t. pipeline processing. [8]
- i) Hazards
 - ii) Efficiency
 - iii) Dynamic pipeline
 - iv) Internal forwarding

P.T.O.

- b) What do you mean by EPIC? State and explain features of EPIC. [8]

OR

- Q4)** a) Compare between. [8]

- i) Static and dynamic pipeline
- ii) Unifunctional and multifunctional pipeline.

- b) What are different pipeline hazards? How can these hazards be detected and resolved? [8]

- Q5)** a) Explain pipeline chaining with example. [8]

- b) How does vectorization works? Explain any two vector optimizing functions. [8]

OR

- Q6)** a) What is Array processor? Explain parallel sorting on Array processor.[8]

- b) Explain the terms. [8]

- i) Vector loops
- ii) Vector processing.

SECTION - II

- Q7)** a) Explain in detail static and dynamic topologies used in inter connection network. [8]

- b) Explain mesh interconnection network for interconnection of processor in parallel computer system. [8]

OR

- Q8)** a) Explain cube interconnection network and hypercube interconnection network. [8]

- b) Explain SIMD architecture. [8]

- Q9)** a) Differentiate between loosely coupled and tightly coupled multiprocessor architecture. [8]

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

OR

Q10)a) What is chip multiprocessing? With block diagram explain the architecture of IBM 4 processor. [8]

b) What is memory contention? What are the different techniques for reducing memory contention? Explain. [8]

Q11)a) What is concept of shared memory programming? Explain [8]

b) Explain synchronous & asynchronous message passing in parallel programming. [8]

c) What is latency? [2]

OR

Q12)a) What are issues involved in multithreaded architecture? [8]

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

i) Send ();

ii) Receive ();

iii) Fork ();

iv) Join ();

c) What is data parallel programming? [2]



Total No. of Questions : 12]

SEAT No. :

P1854

[Total No. of Pages : 3

[5059] - 159

B.E. (Electronics) (Theory) (Elective - II)
ENTREPRENEURSHIP & BUSINESS PLANNING
(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) Define Entrepreneurship? Explain types of entrepreneurial businesses in brief. [9]
- b) Identify the characteristics of successful Entrepreneurs. What are the challenges faced by different Entrepreneurs in the present scenario. [9]

OR

- Q 2)** a) Define the concept of supply and demand. [6]
- b) How does the market structure affect the price of a good or service? [6]
- c) Write short note on different entrepreneur skills. [6]

- Q 3)** a) What are different forms of ownership? Explain in Brief. [6]
- b) What is Franchise? State its advantages and disadvantages. [6]
- c) What is the role of government in entrepreneurial development? [4]

OR

- Q 4)** a) What is SWOT analysis? Explain in brief in the context of entrepreneurial businesses. [4]
- b) What are the issues in setting up of business. [4]
- c) Define Business plan. Discuss a typical business plan with a case study [8]

P.T.O

- Q 5) a)** What is product Marketing? Explain with a example. [8]
b) What are the basic elements of business plan? [8]

OR

- Q 6)a)** What is the importance of advertising? Explain different types of advertisements. [6]
b) What is inventory? What are different types of inventory? [6]
c) Define and explain Breakeven Point. [4]

SECTION - II

- Q7) a)** Categorize business risk. Identify security precautions to protect your business from different types of theft? [6]
b) Explain the different types of insurance you may need for your business [6]
c) What are the alternatives to hiring permanent staff? [6]

OR

- Q8) a)** Define leadership qualities, explain in brief. [6]
b) What are the different methods of record keeping? Explain the advantages and disadvantages of each. [6]
c) Write a short note on inventory tracking. [6]

- Q9) a)** What is the role of computer technology and Internet in business? [6]
b) Explain the services provided by a financial advisor. [4]
c) Explain in brief financial management. [6]

OR

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

- Q11)**a) What are green business opportunities, explain in the context of Environmental Threat and Opportunity Profile (ETOP). [8]
- b) Write a short note on legal requirements in a business. [8]

OR

Q12) Write short notes on

- a) Explain business idea with an example. [6]
- b) Explain different business ideas for a start up business. [6]
- c) Business ethics. [4]



Total No. of Questions :12]

P2126

SEAT No. :

[Total No. of Pages : 2

[5059]-160

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

(2008 Pattern) (Elective - II) (404205) (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 wherever necessary.*
- 4) Figures to the right side indicate full marks.*
- 5) Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Explain the principles and application of MEMS desig. [8]
b) Explain the various transduction methods of mechanical transducer. [8]

OR

- Q2)** a) Write a short note on materials for MEMS. [8]
b) Explain the micromachining process in detail. [8]
- Q3)** a) Explain various analog controls in MEMS. [8]
b) What are the various sliding controls of MEMS. [8]

OR

- Q4)** a) Write a short note on active substrate material. [8]
b) Write short note on silicon piezo-resistors. [8]

- Q5)** a) What are various and chemical transducers. [9]
b) Write a short note on biosensors. [9]

OR

- Q6)** a) Explain the concept of electrophoresis. [9]
b) Explain various thermal transducers. [9]

P.T.O.

SECTION-II

- Q7)** a) Explain the SOC design flow. [8]
b) Differentiate between VLSI and SOC signal flow. [8]

OR

- Q8)** a) Explain the core architecture of digital media. [8]
b) What are the various associated compilation tech of digital media. [8]

- Q9)** a) Explain the process of physical design automation. [8]
b) Explain the process of lithography. [8]

OR

- Q10)**a) What is behavioural synthesis. Elaborate in detail. [8]
b) Write a short note on FPGA synthesis. [8]

- Q11)**a) Explain the process of hardware/sw co-design [9]
b) What is testability. Explain in brief. [9]

OR

- Q12)**a) Give the overview of mechanical packaging. [9]
b) What are various embedded core based SOC. [9]



Total No. of Questions : 12]

P4957

SEAT No. :

[Total No. of Pages : 3

[5059]-161

**B.E. (Electronics Engineering)
ROBOTICS AND AUTOMATION
(2008 Pattern) (Elective - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from Section - I and Section - II.*
- 2) *Answer to the sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

- Q1)** a) Explain how robots can be classified based on the types of joints with the help of neat sketches. **[10]**
- b) Define following terms: **[8]**
- i) Degree of Freedom
 - ii) Work envelop
 - iii) Reach & Stroke
 - iv) Payload

OR

- Q2)** a) Explain the terms work envelop and work volume for the following types of robot. **[10]**
- i) Cartesian Robot
 - ii) Cylindrical Robot
 - iii) Spherical Robot
- Explain the significance of these terms with respect to Industrial applications.
- b) Discuss various specifications of a robotic system. **[8]**

P.T.O.

- Q3)** a) What is Inverse kinematic solution? Why the Inverse kinematic solutions are not unique? [8]
- b) Explain the term robot arm dynamics. Discuss Kane's Method used for formulation of dynamical equations. [8]

OR

- Q4)** a) For the point $4i + 2j + 10k$, perform following operations [8]
- Rotate 30 deg about x-axis.
 - Translate 3 units along y-axis.
 - Rotate 45 deg about x-axis & translate 4 units along y-axis.
 - Translate 2 units along y-axis then rotate 45 deg about x-axis
- b) What is D-H representation? Discuss D-H algorithm. [8]

- Q5)** a) Explain the working principle of proximity rod tactile sensor with neat sketch. [8]
- b) Explain the concept of end effector, tool frame, tool point, roll, pitch, yaw with the help of neat diagram. [8]

OR

- Q6)** a) List different types of sensors used in robotics? Explain any 2 with neat diagram. [8]
- b) Explain the following mechanisms with neat diagram. [8]
- Slider-Crank mechanism
 - Four bar mechanism

SECTION - II

- Q7)** a) Explain with the block diagram different parameters involved in Trajectory planning problem? Explain different steps in Trajectory planning. [10]
b) What do you mean by Error Budgeting? What are the parameters related to it? [8]

OR

- Q8)** a) The trajectory of a particular joint is specified as follows. Path points in degrees:10,35,25,10. The duration of these segments should be 2,1,3 seconds respectively. The magnitude of default acceleration to use at all blend points is 50 degrees/second². Calculate all segment velocities, blend times and linear time. [10]
b) Explain how straight line motion can be achieved using an Articulated Robot. [8]

OR

- Q9)** a) What is image segmentation? Explain in brief different challenges encountered in real world video for segmentation. [8]
b) Discuss the use of Intelligent Sensors in robotics. [8]

OR

- Q10)**a) Explain applications of robot vision system. [8]
b) Draw neat sketch showing robot system with computer vision and explain. [8]

- Q11)**a) Draw and explain the standard components in inspection system. [8]
b) Explain in brief: [8]
i) PLC
ii) SCADA

OR

Q12) Write short note on

- a) Welding automation using robot [5]
b) Intelligence in robot [5]
c) Need of automation in industry and relation of automation with productivity. [6]



Total No. of Questions :12]

P2127

SEAT No. :

[Total No. of Pages : 2

[5059]-162

B.E. (Electronics)

COMPUTER NETWORK AND SECURITY

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Explain any two types of topologies and give applications of each. [8]
b) Discuss the similarities and differences of the two reference models. [8]

OR

- Q2)** a) Enlist the uses of computer networks. [4]
b) Explain the working of X. 25? [4]
c) Give applications of various types of networks. [8]

- Q3)** a) Define the following with examples- URL, Browser. [4]
b) How does SMTP and SNMP work. Explain with diagram. [8]
c) What is the function of Traceroute? [4]

OR

- Q4)** a) Explain with example DNS. [6]
b) Create a page using HTML. Write all the commands which could be used to create the page with the desired outcome. [6]
c) What is the significance of BOOTP and ICMP? [4]

- Q5)** a) Explain the types of addressing with appropriate examples. [8]
b) List with explanation issues at Network layer. [6]
c) What are interior and exterior protocols? Explain any one. [4]

OR

P.T.O.

- Q6)** a) Compare TCP and UDP. [6]
b) What are the various methods for Congestion control? Discuss any one. [6]
c) What are various High speed LANs. Explain any one. [6]

SECTION-II

- Q7)** a) Discuss Sliding window protocol and its types. [6]
b) What are Static and Dynamic channel allocation types? Give their types. [6]
c) What are the types of collision free protocols? How do they work? [6]

OR

- Q8)** a) With appropriate diagram explain the working of IEEE 802.3. [8]
b) Give applications of the components with their purpose-Hubs, Repeaters, Bridges, Switches, Routers, Gateways. [10]

- Q9)** a) What are the various types of unguided media? Explain any one. [8]
b) Why does the strength of the signal go on reducing after it travels a longer distance, explain? [4]
c) How is the capacity of a channel calculated? Which factors affect the performance? [4]

OR

- Q10)** a) Compare the types of Packet switching. [8]
b) With example explain the working of Message switching. [4]
c) What is a Modem? How does it support internet? [4]

- Q11)** a) With steps explain the working of DES. [6]
b) Write a short note on network simulation. [4]
c) What are the types of cryptography? Explain any one. [6]

OR

- Q12)** a) What is network tester used for? [4]
b) With diagram explain a security model. [6]
c) What is the significance of network monitoring and protocol analyzer? [6]



Total No. of Questions : 12]

SEAT No. :

P1855

[Total No. of Pages : 3

[5059] - 163

B.E. (Electronics)

PROCESS AUTOMATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answer 3 questions from section I and 3 questions from Section II.*
- 3) *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 indicate full marks.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Draw and explain the block diagram of process control system. [8]
b) Draw a diagram of flow control loop and explain the functions of all components. [8]

OR

- Q2)** a) Explain the following process characteristics with suitable examples [8]
i) Process lag
ii) Selfregulation
b) Draw a diagram of level control loop and explain the functions of all components. [8]
- Q3)** a) Draw and explain the circuit diagram of op-amp based PID controller [8]
b) Explain PI and PD modes of PID Controller. [8]

P.T.O.

OR

- Q4)** a) Explain closed loop ultimate cycle Ziegler Nichol's Method of PID tuning. [8]
b) Explain P,I and D actions of PID controller. Give their features. [8]
- Q5)** a) Compare electronic, hydraulic and pneumatic control systems. [8]
b) Sketch and explain inherent and installed characteristics of linear, equal percentage and quick opening control valves. [10]

OR

- Q6)** a) Explain the concept of cavitation and flashing in control valves. [8]
b) Define and explain [4]
i) Rangeability
ii) Valve sizing coefficient C_v
- c) An equal percentage valve has a maximum flow of $150\text{cm}^3/\text{sec}$ and a minimum flow of $5\text{cm}^3/\text{sec}$. If the full travel of valve is 3cm. Determine rangeability, flow at 1cm and 2cm opening. [6]

SECTION - II

- Q7)** a) Explain the concept of cascade control scheme with the help of neat block diagram. List the guidelines for the tuning of controller. [10]
b) Explain the model reference adaptive control scheme. [8]

OR

- Q8)** a) Compare feedback and feed forward control systems with reference to their merits and demerits. [8]
b) Explain model predictive control in detail. Also explain the concept of prediction horizon and control horizon. [10]
- Q9)** a) Sketch and explain the feed forward control scheme for distillation column. [8]
b) Explain robot system and its components. [8]

OR

- Q10)**a) Explain feedback control scheme for heat exchangers. [8]
b) Explain surge control in compressors. [8]

- Q11)**a) Explain distributed control system with the help of neat block diagram. [8]
b) Write a short note on supervisory control. [8]

OR

- Q12)** Write short notes on [16]
a) Square root extractor
b) Control panels



Total No. of Questions : 12]

SEAT No. :

P1856

[Total No. of Pages : 3

[5059] - 164
B.E. (Electronics)
AUDIO AND VIDEO ENGINEERING (Elective - III)
(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidate:-

- 1) Answer any three questions from each section.*
- 2) Answer to the two sections should be written in seperate book.*
- 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) What do you understand by persistence of vision & flicker. How is flicker removed. **[8]**
- b) Define the following. **[4]**
- i) Kell factor
 - ii) Aspect ratio
 - iii) Hue
 - iv) Saturation
- c) Explain the terms with suitable sketches. **[6]**
- i) Chromaticity diagram
 - ii) Frequency interleaving

OR

- Q2)** a) Explain with neat sketch colour TV camera. **[8]**
- b) Explain why FM is used for sound & AM used for picture in television system. **[6]**
- c) What is colour burst signal? why and where it is added? **[4]**

P.T.O.

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

OR

- Q4)** a) Draw a neat block diagram of colour TV receiver and explain function of each block. [8]
b) Compare high level and low level tranusmitter. [4]
c) Compare PAL, NTSC and & SECAM colour TV system. [4]

- Q5)** a) Explain the formal of MAC signal used for transmission of colour TV signal. State the various types of MAC signals. [8]
b) State the features of following video compression techniques. [8]
i) MPEG - 2
ii) MPEG - 4

OR

- Q6)** a) State the advantages of digial TV. Draw a neat block diagram of digital TV. receiver & briefly explain function of each block. [8]
b) Discuss the different digital TV recording techniques. [8]

SECTION - II

- Q7)** a) State the HDTV standards. Describe the compatibility problems in HDTV. [8]
b) Explain with neat block diagram direct broadcasting satellite for TV broadcasting. [10]

OR

- Q8)** a) Explain in short. [4]
i) Conditional access system (CAS)
ii) Digital broadcasting
b) Write a note on. [6]
i) CCTV
ii) CATV
c) Discuss a live TV coverage plan for a football match. Show the camera placement at different locations & other equipment set - up for line broadcast. [8]

- Q9)** a) Draw and explain block diagram of MP3 player. [8]
b) With the help of block diagram, Explain Blue Ray DVD player. [8]

OR

- Q10)** a) Explain the different DVD formats. [8]
b) Explain and Enlist the audio compression ITU - T standards [8]

- Q11)** a) Define the following terms. [8]
i) Reverberation
ii) Absorption coefficient
iii) Accoustic chamber
iv) Sound reduction index
b) Write a short note on [8]
i) Special type of speakers
ii) Hi Fi system

- Q12)** a) Explain with neat block diagram how digital satellite radio (DSR) receiver works. [8]
b) Explain the working of a typical chordless microphone PA system. State the type of microphone used & their specifications. [8]



Total No. of Questions : 12]

SEAT No. :

P1857

[Total No. of Pages : 3

[5059] - 165
B.E. (Electronics)
IMAGE PROCESSING AND MACHINE VISION
(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) *Figurs 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) What are the different elements of visual perception ? Explain in detail.[8]
b) With the help of example explain uniform and non uniform image quantization. [10]

OR

- Q2)** a) With the help of block diagram explain the fundamental steps in Digital Image Processing. [8]
b) Discuss in detail basic methods of Image sensing and acquisition. [10]
- Q3)** a) Differentiate between contrast Stretching, Intensity - level slicing and bit plane slicing. [8]
b) What is histogram equalization? Perform the equalization of the image.[8]

$$I = \begin{vmatrix} 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 & 3 \\ 3 & 5 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 & 3 \\ 4 & 4 & 4 & 4 & 4 \end{vmatrix}$$

OR

- Q4)** a) With help of the given image matrix justify the statement that median filter is an effective tool to minimize salt and pepper noise. [8]

$$F(m,n) = \begin{vmatrix} 24 & 22 & 33 & 25 & 32 & 24 \\ 34 & 255 & 24 & 0 & 26 & 23 \\ 23 & 21 & 32 & 31 & 28 & 26 \end{vmatrix}$$

- b) With the help of examples explain sharpening filter. [8]

- Q5)** a) What is the drawback of laplacian operator? What is the advantage of using LOG filter? Explain in detail. [8]

- b) Compare Region Growing & Region Splitting and Merging algorithms. [8]

OR

- Q6)** a) Differentiate between local and global thresholding. Explain the utility of Adaptive thresholding. [8]

- b) Discuss Hough transform with algorithm and its application. [8]

SECTION - II

- Q7)** a) Give the block diagram of lossless predictive encoder and decoder. Explain one application of this technique. [8]

- b) With the help of block diagram explain Transform coding system. Explain the terms forward and Inverse transformation kernels. [10]

OR

- Q8)** a) Give the 2D-equation for forward and Reverse DWT coefficient of Image I (x,y) Also explain how Wavelet Transform helps in edge detection. [10]

- b) Find the set of codewords and average word length using Huffman coding scheme for a set of gray levels with probabilities given below. [8]

Input	G1	G2	G3	G4	G5	G6
Probability	0.1	0.1	0.2	0.1	0.2	0.3

- Q9)** a) Describe polygonal approximations using Minimum-perimeter polygons (MPP.) [8]
b) Define. [8]
i) Eulers's number
ii) Projection
iii) Eccentricity
iv) Elongatedness

OR

- Q10)** a) Define the terms area, perimeter, compactness and circularity ratio. What are Topological Descriptors? [8]
b) What are moments? Where are they used? [8]
- Q11)** a) Explain in detail salient features of single perspective camera. [8]
b) What is Iso - morphism? Describe its classes? [8]

OR

- Q12)** a) Explain [8]
i) Foreshortening
ii) Vanishing points in 3-D vision
b) What is the application of graph theory in image processing? [8]



Total No. of Questions : 12]

SEAT No. :

P3007

[5059]-166

[Total No. of Pages : 3

B.E. (Electronics)

OPTICAL AND MICROWAVE COMMUNICATION

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I, and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *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)** If a multimode step index fiber having the core refractive index of 1.5, cladding refractive index of 1.38, core radius of $25\mu\text{m}$ operates at the wavelength of 1300nm. Calculate: **[8]**
- i) Numerical aperture
 - ii) Normalized frequency
 - iii) Solid acceptance angle
 - iv) Total number of modes entering the fiber
- b) Explain the working of Reach-through structured APD. State advantages and drawbacks of the same. **[8]**

OR

- Q2) a)** Define and explain the following terms of fibers. **[8]**
- i) Group and phase velocities
 - ii) Index profile
 - iii) V-number
 - iv) Modes in fiber
- b) Write various Modulation Techniques used in optical fiber communication system. **[8]**

P.T.O.

- Q3)** a) Explain intramodal and intermodal dispersion in fibers in detail. [8]
 b) When the optical power launched into a 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 a 12 km optical link using same fiber splices at 1 km interval, each giving attenuation of 0.5dB.

OR

- Q4)** a) What are the classes of Optical amplifiers? Explain in brief the two main types of optical amplifiers. [8]
 b) Explain the basic structure of an STS-1 SONET frame. [8]
- Q5)** a) Explain the measurement technique for liquid level and strain. [8]
 b) Describe Brain Surgery in detail. [6]
 c) Write a short note on Removal of tumours of vocal cards. [4]

OR

- Q6)** a) Write short notes on the following: [12]
 i) Interferometric method of Measurement of length.
 ii) Medical applications of lasers.
 iii) Laser heating and welding.
 b) Describe in detail the Laser instruments for surgery. [6]

SECTION - II

- Q7)** a) When the dominant mode is propagated in an air filled rectangular waveguide, the guide wavelength for a frequency 9GHz is 4 cm. Calculate breath of guide. [6]
 b) Explain the properties of H plane tee and give reason why it is called shunt tee. [6]
 c) For a directional coupler the incident power is 550 mW. Calculate the power in the main arm and auxillary arm. The coupling factor is 30dB. [4]

OR

- Q8)** a) Explain the construction and working of an gyrator in detail. [6]
 b) Write a short note on Phase Changer. [6]
 c) Compare between Circulator and Isolator. [4]

- Q9) a)** A two cavity klystron amplifier has following parameters: [8]
Beam voltage, $V_0 = 900\text{V}$, $I_0 = 30\text{ mA}$, frequency $f = 8\text{ GHz}$, Gap spacing in either cavity $d = 1\text{ mm}$, Spacing between centres of cavities $L = 4\text{ cm}$, effective shunt impedance $R_{sh} = 40\text{ k}\Omega$. Determine:
- The electron velocity
 - The DC electron transit time
 - The input voltage for maximum output voltage
 - The voltage gain in dB.
- b) Explain working of HTWT with the help of suitable diagram. [6]
- c) Write a short note on Multicavity klystron. [4]

OR

- Q10)a)** Explain the construction and working of Two cavity klystron in detail. [8]
- b) Explain how oscillations are sustained in cavity magnetron. Assume π mode of oscillations. [6]
- c) Compare klystron tube with Travelling wave tube amplifier. [4]

- Q11)a)** Explain the negative resistance characteristics concept of the following two terminal devices operating in a microwave range. [8]
- Tunnel diode
 - Gunn diode
 - IMPATT diode
- b) Explain various modes of Gunn diode in detail. [8]

OR

- Q12)** Write short notes on the following along with applications: [16]
- Schottky diode.
 - Parametric amplifier.
 - Varactor diode.
 - Terrestrial and satellite based microwave communication system.



Total No. of Questions : 12]

SEAT No. :

P1858

[Total No. of Pages : 3

[5059] - 168

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

ADVANCED COMMUNICATION SYSTEM (Elective - IV)

(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) Describe the following w.r.t. mobile environment. [6]
- i) Propagation loss
 - ii) Multipath fading
- b) Discuss different propagation paths in Mobile transmission. [6]
- c) Describe the operation of cellular system in detail. [6]

OR

- Q2)** a) With suitable example, explain various propagation paths in cellular mobile system. [6]
- b) Explain various mechanisms to enhance spectral efficiency [6]
- c) Explain Ground incident angle, elevation angle and reflection angle. [6]
- Q3)** a) Derive free space path loss formula for wireless communication. [8]
- b) Describe the following w.r.t. mobile communication [8]
- i) Underlay — overlay
 - ii) Handoffs & dropped calls

P.T.O.

OR

Q4) a) Classify the antennas based on the various situations occurred in mobile wave propagation. [8]

b) Explain near end and far end interference occurred in mobile. [8]

Q5) a) Describe the architecture of GPRS. [8]

b) How security is achieved in Mobile network? Explain algorithms related to Security. [8]

OR

Q6) a) With the help of suitable diagram, explain macro cells & microcell to enhance the capacity. [8]

b) With neat block diagram, describe GSM architecture in detail. [8]

SECTION - II

Q7) a) What are Kepler's three laws of planetary motion? Give the mathematical formulation of Kepler's third law. [8]

b) Draw the block diagram and explain Attitude and Orbit Control subsystem of a Satellite. [8]

OR

Q8) a) Describe various types of antenna used on satellite. [8]

b) Define and explain the following terms with respect to the satellite communication

i) Poles

ii) Latitude

iii) Hemispheres

iv) Greenwich Meridian [8]

- Q9)** a) Describe QPSK modulator and demodulator for satellite communication [8]
- b) Define and explain the following terms with reference to the FM techniques.
- i) Signal to Noise Ratio
- ii) Pre-emphasis & De-emphasis [8]

OR

- Q10)** a) A Ku band satellite uplink has a carrier frequency of 14.125 MHz and carries a symbol stream at $R_s = 18\text{Mps}$. The transmitter and receiver have RRC filters with $\alpha = 0.30$. What is the frequency range of the transmitted RF signal? [8]
- b) What are the various considerations and assumptions while designing the uplink and downlink budget? [8]

- Q11)** Explain the terms with respect to VSAT [18]
- a) Link budget
- b) Free space path loss
- c) Edge of coverage loss

OR

- Q12)** Write Short notes on the following [18]
- a) TDMA frame structure
- b) Network architectures in VSAT system
- c) FDMA
- d) Inter-modulation



Total No. of Questions : 12]

SEAT No. :

P1859

[Total No. of Pages : 2

[5059] - 169

B.E. (Electronics)

AUTOMOTIVE ELECTRONIC SYSTEMS (Elective - IV)

(2008Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 and Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) With the help of schematic diagram, explain battery charging system and its application in automotive system. [8]
- b) Write a short note on
- i) Electric motors used in automobiles
 - ii) Emission control in vehicles [10]

OR

- Q2)** a) Explain hybrid system designs used in automotives (like solar, electric/ gasoline, LPG etc). [8]
- b) Draw and explain conventional automobile ignition system in brief. [10]

- Q3)** a) Describe various sensor characteristics through automotive perspective. Also explain operation of engine coolant temperature sensor. [8]
- b) With suitable block diagram explain various pressure control systems used in automobiles. List sensors used in such system. [8]

OR

- Q4)** a) Explain the velocity sensors used in automotives with respect to their working principle, characteristics, limitations and applications. [8]
- b) Compare different types of actuators used in automotive applications.[8]

P.T.O.

- Q5)** a) Explain need of traction control? How is it implemented? [8]
b) Write short note on: Automatic Cruise Control. [8]

OR

- Q6)** a) Explain Antilock braking system in details. [8]
b) Explain how simulation helps to design the better automotive applications. [8]

SECTION - II

- Q7)** a) Compare 8 bit and 16 bit microcontrollers through automotive perspective. [8]
b) Explain the use of professional development system like Embedded C, in the development of automotive control systems. [8]

OR

- Q8)** a) Comment on the role of watchdog timers and interrupts in 16-bit microcontrollers used in automotive domain. [8]
b) Explain in brief use of PWM outputs available in microcontrollers in the development of automotive applications. [4]
c) Explain software development tool chain used for development, testing and debugging of various software for automotive applications. [4]

- Q9)** a) What are GPS & GPRS? State its use in automotive. [10]
b) Compare CAN and LIN protocol. [8]

OR

- Q10)** a) What is need of MOST? List devices that can be connected using MOST and bandwidth requirement for each case. [10]
b) Enlist various applications of telematics in automotive. Explain any one in detail. [8]

- Q11)** a) Explain the process to find faults in automotive system. Explain DTC code in detail. [8]
b) Explain in brief: Safety aspects in automotive. [8]

OR

- Q12)** a) Explain future trends in automotive electronics. [8]
b) Compare on-board & off-board diagnostic system. [8]



Total No. of Questions : 12]

SEAT No. :

P2108

[5059]-17

[Total No. of Pages : 2

B.E.(Civil)

**ADVANCED FOUNDATION ENGINEERING
(2008 Course)(Elective-III)(Semester-II) (401007)**

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3 or Q4,Q5 or Q6 , Q7 or Q8,Q9 or Q10,Q11 or Q12.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of electronic calculator is allowed.*
- 4) *Assume suitable data if necessary.*
- 5) *Neat diagrams must be drawn wherever necessary.*

- Q1)** a) Discuss IS code provisions for soil exploration for tunnels. [6]
b) State the field tests involved in deep investigation studies and explain any one. [6]
c) Does increasing the number of bore holes cause an increase in revealing any additional information regarding the subsoil? Explain. [6]

OR

- Q2)** a) Explain the various stages involved in subsoil investigation studies for dam project. [6]
b) Discuss a case study of failure of a deep foundation. [6]
c) How will you plan for subsoil exploration programme for an offshore structure? [6]

- Q3)** a) State the various methods of raft design and explain any one. [8]
b) Explain the considerations in the design of combined footings. [8]

OR

- Q4)** a) Discuss the provisions for design and construction of raft foundations as per IS 2950-1965. [8]
b) Explain the step by step procedure for design of combined trapezoidal footing along with the formulae involved. [8]

P.T.O.

- Q5) a)** Write short note on raker piles and discuss its design considerations. [8]
b) Explain cyclic pile load test with neat sketch. [8]

OR

- Q6) a)** How is the testing of piles subjected to tensile loads carried out? explain. [8]
b) Explain the Reese and Matlock theory for laterally loaded piles. [8]
- Q7) a)** Discuss design aspects of 2 bulb under reamed pile foundation. [9]
b) State the methods for design of laterally loaded piles and explain any one [9]

OR

- Q8) a)** Under which conditions under reamed piles are suitable as foundations, explain. [9]
b) Explain the step by step procedure for construction on double under reamed pile foundation with sketches. [9]
- Q9) a)** What are the changes required to be incorporated in design for providing underreamed pile to cater for tensile loading. [8]
b) Compare the design and suitability aspects of stone columns and sand drains. [8]

OR

- Q10) a)** Write short note on Sand drains and its design aspects. [8]
b) Stone columns are to be provided for an industrial establishment site. [8]
- Q11) a)** What are the IRC code provisions for well foundation, Explain. [8]
b) What are the measures to be taken to avoid failure of well foundation. [8]

OR

- Q12) a)** Discuss in detail any case study related to failure of well foundation. [8]
b) Describe in detail the design considerations in well foundation. [8]



Total No. of Questions : 12]

SEAT No. :

P1860

[Total No. of Pages : 4

[5059] - 170

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

ARTIFICIAL INTELLIGENCE

(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

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

SECTION - I

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

OR

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

- Q3)** a) What are different Heuristic search strategies, explain A* search in detail. [10]
 b) Explain the mathematics of constrained satisfaction problems. [6]

OR

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

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

OR

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

SECTION - II

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

OR

Q8) a) For the given example of restaurant (a decision tree and table is given below as Figure 1 and Table 1) choose the attribute that gives largest Information Gain amongst the following attributes:

- i) Patrons
- ii) Type
- iii) Rain

[12]

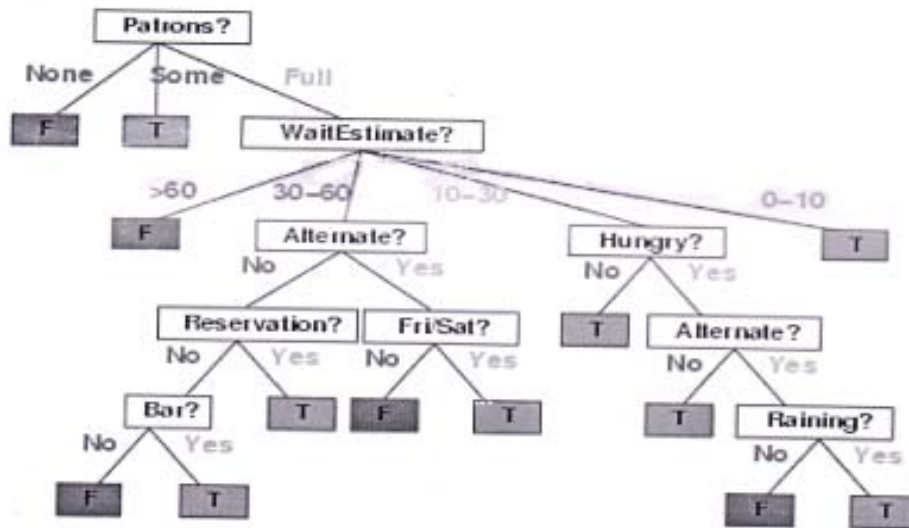


Figure 1

Example	Attributes										Target
	Alt	Bar	Fri	Hun	Pat	Price	Rain	Res	Type	Est	
X ₁	T	F	F	T	Some	\$\$\$	F	T	French	0-10	T
X ₂	T	F	F	T	Full	\$	F	F	Thai	30-60	F
X ₃	F	T	F	F	Some	\$	F	F	Burger	0-10	T
X ₄	T	F	T	T	Full	\$	F	F	Thai	10-30	T
X ₅	T	F	T	F	Full	\$\$\$	F	T	French	>60	F
X ₆	F	T	F	T	Some	\$\$	T	T	Italian	0-10	T
X ₇	F	T	F	F	None	\$	T	F	Burger	0-10	F
X ₈	F	F	F	T	Some	\$\$	T	T	Thai	0-10	T
X ₉	F	T	T	F	Full	\$	T	F	Burger	>60	F
X ₁₀	T	T	T	T	Full	\$\$\$	F	T	Italian	10-30	F
X ₁₁	F	F	F	F	None	\$	F	F	Thai	0-10	F
X ₁₂	T	T	T	T	Full	\$	F	F	Burger	30-60	T

Table 1

b) Explain the concept of knowledge in learning.

[6]

- Q9)** a) How is an expert system different from a traditional computer system? [6]
 b) Use Waltz algorithm to fully describe the below figure (Figure 3): [10]

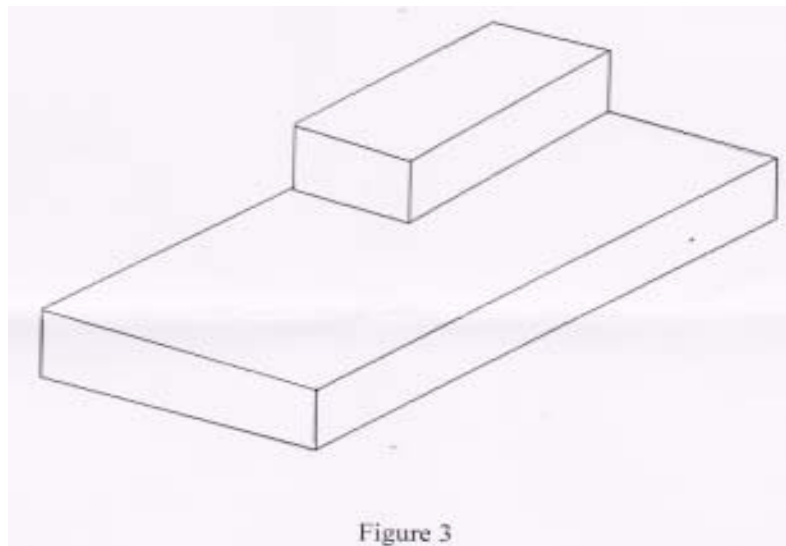


Figure 3

OR

- Q10)** a) Draw a neat diagram of an expert system and explain the functioning of the major components. [8]
 b) Write a short note on the shell and knowledge base of an expert system. [8]

- Q11)** a) Differentiate between [12]
- Natural Language Processing (NLP) and Natural Language Generation (NLG).
 - Syntax, semantics and pragmatics
 - Lexical ambiguity and syntactic ambiguity
- b) Draw the parse tree with semantic interpretations for the string “ $7 + (8 \div 4)$ ” [4]

OR

- Q12)** a) With suitable examples explain in short: Lexicon of ϵ_0 and Grammar of ϵ_0 . [8]
 b) With relevant mathematics, explain Probabilistic language models. [8]



Total No. of Questions : 12]

SEAT No. :

P1861

[Total No. of Pages : 3

[5059] - 170-A
B.E. (Electronics) (Semester - II)
NANOTECHNOLOGY IN ELECTRONICS
(2008 Pattern) (Elective - IV)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer three questions from each section.*
- 2) Answer to the two sections should be written in separate answer books.*
- 3) Neat diagram must be drawn wherever necessary.*
- 4) Figure to 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 behavior. **[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) Explain the properties of metal Nano cluster. [8]
b) What are the different types of carbon structure? Explain it. [8]

OR

- Q6)** 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

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 in detail information theory in Nano-electronics. [8]
b) Explain diffusion process in detail. [8]

OR

- Q10)** a) Explain soft computing with respect to Nano electronics. [8]
b) Explain in detail atomic lithography. [8]

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

OR

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



Total No. of Questions : 12]

SEAT No. :

P1862

[Total No. of Pages : 3

[5059] - 171
B.E. (E & TC)
ELECTRONIC PRODUCT DESIGN
(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt Q.No. 1 or Q.No.2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No. 7 or Q.No. 8, Q.No. 9 or Q.No. 10, Q.No. 11 or Q.No. 12.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*
- 5) *Use of non - programmable calculator is allowed.*

SECTION - I

- Q1)** a) Explain the term techno-commercial feasibility with suitable example.[8]
b) Explain the bath-tub curve. [6]
c) Discuss the importance of pilot production batch. [4]

OR

- Q2)** a) Explain the exponential law of reliability. With the help of suitable example estimation the reliability of any one electronic product. [8]
b) Discss the importance of various environmental tests carried out on electronic product. [6]
c) State the objectives of ergonomics. [4]

- Q3)** a) Explain the important parameters while selecting OP-AMP as signal conditioner. [8]
b) Discuss the selection criterion of ADC with suitable example. [8]

OR

- Q4)** a) Explain step-by-step how error budget analysis is carried out for instrumentation amplifier. [8]
b) Enlist different types of error associated with ADC/DAC. [8]

P.T.O.

- Q5) a)** With the help of suitable example justify the selection of microcontroller. [8]
- b) Write note on - [8]
- i) RS 485
 - ii) SPI.

OR

- Q6) a)** Explain in detail the following interfaces - [8]
- i) Microcontroller with high brightness LED.
 - ii) Microcontroller with LCD.
- b) Discuss the various types of touch-screen indicating advantages & short-coming of each. [8]

SECTION - II

- Q7) a)** With the help of neat block diagram explain the different approaches of software development. [10]
- b) State the goals of software design. Explain the four types of constructs used in structured programming. [8]

OR

- Q8) a)** Explain in detail the phases of bugs introduction in the software & how to debug these bugs. [10]
- b) Write notes on - [8]
- i) Emulator
 - ii) Documentation for software

- Q9) a)** Discuss the PCB design rules for high speed high frequency circuits. [8]
- b) Estimate the parasitic value for the following geometries of a PCB track- [8]
- i) Resistance of 12 cm long cu track with 0.6 mm width on a std. micron of 35 copper - clad laminate. (Take $\rho = 1.72 \times 10^{-6} \Omega\text{-cm.}$)
 - ii) Capacitance of two 1.5 mm wide tracks on opposite side of a double - sided PCB with length = 15cm, laminate thickness = 1.2mm & $\epsilon_r = 4.2.$

OR

Q10) a) Discuss the need of EMI/EMC standards. Briefly explain the steps of radiation measurement using neat diagram. [8]

b) With respect to PCB design aspect explain following terms - [8]

i) Guarding

ii) Signal integrity

iii) Characteristic impedance (Z_0)

Q11) a) Explain the parameters to be measured for link feasibility. [6]

b) Discuss the design considerations of following blocks in a communication system - [10]

i) digital PLL

ii) equalizer

iii) interleaver

OR

Q12) a) State the different specifications of multimedia PC level 2. [8]

b) Explain the frequency selection criterion in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P1863

[Total No. of Pages : 3

[5059] - 172
B.E. (E & T/C)
VLSI DESIGN & TECHNOLOGY
(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) *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 current source and sink along with their limitations. [8]
b) Explain CMOS op - amp in detail. Brief the concepts of active load, current mirror and constant current source output stage. [8]

OR

- Q2)** a) Explain device parasitic and their limitations on the performance of CMOS circuits. [8]
b) With the help of schematic and necessary expression explain how MOSFET acts as diode and resistor. [8]

- Q3)** a) Design CMOS logic for $y = (\overline{ABC} + \overline{D})$. Calculate area on chip. [8]
b) Explain static and dynamic power dissipation. Derive an expression for power delay product. [8]

OR

- Q4)** a) Prove that W/L ratio of PMOS to NMOS is approximately 2. [8]
b) Explain transmission gate and any one application of it in detail. [8]

P.T.O.

- Q5)** a) Explain the modeling styles used in VHDL with one example each. [9]
b) Write a note on: [9]
i) Function and procedure
ii) Packages
iii) Metastability

OR

- Q6)** a) Draw the diagram and write the VHDL code for Traffic Light Controller.[9]
b) Explain the process of synthesis and list the synthesizable and non synthesizable statements. [9]

SECTION - II

- Q7)** a) List typical technical features and specifications of any FPGA family in detail. [8]
b) With suitable schematic explain antifuse RAM and flash technology in detail. [8]

OR

- Q8)** a) Draw block diagram and explain the architecture of CPLD. [8]
b) Differentiate between CPLD and FPGA. [8]

- Q9)** a) What is the need of design for testability. Explain in short different types of faults. [8]
b) Explain TAP controller with its state diagram. [8]

OR

- Q10)** Write short note on: [16]
i) JTAG
ii) BIST
iii) Controllability and observability
iv) Scan path - testing

- Q11)** a) What are the limitations of single phase clock. Explain with neat schematic two phase clock system in detail. [9]
- b) Write short note on: [9]
- i) Signal integrity
 - ii) Supply and ground bounce
 - iii) Wire parascitics

OR

- Q12)** a) Write short note on: [9]
- i) Design validation
 - ii) EMI immune design
 - iii) Off chip connections
- b) What is need of clock distribution. Explain techniques of clock distribution. [9]



Total No. of Questions : 12]

SEAT No. :

P1864

[Total No. of Pages : 3

[5059]-173

B.E. (Electronics & Telecommunication)

COMPUTER NETWORK

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) Explain the TCP/IP model with protocols at each layer. [6]
- b) Compare Coaxial Cable, Twisted pair cable and Fiber optic cables. [6]
- c) Explain how you will transmit the packets by using Datagram approach. [6]

OR

- Q2)** a) Draw and explain typical cable TV system. How cable video signal and internet data can be send over the same cable. [6]
- b) What is DSL? Explain any two types of DSL. [6]
- c) Explain the terms interfaces, services, and protocols. [6]

- Q3)** a) List the design issues involved in data link layer design. [8]
- b) What are the responsibilities of MAC- Layer? Explain IEEE 802.3 MAC-Layers. [8]

OR

P.T.O.

- Q4)** a) Explain Go Back - N ARQ and selective repeat ARQ protocols. [8]
b) Draw HDLC frame format. Write function of each field. [8]
- Q5)** a) What is IEEE 802.11? Explain wireless LAN in brief. [8]
b) What is ATM? Give the format of ATM cell and explain. [8]

OR

- Q6)** a) Draw the layer architecture and explain the function of each layer in Bluetooth. [8]
b) Write short notes on : [8]
- i) Gateway
 - ii) Hub
 - iii) NIC
 - iv) Routers.

SECTION - II

- Q7)** a) List the goals of network layer. Define routing, flooding. [8]
b) What is dynamic routing? Discuss distance vector routing. [8]

OR

- Q8)** a) Draw IP Address format for class A, B, C, D and E using suitable example. [8]
b) Explain ICMP and IGMP briefly. [8]
- Q9)** a) Explain the different Quality of Service parameters. Also write about transport Layer service primitives. [8]
b) With the help of TCP header explain the function of each field. [8]

OR

Q10) a) How congestion affects network performance, also explain the difference between flow control and congestion control. **[8]**

b) Explain connection establishment and connection releasing with respect to transport layer. **[8]**

Q11)a) Explain Telnet and FTP in detail with respect to server and client communication. **[8]**

b) What is DNS? Explain the components of DNS system. **[6]**

c) What is the function of SMTP and POP-3 protocols in E-mail system?**[4]**

OR

Q12)a) Distinguish between public key and private key algorithm. State the advantages of RSA algorithm. **[8]**

b) What are the main responsibilities of Application layer? Explain in brief.**[6]**

c) What is URL and what is its component. **[4]**



Total No. of Questions : 12]

SEAT No. :

P1865

[Total No. of Pages : 3

[5059]-174

B.E. (Electronics & Telecommunication)

DIGITAL IMAGE PROCESSING

(2008 Pattern) (Elective - 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 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** With reference to relation between pixels explain **[8]**
- i) 4 connectivity
 - ii) 8 connectivity
- b) Draw a neat block diagram of basic digital image processing system using fundamental components. Explain in detail. **[8]**

OR

- Q2) a)** Write a short note on human visual system. **[8]**
- b) What is necessity of image digitization. Discuss uniform and non uniform sampling process. **[8]**

- Q3) a)** Explain the following concept with respect to zooming - **[8]**
- i) Replication
 - ii) Interpolation
- b) Show that a high pass filtered image can be obtained in the spatial domain as "High Pass filtered image = original image - Low Pass filtered image". **[8]**

OR

P.T.O.

Q4) a) What is meant by histogram. Explain the steps in histogram equalisation. [8]

b) What is colour model? Explain HSI to RGB conversion. [8]

Q5) a) Write formulae for 2D DFT - forward and inverse transform. Explain properties of 2D - DFT and state its applications. [9]

b) With reference to 2D transform, explain. [9]

i) Symmetry

ii) Basis images

iii) Rotation

OR

Q6) a) Find 2D - DCT of following image matrix. [9]

$$\begin{bmatrix} 4 & 2 \\ 4 & 2 \end{bmatrix}$$

Write one application of DCT.

b) Write short note on KL transform Differentiate between DFT and DCT. [9]

SECTION - II

Q7) a) In transform based image compression image is subdivided into smaller subimages. Discuss the effect of subimage size on [8]

i) Compression performance

ii) Computational complexity

b) What is data redundancy? Explain various data redundancies identified in an image. [8]

OR

Q8) a) Explain with neat block diagram working of two dimensional transform coding for image compression. Discuss considerations for selection of size of subimage. [8]

- b) An image consists of 8 gray levels 90 to 97 with probabilities 0.3, 0.3, 0.1, 0.08, 0.08, 0.07, 0.05, 0.02. Give Huffman code for gray levels and comment on coding efficiency. [8]

Q9) a) Derive the kernel for second order derivative for detecting edges. Compare its performance with first order derivative. [8]

b) Explain the following transformations stating their applications. [8]

- i) Erosion
- ii) Dilation
- iii) Opening
- iv) Closing

OR

Q10) a) Explain chain code and B splines for boundary representation. [8]

b) Explain Laplacian edge detector. Why is LoG operator preferred over Laplacian for edge detection. Explain in detail. [8]

Q11) a) In relation to restoration filters, explain the mathematics and significance of arithmetic mean, geometric mean, harmonic and contra harmonic mean filters. [8]

b) With relevant block diagram, explain in detail character Recognition system stating its applications. [10]

OR

Q12) a) Explain with proper mathematics, various noise models with their PDF, occurring in an image (any 4). [8]

b) Explain in detail fingerprint recognition system in Image Processing. [10]



Total No. of Questions :12]

SEAT No. :

P3008

[Total No. of Pages :3

[5059] - 175

B.E. (E & TC)

EMBEDDED SYSTEM AND RTOS

(2008 Course) (Semester - I) (Elective - I) (404184)

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.*

SECTION - I

Q1) a) What is embedded system? Justify that design of embedded system is unified hardware -software approach. **[9]**

b) With an example explain need of optimizing design metrics. **[9]**

OR

Q2) a) What is CAN protocol? Explain Frame format of CAN. **[9]**

b) Explain following protocol. **[9]**

i) Bluetooth

ii) IEEE 802.11

Q3) a) Explain limitation of 08 bit processor and need of 32 bit processor in embedded system. **[8]**

b) With neat interfacing diagram explain 16×2 LCD interfacing with LPC 2148 controller. **[8]**

OR

P.T.O.

Q4) a) Explain any four selection criterion for processor selection in embedded system. [8]

b) Explain following system control blocks of LPC 2148 [8]

i) PLL

ii) VPB bus

iii) Power control

iv) Walk-up timer

Q5) a) Explain following software architectures of embedded system. [8]

i) Round Robin with interrupt

ii) RTOS

b) Explain any two task management functions in μ cos-II. [8]

OR

Q6) a) Draw and explain task state diagram in μ cos-II. [8]

b) Explain any two memory management functions in μ cos-II. [8]

SECTION - II

Q7) a) What is embedded Linux? Explain various components of embedded Linux. [8]

b) Explain following tool utilities [8]

i) Minicom

ii) Busybox

OR

Q8) a) Explain Linux file system in brief. [8]

b) What is device driver? Explain device driver skeleton. [8]

- Q9)** a) Compare QNX and VXWorks OS. [8]
b) Explain spiral model development advantages over waterfall & V model. [8]

OR

- Q10)**a) Compare Android and symbian towards smart phone usage. [8]
b) Explain monolithic, microkernel and decoupled approach of operating system. [8]

- Q11)**a) With neat diagram and required hard ware, software components, explain digital camera. [10]
b) Explain suitable application in automotive with usage of CAN protocol.[8]

OR

- Q12)**a) Explain the features of processor, memory and I/o devices required for ECG system. [10]
b) Explain case study of Adaptive cruise control system in automotive. [8]



Total No. of Questions : 12]

SEAT No. :

P1866

[Total No. of Pages : 3

[5059]-176

B.E. (Electronics & Telecommunication)

INDUSTRIAL DRIVES AND CONTROL

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) What is the need of phase controlled converter. Explain with circuit diagram and waveforms the working of 3 phase controlled converter with Inductive load, comment on power factor. [8]
- b) The three phase fully controlled SCR bridge converter operating from 400V, 3 phase AC supply calculate the average DC output voltage for firing angle $\alpha = 45^\circ$. [8]

OR

- Q2)** a) What are the dual converters? Explain circuit diagram and waveforms and working of 3 phase dual converter with highly inductive load. [8]
- b) Explain two quadrant type 'C' chopper with neat diagram and waveforms. [8]

- Q3)** a) What are Inverters? Explain with circuit diagram and waveforms the working of three phase voltage source. Inverter operating in 180° mode R.L.load. [10]
- b) Which are different techniques of voltage control and harmonic reduction in Inverter circuits. [8]

OR

P.T.O.

Q4) a) Explain with neat diagram, waveforms the working of 3 phase to single phase cycloconverter. [10]

b) Draw the schematic of 3 phase current source inverter. Describe its operation with current waveforms. [8]

Q5) a) State the equations that govern the operation of separately excited DC motor. Express speed in terms of other parameters. Draw and explain circuit diagram of separately excited DC motor drive with three phase full converter. [8]

b) Draw block diagram of closed loop control of separately excited DC motor. Calculate transfer function. [8]

OR

Q6) a) Starting from basic control equations, develop control block diagram for open loop control of DC series motor and calculate $\frac{\Delta W}{\Delta V}$ and $\frac{\Delta W}{\Delta T_u}$ [8]

b) Explain field failure and under voltage protection for D.C. motor. [8]

SECTION - II

Q7) a) Which are different speed control methods of Induction motor. Explain the operation of any one in details. [8]

b) Explain braking methods of Induction motor. [8]

OR

Q8) a) What is slip power recovery in AC motor drives. Explain torque - speed characteristics of three phase Induction motor. [8]

b) Explain direct vector control and indirect vector control technique for induction motor drive. [8]

- Q9) a)** Explain the operation of Switched Reluctance Motor (SRM). List the SRM that have sparked interest in its use as an adjustable drive. [9]
- b) Draw and explain the torque speed characteristics of synchronous reluctance motor at constant voltage and frequency. [9]

OR

- Q10) a)** List the drive requirements for stepper motor. With the help of neat circuit diagram and relevant waveforms, explain the operation of permanent magnet stepper motor drive. [10]
- b) Draw and explain the operation of 3 phase brushless DC motor drive. [8]

Q11) a) Explain with neat diagram traction motor AC drive. [8]

- b) Write the short notes on : [8]
- i) Fuzzy logic based Induction motor speed control
 - ii) Fuzzy logic based wind generation system.

OR

- Q12) a)** What is necessity of power quality? Explain with different types of power line disturbances. [8]
- b) What is energy Audit. Explain required procedure for energy audit. [8]



Total No. of Questions :12]

SEAT No. :

P3009

[Total No. of Pages :3

[5059] - 177

B.E. (E & TC)

MICROWAVE COMMUNICATION & RADAR

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *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.*

SECTION - I

- Q1)** a) What is waveguide? Explain advantages of waveguide. State the applications of waveguides. [9]
- b) Explain the steps of solving the waveguide problems. What is TEM mode. [9]

OR

- Q2)** Write short notes on: [18]
- a) Power Losses in RWG.
 - b) Excitations of modes in RWG.
 - c) Power transmission in RWG.

- Q3)** a) Draw & explain E & H-plane tee. [8]
- b) Draw & explain Two-hole directional coupler. [8]

OR

P.T.O.

- Q4)** a) What is magic tee? State and explain the S-matrix of a magic tee. [8]
b) What are circulators & Isolators? State and explain the applications of the same. [8]

- Q5)** a) Explain the construction & operation of Reflex Klystron. [8]
b) Explain the operating principle of magnetron. State and explain its types. [8]

OR

- Q6)** a) Draw and explain slow-wave structures. [8]
b) Draw the diagram of helix traveling-wave tube. Explain the Amplification process in TWT. [8]

SECTION - II

- Q7)** a) Explain the following w.r.to IMPATT diode: [9]
i) Physical structure.
ii) Negative resistance.
iii) Power output.
b) Draw equivalent ckt. of a parametric amplifier. Explain power gain, Noise Figure, and Band width of the same. [9]

OR

- Q8)** a) Explain the following w.r.to TRAPATT diode: [9]
i) Physical structure.
ii) Negative resistance.
iii) Power output.
b) Explain the operating principle of Transferred Electron Devices (TEDs). Draw construction diagram of Gunn diode. Also explain Gunn effect. [9]

- Q9)** a) Draw & explain the block diagram of vector Network Analyzer. [8]
b) Write short notes on: [8]
i) VSWR meter.
ii) Power meter.

OR

- Q10)**a) Explain the following: [8]
i) Noise factor.
ii) Cavity Resonator.
b) Explain attenuation measurement technique with the help of microwave bench set-up. [8]

- Q11)**a) Draw & explain the block diagram of pulse radar. [8]
b) Explain the factors that affects the maximum range of radar. [8]

OR

- Q12)** Explain the following: [16]
a) Duplexer.
b) PRF.
c) CW Doppler radar.
d) Antennas and Scanning.



Total No. of Questions : 12]

SEAT No. :

P1867

[Total No. of Pages : 3

[5059]-178

B.E. (Electronics & Telecommunication)

ENTREPRENEURSHIP DEVELOPMENT

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Answer any three questions from Section -I and three questions from Section -II.*
- 2) *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) State a characteristic of a successful entrepreneur. Why are small business so important to our economy? [10]

b) Name some financial any non-financial goals an entrepreneur may have. [6]

OR

Q2) a) Describe different kinds of entrepreneurial businesses. [8]

b) Name one historical entrepreneur and describe what he or she did. [8]

Q3) a) What steps should you take when purchasing a business? [6]

b) What are some of the questions you should ask when evaluating a franchise opportunity? [6]

c) What are some of the advantages and disadvantages of a Partnership?[4]

OR

P.T.O.

- Q4) a) Explain :** [8]
- i) The government as a regulator.
 - ii) The government as a redistributor of income.
- b) What is the difference between a fixed and a variable cost? [8]

- Q5) a) What are the main options for locating a retail business?** [6]
- b) How do you choose vendors for your business? [6]
- c) Give three examples of sales promotion. Why is personal selling important to business? [6]

OR

- Q6) a) What is the difference between direct and indirect competition? What is the purpose of analyzing competitors?** [12]
- b) What is a target market? What are some strategies for maintaining customer loyalty? [6]

SECTION - II

- Q7) a) What steps are involved in hiring employees?** [8]
- b) How can you motivate employees? State some desirable leadership characteristics. [8]

OR

- Q8) a) What are some of the advantages and disadvantages of using a computer to handle your record keeping?** [8]
- b) What are the different training techniques? [8]

Q9) a) How do you analyze sales by product? What is the difference between gross sales and net sales? [8]

b) Name the three types of printers and an advantages of each. [8]

OR

Q10) a) Where should you purchase the technology you need? [8]

b) List three kinds of software and explain what they do. [8]

Q11)a) What does it mean to have a high code of ethics? [9]

b) What are some sources of information that can help you find out about doing business abroad? [9]

OR

Q12)a) What laws protect businesses and the public? [9]

b) What are some responsibilities entrepreneurs have to suppliers, customers and the community? [9]



Total No. of Questions : 12]

SEAT No. :

P1868

[Total No. of Pages : 3

[5059] - 179

B.E. (E&TC)

JOINT TIME FREQUENCY ANALYSIS

(Elective - II) (2008 Pattern)

Time : 3 Hour]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) State and explain the Parseval's Theorem. [6]
b) Discuss Haar scaling function and wavelet function alongwith their waveforms and mathematical expressions. [6]
c) Discuss Heisenberg's Uncertainty Principle. [6]

OR

- Q2)** a) Consider the continuous time function, $x(t)$ defined as follows :

$$x(t) = 1 - t^2 \dots -1 < t < 1$$
$$= 0 \dots \text{otherwise}$$

Find the time - bandwidth product for this function. [14]

- b) What should be the minimum value of TBW ? Does any function satisfy this TBW value criteria ? [4]

- Q3)** a) Obtain and sketch the magnitude & frequency response analysis & synthesis filters of Haar 2-band filter bank. [8]

- b) If $f_1(n) = \{1, 2 - 1, 2\}$ &

$$\begin{array}{c} \uparrow \\ f_2(n) = \{3, 2, 1, 1, \} \text{ then} \\ \uparrow \end{array}$$

Find [8]

i) $\langle f_1(n), f_2(n) \rangle$

ii) $\langle f_1(n), f_1(n) \rangle$

P.T.O.

OR

Q4) a) Discuss the differences between STFT & wavelet transforms along with their tiling diagrams. [8]

b) Prove that for Haar 2-band filter bank, analysis filters are power complementary. [8]

Q5) a) Given

$$x[n] = \{2, 3, 1, 2, 5, 2, 2, 4, \} \in V_3 .$$

Develop complete wavelet packet tree till V_0 & calculate the coefficients along with the corresponding bases. [8]

b) Prove the perfect Reconstruction for above example. [8]

OR

Q6) a) State all MRA axioms. [8]

b) Write short note on :

i) Hilbert Transforms & its applications.

ii) Daubechies filters. [8]

SECTION - II

Q7) Decompose the signal, $x(n) = \{2, 3, 1, 3, 5, 4, 4, 6\}$ till V_0 subspace using lifting scheme. Signal belongs to subspace V_3 . [18]

a) Do the in-place computation.

b) Verify the reconstruction with block schematic of lifting scheme.

OR

Q8) Write notes on : [18]

a) Shanon wavelet

b) Meyer wavelet

c) Wavelet packet trees.

- Q9)** a) What are the biorthogonal scaling functions ?
 Explain the design procedure of biorthogonal 5/3 filter bank. [12]
- b) Discuss the need for Joint Time frequency analysis. [4]

OR

Q10) If $\phi(t)$ is a Haar Scaling f^n and

$$x(t) = 3.\phi(2t) + 4\phi(2t - 1) + 5\phi(2t - 2) + 3\phi(2t - 3) + 6.\phi(2t - 4) + 4\phi(2t - 5) + 4.\phi(2t - 6) + 7\phi(2t - 7) \quad +$$

Comment on the subspace, which the signal $x(t)$ belongs to.

Project $x(t)$ down the ladder. Show that, $V_j = V_{j-1} \oplus W_{j-1}$

Sketch the projections on the corresponding v&w subspaces. [16]

Q11) Given $x[n] = \{5,4,20,8,16,5,13,10\} \in v_3$. Perform MRA using Haar 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 $x[n]$. [16]

OR

- Q12)** a) Discuss scalograms & spectrograms in detail. [8]
- b) Write a short note on : CWT and its advantages and disadvantages. [8]



Total No. of Questions : 6]

SEAT No. :

P1780

[Total No. of Pages : 3

[5059]-18

B.E. (Civil Engineering)

ADVANCED ENGINEERING GEOLOGY WITH ROCK
MECHANICS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Write notes on :

- a) Field Characters of Basalt flows. [6]
- b) Types of Volcanic Breccias. [4]
- c) Engineering significance of Kaladgis and Vindhyan rocks of Maharashtra state. [8]

OR

- a) Regional Distribution of DTB. [6]
- b) Fractures in Deccan Trap. [4]
- c) Engineering Significance of Archeans and Dharwarian rocks occurring in Maharashtra State. [8]

- Q2)**
- a) Discuss in detail, the old and recent theories about the origin of Tachylytic basalt. [7]
 - b) Discuss in detail the relationship between local geology and location of spillway in Deccan trap area. [9]

OR

P.T.O.

- a) Treatment to be given to a fractures dykes crossing dam alignment. [7]
- b) Discuss any three case histories of dams in Maharashtra where economy has been achieved by correctly interpreting the local geology of the area. [9]

Q3) Write notes on :

- a) Water bearing characters of dykes. [4]
- b) Influence of Climate on Soil formation. [4]
- c) Chances of getting ground water along flow contacts. [4]
- d) Granular disintegration. [4]

OR

- a) Water bearing characters of Amygdaloidal basalt. [4]
- b) Watershed development. [4]
- c) Transported soils of Maharashtra State. [4]
- d) Scarcity of Sand in Deccan traps area. [4]

SECTION - II

- Q4)** a) Explain in details various mechanical properties of rocks masses in detail. [9]
- b) Explain Rock Structural Rating (RSR) System of classification of rock masses in detail. [9]

OR

- a) Explain Electrical Resistivity method in details. [4]
- b) Explain Rock Mass Rating (RMR) System of classification of rock masses in detail. [9]
- c) Rock Quality Designation & core recovery. [5]

Q5) Write notes on :

- a) Minimum depth of drilling for bridge foundations investigations. [4]
- b) Tunneling through Amygdaloidal Basalts & few case histories. [8]
- c) Tunnel associated with dyke/dykes. [4]

OR

Write notes on

- a) Discuss importance of subsurface investigations for foundation of bridges. [4]
- b) Tunneling through Compact Basalts & few case histories. [8]
- c) Tunneling through fractures. [4]

- Q6)**
- a) Treatment to be given to fault zone crossing dam alignment. Give examples. [6]
 - b) Objectives and facts about using amygdaloidal basalts as rubble for masonry. Give example. [6]
 - c) Filled Grounds. [4]

OR

- a) Compact Basalt as a construction material. [6]
- b) R.I.S. and dams. [6]
- c) Role of Geology in Urban Planning. [4]



Total No. of Questions : 12]

SEAT No. :

P1869

[Total No. of Pages : 3

[5059]-180

B.E. (E&Tc)

MICRO ELECTROMECHANICAL SYSTEM SYSTEM AND ON CHIP

(2008 Pattern)

Time: 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answer 3 questions from section I and 3 questions from section - II.*
- 3) *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 is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Define transducer. Draw block schematics of transducers and explain transduction with respect to signal domains. [8]
- b) What is microsystem? What figure of merits are used for specifying, characterizing and comparing the performance of microsystem? [8]

OR

- Q2)** a) What is surface micromachining? Explain it with respect to, [8]
- i) Basic process sequence
 - ii) Materials & etching processes used
- b) Explain metal film thermoresistor and semi conducting thermoresistors with necessary expressions. [8]
- Q3)** a) Write a short note on. [10]
- i) Bulk micromachined pressure sensor
 - ii) Surface micromachined pressure sensor.
- b) Define Lorentz force. Explain Hall effect principle and its modes of operation. [8]

P.T.O.

OR

- Q4) a)** Explain the principle of piezoelectric transducer with respect to [9]
- i) Definition
 - ii) Structure
 - iii) Piezoelectric materials.
 - iv) Crystal model showing charge generation.
- b) Explain capacitive accelerometer with respect to [9]
- i) Working principle.
 - ii) Fabrication aspects.
 - iii) Packaging aspects.
 - iv) Electronic readout ranges.
- Q5) a)** Explain the transduction principle and sensing characteristics of voltametric sensors and potentiometric sensors. [8]
- b) What are the material requirements and fabrication techniques for biomedical microsystems ? [8]

OR

- Q6) a)** Explain any four of the following with respect to high aspect ratio micromachining. [16]
- i) Poros silicon
 - ii) Deep reactive Ion etching
 - iii) Lasor micromachining
 - iv) Focused Ion beam micromachining
 - v) Powder blasting.

SECTION-II

- Q7) a)** What are the applications of microsystems ? [8]
- b) Enlist various packaging technologies and explain each in detail [10]

OR

- Q8) a)** Explain IC-fabrication technology in detail for, [9]
- i) Silicon bulk micromachining
 - ii) Silicon surface micromachining.
 - iii) LIGA.

- b) Explain 'Design and Testing of microsystem' with respect to. [9]
i) Design methodology
ii) CAD tools for microsystems.
iii) Testing issues

- Q9)** a) What are the pros and cons of behavioural synthesis ? [8]
b) Explain abstraction levels associated with synthesis tools. [8]

OR

- Q10)a)** Explain design flow with respect to generic methodology problems and alternative solution for layout synthesis. [8]

- b) How the standard cell approach is good solution for layout synthesis problem ? [8]

- Q11)a)** Explain any two of the following routing techniques [8]
i) Path Search methods
ii) Row based routing
iii) The LEGAL algorithm.

- b) Explain various steps of Hardware/software codesign. [8]

OR

- Q12)** Write a short note on [16]

- i) Design for Testability
ii) Built in self Test



Total No. of Questions : 12]

SEAT No. :

P1870

[Total No. of Pages : 2

[5059]-181
B.E. (E&TC)
MOBILE COMMUNICATION
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) Explain step by step evolution of mobile radio communication. [8]
b) Compare modern wireless 2G and 3G communication system. [8]
OR
- Q2)** a) Classify and describe Honoff strategy with neat diagram in GSM and CDMA. [8]
b) With the help of hexogon cell structure describe the operation of frequency reuse to avoid interferences in mobile system. [8]
- Q3)** a) Describe in brief following propogation mechanism. [9]
i) Free space loss
ii) Reflection
iii) Diffraction
iv) Scotlering
b) Classify and explain different types of small scale fading. [9]
OR
- Q4)** a) Explain in detail, impulse response model of multipath channel. [9]
b) Define fading and explain small scale multipath propagation model for radio propagation. [9]
- Q5)** a) Compare linear modulation techniques for mobile radio. [8]
b) With neat diagram, explain the working of spread spectrum modulation techniques. [8]
OR
- Q6)** a) Compare linear and non-linear equalisation techniques for mobile radio. [8]
b) Describe the working of path diversity RAKE receiver techniques for mobile radio. [8]

P.T.O.

SECTION - II

- Q7)** a) Classify and describe in brief different multiple access techniques for wireless communication. [10]
b) List and explain criteria for selection of speech coders in mobile communication. [8]

OR

- Q8)** a) With neat diagram, describe the working of GSM codec. [10]
b) Describe with block diagram, operation of pack radio. [8]

- Q9)** a) Explain the significance of each block in GSM system. [8]
b) Describe step by step, call establishment of mobile user with PSTN subscriber. [8]

OR

- Q10)**a) Explain the working operation of circuit switched data transmission technique with neat diagram. [8]
b) Classify and explain the need of logical channels in GSM. [8]

- Q11)** a) Compare IS-95 CDMA and CDMA 2000. [8]
b) Explain in brief working of spreading and modulation used in CDMA. [8]

OR

- Q12)**a) Classify and explain the significance of logical and physical channels in CDMA cell establishment. [8]
b) With neat diagram, explain the operation of soft Handover mechanism in CDMA. [8]



Total No. of Questions : 12]

SEAT No. :

P1871

[Total No. of Pages : 3

[5059]-182

B.E. (E&TC) (Semester - II)

TELECOMMUNICATION & SWITCHING SYSTEM

(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) Explain and compare Message switching, Packet Switching and Circuit switching. [8]
b) Draw the block diagram for a TST Switch and explain various functional entities. [8]

OR

- Q2)** a) Derive and calculate the unavailability for dual processor system with MTBF = 1650 Hrs. and MTBF = 5 Hrs in 25 years. [8]
b) Explain operation of Input controlled time division switching with a neat block diagram. [8]

- Q3)** a) Define Grade of Service and Blocking Probability. [4]
b) State the difference between Lost Call system and Queuing system [4]
c) On average, during a busy hour a customer with single line make 10 call and receives 3 call the average call duration is 2 minutes Find [10]
i) The outgoing traffic
ii) The incoming traffic
iii) The total traffic
iv) What is the probability that a caller will find the line free.

OR

- Q4)** a) Define Erlang and CCS. How are they related? [4]
b) Explain the terms 'offered traffic' and 'carried traffic' [4]
c) During the busy hour, 1000 calls were offered to a group of trunks and 10 calls were lost. The average call duration is 2 minutes. Find [10]
i) The traffic offered
ii) The traffic carried
iii) The traffic lost
iv) The grade of service
v) The total duration of period of congestion

P.T.O.

- Q5) a)** With a neat diagram explain the Principle of Grading to improve Trunking efficiency. **[8]**
- b) State and explain in detail Sequence of operations of a for a telephone call. **[8]**

OR

- Q6) a)** What is DTMF? Discuss the generation and detection of DTMF. **[8]**
- b) Explain the design procedure for 'N' by 'N' switch with three stages and no. of links = N. What is the minimum no. of cross-points required? **[8]**

SECTION - II

- Q7) a)** What is an Elastic Store? What is the effect of unsynchronized clock on Elastic Store? **[4]**
- b) What is Systematic Jitter? What is the effect of Systematic Jitter? **[4]**
- c) Explain the Network Master approach for Network Synchronization. **[8]**

OR

- Q8) a)** Explain the Plesiochronous Network approach for Network Synchronization. **[4]**
- b) What is the effect of unsynchronized clock on Elastic Store? **[4]**
- c) What is Timing Jitter? Draw and explain block schematic diagrams for measuring Timing Jitter. **[8]**

- Q9) a)** Explain the Network layer in an ISO-OSI Reference Model for Communication Architecture. **[8]**
- b) Explain various Access Methods used in LANs. **[8]**

OR

Q10)a) Explain the Internetworking Structures for the following with the help of an ISO-OSI Reference Model. **[8]**

i) Repeater

ii) Bridge

iii) Router

iv) Gateway

b) Explain ISDN Network Architecture in detail. **[8]**

Q11) a) Define following terms w.r.t. cellular mobile communication **[8]**

i) Frequency reuse

ii) Frequency reuse factor

b) Draw the architecture of IS-95 system. Explain various functional entities **[10]**

OR

Q12)a) With a neat diagram explain in detail topology of Cellular system. **[8]**

b) Draw block diagram for the GSM system architecture. Explain various functional entities. **[10]**



Total No. of Questions : 12]

SEAT No. :

P1872

[Total No. of Pages : 4

[5059]-183

B.E. (E&TC) (Semester - II)
OPTICAL FIBER COMMUNICATION
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Answer Q.1 or Q. 2, Q.3 or Q. 4, Q.5 or Q. 6 from Section I and 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 whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) State and explain the advantages of optical fiber communication system. [6]
b) A step index fiber with a core refractive index of 1.5 has a refractive index difference of 1.3% and core diameter of 40 μ m. Estimate the number of guided modes propagating in the fiber when the transmitted light has a wavelength of 1.55 μ m. [6]
c) What are the two major stages of fiber fabrication process? Briefly describe each. [6]

OR

- Q2)** a) Draw a neat block diagram of an optical fiber communication link and explain the function of each block. [6]
b) A step index fiber has core refractive index 1.47 and $\Delta=1.4\%$ with core diameter of 100 μ m. The operating wavelength is 850 nm. Calculate: [6]
i) Numerical aperture of fiber
ii) V parameter and number of modes
c) Compare step index and graded index fiber. State major advantages and applications of graded index fiber. [6]

- Q3)** a) Explain macro bending and micro bending effects in optical fiber. [8]
b) Calculate the total pulse broadening due to material dispersion for graded index fiber of total length 80 km when LED is emitting at: [8]
i) 850 nm and
ii) 1300 nm is coupled to the fiber.

In both cases assume $\Delta\lambda=40$ nm. The material dispersion parameter of the fiber for the two wavelengths is -105.5 ps $\text{nm}^{-1}\text{km}^{-1}$ and -2.8 ps $\text{nm}^{-1}\text{km}^{-1}$ respectively. Comment on the selection of wavelength.

P.T.O.

OR

Q4) a) For experimentation, two step index fibers that exhibit the following [8]
parameters are chosen:

- i) A multimode fiber with $n_1 = 1.5$ and $\Delta = 3\%$ and an operating wavelength of 820 nm.
- ii) An 8 μm core diameter single mode fiber with $n_1 = 1.5$ and $\Delta = 0.3\%$ and an operating wavelength of 1550 nm.

Estimate the critical radius of curvature at which large bending losses occur in both cases.

b) Explain the following mechanisms associated with optical fibers: [8]

- i) Scattering Losses
- ii) Absorption Losses

Q5) a) State and explain the requirements of a good optical source from link design point of view. [8]

b) Describe the various types of fiber misalignment which may contribute to insertion losses at fiber joints. [8]

OR

Q6) a) Radiative and non-radiative recombination lifetimes of the minority carriers in the active region of a double-heterojunction LED are 60 ns and 100 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is 1.55 μm at a drive current of 45 mA. [8]

b) Explain the concept of intensity modulation of LEDs and Laser diodes using their I-P characteristics. [8]

SECTION - II

Q7) a) Compare and contrast p-n, p-i-n and avalanche photo detectors. [6]

b) Explain the terms quantum efficiency and responsivity of a photo detector. How these terms are related to each other? [6]

c) An InGaAs Avalanche photo detector has quantum efficiency 90% at a wavelength of 1310 nm. If an incident optical power of 0.5 μW produces a multiplied photo current of 15 μA . Calculate responsivity and the multiplication factor. [6]

OR

- Q8)** a) Explain the working of p-i-n photo detector with relevant diagrams. [6]
- b) A laboratory setup uses an InGaAsP heterojunction photo transistor which has a common emitter current gain of 170, when operating at a $\lambda = 1300\text{nm}$ with an incident optical power of $80 \mu\text{W}$. The base-collector quantum efficiency at this wavelength is 65%. Estimate the collector current in the device. [6]
- c) With reference to optical detector explain the following terms: [6]
- i) Dark Current Noise
 - ii) Quantum Noise
 - iii) Thermal Noise

- Q9)** a) The following parameters are established for a long-haul single-mode optical fiber system operating at a wavelength of $1.3 \mu\text{m}$: [8]

Mean power launched from the laser transmitter: -3 dBm

Cabled fiber loss: 0.4 dB km^{-1}

Splice loss: 0.1 dB km^{-1}

Connector losses at the transmitter and receiver : 1 dB each

Mean power required at the APD receiver:

When operating at 35 Mbit s^{-1} (BER 10^{-9}): -55 dBm

When operating at 400 Mbit s^{-1} (BER 10^{-9}): -44 dBm

Required safety margin: 7 dB

Estimate:

- i) The maximum possible link length without repeaters when operating at 35 Mbit s^{-1} (BER 10^{-9}). It may be assumed that there is no dispersion–equalization penalty at this bit rate.
 - ii) The maximum possible link length without repeaters when operating at 400 Mbit s^{-1} (BER 10^{-9}) and assuming no dispersion-equalization penalty.
- b) Describe the system design considerations involved in establishing point-to-point optical fiber link. [8]

OR

Q10)a) An optical fiber system is to be designed to operate over an 8 km length without repeaters. The rise times of the chosen components are: **[8]**

Source (LED): 8 ns

Fiber: intermodal: 5 ns km^{-1}

(pulse broadening) intra-modal: 1 ns km^{-1}

Detector (*p-i-n* photodiode): 6 ns

Estimate the maximum bit rate that may be achieved on the link when using an NRZ format.

b) Draw a neat block diagram representing the basic elements of an analog link and state the major noise contributors. **[8]**

Q11)a) Compare SOA and EDFA optical amplifiers based on working principle, amplification gain and drawbacks. **[8]**

b) Explain WDM technique. Hence compare Dense WDM and Coarse WDM. **[8]**

OR

Q12) Write a short note on **[16]**

a) WDM components

b) Noise in optical amplifiers

c) Fiber couplers

d) Applications of Optical amplifiers



Total No. of Questions : 12]

SEAT No. :

P1873

[Total No. of Pages : 3

[5059]-184

B.E. (E&TC) (Semester - II) (Elective - III)

SOFT COMPUTING

(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 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) Write note on (any three) **[18]**

- a) Characteristics of neuro fuzzy and soft computing
- b) Applications of soft computing
- c) Artificial neural network application in biomedical engineering
- d) From Conventional AI to Computational Intelligence.

OR

Q2) a) Consider fuzzy relations: **[10]**

$$\mathbf{R} = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \begin{bmatrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix} \end{matrix}, \quad \mathbf{S} = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \begin{bmatrix} 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{bmatrix} \end{matrix}$$

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

- b) What is a fuzzy set? Explain the Properties of fuzzy sets in detail. **[8]**

P.T.O.

- Q3)** a) What is fuzzification? Explain any two fuzzification methods in detail. [8]
b) Explain Centroid method and Max- membership principle method for de-fuzzification in detail. [8]

OR

- Q4)** a) Explain the concept of Composite linguistic variables and the use of concentration and dilation operations. [8]
b) Draw and explain the architecture of a typical FLC. [8]

- Q5)** a) Explain the following terms with reference to fuzzy inference systems: [6]
i) Premise (Antecedent)
ii) Conclusion (Consequent)
iii) Rule - base
b) Write short note on: [10]
i) Two input one output Mamdani inference system
ii) Synthesis and validation of fuzzy controller

OR

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

SECTION - II

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

OR

- Q8)** a) What is activation function and explain various types of activation functions. [8]
b) What is basic limitation of single layer perceptron? How it is overcome using multilayer perceptron? [8]

- Q9)** a) Discuss in detail supervised and unsupervised learnings? Explain with suitable examples. [10]
b) Explain the concept of linear separability with example. [6]

OR

Q10)a) Explain backpropagation algorithm for Multi layer perceptron. [8]

b) Describe self organizing map architecture and explain Kohonen model. [8]

Q11)a) Using Perceptron network implement Bipolar AND function. [10]

b) Explain the concept of Adaptive neuro Fuzzy Inference system (ANFIS) with architecture. [8]

OR

Q12) Write short note on (Any two) [18]

a) Hybrid Learning Algorithm

b) Application of ANN in image processing

c) Radial Basis Function network



Total No. of Questions : 12]

SEAT No. :

P1874

[Total No. of Pages : 2

[5059]-185

B.E. (E&TC) (Semester - II) (Elective - III)

SPEECH PROCESSING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) Explain in brief human speech production mechanism. [10]
b) Write short note on articulatory phonetics and acoustic phonetics. [8]

OR

- Q2)** a) Explain pitch period estimation using a parallel processing approach. [10]
b) Explain pitch period estimation using AMDF [8]

- Q3)** a) Write a note on selection of order of linear predictor filter. [8]
b) State and explain Levinson Durbin algorithm. [8]

OR

- Q4)** a) Explain Burg's algorithm based on lattice method. [8]
b) Explain two stage lattice filter with equation. Explain how the reflection coefficients are calculated. [8]

- Q5)** a) Explain the computation of PLP coefficients. [8]
b) Write a note on mel scale and bark scale. [8]

P.T.O.

OR

- Q6)** a) Explain Heisenburg's uncertainty principle in speech analysis. [8]
b) Explain filter bank approach for speech processing. [8]

SECTION - II

- Q7)** a) Explain Wiener filter. How it is used for echo cancellation? [8]
b) Explain the transform domain technique used for speech enhancement. [8]

OR

- Q8)** a) Explain comb filter for speech enhancement. [8]
b) What are the different techniques used for wide band noise removal. [8]

- Q9)** a) Explain HMM for speech recognition. Also discuss training & testing procedure for HMM. [8]
b) Explain with block schematic isolated digit recognition system. [8]

OR

- Q10)** a) State different conditions for DTW optimization. [8]
b) Explain briefly major obstacles in speech recognition. [8]

- Q11)** a) Explain with block diagram text-to-speech synthesis system. [10]
b) Explain with block diagram formant based synthesizer. [8]

OR

- Q12)** a) With the help of block schematic explain LPC - based synthesizer. [10]
b) Explain phoneme-based synthesis related to concatenative synthesis. [8]



Total No. of Questions : 12]

SEAT No. :

P1875

[Total No. of Pages : 2

[5059]-186

B.E. (E&TC) (Elective - III)

TELEVISION AND VIDEO ENGINEERING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Black 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) List the specification of CCIR-B standards. [6]
b) Draw and explain frequency response of RF amplifier in PAL TV. [6]
c) Write short notes on Interlaced and progressive scanning [6]

OR

- Q2)** a) Calculate the field frequency and horizontal scanning frequency for CCIR-standards used in India. Show that the video band width is 5MHz. [6]
b) Explain the concept of a composite video signal in Television [6]
c) What is chromaticity diagram? Explain its significance in color TV. [6]

OR

- Q3)** a) What is the significance of a color killer circuit? [8]
b) Describe how a pattern generator is useful in testing a TV receiver. [8]
- Q4)** a) Explain the working of Wobulator along with the internal diagram. [8]
b) Compare NTCS and SECAM color TV standards. [8]

- Q5)** a) Write a short note on MAC. [8]
b) Draw and explain the block diagram of Digital TV receiver [8]

P.T.O.

OR

- Q6)** a) Compare features of Analog and Digital TV. [8]
b) Draw the block diagram of JPEG compression technique and explain the significance of each block [8]

SECTION - II

- Q7)** a) Explain the working and various specifications of HDTV. [8]
b) What is a Set Top Box? Why is it required? Explain its block diagram and working. [10]

OR

- Q8)** a) Write a short note on Video on Demand. Give the details of the Satellite used in DBS system [10]
b) Explain DTH technique for TV broadcasting using neat block diagram. [8]

- Q9)** a) What is Mobile TV? What are its challenges and the hardware requirements [8]
b) Write a short note on ipod. [8]

OR

- Q10)** a) Define and describe the working of IPTV. Compare with Internet TV [8]
b) Along with a block diagram explain the working of a Video door phone system. [8]

- Q11)** a) Compare LED and Plasma display devices [8]
b) Give an overview of different digital recording formats used. [8]

OR

- Q12)** a) Compare DVD and Blu ray DVD. Draw and explain the block diagram of CD recording [10]
b) Explain Digital camera using CCD technology [6]



Total No. of Questions : 12]

SEAT No. :

P1876

[Total No. of Pages : 2

[5059]-187

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Answer any three questions from each section.*
- 2) *Figure to the right indicates full marks.*
- 3) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Define the terms with appropriate example **[10]**
i) Accuracy
ii) Error
iii) Linearity
iv) Sensitivity
v) Resolution
b) Explain calibration and calibration standards. **[8]**
- OR
- Q2)** a) Explain the static characteristics of measuring instruments. **[8]**
b) Draw a typical instrument block diagram. Explain simple and distributing types of measurements in detail. **[10]**
- Q3)** a) Using LCR-Q meter, explains the measurement of inductance, capacitance and resistance. Also state how you will measure Q of a coil. **[8]**
b) Draw and explain suitable diagram for period measurement using Universal counter. **[8]**
- OR
- Q4)** a) With the help of neat diagram, explain the method of True RMS measurement. **[6]**
b) Explain in detail vector impedance meter with the help of block diagram. **[10]**
- Q5)** a) Write short note on:
i) Sampling Oscilloscope
ii) Probes
iii) Acquisition methods in DSO
iv) DPO

P.T.O.

OR

- Q6)** a) Draw block diagram of High frequency oscilloscope and give features of typical stages. - [8]
b) With respect to DSO explain following: [8]
i) Math function
ii) FFT
iii) Roll mode
iv) Glitch mode

SECTION - II

- Q7)** a) Explain swept super heterodyne Spectrum analyzer with neat block diagram. [10]
b) Explain functional block diagram of heterodyning wave analyzer. [8]

OR

- Q8)** a) Explain following terms with respect to spectrum analyzer [6]
i) Dynamic range
ii) Resolution Bandwidth
iii) Span
b) Draw the block diagram of Logic analyzer and explain its operation. Explain display methods used in analysis using logic analyzer. [12]

- Q9)** a) Explain test setup for EMI measurement. [8]
b) List and compare different solid state microwave signal sources. [8]

OR

Q10) Draw block diagram of a direct digital synthesizer (DDS). Explain its operation. [8]

- Q11)** a) Write short note on: [8]
i) Automatic Test Equipment (ATE)
ii) LABVIEW features
b) What do you mean by virtual instrumentation? Explain in brief any one virtual instrumentation workbench. [8]

OR

- Q12)** a) Explain in detail structure of IEEE488 instrumentation bus used to interface spectrum analyzer with computer. [8]
b) Explain how to test an audio amplifier using computer controlled measurement system. [8]



Total No. of Questions : 12]

SEAT No. :

P1877

[Total No. of Pages : 2

[5059]-188

B.E. (Electronics & Telecommunication)

ARTIFICIAL INTELLIGENCE

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) Give examples of problems games which require A.I. techniques? Give the role of A.I. in solving it. [8]
b) Explain the architecture of a typical agent. What is a rational agent? [8]
OR
- Q2)** a) Explain "Simple Reflex based agent" with the help of schematic diagram or pseudo code. [8]
b) Explain the scheme with pseudocode for [8]
i) Simple reflex agent
ii) Utility based agent
- Q3)** a) Define and differentiate with the merits and demerits between Breadth First Search and Depth First Search. Which one of them is better? [8]
b) Explain A* algorithm with its pseudo code [8]
OR
- Q4)** a) Explain AO* algorithm with its pseudo code. [8]
b) Explain constraint satisfaction algorithm with its pseudo code [8]
- Q5)** a) Represent the following sentences by First order logic calculus. [10]
i) Some dogs bark
ii) All dogs have four legs
iii) All barking dogs are irritating
iv) No dogs purr
v) Fathers are male parents with children
vi) Students are people who are enrolled in courses.
b) Explain the concept of forward chaining and backward chaining in the knowledge Representation [8]

OR

P.T.O.

- Q6)** a) State the rules and steps for converting a given well predicate logic. Statements to clausal form. [10]
b) Enumerate the issues in Knowledge representation. [8]

SECTION - II

- Q7)** a) Explain the decision tree algorithm with suitable example [10]
b) Explain ADA-BOOST algorithm with pseudo code. [8]

OR

- Q8)** a) Explain in detail Instance based learning. [10]
b) Write short notes on: [8]
i) Passive reinforcement learning
ii) Active reinforcement learning

- Q9)** a) What is difference between expert system and traditional system? Comment on the advantages and disadvantages of expert system. [8]
b) What are trihedral figures? How waltz's algorithm can be applied to propagate symbolic information? [8]

OR

- Q10)**a) Explain the typical architecture of Expert System [8]
b) Explain Waltz algorithm. Highlight the limitations of Waltz algorithm. [8]

- Q11)**a) What is NLP? Explain different phases of NLP. [8]
b) What do you mean by grammar induction? Explain it in detail. [8]

OR

- Q12)** Write short notes on: [16]
a) Syntactic analysis
b) Ambiguity and disambiguation



Total No. of Questions : 12]

P1878

SEAT No. :

[Total No. of Pages : 2

[5059]-189
B.E. (E&TC)
AUTOMOTIVE ELECTRONICS
(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) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) Explain four stroke engine operation on the basis of following action. [9]
- i) Intake
 - ii) Compression
 - iii) Power
 - iv) Exhaust
- b) What are functions of battery under following conditions. [9]
- i) Engine OFF
 - ii) Engine ON
 - iii) Engine running

OR

- Q2)** a) Explain working principle of Hybrid vehicles. [9]
- b) What is the role of spark plug, H.T. Coil and distributor in ignition system? [9]
- Q3)** a) Explain any position sensor used in Automotive. [8]
- b) How flow sensing & measurement is carried out in fuel injection system [8]

OR

- Q4)** a) Explain Hall effect sensor with any one application in Automotive. [8]
- b) Write a short note on: (any two) [8]
- i) Airbags
 - ii) Instrumentation amplifier
 - iii) Tyre pressure monitoring system

P.T.O.

- Q5)** a) Explain with suitable diagram anti lock braking system. [8]
b) Explain the working principle of power steering system. [8]

OR

- Q6)** a) Explain strategies of engine management and control. [8]
b) Explain cruise control system. [8]

SECTION - II

- Q7)** a) Explain algorithm for timer as a counter with interfacing diagram. [8]
b) Explain 8-bit PIC architecture in brief. [8]

OR

- Q8)** a) Explain any two methods to control interrupt latency. [8]
b) Explain features of processor that qualify it to use in automotive. [8]

- Q9)** a) Explain suitability of MOST protocol in automotive. [8]
b) Explain CAN & flexray communication protocol w.r.t. [8]
i) Use
ii) Speed
iii) Structure
iv) Advantage

OR

- Q10)** a) Compare the features of ARM9, ARM11 & ARM cortex. [8]
b) Explain use of GPRS and GPS in automotive with an example. [8]

- Q11)** a) Explain on – board and off – board diagnosis systems in automotive. [9]
b) Write diagnostic procedures and sequence in automotive context. [9]

OR

- Q12)** Write a short note on: (any three) [18]
a) Passenger safety and comfort system
b) Automotive EMC standards
c) SAE standards in automotive
d) Self diagnostic system



Total No. of Questions : 12]

P1879

SEAT No. :

[Total No. of Pages : 2

[5059]-190

B.E. (E&TC)

NANOTECHNOLOGY

(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 answer books.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figure to right indicates full marks.*

SECTION - I

Q1) Write short notes on :

[18]

- i) Nano crystal growth
- ii) Dip pen Nano Lithography
- iii) Spectroscopy

OR

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

[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]

Q5) a) Explain the properties of metal Nano cluster.

[8]

b) What are the different types of carbon structure? Explain it.

[8]

P.T.O.

OR

- Q6)** 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

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 in detail information theory in Nano-electronics [8]
b) Explain diffusion process in detail. [8]

OR

- Q10)**a) Explain soft computing with respect to Nano electronics [8]
b) Explain in detail atomic lithography. [8]

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

OR

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



Total No. of Questions : 12]

P1880

SEAT No. :

[Total No. of Pages : 4

[5059]-191

B.E. (E&TC)

PLC & AUTOMATION (Elective - IV)

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Answers to the TWO sections must be written in SEPARATE Books.*
- 2) *Figures to the RIGHT indicate FULL Marks.*
- 3) *Neat diagrams must be drawn WHEREVER necessary.*
- 4) *Assume SUITABLE DATA, if necessary.*

SECTION - I

- Q1)** a) Explain Direct Digital Control (DDC) and Supervisory Control in the context of industrial automation. [8]
- b) Explain PROFIBUS for industrial communication. [8]

OR

- Q2)** a) Explain Servo problem and Regulator problem in industrial control with a suitable example. [8]
- b) What is FIELDBUS ? Enlist the salient features of the same. [8]

- Q3)** a) What is a transmitter? Enlist the desirable features of a transmitter for industrial automation. [4]
- b) Explain the concept of 2-wire transmitter with the help of a neat schematic. Enlist the advantages of the same. [6]
- c) Explain the use of DPT for liquid and gas service with a schematic. [6]

OR

- Q4)** a) With the help of a block schematic, explain SMART Temperature Transmitter with Thermocouple as the sensor. [8]
- b) A Pt-100 RTD is used to measure the temperature of a winding in a dc motor. The range of operation is 100°C to 400°C. Design the necessary analog signal conditioning circuitry to convert this temperature range into 4 to 20 mA standard output. The design should have provision for “Zero” and “Span” adjustments. [8]

P.T.O.

Q5) a) Explain the following terms related to a PID Controller;

- i) Proportional Band
- ii) Integral Time
- iii) Derivative Time

Comment on the effect of these parameters on overall system response [6]

b) Calculate the output of PID Controller as a function of time; for the error shown in Fig. 1., with $K_p = 5$, $K_i = 0.7/s$, $K_d = 0.5s$ and $P_1(0) = 20\%$

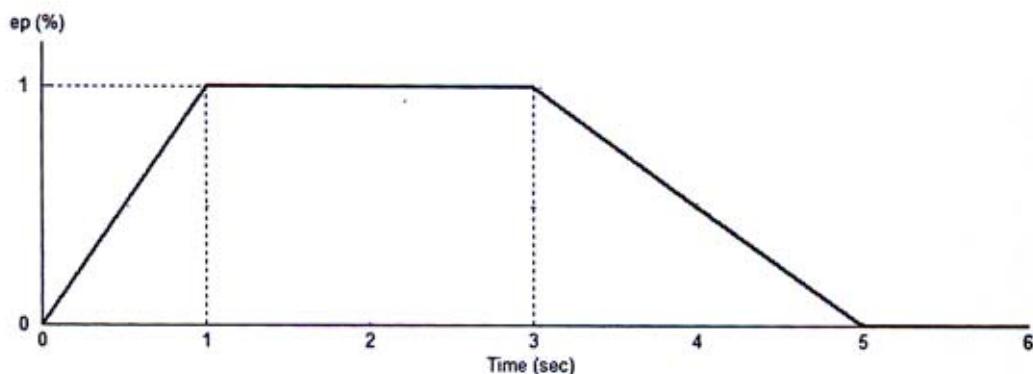


Fig. 1 : Error (Q.5b)

Demonstrate the input and output graphically (to the scale) [12]

OR

Q6) a) Explain various modifications of the basic PID control law for practical applications. [8]

b) In an application of the Ziegler-Nichols method for controller tuning, a process oscillates at 30% proportional band with a period of 11.5 minutes. Determine the nominal PID controller settings. [4]

c) Pressure from 50-400 psi is converted to voltage by the relation;
$$V = 0.385 (P)^{1/2} - 2.722$$

This is input to an 8-bit ADC with a 5.0 V reference. Develop a linearization equation to give a quantity 'P' in the program that is equal to actual pressure. [6]

SECTION - II

- Q7)** a) Sketch the following control valves; [6]
i) Gate valve
ii) Butterfly valve
- b) Explain stepper motor as an electrical actuator with the relative merits over pneumatic actuators. [6]
- c) Define Valve flow Coefficient - Cv
A control valve is flowing 63.4 gpm of water and an assigned pressure drop of 10 psi. Calculate Cv. [4]

OR

- Q8)** a) Explain the different valve flow characteristics with suitable applications for each; [6]
i) Quick opening
ii) Linear
iii) Equal percentage
Comment on inherent and installed valve characteristics. [6]
- b) A valve has rangeability of 30. The maximum stem travel is 5 cm and is half open under nominal conditions, with flow of 65 m³/hr. Calculate opening of this equal percentage valve at 100 m³/hr [6]
- c) Sketch a spring diaphragm actuator and label all the parts. [4]

- Q9)** a) Explain the architecture of a PLC with a block schematic. [6]
- b) Develop a programmed ladder diagram for the typical Starting scheme of a Mill Motor in a Boiler Plant. [6]
The sequence of operation is;
i) The FD fan is ON after System START
ii) Furnace Oil interlock is satisfied
iii) When (i) and (ii) are satisfied, a Master Fuel Relay (MFR) is energized
iv) This energizes an auxiliary relay MFRA and an indication lamp 'L' indicating that Interlock Stage – 1 ready
v) When the conditions 'Coal Feeder OFF', 'Coal Bunker Level HIGH', 'Cold Air Damper OPEN', 'Hot Air Damper OPEN', are satisfied after MFRA ON, the closing coil of circuit breaker (CCBR) of the mill motor is energized and the motor starts, if the START Push Button is switched ON.
- Your answer must include,
i) I/O Listing
ii) Ladder Diagram [12]

OR

- Q10)a)** Define Programmable Logic Controller — PLC. Enlist the typical specifications of an industrial PLC. [6]
- b) Develop a physical ladder diagram for the level control application in Fig. 2

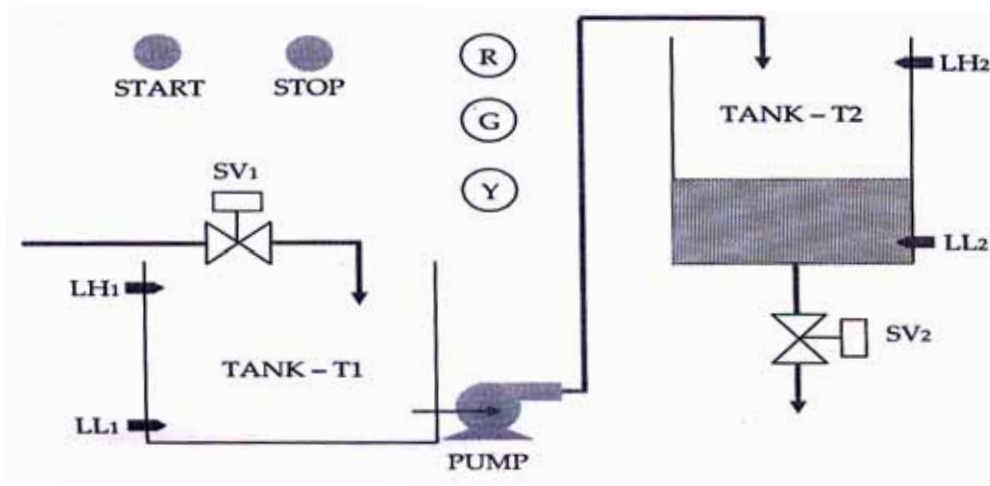


Fig. 2. : Level Control (Q. 10b.)

The sequence of operation is;

- i) MASTER START and STOP Push Buttons
- ii) Check level in T1. If it is more than LL_1 , start PUMP, else open SV_1 . Close SV_1 , when level reaches LH_1 .
- iii) If level is above LL_1 in T1 and below LL_2 in T2, start PUMP.
- iv) When level in T2 reaches LH_2 , stop the PUMP and open SV_2 after 90 seconds.
- v) When level drops to LL_2 , close SV_2 and go to step (ii).
- vi) The following indicators should be switched on,
 RED : if level in T1 is low
 GREEN : if level in T2 is high
 YELLOW : when T2 is getting filled

Your answer must include,

- i) I/O Listing
- ii) Ladder Diagram

[12]

- Q11)a)** Explain the concept of Fuzzy Logic. Enlist the advantages and disadvantages of Fuzzy Logic based control. [8]
- b) Explain Fuzzy Logic based control with a suitable application. [8]

OR

- Q12) a)** Explain the usage of Artificial Neural Network in Industrial Control with an application. [8]
- b) Explain Statistical Process Control. [8]



Total No. of Questions : 12]

SEAT No. :

P1771

[Total No. of Pages : 4

[5059]-2
B.E. (Civil)
DAMS AND HYDRAULIC STRUCTURE
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answer to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Classify and explain the dam on the basis of construction material with sketch. **[8]**
- b) Explain clearly the procedure of carrying out detailed investigation of dam site. **[8]**

OR

- Q2)** a) Explain the factors which govern the selection of site for dam construction. **[8]**
- b) Write the concept of arch dam and write short note on constant radius arch dam with neat sketch. **[8]**

- Q3)** a) Explain with sketch how you will find the
- i) Uplift pressure on a gravity dam with drainage gallery. **[4]**
 - ii) Silt pressure on gravity dam. **[4]**
- b) Explain two dimensional analytical method for stability analysis of gravity dam. **[10]**

OR

- Q4)** a) Distinguish between high and low gravity dams. State the criteria to decide high gravity dam. **[6]**

P.T.O.

- b) Derive an expression for determining base width from elementary profile of gravity dam. [6]
- c) State the load combinations recommended by BIS to be adopted for design of gravity dam. [6]

- Q5)**
- a) Describe clearly the procedure for construction of a rolled fill earthen dam. [4]
 - b) Explain with sketch Rock toe [4]
 - c) Explain with sketch Chimney drain [4]
 - d) Explain with sketch Piping in earthen dam [4]

OR

- Q6)** Determine the pheretic line for an earthen dam homogeneous in section from the following data. [16]

- a) Height of dam = 20m
- b) Free board = 2m
- c) Coefficient of permeability of dam = 4×10^{-4} cm/sec.
- d) Top width = 4m.
- e) Upstream & Downstream slope = 3 : 1

Draw pheretic line and calculate seepage rate (discharge) through the dam to the scale.

SECTION - II

- Q7)**
- a) Explain khoslas potential flow theory for design of impervious floor for subsurface flow. [5]
 - b) State the purpose types of crest gates. Explain the working of radial gate. [5]
 - c) Discuss the various types of energy dissipation devices used below spillway in relation to position of tail water depth and jump height curve. [8]

OR

- Q8)** a) Discuss the choice, design and construction of siphon spillway. [5]
 b) Explain necessity of inspection, maintenance and safety of spillway gates. [5]
 c) Design the crest of the spillway of 125m length to carry a discharge of 2500 m³/sec. Assume the level of bed of river as 500m and level of water to be 550m & d/s slope 0.8 H; 1V. [8]

Q9) Write short note on : [4 × 4 = 16]

- a) What are cross drainage works? And their necessity.
 b) Discuss the various design consideration in case of cross drainage work.
 c) Lacey's theory for design of alluvial canal.
 d) Losses in irrigation canal.

OR

Q10)a) Check whether following canal parameter conform to Kennedy's theory of canal design [8]

Full supply discharge = 45 m³/s

Full slope depth = 1.8m

Bed slope of channel 1 in 4000.

Side slopes = 1H : 2V, Bed Width = 30m

Critical vel. ratio = 1.17

Manning's constant = 0.023

- b) Write notes on [4 × 2 = 8]
 i) Regime channel
 ii) Silt factor
 iii) Cross regulators
 iv) Vertical drop falls

Q11)a) What is cut off? Describe briefly how a cutoff may be used as a river training measure. [8]

- b) What is meant by hydropower? What are different types of hydropower plants and explain any one with neat sketch. [8]

OR

Q12)a) Write short notes on **[2 × 4 = 8]**

- i) Necessity of river bank protection & types of work for such protection.
- ii) Spurs and Groynes as types of river training work.

b) Define the terms **[4 × 2 = 8]**

- i) Load factor
- ii) Power factor
- iii) Plant factor
- iv) Utilization factor



Total No. of Questions : 12]

SEAT No. :

P1781

[Total No. of Pages : 3

[5059]-20

B.E. (Civil)

CONSTRUCTION MANAGEMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) How Infrastructure development in India has contributed majorly in the country's economic growth and explain components of Infrastructure sector? [8]
- b) What are the reasons of project overruns and means to combat them?[6]
- c) What is the role of project monitoring in construction? [4]

OR

- Q2)** a) What do you mean by Project Management Consultant? Explain its role in case of road construction. [8]
- b) Explain the role of construction industry in economic development? [6]
- c) Write the necessity and applications construction management? [4]
- Q3)** a) What is the purpose of scheduling in construction? [4]
- b) Draw & explain multiple activity chart with suitable example. [6]
- c) Define WBS. Explain the project WBS levels with suitable example?[6]

P.T.O.

OR

- Q4)** a) Write the objectives of work study and work measurement? [4]
b) Define work study and explain the procedure of method study. [6]
c) Explain the Line of balance (LOB) technique with suitable example. [6]

Q5) Write short note on following, any four : [16]

- a) Workman's compensation Act 1923
b) Project balance sheet
c) Interstate migrantworkers act
d) Working capital
e) Profit loss account statement

OR

- Q6)** a) Write the need and importance of labor laws? [4]
b) Explain in detail the Means of finance. [6]
c) Write a note on Building and other construction workers Act 1996? [6]

SECTION - II

- Q7)** a) Write the concept of value and detail steps in value analysis? [8]
b) Explain following terms : [10]
i) Risk management
ii) Break even analysis

OR

- Q8)** a) As an Owner, Consultant and Contractor for a road construction, explain the risk faced by them with examples wherever possible. [8]
b) Explain following terms : [10]
i) Value analysis
ii) Energy cost escalation and its impact

- Q9)** a) Define materials management and its role of in construction Management and its linkages? [8]
b) Explain the Role of ERP in Human Resource Management (HRIS). [8]

OR

- Q10)**a) Explain in detail material codification and classification. [8]
b) Explain following terms: [8]
i) Staffing policy
ii) Performance Appraisal and Job Evaluation

- Q11)**a) What is an Expert system? How Artificial Intelligence is useful in the development of Expert system? [8]
b) Discuss the concept of Fuzzy logic. [8]

OR

- Q12)**a) Write the applications of Artificial Neural networks in construction management with suitable example? [8]
b) Write short note on the following: [8]
i) Analogy between Biological neuron and Artificial neuron
ii) Genetic algorithm



Total No. of Questions : 12]

SEAT No. :

P1881

[Total No. of Pages : 2

[5059]-201

B.E. (Computer Engineering) (Semester - I)
DESIGN AND ANALYSIS OF ALGORITHMS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) What is meant by divide and conquer? Explain merge sort algorithm. State its time complexity. **[10]**

b) Prove by contradiction: There are infinitely many prime numbers. **[8]**

OR

Q2) a) Write a greedy algorithm to solve the knapsack problem and prove: If $p_1/w_1 \geq p_2/w_2 \geq \dots \geq p_n/w_n$ then Greedy knapsack generates an optimal Solution to the given instance of the knapsack problem. **[8]**

b) Write Greedy Kruskal's minimum spanning tree algorithm. Also explain it with a suitable example. State its time complexity. **[10]**

Q3) a) Write an algorithm to construct the optimal binary search tree given the roots $r(i,j)$, $0 \leq i < j \leq n$. Show that this can be done in time $O(n)$. **[8]**

b) Explain principle of optimality. How 0/1 knapsack problem is solved using dynamic programming? **[8]**

OR

Q4) a) What is travelling salesperson problem (TSP)? Explain the solution to TSP using dynamic programming. **[8]**

b) Explain the solution to multi-stage graph problem with backward approach. **[8]**

Q5) a) Write an algorithm to solve Graph coloring problem using backtracking. **[8]**

b) Explain the solution to travelling salesperson problem using branch and bound method. **[8]**

P.T.O.

OR

- Q6)** a) Explain general strategy for backtracking. Write an algorithm to solve 8 Queen's Problem using backtracking method. [8]
b) Write control abstraction for LC-search. Solve 0/1 knapsack problem using LC branch and bound method. [8]

SECTION - II

- Q7)** a) Define P, NP, NP-Hard and NP-Complete. [8]
b) Explain in brief AND / OR Graph decision problem. [4]
c) State and explain Cook's theorem. [6]

OR

- Q8)** a) State and explain NP-Hard scheduling problems. [8]
b) Explain in brief Clique Decision problem. [4]
c) Prove that
The Clique Decision problem reduces to The Node Cover Decision problem. [6]

- Q9)** a) Explain different parallel computation models. [8]
b) Explain implementation of Quick sort on multiprocessor system with a suitable example. [8]

OR

- Q10)** a) Explain in detail parallel sorting. [8]
b) Explain prefix computation with a suitable example. [8]

- Q11)** a) Explain all options for implementing Huffman's problem. [8]
b) Explain any two heuristic search algorithms. [8]

OR

- Q12)** a) How deadlock is detected and avoided? Explain with an example. [8]
b) Explain convex hull problem and techniques to solve it. [8]



Total No. of Questions : 12]

SEAT No. :

P1882

[Total No. of Pages : 2

[5059]-202

B.E. (Computer Engg.)

PRINCIPLES OF COMPILER DESIGN

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Write a LEX program to count no. of characters, words and lines in a given input text file. **[8]**
- b) Explain with a suitable example, the techniques used in YACC to resolve shift-reduce and reduce-reduce conflicts. **[8]**

OR

- Q2)** a) What is difference between phase and a pass of a compiler? Explain machine dependent and machine independent phases of a compiler. **[8]**
- b) Write the rules to calculate FIRST & FOLLOW sets. **[8]**

- Q3)** a) Define and explain following terms with example. **[8]**
- i) Dependency Graph
 - ii) L-attributed definition
- b) Explain the following terms with suitable examples: **[8]**
- i) Synthesized Attributes
 - ii) Marker Non Terminal Symbols

OR

- Q4)** a) What is mean by syntax directed definitions? Give syntax directed definition for any example of arithmetic expression. **[8]**
- b) Explain Type system and Type expressions. **[8]**

P.T.O.

- Q5) a)** How would you generate intermediate code for the flow of control statements? Explain with examples. [8]
- b) How Back patching can be used to generate code for Boolean expressions and flow of control statements? [10]

OR

- Q6) a)** List the commonly used intermediate representation. Give one example of each of one. [8]
- b) Write a translation scheme to generate intermediate code for assignment statements with array references. [10]

SECTION - II

- Q7) a)** Discuss: Static and Dynamic Scope. [8]
- b) Explain in detail about Run Time Storage Allocation. [8]

OR

- Q8) a)** What are the two approaches of implementing Dynamic Scope? Give the difference between the two. [8]
- b) What is an activation record? Explain each of its fields. [8]

- Q9) a)** Discuss various issues in code generation phase. [8]
- b) What is a DAG? With suitable illustrations explain the role of DAG in code generation phase. [8]

OR

- Q10)a)** What is loop transformation? What are its types? [8]
- b) Write short note on strength reduction and variable propagation. [8]

- Q11)a)** What are induction variables? Explain induction variable elimination algorithm? [8]
- b) What do you mean by a common sub-expression? Discuss the algorithm for elimination of common sub-expression. [10]

OR

- Q12)a)** Write a short note on data flow analysis. [8]
- b) Explain fundamental data flow properties. [10]



Total No. of Questions : 12]

SEAT No. :

P1883

[Total No. of Pages : 3

[5059]-203

B.E. (Computer Engineering) (Semester - I)
OBJECT ORIENTED MODELING AND DESIGN
(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.*

SECTION - I

- Q1)** a) Draw and explain 4+1 view architecture of the system models all the view of the system? [8]
- b) Explain and elaborate the building blocks of UML? [8]

OR

- Q2)** a) Define stereotype? What is the significance of stereotype in UML diagrams? [8]
- b) Explain different phases of RUP? [8]

OR

- Q3)** a) Draw a activity diagram for the system online shopping. Online customer can browse or search items, view specific item, add it to shopping cart, view and update shopping cart, do checkout. User can view shopping cart at any time. [8]
- b) What are different types of requirements? Explain with an example? [8]
- Q4)** a) Explain different types of relationships used in use case diagram. Elaborate with an example? [8]
- b) Define major use cases for a credit card processing system . The merchant submits a credit card transaction request to the credit card payment gateway on behalf of a customer, Bank which issued customer's credit card is actor which could approve or reject the transaction. If transaction is approved, funds will be transferred to merchant's bank account. [8]

P.T.O.

OR

- Q5)** a) Draw a class diagram for a banking system. Make and state suitable assumptions for the same. [8]
- b) What is need and purpose of object diagram in UML [6]
- c) Explain import and access stereotypes with reference to package diagram.[4]

OR

- Q6)** a) Draw a class diagram for Library Management System (LMS)— system manages Library, Catalog, Book, Account. Use advanced class diagram notation. Assume and make suitable assumptions. [8]
- b) What is CRC .Compare it with class diagram [6]
- c) What is the need and purpose of composite structure diagram. [4]

SECTION - II

- Q7)** a) Draw a state diagram for printer for printing a document. [8]
- b) Explain interaction operators: Alternative, Break and Parallel [6]
- c) Explain the significance of timing diagram [4]

OR

- Q8)** a) Draw a Sequence diagram for the following system: [8]
- Facebook user authentication in a web application how Facebook user could be authenticated in a web application to allow access to his/her Facebook resources. Facebook uses a framework which enables web application (called “client”) to request access to resources controlled by the FB user and hosted by the Facebook server. Assume and make suitable assumptions.
- b) What are the elements of communication diagram. [6]
- c) Explain with an example What are combined fragments in Sequence diagram. [4]

Q9) a) Give notation and explanation for following concepts related to deployment [8]

diagram. : Node, artifact, <<manifest>>, communication path.

b) Explain Black Box view and White box view in Components diagram [8]

OR

Q10)a) Enlist the differences between component diagram and deployment diagram. [8]

b) Identify any two possible components and the interfaces they support for a hypothetical typical college library system that issues (returns) books to student members. The students can search for the books details as well as check availability. Draw a COMPONENT diagram to show the two identified components with interfaces they support. [8]

Q11)a) Explain the Iterator design pattern with an example [8]

b) Explain the concept and significance of forward engineering and reverse engineering in UML diagrams [8]

OR

Q12)a) Explain the proxy design pattern with an example. [8]

b) How do you reverse engineer a class diagram? [8]



Total No. of Questions : 12]

P1884

SEAT No. :

[Total No. of Pages : 2

[5059]-204

**B.E. (Computer Engg.)
IMAGE PROCESSING
(2008 Pattern) (Elective - I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the image acquisition using sensor array? [8]
b) What is distance measure? What are different techniques? [8]

OR

- Q2)** a) What is digital image processing? Explain sampling and quantization. [8]
b) Explain the representing digital images. [8]

- Q3)** a) What is the need of transformation? Explain Walsh transform [8]
b) Explain Hadamard and Walsh transformation. [8]

OR

- Q4)** a) Explain the contract stretching using histogram equalization [8]
b) What is sharpening? Explain any filter used for sharpening. [8]

- Q5)** a) What is region splitting and merging? [9]
b) What is texture? Explain statistical and spectral descriptor [9]

OR

- Q6)** a) With the help of appropriate mask explain the following: [9]
i) Point detection
ii) Line detection
b) Write short note on image processing filters. [9]

P.T.O.

SECTION - II

- Q7)** a) What is image restoration? Explain various noise models [8]
b) Explain Blind-deconvolution technique [8]

OR

- Q8)** a) Explain the image degradation and restoration model [8]
b) Explain the adaptive filters with suitable example. [8]

- Q9)** a) Why image compression is needed? Explain Huffman coding [8]
b) Explain how the neural networks are used for pattern matching [8]

OR

- Q10)**a) What is pattern? Explain any pattern matching technique [8]
b) What are the regional descriptors for texture representation? [8]

- Q11)**a) Write short note [18]
i) Wavelets used for image processing
ii) Sub-band coding
b) Dimension reduction

OR

- Q12)** Write short note [18]
a) Principal Component Analysis
b) Character Recognition application
c) Image pyramids



Total No. of Questions : 12]

SEAT No. :

P1885

[Total No. of Pages : 3

[5059]-205

B.E. (Computer Engg.) (Semester - I) (Elective - I)
DESIGN AND ANALYSIS OF COMPUTER NETWORKS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain applications of Little's theorem in Queuing theory & analyze M/M/1 Queuing system using state transition diagram. [9]
- b) Message arrive independently to a system at the rate of 10 pm. Their length is exponentially distributed with an average of 3600 characters. They are transmitted on a 9600 bps channel. A character is 8 bit long. [9]
- i) What is average service time, arrival rate, service rate?
 - ii) What are the average number of message in queues & number of message in queue?

OR

- Q2)** a) In a small convenience store there's room for only 4 customers. The owner himself deals with all the customers - he likes chatting a bit. On average it takes a customer 4 minutes to pay for his/her purchase. Customers arrive at an average of 1 per 5 minutes. If a customer finds the shop full, he/she will go away immediately.
- i) What fraction of time will the owner be in the shop on his own?
 - ii) What is the mean number of customers in the store?
 - iii) What fraction of customers is turned away per hour?
 - iv) What is the average time a customer has to spend for check-out? [9]
- b) Describe exponential random variable and memory less property of random variable? [9]

P.T.O.

- Q3)** a) Explain the steps for performance analysis and tuning. How performance of a system is tuned. [8]
- b) Explain hierarchical and collapsible network architecture? [8]

OR

- Q4)** a) List and explain common resources. Used in system design with their metrics. [8]
- b) Explain various optimization techniques like multiplexing parallelism, virtualization, soft state etc. used in system design? [8]

- Q5)** a) A Computer on 6 Mbps network is regulated by token bucket. The bucket is filled at the rate of 1 Mbps. It is initially filled to capacity with 8 megabits. How long can the computer transmit at the full 6 Mbps? [8]
- b) Explain the rate controlled scheduling for generated service connection? [8]

OR

- Q6)** a) Explain how TCP support flow control? Differentiate between open loop and close loop flow control technique. [8]
- b) Explain WFQ? What is the advantage of worst case fair weighted fair queuing (WF²Q) over WFQ? [8]

SECTION - II

- Q7)** a) Explain different traffic model in details? [9]
- b) What is QOS? Explain different approaches to improve QOS [9]

OR

- Q8)** a) Explain, what are the different time scale and mechanism used at these time scale for traffic management? [9]
- b) What is peak-load pricing. Explain if peak-rate allocation is reasonable for data traffic? [9]

- Q9) a)** Explain router architecture with suitable diagram. [8]
b) Explain expanded tries scheme in details. [8]

OR

- Q10)a)** Divide a network 192. 168.4.0/24 into two sub networks having host size of 50. Find subnetwork address, subnet mask and IP address range for the sub network? [8]
b) Explain Router architecture with suitable diagram. [8]

- Q11)a)** Discuss security issues at transport layer with suitable example and possible solutions? [8]
b) What are the functions of network Layer? Explain? [8]

OR

- Q12)a)** Explain subletting? [8]
b) Explain which points are considered while planning and implementing network. [8]



Total No. of Questions : 12]

SEAT No. :

P1886

[Total No. of Pages : 2

[5059]-206

B.E. (Computer Engineering) (Elective - I) (Semester - II)

ARTIFICIAL INTELLIGENCE

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Assume suitable data wherever necessary.*
- 2) *Separate answer books must be used for the sections.*
- 3) *Draw proper diagrams wherever necessary.*

SECTION - I

- Q1) a)** Why would evolution tend to result in systems that act rationally? [8]
What goals are such systems designed to achieve
- b) Prove each of the following statements: [10]
- i) Breadth-first search is a special case of uniform-cost search
 - ii) Uniform-cost search is a special case of A* search

OR

- Q2) a)** What are the different approaches in defining artificial intelligence And what is Artificial Agent? [8]
Give the name of the algorithm that results from each of the following special cases: [10]
- b) i) Local beam search with $k = 1$
ii) Genetic algorithm with population size $N = 1$

- Q3) a)** Explain algorithm for searching AND-OR graphs generated by nondeterministic environment. [8]
- b) Explain A* Algorithm in detail with example [8]

OR

- Q4) a)** Enlist the various search-based techniques for game playing Explain characteristics features of each. [8]
- b) Solve given Crypt arithmetic problem using Constraint Satisfaction SEND+MORE=MONEY [8]

P.T.O.

- Q5)** a) Explain optimal decision in Games with optimal strategies [8]
b) Give MIN-CONFLICT algorithm for solving CSPs by local search [8]

OR

- Q6)** a) Explain Stochastic Games with example [8]
b) Explain Simulated annealing with example [8]

SECTION - II

- Q7)** a) Describe the differences and similarities between problem solving and planning. [10]
b) What are the various components of a typical planning system? [8]

OR

- Q8)** a) Explain Frames and Semantic net with example [10]
b) Explain multibody planning & multiagent planning [8]

- Q9)** a) Explain Decision trees and implementation aspects of Decision trees [8]
b) Explain different approaches for uncertain reasoning [8]

OR

- Q10)** a) Explain different forms of learning [8]
b) Explain Discourse and pragmatic processing [8]

- Q11)** a) Draw and explain the Architecture of Ideal Expert System [8]
b) Explain steps in NLP [8]

OR

- Q12)** a) Explain implementation aspects of Syntactic Analysis [8]
b) Explain with suitable examples Morphological Analysis & Pragmatic analysis as applicable to Natural language processing [8]



Total No. of Questions : 12]

P1887

SEAT No. :

[Total No. of Pages : 2

[5059]-207

**B.E. (Computer Engineering)
SOFTWARE ARCHITECTURE
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain software architecture and functional nonfunctional requirements. [6]
b) Write short notes on [12]
i) Software design
ii) Synchronous and asynchronous messaging

OR

- Q2)** a) Write short note on software architecture and 4+1 views. [8]
b) Explain software architect and his/her role in IT industry. [10]

- Q3)** Explain the given terms in context of QUALITY. [16]
a) Importance of achieving 'performance' for any system.
b) Quality attributes
c) Testability
d) Relationship between design and quality

OR

- Q4)** Explain and illustrate the following concepts (in context of quality attribute/tactics) with examples, in brief [16]
a) USABILITY
b) Interfaces and ease of modifiability
c) Authentication as a security tactic
d) Performance, response time, throughput

P.T.O.

- Q5)** a) Give intent/motivation for Singleton pattern, with examples. [8]
b) Write short note on MVC pattern. [8]

OR

- Q6)** Which design pattern will you choose in following CONTEXT and why?
a) Explain how the pattern will work with UML diagrams, CONTEXT is that you wish to create objects in your application Dynamically? [8]
b) Write short note on MEDIATOR pattern [8]

SECTION - II

- Q7)** a) Compare the java world and Microsoft world for their offerings .NET and J2EE. [9]
b) What is the role of JAVA SE, JAVA EE technologies? [9]

OR

- Q8)** a) Discuss how JDBC is used by web applications. [9]
b) What is the need of J2ME and Java APIs? [9]

- Q9)** In brief explain the concept and give good examples to illustrate. [16]
a) Server side responsibilities.
b) XMLDOM
c) Custom controls in VB
d) Need for JSF

OR

- Q10)** Explain following Web Client side concepts through simple examples. [16]
a) Browser differences
b) Use of active X controls
c) XHTML
d) Java applets

- Q11)** a) Explain role of server side in a typical website and UDDI [8]
b) List and explain advantages of java and struts. [8]

OR

- Q12)** a) Explain interfaces and DLL servers in context of COM/.NET. [8]
b) Write short note on .NET and advantages of .NET. [8]



Total No. of Questions : 12]

SEAT No. :

P1888

[Total No. of Pages : 2

[5059]-208

B.E. (Computer Engineering) (Elective - II)

MULTIMEDIA SYSTEMS

(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 Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section —I & Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section —II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) Explain Microsoft Power Point in brief. [8]
b) Compare streaming of Live audio, video and stored audio, video. [8]

OR

- Q2)** a) Explain with diagram structural components of Multimedia Database. [8]
b) Describe in brief Multimedia file system with reference to conventional file system. [8]

- Q3)** a) Explain different techniques for enhancement of an Image using point processing. [8]
b) Explain RLE compression technique by taking a suitable example. [8]

OR

- Q4)** a) Explain with diagram basic image Processing system. [6]
b) Explain lossless and Lossy compression techniques of an Image. [10]

- Q5)** a) Which different parameters represents Sound Wave. [8]
b) Explain with diagram chains and loops of MIDI. [10]

OR

- Q6)** a) Explain VOC audio file format. [8]
b) What are different techniques of Audio Compression? Explain DM & DPCM in brief. [10]

P.T.O.

SECTION - II

- Q7)** a) Explain Huffman coding technique with example. [10]
b) Which are the different video broadcasting techniques? Compare them. [6]

OR

- Q8)** a) Enlist different video transmission standards. Explain any one in brief. [8]
b) Enlist text file formats and explain any two in brief. [8]

- Q9)** a) Describe following 2D animation techniques in brief [10]
i) Rotoscoping
ii) Onion skinning
b) Explain the architecture of Open GL [8]

OR

- Q10)** a) State and explain principles of 2D animation. [10]
b) Explain the role of animation in website development. [8]

- Q11)** a) Explain in brief Rate Control and End-to-End Error control of Multimedia communication system. [8]
b) Explain use of virtual reality in Entertainment. [8]

OR

- Q12)** Write short notes on following - [16]
a) Kiosk
b) Quality of Service in Multimedia data transmission.
c) Applications of Multimedia in e-learning & Education.



Total No. of Questions : 12]

P1889

SEAT No. :

[Total No. of Pages : 2

[5059]-209

B.E. (Computer Engg.) (Elective - II)

MOBILE COMPUTING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

SECTION - I

Q1) a) What are the different identification numbers used in GSM. Explain the structure of each. **[10]**

b) State reasons behind the design of GSM system. What are the primary objectives of FPLMTS? **[6]**

OR

Q2) a) Justify that the standardization of air interface can satisfy international roaming. **[6]**

b) Distinguish between: **[6]**

i) GSM and PLMN

ii) GSM and CDMA

c) Elucidate the applications of mobile communication. **[4]**

Q3) a) Explain frequency reuse in GSM system. What are the advantages of this approach? **[8]**

List different frequency reuse schemes and explain any one of them.

b) Explain the functions of MS, BTS and BSC. **[8]**

OR

Q4) a) What is echo canceller? Explain its use on PSTN MSC interface. **[8]**

b) Explain the structure of a TDMA slot with a frame for **[8]**

i) Dummy burst.

ii) Access burst

P.T.O.

- Q5) a)** Describe cyclic and pseudorandom algorithms for frequency hopping in detail. [8]
b) Explain the mobile initialization procedure in mobility management [10]

OR

- Q6) a)** Explain the MS location updating with the help of a diagram. [8]
b) What are the steps in the establishment of MS-MS call. Explain the call set-up with suitable signal and response diagram. [10]

SECTION - II

- Q7) a)** Explain the need and use of Temporary Mobile Subscriber Identity (TMSI) number. [8]
Also explain, how it helps to provide the security in GSM.
b) Explain the generic authentication process in the context of security management in GSM system. [8]

OR

- Q8) a)** Explain the characteristics of SIM. [8]
b) Explain, with the help of a diagram, the equipment identification process adopted in the GSM system. [8]

- Q9) a)** What are the multiplexing issues in frequency and time domains? [8]
b) Compare and contrast: TDMA, FDMA, CDMA [8]

OR

- Q10) a)** Explain the functioning of CDMA system. [8]
b) Derive the multiple access efficiency of FDMA and TDMA system. [8]

- Q11) a)** Explain the procedures provided by RR layer during “Connection release Phase” with diagram. [8]
b) Explain in detail the Mobility Management Specific procedure and Mobility Management Connection management procedure. [10]

OR

- Q12) a)** Explain the services/support provided by MTP3, SCCP and TCAP protocols. [8]
b) Explain the physical layer and data link layer of GSM Protocol stack. [10]



Total No. of Questions : 12]

SEAT No. :

P2109

[5059]-21

[Total No. of Pages : 3

B.E.(Civil Engineering)

INTEGRATED WATER RESOURCES AND PLANNING

(2008 Course)(Elective-IV)(Semester-II) (401008)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Write a short note on scope for privatization in the field of water resources. **[4]**
- b) What is National Water policy? Explain the recent norms of National Water Policy at state level. **[6]**
- c) Enlist the different water infrastructure problems and their perspective. **[8]**

OR

- Q2)** a) What are riparian rights? Explain any two. **[6]**
- b) Explain the significance of prior appropriation. **[4]**
- c) Discuss the different principals of planning and financing of water resource project. **[8]**

- Q3)** a) The runoff of stream in the month of October has mean and standard deviation of 165 and 200 cumec-months respectively. Assuming that lognormal distribution is a good fit. Find the probability that october runoff in the stream in any year exceeds 185 cumec months. What is the probability that the october runoff would fall in the range 100 to 250 cumec months? **[8]**
- b) Define mean, mode, median standard deviation and coefficient of a distribution. **[8]**

OR

P.T.O.

- Q4)** a) Write short note on [8]
i) Application of ANN in flood prediction
ii) Use of Fuzzy Logic in water resources planning & management.
b) Define correlation and regression? What is difference between correlation coefficient and regression coefficient? What is the relation between them? [8]

- Q5)** a) State general methods of rainfall-runoff modeling used in India. [8]
b) Distinguish between the mitigation plans of flood management and drought management. [8]

OR

- Q6)** a) Explain the use of geoinformatics in drought management. [8]
b) What are different types of Drought? Explain severity index of drought with suitable examples in India. [8]

SECTION-II

- Q7)** a) State the different water requirements for environmental management and explain any three of them in detail. [9]
b) What is water quality management? Discuss various issues related to water quality management. [9]

OR

- Q8)** a) What is the role of an Civil Engineer in protection of vital ecosystem.[9]
b) What is 'Inter Basin Water Transfer enumerate it with suitable example.[9]
Q9) a) Correlate direct and indirect benefits of water resource development to employment generation. [8]
b) Explain 'Co-operative movement in the water resource development' with the help of case study. [8]

OR

- Q10)a)** Write a note on control of water logging and its different types. [8]
- b) Explain how the social impact of water resource development is related to agro-industry. [8]
- Q11)a)** What is Decision Support System for Integrated Water Resource Planning and Management? Explain with suitable example. [10]
- b) Explain the concept of perspective plan for basin development and management. [6]

OR

- Q12)a)** Write short note on: Use of Fuzzy Logic in water resources planning and management. [8]
- b) State and define four statistical parameters used in statistical methods and explain their importance. [8]



Total No. of Questions : 12]

SEAT No. :

P1890

[Total No. of Pages : 2

[5059]-210

**B.E. (Computer Engineering)
EMBEDDED SYSTEMS (Elective - II)
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Answer any three question from each section*
- 2) *Answer to the 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) *Neat diagrams must be drawn wherever necessary.*
- 6) *Assume suitable data whenever necessary*
- 7) *Figure to right indicates full marks*

SECTION - I

Q1) a) Define Embedded system. What are the components of embedded system hardware? Explain with neat diagram. **[8]**

b) What are the constraints in an embedded system design? **[8]**

OR

Q2) a) What are the design metrics in an embedded system? Explain **[8]**

b) What are the challenges in embedded system design? **[8]**

Q3) a) What features of processor should be taken into consideration while selecting it for embedded system design? Give examples. **[8]**

b) Explain three performance metrics of a processor :MIPS,MFLOPS and Dhrystone per second. **[8]**

OR

Q4) a) Explain three stage pipeline architecture of ARM7. **[8]**

b) ARM9 is suitable for which application domains? Justify your answer.**[8]**

P.T.O.

- Q5) a)** Explain the handshaking signals used in serial communication and parallel communication with the help of application block diagram. [12]
b) Why do you need at least one timer in an embedded system? [6]

OR

- Q6) a)** What are the advantages of multibyte data input buffer and o/p buffers of a device port? [6]
b) Write short notes on any three. [12]
i) CAN bus
ii) Networked embedded System
iii) I2 C bus
iv) USB bus

SECTION - II

- Q7) a)** What are the criteria by which an appropriate programming language is chosen for embedded software of a given system. [8]
b) Explain the importance and application of the following data structure in the embedded system with the suitable example [8]
i) Stack
ii) Queue

OR

- Q8) a)** What are the advantages and disadvantages of using JAVA for embedded system design [8]
b) How does the USB protocol provide for a device attachment, configure test with the device [8]

- Q9) a)** What are the different scheduling algorithms? Explain basic scheduling policy of RTOS [8]
b) What are the rules to use interrupts in RTOS embedded system [8]

OR

- Q10)a)** Explain in detail memory management in any RTOS [8]
b) Explain file system organization for RTOS [8]

- Q11)a)** What is IPC? Explain IPC in RTOS systems [8]
b) Explain with block diagram interfacing of digital camera [10]

OR

- Q12)a)** What are security issues in case of embedded OS [8]
b) Explain the design for interfacing mobile device [10]



Total No. of Questions : 12]

SEAT No. :

P1891

[Total No. of Pages : 2

[5059] - 211

B.E. Computer Engineering

SOFTWARE TESTING AND QUALITY ASSURANCE

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

Time : 3 Hour]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Give the importance of software testing. Explain the V model for software testing. [8]
b) Explain the verification and validation with examples. [8]

OR

- Q2)** a) Explain the defect life cycle with defect report. [8]
b) Explain the testing principles and criteria for completion of testing. [8]

- Q3)** a) Give the design of test cases for online book ordering system. [10]
b) Compare the white box and black box testing with their challenges. [8]

OR

- Q4)** a) Explain black box testing methods. [10]
b) Explain the purpose of positive and negative testing with the design of test cases. [8]

- Q5)** a) Explain the graph based testing with example. [8]
b) Describe the loop testing and mutation testing. [8]

P.T.O.

OR

- Q6)** a) Explain boundary value testing and equivalence partitioning. [8]
b) How do the test cases are derived in basis path testing? [8]

SECTION - II

- Q7)** a) What is GQM? How it is used in testing? [8]
b) What is the need of validation testing? Explain validation testing methods. [10]

OR

- Q8)** a) Describe scenario testing and regression testing. [10]
b) Explain the testing measurement tools and metrics. [8]
- Q9)** a) Explain six sigma in software quality management. [8]
b) Describe the role of quality control in testing. [8]

OR

- Q10)** Explain the following: [16]
a) Testing phases
b) TQM
c) SQA activities

- Q11)** a) Explain the GUI testing with an automation testing tool. [8]
b) Compare manual and automation testing with examples. [8]

OR

- Q12)** a) Explain the need of automation testing. Give the automated test case design with a tool. [8]
b) How functional testing can be automated? Explain with a web application. [8]



Total No. of Questions : 12]

SEAT No. :

P1892

[Total No. of Pages : 4

[5059] - 212

**B.E. (Computer Engineering)
DISTRIBUTED OPERATING SYSTEMS
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Compare between network operating system, distributed operating system and multiprocessor operating system. **[6]**
- b) A client makes remote procedure calls to server. The client takes 5 milliseconds to compute the arguments for each request. And the server take 10 milliseconds to process each request. The local operating system processing time for each send or receive operation is 0.5 milliseconds, and the network time to transmit each request or reply is 3 milliseconds, marshaling or unmarshaling takes 0.5 milliseconds per message. You can ignore context switching time. Calculate the time taken by client to generate and return from two requests:
- i) if it is single threaded
 - ii) if it has two threads that can make requests concurrently on a single processor.
- Is there a need for asynchronous RPC, if client and server processes are threaded? **[10]**

OR

- Q2)** a) What are the different kinds of transparency in distributed system? How migration transparency handles in distributed operating system. **[6]**
- b) What is RPC in inter process communication? What are the different RPC semantics? For each of the following applications, do you think at least once semantics or at most once semantics is best? Why? **[10]**
- i) reading and writing files from file server
 - ii) compiling a program
 - iii) remote banking

P.T.O.

- Q3) a)** Explain the following with respect Lamport logical clock with suitable example. [8]
- i) happened before relation
 - ii) causally events
 - iii) concurrent events
 - iv) limitation of Lamport clock
- b) What is NTP? Discuss the factors to be taken into account when deciding to which NTP server a client should synchronize its clock. [8]

OR

- Q4) a)** What is the global state? Consider a distributed system where each node has its own clock. Assume that the entire clock in the system is perfectly synchronized. Also, assume that the communication network is reliable. Give the steps for recording the global state. [8]
- b) Why is computer clock synchronization necessary? Describe the design for a system to synchronize the clocks in distributed system. [8]
- Q5) a)** Explain the following deadlock detection algorithms. [10]
- i) a path pushing algorithms
 - ii) a edge chasing algorithms
- b) What are the different types of mutual exclusion algorithms? Why do we need mutual exclusion algorithms? How we measure their performance? [8]

OR

- Q6) a)** Why do we need the agreement protocol in distributed operating system? Explain the following agreement problems. [10]
- i) the byzantine agreement problem
 - ii) the consensus problem.
- b) Explain the Lamport's algorithm for mutual exclusion. Show that in Lamport's algorithm the critical section is accessed according to the increasing order of timestamp. [8]

SECTION - II

- Q7)** a) Why thrashing an important issue in DSM system and what methods are available for dealing with it? [6]
- b) Discuss whether message passing or DSM is preferable for fault tolerant application. [6]
- c) What is the motivation to use distributed shared memory? Explain in which respect DSM is suitable or unsuitable for client server system. [6]

OR

- Q8)** a) Compare the sender initiated and receiver initiated load distributing algorithms for sharing the load on the following issues. [12]
- i) transfer policy
 - ii) selection policy
 - iii) location policy
 - iv) information policy
 - v) stability
- b) What are the different components (policy) of the load distributing algorithm? What are their. [6]
- Q9)** a) Explain the following: [8]
- i) process failure
 - ii) system failure
 - iii) secondary storage failure
 - iv) communication medium failure
- b) What are checkpoints? How does it help in recovery mechanism? Explain the consistent set of checkpoints and checkpoint algorithm for recovery. [8]

OR

- Q10)**a) Explain the following with example: [8]
- i) orphan messages and dominos effect
 - ii) lost messages
 - iii) livelock
- b) How do we perform backward error recovery and forward error recovery mechanisms? In the operation based approach of backward recovery what is updating in place and write-ahead log scheme? [8]

Q11)a) What is the cluster? How do you compare cluster with distributed system? How do we classify the clusters? Give any suitable example of the cluster. **[10]**

b) What is service oriented architecture? How does it differ than software architecture? What are web services? How does it correlate to the service oriented architecture? **[6]**

OR

Q12)a) Explain the relation of the following system with distributed system.**[10]**

i) cluster computing

ii) grid computing

iii) cloud computing

iv) service oriented architecture

b) What is grid? Why do we need grid? What are the elements of grid? What is grid middleware and middleware elements in grid? **[6]**



Total No. of Questions : 12]

P1893

SEAT No. :

[Total No. of Pages : 3

[5059] - 213

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

ADVANCED COMPUTER ARCHITECTURE

(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 diagram must be drawn whenever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What are the fundamental issues with respect to parallel processing in order to improve performance compare to uni processor system? [8]
- b) Describe principles of Scalable performance with the help of performance matrices and speedup performance laws. [10]

OR

- Q2)** a) List the applications of Parallel Processing. Briefly explain any two of them. [8]
- b) Derive the expression for speedup and throughput of a pipeline processor. Explain how speedup can be maximized? [10]

- Q3)** a) What is job sequencing problem with pipeline architecture? Define the following terms. [8]
- i) Forbidden List
 - ii) Greedy Cycle
 - iii) Collision Vector
 - iv) Simple Cycle
 - v) Minimum Average Latency (MAL)
 - vi) Throughput
- b) What are different Control Hazards? Explain the different techniques to resolve the same. [8]

OR

P.T.O.

- Q4)** a) What is role of Branch Prediction Buffer and Branch Target Buffer in Branch handling? [8]
- b) What are the features of SPARC architecture? How does windowed register file contribute towards its high performance? [8]

- Q5)** a) Explain following pipe lined vector processing methods with respect to vector summation computation. [8]
- i) Vertical Processing
- ii) Vector Looping
- How intermediate results are handled in both the cases ?
- b) Explain various types of vector instructions with proper examples. [8]

OR

- Q6)** a) Explain basic architectural configurations of SIMD Processors. What the network design decisions are for inter P-E communications with respect to interconnection network. [8]
- b) Explain matrix multiplication on SIMD architecture. Discuss complexity of your algorithm. [8]

SECTION - II

- Q7)** a) Explain desirable architectural features of processor to be effective in a multiprocessing environment. [10]
- b) Explain operating system features for multiprocessor configuration. [8]

OR

- Q8)** a) Describe loosely coupled and tightly coupled multiprocessor system? [10]
- b) Discuss different bus arbitration techniques used in multiprocessor system. [8]
- Q9)** a) What Basic Concept of Multithreading? Explain Multithreaded Architectures and its Computational Model for Parallel Processing System. [8]
- b) Describe Latency hiding techniques supported by Multithreaded Architectures. [8]

OR

Q10)a) Explain following terms associated with message passing. [8]

- i) Synchronous and Asynchronous message passing schemes.
- ii) Blocking and Non Blocking Communication.

b) Write a short note on Message passing paradigms. [8]

Q11)a) What are features of parallel programming Languages? [8]

b) Describe the major phases of parallel compiler. [8]

OR

Q12)a) Explain the classification of parallel algorithms with suitable examples. [8]

b) How parallel Virtual Machine acts as a programming interfaces for parallel processing? [8]



Total No. of Questions : 12]

P1894

SEAT No. :

[Total No. of Pages : 2

[5059] - 214

B.E. (Computer Engineering)

PATTERN RECOGNITION (Elective - III) (Semester - II)

(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) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What are the learning and adaption methods in pattern recognition system? Explain. [8]
- b) What are the issues in design of pattern recognition system? How feature extraction is important for pattern recognition? [8]

OR

- Q2)** a) Explain Regression, Interpolation and Density estimation and Associative memory in brief. [8]
- b) Compare the merits of supervised and unsupervised learning in pattern recognition. [8]

- Q3)** a) Explain Feature space, Loss function, Risk, Bayes risk and Decision rule in brief. [10]
- b) Explain the functional structure of a general statistical pattern classifier. [8]

OR

- Q4)** a) What is the use of univariate and multivariate density? Explain in detail. [10]
- b) Explain the problem of Minimum-Error-rate classification with suitable examples. [8]

P.T.O.

- Q5) a)** What are sample covariance, and absolutely unbiased estimator? Explain in detail. [8]
b) Explain recursive Bayes incremental learning method with example. [8]

OR

- Q6) a)** Explain Bayes Error, Model error and Estimation error in detail. [8]
b) When does Maximum-Likelihood and Bayes methods differ? Explain in detail. [8]

SECTION - II

- Q7) a)** Explain any one classical approach to find effective linear transformation in detail. [8]
b) What is problem of finding the best direction? Explain how scatter matrix is useful to solve this problem. [8]

OR

- Q8) a)** Explain how Hidden Markov Model (HMM) is effective to solve the problem of multiple decision? [8]
b) What is Overfitting problem? Explain in detail with suitable example. [8]

- Q9) a)** Explain non parametric technique for directly estimating the posteriori probabilities in brief. [10]
b) What are Parzen windows? Explain how Parzen windows are used to estimate the density. [8]

OR

- Q10) a)** How the nearest neighbor rule is suboptimal procedure? Explain how its use will lead to an error rate greater than the Bayes rate? [10]
b) Explain the steps involved in SVM training, in brief. [8]

- Q11) a)** Explain k-Means and fuzzy k-Means clustering algorithm in detail. [8]
b) Justify the significance of Nominal data and String in a classification problem with suitable example. [8]

OR

- Q12) a)** Show that the computational complexity of k-Means clustering algorithm is $O(ndcT)$, where n is the number of d -dimensional patterns, c is the assumed number of clusters, and T is the number of iterations. [8]
b) Explain the difference in Pruning and joining with proper example. [8]



Total No. of Questions : 12]

SEAT No. :

P1895

[Total No. of Pages : 2

[5059] - 215

B.E. (Computer Engineering)

HIGH PERFORMANCE NETWORKS (Elective - III)

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Discuss in short about 1000 BASE-X family with suitable applications. **[8]**

b) Explain high level system architecture of Gigabit. **[10]**

OR

Q2) a) Explain in short the need of flow control in gigabit Ethernet? How it is supported? **[8]**

b) Differentiate between 10, 100, 1000 Mbps nlw based on their MAC characteristics. **[10]**

Q3) a) Explain physical configurations for ISDN User-Network Interfaces with examples. **[8]**

b) Explain in brief elementary functions for ISDN. **[8]**

OR

Q4) a) Describe the SS7 protocol architecture. **[8]**

b) Explain Frame-Mode Control Signaling with example. **[8]**

Q5) a) Explain in short the functional architecture of B-ISDN. **[8]**

b) What is Quality of Service? Explain in detail the various ATM QoS parameters specifying their category of assessment **[8]**

OR

P.T.O.

- Q6)** a) Explain in details the ATM adaptation layer. [8]
b) What are the different ATM Service Categories? Explain in details. [8]

SECTION - II

- Q7)** a) Draw and explain a typical ADSL equipment configuration. [8]
b) Draw and explain the general block diagram of DMT Transmitter [8]

OR

- Q8)** a) Explain architecture of VDSL. [8]
b) Explain in short why are some variations of xDSL asymmetric? [8]

- Q9)** a) Explain step-by-step MPLS operations that can occur on data packets in an MPLS domain. [8]
b) Explain working of RSVP. [8]

OR

- Q10)**a) Describe the following terms related to MPLS operation. [8]
i) LER
ii) LSR
iii) LDP
iv) LSP
b) Explain tunneling in MPLS. [8]

- Q11)**a) What is Wi-Fi? Explain with configuration steps. [10]
b) What is WiMax? Explain in details. [8]

OR

- Q12)**a) Comment on any 3 WiMax QoS classes along with suitable Application Support. [8]
b) Explain the following terms related to WiMax [10]
i) Fixed wireless access
ii) Nomadic wireless access



Total No. of Questions : 12]

SEAT No. :

P1896

[Total No. of Pages : 3

[5059] - 216

B.E. (Computer)

NEURAL NETWORKS (Elective - III)

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Discuss the important features of Artificial Neural Network (ANN). What do you mean by Neural learning? State different types of learning. [8]
- b) What is weight vector in ANN training? How it is described in following learning laws: (i) Hebb's Law and (ii) Delta Learning Law [8]

OR

- Q2)** a) What is the importance of Neural learning? Discuss Winner-Take-All learning rule in detail. [8]
- b) Draw a McCulloch Pitts Neuron model. Define the firing rule and explain how it performs the basic logic operations for NAND Gate. [8]

- Q3)** a) What is an Activation Function? How it helps in Neural Network training? Explain any Two activation functions and its use in details. [10]
- b) State the significance of Learning Rate, Momentum term and activation function in Back propagation training. [8]

OR

- Q4)** a) What is linearly Non-separable classification problem? Can single Perceptron solve such problem? Discuss ADALINE computing model of a neuron. [10]
- b) Draw and explain the architecture of RBFN (Radial Basis function) Network. How it act as classifier? [8]

P.T.O.

Q5) a) What do you mean by associative learning? Discuss the architecture and operation of Hopfield Network. [8]

b) What is meant by simulated annealing? What is annealing schedule? [8]

OR

Q6) a) How associative memory models classified? With diagram explain the working of Auto-associative Neural Network. [8]

b) Describe Boltzmann learning law. Explain limitation of Boltzmann learning. [8]

SECTION - II

Q7) a) What is plasticity-stability dilemma problem? Explain the ART Training algorithm used for pattern clustering. [10]

b) Discuss Hybrid Learning procedure applied to RBFN. [8]

OR

Q8) a) How pattern Clustering is different than Classification? Explain with algorithm the self-organizing network used for feature mapping. [10]

b) What is vector quantization? How it is used for pattern clustering? [8]

Q9) a) Compare and Discuss the learning of SVM and RBFN. [8]

b) Explain the steps in the solution of a general optimization problem by ANN. [8]

OR

Q10) a) Explain with architecture and algorithms the use of ANN in character recognition. [8]

b) Discuss in brief auto-association and hetero-association process used for neural processing. [8]

- Q11)a)** What do you mean by Fuzzy Logic? What is the use of membership function? Give any Two examples. [8]
- b) Explain the architecture of any suitable Neuro Fuzzy system designed for pattern recognition task. [8]

OR

- Q12)a)** What is Soft Computing? compare its different components/domains with features. [8]
- b) How Fuzzy sets are different than traditional set? How Fuzzy logic can be used with Neural Networks for supervised or unsupervised learning? [8]



Total No. of Questions : 12]

SEAT No. :

P1897

[Total No. of Pages : 3

[5059] - 217

**B.E. (Computer Engineering)
ADVANCE DATABASES (Elective - III)
(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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What are the different partitioning techniques? Explain the advantages and disadvantages of round robin partitioning techniques. [8]

b) What factors could result in skew and what can be done to reduce the skew? [8]

When a relation is partitioned on one of its attribute by

- i) Hash partitioning
- ii) Range partitioning

OR

Q2) a) What is parallelism? Explain the difference between interquery & Intraquery parallelism. [8]

b) Explain partitioned parallel hash join. [8]

Q3) a) What is transparency? Explain different types of transparency in distributed system. [8]

b) Explain distributed transaction management and its types. [8]

OR

Q4) a) Explain the types of storage mechanism and failure in distributed system. [8]

b) Explain two phase commit protocol. How three phase commit protocol overcome the disadvantages of the two phase commit protocol. [8]

P.T.O.

- Q5)** a) Why do we have the XML DTD? Explain with an example. [8]
 b) What is the role of middle tier? How it helps in client server communication? [10]

OR

- Q6)** Write short note on the following. [18]
 a) XQUERY .
 b) Cookies
 c) Thin & Thick Client
 d) 3tier architecture

SECTION - II

- Q7)** a) What are you mean by data cleaning? Explain different methods of data cleaning? [8]
 b) Explain the components of data warehouse with a neat diagram. [10]

OR

- Q8)** a) Differentiate between OLA P & OLTP. [6]
 b) Explain the following operation on the multidimensional data. [6]
 i) Roll up and drill down
 ii) slicing & dicing
 c) What are different types of schema? Explain the design a star schema.[6]

- Q9)** a) Consider the following data set. [8]

Food Item	Protein content	Fat Content
F1	1.1	60
F2	8.2	20
F3	4.2	35
F4	1.5	21
F5	7.6	15
F6	2.0	55
F7	3.9	39

Find the cluster for the object in the dataset by using K-means algorithm, if k=4.

- b) What is Decision tree? Explain ID3 algorithm to create decision tree.[8]

OR

Q10)a) Find the strong association rule by using Apriori algorithm for the given dataset which satisfy following requirements. [8]

- i) Support = 30%
- ii) Confidence = 90%

Customer	Products			
C1	S1		S3	
C2		S2		
C3				S4
C4		S2	S3	S4
C5		S2	S3	
C6		S2	S3	
C7	S1	S2	S3	S4
C8	S1		S3	
C9	S1	S2	S3	
C10	S1	S2	S3	

- b) Explain the following terms: [8]
 - i) Frequent itemset.
 - ii) Outlier analysis.

Q11)a) What do you mean by relevance ranking? Explain any methods of relevance ranking. [8]

- b) Explain the following: [8]
 - i) Ontology
 - ii) Stop words

OR

Q12)a) What is page ranking and popularity ranking? Explain in brief. [8]

- b) Explain the following terms. [8]
 - i) Web crawlers.
 - ii) Vector sapce model.



Total No. of Questions :12]

SEAT No. :

P3010

[5059]-218

[Total No. of Pages :2

B.E.(Computer Engineering)
VLSI & DIGITAL SYSTEM DESIGN
(2008 Course) (Elective-IV) (Semester-VIII) (410451)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Question No. 1 or 2, 3 or 4, and 5 or 6 from section I and Q. No. 7 or 8, 9 or 10 and 11 or 12 from section - II.*
- 2) *Answers to the two sections must be written in separate answer books.*
- 3) *Neat diagram must be drawn whenever necessary.*
- 4) *Figures to the right indicates full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain design methodology with flow chart for ASIC design. [8]
b) Explain types of technology scaling. [9]
OR
- Q2)** a) Compare speed- power performance of ECL, CMOS, BICMOS. [9]
b) Explain classification of IC technology based on design style. [8]
- Q3)** a) Explain merits and demerits of Cu interconnect. [8]
b) Explain fabrication process for CMOS device. [9]
OR
- Q4)** a) Explain Shallow Trench Isolation (STI) with process flow. [8]
b) Write short note on [9]
i) Gate formation
ii) Contact formation
iii) Source drain region formation.
- Q5)** a) Explain the different techniques of etching. [8]
b) Explain basic properties of silicon wafer. [4]
c) Explain purification steps of raw silicon wafer. [4]

OR

P.T.O.

- Q6)** a) Write a short note on [8]
i) Optical Lithography
ii) Thermal Oxidation [8]
b) Explain chemical vapor oxidation technique.

SECTION-II

- Q7)** a) Write code in VHDL for 16:1 multiplexer. [8]
b) Explain different Modelling styles in HDL. [9]

OR

- Q8)** a) Explain following terms with examples. [9]
i) Identifier
ii) Variable
iii) Array
b) Write VHDL code for lift controller. [8]

- Q9)** a) Explain the types of programmable logic devices in detail. [8]
b) Discuss logic levels and noise margins with respect to CMOS circuits. [4]
c) Explain CMOS inverter with VTC. [4]

OR

- Q10)** a) Explain static and dynamic behaviour of CMOS devices and circuits. [8]
b) Compare ASIC and FPGA in details. [8]

- Q11)** a) Describe software aspect of digital design. [8]
b) Explain the metastability in detail. [5]
c) Explain merits and demerits of CPLD. [4]

OR

- Q12)** a) Draw neat diagram and explain briefly 6-T SRAM. [8]
b) For combinational logic explain the following. [9]
i) Timing diagram
ii) propagation delay
iii) Timing specification



Total No. of Questions : 12]

P1898

SEAT No. :

[Total No. of Pages : 5

[5059] - 219

B.E. (Computer)

OPERATIONS RESEARCH

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Discuss various models of operation research. **[8]**

b) Solve following linear programming problem using simplex method. **[10]**

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

$$\text{Subject to } x_1 + x_2 \leq 4$$

$$x_1 - x_2 \leq 2$$

$$\text{and } x_1, x_2 \geq 0$$

OR

Q2) a) Solve following LPP using graphical method. **[10]**

$$\text{Max } z = 2x_1 + 2x_2$$

$$\text{Subject to } x_1 + x_2 \leq 400$$

$$2x_1 + x_2 \leq 600$$

$$\text{and } x_1, x_2 \geq 0$$

b) Write a short note on sensitivity analysis with respect to linear programming. **[8]**

P.T.O.

Q3) a) Describe: [6]

- i) Random variable.
- ii) Discrete Random variable.
- iii) Continuous Random variable.

b) A person who retired from service has received provident fund amount. He wants to invest this amount into share market. A Broker offers him the following investment alternatives and percentage return rates. [10]

Investment	Market conditions (Return Rates)		
	Low	Medium	High
Regular shares	-5%	10%	15%
Risky shares	-8%	12%	20%
Property	-10%	15%	25%

over the past 200 days, the market conditions have had medium return rates for 100 days and high return rates for 40 days.

On the basis of the given data, as a decision making policy. Answer the following:

- i) Identify the states of nature and find the probabilities of their occurrence.
- ii) Identify the courses of action.
- iii) Write the pay-off matrix and find the EMV for each course of action and state the optimum investment policy for the investment.

OR

Q4) a) Two competitive manufacturers are producing a new toy under licence from a patent holder. In order to meet demand they have the option of running the plant for 8,16 or 24 Hrs. a day. As the length of production increases so does the cost. One of the manufacturer say A, has setup the matrix given below, to estimate the percentage of the market he could capture and maintain the different production schedule. [10]

Manufacturer B

Manufacturer A	C1:8 Hrs.	C2:16 Hrs.	C3:24 Hrs.
S1: 8 Hrs.	60%	56%	34%
S2: 16 Hrs.	63%	60%	55%
S3: 24 Hrs.	83%	72%	60%

- i) At which level should each manufacturer produce?
 - ii) What percentage of the market will B have?
- b) With respect to statistical decision theory, indicate the difference between decision making under Risk and uncertainty. [6]

- Q5) a)** Discuss various queueing models with their characteristic properties. **[8]**
- b) A toll gate is operated on highway where vehicles arrive according to Poisson distribution with a mean frequency of 1.2 vehicles per minute (min). The time of completing toll tax payment is an exponential distribution with mean 20 seconds. Find P_0 , L_s , L_q , W_s , the probability that a vehicle spends more than 30 seconds in the system and the average waiting time in the queue for those who wait. **[8]**

OR

- Q6) a)** With the help of suitable diagram, explain structure of a queueing system. **[8]**
- b) At what average rate must a clerk at supermarket work in order to ensure a probability of 0.90 so that the customer will not have to wait longer than 12 minutes. Assume that there is only one counter at which customer arrives in a poisson fashion at an average rate of 15 per hour. The length of service by the clerk has an exponential distribution. **[8]**

SECTION - II

- Q7) a)** What is no passing rule in a sequencing algorithm? Explain the principal assumptions made while dealing with sequencing problems. **[8]**
- b) Find an optimal sequence for following sequencing problem of four jobs and five machines. Assuming that passing is not allowed. Processing time (in hrs.) is given below. **[10]**

Machine

Job	M_1	M_2	M_3	M_4	M_5
A	7	5	2	3	9
B	6	6	4	5	10
C	5	4	5	6	8
D	8	3	3	2	6

Also find total elapsed time.

OR

- Q8) a)** For following project draw Network diagram and find project completion time. Find total float for each activity. **[10]**

Activity	Preceding Activities	Activity Duration (Days)
A	–	4
B	–	7
C	–	6
D	A, B	5
E	A, B	7
F	C, D, E	6
G	C, D, E	5

- b) What is a network diagram? Define following terms. **[8]**
- i) Activity
 - ii) Event
 - iii) Critical Activity
 - iv) Critical path
 - v) Crash duration
 - vi) Crash cost

- Q9) a)** Write a note on Fibonacci search plan method of non linear programming. **[8]**
- b) Explain steps of Kuhn - Tucker necessary conditions for maximization of non linear programming function. **[8]**

OR

- Q10) a)** Define separable functions. Give one example of separable and non separable functions. Explain separable programming problem. **[8]**
- b) Explain how to obtain normality and orthogonality conditions. **[8]**

- Q11) a)** State and explain characteristics of dynamic programming problems. **[8]**
- b) Explain the stages of solving linear programming problems using dynamic programming. **[8]**

OR

Q12)a) Discuss in which areas of an organization can dynamic programming be applied successfully? **[8]**

b) A Truck can carry a total of 10 tons of a product. Three types of product are to be loaded. Their weights and values are given below. Determine how many units of T_1 , T_2 & T_3 are to be loaded in order to maximize the total value. **[8]**

(At least one unit of each type must be selected).

Product	Weight (tons)	Value
T_1	2	65
T_2	3	80
T_3	1	30



Total No. of Questions :12]

P2988

SEAT No. :

[Total No. of Pages :3

[5059]-22

B.E. (Civil)

**ADVANCED TRANSPORTATION ENGINEERING
(2008 Pattern) (Semester-II) (Elective-IV) (401008 B)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, and Q.5 or Q.6 from section-I Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 from section-II*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Molliés charts, electronics pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*
- 6) *Neat diagrams must be drawn whenever necessary.*

SECTION-I

Q1) a) Discuss in brief the stages in transport planning process. **[12]**

b) Explain in brief the factors affecting Trip Generation and attraction rates. **[6]**

OR

Q2) a) What is Trip distribution? State methods of Trip distribution. Explain any one method in brief. **[12]**

b) Enlist the various Traffic surveys carried out for transport planning process. Explain any one method of survey in brief. **[6]**

Q3) a) Discuss in brief the importance of grade separated interchanges in traffic control. **[6]**

b) Explain in brief the merits and demerits of intelligent transportation systems. **[10]**

OR

P.T.O.

- Q4)** a) Write a short note on Mass Rapid Transit systems. [6]
b) Explain in brief the following: [10]
i) Flyovers
ii) underpass
iii) Overpass
iv) Meeting at grade.
v) Roundabout

- Q5)** a) What do you mean by economic evaluation of transportation plan? Also state the objectives of carrying out economic evaluation. [10]
b) Write a short note on benefit cost method. [6]

OR

- Q6)** a) Discuss in brief the comparison of various methods of economic evaluation. [10]
b) What measures you will take to reduce delay at TOLL collection points. [6]

SECTION -II

- Q7)** a) Explain in brief the fundamental diagram of traffic flow. [6]
b) Explain in brief the following terms: [12]
i) Parking Accumulation
ii) Parking Volume
iii) Parking Load
iv) Parking Index.

- Q8)** a) Explain in brief the concept of level of service. [6]
b) Explain in brief the following relations:
Speed V_s Density, Flow V_s Density and speed V_s Flow. [12]

- Q9)** a) A Two lane two way road is at present carrying a traffic of 1000 Commercial Vehicles Per Day (CVPD) it is to be strengthened for growing traffic needs. The VDF has been found to be 3.0. The rate of growth of traffic is 10% per annum. The period of construction is 5.0 years. The pavement is to be designed for 15 years after construction .Calculate the cumulative standard axles to be used in design. [10]

b) State comparison between highway pavement and airfield pavement. [6]

OR

Q10)a) Discuss the various types of failures in flexible pavement. [10]

b) Define Unevenness Index. Explain in brief the working of Bump Integrator. [6]

Q11)a) Why joints are necessary in Rigid pavements? Discuss in brief various types of joints in Rigid pavements. [10]

b) Write a short note on warping stresses and frictional stresses. [6]

OR

Q12)a) Explain in brief the various factors affecting design of rigid pavements. [10]

b) Discuss in brief assumptions made by Mr H M Westergaards while doing analysis of Cement concrete pavements. [6]



Total No. of Questions : 12]

P1899

SEAT No. :

[Total No. of Pages : 3

[5059] - 220

**B.E. (Computer Engineerig)
CLOUD COMPUTING (Elective - IV)
(2008 Pattern)**

Time : 3 Hour]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer THREE questions from each section.*
- 2) *Answers to the TWO sections should be written in SEPRATE answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagram wherever necessary.*
- 5) *Make suitable assumptions wherever necessary.*

SECTION - I

- Q1)** a) Define cloud. Describe in detail components of cloud. How cloud computing services uses various component ? [8]
- b) What are different organizational scenarios of cloud? What are the essential characteristics of cloud? [8]
- c) Define Elastic computing [2]

OR

- Q2)** a) Describe Cloud computing platforms each with examples. [8]
- b) Explain the services provided by the Google App Engine and Google Datastore in terms of Platform as a service. [8]
- c) Define Elastic Computing. [2]

- Q3)** a) What is necessity of web services? Describe in detail REST web services. [8]
- b) Describe AJAX paradigm. How AJAX application works? Explain the significant processing steps of AJAX for Rich Internet application. [8]

OR

P.T.O.

- Q4)** a) Explain how virtual machine technology enables decoupling physical hardware from virtual machine. What are the determination of virtual machine migrations. [8]
- b) Discuss following levels of virtualization technology :- [8]
- i) Integrated provisioning
 - ii) Virtual images
 - iii) Elastic provisioning
 - iv) Elastic operations
- Q5)** a) Explain in detail the parallel efficiency of Map Reduce in Cloud File Also describe relational operations using MapReduce. [8]
- b) Explain how big tables are stored on distributed file systems such as GFS and HDFS. [8]

OR

- Q6)** a) Explain with suitable example how a batch processing could be executed in parallel using Mapreduce. [8]
- b) How amazon dynamo works for data storage across distributed file systems? [8]

SECTION - II

- Q7)** a) What is IAM (Identity and Access Management)? How an IAM practices to improve operational efficiency and to comply with regulatory, privacy, and data protection requirements. [9]
- b) Write in brief infrastructure security management. [9]

OR

- Q8)** a) Explain in detail virtualization software security in cloud environment. [9]
- b) How Security controls applicable to PaaS applications. [9]

- Q9)** a) Describe intercloud environment. Compare different issues in inter-cloud environments. [8]
- b) Describe in detail streaming in Cloud for QoS monitoring deployed in cloud computing? [8]

OR

- Q10)**a) How resource optimization. resource dynamic reconfiguration works in cloud network? [8]
- b) Explain in detail how Dependability, data migration in cloud computing environment. [8]

- Q11)**a) Explain in detail Ecucalyptus with its components. [8]
- b) What is Open Nebula cloud? Explain main components of Open Nebula. [8]

OR

- Q12)**a) Explain in details XEN cloud. [8]
- b) Write a short note on [8]
- i) TPlatform
- ii) Enomaly Elastic Computing Platform.



Total No. of Questions :12]

SEAT No. :

P3011

[5059]-220-A

[Total No. of Pages :2

B.E.(Computer)

INFORMATION SECURITY

(2008 Course) (Semester-II) (Elective-IV) (410451)

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) What are the heads of information security? Discuss in detail. [10]
b) Discuss the problems of classical ciphering techniques in details. [8]

OR

- Q2)** a) Draw & explain diagram of lifecycle of information security. [10]
b) Explain triple DES algorithm with advantages over DES algorithm. [8]

- Q3)** a) What is cryptography? Discuss different types of cryptography in short.[8]
b) Explain any one mechanism of information security in detail. [8]

OR

- Q4)** a) Explain AES algorithm in detail. [8]
b) What is ciphering ? Explain any one ciphering technique with suitable example. [8]

- Q5)** a) Discuss Man-in -middle attack with example. [8]
b) Explain algorithm for key management. [8]

OR

- Q6)** a) What is kerberos? Discuss it in detail. [8]
b) Differentiate public & private key cryptography. [8]

P.T.O.

- Q7)** a) Encrypt any one message using ECC algorithm. [10]
b) What is MDS ? Explain MDS in detail with suitable example. [8]

OR

- Q8)** a) Explain P K I in detail. [10]
b) What is hash function? Differentiate hash & MAC with suitable example. [8]

- Q9)** a) Discuss design principle of firewall. [8]
b) What is IDS ? Discuss its applications in network. [8]

OR

- Q10)** a) Discuss working principle of intrusion detection prevention system. [8]
b) Differentiate TLS and SSL. [8]

- Q11)** a) What is SET? Discuss it with suitable example. [8]
b) Discuss working principles of PGP. [8]

OR

- Q12)** Write a short note on following: [16]
a) Any one email format.
b) SET
c) Applications of smart cards.
d) Security services.



Total No. of Questions : 12]

SEAT No. :

P1900

[Total No. of Pages : 3

[5059] - 221

B.E. (Information Technology)

INFORMATION ASSURANCE AND SECURITY

(2008 Pattern)

Time : 3 Hour]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the following terms with example. **[8]**
- i) Confusion & Diffusion
 - ii) Secret Splitting & Secret Sharing
- b) List and briefly define types of cryptanalytic attacks based on what is Known to attacker. **[8]**

OR

- Q2)** a) Explain the following threats: **[8]**
- i) Modification or alteration
 - ii) Masquerading
 - iii) Repudiation of origin
 - iv) Denial of service (DOS)
- b) Show that three security services confidentiality, integrity and availability are sufficient to deal with the threats of disclosure, disruption, deception and usurpation. **[8]**
- Q3)** a) In a public key cryptosystem using RSA, given $N=209$ and the encryption key (E) as 23, find out the corresponding private key(D). **[6]**
- b) Explain Data Encryption Standard (DES) symmetric cryptographic algorithm along with different modes of operations. **[10]**

P.T.O.

OR

- Q4)** a) What are the key requirements of message digest & why SHA is more secure than MD5. [8]
b) Draw AES block diagram and explain the steps in detail. [8]

- Q5)** a) What is man in the middle attack? Explain with example the Diffie-Hellman Key exchange algorithm. [9]
b) What is digital signature .Explain the steps to create a digital signature using Digital Signature Algorithm (DSA). [9]

OR

- Q6)** a) Explain X.509 standard for digital certificate. [9]
b) Explain the key distribution scenario using private key algorithm. [9]

SECTION - II

- Q7)** a) List the benefits of IPSec .Distinguish between tunnel and transport mode in IPSec. Describe briefly how IPSec works. [8]
b) What problem was Kerberos designed to address. Describe Kerberos Realm. [8]

OR

- Q8)** a) Discuss SSL with respect to 4 phases. [8]
i) Establish security capabilities.
ii) Server authentication and key exchange.
iii) Client authentication and key exchange.
iv) Finish.
b) State various categories of Intrusion Detection System. [8]

- Q9)** a) Which are the key participants in SET? How does SET protect payment information from the merchant.? Explain the SET model. [8]
b) Explain ISO 27001 security standard and state its purpose. [8]

OR

Q10)a) What is dual signature? Why dual signatures are needed? Explain mathematically and by schematic diagram how it is generated. [8]

b) Explain electronic payment system List the characteristics of e-payments. Explain list of requirements to evaluate e-payments system. [8]

Q11)a) Describe the term “Industrial Espionage” in detail with example. [9]

b) Write short note on Indian IT Law 2000, 2008 amendments. [9]

OR

Q12) Write short notes on: [18]

a) Identity Theft

b) Computer Forensics

c) Online Investigative Tools



Total No. of Questions : 12]

SEAT No. :

P1901

[Total No. of Pages : 3

[5059] - 222

B.E. (Information Technology)

OBJECT ORIENTED MODELING AND DESIGN

(2008 Pattern) (Semester - I)

Time : 3 Hour]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Define State Diagram and State Model. Develop a State Machine Diagram for an elevator system of a building. State clearly the assumptions you make about the system. [8]
- b) What is an association end? What are the properties of association end? [6]
- c) Discuss by giving appropriate example when will you model an entity such as 'bank account' as. [4]
- i) Attribute
 - ii) Class

OR

- Q2)** a) Explain 4+1 view architecture with corresponding UML diagram. [8]
- b) Discuss the difference between Inception and Elaboration phases of Rational Unified Model. [6]
- c) Compare Interface and Port giving examples. [4]
- Q3)** a) OMG standard CORBA is a standard for middleware to develop distributed networked. applications. Explain the following concepts in context of distributed application and CORBA. 1) Distributed objects/components 2) Stubs and Skeletons 3) Interfaces. [8]
- b) How do you show an OBJECT in a class diagram, explain with an appropriate example and with correct notation the conversion of class diagram into object diagram? [8]

P.T.O.

OR

- Q4)** a) Write a short note on UML versions. [8]
b) Explain the need of XML, MOF and XMI. [8]
- Q5)** a) What is use case diagram? Identify the various use cases and draw the use case diagram for “ Online Examination System”. [8]
b) The System is for a marketing company. We have the country divided into marketing regions. Salespersons work for regions. Salespersons make sale that are described in terms of the day of sale, the products sold with quantity and rate. The products are categorized into two categories: Indian products and imported products. Draw the class diagram using aggregation, inheritance, association, dependency and realization relationships to model above system. [8]

OR

- Q6)** a) Write a note on composite structure Diagram. [4]
b) Draw a package diagram for “Online Hotel Booking System” showing packages, package relationships. [4]
c) Draw a class diagram for “Online Railway Reservation System” using advanced notations. Assume suitable data. [8]

SECTION - II

- Q7)** a) An auto rental company wants to develop an automated system that would handle car reservations, customer billing, and car auctions. Usually a customer reserves a car, picks it up, and then returns it after a certain period of time. At the time of pick up, the customer has the option to buy or waive collision insurance on the car. When the car is returned, the customer receives a bill and pays the specified amount. In addition to renting out cars, every six months or so, the auto rental company auctions the cars that have accumulated over 20,000 miles. Draw a use- case diagram for capturing the requirements of the system to be developed. Include an abstract use case for capturing the common behavior among any two use cases. Extend the diagram to capture corporate billing, where corporate customers are not billed directly; rather the corporations they work for are billed and payments are making sometime later. [8]
b) Write a short note on deployment diagrams, need, example, and notation. [6]
c) Compare Forward Engineering and Reverse Engineering. [4]

OR

- Q8)** a) Draw a sequence diagram for ‘Schedule a faculty meeting’. Here are some of the assumptions. The HOD interacts through a (GUI) form to schedule the meeting. A special control object called scheduler does the automated meeting scheduling. The scheduler bases its decision on free slots in the (entity object) timetable. The entire faculty involved will get an invitation through SMS on their mobiles. The system depends on an external mobile gateway subsystem to handle forwarding SMS’s. [8]
- b) What is Sequence Diagram? What are the elements used in Sequence Diagram explain with example. [6]
- c) Explain the concept of ‘asynchronous message’ with a suitable example in the context of Sequence Diagram. [4]
- Q9)** a) Draw the Activity diagram for withdrawing money from ATM. [8]
- b) Explain association and aggregation with an example. [8]

OR

- Q10)**a) Describe Branching and Forking in Activity diagram with suitable example. [8]
- b) What is the purpose of an Interaction Diagram? Explain with suitable example the different types of interaction diagrams in UML 2.0.. [8]
- Q11)**a) Draw the sequence diagram for issuing CD/DVD from video library. [8]
- b) What is pattern? How it is categorized? Describe one category with an example. [8]

OR

- Q12)**a) Write a note on Communication Diagram. [4]
- b) With suitable example, explain different use case relationships. [4]
- c) Write note on applications of UML in embedded system. [8]



Total No. of Questions : 12]

SEAT No. :

P1902

[Total No. of Pages : 2

[5059] - 223

B.E. (IT)

**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) Explain integration testing with Top down & Bottom Up approach. [8]

b) What is Alpha, Beta & Acceptance testing? [8]

OR

Q2) a) Explain levels of Software Testing in detail. [8]

b) How will you perform performance testing for a website? [8]

Q3) a) Explain Test plan template for any application. [8]

b) Draw and explain software defect life cycle. [8]

OR

Q4) a) Write test cases for Login window application. [8]

b) What are White box testing approaches?. [8]

Q5) a) What are software metrics? Explain scope of software metrics. [8]

b) Explain Function point analysis with example. [10]

OR

P.T.O.

- Q6)** a) Explain with example EQM method for identifying software measures?[10]
b) What are metrics for software maintenance & In Process Quality Metrics. [8]

SECTION - II

- Q7)** a) Explain the following terms w.r.t software quality: [10]
i) Quality
ii) Cost of Quality
iii) Quality Assurance
iv) Quality control
b) Illustrate with example the use of following techniques in improving quality. [8]
i) Code inspection
ii) Project planning

OR

- Q8)** a) List Ishikawa's Seven Basic Quality Tools. Explain any three with diagram and example. [10]
b) Explain correctness, reliability, usability, integrity with example. [8]

- Q9)** a) Explanation for the PDCA cycle with reference to ISO 9000:9001 with Diagram. [8]
b) Explain in detail maturity levels of CMM. [8]

OR

- Q10)**a) Explain basic concepts of ISO 900 and ISO 9001. [8]
b) What is six sigma? Explain the terms DMAIC and DMADV. [8]

- Q11)**a) Explain Requirements Management (RM), software project tracking and oversight (SPTO) [8]
b) Explain the goals and activities performed in the following KPA's [8]
i) Software configuration management.
ii) Organization process definition.

OR

- Q12)**a) What do you mean by software product engineering (SPE) explain with example. [8]
b) Explain KPA's Quantitative process management (QPM), Defect prevention (DP). [8]



Total No. of Questions : 12]

SEAT No. :

P1903

[Total No. of Pages : 3

[5059] - 224

B.E. (Information Technology)

ADVANCED DATABASE MANAGEMENT SYSTEM

(2008 Pattern)

Time : 3 Hour]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain PL/SQL Transactions. What is save point & cursor? [8]
- b) What is need of PL/SQL? Draw PL/SQL BLOCK structure and execution environment. Explain each block [8]

OR

- Q2)** a) Explain difference between procedure & function in PL/SQL. Write any procedure to explain the concept. [8]
- b) What is Cursor in PL/SQL? Explain its types with their attributes. Also explain how to open cursor, fetch cursor, close cursor using suitable example. [8]

- Q3)** a) What are TP Monitors? Explain the TP Monitor architectures. [8]
- b) Write short note on Main Memory Databases? [8]

OR

- Q4)** a) Explain Transactional workflow with suitable example. [8]
- b) Write down different methods for concurrency control? [8]

P.T.O.

Q5) a) Where you need to use complex data types? Also explain structured data types and inheritance in object based databases. [8]

b) A car rental company maintains a vehicles database in its current Fleet. For all vehicles, it includes the vehicle identification number, license number, manufacturer model, date of purchase and color. Special data are included for certain types of vehicle. [10]

Trucks: cargo capacity

Sports cars: horsepower, renter age requirement.

Vans: Number of passengers

Off-road vehicles: ground clearance, drivetrain (four-or two-wheel drive)
Construct an SQL: 1999 schema definition for this database.
Use inheritance where appropriate

OR

Q6) a) Describe XML query algebra operation. Describe use of X-Query for path Expression and FLWOR expression in DBMS. [8]

b) Explain XML DTD representation for nested relational schema.[10]

SECTION - II

Q7) a) Explain Kimball database design methodology for data warehouse. [9]

b) Present a diagrammatic representation of typical architecture and main components of data werehouse.. [9]

OR

Q8) a) Explain Data Marts-Reasons and issues. [9]

b) Explain all schemas used in Data warehouse. [9]

Q9) a) Write a note on classification-Decision Trees. [8]

b) What is k-means algorithms used for? Explain with help of example. [8]

OR

Q10) Write short notes on [any two] **[16]**

- a) Bayesian Classifiers.
- b) Difference between OLTP and OLAP
- c) OLAP benchmarks and applications.

Q11)a) Explain Implicit Locking. How does Oracle implement it? **[8]**

b) Explain statistical database auditing. **[8]**

OR

Q12)a) Explain what the need of granting and revoking privileges. **[8]**

b) Explain Oracle's named Exception Handlers. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1904

[Total No. of Pages : 3

[5059] - 225

**B.E. (Information Technology)
ARTIFICIAL INTELLIGENCE
(2008 Pattern) (Elective-I)**

Time : 3 Hour]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the TWO sections should be written in separate sheet.*
- 2) *Use of logarithmic tables. slide rules and electronic pocket calculator is allowed.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figures to the right indicates full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) 'What is Artificial Intelligence? Briefly explain how AI Technique can be represented. [8]
- b) What is a software agent? State the difference between utility function and performance measure? [8]

OR

- Q2)** a) What is a PEAS description? Write a PEAS description for an automated taxi? [8]
- b) What is intelligent agent? Write the environment characteristics of any four agent type. [8]

- Q3)** a) What is heuristics? What are the factors that affect the quality of a heuristic? [8]
- b) Explain constraint satisfaction problem with an example. [8]

OR

- Q4)** a) Define the following problems. What types of control strategy is used in the following problem. [8]
- i) The Tower of Hanoi
 - ii) Cryptarithmic problems
 - iii) The Missionaries and cannibals problems
 - iv) 8-Puzzle problem
- b) What is production system? Explain it with an example. Discuss the Characteristics of a production system. [8]

P.T.O.

- Q5)** a) What are the components of a first order logic? [6]
b) Discuss various approaches and issues in knowledge representation. [6]
c) Write unification algorithm and explain resolution in predicate logic. [6]

OR

- Q6)** a) What do you understand by unification in Predicate logic? Give an example to illustrate. [6]
b) Explain briefly the difference between procedural and declaration knowledge. [6]
c) Draw a conceptual dependency graph for the sentence "A dog is greedily eating a bone". [6]

SECTION - II

- Q7)** a) Explain how Computer Vision is used for manipulation and navigation. Explain with suitable examples. [9]
b) Define Planning. Explain the main components of a planning system. [9]

OR

- Q8)** a) What is block world problem? Explain with example and diagrammatic representation. [9]
b) Write short notes on (ANY THREE) [9]
i) Image formation process
ii) Object Recognition
iii) Perception
iv) Extracting 3D information

- Q9)** a) Explain the basic architecture of an expert system. Also give its applicability in different areas with suitable examples. [8]
b) What is a Hopfield Network? How is it used in learning a network? [8]

OR

- Q10)a)** Explain the following terms with reference to neuron. [8]
- i) Fault Tolerance.
 - ii) Adaptability.
 - iii) Requirement of hidden layer.
 - iv) IV. Activation potential.
- b) Describe in detail the steps involved in the knowledge Engineering process. [8]

- Q11)a)** Explain the procedure for converting English to Prolog facts and Rules. [8]
- b) What is the usage of cut in prolog? Explain with suitable prolog code. [8]

OR

- Q12)a)** Explain the data types in prolog programming language? Also write the areas in which prolog programming language is used? [8]
- b) Write brief notes on following (ANY TWO) [8]
- i) Genetic Algorithms
 - ii) Parallel Artificial Intelligence
 - iii) Backtracking In Prolog
 - iv) List



Total No. of Questions : 12]

SEAT No. :

P1905

[Total No. of Pages : 3

[5059] - 226

B.E. (Information Technology)

COMPILER DESIGN

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) With the help of the block diagram explain phases of the compiler. Also write down output of each phase of the compiler for expression $A=B + C * 10$ [10]

b) Discuss the merits and demerits of a compiler and an interpreter. [6]

OR

Q2) a) Write a LEX program to [8]

i) display occurrences of word 'computer' in text.

ii) read a text and display total number of vowels and total word in it.

b) Write short note on LEX. [8]

Q3) a) For following grammar.

$S' \rightarrow S\#$

$S \rightarrow qABC$

$A \rightarrow a|bbD$

$B \rightarrow a|\epsilon$

$C \rightarrow b|\epsilon$

$D \rightarrow c|\epsilon$

i) Computer first and follow sets. [6]

ii) Construct LL (1) parser [4]

iii) Show the parsing of string qbbcb [2]

b) Differentiate between top down and bottom up parser. [6]

P.T.O.

OR

Q4) Consider the following grammar, and construct the LR (1) parsing table. [18]

$S \rightarrow L = R$

$S \rightarrow R$

$R \rightarrow L$

$L \rightarrow * R$

$L \rightarrow id$

$L \rightarrow \epsilon$

Q5) a) Write syntax directed translation to translate the following 'for' statement into three address code statements. $S \rightarrow \text{for} (E1, E2, E3) S_1$ [8]

b) Write three address sequences for the following. [4]

i) switch (ch)

{

case 1 : a = b * c ;

Break;

case 2 : a = b - c;

Break ;

}

ii) while x > y do [4]

if c < d then

a = b + c

else

a = b / c

OR

Q6) a) Explain Bottom up evaluation of inherited attributes. [8]

b) Translate following assignment statement into intermediate code

$Z[i][j] := (X[i][j] * Y[i][j]) / 10$ [8]

SECTION - II

- Q7)** a) Write short note on activation records. [8]
b) Explain the significance and design of symbol table in the context of compiler. [8]

OR

- Q8)** a) Explain Dynamic Storage Allocation Techniques. [8]
b) Explain following storage allocation schemes with proper examples [8]
i) Stack storage allocation
ii) Heap storage allocation

- Q9)** a) Discuss the various principle sources of code optimization. [10]
b) Describe any code generation algorithm you know with suitable illustration. [8]

OR

- Q10)** a) Discuss different issues in code generation phase. [10]
b) Write Quadruple and Triple representation of following expression [8]

$$x := y * - z + y * - z + y / z$$

- Q11)** a) Explain different features of object oriented programming with example. [8]
b) Write short note on data abstraction and information hiding [8]

OR

- Q12)** a) Explain differences between class based language and object based language with example. [8]
b) How the compiler handles the following types of constructions in object oriented programming? Explain with examples. [8]
i) Parameterized constructors
ii) Default constructors
iii) Copy constructors
iv) Conversion constructors



Total No. of Questions : 12]

SEAT No. :

P1906

[Total No. of Pages : 2

[5059] - 227

B.E. (Information Technology)

**ADVANCED OPERATING SYSTEM (Elective - I) (Semester - I)
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain following Operating System Kernels in Detail with necessary eg. Monolithic Kernel. Exokernel Microkernel. **[10]**

b) Explain the services provided by the operating system for Memory management. **[8]**

OR

Q2) a) Explain multilevel queue and multilevel queue with feedback scheduling. **[10]**

b) Differentiate between process and thread. Draw and explain PCB and TCB. **[8]**

Q3) a) Give Functional specification for SEND and RECEIVE primitives. **[8]**

b) Write structure of PCB in KMOS. Describe its various fields. **[8]**

OR

Q4) a) How various system lists are maintained in KMOS? Explain with suitable diagram. **[8]**

b) Explain the functional specifications of KMOSSTART and KMOSCLOCK. **[8]**

Q5) a) Explain different multiprocessor interconnection types along with diagrams. **[8]**

b) Explain parallel programming with suitable algorithm. **[8]**

P.T.O.

OR

- Q6)** a) Explain the classification of shared memory multiprocessors on the basis of memory architecture and access delays. [8]
b) Explain the wave scheduling with respect to multiprocessor O.S. [8]

SECTION - II

- Q7)** a) Differentiate between internal and external fragmentation, What are the different ways to deal with external fragmentation? [10]
b) Explain high memory mapping with its type. [8]

OR

- Q8)** a) Explain kcalloc () and vmalloc () system calls with example. [10]
b) Write a note on statically allocating on stack. [8]

- Q9)** a) Explain with suitable diagram kernel I/O subsystem. [8]
b) Explain generalized device drivers. [8]

OR

- Q10)** a) Explain the concept of disk caching with necessary example. [8]
b) Explain kernel data structures for I/O management. [8]

- Q11)** a) Explain following system calls with eg. [8]
i) unmount
ii) write
iii) lseek
iv) link
b) Explain in detail Virtual File System. [8]

OR

- Q12)** a) Explain the process of mapping and unmapping of file blocks. [8]
b) Write a note on I/O scheduler. [8]



Total No. of Questions : 12]

SEAT No. :

P3012

[5059]-228

[Total No. of Pages : 3

B.E.(I.T)

EMBEDDED SYSTEMS

(2008 Course)(Elective-II)(Semester-I) (414444A)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) What is SOC? What are the advantages of using ASIC in embedded systems? [8]
- b) How a design selects appropriate microcontroller or microprocessor for a specific application? [8]

OR

- Q2)** a) Define embedded system? Give examples [6]
- b) With the help of neat diagram, explain different components required in an embedded system. [6]
- c) Name different chips of RISC architecture. Also mention characteristics of RISC. [4]
- Q3)** a) How energy is managed for handheld embedded systems? [6]
- b) How times are useful in embedded systems? [6]
- c) Explain different types of memories used in embedded system board. [6]

OR

- Q4)** a) Select appropriate EPROM, RAM and peripherals for a vending machine application. Explain the solution. [8]
- b) How clock affects the performance of embedded system? [4]
- c) Draw and explain memory organization for a small scale embedded system such as temperature controller. [6]

P.T.O.

- Q5) a)** Explain RS 232- c protocol. where it is useful? [8]
b) Explain I²C protocol in brief which applications use I²C? [8]

OR

- Q6) a)** Explain salient features of CAN protocol. How bus arbitration is achieved? [8]
b) What is the topology used in USB protocol? How device is recognized? [8]

SECTION-II

- Q7) a)** Which applications prefer 'C' language for C++ for embedded software development? Mention is application which make use of 'c' over c++ [8]
b) What is JTAG? Explain. [6]
c) Use of assembly language programming in embedded systems slows the development cycle. If this is ture, give reasons. [4]

OR

- Q8) a)** Is use of Java preferred over C++? where these languages are suitable in embedded environment? [6]
b) Compare compiler and cross compiler. [6]
c) Explain software development cycle for embedded systems. [6]
Q9) a) Explain salient features of RTOS. Explain types of RTOS. Also give two examples each for each type. [8]
b) Explain cyclic scheduling model for RTOS. Also give interrupt latency time for this scheduling model. [8]

OR

- Q10)a)** What is Preemptive scheduling in RTOS? Explain. [8]
b) What is IPC? Give two methods of IPC. [8]
Q11)a) Explain scheduling technique used in micro c/os-II. Also mention its area of application. [6]
b) With the help of neat system block diagram explain the system requirements and tasks for chocolate vending machine. [10]

OR

- Q12)a)** What is hard RTOS? Which one out of Micro C/os-II and Vx works is hard RTOS? What makes an RTOS a hard RTOS? **[8]**
- b) With the help of neat diagram, explain synchronization and IPCs for smart card application. **[8]**



Total No. of Questions : 12]

P1907

SEAT No. :

[Total No. of Pages : 2

[5059] - 229

B.E. (Information Technology)

MOBILE COMPUTING

(2008 Pattern) (Elective - II) (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) Which are the three components of SS7 network? Explain the registration process in roaming management through SS7 network? [10]

b) Explain in detail the concept of frequency reuse. [8]

OR

Q2) a) Describe the three Handoff strategies. [10]

b) Explain in detail the concept of frequency reuse. [8]

Q3) a) Draw and explain with diagram a GSM architecture. [8]

b) Explain HLR and VLR. [8]

OR

Q4) a) Explain various databases used in GSM architecture. [8]

b) Draw GSM MAP service framework and explain it. [8]

Q5) a) Draw and explain SMS architecture. [8]

b) Discuss any one solution for reducing the International Call Delivery Cost. [8]

P.T.O.

OR

- Q6)** a) Write a short note on number portability. [8]
b) Draw and explain SMS protocol stack. [8]

SECTION - II

- Q7)** a) Explain in detail FDMA. [8]
b) Describe distillation. Which layer of WAP implement this mechanism. [8]

OR

- Q8)** a) Describe WAP Protocol stack. [8]
b) Describe in detail GPRS. [8]

- Q9)** a) Explain important processes used in mobile IP. [8]
b) What is the basic purpose of DHCP? How can DHCP be used for mobility and support of mobile IP? [8]

OR

- Q10)** a) Describe how the data transfers from mobile node to a defined node and vice versa. [8]
b) Write a short note on IPv6. [8]

- Q11)** a) Define Bluetooth. Explain Bluetooth with reference to specifications, picocell, scatternet and protocol stack. [10]
b) Explain with diagram spread spectrum technology. [8]

OR

- Q12)** Write short notes on: (6 Marks Each) [18]
a) RFID.
b) Wi-Max.
c) MANET.



Total No. of Questions :12]

SEAT No. :

P2989

[Total No. of Pages :5

[5059] - 23

B.E. (Civil)

**STATISTICAL ANALYSIS AND COMPUTATIONAL
METHODS IN CIVIL ENGINEERING (Elective - IV)
(2008 Course) (Semester - II)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Calculate mean, median, mode and standard deviation for the following data. **[10]**

Class	30-39	40-49	50-59	60-69	70-79	80-89	90-100
No. of observations	1	3	11	21	43	32	9

b) What do you mean by skewness and kurtosis. **[6]**

OR

Q2) a) Determine mean, median, mode, and standard deviation for the following data. **[10]**

Class	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99
No. of observations	1	2	11	10	12	21	6	9	4	4

P.T.O.

- b) Define the following: [6]
- i) Variance
 - ii) Coefficient of skewness
 - iii) Standard deviation.

- Q3)** a) Find the value of z such that [10]
- i) Area to the right of z is 0.2266
 - ii) Area to the left of z is 0.0314
 - iii) Area between -0.23 and z is 0.5722
 - iv) Area between 1.15 and z is 0.0730
 - v) Area between $-z$ and z is 0.900

Use the standard Normal Distribution Table given below.

Z	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Area	0.0398	0.0793	0.1179	0.1554	0.1915	0.2257	0.2580	0.2881	0.3159	0.3413

Z	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
Area	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452	0.4554	0.4641	0.4713	0.4772

Z	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
Area	0.4821	0.4861	0.4893	0.4918	0.4938	0.4953	0.4965	0.4974	0.4981	0.4987

- b) If 3% of the electric bulbs manufactured by a company are defective, find the probability that in a sample of 100 bulbs, [6]
- i) Zero
 - ii) One
 - iii) Two bulbs will be defective.

OR

- Q4) a)** Find the area under the normal curve **[10]**
- i) to the left of $z = -1.78$
 - ii) to the left of $z = 0.56$,
 - iii) to the right of $z = -1.45$,
 - iv) Corresponding to $z \geq 2.16$, and
 - v) Between $-0.80 \leq z \leq 1.53$

Use the standard normal distribution table given in Q. 3a.

- b) 10% of the tools produced in a certain manufacturing process turn out to be defective. Find the probability that in a sample of 10 tools chosen at random, exactly 2 will be defective by using **[6]**
- i) The binomial distribution and
 - ii) The Poisson approximation to the binomial distribution.

- Q5) a)** Fit a least square parabola of the form $y = a_0 + a_1x + a_2x^2$ to the following data. **[12]**

x	0	1	2	3	4	5	6
y	2.4	2.1	3.2	5.6	9.3	14.6	21.9

- b) Compute $f(0.3)$ for the following data. **[6]**

x	0	1	3	4	7
$f(x)$	1	3	49	129	813

OR

- Q6) a)** Fit a least square line for the following data. **[12]**

Year	1999	2000	2001	2002	2003	2004	2005
Population	4154	4240	4418	4547	4716	4867	5096

- b) Find $f(0.5)$ for the following data. **[6]**

x	0	1	2	3	4
$f(x)$	1	7	23	55	109

SECTION - II

Q7) a) Solve the following using Gauss Elimination method. **[8]**

$$\begin{aligned}4x_1 + x_2 + x_3 &= 4; & x_1 + 4x_2 - 2x_3 &= 4; \\3x_1 + 2x_2 - 4x_3 &= 6\end{aligned}$$

b) Solve the following using Gauss–Seidel method (3 iterations) **[8]**

$$\begin{aligned}x_1 - 8x_2 + 3x_3 &= -4; & 2x_1 + x_2 + 9x_3 &= 12; \\8x_1 + 2x_2 - 2x_3 &= 8\end{aligned}$$

OR

Q8) a) Solve the following using Gauss-Jordan method. **[8]**

$$\begin{aligned}2x_1 + x_2 + 3x_3 &= 1; & 4x_1 + 4x_2 + 7x_3 &= 1; \\2x_1 + 5x_2 + 9x_3 &= 3\end{aligned}$$

b) Solve the following using Gauss–Seidel method (3 iterations) **[8]**

$$\begin{aligned}4x_1 + 2x_2 + x_3 &= 11; & -x_1 + 2x_2 &= 3; \\2x_1 + x_2 + 4x_3 &= 16\end{aligned}$$

Q9) a) Using false position method, find the root of $x^3 - 4x + 1 = 0$ lying between 0 and 1. **[8]**

b) Explain Newton-Raphson method. **[8]**

OR

Q10) a) Find the root of the following equation using secant method. **[8]**
 $e^{-x} = 3 \cdot \log_{10}^x.$

Take initial solution as 1.0 and 2.0.

b) Explain bisection method. **[8]**

Q11)a) Solve $\int_1^{1.04} f(x) \cdot dx$ from following data using Simpson's 1/3 rule. [8]

x	1	1.01	1.02	1.03	1.04
$f(x)$	3.953	4.066	4.182	4.300	4.421

b) Use Gauss-quadrature 3 point formula to evaluate $I = \int_0^1 \frac{1}{x} \cdot \sin \frac{1}{x} \cdot dx$ [10]

OR

Q12)a) Evaluate using Simpson's 3/8 rule $I = \int_4^{5.2} \log x \cdot dx$ [8]

b) Evaluate using gauss - quadrature 3 point formula. [10]

$$I = \int_0^1 \frac{dx}{1+x^2}.$$



Total No. of Questions :12]

P2128

SEAT No. :

[Total No. of Pages : 2

[5059]-230

B.E. (IT)

MULTIMEDIA SYSTEMS

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to section I and section II should be written in separate answer sheets.*
- 2) *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.*
- 3) *Answer Q.No.7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or Q.No.12 from Section-II.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of non programmable calculator is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) What is Multimedia Presentation? Describe it's important Characteristics. Explain two applications of a Multimedia presentation. [8]
b) Explain Different Real Time Protocols used for multimedia application. [8]

OR

- Q2)** a) What is Multimedia? Explain goals and objectives of Multimedia.Explain the basic components of multimedia. [8]
b) Explain in detail, text file formats: DOC, RTF, PDF, PS [8]

- Q3)** a) Compare following compression techniques. [8]
i) Lossy & lossless
ii) Symmetrical & asymmetrical
b) Write short notes on Image acquisition and processing. [8]

OR

- Q4)** a) Write short notes on hybrid JPEG. [8]
b) Explain various Image Enhancement techniques. [8]

P.T.O.

- Q5)** a) Explain audio compression techniques in brief. [9]
b) Write short notes on. [9]
i) Nature of sound waves.
ii) Characteristics of sound waves.
iii) Psycho-acoustic analysis.

OR

- Q6)** a) What is MIDI? Explain the use of MIDI in Multimedia? [9]
b) Explain in brief, the elements of audio systems. [9]

SECTION-II

- Q7)** a) What do you mean by digital video? Explain features of EDTV in details. [8]
b) Explain the video file formats: AVI, MOV in details. [8]

OR

- Q8)** a) What is video recording systems explain VHS in short. [8]
b) Write short notes on DVD formats. [8]

- Q9)** a) What is virtual reality? Elaborate an application of virtual reality. [8]
b) Explain role of following in the context of virtual reality. [8]
i) CCD
ii) VCR
iii) 3D Sound system.

OR

- Q10)**a) State and Explain various tools of virtual reality. [8]
b) State, what is VRML and explain its application in virtual reality. [8]

- Q11)**a) What is animation? Explain principles of animation in brief. [9]
b) Explain with suitable example creation of animation using flash player. [9]

OR

- Q12)**a) Explain following types of animation. [9]
i) Flip book animation.
ii) Onion Skinning.
iii) Motion Cycling.
b) What is swf file format? Explain animation on Web in detail. [9]



Total No. of Questions : 12]

SEAT No. :

P1908

[Total No. of Pages : 3

[5059] - 231

B.E. (Information Technology)

DISTRIBUTED SYSTEM

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Define Distributed Systems? Give Two examples and explain each in details. **[8]**

b) How do you handle heterogeneity in distributed systems? **[8]**

OR

Q2) a) Discuss the challenge of heterogeneity and scalability while designing distributed systems. **[8]**

b) Which system is a better system? Distributed or Parallel processing. **[8]**

Q3) a) What are the main issues related to the correctness of the IPC protocols of a message-passing system? Describe a suitable mechanism for handling each of these issues. **[10]**

b) Why are transport-level communication services often inappropriate for building distributed applications? **[8]**

OR

Q4) a) Suggest a suitable mechanism for implementing each of the following types of IPC semantics. **[10]**

i) Last one

ii) At least once

iii) Exactly once.

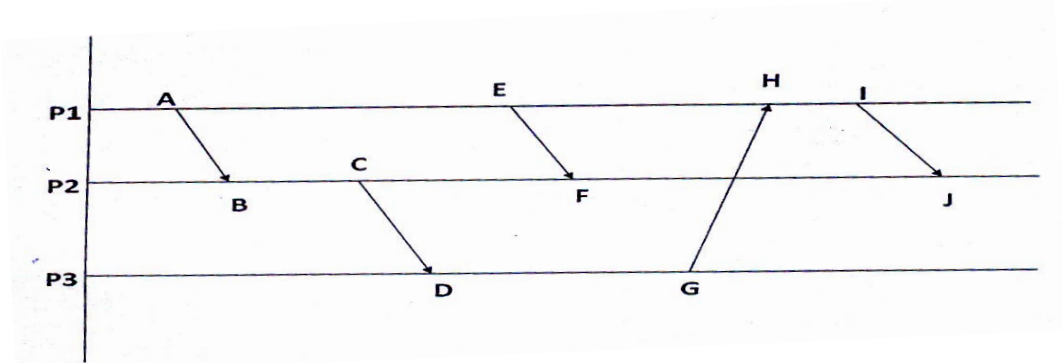
b) Discuss the techniques that makes LRPC more efficient than RPC. **[8]**

P.T.O.

- Q5) a)** How do clock synchronization issues differ in centralized and distributed systems? [8]
- b) What will happen if in a bully algorithm for electing a coordinator when two or more processes almost simultaneously discover that the coordinator has crashed? [8]

OR

- Q6) a)** Solve following timing diagram using Lamport's Logical Clock algorithm and Vector Time-stamp method both. [10]



- b) Differentiate between internal and external synchronization of clocks in a distributed systems. [6]

SECTION - II

- Q7) a)** In what aspects the distributed file systems differ from centralized file system? [8]
- b) Describe file sharing mechanism in CODA file system. [8]

OR

- Q8) a)** Discuss following properties of distributed file systems. [8]
- i) High degree of availability.
 - ii) High degree of security.
 - iii) High degree of performance.
- b) Discuss security implementations in Network File System. [8]

- Q9) a)** What is Distributed Shared memory? What are the design issues in implementation of DSM? [8]
- b) What will happen if we prefer page size of virtual memory implementation as the block size of the DSM system? [8]

OR

Q10)a) Explain and compare Strict Consistency model with Sequential Consistency model with one example each. **[8]**

b) What is the data centric consistency model? Explain in detail. **[8]**

Q11)a) What is the relationship among reliability, availability and maintainability. **[8]**

b) Write and explain Two phase commit and Three phase Commit Protocols in details. **[10]**

OR

Q12)a) How failure is masked using redundancy? What is k fault tolerant system? **[8]**

b) What is triple modular redundancy? Explain with one example. **[10]**



Total No. of Questions : 12]

SEAT No. :

P1909

[Total No. of Pages : 2

[5059] - 232

**B.E. (Information Technology)
INFORMATION RETRIEVAL
(2008 Pattern)**

Time : 3 Hour]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q 11 or Q12.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume Suitable data if necessary*

SECTION - I

Q1) a) Explain Luhn's Idea and Conflation Algorithm in detail and explain in short steps to conflate the following words: Here, Hereby, Hereafter, Herein, Hereupon . **[12]**

b) Explain the steps taken to form clusters using single pass Algorithm. **[6]**

OR

Q2) a) State Cluster Hypothesis. Explain Graph Theoretic approach for clustering. **[8]**

b) Explain Exhaustively and specificity with respect to index term weighting. **[8]**

c) Define Cluster Representative. **[2]**

Q3) a) Explain sequential and Index-Sequential file structures with their advantages and Disadvantages. **[8]**

b) Explain Boolean search in detail. What do you mean by co-ordination Level? Explain with example. **[8]**

OR

Q4) a) Explain Boolean Model in detail. **[6]**

b) Explain in detail cellular Multilists. **[6]**

c) How Query operation can be modified for fast retrieval. **[4]**

P.T.O.

- Q5)** a) Explain: R-Precision, Precision Histograms with proper example. [10]
b) What is the significance of Retrieval Performance Evaluation. Consider set of relevant documents to the query q as {d₁, d₃, d₅, d₂, d₄, d₆, d₁₂, d₂₄, d₃₆, d₄₈}. A new retrieval algorithm returns the following answer. {d₄₈, d₄₁, d₆, d₆₁, d₆₇, d₅, d₅₁₁, d₅₄, d₅₇, d₂, d₂₈, d₂₁, d₂₅₀, d₂₁₁, d₁} Evaluate retrieval performance of the algorithm. [6]

OR

- Q6)** a) Describe the various challenges for the effective deployment of Digital Libraries. [8]
b) Explain E-measure and Harmonic Mean. [8]

SECTION - II

- Q7)** a) Explain Ontology Life cycle. [8]
b) Explain distributed IR with the help Source Selection and Query Processing. [8]

OR

- Q8)** a) What is Parallel Computing? Explain taxonomy of parallel architectures. [8]
b) Define Ontology? Explain in detail reasons to develop Ontology. [8]

- Q9)** a) Discuss steps on which Data Retrieval relies in Multimedia IR. [8]
b) Explain Uncertainty, Proximity and Weights in Query Expressions. [8]

OR

- Q10)** a) What do you understand by Spatial Access Methods? State drawbacks of sequential scanning. [8]
b) Write short Note on MULTOS. [8]

- Q11)** a) What are Web Robots? What is its role in web search engines. [6]
b) Enlist the search Engines? On what parameters they can be compared. [8]
c) What are different forms of searching the web. [4]

OR

- Q12)** a) State difference between search Engine and Web Directories. [6]
b) Write short notes on following. [12]
i) Web content mining?
ii) Economic Legal Issues with web Agents
iii) Collaborative Filtering.



Total No. of Questions : 12]

P1910

SEAT No. :

[Total No. of Pages : 3

[5059] - 233

B.E. (I.T.)

REAL TIME SYSTEM (Elective - III) (Semester - II)

(2008 Pattern)

Time : 3 Hour]

[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) Which performance measures are the most appropriate for real-time systems? [4]
What are the issues in real time computing? [4]
- b) What are good properties of performance measure? [4]
Draw the flow chart for Hierarchical view of performance measure. [4]

OR

- Q2)** a) Draw block diagram for real time computer. Explain various characteristics of real time system. [8]
- b) Describe in brief the effect of following in estimating the run time of a program. [8]
- i) Source code
 - ii) Compiler
 - iii) Machine Architecture.
 - iv) Operating system

- Q3)** a) List down the task classes and types of real time scheduling. What are the assumptions for real time scheduling algorithm? Illustrate the working of rate monotonic algorithms. [10]
- b) Why priority inversion mechanism is not suited for real-time applications. Write appropriate solution for this problem. [8]

P.T.O.

OR

Q4) a) What are the assumptions of Earliest Deadline First scheduling algorithm. Explain the properties of EDF. Write the theorem of Earliest Deadline First schedulability test. [12]

b) Draw the EDF - Gant chart for the tasks of $T1 = (4,1)$, $T2 = (5,2)$, $T3 = (7,2)$ [6]

Q5) a) Explain the module support with a precise specification of the interface in real time programming language for information hiding, separate compilation, abstract data types. [10]

b) Explain the characteristics of real time programming language. [6]

OR

Q6) a) Explain how the two phase locking approach used in pessimistic concurrency control is disadvantage to real time system. How can it be modified to overcome the problem? [8]

b) Explain adaptive earliest deadline algorithm. Drive load significance using control parameter $H = 0, \infty$ [8]

SECTION - II

Q7) a) Explain Virtual Time Carrier Sensed Multiple Access (VTCSMA) algorithms with flow chart. [4]

b) Consider VTCSMA-L. support the packets arrive according to the following table. [10]

Node	M	RC at Arrival	Dm	Lm
1	1	0	32	16
2	2	10	36	20
3	3	20	56	40
4	4	20	72	60

Let us assume that for each packet is $T_m=15$, Propagation time $t=1$.

Draw the trajectory for $n=2,4$

c) Discuss the various communication medium used in real time networking. [4]

OR

Q8) a) Write a short notes on (any Two) [10]

i) Timed Token protocol

ii) Deadline Based protocol

iii) Polled Bus Protocol

b) Discuss the window protocol with suitable example. Discuss the performance of this algorithm. [8]

- Q9)** a) Draw the RTOS kernel function of real time operating system. [4]
b) Describe the feature of real time operating system. [4]
c) Describe the following capability of real time operating system. [8]
i) Internal interrupt handling in priority fashion.
ii) Memory management through virtual memory mapping and memory locking.

OR

- Q10)**a) Write short notes on the following mechanism present in real time operation system. [10]
i) Inter - task communication and synchronization
ii) Scheduling mechanism
b) With the help of block diagram explain the capability of Vx Work architecture. [6]
- Q11)**a) Explain reliability model for hardware redundancy. State reliability model require for permanent fault only. [8]
b) What do you mean by fault latency? Discuss the causes of failures in real time system? [8]

OR

- Q12)**a) Describe the following structure for hardware redundancy:(Any two)[8]
i) Static pairing
ii) N-modular redundancy
iii) Information redundancy
b) Explain the Byzantines algorithm for fault tolerance with an example. Also specify the interactive consistency condition. [8]



Total No. of Questions : 12]

SEAT No. :

P1911

[Total No. of Pages : 3

[5059] - 234

B.E. (I.T.)

SOFTWARE ARCHITECTURE

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.
- 2) From Section-I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, and answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 From Section - II.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.

SECTION - I

Q1) a) Explain the following with a suitable example. **[12]**

- i) Architecture is high level design.
 - ii) Architecture is the overall structure of the system.
 - iii) Behavior of each software element is part of the architecture.
 - iv) Architecture has components and connectors.
- b) Explain : Architecture is the vehicle for stakeholder communication. **[6]**

OR

Q2) a) Write short notes on architecture business cycle. **[6]**

- b) Write the definition of software architecture and explain each term and its significance in architecture. **[6]**
- c) Write short note on documenting architecture. **[6]**

P.T.O.

Q3) Explain the given terms in the context of quality: **[4 × 4 = 16]**

- a) Availability.
- b) Testability.
- c) Usability.
- d) Portability.

OR

Q4) Explain the given terms in the context of quality: **[4 × 4 = 16]**

- a) Business quality.
- b) Tactics.
- c) MTTF, MTTR.
- d) Scenario template elements.

Q5) a) Which design pattern will you choose to ensure that a single instance of a class will be created in an application? How will you achieve it in any object oriented language. **[10]**

b) Write short note on iterator design pattern. **[6]**

OR

Q6) a) For the design pattern 'Adaptor' give the following:

i) Motivation/problem. **[2]**

ii) Solution ie the pattern. **[3]**

iii) Example. **[2]**

iv) Structure of classes involved. **[3]**

b) Write short note on Façade design pattern. **[6]**

SECTION - II

- Q7)** a) What is MVC architecture style? Show its relevance by taking an application example of your own choice. [5 + 5 = 10]
b) What is the difference between html and XML, what is its use in the context of web services? [8]

OR

- Q8)** a) What is JDBC? Write in detail about any one type of JDBC driver. [6]
b) What are the three layers in a three tier application? Explain the significance of each in brief. [6]
c) Show the fitment of server side technologies, client side technologies and persistence in three tier architecture. [6]

- Q9)** a) Java enterprise edition (J2EE) architecture block diagram and explain the significance of each block in brief. [10]
b) What are the characteristics of a web application? Write in brief. [6]

OR

- Q10)** a) What is web server? Explain in brief. [4]
b) What is an application server? Explain in brief. [4]
c) What is EJB? What are the types of EJBs? Explain in brief. [8]

- Q11)** a) What are .Net assemblies? What do they use? [8]
b) What are DLL servers? [8]

OR

- Q12)** a) Write short notes on .Net architecture. [8]
b) Write short notes components and web services. [8]



Total No. of Questions : 12]

SEAT No. :

P1912

[Total No. of Pages : 3

[5059] - 235

B.E. (I.T.) (Semester - II)
ADVANCED GRAPHICS
(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
- 2) *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 advantages and disadvantages of Bezier curve and NURBS Non - Uniform Rational B-Spline. Give the procedure for spline specifications. **[10]**

b) Explain the concept of parallel projection and perspective projection for 3-D objects with eg. Compare these two types of projections. **[8]**

OR

Q2) a) Explain different types of polygons with related equations. How polygon tables are used for representing polygon surfaces. **[10]**

b) Develop a general form of a B-Spline blending function of degree 3. **[8]**

Q3) a) What is Animation? Explain frame-by frame and real-time animation techniques. **[8]**

b) Explain various methods of controlling animation. **[8]**

OR

P.T.O.

Q4) a) Explain the types of animation languages with appropriate examples. [8]

b) Explain the main categories of Animation tools. Discuss various devices used for producing animation. [8]

Q5) a) Explain Boundary representation methods with eg. [8]

b) Explain the concept of primitive instancing with eg. [8]

OR

Q6) Write a short note on following: [16]

a) Constructive Solid Geometry.

b) Polygon Meshes.

c) Spatial-partitioning representations.

d) Polygon Meshes.

SECTION - II

Q7) a) Compare the CMY and YIQ color model. Write a note on RGB color model. [8]

b) Explain basic ray tracing methods. [10]

OR

Q8) a) Explain the procedure for conversion of RGB model to CMY model and CMY model to RGB model. [8]

b) What is the significance of rendering? Explain various types of polygon rendering methods. [10]

Q9) a) Compare between flat shading and Phong shading. Explain Gouraud shading. [8]

b) Explain HSV and HLS color models. [8]

OR

- Q10)** a) Explain the basic illumination models. [8]
b) Explain the concept of beam tracing with eg. [8]

- Q11)** a) What is meant by Virtual Reality? Describe any two special devices that are used for man machine interaction in virtual reality systems. [8]
b) Define Virtual Reality. Explain various application areas of virtual reality. [8]

OR

- Q12)** Write a short note on following: [16]
a) VRML.
b) Ray Tracing.
c) YIQ color model.
d) Specular Reflection.



Total No. of Questions : 12]

SEAT No. :

P1913

[Total No. of Pages : 2

[5059] - 236

B.E. (Information Technology)
Advanced Computer Networks
(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Describe the layers of ISO/OSI model. [10]
b) State and explain various principles of network design. [8]

OR

- Q2)** a) Enlist the Networking principles and services with Layered architecture. [12]
b) Describe Internet, ATM and cell phone. [6]

- Q3)** a) Draw and explain the ATM header along with the structure. [8]
b) Describe the mobility management issues in wireless networks. [8]

OR

- Q4)** a) Define Wireless communication and explain its architecture. [8]
b) Describe WDM system with diagram in Optical Networks. [8]

- Q5)** a) What are various parameters of Quality of Service? [6]
b) Illustrate Congestion control and Flow control mechanism of datagram network w.r.t. Open Loop and Closed Loop. [10]

OR

P.T.O.

- Q6)** a) Describe congestion control mechanism of ATM network w.r.t. [8]
i) Internal congestion control.
ii) Global congestion control.
b) Describe Marcov Chain Models w.r.t. M/M/1 queue and M/M/2 queue. [8]

SECTION - II

- Q7)** a) Write notes on : BGP and RIP. [10]
b) Define traffic engineering and explain TE with MPLS. [8]

OR

- Q8)** a) Explain formats of various BGP messages. [8]
b) What are VPNs? Explain the significance of tunneling in VPNs. [10]

- Q9)** a) State the general characteristics of Mobile IP. [6]
b) List and describe various features of IPv6. [10]

OR

- Q10)** a) Describe RTP and RSVP. [8]
b) What are different APIs for IPv6? [8]

- Q11)** a) What is cluster based network architecture for ad-hoc networks. [6]
b) What is ad-hoc network? Explain its limitations and applications. [10]

OR

- Q12)** a) How to implement firewall in the network? [8]
b) What are overlay networks? Why it is important? [8]



Total No. of Questions : 12]

SEAT No. :

P1914

[Total No. of Pages : 3

[5059] - 237

B.E. (Information Technology)

Bioinformatics

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Question No. 1 or 2, 3 or 4, 5 or 6 from Section - I and Question No. 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) Define Bioinformatics. Explain any three major applications of Bioinformatics. **[8]**

b) Explain the significance of Central Dogma for Molecular Biology in detail. **[8]**

OR

Q2) a) State the different databases in Bioinformatics. Explain any two Protein databases in brief. **[8]**

b) Explain any two limitations of Baye's Theorem. **[8]**

Q3) a) Write a note on Sequence Visualization in Bioinformatics. **[8]**

b) Explain stepwise spotting process in microarrays in brief. **[8]**

OR

P.T.O.

- Q4)** a) Explain quantitative randomness in Bioinformatics. [8]
b) Discuss differences between clustering and classification. [8]

- Q5)** a) Explain Dynamic Programming method of Sequence Alignment with neat diagram. What is the significance of Substitution matrix in Bioinformatics? [10]
b) What is pattern matching? Discuss different methods of pattern matching. [8]

OR

- Q6)** a) Explain the stepwise procedure for text mining in detail. What are the various tools used for text mining? [10]
b) State the word methods for Pattern Matching in Bioinformatics. Explain any one in detail. [8]

SECTION - II

- Q7)** a) Explain Modeling and Simulation process along with the components in detail. [10]
b) Explain the Ab-Initio process of Protein structure prediction in detail. [8]

OR

- Q8)** a) Elaborate on different standards and Issues for Communication and Collaboration in Bioinformatics. [10]
b) Explain the steps in drug discovery and development process in detail. [8]

- Q9)** a) Explain BLAST algorithm in detail. [8]
b) Explain the steps in FASTA algorithm for similarity search. [8]

OR

Q10) a) Differentiate between FASTA and BLAST tools for sequence alignment. **[8]**

b) What is Hashing? How is it exploited in FASTA database algorithms. **[8]**

Q11) a) Write a note on Environmental Biotechnology. **[8]**

b) Write a note on Genetic Engineering and dangers in Genetic Engineering.
What is Genetic marker? **[8]**

OR

Q12) a) Explain how interchange and transformation of pollutants take place in atmosphere, hydrosphere and lithosphere. **[8]**

b) Discuss the various factors responsible for degradation in the ecosystem. **[8]**



[5059] - 238

B.E. (I.T.) (Semester - II)
Neural Network and Expert Systems
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

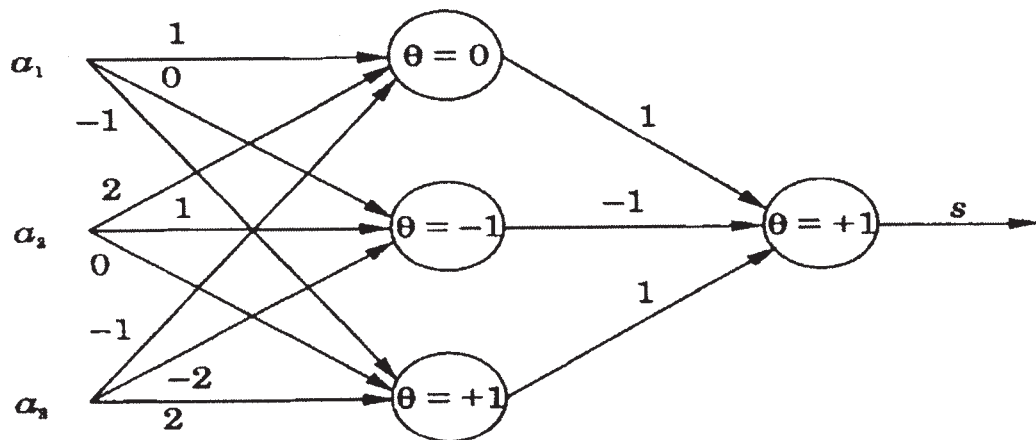
- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Implement NAND and NOR gate using McCulloch Pitt's neurons. [7]
- b) Explain, with examples, following pattern recognition tasks: [9]
- i) Association.
 - ii) Classification.
 - iii) Clustering.

OR

- Q2)** a) What do you mean by hard and soft activation function? State its types. [8]
- b) What is MP Neuron Model? Give the output of the following network for the input [1 1 1] T [8]



P.T.O.

- Q3)** a) Explain following learning laws in detail. [9]
- i) Hebb's Learning law.
 - ii) Perceptron learning law.
- b) Compare the paradigms : Supervised Learning and Unsupervised Learning. [7]

OR

- Q4)** a) Distinguish between linearly separable and linearly non-separable problems. What is limitation of perceptron. [8]
- b) What are feed forward neural networks? Explain pattern classification and regression using Multi-layer feed forward neural networks. [8]

- Q5)** a) Explain construction of optimal hyperplane for linearly separable pattern with respect to SVM. [9]
- b) What are RBF networks? How it is used to perform complex pattern classification task? [9]

OR

- Q6)** a) Explain radial basis function networks in the form of layered structure. [9]
- b) Write a short note on optimal hyperplane for non separable patterns. [9]

SECTION - II

- Q7)** a) What is Hopfield network? What are the applications of Hofield networks. [8]
- b) Explain Boltzman machine architecture together with the Boltzman learning law. [9]

OR

Q8) a) What is SOFM? Draw and explain its architecture. How training is done in SOFM? [9]

b) Write a short note on “Recurrent Neural Networks”. [8]

Q9) a) Explain the rule based architecture of expert system. [8]

b) What are the advantages in keeping knowledge base separate from control module in knowledge based system? [8]

OR

Q10) a) Explain with neat diagram blackboard system architecture and its components. [8]

b) What is uncertainty? Explain two approaches that deal with uncertainty problem. [8]

Q11) a) Explain how knowledge is represented in PROLOG? [9]

b) Write a short note on ELIZA? [8]

OR

Q12) a) List programming languages for AI problems. Comment on language constructs in LISP. [9]

b) Write a short note on MYCIN. [8]



Total No. of Questions : 12]

SEAT No. :

P1916

[Total No. of Pages : 2

[5059] - 239

B.E. (I.T.) (Semester - II)

Geo Informatics System

(2008 Pattern) (Elective - IV)

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) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What is image registration? Explain logarithmic and exponential contrast stretch in detail. [8]
- b) Explain A to D conversion process in digital image processing of remotely sensed data. [8]

OR

- Q2)** a) What is image pre-processing? Explain it in detail with example. [8]
- b) Explain visual interpretation technique to be applied on digital images. [8]

- Q3)** a) Define Remote Sensing. With the help of block diagram explain the steps involved in remote sensing? [12]
- b) Classify and write salient features of remote sensors. [6]

OR

- Q4)** a) What are different groups of earth satellites? Name the satellites in each group and mention their tasks. [6]
- b) Explain RADAR scattering mechanism. Differentiate between SAR and SLAR. [12]

P.T.O.

- Q5) a)** Explain all map projections used in GIS. [8]
b) Define GIS and explain the architecture of GIS system. [8]

OR

- Q6) a)** Give reasons and justifications for using computers in the process of making maps. [8]
b) What is entity and field in GIS? How these are modelled in GIS? Elaborate with example. [8]

SECTION - II

- Q7) a)** Explain in detail the process of affine transformation? [8]
b) Explain any four FDGC content standards of GIS metadata. [8]

OR

- Q8) a)** Explain topological and locational error. [8]
b) Explain attribute data and table in context of GIS. [8]

- Q9) a)** Explain any two types of graphs used in data exploration. [8]
b) Elaborate overlay and buffering in context of vector data representation with example. [10]

OR

- Q10) a)** What are neighborhood and zonal operations in context of raster data representation? [6]
b) Compare raster and vector data analysis. [6]
c) What are the types of GIS queries? Elaborate. [6]

- Q11) a)** Explain how GIS is used in major river valley projects? [10]
b) Explain hybrid database model of GIS in detail. [6]

OR

- Q12) a)** Discuss the implementation of GIS project. What tests will be performed in evaluating any GIS project? [10]
b) Explain the software model useful for GIS project design. [6]



Total No. of Questions :12]

SEAT No. :

P2990

[5059]-24

[Total No. of Pages :2

B.E.(Civil Engineering)

**FINITE ELEMENT METHOD IN CIVIL ENGINEERING
(2008 Course) (Semester-II) (401008) (Open Elective) (Elective-IV)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

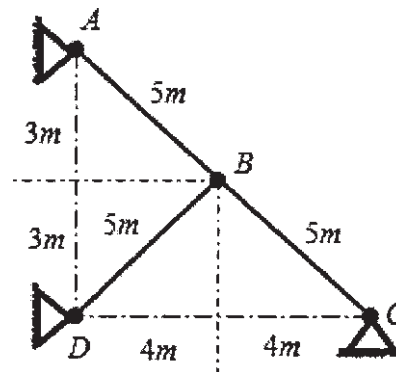
- 1) Answer to the two sections should be written in separate books.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of non programmable calculator is allowed.
- 5) Assume suitable data if necessary.

SECTION-I

Q1) A beam of length 8 m, fixed at one and supported by roller at the other end carries a 20 kN concentrated load and a clockwise moment of 20 kNm at the centre of the span. Take $E = 200 \text{ GPa}$ and $I = 20 \times 10^{-6} \text{ m}^4$, determine deflection, bending moment and shear force at midspan, Also find reactions at supports. **[18]**

OR

Q2) Write the 4×4 stiffness matrix of truss element. Hence, obtain the global stiffness matrix of truss as shown in Fig.1. Also, by imposing the boundary conditions, write reduced stiffness matrix. Take EI constant. **[18]**



Q3) Obtain stiffness matrix for a grid element. Also explain transformation matrix for a grid element. **[16]**

OR

Q4) Derive stiffness matrix of plane frame element considering axial force, shear force and bending moment. When do you need transformation matrix? Write transformation matrix of frame element. **[16]**

P.T.O.

- Q5)** a) Derive compatibility conditions in-terms of stresses. [6]
b) Derive the differential equations of equilibrium in case of three-dimensional stress system. [10]

OR

- Q6)** a) Explain plane stress and plane strain elasticity problem with example. Write stress-strain relationship. [6]
b) State and explain 'Convergence Requirements of displacement function' [10]

SECTION-II

- Q7)** Write short note on. [16]
a) Principle of minimum potential energy.
b) Principle of virtual work.
c) CST and LST elements.
d) 3D Tetrahedron and Hexahedron elements.

OR

- Q8)** a) Derive connectivity matrix [A], elasticity matrix [D], strain-displacement matrix [B] and stiffness matrix [K] for the four noded rectangular element in Cartesian coordinate system using finite element formulation. [16]

- Q9)** a) Give two dimensional and three dimensional Pascal's triangle. Explain its use in FEM analysis. [8]
b) Obtain strain displacement matrix for a CST element. [8]

OR

- Q10)** a) Derive shape functions for the eight noded serendipity element in natural coordinate (ξ, η) system. [8]
b) Derive the relationship between the natural (area) and cartesian coordinates of a triangular element. [8]

- Q11)** a) Explain jacobian matrix in case of four noded isoperimetric quadrilateral element. Obtain strain displacement matrix. [12]
b) State and explain three basic laws on which isoparametric concept is developed. [6]

OR

- Q12)** Derive the stiffness matrix for 1D isoparametric element using principle of virtual work. [18]



Total No. of Questions : 12]

SEAT No. :

P1917

[Total No. of Pages : 2

[5059] - 240

B.E. (I.T.)

Business Intelligence

(2008 Pattern) (Open Elective)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Draw neat diagrams wherever necessary.
- 2) Assume suitable data, if necessary.
- 3) Figures to the right indicate full marks.

SECTION - I

Q1) a) Explain how data warehouse is different from databases. What care should be taken while implementing data warehouses. [8]

b) What is OLTP? Which are the applications where OLTP is widely used? Can OLAP be used in place of OLTP? [8]

OR

Q2) a) Discuss OLAP. Who are the users of OLAP? What is the kind of queries for which OLAP is suitable? Give examples. [8]

b) Explain with the help of diagram data warehouse. Explain different components of data warehouse. [8]

Q3) a) Write short notes on : Snowflakes and Star schema. [8]

b) What are snapshots? Explain different types of snapshots. [8]

OR

Q4) a) Define dimensions. Discuss hierarchies in dimensions. [8]

b) Define facts. Explain different types of facts. [8]

Q5) a) Explain different processes in ETL. [9]

b) Explain the term loading. What is initial and incremental loading? Are these similar to database loading? [9]

OR

P.T.O.

- Q6)** a) If the data is inconsistent, incomplete or noisy; what steps should be taken before it is loaded in the warehouse? Give examples. [9]
b) What are metadata, data cubes and marts. [9]

SECTION - II

- Q7)** a) Explain presentation layer and data layer. [8]
b) What is data aggregation? Is it a mandatory step? Explain. [8]

OR

- Q8)** a) Write a note on report level and data level security. [8]
b) Discuss various reporting elements. [8]

- Q9)** a) What is the difference between classification and regression. [8]
b) Write a note on text mining. [8]

OR

- Q10)** a) What is decision tree? Is it used for classification or clustering or for both? [8]
b) What is cluster analysis? Explain working of k-means algorithm. [8]

- Q11)** a) Write a note on HIVE and Netezza. [9]
b) Write a note on Pentaho. [9]

OR

- Q12)** a) Write a note on PIG and Teradata. [9]
b) Write a note on agile BI. [9]



Total No. of Questions : 12]

SEAT No. :

P1918

[Total No. of Pages : 3

[5059] - 241

B.E. (Instrumentation & Control) (Semester - I)

Process Instrumentation

(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 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 with suitable examples degrees of freedom. **[8]**
b) Differentiate clearly with suitable example multi capacity and single capacity process. **[8]**

OR

- Q2)** a) Explain with suitable example analysis of Liquid Process. **[8]**
b) Elaborate interacting and non interacting processes. **[8]**

- Q3)** a) Explain in brief: **[8]**
i) Steady State gain.
ii) Variable time constant.
iii) Valve gain.
iv) Transmitter gain.
b) What is the need of analyzing process control loops? With the help of necessary diagrams and equations explain the procedure to test a typical flow control loop. **[10]**

P.T.O.

OR

- Q4)** a) Draw the faceplate of SLPC and Enlist its features. [10]
b) Explain in brief linearization of Equal Percentage Valve. [8]

- Q5)** a) Draw a schematic of feedback control system and describe the necessary components of feedback control system. [8]
b) Discuss in brief control performance measures for setpoint input. [8]

OR

- Q6)** a) What do you mean by Fine Tuning? Explain with suitable example. [8]
b) What are factors to be considered for Controller Tuning. [8]

SECTION - II

- Q7)** a) Derive transfer function of Feedforward controller for setpoint tracking and disturbance rejection. [8]
b) How to improve nonlinear process performance? Explain any one in detail. [8]

OR

- Q8)** a) Discuss in brief design criteria for cascade control system. [8]
b) Explain the working of a selective control with suitable application. [8]

- Q9)** a) Discuss in brief influence of interaction on multivariable system behavior. [8]
b) What do you mean by RGA matrix? List important properties of RGA. [10]

OR

Q10) a) Explain in brief procedure for calculating Relative Gain Array for 2 x 2 systems. List important properties of RGA. [10]

b) Explain necessity of decoupling control with the help of suitable example. [8]

Q11) a) Explain with suitable block diagram “Smith Predictor”. [8]

b) Discuss in brief step analysis method for finding multiple time constant and dead time. [8]

OR

Q12) Write short notes on any two: [16]

a) Dynamic Matrix Control.

b) Fuzzy Logic Applications.

c) Artificial Neural Network.



[5059] - 242

B.E. (Instrumentation & Control)**DIGITAL CONTROL****(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) Assume suitable data, if necessary.

SECTION - I

- Q1) a)** Characteristic equation of the system is as shown below. Find the stability of the system by using Jury's Stability Test. [10]

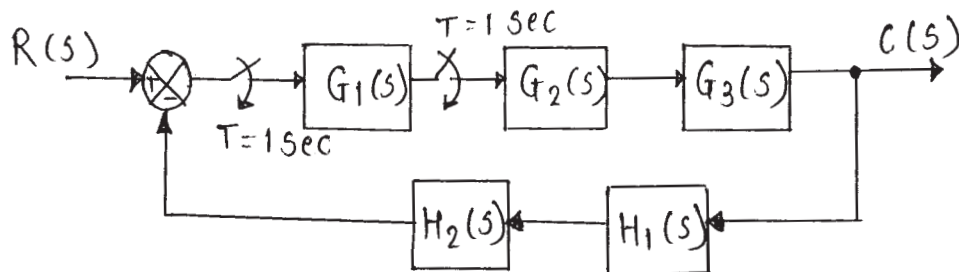
$$p(z) = z^4 - 1.2z^3 + 0.22z^2 + 0.065z - 0.004 = 0.$$

- b) List the advantages of Discrete Control over the Analog Control. [6]

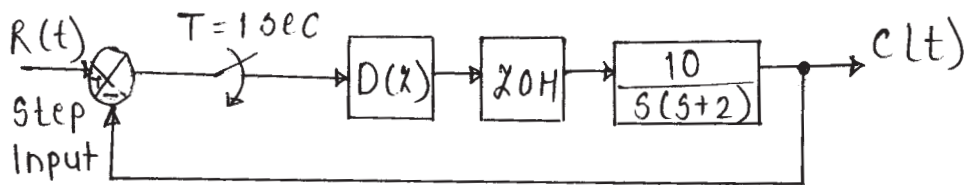
OR

- Q2) a)** Derive the Mathematical Model of Zero Order Hold. [8]

- b) Find the pulse transfer function for the system shown below. [8]

**P.T.O.**

Q3) Design an Deadbeat Controller for the system shown the figure below. [16]

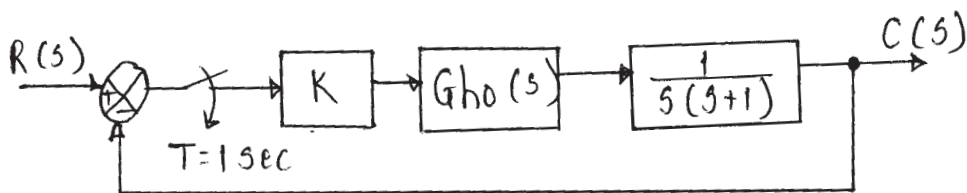


OR

Q4) a) List the salient features of Deadbeat Controller and explain them in short. [8]

b) Compare velocity form and positional form of digital PID controller. [8]

Q5) Find the range of 'K' for the system to be stable by using Jury's Stability Test. [18]



OR

Q6) a) Explain with a help of diagram stability of a system S-plane and Z-plane. [10]

b) Write a short note on bilinear transformation. [8]

SECTION - II

Q7) a) Investigate the State Controllability and State Observability for the system below. [8]

$$x(k+1) = \begin{bmatrix} 1 & -2 \\ 1 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} U(k)$$

$$y(k) = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} x(k)$$

- b) Find the Eigen Vector, eigen values and diagonalize the following matrix by Similarity Transformation. [8]

$$G = \begin{bmatrix} -4 & 1 & 0 \\ 0 & -3 & 1 \\ 0 & 0 & -2 \end{bmatrix}$$

OR

- Q8)** a) Define State Controllability and State Observability and write the equations of State Controllability and State Observability. [8]

- b) Define State Observers and explain the types of State Observers in short. [8]

- Q9)** a) Derive the equation of Ackerman's Formula for the Pole Placement. [9]

- b) Define the following terms: [9]

- i) State Observer.
- ii) State Space.
- iii) State Variable.

OR

- Q10)** a) Find the Controllability and Observability for the system given by the following state model. [12]

$$x(k+1) = \begin{bmatrix} 0 & 1 \\ -0.4 & -1.3 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} U(k)$$

$$y(k) = [0.8 \ 1] x(k)$$

- b) State the duality property of the Controllability and Observability. [6]

Q11) a) Write a short note on Performance Index. [6]

b) Write a short note on Optimal Control. [10]

OR

Q12) For a system given by the state model as follows: [16]

$$x(k+1) = Gx(k) + H U(k)$$

$$y(k) = C x(k)$$

Determine the control sequence to minimize the given performance index and also find J min.

$$J = \frac{1}{2} [X(10)]^2 + \frac{1}{2} \sum_{k=0}^9 [X^2(k) + U^2(k)]$$

$$\therefore G = 0.3679$$

$$H = 0.6321$$

$$C = 0.9210$$

$$X(0) = 1$$



Total No. of Questions : 12]

SEAT No. :

P1945

[Total No. of Pages : 3

[5059]-243

B.E. (Instrumentation and Control) (Semester - I)

PROJECT ENGINEERING AND MANAGEMENT

(2008 Course)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8., Q.9 or Q.10., Q.11 or Q.12.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data, if necessary.*

SECTION - I

- Q1)** a) What is the role of project team in making the project statement? [8]
b) What is project? What are various types of project? [8]

OR

- Q2)** a) What is organizational structure? Explain one in detail. [10]
b) What is degree of automation? [6]

- Q3)** a) Explain the pricing process, salary overheads, labour hours and materials and support costs during the cost and estimation process. [12]
b) Write short note on SOW. [4]

OR

- Q4)** a) What are the various activities done in project management software MS Project. [10]
b) What are the S curve concept and crash time concepts. Explain. [6]

P.T.O.

- Q5) a)** Prepare Technical specification sheet in s-20 format (any two) [10]
- i) Magnetic flow meter
 - ii) Differential pressure instruments
 - iii) Rotameters
- b) Write the importance of material balance sheet [8]

OR

- Q6) a)** What are process flow sheet and P & I diagram? Draw P & I diagram for temperature loop. [8]
- b) What are the various standards used in instrumentation project. Write the short notes on S5.1, S5.5. [10]

SECTION - II

- Q7) a)** What are the selection criteria for cable for any specific application? [8]
- b) Draw installation sketch of DPT. [8]

OR

- Q8) a)** What are the types of cables used in plant automation? Suggest cables for carrying transmission signal. Justify your answer. [8]
- b) What is loop wiring diagram? Draw a loop wiring diagram of pressure control loop. [8]

- Q9) a)** What are the documents required during the construction activities. Explain in detail. [10]
- b) What is cold and hot commissioning? Explain in detail. [8]

OR

Q10) a) What are installation and commissioning activities? Explain step by step. [12]

b) What is mean by vendor? What is vendor registration? [6]

Q11) a) Write the specifications of control panel [8]

b) Write a short note on consoles. [8]

OR

Q12) a) Explain the FAT for control panel. [8]

b) Write the classification of control panels. Explain any one type in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P1920

[Total No. of Pages : 3

[5059] - 244

B.E. (Instrumentation & Control) (Semester - I)

BIOMEDICAL INSTRUMENTATION

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate marks allotted to that question.*
- 3) *Write answers in the separate answer book for each section.*
- 4) *Assume suitable data if required.*
- 5) *Draw a neat diagram whenever necessary.*

SECTION - I

- Q1)** a) Define bio electrode. Name various types of basic bio electrodes used for bioelectric potential measurements. Explain the necessity of microelectrode, micropipette electrode. [8]
- b) Define offset potential, action potential. Resting potential, Evoked potential. [8]

OR

- Q2)** a) Draw and explain the structure of the human cell. [6]
- b) What is a half cell potential? Draw and explain electrical equivalent circuit of electrode Jelly and Tissue. [6]
- c) Define and discuss the term "Biosensors". [4]

- Q3)** a) Explain different chambers of heart. Explain on Electrical conduction system of heart. The process of ECG genesis. [8]
- b) Discuss the various ECG lead configurations in detail. [8]

OR

P.T.O.

Q4) a) Enlist various preamplifiers used in bio signal conditioning? What are the limitations of differential amplifier and explain how it overcomes with an improved version of the same. [10]

b) Draw and explain phonocardiogram. [6]

Q5) a) What is systolic and diastolic pressure? Enlist two important techniques that play important role in sphygmomanometric BP measurement. Explain the same method of BP measurement along with its advantages and disadvantages. [10]

b) Explain the Dye dilution method of cardiac output measurement. And calculate the cardiac output for heart rate of 71 beats / min. and stroke volume of 70 ml. [8]

OR

Q6) a) What are various blood flow measurement techniques? What are the problems faced by magnetic blood flow meters if they use permanent magnets or DC excitation. [8]

b) Discuss Doppler shift Ultrasonic blood flow measurement along with neat diagram. [8]

c) List out the microphones used in phonocardiograph. [2]

SECTION - II

Q7) a) What is an EEG? Explain the 10-20 Electrode placements. [10]

b) Explain the various types of EEG Electrodes. [6]

OR

Q8) a) Explain the functions of various lobes of Brain. [8]

b) Draw and explain the brain stem along with the function of each part of it. [6]

c) What is Evoke response? [2]

- Q9)** a) Enlist various ophthalmic instruments & briefly explain them. Give their area of application. List out various ophthalmic instruments. Explain instruments that are used for measurement of Intraocular pressure. Explain the principles involved in the measurement of the indentation and appplanation tonometer. **[10]**
- b) Explain the role of Cones and Rods in human vision. Explain various errors in vision and their method of correction. **[4]**
- c) Suggest suitable devices that are used to recover the percentage losses in EAR and EYE, if some residual capacity has been retained with these organs. **[2]**

OR

- Q10)** a) Define a “Hearing threshold”. Explain the Bekesy audiometer with the help of a suitable block diagram. **[10]**
- b) What are three main sections of the Human auditory system? Explain the function performed by each section in human hearing phenomenon. **[6]**

- Q11)** a) What is Spiro gram? Draw & explain Wedge Spiro meter for respiratory measurement. **[10]**
- b) Draw and explain thermal conductivity analyzer. **[8]**

OR

- Q12)** a) Define the followings: **[10]**
- | | |
|------------------|----------------------|
| Gross Shock, | Micro current shock, |
| Let go Current, | Hold on current. |
| Lung Compliance, | |
- b) Explain the various methods of accident prevention in medical equipments. **[8]**



Total No. of Questions :12]

SEAT No. :

P3013

[Total No. of Pages :3

[5059] - 245

B.E. (Instrumentation & Control)

LASER BASED INSTRUMENTATION (Elective - I)

(2008 Course) (Semester - I) (406264 B)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain in detail the process of emission and absorption of radiation. [8]
b) Explain the importance of Einstein's equations in emissions of radiation. [8]

OR

- Q2)** a) State the different processes due to which the small gain coefficients of laser get affected. [8]
b) Write short notes on [8]
i) Laser modes
ii) Q switching

- Q3)** a) What are different laser system features which are applicable to most commercial and industrial lasers? Explain each in short. [9]
b) Estimate the efficiency of a GaAs laser operating well above threshold. The refractive index of material is 3.5 and laser cavity length is 0.3 mm. The loss coefficient is 800 per metre length and the internal quantum efficiency is 0.7. [4]
c) What are the steps that should be followed in a safe laser laboratory operation? [5]

OR

P.T.O.

- Q4)** a) Explain the construction and working of GaAs homojunction semiconductor diode laser. [8]
- b) How the laser products are classified for safety standards? [4]
- c) Calculate the threshold pumping power of a Nd: Glass laser for critical population inversion of $9 \times 10^{21}/\text{m}^3$ and spontaneous life time of $250 \mu\text{s}$. The upper level is at an energy of 1.3eV . [6]

- Q5)** a) Describe how Fabry-Perot interferometer is used with small coherent length source for displacement measurements. [8]
- b) What is Speckle Pattern? Describe subjective and objective speckles. [8]

OR

- Q6)** a) Describe the dynamic tracking of speckle pattern for displacement measurements. [8]
- b) What are the properties of speckle pattern? Describe each in short. [8]

SECTION - II

- Q7)** a) Explain the principle of operation of Laser velocimeter. [8]
- b) What are the two options for the electronic processing of the Doppler signal? Compare it. [8]

OR

- Q8)** a) Explain the frequency domain processing of Doppler signal in detail. [8]
- b) What are the performance parameters of operation of laser velocimeter? Discuss. [8]

- Q9)** a) What is Sagnac effect? Show how is the phase shift is proportional to the angular velocity. [8]
- b) What are the components required for all fiber FOG configuration? Explain each in short. [8]

OR

Q10)a) Show that the frequency of the sagnac signal in RLG is proportional to the angular velocity of rotation. [8]

b) Explain in detail the closed loop configuration of Fiber Optic Gyroscope. [8]

Q11)a) Write a short note on Holographic Interferometer. [9]

b) What are different emulsions used to record the holograms? Mention the characteristics of it. [9]

OR

Q12)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 1.4 per unit length in x-direction and the fringe spacing is found to be 1 mm. Hence find the strain. [8]

b) List out the applications of holographic interferometer that you know. Explain any one in detail. [10]



Total No. of Questions :12]

SEAT No. :

P3014

[Total No. of Pages :4

[5059] - 246

B.E. (Instru. & Control)

ADVANCED CONTROL SYSTEM

(2008 Pattern) (Semester - I) (Elective - I) (406264C)

Time : 3 Hours]

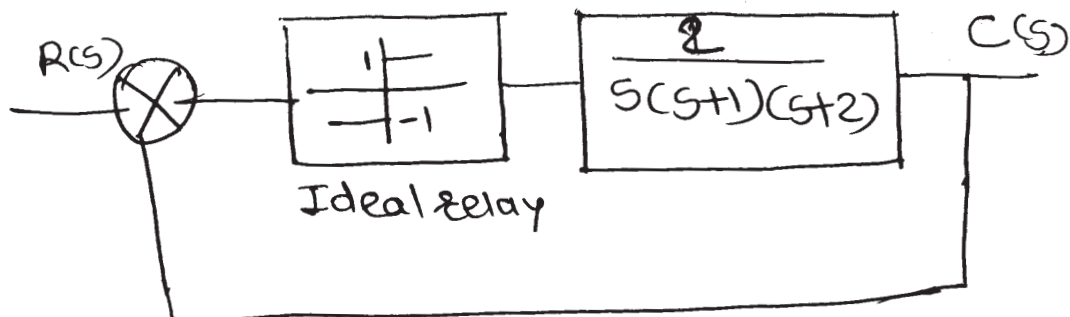
[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

- Q1) a) Obtain the stability of system shown in figure by describing function method. [10]



- b) Explain in brief Jump resonance. [8]

OR

- Q2) a) Define limit cycle & distinguish three kinds of limit cycles. [8]

- b) Derive the describing function of the saturation non linearity. [10]

P.T.O.

Q3) a) Select **[9]**

i) $V = 2x_1^2 + x_2^2$

ii) $V = x_1^2 + 2x_2^2$

iii) $V = (x_1 + x_2)^2 + \frac{3}{2}x_1^2 + \frac{x_2^2}{2}$

as liapunov function and determine the stability for each case. The system is given below. $\dot{x}_1 = x_2$ $\dot{x}_2 = -x_1 - 2x_2$.

b) Explain positive definite, negative definite and semidefinite function with examples. **[7]**

OR

Q4) a) A second order system represented by $\dot{x} = Ax$ where $A = \begin{bmatrix} 0 & 1 \\ 3 & -2 \end{bmatrix}$

Assuming matrix Q to be Identity matrix solve for matrix P in the equation $A^T P + PA = -Q$. Use Liapunov theorem and determine the stability of the system write the Liapunov function $v(x)$. **[10]**

b) Select liapunov function and determine the stability for **[6]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 2 \\ -2 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Q5) a) Explain MIT Rule for continuous time MRAC scheme with reference to first order system. **[10]**

b) State classification of model reference adaptive control system. Explain any one in detail. **[6]**

OR

Q6) a) Explain model reference adaptive control using Lyapunov approach for stability analysis for continuous time system. **[10]**

b) Determine whether the following quadratic form is positive definite. **[6]**

$$Q = x_1^2 + 4x_2^2 + x_3^2 + 2x_1x_2 - 6x_2x_3 - 2x_1x_3$$

SECTION - II

Q7) a) Write short note on: **[12]**

- i) Indirect self tuning regulator.
- ii) Linear Quadratic self tuning regulator.

b) Explain the mechanism of controller design & parameter estimation in self Tuning regulator (STR). **[6]**

OR

Q8) a) Explain thd different approaches to self tuning regulators. **[8]**

b) Explain in detial Recursive parameter estimation. **[10]**

Q9) a) Enlist the considerations in design of Robust control system. **[8]**

b) Explain in detail general purpose adaptive regulator. **[8]**

OR

Q10) Explain following Industrial adaptive controllers with reference to parameter estimation, control design, prior information of Industrial experiences. **[16]**

a) Asea Brown Boveri (ABB) Aadaptive controller.

b) EXACT: The foxboro adaptive controller.

Q11)a) Obtain the control law which minimizes the performance index.

$$J = \int_0^{\infty} (x^2 + y^2) dt \quad \text{[8]}$$

For the system

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

b) Discuss performance measures for optimal control problems. **[8]**

OR

Q12)a) Consider the plant. **[8]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u$$

Prove that system is unstable & controllable.

b)
$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & -4 \\ 1 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 2 \end{bmatrix} u$$

$Y = [1 \ 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ determine feed back gain matrix for system desired pole at $-50, -50$. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1921

[Total No. of Pages : 3

[5059] - 247

B.E. (Instrumentation & Control Engg.) (Semester - I)

BUILDING AUTOMATION - I

(2008 Pattern) (Elective)

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)** According to NTPA define fire and flame. Explain following terms. [8]
- i) Fire triangle.
 - ii) Fire signature.
- b) Explain different fire development stages. Which detectors are normally used to detect fire in fire stages & why? [10]

OR

- Q2) a)** Define: [8]
- i) Automatic fire alarm system.
 - ii) Zone.
 - iii) Notification appliances.
 - iv) Initiating device circuit.
 - v) Notification appliance circuit.
 - vi) Initiating device circuit.
 - vii) Analog addressable sensor.
 - viii) SLC interface.
- b) Explain classification of fire detection systems. What are fire suppression systems. Explain. [10]

P.T.O.

- Q3)** a) Conventional fire alarm system detectors prone to false alarm and addressable detectors not. Justify the statement. [8]
- b) Which are different factors affecting sensitivity of conventional detectors. [8]

OR

- Q4)** a) Explain following FACP parts: [8]
- i) Central processing unit.
 - ii) Main power supply.
 - iii) FACP display interface.
 - iv) SLC interface card.
- b) Explain class A IDC & class B IDC. [8]

- Q5)** a) Which are different supplementary operations that can be performed by fire alarm system. [8]
- b) Explain light scattering and light obscuring principle of photoelectric smoke detector. [8]

OR

- Q6)** a) Write a short note on fire sprinkler system. [8]
- b) Explain NFPA guidelines for spot detector placement. [8]

SECTION - II

- Q7)** a) What is authentication in access control system? What are different ways to authenticate? What are possible attacks on password based authentication? [10]
- b) Explain access control model and access control matrix. [8]

OR

Q8) a) What is physical access control? Explain different components used in physical access control system. [10]

b) Explain wiegand protocol with bit format. [8]

Q9) a) Explain MIPEG and MPEG4 types data compression. [8]

b) What are camera illumination requirements? Give classification of lenses in CCTV. [8]

OR

Q10) a) What are different activities carried out in CCTV control room. [8]

b) Explain technical tips for camera selection. [8]

Q11) a) What is intrusion detection system? Explain its importance and types. [8]

b) Explain different types of intrusion detectors. [8]

OR

Q12) a) Explain general camera specifications for CCTV application. [8]

b) Explain criteria for monitor selection in CCTV. [8]



Total No. of Questions : 12]

SEAT No. :

P1922

[Total No. of Pages : 3

[5059] - 248

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

ENVIRONMENTAL INSTRUMENTATION

(2008 Pattern) (Elective -II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the necessity of instrumentation & control for environment. [8]
b) Discuss the portable & stationary analytical instruments. [10]

OR

- Q2)** a) Explain in short: [2 × 5 = 10]
i) Flame ionization detector.
ii) Hydrocarbon analyzers.
b) Discuss the necessity of sensor requirement for environment. [8]

- Q3)** a) Explain in detail water quality parameters. [8]
b) What are the requirements of water treatment facilities? [8]

OR

- Q4)** a) Explain thermal conductivity detectors used in water treatments. Discuss their advantages and disadvantages. [8]
b) Write a note on opacity monitors. [8]

P.T.O.

- Q5) a)** Discuss the General equation for settling or rising of discrete particles. [8]
- b) Explain sedimentation process in detail. [8]

OR

- Q6) a)** Explain the process for laboratory analysis of ground water samples. [8]
- b) Discuss on design criteria of settling tank. [8]

SECTION - II

- Q7) a)** Discuss the Automatic waste water sampling process. [10]
- b) Give the general guidelines for choosing optimum sampling locations. [8]

OR

- Q8) a)** What is the concept of waste water monitoring? Discuss in brief about automatic waste water sampling. [8]
- b) Draw and explain primary, secondary and tertiary treatment of waste water. [10]

- Q9) a)** Discuss the analytical methods for air pollution. [8]
- b) Define air sampling. What are the different air sampling methods? Explain any one in detail. [8]

OR

- Q10) a)** Discuss the methods for control of air pollution. [8]
- b) List and compare any two particulate emission control techniques. [8]

Q11) a) Compare between open channel and non open channel flow measurement. **[8]**

b) What are the government policy for quality assurance of storage water. **[8]**

OR

Q12) a) What is the need of rain water harvesting? Discuss any one method used for rain water harvesting. **[8]**

b) Define the role of NGO's municipal corporation for Rain water harvesting. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3015

[5059]-249

[Total No. of Pages :3

**B.E.(Instrumentation & Control)
NANO INSTRUMENTATION
(2008 Pattern)(Elective-II)(406265B)**

Time :3Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1) a)** Explain energy sub-bands and density of states in Nano-scale structures viz. in a **[6]**
- i) Quantum Dot
 - ii) Quantum wire and
 - iii) Quantum well.
- b) What is Top-down and Bottom-up process? Describe two self-Assembly techniques with suitable diagrams. **[6]**
- c) Give the different types of Nano materials, their properties and applications **[6]**

OR

- Q2) a)** Describe the electron tunnelling through potential barrier and give the expression for wave function, transmission probability and kinetic energy. **[6]**
- b) Write a note on Nanolithography. **[6]**
- c) Describe PVD&CVD techniques for the synthesis of Nano materials. **[6]**

P.T.O.

- Q3)** a) Give the principle and working of an AFM with diagram and its different modes of operation. [8]
- b) Explain the principle and working of a scanning near field optical Microscope [8]

OR

- Q4)** a) Explain the various modes of operation of a scanning Tunneling Microscope [8]
- b) In an AFM, describe different types of interatomic forces involved in the tip sample interaction. [8]

- Q5)** a) What are different types of CNT's? Explain the structure properties and the terms viz. chiral vector, Chiral angle that leads to the nature of CNT's [8]
- b) Describe the CNT Transistor in detail. [8]

OR

- Q6)** a) What are the important features that makes CNT as good microwave absorbing material? Based on CNT array explains RF Filter. [8]
- b) Give the Comparison of field emission based devices using CNT versus metallic electron emitting tips. [8]

SECTION-II

- Q7)** a) Explain the terms, spin transport, spin injection, spin relaxation, spin polarization and magnetic moment. [8]
- b) Explain spin diode and spin transistor. [8]

OR

- Q8)** a) Describe GMR effect and Tunnelling Magneto Resistance effect with suitable diagrams. [8]
- b) Write a note on spin filtering device & give its applications. [8]

Q9) a) What is FET? Explain the MOSFET transistor's structure and working. Give the effect of scaling down. [8]

b) Explain single electron transistor and Coulomb Blockade effect. [8]

OR

Q10)a) Explain the Resonant Tunnelling Diode and Transistor with its structure and operation. [8]

b) Write a note on Mesoscopic devices at room temperature. [8]

Q11)a) Define Nano transducers and sensors? Describe Nano Mechanical sensor. [6]

b) Explain CNT based electron emitting device. [6]

c) Write a short note on Molecular switch. [6]

OR

Q12)a) Explain Light Emitting Diode and Nano laser. [6]

b) Explain Nano wire based optical Waveguide in detail. [6]

c) Describe chemical Nano scale sensor. [6]



Total No. of Questions : 6]

SEAT No. :

[Total No. of Pages : 3

P2110

[5059]-25

B.E.(Civil)

GEOINFORMATICS

(2008 Course)(Open Elective)(Semester-II) (401008)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) a) Describe characteristics of LANDSAT. [8]

b) Define resolution and explain any 2 types [8]

OR

a) Explain EMR. State the characterization for different frequencies on images. [8]

b) Discuss Visual Image Interpretation. Write the Elements of Visual Image Interpretation. [8]

Q2) a) What is false colour composite(FCC)Images? What are its advantages?[8]

b) Write a note on: [8]

i) Supervised Classification.

ii) Unsupervised Classification.

OR

a) Explain any two satellite images and its application. [8]

b) Write a note on: [8]

i) Image Rectification.

ii) Thermal & Infra Red Satellite

P.T.O.

- Q3)** a) Describe Characteristics of IR Images. [10]
b) “Geometric” Corrections in Images under processing. [8]

OR

- a) What is Digital Image processing and briefly explain its application [10]
b) Discuss the flow chart application of remote sensing in ground water assessment. [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) Map Resolution

OR

- a) Define GIS? Explain in detail its components. [8]
b) Write a note on: [8]
i) Hardware and software for GIS
ii) Attributes.

- Q5)** a) What is GPS? Explain its importance in GIS tooling. [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 Digital Image Processing. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1923

[Total No. of Pages : 2

[5059] - 250

B.E. (Instrumentation and Control) (Semester - II)

ADVANCED DIGITAL SIGNAL PROCESSING

(2008 Pattern) (Elective -II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.*
- 2) 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 integer band positioning. Explain even and odd integer positioning. **[12]**

b) Explain term Decimation. **[6]**

OR

Q2) a) Explain any one application of multirate digital signal processings in details. **[12]**

b) Explain term Interpolation. **[6]**

Q3) a) Explain forward linear prediction. **[10]**

b) Explain discrete time random signal and process. **[6]**

OR

Q4) a) Explain backward linear prediction. **[8]**

b) Compare AR, MA, ARMA processes, explain in brief. **[8]**

P.T.O.

- Q5)** a) Discuss the direct and indirect methods of estimation of energy density spectrum. [8]
b) Explain Burg method for AR model parameters estimation. [8]

OR

- Q6)** Compare the performance characteristics of Nonparametric Power Spectrum estimators. [16]

SECTION - II

- Q7)** a) Brief the different steps in LMS algorithm. [8]
b) Explain application of adaptive filtering for system modelling. [8]

OR

- Q8)** a) Explain different properties of LMS algorithm. [8]
b) Explain FIR adaptive filters. [8]

- Q9)** a) Explain the different features of TMS 320c67 xx DSP processor. [9]
b) Discuss the linear and circular addressing modes in TMS320C67XX. [9]

OR

- Q10)** a) Draw the functional block diagram of TMS320C67XX. Show all details. [9]
b) Explain different types of instructions of TMS320C67XX. [9]

- Q11)** a) Explain following properties of CWT Linearity, Translation, Shifting, and Scaling. [6]
b) Write short note on Wavelet Packets. [10]

OR

- Q12)** a) Explain two dimensional wavelets in details. [10]
b) Explain Q factor filtering in wavelets. [6]



Total No. of Questions : 12]

SEAT No. :

P1924

[Total No. of Pages : 3

[5059] - 251

B.E. (Instrumentation and Control)
AUTOMOBILE INSTRUMENTATION
(2008 Pattern) (Elective -II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate 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 current trends in modern automobiles? [6]
b) Explain various open loop and close loop components of engine management system. [10]

OR

- Q2)** a) Explain the motivations behind the use of electronics in automobile system. [6]
b) Explain about various components involved in mechanism of vehicle motion control system. [10]

- Q3)** a) Explain principle of fuel injection with neat block diagram. [6]
b) What is multi port or point fuel injection system in regards with automobile Engine operation? Explain it with neat block diagram. [10]

OR

- Q4)** a) What are the advantages of electronic ignition system? [6]
b) Types of solid state ignition systems. [2]
c) Their (solid state ignition systems) principle of operation, [5]
d) Electronic spark timing control system (steps involved) [3]

P.T.O.

Q5) Explain following modes of engine control: **[18]**

- a) Engine Cranking.
- b) Engine Warm-up.
- c) Open loop control.
- d) Close loop control.
- e) Acceleration Enrichment.
- f) Deceleration Learning.
- g) Idle Speed Control.

OR

- Q6)** a) Explain importance of exhaust gas emission control system and explain its operation? **[10]**
- b) Explain three way catalyst converter (TWC) for exhaust gas emission control. **[8]**

SECTION - II

Q7) a) Explain the principle of Electronic Braking. **[8]**

b) Explain Anti Lock Braking System (ABS). **[8]**

OR

Q8) a) Explain the operation of electronic steering control theory. **[8]**

b) Write a short note on cruise control circuit. **[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. :

P1925

[Total No. of Pages : 2

[5059] - 252

B.E. (Instrumentation & Control) (Semester - II)

PROCESS DYNAMICS AND CONTROL

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain dynamic behavior of linear first-order and second-order system. [8]

b) Comment on stability of controlled system. [8]

OR

Q2) a) Explain need of mathematical modeling. Explain I/O modeling. [8]

b) Find mathematical model of twin tank system (series) [8]

Q3) a) Explain any four control schemes of heat exchanger system. [10]

b) List dynamics of heat exchanger system. [8]

OR

Q4) a) Explain feedback control of Liquid - to - Liquid Heat exchanger. [10]

b) Explain exchanger response to changes in steam temperature. [8]

Q5) a) Explain safety interlocks of Boilers. [8]

b) Compare 1-element, 2-element and 3-element level control in Boiler. [8]

OR

P.T.O.

- Q6)** a) Explain with neat sketch feed forward control of feed water. [8]
b) Explain shrink and swell effect. Also explain inverse response phenomenon. [8]

SECTION - II

- Q7)** a) Explain end point detection of continuous and batch reactors. [10]
b) Explain time constants in reactors. Explain effect of lags in case of reactors. [8]

OR

- Q8)** a) Draw and explain control configuration for flow and temperature in reactor system. [10]
b) Explain batch production management in reactor. [8]

- Q9)** a) Explain Mass and energy balance equation in distillation column. [8]
b) Draw and explain overhead and bottom composition control schemes in case of distillation column system. [8]

OR

- Q10)** a) Explain control scheme for distillate reflux control. [8]
b) Explain frequency response and lag in liquid of distillation system. [8]

- Q11)** a) Explain design aspects of waste-water treatment plant. [8]
b) Explain types of pumps and their characteristics (any two). [8]

OR

- Q12)** a) Write short note on controls required in compressors. [8]
b) Discuss control scheme development for waste-water treatment plant. [8]



Total No. of Questions : 12]

SEAT No. :

P1926

[Total No. of Pages : 2

[5059] - 253

B.E. (Instrumentation & Control) (Semester - II)

INDUSTRIAL AUTOMATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) List and explain the benefits of automation in plant. [10]

b) Explain the role of PLC and PAC system with reference to automation pyramid. [8]

OR

Q2) a) List and explain the benefits of automation in plant. [10]

b) With the help of block diagram explain the different stages of preparing Functional Design Specifications. [8]

Q3) a) Explain Foundation fieldbus communication layers with respect to OSI/ISO reference model. [8]

b) Write short note on Profibus. [8]

OR

Q4) a) List and explain at least four universal commands used in HART. [8]

b) Write short note on OPC Protocol. [8]

Q5) a) Explain the analog control used in PLC system. [8]

b) With an example explain the “Functional block diagram” in PLC Programming. [8]

OR

P.T.O.

- Q6)** a) With an example explain the “Sequential Function Chart”. [8]
b) Write short note on CNC Machine. [8]

SECTION - II

- Q7)** a) Write a program in DCS system (Any make) using FBD programming method for any Temperature control loop. Write the different steps involved in the configuration of function blocks. [10]
b) Explain how DCS support ERP. [8]

OR

- Q8)** a) With some suitable example explain four major components of the DCS system. [10]
b) Explain the various logical function blocks used in DCS system. [8]

- Q9)** a) With the help of an example explain what “Third party interface”. [8]
b) Explain the need of diagnosis and reporting function used in DCS. [8]

OR

- Q10)** a) Explain the need of database management system in DCS. [8]
b) Explain the Security and User access management system in any DCS System. [8]

- Q11)** a) With the help of block diagram explain safety life cycle. [8]
b) What is Process Hazard Analysis (PHA)? How it is carried out? [8]

OR

- Q12)** a) Explain the different layers of protection. [8]
b) Write on applications of safety systems. [8]



Total No. of Questions : 12]

SEAT No. :

P1927

[Total No. of Pages : 2

[5059] - 254

B.E. (Instrumentation) (Semester - II)
ADVANCED BIOMEDICAL INSTRUMENTATION
(2008 Pattern) (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 indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What is the need of 'Cardioversion'? Explain synchronised Defibrillator with the help of a neat block diagram. [8]
- b) Explain different electrodes used for various modes of ESU. [6]
- c) What are the advantages and disadvantages of fixed rate pacemaker. [4]

OR

- Q2)** a) What are the specifications of Drug Delivery System. [4]
- b) Describe the working of peristaltic pump used in Drug Delivery System. [8]
- c) Write a short note on 'Anasthsia Machine'. [6]

- Q3)** a) What does the blood consist of? Explain the function of each. [8]
- b) Describe system components for a typical Telemedicine System. [8]

OR

- Q4)** a) What is telemetry? Explain Frequency Division Multiplexing with a suitable block diagram. [10]
- b) Draw the graph explaining the basic working principle of oximeter. [6]

P.T.O.

- Q5)** a) Discuss how CT imaging is advantageous than Xray imaging. [6]
b) Compare Radiography and Fluroscopy. [4]
c) Explain any one application of fluroscopy. [6]

OR

- Q6)** a) With a neat diagram explain the working of Xray tube. [8]
b) Describe various types of gantries used in CT scanning. [8]

SECTION - II

- Q7)** a) How the frequency and size of transducer is important in ultrasound imaging. Specify their values for abdominal and retinal scanning. [8]
b) Explain the working of a gamma camera with a suitable diagram. [8]

OR

- Q8)** a) What is echoencephalograph? Describe it in detail with a neat diagram. [8]
b) Write a short note on 'Positron Emission Tomography'. [8]

- Q9)** a) How diathermy helps in reducing the pain? Describe Short wave diathermy. [8]
b) What is retinal detachment? Describe the cause and its repairing methods. [8]

OR

- Q10)** a) Which properties of laser make them suitable for biomedical applications? Explain any one application of laser in Ophthalmology. [10]
b) What is Ultrasound Diathermy? [6]

- Q11)** a) Describe the instrumentation involved in Peritoneal Dialysis. [8]
b) Describe various orthotic and prosthetic devices. [10]

OR

- Q12)** a) Describe different types of wheelchairs and materials used for it. [8]
b) What are the types of dialysers used in Hemodialysis. Compare them on the basis of size, efficiency and cost. Explain Coil Type Dialyser. [10]



Total No. of Questions : 12]

SEAT No. :

P1928

[Total No. of Pages : 3

[5059] - 255

B.E. (Instrumentation and Control) (Semester - II)

FIBER OPTIC INSTRUMENTATION

(2008 Pattern) (Elective -III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a) Explain following: [10]**
- i) Step-index fiber.
 - ii) Graded-index fiber.
- b) Determine the acceptance angle and critical angle of an optical fiber with numerical aperture of 0.20 and a cladding refractive index of 1.59. [8]

OR

- Q2) a) A silica optical fiber with a core diameter large enough to be considered by ray theory analysis has a core refractive index of 1.50 and a cladding refractive index of 1.47. Determine : [9]**
- i) The critical angle at the corecladding interface;
 - ii) The NA for the fiber;
 - iii) The acceptance angle in air for the fiber.
- b) Describe with the aid of simple ray diagram: [9]
- i) Total internal reflection.
 - ii) Skew rays.

Also, explain the advantages optical fibers.

P.T.O.

- Q3)** a) Explain absorption losses in optical fibers and compare the intrinsic and extrinsic absorption mechanisms. [8]
- b) Describe linear scattering losses in optical fibers with respect to: [8]
- i) Rayleigh scattering.
 - ii) Mie scattering.

OR

- Q4)** a) Explain Micro bending and Macro bending in optical fiber. Also, explain the critical bending radius for an optical fiber. [8]
- b) Explain in detail the chromatic dispersion in optical fiber. [8]

- Q5)** a) Compare the structures of LED and Laser as light sources in optical waveguides. [8]
- b) Compare P-I-N diode with avalanche photodiode. [8]

OR

- Q6)** a) Explain following: [8]
- i) Fiber alignment and joint loss.
 - ii) Fiber splicing techniques.
- b) Explain various types of optical couplers. [8]

SECTION - II

- Q7)** What are the advantages of Intensity Modulated Optical Sensors (IMOS)? Describe following techniques of sensing which is based on intensity modulation. Also enlist different parameters, which can be sensed by using these techniques. [18]
- a) Evanescent field.
 - b) Coupling.
 - c) Encoding based position sensors.

OR

Q8) a) What do you understand by intrinsic and extrinsic Optical Fiber Sensors? With the aid of suitable diagrams describe one Extrinsic Optical Fiber Sensor. How do you calibrate this sensor. [9]

b) What are the advantages and drawbacks of Optical Fiber Sensors? [9]

Q9) a) What are the advantages and disadvantages of Distributed Optical Fiber Sensing? Explain role of Optical Time Domain Reflectometer (OTDR) in Distributed Optical Fiber Sensing. [8]

b) How various parameters are sensed by using Fiber Bragg Grating? [8]

OR

Q10) Write short notes on:

a) Fiber Bragg Grating. [8]

b) Distributed Optical Fiber stress-strain sensor. [8]

Q11) a) Sketch the major elements of a fiber amplifier and describe the operation of the device. Indicate the benefits of fiber amplifier technology in comparison with that associated with silicon laser amplifiers (SLAs). [10]

b) Write a note on Integrated Optics. [6]

OR

Q12) a) Give major reasons which have led to the development of optical amplifiers, outlining the attributes and application areas for these devices. [8]

b) Explain with the aid of suitable diagrams, following integrated optical devices: [8]

i) Beam splitter.

ii) Directional coupler.



Total No. of Questions : 12]

SEAT No. :

P3746

[Total No. of Pages : 3

[5059] - 256

B.E. (Instrumentation)

PROCESS MODELLING AND OPTIMISATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :-

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

SECTION - I

- Q1)** a) Derive second order model of any electric circuit. [8]
b) Derive process model of two tanks in parallel. [8]

OR

- Q2)** What is curve fitting? Derive the equations to find the coefficients for linear relation $y = ae^b$. [16]

- Q3)** a) Derive mathematical model of flash drum. [9]
b) Derive mathematical model of a evaporator. [9]

OR

- Q4)** a) Derive Mathematical model for two tanks in series with constant holdups. [6]
b) Develop a steady state mathematical model for n tray distillation column. [12]

P.T.O.

- Q5)** a) Explain pulse testing method. [8]
 b) Explain merits and demerits of step and sine wave testing. [8]

OR

- Q6)** a) Explain relationships among time, Laplace and frequency domain. [8]
 b) Explain ATV identification method. [8]

SECTION - II

- Q7)** a) Determine the stability of a 2×2 process with a diagonal feedback controller given as : [9]

$$G_m = \begin{bmatrix} 3 & 10 \\ 1 & 5 \end{bmatrix} \text{ and } B_s = \begin{bmatrix} 2 & 0 \\ 0.5 & 1 \end{bmatrix}$$

- b) Write short note on robust nests doylt stein criterion. [9]

OR

- Q8)** a) How interaction between loops can be determine? Explain limitation of method. [9]

- b) Explain Inverse Nyquist array. [9]

- Q9)** For the functions given below, analyze the concavity and convexity in each case, [16]

a) $f(x_1, x_2) = (x_1 + x_2)^2 + x_2^2$

b) $f(x) = 2x_1^2 + 3x_1x_2 + 2x_2^2 + x_1 + 5x_2 + 25$

c) $f(x) = x + 4x^2 + 5x^3$

d) $f(x_1, x_2) = 4x_1^2 - 6x_1x_2 + 9x_2^2$

OR

Q10)a) How to find extremum of the objective functions and also explain it's importance. [8]

b) Explain quadratic approximation. [8]

Q11)a) Explain quasi Newton method of optimization. [8]

b) Explain steepest descent method. [8]

OR

Q12)a) Explain multidirectional search method for optimization. [8]

b) How the single variable function can be optimize. [8]



Total No. of Questions : 12]

SEAT No. :

P1929

[Total No. of Pages : 2

[5059] - 257

B.E. (Instrumentation and Control)

BUILDING AUTOMATION - II

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn 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) Differentiate heat intensity and heat quantity. [8]

b) Define Sensible Heat loss with suitable example and explain its effects on human comfort. [10]

OR

Q2) a) Explain use of Psychometric chart. [10]

b) Explain various processes of Air conditioning for HVAC. [8]

Q3) a) Describe different types of boilers for HVAC. [8]

b) Explain steam heating system. [8]

OR

Q4) a) Describe vapor compression cycle. [8]

b) Describe various steam traps of steam system. [8]

Q5) a) Describe the functions of DDC with respect to HVAC. [6]

b) What is BMS? Explain its components. [10]

OR

P.T.O.

- Q6)** a) Explain multiloop controller DDC. [6]
b) Describe P, PI and PID control actions with HVAC. [10]

SECTION - II

- Q7)** a) Describe motor control center with block diagram. [8]
b) Describe LON protocol. [8]

OR

- Q8)** a) Explain BACnet protocol. [8]
b) Describe MODBUS protocol. [8]

- Q9)** a) Explain role of ASHRAE in HVAC. [8]
b) Explain the elements of green building. [8]

OR

- Q10)** a) What are the different energy management/conservation strategies? Explain. [8]
b) Explain lighting control. [8]

- Q11)** a) Explain features and benefits of IBMS. [10]
b) During the life cycle of any project execution what are the various steps or milestones? [8]

OR

- Q12)** a) Name different verticals where Building Management System can be used. Explain any two. [10]
b) What are the different building management systems which can be integrated and also list few of the advantages of integration? [8]



Total No. of Questions : 12]

SEAT No. :

P1930

[Total No. of Pages : 2

[5059] - 258

B.E. (Instrumentation & Control) (Semester - II)

AGRICULTURE IN INSTRUMENTATION

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer 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 role of Instrumentation in Agriculture engineering. [8]

b) Discuss the Index properties of Soil. [8]

OR

Q2) a) Write a note on Hygrometer (any two): [8]

b) Write a note on Bio sensor. [8]

Q3) a) Explain the instrumentation for Sugar plant. [9]

b) Explain the instrumentation for Dairy industry. [9]

OR

Q4) a) Explain the flow diagram of Fermenter process. [9]

b) Explain the flow diagram of juice extraction process. [9]

Q5) a) Explain Micro Irrigation system. List out the applications. [10]

b) Explain the necessity of Irrigation system in agriculture. [6]

OR

P.T.O.

- Q6)** a) Explain concept of irrigation scheduling and Irrigation efficiencies. [8]
b) Define the design considerations in irrigation channels. [8]

SECTION - II

- Q7)** a) Explain the application of SCADA for DAM parameters. [8]
b) Explain irrigation control management of up stream & down stream control system. [8]

OR

- Q8)** a) Explain the instrumentation sensor system for green house. [8]
b) With a block diagram explain the application of PLC for cold storage systems. [8]

- Q9)** a) Explain implementation of hydraulic control circuit use in harvesters cotton pickers. [6]
b) With a block diagram explain the application of SCADA for cold storage systems. [10]

OR

- Q10)** a) Explain selection criteria for pump in detail. Explain installation of pump. [8]
b) Explain pump different types of pumps used in agriculture field. [8]

Q11) Write short notes on:

- a) Agrometrological instrumentation weather stations. [9]
b) UV bio sensor methods in agriculture. [9]

OR

- Q12)** a) Explain the aquifer properties. [9]
b) Explain soil water content measurement using TDR. [9]



Total No. of Questions : 12]

SEAT No. :
[Total No. of Pages : 3

P1931

[5059] - 259

B.E. (Instrumentation & Control)
MICRO ELECTRO MECHANICAL SYSTEMS
(2008 Pattern) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Answer three questions from Section I and three questions from Section II.*
- 2) Answers to the two Sections should be written in separate answer-books.*
- 3) Draw neat sketches wherever necessary.*
- 4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is permitted.*

SECTION - I

- Q1) a)** What is microsystem? Explain its components. Enlist different microsystems. [8]
- b) What is MEMS. Give examples of MEMS and explain any one. [8]

OR

- Q2) a)** Define smart materials. Enlist types of smart materials and explain any one. [8]
- b) Draw and explain the smart system blocks. State the requirements expected in a smart system. [8]

- Q3) a)** Explain with diagram the principle of operation of piezoresistive pressure sensor. State its applications. [8]
- b) Explain with diagram the principle of operation of conductometric gas sensor. State its applications. [8]

OR

P.T.O.

Q4) a) Explain with diagram the principle of operation of magnetic microrelay. State its applications. [8]

b) Explain with diagram the principle of operation of piezoelectric inkjet printer head. State its applications. [8]

Q5) a) What is thin-film deposition in microsystem fabrication. Explain PVD process for metal film deposition. [9]

b) Explain the process of photolithography. What is positive and negative resist? [9]

OR

Q6) a) Compare the bulk and surface micromachining processes for silicon. [9]

b) Enlist advanced processes for microfabrication. Explain any one. [9]

SECTION-II

Q7) a) What is a bar? Explain with diagram the concept of stress in a bar. [8]

b) Explain with diagram the Bimorph effect. [8]

OR

Q8) a) What is residual stress and stress gradient. Explain the effect of residual stress on a fixed-free beam. [8]

b) Define:

i) Stress.

ii) Strain.

iii) Hook's Law.

iv) Young's modulus of elasticity. [8]

Q9) a) Explain the difference between Finite Difference Method and Finite Element Method. [8]

b) Draw flow chart of finite element procedure and describe it. [8]

OR

- Q10)** a) Describe different applications of Finite Element Method. [8]
b) What are the different steps involved in solving structural problems using Finite Element Method? [8]

- Q11)** a) Explain tunnel diode and its I-V characteristics with the help of diagram. [9]
b) Explain the operating principle of phase-locked loop (PLL) using block diagram. [9]

OR

- Q12)** a) Explain stability of control systems and enlist methods to determine stability of control systems. [9]
b) Explain the CMOS First and MEMS First approach for integration of microsystem and microelectronics with neat diagrams. [9]



Total No. of Questions : 12]

SEAT No. :

P1782

[Total No. of Pages : 3

[5059] - 26

B.E. (Civil)

HYDROPOWER ENGINEERING

(2008 Pattern) (Open Elective)

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.*

SECTION - I

- Q1)** a) What are the different sources of energy? Differentiate between renewable and non renewable energy sources. [8]
- b) What is pumped storage plant? What are its advantages and limitations. [8]

OR

- Q2)** a) Differentiate between Hydropower and thermal plant. [8]
- b) Explain hydropower potential of India on the basis of river systems. State the examples and significant hydropower stations established these systems. [8]

- Q3)** a) State the different types of run off river plants and explain the components and their functions of run of river plant. [8]
- b) Differentiate between base load and peak load plant. [8]

OR

- Q4)** a) Classify the hydropower plant on the basis of [8]
- i) Functions
 - ii) Plant capacity
 - iii) Head
 - iv) Location

P.T.O

- b) With neat sketch explain, components, their function and working of valley power plant. [8]

Q5) a) Explain the significance of load prediction. What are the different methods of load prediction? Explain any one. [8]

- b) A river has a constant flow of 40 cumes with the head of 15 m considering overall efficiency of 85% 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

OR

Q6) a) Explain the load duration curve on the basis of [8]

- i) Concept
- ii) Significance
- iii) Application
- iv) Graph

- b) A load on hydal plant varies from minimum of 10000 kW to a maximum of 40000 kW. Two turbo generator of capacities 22000 kW each have been installed. Calculate [10]

- i) Total installed capacity of the plant
- ii) Plant factor
- iii) Maximum demand
- iv) Load factor
- v) Utilisation factor

SECTION - II

Q7) a) What are the components of dam foot power house? Explain their function which type of turbine is preferred in dam foot power house? Why? [8]

- b) State names and functions of three bays of superstructure of power house with sketch. [8]

OR

- Q8) a)** What is meant by instrumentation of power house. [8]
b) What are the safety requirements of power house. [8]

- Q9) a)** Differentiate between reaction turbine and impulse turbine. [8]
b) Determine the number of turbines and diameter of runner for a power plant having 40 cumecs inflow, 20m head. The efficiency of turbine is 75% with the speed of 200 rpm. Assume the specific speed of 250 and speed ratio as 0.8. [10]

OR

- Q10)a)** Classify the turbine on the basis of specific speed, Head, discharge and direction of flow. [8]
b) Derive equation of definition of draft tube. [10]

- Q11)a)** What is concept of carbon credit? Explain its significance. [8]
b) What are duties of electricity generation companies. [8]

OR

- Q12)a)** What are the provisions related to safely and electric supply as per electricity act 2003? [8]
b) What is pricing of electricity? State any four factors governing pricing of electricity. [8]



Total No. of Questions :12]

SEAT No. :

P2129

[5059]-260

[Total No. of Pages : 2

**B.E. (Instrumentation & Control)
DIGITAL IMAGE PROCESSING
(406270) (2008 Course)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer to section I and section II should be written in separate answer sheets*
- 2) 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*
- 3) Answer Q.No.7 or Q.No.8 Q.No.9 or Q.No.10 Q.No.11 or Q.No.12 from Section-II*
- 4) Neat diagrams must be drawn whenever necessary.*
- 5) Figures to the indicate full marks.*

SECTION-I

Q1) Explain the steps in digital image processing. **[16]**

OR

Q2) Discuss various image degitizing components with suitable examples. **[16]**

Q3) Explain intensity and spatial resolution with suitable examples. **[16]**

OR

Q4) Explain image sampling and quantization with suitable examples. **[16]**

Q5) Obtain the 2D DCT of the following image: **[18]**

1 2 3

4 5 6

7 8 9

OR

Q6) Explain DFT. Discuss its properties and applications. **[18]**

P.T.O.

SECTION-II

Q7) Explain mean spatial filter for image enhancement with suitable example. **[18]**

OR

Q8) Explain image enhancement in frequency domain. **[18]**

Q9) Explain image degradation model. **[16]**

OR

Q10) Explain weiner filtering. **[16]**

Q11) Explain edge detecting operators with suitable example. **[16]**

OR

Q12) Discuss edge detection in image with suitable application. **[16]**



Total No. of Questions : 12]

SEAT No. :
[Total No. of Pages : 4

P1932

[5059] - 261

B.E. (Chemical) (Semester - I)
PROCESS DYNAMICS AND CONTROL
(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 diagram must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*
- 4) Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** What are the design elements of control system? Explain with examples. [8]
b) Derive the Input-output model for CSTR system. [8]

OR

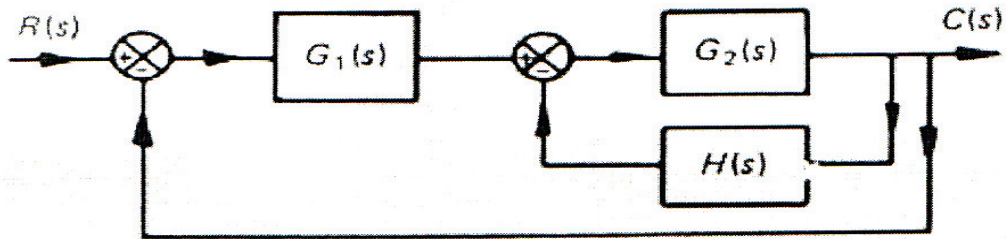
- Q2) a)** Derive the transfer function and time domain equation for a pure Capacitive process subjected to unit step input. Sketch the dynamic response of the same. [8]
b) A thermometer showing steady state temperature of 20°C is suddenly immersed into a hot bath at 100° C. If the time constant of thermometer is 5 sec, determine the following: [8]
i) Thermometer reading after 5 sec.
ii) Time required reading 80°C on Thermometer.
iii) Time required for 80% response.

- Q3) a)** Derive the transfer function for damped oscillator / vibrator system. Comment on type of dynamic response of the system. [8]
b) Discuss the characteristics of underdamped response. Sketch the overshoot and decay ratio versus damping factor ξ if damping factor ξ is varied from 0 to 1. [8]

P.T.O.

OR

- Q4) a)** Reduce the following block diagram and obtain the transfer function $C(s)/R(s)$. [8]



- b) A first order process with following transfer function is controlled by P controller. Assuming servo problem and neglecting the dynamics of final control element and measuring instrument i.e. $G_f(s) = G_m(s) = 1$;

$$\text{The open loop process is } G_p(s) = \frac{1}{s+1}$$

Determine the following; [8]

- i) Closed loop transfer function.
 - ii) Order of response.
 - iii) Closed loop gain, time constant.
 - iv) Offset.
- Q5) a)** Define stability of the process and discuss Characteristic equation and Routh-Hurwitz criteria for stability. [8]
- b) Draw the root locus diagram for the system with following transfer function; [10]

$$G_p(s) = \frac{K_p}{s(s+1)(s+2)}$$

OR

Q6) Write short notes on: [18]

- a) Feedback v/s Feedforward control.
- b) Controller tuning.
- c) ISE, IAE, ITAE.

SECTION-II

Q7) a) Sketch the Bode diagram for the given first order system [9]

$$Gp (s) = \frac{1}{(5s + 1)}$$

b) Sketch the Nyquist diagram for PD controller [9]

OR

Q8) a) Sketch the Nyquist diagram for PI controller. [9]

b) Discuss the following: [9]

- i) Gain margin & phase margin.
- ii) Bode stability criteria.

Q9) Discuss in detail with a neat sketch of following: [16]

- a) Cascade Control system for CSTR.
- b) Adaptive control

OR

Q10) Draw a neat sketch of following and explain with suitable examples: [16]

- a) Ratio Control.
- b) Auctioneering control.

Q11) Draw the instrumentation diagram for Plant wide control for plants involving compressor and discuss in detail about its functioning. [16]

OR

Q12) Write short notes on :

[16]

- a) PLC and SCADA.
- b) DCS.
- c) MIMO Control system.
- d) Digital approximation of Analog signals.



Total No. of Questions : 12]

SEAT No. :
[Total No. of Pages : 4

P1933

[5059] - 262

B.E. (Chemical Engineering)
CHEMICAL REACTION ENGINEERING - II
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Calculate the time needed to burn to completion particles of graphite ($R = 5\text{mm}$, $p = 2.2 \text{ gm/cm}^3$, $k'' = 20 \text{ cm/sec}$) in an 8% oxygen stream. For the high gas velocity used assume that film diffusion does not offer any resistance to transfer and reaction. Reaction temperature = 900°C . [8]
- b) Derive the equation for rate of reaction and time for complete conversion of small particles in case of shrinking spherical particles with gas film diffusion control (Stokes Regime) [8]

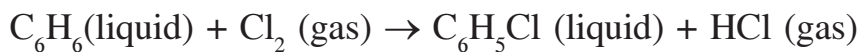
OR

- Q2)** a) A stream of particles of one size are 80% converted (SCM/ash diffusion control. uniform gas environment) on passing through a reactor. If the reactor is made twice the size but with the same gas environment, same feed rate, and same flow pattern of solids, what would be the conversion of solids? The solids are in plug flow.
A solid feed consisting of
20 wt% of 1-mm particles and smaller
30 wt% of 2-mm particles
50 wt% of 4-mm particles
passes through a rotating tubular reactor some what like a cement kiln where it reacts with gas to give a hard nonfriable solid product (SCM/reaction control, $\pi = 4 \text{ h}$ for 4 - mm particles). [8]

P.T.O.

- b) Derive an expression for fractional conversion of particles in case of fluidized bed with entrainment of solid fines with all controlling resistances. [8]

Q3) Benzene is to be chlorinated in a tower by countercurrent contacting with a stream of pure gaseous chlorine. The reaction is slow, elementary and irreversible.



The reaction occurs in the liquid between dissolved chlorine and benzene. The required assumptions are:

Constant molar density of liquid, $C_T = \text{constant}$; Constant pressure in gas phase, $\pi = \text{constant}$; Plug flow of both streams; Small amount of dissolved and unreacted chlorine in liquid; Low solubility of HCl in liquid; The reaction of Cl_2 with $\text{C}_6\text{H}_5\text{Cl}$ to be neglected. Derive the expression for the height of tower as a function of the system variables. [18]

OR

Q4) a) Explain in detail slurry reaction kinetics. [8]

- b) Hydrogen sulfide is absorbed by a solution of methanolamine (MEA) in a packed column. At the top of the column, gas is at 20 atm and it contains 0.1% of H_2S while the absorbent contains 250 mol/m³ of free MEA. The diffusivity of MEA in solution is 0.64 times that of H_2S . The reaction is normally regarded as irreversible and instantaneous.



(A) (B)

For the flow rates and packing used

$$k_{Ala} = 0.03 \text{ s}^{-1}$$

$$k_{Aga} = 60 \text{ mol/m}^3 \cdot \text{s} \cdot \text{atm}$$

$HA = 1 \times 10^{-4} \text{ m}^3 \cdot \text{atm/mol}$, Henry's law constant for H_2S in water. Find the rate of absorption of H_2S in MEA solution. [10]

- Q5) a)** The following data were obtained at 70°C for the equilibrium adsorption of n-hexane on silica gel particles.

Partial pressure of C ₆ H ₁₄ in gas, atm	C ₆ H ₁₄ adsorbed, g mol/(g gel)
0.0020	10.5 × 10 ⁻⁵
0.0040	16.0 × 10 ⁻⁵
0.0080	27.2 × 10 ⁻⁵
0.0113	34.6 × 10 ⁻⁵
0.0156	43.0 × 10 ⁻⁵
0.0206	47.3 × 10 ⁻⁵

Determine the values of constants C_m and K_c for Langmuir isotherm by least-square-analysis. [8]

- b) Explain in detail the BET method for determination of surface area of catalyst. [8]

OR

- Q6) a)** Explain the catalyst with various types and explain preparation of catalyst in detail. [8]

- b) Estimate the surface area of the silica gel by using the adsorption data for oxygen at -183°C the density of the liquefied oxygen at -183°C is 1.14 g/cm. data at -183°C is :

$$V = 22,400 \text{ cm}^3/\text{g mol}; I = 0.40 \times 10^{-3} \text{ cm}^{-3}; s = 13.2 \times 10^{-3} \text{ cm}^{-3} \quad [8]$$

SECTION-II

- Q7) a)** Discuss in detail gaseous diffusion in single cylindrical pores with the help of Knudsen diffusivity and molar flux equations. [8]

- b) Explain in detail method for measuring diffusion in porous catalyst. [8]

OR

- Q8) a)** Write a short note on mass transfer with reaction with the help of effectiveness factor in catalytic reactions. [8]

- b) Explain in detail significance of intrapellet diffusion. [8]

Q9) The catalytic reaction $A \rightarrow 4R$ is studied in a plug flow reactor using various amounts of catalyst and 20 liter/hr of pure A feed at 3.2 atm and 117 °C. The concentration of A in the effluent stream is recorded for the various runs as follows

Run	1	2	3	4	5
Catalyst used, kg	0.020	0.040	0.080	0.120	0.160
$C_{A,out}$, mol/lit	0.074	0.060	0.044	0.035	0.029

Find a rate equation to represent this reaction using integral method of analysis with following data $C_{A0} = 0.1$ mol/lit, $F_{A0} = 2$ mol/hr, $\epsilon_A = 3$ [16]

OR

Q10)a) What are the various experimental methods for finding rates in catalytic reactions? Explain any one in detail. [8]

b) What are the various controlling resistances in case of solid catalysed reactions? Explain one in detail. [8]

Q11) Write a short note on design procedures for [18]

- a) Bubble column reactor
- b) Fermentor
- c) Fluidized bed reactor

OR

Q12)a) Explain in detail design of staged adiabatic reactor. [9]

b) Explain Michaelis-Menton Kinetics with its model parameters. [9]



Total No. of Questions : 12]

SEAT No. :

P3016

[5059]-263

[Total No. of Pages : 3

B.E. (Chemical)

CHEMICAL ENGINEERING DESIGN - II

(2008 Course) (Semester - I) (409345)

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)** Calculate the diameter of shaft for an agitation system. Power required for agitation is 3HP and speed of rotation is 56 rpm. Impeller diameter is 65 cm. Maximum torque is 18900 kg-m while bending moment is 27700kg-m Permissible shear stress = 400 kg/cm², Permissible tensile stress = 600 kg/cm². **[8]**
- b) With neat sketches describe vortex and swirling and methods to avoid it. **[8]**

OR

- Q2) a)** A jacketed reactor with agitator has a diameter of 1.5 m with a hemispherical bottom and a flat top. Jacket is fitted to the cylindrical section only and extends to a height of 1.2 m. The spacing between the jacket and the vessel wall is 75 mm. The jacket is fitted with a spiral baffle. The pitch between the spirals is 200 mm. Cold water at 10°C is used as a coolant @ 32,000 kg/h with an exit temperature of 20°C. Estimate the heat transfer coefficient at the outside wall of the reactor and the pressure drop in the jacket. Density of water = 998 kg/m³, viscosity of water = 1.136 m Ns/m², $N_{Pr} = 7.9$, $k_f = 0.59$ w/mK, $j_f = 3.2 \times 10^{-3}$. **[10]**
- b) Explain the classification of agitators. **[6]**

P.T.O.

- Q3) a)** What are the different design methods for binary systems? Explain any one in detail. [8]
- b) What are the steps in the procedure for plate design? [8]

OR

- Q4) a)** Find out the plate pressure drop and check the downcomer back up for the column with the help of following data: Diameter of column = 0.79 m, Area of column = 0.5 m², Volumetric flow rate of vapour = 1.13 m³/s, Orifice coefficient = 0.84, Density of vapour = 0.70 kg/m³, Density of liquid = 950 kg/m³, Weir height = 50 mm, Weir length = 0.6 m, Hole diameter = 5 mm, Plate thickness = 5 mm, Height of overflow weir = 27 mm, Maximum liquid rate = 4.06 kg/s. [10]
- b) What is the function of weir on a plate and what is effect of weir height on column performance? [6]

- Q5) a)** The following data are obtained for a packed column used for absorption:

mG_m/L_m	0.5	0.6	0.7	0.8	0.9	1.0
N_{OG}	4.8	5.2	6.5	8.0	10.8	19.0

- Select the optimum value of mG_m/L_m and give reasons. [10]
- b) Explain in detail Onda's method for prediction of HTU. Give the necessary equation. [8]

OR

- Q6) a)** What are the design features of packing support and liquid distributor, so that smooth operation of packed column is ensured. [8]
- b) A feed containing 45% more volatile component enters a packed bed. The distillate from the packed bed contains 95% more volatile component and bottom product contains 10% more volatile component. Relative volatility of the mixture is 3.0. A total condenser is used and the tower is operated with a reflux ratio of 1.25 times the minimum reflux ratio. The height of transfer unit values for rectifying section are $H_y = 0.5$, $H_x = 1.0$. Mass transfer coefficient is constant across the column. Determine the flow rates, steam consumption and packing height required to achieve the separation. [10]

SECTION - II

- Q7)** a) Design a separator for the separation of a mixture of steam and water. Steam: Flow rate = 2100 kg/h, Density = 2.2 kg/m³, Water: Flow rate = 1000 kg/h, Density = 930 kg/m³, Operating pressure = 4 bar. [10]
- b) What are material hazards and process hazards? [8]

OR

- Q8)** a) Explain design of pipelines based on fluid dynamic parameter. Give details of any one case. [10]
- b) Explain the working of cyclone separator. [8]
- Q9)** a) Give the relevant equations for the design of natural gas pipeline and the properties for the same. [8]
- b) Why are standards required? Name a few standards followed in piping design. [8]

OR

- Q10)**a) Explain Pipe line networks and their analysis for flow in branches. [8]
- b) Water is flowing through a pipeline at a rate of 1 kg/sec. The internal diameter of the pipeline is 25 mm and the length of pipeline is 2200 m. Estimate the pressure drop in the pipeline. Density of water = 1000 kg/m³, Viscosity of water = 0.001 N.s/m². [8]
- Q11)**a) 30 kg/sec of water is to be transported through a steel pipeline to a location 2 km away. The frictional pressure drop across the pipeline is 50,000 N/m². Find the diameter of the pipeline. Roughness of pipeline is 4.1×10^{-5} . Density = 995 kg/m³, viscosity of water 0.8×10^{-3} N.s/m². [8]
- b) What are the various types of supports used for piping? [8]

OR

- Q12)**a) Discuss about the selection of optimum pipe diameter. [6]
- b) Explain types of gaskets and their selection. [10]

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Total No. of Questions : 12]

SEAT No. :
[Total No. of Pages : 2

P1934

[5059] - 264

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(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) 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) Describe 'The Nitrogen Cycle' in detail. **[16]**

OR

Q2) With the help of neat sketch, describe ESP for air pollution control. **[16]**

Q3) During a dispersion study the lapse rate was constant at 1.1 °C per 100 m. If the atmosphere is assumed to behave as a perfect gas, at what altitude was the pressure one-third the sea level. The sea level temperature and pressure were 14 °C and 1 atm. respectively. **[16]**

OR

Q4) The rate of emission of SO₂ from the stack of a power plant is 150 gm/sec. The stack height is 50 m. Calculate the effective stack height on a sunny September day when the wind velocity is 5 m/sec. Use Class B stability. The effluents are being released at 10m/s and at a temperature of 310°K. The atmospheric temperature is 293°K. (Assume stack diameter = 1m) **[16]**

Q5) Write a short notes on each of the following with figure. **[18]**

- a) Control of SO_x in a complex fertilizer plant.
- b) Removal of hydrogen sulphide from sour gas in a petroleum industry.

P.T.O.

OR

Q6) Write a short notes on each of the following with figure. [18]

- a) Fabric filter systems.
- b) Fixed bed adsorber

SECTION-II

Q7) Write a detail note on 'Dissolved Oxygen in the water'. [16]

OR

Q8) Derive Streeter - Phelps equation and explain the terms used in the equation. [16]

Q9) Design an activated sludge process to yield an effluent BOD of 20 mg/l and suspended solids of 25 mg/l. The influent BOD following primary clarification is 160 mg/l. Assume $Y = 0.65$, $K_d = 0.05$ and sludge retention time 10 days. The waste flow is $10 \text{ m}^3/\text{min}$. [18]

OR

Q10) Design one stage high rate trickling filter to produce a BOD effluent of 50 mg/l. given the following data.

$$Q = 10,000 \text{ m}^3/\text{d}$$

$$\text{Influent BOD} = 400 \text{ mg/l}$$

$$\text{Temperature } T = 20^\circ\text{C}$$

Primary sedimentation tank will be used before the trickling filter. [18]

Q11) Explain the following points related to sugar industry. [16]

- a) Manufacturing process and waste water generation.
- b) Characteristics of waste water and
- c) Methods of treatments.

OR

Q12)a) Give the typical classification of solid waste. Also, explain each class in brief. [6]

b) Describe 'composting' operation for disposal of solid waste in detail. (Diagram is necessary). [10]



Total No. of Questions : 12]

SEAT No. :
[Total No. of Pages : 3

P1935

[5059] - 265

B.E. (Chemical Engg.)

MEMBRANE TECHNOLOGY

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Answer any three questions from each sections.*
- 2) Answer to the two section 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) Classify membranes used for separation purpose. [6]
b) Distinguish between MF,UF, and RO processes based on pore size and solute rejection properties. [6]
c) Distinguish between osmosis and reverse osmosis. [6]

OR

- Q2)** a) Define membrane and classify membrane separation processes. [6]
b) Explain historical background of membrane processes. [6]
c) State merits and demerits of membrane processes over conventional separation processes. [6]

- Q3)** a) Explain the effect of molecular weight and chain interactions in case of polymeric membranes on removal efficiency. [8]
b) State materials and their properties used for membranes. [8]

OR

P.T.O.

- Q4)** a) Explain the effect of chain flexibility on properties of polymeric membranes. [8]
- b) Define the glass transition temperature of polymer and explain the effect of polymer structure on it. [8]

Q5) Explain the following methods of preparation of synthetic membranes:

- a) Immersion precipitation [8]
- b) Phase inversion [8]

OR

Q6) Explain any four methods of preparation of composite membranes. [16]

SECTION-II

Q7) Explain any four methods of characterization of porous membranes. [16]

OR

Q8) Explain any four methods of characterization of nonporous membranes. [16]

- Q9)** a) Explain the nonequilibrium thermodynamic principles involved in membrane transport processes. [8]
- b) Explain the transport processes involved in porous and nonporous membranes. [8]

OR

Q10) Explain theory and applications of any four pressure-driven membrane separation processes. [16]

Q11) Write short notes on the following: [18]

- a) Spiral wound membrane module.
- b) Gel layer model for concentration polarization of membranes.
- c) Osmotic pressure model for concentration polarization of membranes.

OR

Q12) Write short notes on the following:

[18]

- a) Boundary layer model for concentration polarization of membranes.
- b) Hollow fiber membrane module
- c) Membrane fouling



Total No. of Questions :12]

SEAT No. :

[Total No. of Pages :3

P3017

[5059] - 266

B.E. (Chemical)

BIOPROCESS ENGINEERING

(2008 Course) (Semester - I) (Elective - I) (409341 D)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer to the different sections must be written in separate answer books.*
- 2) *Assume suitable data, if necessary.*
- 3) *Draw neat sketches wherever necessary.*

SECTION - I

Q1) Explain **[16]**

- i) Protist kingdom,
- ii) Co-enzymes and
- iii) Saccharides.

OR

Q2) Explain **[16]**

- a) Fatty acids,
- b) Ammylase and
- c) Limiting nutrient

Q3) Explain manufacturing process for **[18]**

- a) Penicillin and
- b) Vitamin - A.

OR

Q4) Explain the operational process of **[18]**

- a) ASP and
- b) UASB.

P.T.O.

Q5) Derive the kinetic expression for the following:

[16]



Where K_m and K_p are the thermodynamic dissociation constants for reversible reactions 1 and 3 respectively. 'k' being the kinetic constant for reaction 2. Describe the kinetics represented by the above equations.

OR

Q6) An enzyme was assayed at an initial substrate concentration of 10^{-5} M. The K_m for the substrate is 2×10^{-5} M. At the end of 2 min, 3% of the substrate has been converted to the product. At the end of 5 min, calculate [16]

- Percent of the substrate converted to the product and
- Product and substrate concentrations.

SECTION - II

Q7) Derive mathematical expressions with the help of Michaelis-Menten inhibition enzymatic kinetics for: [18]

- Noncompetitive inhibition
- Competitive inhibition.

OR

Q8) A chemostat was operated for feed concentration 700 mg/l, at various dilution rates as given. Calculate [18]

- Michaelis-Menten constant (K)
- Yield coefficient of biomass with respect to substrate (Y).

Dilution rate (hr ⁻¹)	0.2	0.3
Substrate concentration (mg/l)	16	45
Biomass concentration (mg/l)	340	326

Q9) An enzyme has a K_m of 4.7×10^{-5} M. If the V_{max} of the preparation is 22 μ moles / (lit.min), what velocity would be observed in the presence of 2×10^{-4} M - substrate and 5×10^{-4} M of **[16]**

- a) a Competitive inhibitor.
- b) A non-competitive inhibitor.

What is the degree of inhibition in these cases? K_i is 3×10^{-4} M.

OR

Q10) The steady state substrate and biomass concentrations for a continuous stirred tank fermenter operated at various dilution rates are given below. Given that the fresh feed concentration is 700mg/l, calculate the values of the Monod constants μ_m and K_s , the yield coefficient Y and the endogenous respiration coefficient K_d . **[16]**

<i>Dilution rate (hr⁻¹)</i>	0.3	0.25	0.2	0.12	0.08
Substrate concentration (mg/l)	45	41	16	8	3.8
Biomass concentration (mg/l)	326	328	340	342	344

- Q11)** a) Explain various geometries of enzyme catalyzed CSTRs with schematic diagram. **[5]**
- b) Explain bioreactor dynamics. **[5]**
- c) Explain in brief fluidized bed bioreactor. **[6]**

OR

- Q12)** a) Explain in brief methods of immobilization of enzymes. **[8]**
- b) Explain the methods of continuous sterilization of bioreactor. **[8]**



Total No. of Questions :8]

P2130

SEAT No. :

[Total No. of Pages : 2

[5059]-267

B.E. (Chemical)

CORROSION ENGINEERING

(2008 Course) (Elective- I) (409341)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) What is a Tafel equation and explain how it is useful for finding corrosion rates. [8]
b) What is Evans diagram? State its application. [8]
- Q2)** a) Describe EMF series. [8]
b) Explain how pitting corrosion takes place? [8]
- Q3)** a) State Nernst equation. Explain its importance in corrosion studies. [8]
b) Explain pourbaix-diagram for Fe-H₂O system. [8]
- Q4)** a) Discuss cavitation corrosion and fretting corrosion and remedial measures for controlling the same. [12]
b) Write short note on Cathodic control. [6]

P.T.O.

SECTION-II

- Q5)** a) Explain Anodic protection technique for controlling the corrosion. [8]
b) State remedial measures to control stress corrosion. [8]
- Q6)** a) Explain how the modification of the materials is done by alloying. [8]
b) What are various factors affecting corrosion of iron under aqueous media?[8]
- Q7)** a) Discuss the use of inhibitors in corrosion control? [8]
b) Enlist different surface coatings available for preventing corrosion. [8]
- Q8)** a) Discuss Galvanic corrosion and pitting corrosion and remedial measures for controlling the same. [12]
b) Write short notes on high temperature oxidation. [6]



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 3

P1936

[5059] - 268

B.E. (Chemical Engg.)

CHEMICAL PROCESS SYNTHESIS

(2008 Pattern) (Elective - II)

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 books.*
- 3) Neat diagrams must be drawn whenever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of logarithmic tables slide rule, Mollier Charts, Electronic pocket calculator and steam tables is allowed.*
- 6) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss hierarchy of chemical process design. [8]
b) Explain the different approaches to chemical process design with advantages and disadvantages. [8]

OR

- Q2)** a) What do you mean by process synthesis? Explain the different steps for complete engineering design and development of new process. [8]
b) Explain in short different parameters in the choice of reactor. [8]

- Q3)** a) Mention different types of reaction systems and discuss any two in detail. [8]
b) Write a short note on - Reaction path. [8]

OR

- Q4)** a) Describe with example the separation of liquid - liquid heterogeneous mixture. [8]
b) Write a short note on - choice and selection criteria for azeotropic distillation as a choice of separator. [8]

P.T.O.

- Q5)** a) What are the methods of separation of heterogeneous mixture? Explain any one in detail. [10]
- b) Write a short note on - (any two) [8]
- i) Choice and selection criteria for absorber as a separator
- ii) Reactor performance
- iii) Reaction path

OR

- Q6)** Write short note on - (any three) : [18]
- a) Overall process design.
- b) Evaporation operation as a choice of separator.
- c) Overall process design.
- d) Liquid - liquid extraction as a choice of separator.

SECTION-II

- Q7)** a) Explain the concept of direct and indirect sequencing using simple column. [8]
- b) Explain with the diagram the concept of side rectifier and stripper arrangement. [8]

OR

- Q8)** a) Explain distillation sequencing for two components system with diagram. [8]
- b) Write a short note on distillation sequencing using thermal coupling. [8]

- Q9)** a) Explain threshold problems in heat exchanger network. [8]
- b) Explain the concept problem table algorithm. [8]

OR

- Q10)** a) Explain composite curve with suitable example related to the heat recovery problems. [8]
- b) Explain graphically heat recovery pinch. [8]

Q11)a) Explain the intensification of hazardous materials. Discuss major hazards in chemical process plants. [10]

b) What are the preventive measures taken to avoid toxic release. [8]

OR

Q12) Write short note on - (any three) : [18]

- a) Explosion hazards.
- b) Utilities selection during heat exchanger network.
- c) Quantitative measures of inherent safety.
- d) Toxic release.
- e) Fire Hazards.



Total No. of Questions :12]

SEAT No. :

P2131

[5059]-269

[Total No. of Pages : 2

B.E. (Chemical)

ADVANCED MATERIALS

(2008 Course)(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) *Neat diagrams must be drawn whenever necessary.*
- 3) *Assume suitable data if necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.*
- 5) *Answer any 3 questions form each Section.*

SECTION-I

Q1) a) Explain in detail Austempered ductile iron [8]

b) Discuss Advanced Metallic systems. [8]

OR

Q2) a) Write down the different types of steels used in chemical industries. [8]

b) Write down the different types steels for special applications with example.[8]

Q3) Explain in detail advanced polymeric materials with example. [16]

OR

Q4) a) Describe the different types of polymeric materials with example in detail.[8]

b) Describe Polymer Technology. [8]

Q5) Explain different Advanced processing methods for Engineering Materials.[18]

OR

Q6) Discuss in detail Advanced ceramic materials with example used in chemical industrial Applications. [18]

P.T.O.

SECTION-II

- Q7)** a) Write down the Physical and chemical properties of Composite Materials.[9]
b) Explain different advanced processing methods for Engineering Materials.[9]

OR

Q8) Explain Reinforcing mechanisms and matrix materials with example in detail.[18]

- Q9)** a) Write down the different advantages and disadvantages of Polymer Composites. [8]
b) Describe fabrication methods of Ceramic Composites. [8]

OR

- Q10)**a) Write down the industrial applications of ceramic materials. [8]
b) Explain Carbon composites, their properties, fabrication methods and their applications. [8]

Q11) Define Nanomaterials with example. Write down the synthesis of nonmaterial,s and what are the different applications of nonmaterials in chemical industries.[16]

OR

Q12) Explain in detail with diagram any two methods for testing of Nanomaterials.[16]



Total No. of Questions : 12]

SEAT No. :

P1937

[Total No. of Pages : 3

[5059]-270

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

POLYMER TECHNOLOGY

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) Answers to the two sections should be written in separate books.*
- 2) Draw neat diagrams wherever necessary.*
- 3) Figures to the right side indicate full marks.*
- 4) Assume suitable data, if necessary.*
- 5) Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

- Q1)** a) Distinguished between Linear, Branch and Cross linked polymers with one example each. **[10]**
- b) Explain in detail different factors which need to be considered for determining mechanical properties of polymers. **[8]**

OR

- Q2)** a) Explain the properties of polymers based on geometric isomerism and chemical composition. **[10]**
- b) Explain the properties of polymers based on Tacticity. **[8]**
- Q3)** a) Explain with one example in detail Suspension Polymerization Technique. **[10]**
- b) Write a note on Addition Polymerization. **[6]**

P.T.O.

OR

- Q4)** a) Explain in detail with examples Interfacial Polymerization Technique. [8]
b) Write a note on “Bulk polymerization”. [8]

Q5) Explain in detail with one example each the effect of Molecular weight on properties of polymers. [16]

OR

- Q6)** a) Find the Number average, weight average Molecular weight and polydispersity Index of the given mixture which is composed of 10 molecule of 10,000 monomer lengths and 190 molecules of 20,000 monomer lengths and 25 molecules of 2000 monomer lengths. [10]
b) Write a note on Number and Weight average Molecular weight. [6]

SECTION - II

- Q7)** a) Discuss “Kinetics of step growth Polymerization”. [8]
b) Explain with example importance of Chain Transfer Agents. [8]

OR

- Q8)** a) Discuss the mechanism of Free Radical Polymerization and derive necessary equations kinetics of Free Radical Polymerization. [10]
b) Discuss Gel Effect in Chain Growth Polymerization. [6]

- Q9)** a) Explain Bulk Molding Composition. [9]
b) Explain in detail with neat sketch Resin Transfer Molding. [9]

OR

Q10) a) Explain any two methods with neat sketch, working of thermoplastic molding. **[10]**

b) Discuss the following additives with the importance: Plasticizer, Filler, fire retardant. **[8]**

Q11) Write a short note on reactor systems used for PP and PS. **[16]**

OR

Q12) Give technology overview for the following polymer. **[16]**

a) Butyl rubber

b) Nylon 66

c) Unsaturated polyester



Total No. of Questions : 12]

SEAT No. :

P3762

[5059]-271

[Total No. of Pages : 3

B.E. (Chemical Engineering)
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 side indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Answers to the two sections should be written in separate Answer books.*

SECTION - I

- Q1)** a) Discuss the different approaches used in the calculation of total pressure drop for series and parallel piping systems? [10]
- b) Discuss in detail about head balancing and quantity balancing methods.[8]

OR

- Q2)** a) Explain in brief non-compressible and compressible fluids. Give the equations for estimation of pressure drop for non-compressible and compressible fluids? [8]
- b) Water flows through a 12-in pipeline (0.275-in wall thickness) at 4000 gal/min. Using the Hazen-Williams equation with a C factor of 100, calculate the pressure loss due to friction in 1000 ft of pipe length. [10]

- Q3)** a) Write down the stainless steel and ferric grade materials used for high temperature and corrosion resistance in piping? Explain in detail the following types of flanges. [8]

- i) Threaded Flange
- ii) Orifice Flange

- b) Discuss the different sections of ASME B31 Code for Pressure Piping?[8]

OR

P.T.O.

Q4) a) List out the major codes and standards providing engineering bodies in piping? Explain any one in detail. [8]

b) Write down the different grades of stainless steel used for piping material components. [8]

Q5) a) How to size control valves for liquid and gas service? [8]

b) Discuss the working principle and applications of Rupture Disks? [8]

OR

Q6) a) Write down the general guidelines used for positioning safety valve along with the example of pressure-reducing station? [8]

b) Explain the different control valve styles? [8]

SECTION - II

Q7) a) Calculate the deposition velocity of a heterogeneous slurry with a solid specific gravity of 3.0 in water, for a pipeline with an 6-in internal diameter. The particle size = 1 mm, and volume concentration = 20 percent? [8]

b) Explain the sizing of the steam trap with the help of following points:[10]

i) Method of heat-up to be employed.

ii) Ensuring adequate pressure differential across the steam trap.

iii) Steam trap load safety factor.

iv) Flow of condensate from the selected trap.

OR

Q8) a) A 50 ft-long, 2-in schedule 40 steam header pipe is flowing saturated steam at 200 psia. The piping includes two standard 90° elbows and a fully open globe valve. The exit pressure is atmospheric. Calculate the steam flow rate in lb/h using the Darcy equation. [8]

b) Explain the design and engineering of the slurry piping system components with the help of following points: [10]

i) Line sizing and pressure drop.

ii) Special considerations of slurry handling.

iii) Pumps for slurry.

iv) Instrumentation.

- Q9)** a) Write down the typical layout considerations of distillation systems and reactors. [8]
- b) Explain the concept of P & IDs? Discuss the different types & approval, engineering and construction issues involved in the construction of P & IDs. [8]

OR

- Q10)**a) Discuss the following points for locating the pipe racks of a process unit [8]
- i) Pipe rack width and number of levels.
- ii) Elevations and bent spacing.
- iii) Pipe flexibility, access and maintenance.
- b) Explain the types of plot plan and their advantages? [8]

- Q11)**a) Develop the typical layout considerations for pumps and storage tanks?[8]
- b) Which data is required to finalize the pipe rack width, number of levels, elevations and bent spacing? [8]

OR

- Q12)** Write short notes on: [16]
- a) Flare selection and sizing.
- b) Design procedures for insulation of piping.
- c) Critical and Optimum thickness of insulation.
- d) Line sizing of pneumatic conveying system.



Total No. of Questions :12]

P2132

SEAT No. :

[Total No. of Pages : 2

[5059]-272

B.E. (Chemical)

ADVANCED SEPARATION PROCESSES

(2008 Course) (409342) (Semester-II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) What is the process of surface based solid-liquid separations involving a second liquid? [8]
- b) What is reverse osmosis? Explain the process and derive the equations of flux for once through continuous operation mode? [8]

OR

- Q2)** a) Explain the details the design of chromatography. [8]
- b) Explain the basic concept of HPLC process. [8]

- Q3)** a) Give the application of chromatography in separation of enzymes and proteins. [8]
- b) Explain adsorption mechanism in separation of fluid-solid system. [8]

OR

- Q4)** a) Give the advantages of membrane separation process over other separation technique. [8]
- b) Explain the basic types of modules used in Reverse Osmosis. [8]

P.T.O.

Q5) Describe mechanism and applications of supercritical fluid extraction in chemical & biochemical industry? [18]

OR

Q6) Differentiate between electrophoresis and dielectrophoresis and discuss advantages of dielectrophoresis over electrophoresis techniques? [18]

SECTION-II

Q7) a) Write down the flotation techniques classification on the basis of mechanism of separation and size of material separated. [9]

b) Write down the Applications of flotation technique. [9]

OR

Q8) a) Explain 'Collapse and drainage phenomena'. [9]

b) Write short note on Design and development of flotation equipment. [9]

Q9) Write short notes on.

a) Temperature Swing Adsorption (TSA) [8]

b) Pressure Swing Adsorption (PSA) [8]

OR

Q10) Write down the applications of chromatography in separation of enzymes and proteins, industrial examples in detail. [16]

Q11) Write short notes on. [16]

a) Adductive Crystallization.

b) Zone Electrophoresis

OR

Q12)a) Explain the adsorption properties and applications of molecular sieve. [8]

b) Explain Continuous Adsorption process. [8]



Total No. of Questions : 12]

SEAT No. :

P1938

[Total No. of Pages : 3

[5059]-273

B.E. (Chemical Engineering)

PETROLEUM REFINING

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Figures to the right side indicate full marks.*
- 2) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss the current status of Petroleum Refining sector in India. Also discuss about the consumption trend currently. How much total quantity is imported? **[8]**
- b) Describe the tests and properties of Diesel. **[8]**

OR

- Q2)** a) What are the current challenges in front of Indian Refineries with respect to Quality of the crude received. **[6]**
- b) Why Pre-refining operation is necessary in the petroleum Industry. **[10]**

- Q3)** Distinguish Between ADU and VDU with respect to various processing. Parameters? Describe Atmospheric distillation Unit with suitable Diagram. **[16]**

OR

- Q4)** What are different types of pipe still heaters? Describe Heating through Exchangers and pipe still heaters with schematic diagram? **[16]**

P.T.O.

Q5) a) What is refining operation? Describe HDS techniques with schematic diagram? [2+10 =12]

b) Give the comments on the statement “Each fraction of crude contains a mixture of compounds with similar boiling points”? [6]

OR

Q6) Write short notes on : [18]

a) Hydro cracking operation

b) Fluid Catalytic Cracking units

c) Thermal cracking.

SECTION - II

Q7) Why coking of crude is necessary? Describe coking process with the typical schematic diagram. [16]

OR

Q8) With neat schematic diagram describes HDM process. [16]

Q9) a) Why additives are added in the petroleum products? Discuss in brief about the additives for gasoline and diesel. [10]

b) Explain the transportation of crude & petroleum products? [6]

OR

Q10) a) What is the blending operation and explain the line blending operation? [8]

b) Discuss the role of catalyst in the refinery along with recent advances in the field of catalytic processes in the refinery? [8]

Q11) What are the feed and products of reforming process? Discuss with neat schematic diagram the Reforming process? **[18]**

OR

Q12) Write short notes on: (Any Three) **[3 × 6 = 18]**

- a) Additives used in the refinery
- b) Recent advances in Housekeeping of petroleum products
- c) Integration of refinery and petrochemical plants for power generation
- d) Packing materials in the refinery



Total No. of Questions :12]

P2133

SEAT No. :

[Total No. of Pages : 2

[5059]-274

B.E. (Chemical)

PROCESS MODELING & SIMULATION
(2008 Course) (409351) (Semester-II)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) What are the different types of models? [8]
b) Provide a classification of the major categories of equations in process model. What are the subclasses in each major category. [8]

OR

- Q2)** Explain the Scope and coverage of process Models in detail. [16]

- Q3)** Explain continuity equations and transport equations in detail. [18]

OR

- Q4)** Write component continuity equations describing the CSTR with your notations.

a) Simultaneous reactions-first order, isothermal $A \xrightarrow{k_1} B \quad A \xrightarrow{k_2} C .$

b) Reversible first order isothermal $A \xrightleftharpoons[k_2]{k_1} B$ [18]

P.T.O.

Q5) Write model for PFR. [16]

OR

Q6) Develop a mathematical model for double effect evaporator. Write assumptions. Draw a figure. [16]

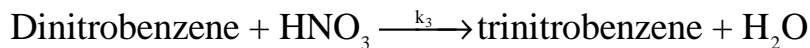
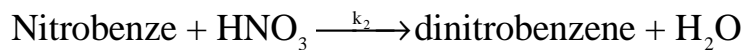
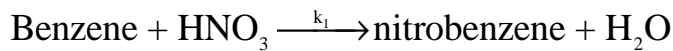
SECTION-II

Q7) Develop a model for absorption column. [16]

OR

Q8) Develop a model for continuous reactive distillation column. [16]

Q9) Benzene is nitrated in an isothermal CSTR in three sequential irreversible reactions.



Assuming each reaction is linearly dependent on the concentrations of each reactant, derive a dynamic mathematical model of the system. There are two feed streams, one pure benzene and one concentrated nitric acid (98 wt%). Assume constant densities and complete miscibility. [18]

OR

Q10) Develop a model for Activated sludge process. [18]

Q11) What is process simulation? Explain any simulator with a proper example. [16]

OR

Q12) A component material balance around a chemical reactor yields the following steady state equation.

$$0 = \frac{F}{V} C_{in} - \frac{F}{V} C - KC^3$$

where $\frac{F}{V} = 0.1 \text{ min}^{-1}$, $C_{in} = 1.0 \text{ Kg mol/m}^3$, $K = 0.05 \text{ m}^6/\text{Kg mol}^2 \cdot \text{min}$.

- How many steady state solutions are there?
- Write two different direct substitution methods and assess the convergence of each. [16]



Total No. of Questions :12]

P2134

SEAT No. :

[Total No. of Pages : 3

[5059]-275

B.E. (Chemical)

**PROCESS ENGINEERING COSTING & PLANT DESIGN
(2008 Course) (Semester-II) (409352)**

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Explain safety considerations in plant design. [8]
b) Write a note on flow sheet preparation. [8]

OR

- Q2)** a) Discuss in detail the techno-economic feasibility of report of a project. [8]
b) Explain significance of laboratory data in process development. [8]

- Q3)** a) Define depreciation and discuss its need and significance? [8]
b) Discuss various methods of determine depreciation charges. [8]

OR

- Q4)** a) Explain the methods for determining depreciation. [8]
b) A heat exchanger has been designed for use in a chemical process. A standard type of heat exchanger with a negligible scrap value costs Rs.4000 and will have a useful life of 6 years. Another proposed heat exchanger of equivalent design capacity costs Rs.6800 but will have a useful life of 10 years and a scrap value of Rs.800 . Assuming an effective compound interest rate of 8% per year, determine which heat exchanger is cheaper by comparing capitalized costs. [8]

P.T.O.

- Q5)** a) Explain in detail mathematical methods for profitability evaluation with neat diagram. [9]
 b) Explain cost indexes and explain their importance while estimating equipment costs scaling such as six-tenth factor rule. [9]

OR

- Q6)** a) Explain cash flow analysis for an industrial operation. [9]
 b) A tray dryer was purchased in 1987 of the cost of Rs.38,000 has total 10 trays, each tray size 36 cms x 24 cms used in food processing unit. Now, production capacity is increased to require size of tray 1m x 1m of total 10 trays. What is the expected cost of dryer in 1997, if cost index in 1987 is 181 and in 1997 is 202? [9]

SECTION-II

- Q7)** a) Give difference between market survey and market research. [8]
 b) By using La-Grange multiplier method minimize the following objective function that is subject to single equality constraints: [8]
 minimize $f(x)=4x_1^2+5x_2^2$
 subject to $2x_1=3x_2=6$.

OR

- Q8)** a) Explain graphical and analytical procedure for optimization with two or more variables. [10]
 b) Write a note on optimum conditions in cyclic operations. [6]
- Q9)** a) Explain preparation of techno-economic feasibility report. [8]
 b) Find the values of x,y and z that minimize the function $x + 2y^2 + z^2$ subject to the constraint that $x + y+z=1$, making use of the Larangian multiplier. [8]

OR

- Q10)** a) Write an explanatory note on Pinch technology. [8]
 b) Derive the equation for optimum cooling water flow rate in condenser. [8]

- Q11)** Define CPM and PERT and explain the application of the same for setting up a new Chemical plant. Define the activities involved in this project and construct the network diagram. [18]

OR

- Q12)a)** Differentiate between CPM and PERT. Give one example of each. [9]
- b) A pilot plant consists six activities as tabulated below. Construct a network diagram and estimate EST, LST, EFT, LFT and Floats. Mark the critical path and determine the project duration. [9]

Activity	Per-event	Sub-event	Duration(days)
A	1	2	5
B	2	3	7
C	3	5	6
D	2	4	5
E	4	5	4
F	5	6	4



Total No. of Questions : 12]

SEAT No. :

P3018

[5059]-277

[Total No. of Pages : 3

B.E. (Chemical Engineering)

**ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES
(2008 Course) (Semester VIII) (Elective-III) (409349)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Assume suitable data, if necessary.*
- 2) *Neat Figures to the right indicate full marks.*
- 3) *Use of scientific calculator is allowed.*
- 4) *Attempt Section I and II on two separate sheets.*

SECTION-I

- Q1)** a) What do you mean by steam trap? Explain its basic operation with diagram. [6]
b) What are various types of traps? Enlist and explain any two. [6]
c) What do you mean by thermodynamic efficiency? Explain how it can be used to improve energy efficiency of a equipment or a process plant with suitable examples? [6]

OR

- Q2)** a) Write a short note on Missing Data. [6]
b) Explain the role, responsibilities and Duties of Energy Manager to be assigned under the Energy Conservation Act 2001 [10]
c) Enlist renewable energy sources [2]

- Q3)** Write short note [16]
a) Solar energy
b) Geothermal energy
c) Tidal energy
d) Wind energy

OR

P.T.O.

- Q4)** a) Define energy audit as per the energy conservation Act 2001. Explain detailed energy audit methodology. [8]
b) Discuss the functions of Insulation in detail. [6]
c) Explain the term energy recycle [2]
- Q5)** a) What are the ways of reduction of steam usage and steam loss? [6]
b) Draw a neat sketch of Jacketed Agitated Vessel. Briefly explain energy conservation opportunities for the same. [8]
c) Enlist different units for Energy. Convert 1 Hp into Watts. [2]

OR

- Q6)** a) What is second law of thermodynamics? Explain how it can be used to save energy with suitable examples? [6]
b) What do you mean by energy conservation and its recycle? Explain with suitable examples. [6]
c) Explain the need of energy conservation and its scope in various industries with suitable examples. [4]

SECTION-II

- Q7)** a) Explain the importance of good housekeeping in a industry as a measure of energy conservation. Explain in detail. [6]
b) Draw the neat diagram of Tripple Effect Evaporator and explain the opportunities for energy conservation [6]
c) Explain various ways of improving use of electrical distribution system in the plant for saving electrical energy [6]

OR

- Q8)** a) List and explain any three energy loss components in chemical plant.[6]
b) Differentiate between renewable and non renewable energy sources [6]
c) Explain the energy conservation scenario in India and globe [6]

- Q9)** a) State different parameters needed for energy audit. And explain atleast five key Instruments needed to measure various parameters for energy audit. [10]
- b) Define and explain thermodynamic efficiency [6]

OR

- Q10)**a) What is primary energy audit. Explain in detail. [6]
- b) What is detailed energy audit. Explain in detail. [6]
- c) Write short note on good housekeeping [4]

- Q11)**a) Explain energy conservation in communiton process. [6]
- b) Explain effect of energy conservation on reliability and control of processes. [6]
- c) Explain how process selection is helpful in saving energy. Explain with suitable example. [4]

OR

- Q12)**a) Explain how systematic design methods are helpful in improving energy usage in chemical reaction. Explain it with suitable example. [8]
- b) Explain how systematic design methods are helpful in improving energy usage in separation equipment. Explain it with suitable example. [8]

✓ ✓ ✓

Total No. of Questions : 12]

SEAT No. :

P3019

[5059]-278

[Total No. of Pages : 2

B.E. (Chemical)

CHEMICAL PROCESS SAFETY

(2008 Course) (Semester-II) (Elective-III) (409349-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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*

SECTION-I

- Q1)** a) Define OSHA, Relative Toxicity and FAR? [8]
b) Explain three statistical methods to characterize accident and loss performance? [8]

OR

- Q2)** a) Explain Safety, hazard, risk in chemical plants. State types of hazards with examples? [8]
b) Explain how Toxicants enter biological organisms? [8]

- Q3)** a) Explain Material Data Safety Sheets (MSDS) with the format during an industrial hygiene study? [10]
b) Explain the importance of Industrial Hygiene. What are the government regulations related to industrial hygiene? [6]

OR

- Q4)** a) How will you evaluate exposure to volatile toxicants by monitoring?[8]
b) Discuss the identification and evaluation of industrial hygiene? [8]

- Q5)** a) Define flammability limits (UFL and LFL). Explain types of Explosions. [9]
b) Distinguish between fire and explosion. Explain Fire Triangle in detail?[9]

OR

P.T.O.

- Q6)** Explain The following: [18]
- a) Minimum oxygen concentration and inerting
 - b) Deflagration and Detonation
 - c) Unconfined vapour cloud explosion (UVCE)

SECTION-II

- Q7)** a) Describe in brief storage and handling of flammable and toxic chemicals? [8]
b) What are the various types of reliefs? [8]

OR

- Q8)** What are the preventive and protective measures to prevent fire and explosion in chemical industry. Explain about Explosion proof equipment and instruments? [16]

- Q9)** a) Explain the concept of HAZOP study and state guide words used for the HAZOP procedure? [8]
b) Write a short note on Event Trees and Fault Trees? [8]

OR

- Q10)** a) Describe process hazard checklists in detail? [8]
b) Describe an informal safety review process for using a cylinder of phosgene to charge gaseous phosgene to a reactor. [8]

- Q11)** a) Explain Emergency shutdown systems? [8]
b) Explain Review of probability theory for Risk Assessment. [10]

OR

- Q12)** Explain briefly [18]
- a) Hazard models and risk data
 - b) Disaster management
 - c) Prevention of hazard human element

✓ ✓ ✓

Total No. of Questions : 12]

SEAT No. :

P3020

[5059]-279

[Total No. of Pages : 3

B.E. (Chemical Engineering)

FOOD TECHNOLOGY

(2008 Course) (Semester II) (Elective-III) (409349-D)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Explain different types of non-Newtonian fluids with example encountered in food processing. Give importance of heterogeneity in food technology. [8]
- b) Discuss processing of milk in India. [8]

OR

- Q2)** a) Discuss various parameters involved in defining taste and their measurement technologies. [8]
- b) What is the effect of processing and storage on nutritional value to food?[8]
- Q3)** a) Explain post harvesting cleaning for food grains. [6]
- b) For which food dry cleaning is used? Explain advantages and disadvantages of dry cleaning? [6]
- c) What is water activity and how it is calculated? Give at least three examples of food with the range of water activity. [6]

OR

P.T.O.

- Q4)** a) With neat diagram explain colour sorting machine and its applications. [6]
b) Discuss applications of dry cleaning process with advantages and disadvantages. Name the food for which it is applicable. [6]
c) What do you understand by water activity? List water activity of some. [6]

- Q5)** a) Explain pasteurization technique for milk. Discuss various parameters used to determine milk quality. [8]
b) List side products from oil seeds processing and its economics. [8]

OR

- Q6)** a) State role of air in ice-cream manufacturing and its modern applications. [10]
b) How chemical sterilization is done. Explain methods with example. [6]

SECTION-II

- Q7)** a) With the neat flow-sheet describe process of manufacture of jam. [8]
b) Explain importance of pectin in jam and jelly manufacture. [4]
c) List the preservatives used for beverages and beverages storage. [4]

OR

- Q8)** a) What is canning ? Explain process of fruit juice storage. [10]
b) How preservatives are classified. Give examples and explain the action of preservatives to prevent food spoilage. [6]

- Q9)** a) Explain wheat grain grinding and the effect on product and product quality. [8]
b) Explain biscuit ingredients and process of manufacture. [8]

OR

- Q10)**a) Discuss effect of freeze drying and storage on sensory, nutritional characteristics of food. [8]
- b) Discuss baked food processing and storage and nutritional value. [8]

- Q11)**a) Explain importance of coating and coating materials used in chocolate industry. [6]
- b) What is temper evident packaging? What is its importance in food and beverages industry. [6]
- c) Explain various types of containers used in food industry stating advantages and disadvantages. [6]

OR

- Q12)**a) With neat flow-sheet explain chocolate manufacturing process. [6]
- b) Discuss different container types and the their merits and demerits. [6]
- c) What information should be available on the packaging material of food? [6]

✓ ✓ ✓

Total No. of Questions : 12]

SEAT No. :

P2111

[5059]-28

[Total No. of Pages : 3

B.E.(Civil)

WAVE MECHANICS

(2008 Course)(Elective-IV)(Open Elective)(Semester-II) (401008)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Q.No.3 or 4 and Q.No.11 or 12 are compulsory.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) Write a short note on WAVEWATCH III and SWAN as numerical models. **[8]**

b) Enumerate methods for wave measurement and explain detail the process of wave measurement by a wave rider buoy. **[8]**

OR

Q2) a) Discuss the process of wave generation and draw a definition sketch of wave propagation. **[6]**

b) What are the types numerical models. Explain any one of them in detail. **[10]**

Q3) a) Prove that water particle displacement follows the elliptical profile. **[8]**

b) A wave with a period of 10 sec in a deep water depth of 17 m and significant wave height of 5.5 m. Find the local horizontal and vertical velocities and accelerations at an elevation of $Z=-4$ m below the SWL when $\theta= 60^\circ$. **[10]**

OR

Q4) a) Derive linear dispersion relationship **[8]**

b) A wave with period of 10 sec and significant wave height of 2.5 m moves towards the shore normal to the sea bed contour. Obtain the rate at which energy per unit width is transported towards the shoreline. Find total energy delivered in 2hours. **[10]**

P.T.O.

Q5) a) Enlist assumptions in the theory of refraction and draw sketches for wave refraction in different cases. [8]

b) A wave of significant height 3.5 m and period 10sec in deep water travels towards shore parallel to bed contours. If its crest makes an angle of 30 with bed contour of 12 m before refraction calculate wave height after crossing the contour. [8]

OR

Q6) a) Write a short note on shoaling. [8]

b) Write short notes on wave breaking, wave set up, wave run up. [8]

Q7) a) 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. [8]

b) Write steps of Gumbel's extreme value distribution method. [8]

OR

Q8) a) The annual maximum wave heights observed at Ratnagiri in m are as follows; 6, 2.23, 3.77, 4.88, 4.53, 2.59, 3.94, 3.12, 5.42, 6.96, 6.24, 4.43, 2.05, 5.23, 2.34, 1.25, 1.67, 3.45, 4.67, 4.35. Find wave height of 50 year return period. For $N = 15$, $\bar{Y}_n = 0.6285$, $S_n = 1.230$ [6]

b) Write short note on Bretschneider Spectrum. [4]

c) Distinguish between short term analysis- long term analysis, probability density function-probability distribution function [6]

Q9) a) What is effect of angle of wave approach on forces due to waves? [8]

b) Write a short note on effect of a non vertical wall [8]

OR

Q10) a) Draw sketches for pressure distribution of non breaking wave forces using Miche-Rundgren method. [8]

b) Explain the pressure distribution on wall of low height with neat sketch. [8]

- Q11)a)** What are the profiles? What is profile accuracy? Mention four types of errors related to profile accuracy? [6]
- b) What is Littoral drift? Explain how it occurs with neat diagrams. [6]
- c) Discuss the effect of wave forces on rubble mound break water structures. [6]

OR

- Q12)a)** Write a note on Dean's Theory to calculate wave forces [6]
- b) Explain in detail two zone of littoral transport. [6]
- c) What are the small diameter members? [6]



Total No. of Questions :12]

SEAT No. :

P3021

[5059]-280

[Total No. of Pages :2

B.E.(Chemical)

STANDARDIZATION AND QUALITY ASSURANCE IN CHEMICAL PROCESS INDUSTRY

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer any three questions each from section I and 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 the importance of material construction? What are the various policies for selection of material of construction (MOC)? **[9]**

b) Explain material consumption. Elaborate various policies to regulate material consumption. **[9]**

OR

Q2) a) Explain the various standards for financial returns. **[9]**

b) Explain Qualitative and quantitative standards of Chemical Process Industries. **[9]**

Q3) a) Explain the formation and functions of BIS (Bureau of Indian Standards) **[8]**

b) What are the various standards used in chemical industries. Highlight the essential features of each standards. **[8]**

OR

Q4) a) Explain the following standards. **[8]**

i) ISI mark

ii) Agmark

b) State the various functions of statistical Quality control (SQC). **[8]**

Q5) a) What is Zero Defect? Enlist the importance and advantages of zero Defects. **[8]**

b) Elaborate on idealized model for national standard system. **[8]**

OR

P.T.O.

- Q6)** a) State the need and role of equipment inspector. [8]
b) What are control charts? Enlist and explain the control charts. [8]

SECTION-II

- Q7)** a) Explain the importance of Total Quality Management (TQM). [9]
b) What is Quality circle (QC)? Explain the functions of QC. [9]

OR

- Q8)** a) Explain the importance of product quality. What are the various quality control aspects necessary for process industries? [9]
b) Explain in detail the advantages and disadvantages of Quality control. [9]

- Q9)** Explain with example the various standards followed in fabricating a storage vessels for process industry. [16]

OR

- Q10)** Write notes on following concepts. [16]
a) Work sampling
b) Zero defects in piping

- Q11)** a) What do you mean by standardisation? Explain in detail the recent trends in standardisation. [8]
b) Explain ISO. Elaborate on importance of ISO certification in global market. [8]

OR

- Q12)** Write notes on [16]
a) ISO 14000 series
b) ISO 9000 series
c) Six sigma
d) HSE management system



Total No. of Questions : 12]

SEAT No. :

P1939

[Total No. of Pages : 3

[5059]-281

B.E. (Chemical Engineering)

CATALYSIS (Theory)

(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) *Assume suitable data, if necessary.*
- 3) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

- Q1)** a) Discuss the role of support in heterogeneous catalyst. [8]
b) Explain catalytic reaction feasibility with respect to activation energy and temperature. [8]

OR

- Q2)** a) How homogeneous and heterogeneous catalyst are industrially useful. [8]
b) Derive the relationship between size, number and total surface area of the crystallites. [8]

- Q3)** a) State various adsorption isotherms and explain its significance. [8]
b) Solid catalyzed reaction $A \rightarrow 3R$ is conducted at 10 atm and 800°C in a basket type mixed reactor of 0.7 lit volume and containing 1g of catalyst of diameter $d_p = 3$ mm. Pure A is fed at various rates into the reactor. Partial pressure of 'A' in the exit stream is measured for each feed rate. Find the rate of reaction using the following kinetic results: [10]

Feed rate, lit/hr	100	22	4	1	0.6
$P_{A, out}/P_{A, in}$	0.8	0.5	0.2	0.1	0.05

OR

P.T.O.

Q4) a) Explain diffusion effect in pores of catalyst particles. [8]

b) The catalytic reaction $A \rightarrow 3R$ is run at 3 atm and 215°C in a PER which contains 9 g of catalyst and uses a Feed consisting of the partially converted product of 0.3 lit/min of pure unreacted 'A'. Assuming the reactor to be a differential reactor. find a rate equation to represent this reaction, using the following results : [10]

Run	1	2	3	4
C_A , in (mol/lit)	0.100	0.080	0.060	0.040
C_A , out (mol/lit)	0.084	0.070	0.055	0.038

Q5) a) Derive Langmuir expression for adsorption isotherm. [8]

b) Write brief note on mass transfer in catalysis. [8]

OR

Q6) Write short note on following [16]

a) Mechanism of liquid-liquid catalyst

b) Phase transfer catalyst

SECTION - II

Q7) a) What is pore volume distribution? Describe the mercury penetration method for its measurement. What is N_2 desorption method? [8]

b) Describe the characteristics of supported metal catalyst with example [8]

OR

Q8) a) Derive mathematical equation for determining catalyst surface area by BET method. [8]

b) Describe the method for manufacturing of Raney Nickel catalyst. [8]

Q9) What is relative activity and degree of inhibition caused by a competitive inhibitor when $[S] = K_m$ and $I = K$? Derive the relation between these parameters. [16]

OR

Q10) An enzyme was assayed at an initial substrate concentration of $2 \times 10^{-5}M$. In 6 min, half of the substrate has been used. The K_m for the substrate is $5 \times 10^{-3}M$. Calculate [16]

- a) k .
- b) V_{max} and
- c) The concentration of product produced after 15 min.

Q11) Write short note on following : [18]

- a) Catalyst Deactivation
- b) Zeolite modification
- c) Alumina as support

OR

Q12) Write note on following : [18]

- a) Cracking catalyst.
- b) ZSM-5.
- c) Shape selectivity in zeolites.



Total No. of Questions : 12]

P3749

SEAT No. :

[Total No. of Pages : 3

[5059]-282

**B.E. (Chemical Engineering)
NANOTECHNOLOGY
(2008 Pattern) (Elective - IV)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the different routes used for chemical modification of carbon nanotubes? [8]

b) Explain the classification of nanomaterials and special nanomaterials? Also discuss the significance of nanoscale size effect? [8]

OR

Q2) a) Discuss the molecular modeling technique for nanomaterials? [8]

b) Explain different purification methods used for carbon nanotubes? [8]

Q3) a) Differentiate between laser ablation and chemical vapor deposition? [8]

b) What is reactive sputtering? RF sputtering is preferred for insulating targets-explain? [10]

OR

Q4) a) Explain in detail steps involved in Chemical vapor deposition for nanomaterial synthesis? [8]

b) Explain the concept of epitaxy and self assembly used for synthesis of polymer nanocomposites? [10]

P.T.O.

- Q5) a)** Explain with neat sketch principle and operation of scanning tunneling microscope (STM)? [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)** Explain principle and operation of scanning probe microscopes? [8]
- b) Explain principle and operation of Fourier Transform Infrared microscope (FTIR)? [8]

SECTION - II

- Q7) a)** What is doping? Explain types of dopants used in extrinsic semiconductor? [10]
- b) Explain how quantum cryptography is used for secure data communication? [8]

OR

- Q8) a)** Explain Heisenberg uncertainty principle? [8]
- b) What is quantum dot, quantum well and wire? Explain in detail? [10]

- Q9) a)** Write down the various factors affecting on contact angle and wetting? [8]
- b) Explain experimental procedure for finding out contact angles. Explain with neat sketch? [8]

OR

- Q10) a)** Explain the concept of colloid stability and various parameters affecting on it? [8]
- b) Explain in detail about nanostructured photocatalysis? [8]

- Q11)** a) How nanotechnology can be used for environmental pollution abatement? [8]
- b) Explain how nanostructure mediated drug delivery helps for treatment of various diseases? [8]

OR

Q12) Write short notes on : [16]

- a) Self cleaning materials.
- b) Biological applications of nanoparticles.
- c) Nanohydrogel
- d) Health hazards of nanomaterials.



Total No. of Questions : 12]

SEAT No. :

P1940

[Total No. of Pages : 3

[5059]-283

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

FUEL CELL TECHNOLOGY (Theory)

(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) *Use of logarithmic tables slide rule. mollier charts electronic pocket calculator & steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the salient features of the storage of the hydrogen as fuel for fuel cell. [9]
- b) Show that electrical work obtainable from electrochemical device is change in Gibbs free energy. [9]

OR

- Q2)** A 1.0 MW fuel cell stack is operated with a cell voltage of 700 mV on pure hydrogen with fuel utilization, U_f of 80%. [18]

- a) How much hydrogen will be consumed?
- b) What is the required fuel flow rate?
- c) What is the required air flow rate for a 25% oxidant utilization, U_{ox} ?

P.T.O.

Q3) Gibbs free energy for the formation of water vapor is -55.14 cal/mole at STP condition. In the typical SOFC, pure hydrogen is fed at the pressure of 3 atm. Total pressure of gases on anodic side is observed to be 3.5 atm. Air is supplied at 1.2 atm. The cell is operated at 1000 °C. Assume that activities of the components are proportional to their partial pressures. **[16]**

- a) Standard open circuit potential.
- b) Open circuit potential at the operating conditions.

Faraday's constant is 96487 J/V.mol.

OR

Q4) Derive Nernst equation for calculating open circuit potential of SOFC using air as an oxidizer for the following conditions : **[16]**

- a) Pure Ethanol as a fuel
- b) Pure Hydrogen as a fuel
- c) Ethanol and H_2 in the proportion of 15:85 % each as a fuel.

Q5) a) A current density of 15 A/m² is obtained when pure hydrogen is fed to SOFC at the pressure of 1.9 atm. Total pressure of gases on anodic side is observed to be 2.7 atm. Air is supplied at 1.9 atm. The cell is operated at 900 °C. The diffusion factors for hydrogen, oxygen, water vapour are 95, 70 and 55 C/sm².atm respectively. Calculate concentration overpotential across cathode and anode. **[8]**

b) Calculate fuel utilization factor, air ratio, power output and fuel efficiency of SOFC using following data **[8]**

Average current density	:	12 A/m ²
Active anode surface area	:	0.5 m ²
Fuel Flow rate	:	25 mol/h
Fuel Composition	:	H_2 80% and CO 20%
Air Flow rate	:	25 mol/h
Output Potential	:	230 V
Lower Heating Value of fuel	:	30000 kcal/Kg

OR

Q6) Explain performance indicators used for solid oxide fuel cell. **[16]**

SECTION - II

- Q7)** a) What is steam reforming? What are the advantages of internal steam reforming over external steam reforming? State its limitations. [9]
- b) Explain Kroger vink notations. [9]

OR

- Q8)** Develop the comprehensive material balance for the SOFC generating 600 kW power at 85% CHP efficiency and 30 % theoretical excess air as an oxidizer. (take $V = 0.7$ V) [18]

- Q9)** a) Calculate mole fraction of defect at 110 and 1300° C. Defect energy is 95 KJ/ mol. Comment on the significance of results. [8]
- b) Derive the correlation to calculate defect mole fraction for pure solid at thermal equilibrium. [8]

OR

- Q10)** a) Design a tubular SOFC to generate 400 KW power from methanol as a fuel. Single tube has a anodic diameter 18 mm and active length of 1.6m. [8]
- b) Design Planner SOFC to generate 900 kW using ethanol as fuel. [8]
- Q11)** a) What are the recent advancements in the materials of anode and their advantages and disadvantages. [8]
- b) Differentiate between planar and tubular structure of SOFC. [8]

OR

- Q12)** Consider hydrogen-oxygen fuel cell operating at 25° C and at atmospheric pressure. Under these conditions, oxygen, hydrogen and product liquid water are in their standard states. Using the data given below, calculate the thermodynamic potential (E) and the heat transfer (Q) between the cell and surrounding to maintain isothermal conditions and the electrochemical efficiency of the fuel cell. [16]

$$\Delta H = - 285840 \text{ J/mol}$$

$$\Delta G = - 237190 \text{ J/mol}$$

$$F = 96487 \text{ J/V.mol}$$



Total No. of Questions :12]

P3022

SEAT No. :

[Total No. of Pages :2

[5059]-284

B.E. (Chemical)

PETROCHEMICAL ENGINEERING

(2008 Course) (Semester-II) (Elective-IV) (409350)

Time : 3Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION-I

Q1) a) What is importance of petrochemicals and the discuss the status of petrochemical Industries in India. **[8]**

b) What are the main building blocks of petrochemical industry? Give the details of petrochemical products that are produced from benzene. **[8]**

OR

Q2) Draw a flow sheet for production of naphthene and explain the process with specification and process conditions. **[16]**

Q3) What are basic principle sources of aromatics? Describe the BTX aromatic separation by suitable diagram. **[16]**

OR

Q4) Describe CDU with suitable diagram? Distinguish between CDU and VDU. **[16]**

Q5) a) Write in details about the various separation and purification techniques used in petrochemical industry. **[10]**

b) Describe with schematic diagram aromatic solvent extraction unit. **[8]**

OR

P.T.O.

- Q6)** a) Write short note on Ziegler-Natta catalysts. [6]
b) Write short note on Delayed coking. [6]
c) Write short note on Thermal cracking. [6]

SECTION -II

Q7) Along with schematic diagram and major engineering problems describe the production of terephthalic acid from p-xylene? [16]

OR

Q8) Along with essential reaction steps, write in detail about the production of ethylene glycol. Draw a neat schematic diagram. [16]

Q9) a) Discuss polymer synthesis and monomer purification. [8]

b) Explain Emulsion polymerization of styrene. [8]

OR

Q10)a) With neat sketches explain in detail about production of PVC along with its engineering problems. [8]

b) Explain classification of different polymerization process and discuss its advantages and disadvantage. [8]

Q11)a) Explain the control of emissions from steam crackers using best Available technique (BAT). [9]

b) Discuss about recent advance in petrochemical plant & refineries in India. [9]

OR

Q12)a) What do you mean by safety in oil refining industry? [9]

b) Justify the statement, "power on, India on". Write views on power generation through petrochemical plants. [9]



Total No. of Questions :12]

P2135

SEAT No. :

[Total No. of Pages : 3

[5059]-285

B.E. (Chemical)

COMPUTER-AIDED PROCESS CONTROL
(2008 Course) (409350) (Semester-II) (Elective-IV)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

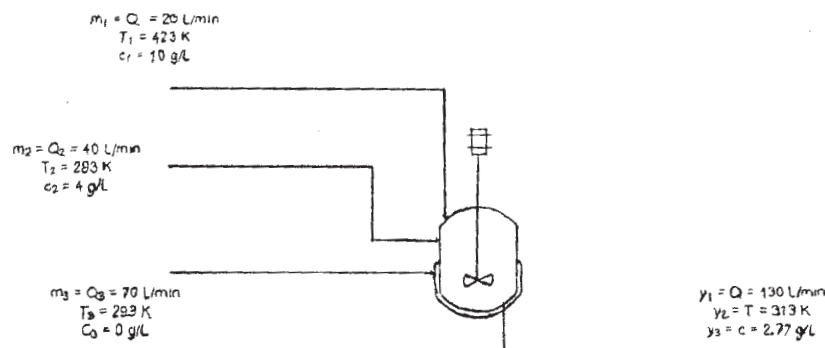
SECTION-I

Q1) What is the difference between digital and analogue control systems? Explain in detail, with the help of block diagram. State the advantages and disadvantages of each. [18]

OR

Q2) Explain in detail. Direct digital control with the help of schematic diagram. Give applications. State advantages of DDC over other control modes. [18]

Q3) Computer RGA and suggest pairings between o/p variables and manipulated variable for following blending (MIMO) system. [16]



P.T.O.

The equations used to model the system are:

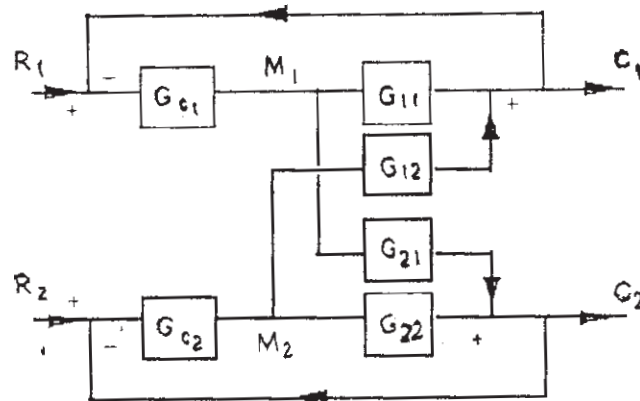
$$y_1 = m_1 + m_2 + m_3$$

$$y_2 = \frac{T_1 m_1 + T_2 m_2 + T_3 m_3}{y_1} = \frac{T_1 m_1 + T_2 m_2 + T_3 m_3}{m_1 + m_2 + m_3}$$

$$y_3 = \frac{C_1 m_1 + C_2 m_2 + C_3 m_3}{y_1} = \frac{C_1 m_1 + C_2 m_2 + C_3 m_3}{m_1 + m_2 + m_3}$$

OR

Q4) a) What is decoupling? Design a decoupler for the following MIMO system. [10]



b) Explain Neiderlynski index for testing stability of MIMO systems. [6]

Q5) a) Explain the discretization of continuous signals $f(t)$ [8]

b) How the continuous signal is reconstructed from the discrete values? Explain with the help of diagram. [8]

OR

Q6) a) Find the z-transformations of following functions. [8]

- i) $f(t) = 1$
- ii) $f(t) = e^{-at}$
- iii) $f(t) = \cos(\omega t)$
- iv) $f(t) = \sin(\omega t)$

b) Explain stability of digital control system. How the s plain is mapped with z- plane? [8]

SECTION-II

- Q7)** a) Explain data transfer techniques for computer aided process control. [8]
b) Explain the role of computer aided process control software. [8]

OR

- Q8)** How modelling and simulation is done in digital process control? Explain the role of software in simulation of digital control. [16]

- Q9)** Explain basic structure of PLC. How integration of PLC is done with computers? [16]

OR

- Q10)** What is plant wide control? Recommend a procedure to design plant wide control system. [16]

- Q11)** Write short notes on the following. [18]

- a) MIMO control for exothermic reactor.
- b) Industrial applications of computer Aided Control.
- c) Distributed Control system

OR

- Q12)** Write short notes on the following. [18]

- a) Singular Value decomposition.
- b) Control system for heat exchanger.
- c) Hold Devices.



Total No. of Questions : 6]

SEAT No. :

P3023

[5059]-287

[Total No. of Pages :1

B.E. (Printing)

TECHNOLOGY OF GRAVURE

(2008 Course) (Semester-I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) Evaluate the effect of cell structures on gravure printability. **[18]**

OR

Q1) Explain Gravure cylinder making by etching process. **[18]**

Q2) Explain factors affecting copper plating of a gravure cylinder. **[16]**

OR

Q2) Explain levelling effect, efficiency factor, polarization effect and throwing power for plating a gravure cylinder. **[16]**

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

OR

Q3) Explain water based inks used in gravure process. **[16]**

SECTION-II

Q4) The rheology of ink plays an important role in ink transfer. Explain **[18]**

OR

Q4) Explain in detail doctor blade assembly of gravure press. **[18]**

Q5) Explain the types of impression systems on a gravure press. **[16]**

OR

Q5) Explain the different pressurization systems on a gravure press **[16]**

Q6) Explain in detail ELS technology for a Gravure press. **[16]**

OR

Q6) Explain in detail Web Tension Control on a gravure press. **[16]**

✓ ✓ ✓

Total No. of Questions :6]

SEAT No. :

P3763

[Total No. of Pages :2

[5059] - 289

B.E. (Printing)

ADVERTISING AND MULTIMEDIA

(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Write Answers to different sections on separate answer sheet.*

SECTION - I

Q1) Explain AIDA model with any suitable example. **[16]**

OR

Write in details about types of appeals used in advertising. Justify with suitable example. **[16]**

Q2) What is campaign planning? Why it is necessary? What benefits are derived out of its execution? Are there any limitations or constraints? Explain in details. **[18]**

OR

Explain any case study of campaign planning along with its period, USP, theme, target audience, brand positioning, market share and other details if any. **[18]**

Q3) Explain following types of advertising with suitable examples. **[16]**

- i) Public service Advertising.
- ii) Service advertising.

OR

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

- a) Public relations advertising.
- b) Marketing and advertising communication process.

P.T.O.

SECTION - II

Q4) Which are the various types of copy writing? Explain any 5 with suitable examples. **[18]**

OR

What is significance of following in designing of print advertisement. **[18]**

- a) White space.
- b) Color.
- c) Image of product.

Q5) “Marketing Research is an excellent tool for decision maker to decide on product launch” Justify **[16]**

OR

What are different ways of budgeting the advertisement expenditure. Explain in details. **[16]**

Q6) Write down those features of print media which makes it the “Preferred One” over the other media. Justify with suitable case/example. **[16]**

OR

Compare and contrast between Print Media Vs Electronic Media. **[16]**



Total No. of Questions : 12]

SEAT No. :

P2112

[5059]-29

[Total No. of Pages : 3

B.E.(Civil Engineering)
FERROCEMENT TECHNOLOGY
(2008 Course)(Open Elective-II)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3 or Q4,Q5 or Q6 , Q7 or Q8,Q9 or Q10 and Q11 or Q12.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *If necessary, assume suitable data and indicate clearly.*
- 5) *Use of electronic pocket calculator is allowed.*

- Q1)** a) Explain the effect of creep and shrinkage on ferrocement structures and also the protective surface treatment given to the same. [8]
- b) What are different properties and specifications of raw materials used for Ferrocement Technology? Also write a note on proportioning of cement mortar. [8]

OR

- Q2)** a) Explain in brief “ Ferrocement as a material of construction”. [8]
- b) Enlist the various construction methods of ferrocement. Explain the skeleton armature method with advantages and disadvantages. [8]

- Q3)** 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) Write a note on “Forming of Ferrocement structures”. [8]

OR

- Q4)** a) Enlist and explain factors governing cost and value of ferrocement in building constructions. Also compare cost of ferrocement structures with conventional structures. [8]
- b) Explain in detail specific surface method and crack control method. [8]

P.T.O.

- Q5)** a) Draw the neat sketches of various structural forms like 'T', 'U', '+', 'L' & Also give the comparative study of behavior forms in respect of strength and design parameters with ferrocement technology. [9]
- b) Explain the design and construction of hoses with following ferrocement building accessories: cavity walls, hollow floors, hollow beams, staircases and other building accessories. [9]

OR

- Q6)** a) Write a note on "Design and Construction of quake proof structures [9]
- b) Draw the neat sketches of various structural forms & Also give the comparative study of behavior forms in respect of strength and design parameters with ferrocement technology. [9]
- Q7)** a) Compare all parameters of ferrocement counterfort retaining wall with reference to conventional counterfort retaining wall. [8]
- b) What is ferrocement? What are its different applications with hydraulic structures? Explain in detail any one. [8]

OR

- Q8)** a) Enlist and explain factors governing cost and value of ferrocement in building constructions. Also compare cost of ferrocement structures with conventional structures. [8]
- b) Explain the special techniques to resist shocks of ferrocement structures affected during earthquake [8]
- Q9)** a) Write a note on: [9]
Ferrocement precast walling and flooring panels.
- b) Explain in detail the industrial precast ferrocement concrete elements you seen with: [9]
- i) Raw materials of construction
 - ii) Analysis and design principles
 - iii) Manufacturing process
 - iv) Testing methodology and quality control.

OR

- Q10)**a) Enlist and explain joints in precast ferrocement elements. [6]
- b) Explain role of ferrocement technology in construction of large size special purpose structures like shell and domes. [6]
- c) Why ferrocement is used for pre-casting? Give the different methods of ferrocement pre-casting and explain any one in detail. [6]
- Q11)**a) What are different points to be considered in designing and constructing Ferro cement cylindrical shell [8]
- b) State four points to be considered while casting precast Ferro cement water tank. [8]

OR

- Q12)**a) Sketch any four forms of folded plates and state assumptions in design of folded plate. [8]
- b) State any four advantages of Ferro cement as precast product [8]



Total No. of Questions : 6]

SEAT No. :

P 3024

[5059] - 290

[Total No. of Pages :2

B.E. (Printing)

QUALITY CONTROL TECHNIQUES IN PRINTING

(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) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION -I

Q1) Explain in detail the concept of Quality Control and Quality Cost concept in detail With examples of each type of quality cost with respect to printing industry. **[16]**

Q2) Explain in detail the quality specifications for printing industry in detail with suitable examples . **[16]**

Q3) PQR company produces dampening solution which must contain 3% of alcohol. The company tries to maintain the actual percentage in the range of + - 0.3. It tests 5 samples per hour. The following table shows the result of last five samples. Construct a control chart for \bar{x} & R. Examine whether the process is under control. **[18]**

$$A_2 = 0.5768, D_3=0, D4 = 2$$

Sample No.	1	2	3	4	5
1	2.6	3.8	3.0	2.8	3.1
2	2.9	3.2	3.0	3.0	3.0
3	3.0	3.7	3.1	3.1	2.9
4	3.0	3.0	3.0	3.0	3.0
5	2.9	3.0	3.1	2.9	3.1

P.T.O.

SECTION - II

Q4) 10 printed samples of size 100 were studied critically for total number of defectives in it. The details of number of defectives in each sample are given below. All samples are accepted by quality control Department of the company. Construct a control chart & comment of result. **[16]**

Sample No	1	2	3	4	5	6	7	8	9	10
No of Defectives	5	2	3	2	2	3	4	2	2	0

Q5) 10 samples each size of size 50 of offset machine blowers were tested in pressure testing . The result of the inspection are given below. **[16]**

Sample No	1	2	3	4	5	6	7	8	9	10
No of Defects	3	1	0	0	2	3	2	1	2	3

Q6) Describe World Class Manufacturing system. **[18]**
Explain in detail Job Production & Mass Production.



Total No. of Questions : 6]

P4958

SEAT No. :

[Total No. of Pages : 2

[5059]-293

**B.E. (Printing Engineering)
SECURITY PRINTING (Elective)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

Solve any 3 questions from each section.

SECTION - I

Q1) What is a security Printed document? Explain with examples. **[18]**

OR

Describe Optical security printing in detail. **[18]**

Q2) Explain Intaglio for Security Printing. **[16]**

OR

Explain design and structure in bank note printing. **[16]**

Q3) Explain smart card concept in security printing. **[16]**

OR

Explain UV printing properties & security applications. **[16]**

P.T.O.

SECTION - II

Q4) Explain CTS system and advantages. **[18]**

OR

Describe MICR system in details. **[18]**

Q5) Explain IR & UV ink applications in Security Printing. **[16]**

OR

Explain Types of inks used for Security Printing with examples. **[16]**

Q6) State and explain Information security systems and applications. **[16]**

OR

Explain latest technology in security printing features. **[16]**



Total No. of Questions : 6]

SEAT No. :

P3025

[5059]-297

[Total No. of Pages : 4

B.E.(Printing)

PRINT PRODUCTION PLANNING & CONTROL

(2008 Course) (Semester - II)

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) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data, if necessary.*

SECTION-I

Q1) Explain the functions of Production planning in detail with suitable examples. **[16]**

OR

Explain the functions of Production Control in detail with suitable examples. **[16]**

Q2) Construct a network diagram for a project comprising of activities B,C,E,F,G,H,I,J,L,M,N,P and Q such that the following precedence relationships are satisfied. **[16]**

B<E,F C,F<G C<L E,G<H
H,L<I H<J L<M H,M<N
I,J<P N<Q

OR

The activities along with their dependency relationships are given below. Draw the arrow diagram. **[16]**

P.T.O.

Activity	Immediate predecessor
A	---
B	---
C	---
E	A
F	A,C
G	B,D
H	E
I	E,F
J	G,H
K	H

Q3) A bookbinder has one printing press, one binding machine and manuscripts of a number of different books. The times required in minutes to perform the printing and binding operations for each book are known. We wish to determine the order in which books should be processed in order to minimize the total time required to turn out all the books. **[18]**

Book	1	2	3	4	5	6
Printing time	35	120	50	20	90	115
Binding time	80	100	95	60	30	10

OR

A foreman wants to process four different jobs on three machines, shaping, drilling and tapping in the same sequence. Decide optimal sequence for the jobs to minimize the total elapsed time to process all the jobs. **[18]**

Jobs	Shaping (minutes)	Drilling (minutes)	Tapping (minutes)
1	11	8	18
2	18	6	4
3	8	9	13
4	23	10	8

SECTION-II

Q4) A company has to assign four workers A,B,C and D to four jobs W,X,Y and Z. The cost matrix is given below. Find the optimum assignment schedule and total corresponding cost. **[16]**

Jobs/ Worker	W	X	Y	Z
A	1000	1200	400	900
B	400	500	300	800
C	300	225	400	500
D	650	500	300	1000

OR

4 different jobs can be done on 4 different machines. The matrix below gives the cost in rupees of producing job I on machine j. How should the jobs be assigned to the various machines so that the total cost is minimized. **[16]**

Machines/ Jobs	M1	M2	M3	M4
J1	7	7	11	6
J2	10	8	9	6
J3	4	4	10	7
J4	10	4	8	3

Q5) A company manufacturing television has four plants with a capacity of 125,250,175 and 100 units respectively. The company supplies TV sets to its four showrooms which have a demand of 100, 400,90,60 units respectively. The transportation cost per unit is given in table below. Find out the optimum transportation schedule which will minimize the cost of transportation. **[16]**

Showrooms/ plants	1	2	3	4	Supply
A	95	100	120	110	125
B	105	105	128	117	250
C	155	109	110	120	175
D	130	125	108	113	100
Demand	100	400	90	60	

OR

The following table shows all the necessary information on the availability of supply to each warehouse the requirement of each market and the unit transportation cost from each warehouse to each market. Find the optimum schedule and minimum total transportation cost. [16]

Market/ Warehouse	P	Q	R	S	Supply
A	6	3	6	4	22
B	5	9	9	7	15
C	5	7	3	6	8
Requirement	7	12	17	9	

Q6) A firm produces 3 products. These products are processed on 3 different machines. The time required for manufacturing one unit of each of the 3 products and daily capacity of the 3 machines is given in the table below. It is required to determine the daily number of units to be manufactured for each product. The profit per unit for product 1, 2 and 3 is Rs.4,3 and 6 respectively. It is assumed that all the quantity produced are consumed in the market. Formulate the LP model. [18]

Machine	Time per unit (minutes)			Machine capacity (minutes per day)
	product 1	product 2	Product3	
M1	7	3	2	440
M2	3	-	3	470
M3	4	5	-	430

OR

A company manufactures 2 products A and B. The profit per unit of A and B is Rs. 60 and 80 respectively. The company is required to supply 200 units of product B to its regular customers. Product A requires machining on machine M1 only and for one unit of A, one hour of M1 is required. Product B requires Machine M2 only and machine hours on M2 has enough hours available to manufacture any number of units of product B. M1 has 400 hour available. Product A and B both require one labor hour each and company has 500 labor hours available. To determine the number of units of A and B to be manufactured, satisfying given conditions. Formulate the LP model. [18]



Total No. of Questions : 6]

SEAT No. :

P3026

[5059]-299

[Total No. of Pages : 2

B.E. (Printing)

PRINTING MACHINE MAINTENANCE

(2008 Course) (Semester - II) (408287 - 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) *All questions compulsory.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) a) Draw a neat diagram of the worm and worm wheel mechanism. Where is it used in the offset press? How is it maintained. **[10]**

b) What is difference between AC motors and DC motors. **[6]**

OR

a) Draw the diagram of helical gears. Compare spur, helical and bevel gears. **[8]**

b) Explain the purpose of belt drive used in sheet fed offset machine. Draw a neat diagram of 'V' belts. What are the advantages of this drive over other drives? How is it maintained? **[8]**

Q2) Explain in steps how to disassemble and assemble rollers in dampening unit. **[16]**

OR

Prepare a daily, weekly, monthly maintenance checklist for ink supply unit and dampening solution supply unit. **[16]**

P.T.O.

Q3) State and explain different maintenance strategies to improve operational effectiveness in a press. [18]

OR

Explain how life of motors and electrical components can be improved. State maintenance carried out for these equipments. [18]

SECTION - II

Q4) a) What is the importance of safety norms and policies to be followed in any press? [9]

b) Explain the uses of the following in condition monitoring: [9]

i) Test charts.

ii) Digital ultrasonic scanner.

iii) Stroboscope

OR

a) What are steps of preventive maintenance of a blanket used in offset. Draw a neat sketch of the 3 ply blanket. [10]

b) What is the purpose of a standard operating procedure. State points to be considered when developing one. [8]

Q5) Write short notes on the following that require special maintenance needs. [16]

a) Roller bearings.

b) Friction clutches.

c) Brakes.

d) Gear box.

OR

a) Define what is hazard. State any 2 physical and chemical hazards in Flexo printing plant. [8]

b) State steps to eliminate these hazards. [8]

Q6) Explain working of a former folding mechanism. What daily, weekly and monthly maintenance is required in former folders. [16]

OR

Explain working and construction of open flame dryer in web press. Explain maintenance of the same. [16]



Total No. of Questions : 8]

SEAT No. :

P1772

[Total No. of Pages : 4

[5059]-3
B.E. (Civil)
STRUCTURAL DESIGN - III
(2008 Pattern)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, From Section-I.*
- 2) *Answer Q.5 or Q.6, Q.7 or Q.8, From Section-II.*
- 3) *Answer to the two sections should be written in separate answer-books.*
- 4) *Figures to the right indicate full marks.*
- 5) *IS 1343, IS 456, IS 3370 are allowed.*
- 6) *Assume suitable data wherever necessary and mentioned it clearly.*

SECTION - I

- Q1)** a) Enlist the various time dependant and instantaneous losses in prestress concrete. **[4]**
- b) Define the term post tensioning. What are the various post tensioning methods. **[4]**
- c) A Post tensioned pre stressed Concrete beam section has top flange 450×150 mm, web 200×700 mm and bottom flange 400×300 mm is simply supported over an effective span of 14 meter. The beam is pre stressed with 5 no's of 12/5 Freyssinet parabolic cables ($F_y = 1650$ Mpa) with their C.G. 100 mm from extreme bottom fiber, stressed one at a time from only one end. Calculate total loss of prestress at the age of 120 days if $K = 0.0026$ /m length of cable , slip of anchorage = 2mm , $C_c = 1.8$, $E_s = 2 \times 10^5$ Mpa, Concrete grade M 40, Creep and relaxation = 2% of initial prestress. **[17]**

OR

- Q2)** a) Explain Stress Concept and Load balancing concept used in Design of Prestress concrete member with neat sketches. **[10]**

P.T.O.

- b) An unsymmetrical prestressed concrete section has top flange 600×200 mm, bottom flange $400 \text{mm} \times 300 \text{mm}$ and web $200 \text{mm} \times 700 \text{mm}$, it is supported over a span of 18 m carries super imposed load of 11 kN/m, the effective prestressing force is 1200 kN located at 100mm from soffit of the section at mid span, cable profile is parabolic and concentric at support. Calculate extreme fiber stresses in concrete at mid span at initial and final stage. Take loss ratio as 0.85 and unit weight of concrete as 25 kN/m^3 . [15]

Q3) Design a Post tensioned Pre stressed concrete beam using I-section for flexure to carry a live load of 10 kN/m over a simply supported span of 22 m with M 45 grade of concrete and Freyssinet cables of 12/5 ($f_y = 1750 \text{ Mpa}$) or 12/7 ($f_y = 1500 \text{ Mpa}$), Design the End block also. Draw sketches showing details of cable profile, end block reinforcement Check for fiber stresses in concrete and deflection is must. [25]

OR

- Q4)** a) State remedial measures to be taken to reduce losses in PSC Beams. [5]
- b) A post tensioned pre stressed concrete Two-way slab of $7 \text{ m} \times 8 \text{ m}$ with discontinuous edge to support imposed load of 4 kN/m^2 using S3 strands each having cross sectional area 100 mm^2 and $f_y = 1900 \text{ Mpa}$ check the safety of the slab at collapse and deflection at service load . Use M45 grade of concrete. [20]

SECTION - II

- Q5)** a) Compare Portal and Cantilever method of analysis of building frames.[6]
- b) Design the continuous beam ABC only for flexure for building frame with 20% redistribution of moments considering combined effect of horizontal and vertical loads as shown in figure (1). Use Cantilever method for lateral loads and Substitute frame method for vertical loads. Consider ultimate dead load (including self weight of beam) and live load intensities as 30 kN/m and 12 kN/m respectively on both span (AB & BC). Use M20 concrete and Fe 500 steel. Show reinforcement details at mid- span of AB and BC and at joint B. [19]

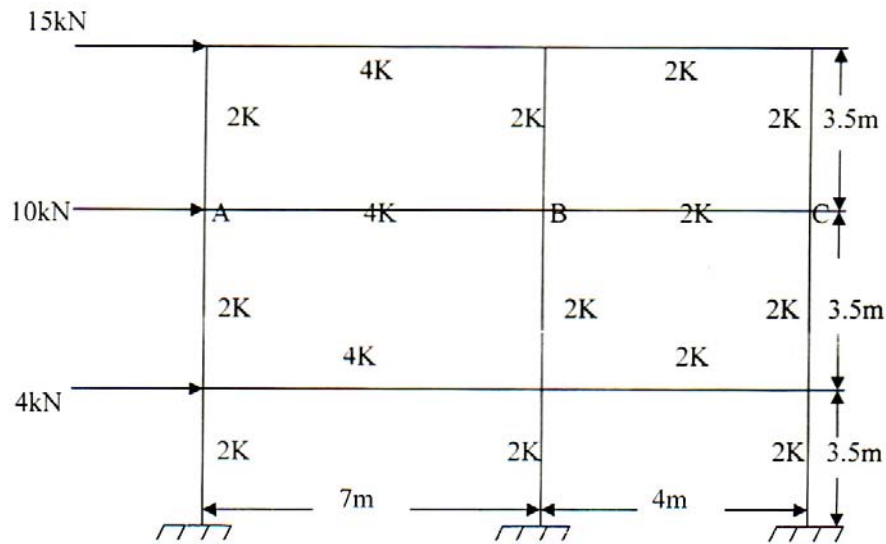


Fig. (1)

OR

Q6) Figure (2) shows the indeterminate frame of a multistoried building. The frames are spaced at 3.5m c/c. Analyse the frame by considering dead load of 4kN/m² and live load of 3 kN/m² for all slab panels. The c/s of beam PQ is 300mm × 500 while that of beam QR is 300mm × 800mm. Use Portal method for horizontal load and proper Substitute frame for vertical loads. Also design beam PQR for combined effect of horizontal and vertical load using 22% redistribution of moments. Use M20 concrete and Fe 500 steel. [25]

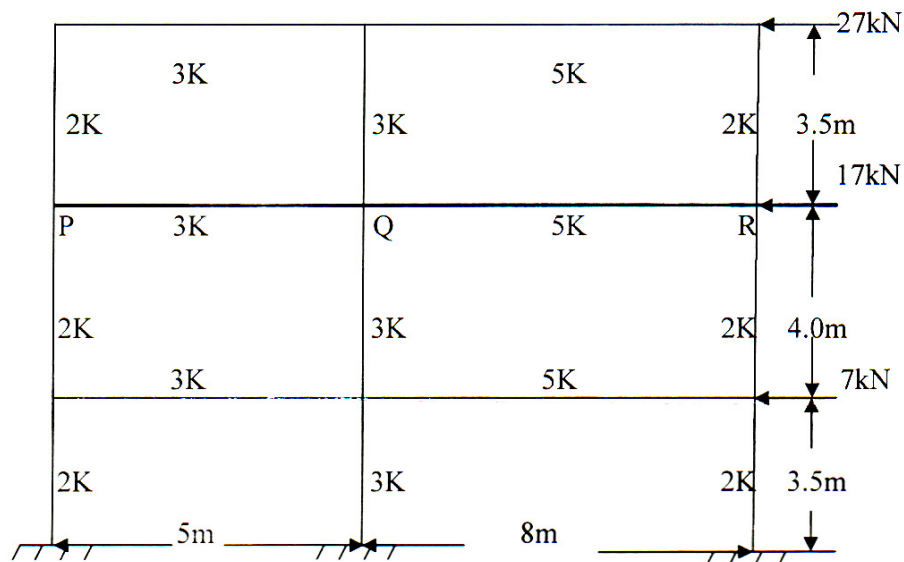


Fig. (2)

Q7) Design a cantilever T-shaped retaining wall to retain soil 5.6m high above the ground level. The embankment is surcharged at an angle of 12° with horizontal. The SBC of soil is 200 kN/m^2 at a depth of 1.5m below GL. An angle of repose is 35° , unit weight of backfill is 17 kN/m^3 , coefficient of friction between wall and soil is 0.55. Give all the checks related to stability of retaining wall. Use M25 concrete and Fe 500 steel. Show the details of reinforcement at Toe, Heel and Stem portion. **[25]**

OR

Q8) a) Compare combined footing and strap footing. Also explain the steps use to find the dimensions of trapezoidal combined footing. **[7]**

b) Design a circular water tank along with base slab for the tank with for the following data : **[18]**

- i) Rigid base rest on ground.
- ii) Capacity of tank = 5.5×10^5 Liters,
- iii) M25 concrete and Fe 500 steel.
- iv) SBC of soil = 210 kN/m^2

Draw pressure diagram and reinforcement details of tank wall and base slab. Assume suitable data if necessary.



Total No. of Questions : 6]

SEAT No. :

P3027

[Total No. of Pages : 2

[5059]-300-A

B.E.(Printing)

FLEXIBLE PACKAGING

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

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) Write properties and applications of the following: **[18]**

- a) LDPE
- b) OPP
- c) PS

OR

Explain the requirements of Packaging. **[18]**

Q2) Explain in detail rotogravure process for flexible packaging **[16]**

OR

Explain in detail Flexography for flexible packaging **[16]**

Q3) Explain along with diagram Extrusion lamination techniques. **[16]**

OR

Explain along with diagram Blown Film Extrusion process. **[16]**

SECTION-II

Q4) Explain in detail lami-tubes in packaging **[16]**

OR

Explain in detail Bag-in-Box concept for liquid product. **[16]**

P.T.O.

Q5) Explain the types of caps for various applications. **[16]**

OR

Describe stretch packaging technique for a given product. **[16]**

Q6) Explain the packaging methods for tea and coffee. **[18]**

OR

Mention deterioration factors for the following: **[18]**

- a) Milk
- b) Bakery Products
- c) Cheese and Butter



Total No. of Questions : 12]

SEAT No. :

P3028

[5059]-301

[Total No. of Pages :2

B.E. (Polymer)

POLYMER COMPOUNDING

(2008 Course) (Semester-I) (409361)

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. Answer question number 7 or 8, 9 or 10 and 11 or 12 from Section -II.*
- 2) *Answers to the two sections should be written on separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw Neat sketches wherever required.*
- 5) *Use of calculator graph paper is allowed.*
- 6) *Assume suitable data if required.*

- Q1)** a) Discuss the solid-solid and solid-liquid mixing in details. [8]
b) Write a note on scale of segregation and intensity of segregation. [8]

OR

- Q2)** a) Explain the mixing action in a double cone blender. [8]
b) Write a note on kinetics of mixing [8]

- Q3)** a) Explain in detail mechanism and theory for filler surface modification and interfacial agents. [8]
b) Discuss in details the mechanism and theory of surface modification of fillers. [8]

OR

- Q4)** a) Discuss the terms polymer blends, polymer alloys, compatible blends, miscible blends, immiscible blends with one example. [8]
b) Write a note on mechanism used for dispersion of nanofillers in polymer melt. [8]

- Q5)** a) Write a note on carbon black and ZnO used as fillers in polymers. [9]
b) Write a note on titanium oxide, nano clay, glass fibers, organic fillers [9]

OR

P.T.O.

- Q6)** a) Discuss mechanism of processing aids and flame retardants. [9]
b) Indicate the mechanism of working of UV stabilizers. [9]

SECTION-II

- Q7)** a) Write a detailed note on PVC compounds for cable. [9]
b) Write a detailed note on compounding of EPDM. [9]

OR

- Q8)** a) Mention the applications of reactive extrusion. [9]
b) Write a detailed note on compounding of SBR. [9]
- Q9)** a) Discuss construction and mixing action of variable depth mixing section [8]
b) Explain in details the requirements of a distributive mixing section. [8]

OR

- Q10)** a) Write a note CRD mixing section [8]
b) Explain fluted mixing section. [8]
- Q11)** a) Explain the terms intermeshing and non-intermeshing twin screw extruders. Compare them with respect to their mixing action and conveying characteristics. [8]
b) Write a detailed note on construction and mixing action in a internal mixer. [8]

OR

- Q12)** a) Explain with neat sketches, working principle of counter-rotating Twin screw extruders [8]
b) Draw comparison between single screw and twin screw extruder with respect to propulsive action and mixing [8]

✓ ✓ ✓

Total No. of Questions : 12]

SEAT No. :

P3029

[5059]-302

[Total No. of Pages : 2

B.E. (Polymer)

MOLD AND DIE DESIGN - 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 diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION - I

Q1) Design a 2 cavity 2 plate mold for the component shown in figure 1. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. **[35]**

OR

Q2) Design a 2 cavity 3 plate mold for the component shown in figure 2. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. **[35]**

Q3) Explain the bubbler cooling for core inserts with a neat figure. **[6]**

OR

Q4) Explain sleeve ejection with neat figures. **[6]**

Q5) With a neat labeled sketch, explain the constructional features of a centre fed blown film die. **[9]**

OR

Q6) With a neat labeled sketch, explain the constructional features of an in-line pipe die. **[9]**

SECTION - II

Q7) a) Explain the process of annealing and normalizing in details. **[9]**

b) Describe the operations of polishing, honing and lapping in details. **[9]**

OR

P.T.O.

Total No. of Questions : 12]

SEAT No. :

P3030

[5059]-303

[Total No. of Pages : 2

B.E. (Polymer)

POLYMER PROCESSING OPERATION - II

(2008 Course) (Semester - I) (409363)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Give the working of blow molding process with complete operation. [9]
b) Explain terms like wall thickness control, parisan swell, and parisan inflation, cutting devices and process parameters. [9]

OR

- Q2)** a) Give the importance of product quality control during extrusion blow molding along with few moulding defects - causes and remedy. [9]
b) Explain how injection stretch blow molding is carried out. and what parameters one has to take care of while processing. [9]

- Q3)** a) Explain thermoforming process step by step and give few examples. [8]
b) Explain plug-assist forming and the advantages it offers. Also explain how is it different than vacuum forming. What is the temperature to which the sheet is heated before forming. [8]

OR

- Q4)** a) Explain drape forming, air-slip forming and pressure forming. [8]
b) Give the defects in thermoformed articles and remedies. [8]

P.T.O.

- Q5)** a) Explain Calendaring basic process with roll configurations. [8]
b) Explain significance of roll separation forces and methods of compensation along with roll bending and roll deflection during calendaring process. [8]

OR

- Q6)** a) Explain embossing lines along with the various parameters, control and their effect on quality. [8]
b) What methodologies are required to take care of roll bending & deflection. [8]

SECTION - II

- Q7)** a) Explain rotational molding with significance of major and minor axis. [9]
b) Explain rotational molding of liquids with any one example. [9]

OR

- Q8)** a) Give effect of any five parameters on rotamolding. [9]
b) Explain the types of faults and remedies during rotational molding. [9]

- Q9)** a) Explain the Microstructure development in slow crystallizing and fast crystallizing polymers. [8]
b) Give the process for Gas injection molding and how is it different than conventional injection molding. [8]

OR

- Q10)** a) Explain molecular orientation and effect of crystallinity on material properties. [8]
b) Give classification of different water injectors. [8]

- Q11)** a) Explain printing equipments used for on-line printing and batch printing. [8]
b) Explain Recycling of plastics with individual steps in the process and their purpose. [8]

OR

- Q12)** a) Give the special guidelines for machining of polymers with respect to tool geometry and other machining parameters. [8]
b) What is vacuum metallizing and how is it done. [8]

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Total No. of Questions : 12]

SEAT No. :

P 3031

[5059] - 304

[Total No. of Pages :2

B.E. (Polymer)

FIBER TECHNOLOGY

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION -I

- Q1)** a) Give molecular requirements of fiber forming polymers and give properties and applications of synthetic and natural fibers. [9]
- b) Give classification of fibers, advantages and disadvantages of synthetic fibers over natural fibers. [9]
- OR
- Q2)** a) Explain various terminologies like fiber, yarn, filament, denier, tenacity. [9]
- b) Explain the source of natural fiber and its spinning technique. [9]
- Q3)** a) Give wet and dry spinning techniques used in fiber manufacture. [8]
- b) Give solution spinning techniques used in fiber manufacture. [8]
- OR
- Q4)** a) Give wet jet spinning techniques used in fiber manufacture. [8]
- b) Give melt spinning techniques used in fiber manufacture and explain any one. [8]
- Q5)** a) Explain composition and function of spin finish. [8]
- b) Give the steps for post spinning operations. [8]
- OR

P.T.O.

- Q6)** a) Explain false twist process with diagram. [8]
b) Explain air jet texturing, and stuffer box texturing. [8]

SECTION -II

- Q7)** a) Give steps for polyeter staple fiber production process with the steps involved [9]
b) Explain fiber structure properties taking few examples. [9]

OR

- Q8)** a) Why structural changes take place during spinning, drawing and heat setting. [9]
b) Explain any two identification techniques required for fibers. [9]

- Q9)** a) Give list of Mass coloration methods and explain any 2 in detail. [8]
b) Give mass coloration advantages and disadvantages. [8]

OR

- Q10)**a) Give method used for Ddyeing of synthetic fibers in loose fiber and yarn form. [8]
b) Give types of dyes used for natural fibers and also give differences between dyes and pigments. [8]

- Q11)**a) What are Modified synthetic fibers and how is the modification achieved. [8]
b) Explain following terms: denier, tenacity and elongation, spin finish content, percent shrinkage. [8]

OR

- Q12)**a) Explain optical fibers with their advantages and applications. [8]
b) Explain nano-fibers and bi-component fibers and what are their applications. [8]



Total No. of Questions : 12]

SEAT No. :

P3032

[5059]-305

[Total No. of Pages : 3

B.E. (Polymer)

MECHANICS OF COMPOSITES
(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) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume suitable data if necessary.

SECTION - I

- Q1) a)** Write the compliance matrix (6x6) for anisotropic material. [9]
- b) Prove that reduced transformed stiffness matrix for an orthotropic lamina can be given by $[\bar{Q}] = [T]^{-1}[Q]^{-1}[T]^{-T}$ where $[T]$ is transformation matrix and $[Q]$ = reduced stiffness matrix. [9]

OR

- Q2) a)** Write in short about coefficients of mutual influence in details. [8]
- b) Prove that for an orthotropic lamina, condition for restriction on poisson's ratios are given by [10]

$$\nu_{21}\nu_{32}\nu_{13} < \frac{1 - \nu_{21}^2 \left(\frac{E_{11}}{E_{22}} \right) - \nu_{32}^2 \left(\frac{E_{22}}{E_{33}} \right) - \nu_{13}^2 \left(\frac{E_{33}}{E_{11}} \right)}{2} < \frac{1}{2}$$

- Q3) a)** Write a note on Maximum Stress Theory. [8]
- b) Reduce maximum strain failure criterion to unidirectionally fibre reinforced composite subjected to uniaxial load at an angle θ . [8]

OR

P.T.O.

- Q4)** a) Write a note on Tsai-Wu tensor theory. [8]
 b) Write down Tsai-Hill failure criteria for all four quadrants. [8]
- Q5)** a) Prove the rule of mixtures for major Poisson's ratio ν_{12} in terms of Poisson's ratio of fibre and Poisson's ratio of matrix using mechanics of materials approach. [8]
 b) Give lower and upper bound on apparent Young's modulus using elasticity approach to stiffness. [8]

OR

- Q6)** a) Prove the rule of mixtures for major Poisson's ratio ν_{12} in terms of Poisson's ratio of fibre and Poisson's ratio of matrix using mechanics of materials approach. [8]
 b) For a sheet molding compound, data for fibre and matrix is as follows for fibre:
 $E_f = 70\text{GPa}$, $\rho_f = 2.5 \text{ kg/mm}^3$, $l_f = \text{fibre length} = 25\text{mm}$, $d_f = \text{fibre diameter} = 3\text{mm}$, For matrix $E_m = 4 \text{ GPa}$, $\rho_m = 1 \text{ kg/mm}^3$
 Calculate tensile modulus, shear modulus and Poisson's ratio. [8]

SECTION - II

- Q7)** a) Explain any 2 non-destructive testing methods used for composites. [8]
 b) Explain any 2 compression testing of composites. [8]

OR

- Q8)** a) Explain test configuration for a two rail and three rail shear test and explain test strain gauge arrangement for determining the shear modulus. [8]
 b) Write in short about at two Fatigue test methods for fiber reinforced composite materials. [8]
- Q9)** a) Determine the [A], [B] and [D] matrices for a laminate with stacking sequence $[+45/-45]_s$. The ply properties are
 $E_1 = 150\text{GPa}$, $E_2 = 8\text{GPa}$, $G_{12} = 9\text{GPa}$, $\nu_{12} = 0.34$ [14]
 b) Write down the [A], [B] and [D] matrices for single layer anisotropic laminates. [4]

OR

- Q10)a)** For a [-60/+60/-60/+60] anti-symmetric angle ply laminate with each layer 1 mm thick, calculate [A], [B] and [D] matrix. The reduced transformed stiffness matrix for individual layers are given below: **[14]**

$$[\bar{Q}]_{-60} = \begin{bmatrix} 20 & 25 & -15 \\ 25 & 85 & -41 \\ -15 & -41 & 28 \end{bmatrix} \text{GPa}$$

$$[\bar{Q}]_{+60} = \begin{bmatrix} 20 & 25 & +15 \\ 25 & 85 & +41 \\ +15 & +41 & 28 \end{bmatrix} \text{GPa}$$

- b) Write force and moment resultants for antisymmetric cross ply laminates and single layered isotropic laminates. **[4]**

- Q11)a)** Explain failure modes of mechanically fastened joints. **[8]**

- b) Derive equilibrium equations in terms of displacements for a transversely loaded specially orthotropic laminated plate. **[8]**

OR

- Q12)a)** Discuss the different types of adhesive and bolted joints for composites. **[6]**

- b) Obtain an expression for beam deflection for a simply supported beam of length L and uniformly distributed load F. **[10]**

x x x

Total No. of Questions : 12]

SEAT No. :

P1941

[Total No. of Pages : 3

[5059]-306

B.E. (Polymer Engineering)

**POLYMER REACTION ENGINEERING
(2008 Pattern) (Elective - I) (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 books.*
- 3) *Draw neat diagrams wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

- Q1)** a) Explain the different parameters used for designing of polymerization reactor. [6]
- b) Discuss in brief polymerization processes by using reactant preparation, polymerization and separation. [12]

OR

- Q2)** a) Discuss the importance of Molecular weight and Molecular weight distribution of polymer. [6]
- b) Explain the characteristics of Chain Growth Polymerization and Explain the distinctive features of Polymer Reaction Engineering. [12]

- Q3)** a) Derive the necessary equation for the total concentration of the free radicals under free radical polymerization. [6]
- b) 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]

OR

P.T.O.

- Q4)** a) Derive the necessary relationship obtained in giving Molecular weight distribution in CSTR for free radical type polymerization. [10]
- b) Discuss all the mechanism steps to be used in Free radical polymerization with one suitable example. [6]

Q5) Styrene is polymerized in batch reactor at 60°C with the free radical initiator. The initial concentration of styrene is 18.35 gmole/lit, and the concentration of initiator is kept constant at 0.04 gmole/lit. Assume termination takes place only by combination. The rate constant are as [16]

$K_0=3 \times 10^{-6} \text{ sec}^{-1}$, $k_p=176 \text{ lit/gmole.sec}$, $k_c=3.6 \times 10^7 \text{ lit/gmole.sec}$, $f=0.6$ the volume of the reactor filled by the reacting system is 3760 lit. For a reaction time of 180 min, compute the following :

- a) The percentage of the styrene polymerized
- b) The number average molecular weight

OR

- Q6)** a) Write a note on Auto Acceleration effect in free radical polymerization. [8]
- b) Write a Note on : Aqueous emulsifier solution. [8]

SECTION - II

Q7) Write a short note on reactor systems used for PET, High Density Polyethylene polymers. [18]

OR

Q8) Give technology overview for the following polymer [18]

- a) PVC,
- b) Nylon 6,
- c) Polystyrene

- Q9)** a) Discuss the role of mass transfer in step growth polymerization. [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. [8]

OR

- Q10)** a) Describe the Three Stages of Emulsion Polymerization needed to understand the kinetics. [10]
- b) Write a note on types of Coordination Catalyst. [6]

Q11) Write a short note on Reactor Selection for carrying out polymerization reaction and Role of control engineering in Polymerization reactor. [16]

OR

- Q12)** a) Explain the reactor design in terms of following factors Polymerization Mechanism, Stoichiometry Factors, Thermodynamics Factors, and Transport Limitations. [8]
- b) Discuss the choice between batch and continuous reactor for polymerization process. [8]



Total No. of Questions : 12]

SEAT No. :

P3764

[5059]-308

[Total No. of Pages : 3

B.E. (Polymer Engineering)

SURFACE COATINGS AND ADHESIVES

(2008 Pattern) (Semester - I) (Elective - II) (409365 - B)

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) Elaborate classification of paints. [5]
- b) With appropriate diagrams elaborate working mechanism of defoamers and emulsifier. [7]
- c) Discuss in detail the characteristics of paints and varnish. [6]

OR

- Q2)** a) Comment on the necessity of solvents in surface coatings applications. [6]
- b) Explain in detail the process of manufacturing paints. [8]
- c) Explain the concept of drying oil and no-drying oils. Give examples of each. [4]

- Q3)** a) Explain in detail paint formulations based on polyurethanes. [8]
- b) Write short note on use of alkyd resins in surface coatings. [8]

OR

- Q4)** a) Write a short note on Emulsion paints. Mention their applications. [6]
- b) Differentiate between Novolac and Resol types of phenolic resins. [4]
- c) Discuss about the paints based on acrylics resins. [6]

P.T.O.

- Q5)** a) With suitable examples comment on factors affecting adhesion of surface coating. [6]
b) Explain the terms - wet and dry film thickness, hiding and wetting power. [4]
c) Discuss in detail about testing of liquid paints. [6]

OR

- Q6)** a) Explain the importance of dispersion testing in surface coating. Explain the test used for the same. [8]
b) Elaborate the methods used to assess mechanical properties of paints. [8]

SECTION - II

- Q7)** a) Explain in detail diffusion theory of adhesion. [9]
b) Enlist various advantages of adhesive joint over conventional joining methods. [9]

OR

- Q8)** a) Discuss in detail mechanical interlocking theory of adhesion. [8]
b) Comment about the importance of surface energy and wettability in adhesive field. [6]
c) What are the disadvantages of adhesive joint? [4]

- Q9)** a) What are pressure sensitive adhesives (PSA)? Enlist various applications of PSAs. [6]
b) Write short note on natural gum based adhesives. [7]
c) Enlist the role of tackifier in adhesive formulation. [3]

OR

- Q10)** a) Explain the concept of structural and non-structural adhesives. Enlist their applications. [4]
b) Write short note on hot melt adhesives. [8]
c) Comment on the health and safety issues involved in solvent based adhesive formulations. [4]

- Q11)a)** Explain in detail the testing protocol used to understand peel strength of pressure sensitive adhesives. [8]
- b) What are various surface preparation techniques used in adhesion technology? Explain any one in detail. [8]

OR

- Q12)a)** With appropriate diagrams, comment on various stresses and joints related to adhesion. [8]
- b) Explain the testing method used for understanding tackiness of adhesive. [8]



Total No. of Questions : 12]

SEAT No. :

P1783

[Total No. of Pages : 4

[5059] - 31

B.E. (Mechanical)

CAD CAM AND AUTOMATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers two sections in two separate answer books.*
- 2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 and Q11 or Q12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) Explain in detail transformation, scaling and rotation? **[8]**
- b) A triangle is defined by its vertices (0, 2), (0, 3), (1, 2). Perform the following transformation on original triangle separately. **[10]**
- i) *Translate the original triangle in space by 2 units in the x direction and 5 units in the y direction.*
 - ii) *Scale the original triangle by factor of 1.5.*
 - iii) *Rotate the original triangle by 45° about the origin.*

OR

- Q2)** a) Write in detail about Inverse Transformation? **[8]**
- b) A line is defined in two dimensional system by its points (1, 2) and (6, 4). Express this in matrix notation and perform the following transformation on original line: **[10]**
- i) *Rotate original line about the origin by 90°.*
 - ii) *Scale original line by a factor of 0.5*
 - iii) *Translate original line by 2 units in x direction and 2 units in y direction*

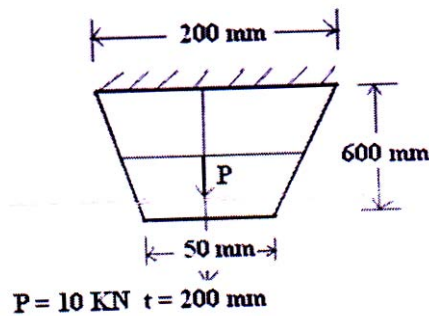
P.T.O

- Q3) a)** What is Geometric Modeling? Explain its types in detail? [8]
b) Explain in detail about Bezier and B spline curve? [8]

OR

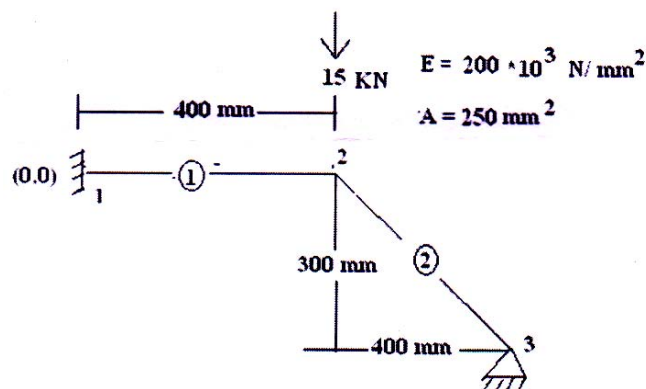
- Q4) a)** Explain the Boolean operations for CSG? State advantages of CSG. [8]
b) Write difference between geometry and topology? [8]

- Q5) a)** What is FEM? Write its stepwise procedure in detail? [6]
b) An axial step bar is shown in figure 1. It is subjected to axial pull P of 10 kN. If material of bar is uniform and having a modulus of elasticity as 150 GPa. Determine deflection and stresses in each element. [10]



OR

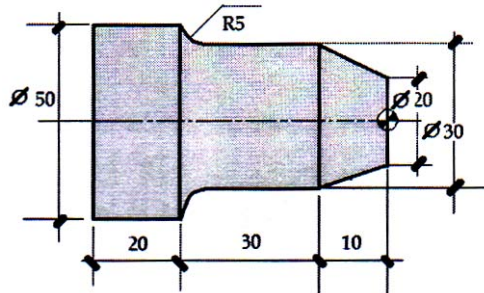
- Q6) a)** A two bar truss is shown in figure. Solve the problem as FEM problem and find Nodal displacement and Elements Stress. [10]



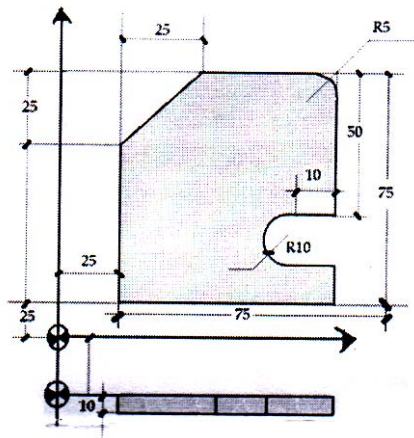
- b)** Explain in detail shape functions for 1D linear element. [6]

SECTION - II

- Q7)** a) What is CAM? Explain an integration of CAD, NC and CAM. [8]
b) Write a manual part program for following component for finishing cut. Assume suitable data for speed, feed etc. [10]



- Q8)** a) Write a manual part program for following component for finishing cut. Assume suitable data for speed, feed etc. Use cutter radius compensation. [10]



- b) Write a short note on CAPP and explain its need? [8]
- Q9)** a) What is Automation? Compare various types of automations. [8]
b) Explain in detail Transfer Line Mechanism and Geneva Mechanism? [8]

OR

- Q10)a)** What is concept of Group Technology and explain it in detail? [8]
b) Explain in detail Automated Guided Vehicle (AGVs). [8]

- Q11)a)** Write short notes on : [8]
i) Classification of Robot
ii) Robot Gripper
b) Write in detail configuration of Robot System [8]

OR

- Q12)a)** What are end effectors? Explain its types in detail? [8]
b) What is importance of Robot in industries and explain its two applications. [8]



Total No. of Questions : 12]

SEAT No :

P3033

[5059]-310

[Total No. of Pages : 2

B.E. (polymer)

**PRODUCT DESIGN AND POLYMER TESTING
(2008 Pattern) (Semester - II) (409368)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain pseudoplastic design method for plastic product design. [9]
b) Write a note on design of hinges and gears. [9]

OR

- Q2)** a) Write a short note on isometric and isochronous curves. [9]
b) Write a detailed note on the concurrent approach in plastic product design. [9]

- Q3)** a) Discuss in details the method for ultrasonic welding with a neat figure. [8]
b) Discuss in details self tapping screws and spring clips as fasteners. [8]

OR

- Q4)** a) Discuss in details the method for high frequency dielectric welding. [8]
b) Write a note on press fits fastening of plastic components. [8]

- Q5)** a) Write a detailed note on ASTM test methods used for determining of tensile strength and modulus. [8]
b) Discuss the ASTM test method used for determining fatigue properties. [8]

OR

- Q6)** a) Write a detailed note on ASTM test methods used for determination of hardness and abrasion resistance. [8]
b) Write a detailed note on ASTM test methods determination of compressive properties. [8]

P.T.O.

SECTION - II

Q7) a) Discuss the procedure for determination of bulk density, moisture absorption. [9]

b) Discuss the procedure for X-ray fluorescence non destructive testing. [9]

OR

Q8) a) Discuss the ultrasonic testing and beta transmission. [9]

b) Discuss the procedure for determination of particle size analysis. [9]

Q9) a) Write a detailed note on method for determination of EMI shielding and electrical conductivity measurements. [8]

b) Discuss the test methods for determining the static charge in polymers. [8]

OR

Q10)a) Discuss the procedure for determination volume resistivity and surface resistivity and arc resistance. [8]

b) Discuss the procedure for determination of color and specular gloss. [8]

Q11)a) Discuss the procedure for determination of flammability tests for cellular plastics. [8]

b) Discuss the procedure for determination of ignition properties of plastics. [8]

OR

Q12)a) Explain the test methods for determining the solvent stress cracking resistance and stain resistance of plastics. [8]

b) Discuss in details the test method used for the determination of the resistance of plastics to fungi and bacterial growth. [8]

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Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 3

P3034

[5059]-311

B.E.(Polymer)

MOLD AND DIE DESIGN-II

(2008 Pattern) (Semester - II) (409369)

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 axially moving rotating core method for ejection of internally threaded components. [9]
- b) Explain the ejection of internally threaded components with collapsible core. [9]

OR

- Q2)** a) Explain the rack and pinion method with neat sketch for ejection of threaded components. [9]
- b) Discuss in details rotating cavity method for ejection of internally threaded components with neat figures. [9]
- Q3)** a) Compare hot runner molds and underfed molds. [8]
- b) Explain the advantages and disadvantages of hot runner molds. [8]

OR

- Q4)** a) Explain in details with neat figures extended nozzle and barb nozzle. [8]
- b) State advantages and disadvantages of hot runner molds. [8]
- Q5)** a) Discuss in details the various factors taken into consideration for placement and size of vent holes in thermoforming molds. [10]
- b) Discuss in details materials used for making thermoforming molds. [6]

OR

P.T.O.

- Q6)** a) Explain in details construction of transfer molds. [10]
 b) Explain constructional features of molds used for extrusion blow molding. [6]

SECTION-II

- Q7)** Design a 2 cavity mold for the component shown in figure 1. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system, Illustrate the relevant design calculations. [30]

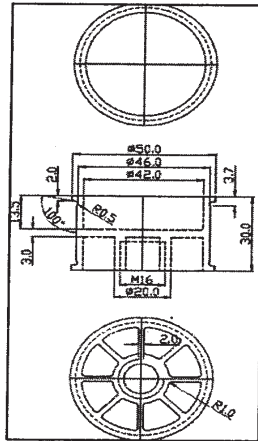


Figure 1

OR

- Q8)** Design a 2 cavity mold for the component shown in figure 2. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [30]

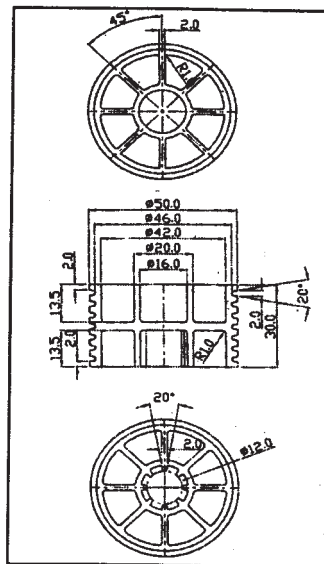
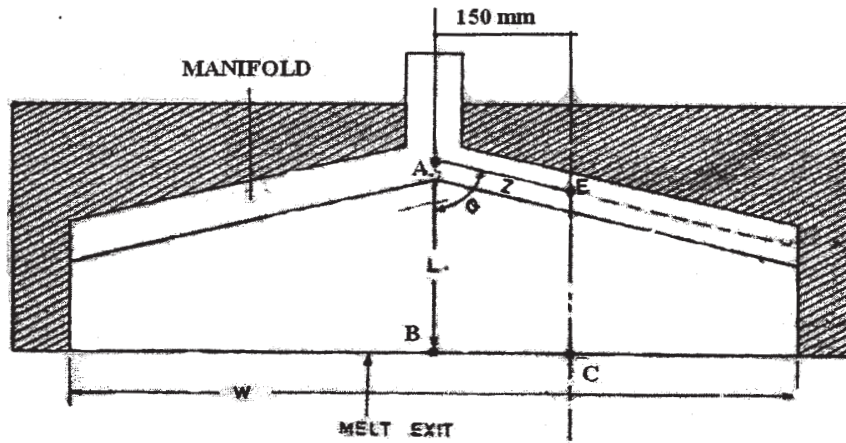


Figure 2

- Q9)** Discuss the various shapes of manifolds used in sheet dies with neat sketches. With a neat sketch, explain the constructional features of a coat hanger sheet die. [10]

OR

Q10) Compare the pressure drop along AB and AEC through a coat hanger film die as shown in figure 3, used to extrude film with width 650 mm and thickness 0.03 mm. The material obeys power law with flow behavior index, $n=0.38$ and $k=600 \text{ kg(f)s}^{0.38}/\text{m}^2$. Melt density is 0.65 g/cc, extruder size = 75 mm, extruder output = 45 kg/hr. The manifold angle $\theta=60^\circ$ and $\alpha=3$. Assume suitable data. [10]



- Q11)a)** Write a note on pack analysis. [5]
b) Explain [5]
 i) meld line
 ii) weld line

OR

Q12) Discuss any two four parameter viscosity models. [10]



Total No. of Questions : 12]

SEAT No. :

P3035

[5059]-312

[Total No. of Pages : 2

B.E. (Polymer)

POLYMER PHYSICS AND CHARACTERISATION
(2008 Course) (Elective - III) (Semester - II) (409370 - A)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain ATR method and its advantages. **[9]**

b) Give the different types of vibrational mode. **[9]**

OR

Q2) a) Give the different methods of sample preparation. **[9]**

b) Explain working of FTIR using the chart method. **[9]**

Q3) a) Explain Nuclear Magnetic Resonance Spectroscopy (NMR) in short. **[8]**

b) Explain how qualitative and quantitative analysis of elements is done using NMR spectroscopy. **[8]**

OR

Q4) a) Explain how characterization of polymers is done using NMR spectroscopy is done. **[8]**

b) Explain relaxation process, chemical shifts, spin-spin interaction for NMR. **[8]**

Q5) a) Explain crystal geometry and structural determination of polymers using wide and small angle X-ray diffraction techniques. **[8]**

b) Explain how molecular weight distribution is found using Mark Howinks equation and data from GPC. **[8]**

OR

P.T.O.

- Q6)** a) Give significance of Bragg law of X-ray diffraction. Also explain powder and fiber diffraction methods. [8]
- b) Explain GPC working with diagram and application. [8]

SECTION - II

- Q7)** a) Give the Basic principal of electron microscopy and explain it working in short. [9]
- b) Give working of transmission electron microscopy (TEM) with its advantages. [9]

OR

- Q8)** a) Explain how specimen preparation is done during electron microscopy. [9]
- b) Explain Lamella, fibrillar growth and spherulite structures in polymers. [9]

- Q9)** a) Explain Thermal transitions and their classification in polymers along with glass transition temperature and its mechanism. [8]
- b) Explain characterizing of polymer and polymer blends using differential thermal analysis (DTA). [8]

OR

- Q10)**a) Explain thermogravimetric analysis (TGA) along with it working and advantages. [8]
- b) Describe Optical Properties along with Interaction of light with polymers, reflection and refraction of light by polymers, birefringence, birefringence in isotropic. [8]

- Q11)**a) Explain dynamic electric analysis (DEA). [8]
- b) Give the concept of birefringence and explain birefringence in isotropic and anisotropic materials. [8]

OR

- Q12)**a) Explain working of dynamic mechanical thermal analyser and its usage (DMTA). [8]
- b) Explain dielectric properties, electrical conductivity and static charge in polymers. [8]



Total No. of Questions : 12]

SEAT No. :

P2136

[5059]-313

[Total No. of Pages : 2

**B.E. (Polymer Engineering)
PROCESSING OF COMPOSITES
(2008 Course) (Elective-III) (409370-B)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Numbers to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION-I

Q1) a) Discuss various types of reinforcements used in composites with neat sketches. Explain in detail with any two examples Treatment of Carbon and Kevlar Fibers and its use in Polymer Composites. **[12]**

b) Explain various types and applications of glass fibers. **[6]**

OR

Q2) a) Explain with one example Treatment of Glass Fibers and its use in Polymer Composite. **[10]**

b) Explain the properties and applications of polyamide fibers. **[8]**

Q3) a) Explain in detail Metal matrix composites. **[8]**

b) Explain in detail Injection molding of Thermoset. **[8]**

OR

Q4) a) Write a short note on Bulk Molding Compounds. **[8]**

b) Explain how to determine the Curing Characteristics of Resin-Catalyst Combination. **[8]**

Q5) Explain in detail with neat diagram the Pultrusion process. **[16]**

OR

P.T.O.

Q6) Explain with applicable diagrams in detail structural reaction injection moulding and discuss resin transfer moulding in short. **[16]**

SECTION-II

Q7) a) Explain in detail with applicable diagrams Resin Film Infusion, Structural Reaction Injection Molding. **[12]**

b) Discuss the various raw materials and additives including the matrix material and the reinforcements used in Autoclave Processing. **[6]**

OR

Q8) Discuss in detail Matrix flow model, Application of Pultrusion and Design considerations for Pultrusion die. **[18]**

Q9) a) Discuss different types of Adhesive used in Composites and explain modes of failure in adhesive bonding. **[8]**

b) Write a note on Machining of composites. **[8]**

OR

Q10)a) Explain thermo mechanical model as applied to filament winding. **[8]**

b) Discuss the effect of various process parameters on filament wound products. **[8]**

Q11)a) Explain Applications of carbon nano-tubes composites. **[6]**

b) Differentiate between polymer Nano-composites with other normal composites. **[10]**

OR

Q12) Explain classification of nano-particles and with two case studies explain Polymer nanocomposites. **[16]**



Total No. of Questions : 12]

SEAT No. :

P3036

[5059]-315

[Total No. of Pages : 3

B.E.(Polymer)

ADVANCED POLYMER RHEOLOGY

(2008 Course)(Elective-IV)(Semester-II) (409371-A)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) How are Finger tensor and Cauchy Green tensor determined from the deformation gradient tensor F? [9]
- b) Determine the velocity gradient tensor L for uniaxial extension and solid body rotation. [9]

OR

- Q2)** a) Determine the deformation gradient tensor F for uniaxial extension and simple shear. [9]
- b) Determine the invariants of the following stress tensor [9]

$$T = \begin{bmatrix} 4 & 3 & -2 \\ 3 & 3 & 2 \\ -2 & 2 & 0 \end{bmatrix}$$

- Q3)** a) Write down the Lodge integral equation and KBKZ integral equation. [8]
- b) Mention the most important non-linear phenomena that a constitutive equation should describe. Explain the phenomena of normal stress difference and the different flow phenomena attributed to first normal stress difference. [8]

OR

P.T.O.

- Q4)** a) Explain the term creep compliance. What is steady state creep compliance. [8]
b) Derive the general linear viscoelastic equation. [8]
- Q5)** a) Explain in details the construction and working of a capillary rheometer. [8]
b) Write a note on sliding plate method used to generate shear flows. [8]

OR

- Q6)** a) Explain the construction of cone and plate rheometer. Derive an equation relating apparent viscosity to geometry of cone and plate rheometer. [8]
b) With neat sketches, explain the various geometries used to create drag flow. [8]

SECTION-II

- Q7)** a) Derive equations for simple uniaxial extension of a rod when both its ends are pulled by moving clamps. [9]
b) Discuss extensional flow experienced during bubble collapse and in the entrance region when melt flows from a larger cross section to smaller cross-section. [9]

OR

- Q8)** a) Explain the lubricated compression method used for generating equibiaxial extensional flow. [9]
b) Explain the construction and working of SER geometry used for studying extensional rheometry. [9]
- Q9)** a) Discuss Einstein's equation for dilute polymeric solutions in detail. [8]
b) Write a note on Rouse theory. [8]

OR

- Q10)** a) Discuss the effect of temperature and long chain branching on polymer on relaxation of polymers [8]
b) Discuss the effect of molecular weight and molecular weight distribution on polymer solutions. [8]

Q11)a) Derive an expression for time taken for inflation of a blow molded bottle. [8]

b) Derive an expression to calculate thickness distribution for a thermoformed deep truncated cone. [8]

OR

Q12) a) Derive an expression for pressure required at the extruder exit during wire coating. [8]

b) Derive an expression for maximum pressure for polymer melt flow in calender rolls. [8]



Total No. of Questions : 12]

SEAT No. :

P2137

[5059]-317

[Total No. of Pages : 2

B.E. (Polymer Engineering)

POLYMER THERMODYNAMICS AND BLENDS

(2008 Course) (Semester-II) (Elective-IV) (409371-(C))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *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) Describe first law of thermodynamics and State Limitations of the First Law of Thermodynamics. [8]
- b) Explain the following terms: [8]
Phase Rule, Intensive Properties, Enthalpy, Internal Energy.

OR

- Q2)** a) Explain Second and Third Law of Thermodynamics. [8]
- b) Explain thermodynamic criteria of polymeric dissolution. Describe the condition under which it is not a spontaneous process. [8]
- Q3)** a) Discuss with necessary diagram the effect of temperature on the Phase stability. [9]
- b) Explain the importance of Molecular weight parameter with necessary diagram on the miscibility of polymer blend systems. [9]

OR

- Q4)** a) Explain Phase Equilibria in single and Multicomponent systems. [10]
- b) Write a short note on Criterion of Phase stability. [8]

P.T.O.

- Q5) a)** Explain behaviour of LCST and UCST of polymer with variation in second virial coefficient and free energy of mixing. [6]
- b) Explain Thermodynamic Quality of solvent to a Polymer. [10]

OR

- Q6)** Explain in detail and derive 'Flory Huggins equation for polymer blends. [16]

SECTION-II

- Q7) a)** Explain the term Polymer blends with its importance. Discuss in detail all E's or advantages in employing polymer blend technology. [8]
- b) Draw and explain in detail the schematic representation of the steps to be taken when developing polymer alloys and blends with a specified set of desired performance characteristics. [10]

OR

- Q8) a)** Explain the merits and demerits of solution blending over melt blending. [6]
- b) Write a short note on Methods of Blending. [12]

- Q9) a)** Write a note on Polymer Blend Morphology. [8]
- b) Discuss the Compatibilization and explain any one method of Compatibilization with suitable examples. [8]

OR

- Q10)a)** Explain with neat diagram Role of Compatibilizer. [8]
- b) Discuss the importance of Reactive Blending with suitable example. [8]

- Q11)** Explain Classification, Applications of Interpenetrating Polymer Network and explain any two examples in detail of Interpenetrating Polymer Network. [16]

OR

- Q12)** Write in detail Rheology of Polymer Blends. [16]



Total No. of Questions : 12]

SEAT No. :

P1784

[Total No. of Pages : 4

[5059] - 32

B.E. (Mechanical)

DYNAMICS OF MACHINERY

(2008 Pattern) (Semester - I)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) *Answer any 3 questions from each section.*
- 2) *Answer to the two questions should be written in the separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Use of Logarithmic Tables, slide Rule, Mollier Charts, Electronic pocket Calculator & Steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) What do you mean by Primary and Secondary Balancing in Reciprocating Engines? **[6]**

- b) Three masses A, B & C are mounted on a shaft. The planes of A and B are 100 cm apart whereas the planes of B and C are 75 cm apart. The masses A, B and C are of 30 kg, 40 kg and 32 kg and have their centre of gravity at a distance of 35 mm, 20 mm and 30 mm respectively from the shaft axis. Find the angular position of all the masses from positive x - direction so that static balance is achieved.

It is required to place weights at a radial distance of 25 cm so that complete balance is achieved. If the weights are to be placed in A and C, calculate the magnitude and angular positions of desired masses. **[12]**

OR

Q2) a) Differentiate between Static and Dynamic Balancing. Why there is need of accurate dynamic balancing of high speed machines? **[6]**

- b) An air compressor has four in - line cylinders at 90° intervals. The crank radius is 140 mm, while the connecting rod is 560 mm long for each cylinder. The mass of reciprocating parts is 20 kg for each cylinders and the speed of the rotation is 600 rpm. The cylinders are 300mm apart. Show that there are no out of balance primary and secondary forces and determine the corresponding magnitudes of primary and secondary couples. **[12]**

P.T.O.

- Q3) a)** Define the following terms used in vibrations. [8]
- i) Amplitude of vibrations
 - ii) Resonance
 - iii) Forced Vibrations
 - iv) Damped Vibrations
- b) What is Logarithmic Decrement? Derive the relations. [8]

OR

- Q4) a)** Define the following terms. [8]
- i) Damping Factor
 - ii) Coulomb Damping
 - iii) Damping Coefficient
 - iv) Critical Damping Coefficient
- b) An under damped shock absorber is to be designed for a motor cycle of mass 200 kg such that during a road bump, the damped period of vibration is limited to 2 seconds and the amplitude of vibrations should reduce to one - sixteenth in one cycle. Find
- i) Spring Stiffness
 - ii) Damping Coefficient of shock absorber [8]

- Q5) a)** What are frequency response curves ? Mention the significance of these curves. [6]
- b) A machine part of mass 2 kg vibrates in a viscous medium. Determine the damping coefficient when a harmonic exciting force of 35 N results in resonant amplitude of 12.5 mm with a period of 0.2 sec. If the system is excited by a harmonic force of frequency 4 Hz, what will be the percentage increase in the amplitude of vibration when damper is removed as compared with that with damping? [10]

OR

- Q6) a)** Explain the following terms. [6]
- i) Force Transmissibility.
 - ii) Vibration Isolation

- b) A mass of 250 N is supported by a spring and dashpot. The spring is stretched by 150 mm due to weight and the dashpot has the coefficient of damping 1000 N per meter per sec. If the support oscillation is S.H.M. with amplitude 25 mm and frequency 6 rad / sec, find. [10]
- The amplitude of the Load
 - The relative amplitude between Load and support.
 - The amplitude of the load when the frequency of disturbing force is equal to the natural frequency.
 - The amplitude of the load when the dashpot has been grounded frequency of the support is 6 rad / sec.

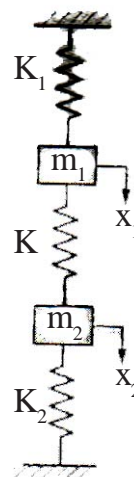
SECTION - II

- Q7) a) Explain the Torsional vibrations of a Geared system by. [8]
- Neglecting inertia of gears
 - Considering inertia of gears
- b) A rotor of 10 kg mass is mounted midway on a 2 cm diameter, horizontal shaft supported at the ends by two bearing. The bearing span is 80 cm. Because of certain manufacturing defect. The C.G. of the rotor is 0.01 mm away from its geometric center. If the system rotates at 3000 rpm, determine the amplitude of the steady state vibration and dynamic load transmitted to the bearings. [Take $E = 2 \times 9.81 \times 10^{10} \text{ N / m}^2$] [10]

OR

- Q8) a) Explain the concept of “Torsionally Equivalent Shaft”. [6]
- b) Determine the natural frequencies of the system shown in the figure. [12]

Given : $K_1 = K_2 = 40 \text{ N / m}$
 $K = 60 \text{ N / m}$
 $m_1 = m_2 = 10 \text{ kg}$



- Q9)** a) Explain the following terms. [4]
- i) Sound pressure level
 - ii) Sound Power level
 - iii) Acoustic Intensity
 - iv) Sound Absorption coefficient
- b) Derive an equation that gives relation between sound Intensity level and Sound Pressure Level. [6]
- c) A customer care containing six officers, individually makes noise level of 60, 56, 62, 53, 51 and 54 dB respectively. Add the noise levels when,
- i) All Officers are working
 - ii) When first and second officers are not working. [6]

OR

- Q10)** a) Write a short note on “ Sound Level Meter”. [4]
- b) What is Sound Enclosure? Describe any one type of sound enclosure.[6]
- c) Explain radiation fields of a Sound source with a Neat Sketch. [6]
- Q11)** a) Write a short note on “ Vibration Isolators”. [4]
- b) Explain Frahm’s Reed Tachometer with a neat sketch. [6]
- c) Explain with a neat sketch, the working principle of a centrifugal pendulum absorber. [6]

OR

- Q12)** a) Explain piezoelectric Accelerometer with a neat sketch. [4]
- b) A vibrometer has a period of free vibration of 2 sec. It is attached to a machine with a vertical harmonic frequency of 1 Hz. If the vibrometer mass has an amplitude of 2.5 mm relative to the vibrometer frame, what is the amplitude of vibration of the machine? [6]
- c) Explain the working principle of FFT analyzer. [6]



Total No. of Questions : 8]

SEAT No. :

P3037

[5059]-321

[Total No. of Pages : 4

B.E . (Petroleum Engineering)
RESERVOIR ENGINEERING - II
(Semester - I) (2008 Course) (412381)

Time : 3 Hours]

[Max. Marks :100

Instructions to candidates:

- 1) *Answer 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 Three 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. is allowed.*
- 7) *Assume suitable data if necessary.*

SECTION-I

- Q1) a)** Explain the importance of the conservation of mass equation in deriving the diffusivity equation. **[6]**
- b) What are the various solutions to the diffusivity equations? Why can't they be used in a generalized form? Which form of the solution do we use for practical purposes? **[10]**

Q2) Following data is given: **[18]**

- q = 40 stb/d
h = 140 ft
B = 1.47 RB / STB
k = 0.5 md
c_t = 1.4 x 10⁻⁵ psi⁻¹
μ = 0.72 cp
r_w = 0.5 ft
P_i = 3200 psi
porosity = 20%
r_e = 2800 ft

Calculate the reservoir pressure at the radius of 2 ft, 8 ft, 22 ft and 68 ft after 9 hours of oil production.

P.T.O.

- Q3)** a) Explain the concept of Superposition in space, with appropriate figures. [4]
 b) What slopes are usually observed while interpreting a well test data? Explain them with appropriate figures. [4]
 c) A new oil well produced 400 std/day for $2 \pm$ days; then it was shut-in for a pressure buildup test, during which the data in Table below were recorded. The other data were: $B_o = 1.25$ rb/stb, $h = 20$ ft, $\phi = 0.20$, $r_w = 0.29$ ft, $c_t = 19.5 \times 10^{-6}$, and viscosity = 1.1 cP. From these data, estimate the formation permeability, k , p_i , and skin factor s . Use the Semi-Log graph. [8]

Shut-in time, $Del-t(hr)$	$(tp+Del-t)/Del-t$	$pws (psia)$
0	-	1165
2	37.0	1801
4	19.0	1838
8	10.0	1865
16	5.5	1891
24	4.0	1905
48	2.5	1925

- Q4)** a) What do you mean by DST? How is it different from a PBU and DD test? [6]
 b) Explain the various flow periods of a DST, along with appropriate figures. [10]

SECTION-II

- Q5)** a) What is pseudo pressure?
 b) Explain the difference between an Isochronal and Modified Isochronal Well test. [16]

Q6) How are the flow regimes in horizontal well test different than in a vertical well test? [16]

Q7) Explain how decline curves originated from Arp's curves. [16]

Q8) Define and explain the pressure derivative plot. Draw and explain the diagnostic plot giving five examples. [18]

Formulas for the exam

For E (i) function values, refer to the table given with the examination paper

$$p = p_i + 70.6 \frac{qB\mu}{kh} \text{Ei} \left(- \frac{948\phi\mu c_i r^2}{kt} \right)$$

$$t_D = \frac{0.000264kt}{\phi\mu_o c_i r_w^2}$$

$$p_{ws} = p_i - \frac{162.6 q_o \mu_o \beta_o}{kh} \log \left[\frac{t_p + \Delta t}{\Delta t} \right]$$

$$p_D = -\frac{1}{2} \text{Ei} \left(-\frac{r_D^2}{4t_D} \right)$$

$$s = 1.151 \left[\frac{p_{1hr} - p_{ws}(\Delta t=0)}{m} - \log \left(\frac{k}{\phi\mu_o c_i r_w^2} \right) + 3.23 \right]$$

$$p_{wf} = p_i - \frac{162.6 q_o \mu_o \beta_o}{kh} \left[\log t + \log \left(\frac{k}{\phi\mu_o c_i r_w^2} \right) - 3.23 + 0.869s \right]$$

$$p = p_i + 70.6 \frac{qB\mu}{kh} \left[\ln \left(\frac{1,688\phi\mu c_i r^2}{kt} \right) \right]$$

$$\frac{(3.975 \times 10^5) \phi\mu c_i r_w^2}{k} < t < \frac{948\phi\mu c_i r_e^2}{k}$$

$$p_{1h} = p_i + m \left[\log \left(\frac{k}{\phi\mu_o \beta_o c_i r_w^2} \right) - 3.23 + 0.869s \right]$$

$$p(r,t) = LS(r,t) = p_i - \frac{70.6 Q \mu}{kh} \left[-\text{E}_i \left(-\frac{948.1 \Phi \mu c_i r^2}{kt} \right) \right]$$

$$k = \frac{162.6 q_o \mu_o \beta_o}{mh}$$

TABLE 1.1—VALUES OF THE EXPONENTIAL INTEGRAL, $-Ei(-x)$

$-Ei(-x), 0.000 < x < 0.209, \text{interval} = 0.001$										
x	0	1	2	3	4	5	6	7	8	9
0.00	+°	6.332	5.639	5.235	4.948	4.726	4.545	4.392	4.259	4.142
0.01	4.038	3.944	3.858	3.779	3.705	3.637	3.574	3.514	3.458	3.405
0.02	3.355	3.307	3.261	3.218	3.176	3.137	3.098	3.062	3.026	2.992
0.03	2.959	2.927	2.897	2.867	2.838	2.810	2.783	2.756	2.731	2.706
0.04	2.681	2.658	2.634	2.612	2.590	2.568	2.547	2.527	2.507	2.487
0.05	2.468	2.449	2.431	2.413	2.395	2.377	2.360	2.344	2.327	2.311
0.06	2.295	2.279	2.264	2.249	2.235	2.220	2.206	2.192	2.178	2.164
0.07	2.151	2.138	2.125	2.112	2.099	2.087	2.074	2.062	2.050	2.039
0.08	2.027	2.015	2.004	1.993	1.982	1.971	1.960	1.950	1.939	1.929
0.09	1.919	1.909	1.899	1.889	1.879	1.869	1.860	1.850	1.841	1.832
0.10	1.823	1.814	1.805	1.796	1.788	1.779	1.770	1.762	1.754	1.745
0.11	1.737	1.729	1.721	1.713	1.705	1.697	1.689	1.682	1.674	1.667
0.12	1.660	1.652	1.645	1.638	1.631	1.623	1.616	1.609	1.603	1.596
0.13	1.589	1.582	1.576	1.569	1.562	1.556	1.549	1.543	1.537	1.530
0.14	1.524	1.518	1.512	1.506	1.500	1.494	1.488	1.482	1.476	1.470
0.15	1.464	1.459	1.453	1.447	1.442	1.436	1.431	1.425	1.420	1.415
0.16	1.409	1.404	1.399	1.393	1.388	1.383	1.378	1.373	1.368	1.363
0.17	1.358	1.353	1.348	1.343	1.338	1.333	1.329	1.324	1.319	1.314
0.18	1.310	1.305	1.301	1.296	1.291	1.287	1.282	1.278	1.274	1.269
0.19	1.265	1.261	1.256	1.252	1.248	1.243	1.239	1.235	1.231	1.227
0.20	1.223	1.219	1.215	1.210	1.206	1.202	1.198	1.195	1.191	1.187
$-Ei(-x), 0.00 < x < 2.09, \text{interval} = 0.01$										
x	0	1	2	3	4	5	6	7	8	9
0.0	+°	4.038	3.335	2.959	2.681	2.468	2.295	2.151	2.027	1.919
0.1	1.823	1.737	1.660	1.589	1.524	1.464	1.409	1.358	1.309	1.265
0.2	1.223	1.183	1.145	1.110	1.076	1.044	1.014	0.985	0.957	0.931
0.3	0.906	0.882	0.858	0.836	0.815	0.794	0.774	0.755	0.737	0.719
0.4	0.702	0.686	0.670	0.655	0.640	0.625	0.611	0.598	0.585	0.572
0.5	0.560	0.548	0.536	0.525	0.514	0.503	0.493	0.483	0.473	0.464
0.6	0.454	0.445	0.437	0.428	0.420	0.412	0.404	0.396	0.388	0.381
0.7	0.374	0.367	0.360	0.353	0.347	0.340	0.334	0.328	0.322	0.316
0.8	0.311	0.305	0.300	0.295	0.289	0.284	0.279	0.274	0.269	0.265
0.9	0.260	0.256	0.251	0.247	0.243	0.239	0.235	0.231	0.227	0.223
1.0	0.219	0.216	0.212	0.209	0.205	0.202	0.198	0.195	0.192	0.189
1.1	0.186	0.183	0.180	0.177	0.174	0.172	0.169	0.166	0.164	0.161
1.2	0.158	0.156	0.153	0.151	0.149	0.146	0.144	0.142	0.140	0.138
1.3	0.135	0.133	0.131	0.129	0.127	0.125	0.124	0.122	0.120	0.118
1.4	0.116	0.114	0.113	0.111	0.109	0.108	0.106	0.105	0.103	0.102
1.5	0.100	0.0985	0.0971	0.0957	0.0943	0.0929	0.0915	0.0902	0.0889	0.0876
1.6	0.0863	0.0851	0.0838	0.0826	0.0814	0.0802	0.0791	0.0780	0.0768	0.0757
1.7	0.0747	0.0736	0.0725	0.0715	0.0705	0.0695	0.0685	0.0675	0.0666	0.0656
1.8	0.0647	0.0638	0.0629	0.0620	0.0612	0.0603	0.0595	0.0586	0.0578	0.0570
1.9	0.0562	0.0554	0.0546	0.0539	0.0531	0.0524	0.0517	0.0510	0.0503	0.0496
2.0	0.0489	0.0482	0.0476	0.0469	0.0463	0.0456	0.0450	0.0444	0.0438	0.0432
$-Ei(-x), 2.0 < x < 10.9, \text{interval} = 0.1$										
x	0	1	2	3	4	5	6	7	8	9
2	4.89×10^{-2}	4.26×10^{-2}	3.72×10^{-2}	3.25×10^{-2}	2.84×10^{-2}	2.49×10^{-2}	2.19×10^{-2}	1.92×10^{-2}	1.69×10^{-2}	1.48×10^{-2}
3	1.30×10^{-2}	1.15×10^{-2}	1.01×10^{-2}	8.94×10^{-3}	7.89×10^{-3}	6.87×10^{-3}	6.16×10^{-3}	5.45×10^{-3}	4.82×10^{-3}	4.27×10^{-3}
4	3.78×10^{-3}	3.35×10^{-3}	2.97×10^{-3}	2.64×10^{-3}	2.34×10^{-3}	2.07×10^{-3}	1.84×10^{-3}	1.64×10^{-3}	1.45×10^{-3}	1.29×10^{-3}
5	1.15×10^{-3}	1.02×10^{-3}	9.08×10^{-4}	8.09×10^{-4}	7.19×10^{-4}	6.41×10^{-4}	5.71×10^{-4}	5.09×10^{-4}	4.53×10^{-4}	4.04×10^{-4}
6	3.60×10^{-4}	3.21×10^{-4}	2.86×10^{-4}	2.55×10^{-4}	2.28×10^{-4}	2.03×10^{-4}	1.82×10^{-4}	1.62×10^{-4}	1.45×10^{-4}	1.29×10^{-4}
7	1.15×10^{-4}	1.03×10^{-4}	9.22×10^{-5}	8.24×10^{-5}	7.36×10^{-5}	6.58×10^{-5}	5.89×10^{-5}	5.26×10^{-5}	4.71×10^{-5}	4.21×10^{-5}
8	3.77×10^{-5}	3.37×10^{-5}	3.02×10^{-5}	2.70×10^{-5}	2.42×10^{-5}	2.16×10^{-5}	1.94×10^{-5}	1.73×10^{-5}	1.55×10^{-5}	1.39×10^{-5}
9	1.24×10^{-5}	1.11×10^{-5}	9.99×10^{-6}	8.95×10^{-6}	8.02×10^{-6}	7.18×10^{-6}	6.44×10^{-6}	5.77×10^{-6}	5.17×10^{-6}	4.64×10^{-6}
10	4.15×10^{-6}	3.73×10^{-6}	3.34×10^{-6}	3.00×10^{-6}	2.68×10^{-6}	2.41×10^{-6}	2.16×10^{-6}	1.94×10^{-6}	1.74×10^{-6}	1.56×10^{-6}

✓ ✓ ✓
4

Total No. of Questions :8]

SEAT No. :

[Total No. of Pages :2

P3765

[5059] - 322

B.E. (Petroleum Engineering)

FORMATION EVALUATION

(2008 Pattern) (Semester - I) (412382)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Question no 4 and 8 from section I and section II respectively are compulsory. Solve any two questions out of remaining from each section.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right side indicate full marks.*
- 4) Assume additional data if required.*

SECTION - I

Q1) Explain the logging environment in an open hole. How is wireline logging operation carried out? What are different effective depths of investigations of various logging tools? Give significance of these different depths of investigations. **[15]**

Q2) Why do we need different types of resistivity tools? Describe the principles and commonly used tools in electrical resistivity logging. **[15]**

Q3) Draw a schematic representation of borehole environment and explain the invasion profile using conventional terms and symbols. **[15]**

Q4) Write notes on any two of the following: **[20]**

- a) Cement bond logs
- b) Temperature log
- c) SP log
- d) Caliper logs.

P.T.O.

SECTION - II

Q5) Explain the 'quick - look' log interpretation method in details. **[15]**

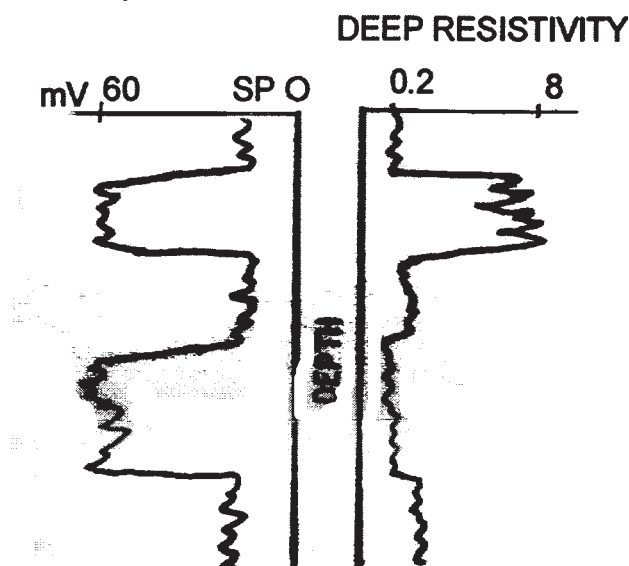
Q6) Draw typical log shapes to represent the following: (Try to give an explanation in terms of sedimentology and grain size distribution giving rise to these patterns) **[15]**

- a) Sharp (discrete) change in sand-shale sequence.
- b) Gradual change in sand - shale sequence.
- c) Cyclicity in sedimentation / repetition of sequence with coarsening towards top in each cycle/

Q7) a) Explain in brief the procedure of examination of well cuttings and core analysis as an aid of formation evaluation. **[10]**

- b) What is the fractured porosity of a fractured reservoir with 14 fractures per meter with an average aperture of 0.75 mm? **[5]**

Q8) a) Give a quick look interpretation and geological interpretation of the logs given in the figure. Assume logically significant additional data and state values clearly. Calculate S_w . **[10]**



- b) Write a detailed note on 'Mud logging' **[10]**



Total No. of Questions : 6]

SEAT No. :

P2138

[Total No. of Pages : 1

[5059]-323

**B.E. (Petroleum Engineering)
WELL ENGINEERING AND DESIGN
(2008 Course)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All Questions are compulsory.*
- 2) *Write Section-I and Section-II on separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) What are different causes of abnormal pressure? Discuss D exponent in detail. [10]
b) Discuss Leak Off Test in detail. [8]
- Q2)** a) Derive trajectory design for type I profile. [8]
b) Write short note on MWD Tool. [8]
- Q3)** a) Draw accumulator system of BOP. [8]
b) Explain soft shut in and hard shut in if kick encounter while drilling. [8]

SECTION-II

- Q4)** Discuss Liner setting and cementation in horizontal well in detail. [18]
- Q5)** a) Discuss different considerations in drill string design. [8]
b) Write short note on: [8]
i) Sinusoidal buckling, ii) MOP.
- Q6)** a) Discuss Power law model of fluid flow. [8]
b) Explain effect of BHHP and Impact force on hole cleaning. [8]



Total No. of Questions : 8]

SEAT No. :

P3766

[5059]-324

[Total No. of Pages : 2

B.E. (Petroleum)

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Questions 1 and 5 from sections I and section II respectively are compulsory. Solve any two questions each from section I and Section II from remaining questions.*
- 3) *Neat diagrams should be drawn wherever necessary.*
- 4) *Figures to the right indicate marks.*

SECTION-I

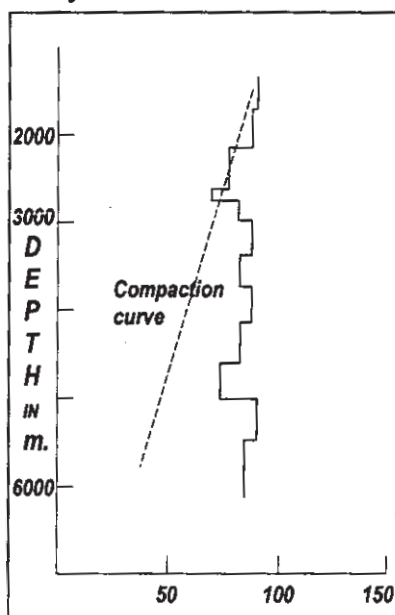
Q1) Answer any four of the following.

[20]

- a) How are magnetic anomalies determined and maps drawn?
- b) Schlumberger and Wenner arrangement of electrical resistivity survey.
- c) How is apparent resistivity different from true resistivity?
- d) Working principle of Geiger Muller Counter
- e) Isotope surveys in geochemical exploration of petroleum
- f) Soil Gas Analysis
- g) Corrections applied to gravity data

Q2) a) The given diagram shows a trace of interval velocities along with the compaction trend. What may be the conclusion derived from curve? Give your comments.

[5]



Log interval transit time, μ sec / foot

P.T.O.

- b) Explain with the help of suitable diagrams how is reflection data used as a tool for stratigraphic and structural studies. [10]
- Q3)** a) What are different field parameters used to design a seismic reflection survey? Describe the constraints. [10]
 b) What is a static correction applied to seismic data? [5]
- Q4)** Write in brief with suitable examples. [15]
 a) Seismic facies analysis
 b) Isochronopach maps
 c) Time lapse seismic for reservoir monitoring
 d) AVO
 e) DHIS

SECTION-II

- Q5)** a) How different subsurface maps and availability of quality data helps in the understanding of the drilling locations? [12]
 b) Calculate the amount of oil present in a reservoir covering an area of 15 km² with an average thickness of 22m. The average porosity is 16% and the water saturation is 22%. Calculate in m³. [8]
 How much oil may be recovered from this reservoir if we assume an average recovery factor of 26 %? How is uncertainty addressed in the calculation of each parameter?
- Q6)** a) What are the different modes of transport of hydrocarbons from the seal of the reservoir to the surface in case of micro seepages? [10]
 b) Explain different geochemical correlation methods. [5]
- Q7)** What spatial and temporal attributes needs to understand if GIS platform is used for the storage of large data base of subsurface reservoir. [15]
- Q8)** a) Discuss in details volumetric and material balance methods of reserves estimation giving advantages of each. [10]
 b) Explain pinch out of a formation and uncertainties associated with the same. [5]



Total No. of Questions : 4]

SEAT No. :

P 3038

[5059] - 325

[Total No. of Pages :2

B.E. (Petroleum Engg.)

**ADVANCED INSTRUMENTATION & PROCESS CONTROL
IN PETROLEUM INDUSTRY**

(2008 Course) (Semester - I) (Elective - I-C) (412384 - 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 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) Explain construction and working of thyristor controlled variable speed ac/dc motors. [6]
- b) Explain construction and working of solenoid valve. [6]
- c) Distinguish between feedback & feed forward control systems. [6]
- Q2)** a) Explain operation and characteristics of 3 - phase induction motor. [8]
- b) Explain types of power cables used and their selection in petroleum industry. [8]
- Q3)** Explain methods for measurement of RPM and vibrations of drilling rig. [8]
- Q4)** a) Explain methods of tuning PID - controllers. [8]
- b) Describe essential features of DCS systems used in petroleum industry. [8]

P.T.O.

SECTION - II

- Q5)** a) With neat block diagram, explain cascade control system. [8]
b) Explain distillation column control system. [8]
- Q6)** a) Explain use of limit switches and alarm systems used in drilling operations liquid. [8]
b) State various & level measurement methods and explain any one in detail. [8]
- Q7)** a) How will you integrate safety systems with process control systems. [8]
b) State various fluid flow measurement systems and explain working of orifice meter in detail. [8]
- Q8)** Write short notes on the following : [18]
a) Production control systems.
b) Multiphase flow meters.
c) ESD systems.



Total No. of Questions : 12]

SEAT No. :

P2139

[Total No. of Pages : 2

[5059]-328

B.E. (Petroleum Engineering)

PETROLEUM REFINING TECHNOLOGY

(2008 Course) (Semester-I) (Elective-II) (412385 A)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) a) Give the composition of petroleum. **[8]**

b) Explain: Aniline Point, Octane Number, Viscosity Gravity Constant. **[8]**

OR

Q2) a) Give the importance of TBP distillation in refinery operations. **[8]**

b) Describe in brief the overall refinery flow. **[8]**

Q3) a) Explain the need for desalting of crude oil. How is desalting done? **[8]**

b) Write a note on the atmospheric topping unit. **[8]**

OR

Q4) a) Discuss dry, wet and damp operation of a vacuum unit. **[8]**

b) Enlist and discuss the auxiliary equipment in distillation. **[8]**

Q5) a) Discuss the process flow for a typical catalytic cracking process. **[9]**

b) Discuss the expanded bed hydrocracking process. **[9]**

OR

P.T.O.

- Q6)** a) What is bitumen? Give its composition. Discuss the air blowing process. [9]
b) Write a note on the delayed coking unit. [9]

SECTION-II

- Q7)** a) With the help of a neat diagram, explain alkylation using sulphuric acid. [8]
b) Explain the semiregenerative process for catalytic reforming. [8]

OR

- Q8)** a) Write a note on the various reforming catalysts. [8]
b) What are the factors affecting alkylation process. [8]

- Q9)** a) Explain DILCHILL dewaxing process. [8]
b) Explain the process of solvent extraction in case of lube oil base stock by NMP. [8]

OR

- Q10)** a) Why is propane a preferred solvent in deasphalting? Write a note on propane deasphalting unit. [8]
b) Discuss the various finishing process in the production of lube oil. [8]

- Q11)** a) What are the various ways of hydrogen production in refineries? Discuss any one. [9]
b) Write a note on atmospheric pollution due to refineries. How is it controlled? [9]

OR

- Q12)** a) Write a note on line blending process. Also explain Reid vapour pressure blending and octane blending of gasoline. [9]
b) Write a note on the Claus process for sulphur recovery. [9]



Total No. of Questions : 12]

SEAT No. :

P1785

[Total No. of Pages : 4

[5059]-33
B.E. (Mechanical)
INDUSTRIAL FLUID POWER
(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) *Figures to the right indicates full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What are the various applications of “Industrial Fluid Power”? [8]
b) Write a short note on “Types of Pipes, Hoses, Fittings”. [8]

OR

- Q2)** a) Write a short note on “ISO symbols”. [8]
b) Classify “Hydraulic oils” in details. [8]

- Q3)** a) Explain with neat sketch working of “Internal Gear Pump”. [8]
b) Explain with neat sketch working of “Gerotor Pump”. [8]

OR

- Q4)** a) Explain with neat sketch “Weight Loaded Accumulator”. [8]
b) Write a short note on “Types of Pressure Intensifiers”. [8]

- Q5)** a) Write a short note on “Types of Pressure Control Valves”. [10]
b) Write a short note on “Types of Flow Control Valves”. [8]

OR

- Q6)** a) Write a short note on “Types of Direction Control Valves”. [10]
b) Explain with neat sketch working of “Unloading Valve”. [8]

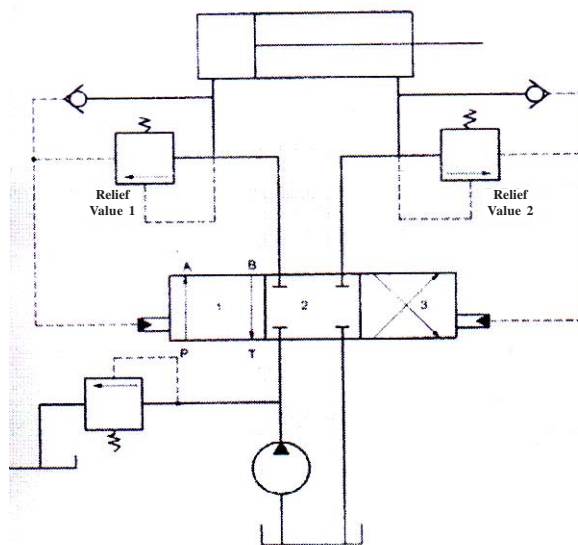
P.T.O.

SECTION - II

- Q7) a)** Why cushioning is necessary in hydraulic cylinders? With the help of neat sketch explain how cushioning is done? [8]
b) Draw and explain hydraulic motor braking circuit. [8]

OR

- Q8) a)** What do you mean by tandem cylinder and telescopic cylinder? [8]
b) Analyze the below given hydraulic circuit. [8]



- Q9) a)** Draw and explain speed control circuit of pneumatic motor. [8]
b) Draw and explain two handed safety circuit used in pneumatics. [8]

OR

- Q10) a)** Describe with neat sketch: [8]
i) Twin pressure Valve (AND Gate).
ii) Quick exhaust valve.
b) Explain time delay valve with neat sketch and its application. [8]

- Q11) a)** Draw and explain a typical compressed air generation and distribution system used in pneumatics. [8]

- b) A pneumatic cylinder is to be continuously moved to and fro. The motion is to be started by operating knob of a direction control valve. The continuous motion is interrupted by operating knob of another direction control valve. The cylinder should stop immediately after pressing this knob. Develop a suitable pneumatic circuit for this application using standard components. [10]

OR

Q12) A machine slide is moved by means of hydraulic cylinder using a meter out circuit. The motion of the cylinder is as follows: [18]

- a) Initially it moves through a distance of 300 mm against a load of 20000 N in about 8 seconds.
- b) It is followed by a working stroke of 150 mm against an effective load of 25000 N. The feed rate during this part of the stroke is required to be between 0.5 to 1.0 m/min.
- c) The return stroke is to be as fast as possible.

Draw a circuit which will fulfill these requirements.

Select different components you have used in the circuit from the given data.

DATA SHEET

(a) Suction strainer:

Model	Flow Capacity (lpm)
S ₁	38
S ₂	76
S ₃	152

(b) Pressure gauge:

Model	Range (bar)
PG ₁	0 - 25
PG ₂	0 - 40
PG ₃	0 - 100
PG ₄	0 - 160

(c) Vane pump:

Model	Delivery in lpm		
	At 0 bar	At 35 bar	At 70 bar
P ₁	8.5	7.1	5.3
P ₂	12.9	11.4	9.5
P ₃	17.6	16.1	14.3
P ₄	25.1	23.8	22.4
P ₅	39.0	37.5	35.6

(d) Relief valve:

Model	Flow capacity (lpm)	Max. working pressure & bar
R ₁	11.4	70
R ₂	19.0	210
R ₃	30.4	70
R ₄	57.0	105

(e) Flow control valve:

Model	Working pressure (bar)	Flow range (lpm)
F ₁	70	0 - 4.1
F ₂	105	0 - 4.9
F ₃	105	0 - 16.3
F ₄	70	0 - 24.6

(f) Directional control valve:

Model	Max. working pressure & bar	Flow capacity (lpm)
D ₁	350	19
D ₂	210	38
D ₃	210	76

(g) Check valve:

Model	Max. working Pressure & bar	Flow capacity (lpm)
C ₁	210	15.2
C ₂	210	30.4
C ₃	210	76

(h) Pilot operated check valve:

Model	Max. working Pressure (bar)	Flow capacity (lpm)
PO ₁	210	19
PO ₂	210	38
PO ₃	210	76

(i) Cylinder (Max. working pressure 210 bar)

Model	Bore diameter (mm)	Rod diameter (mm)
A ₁	25	12.5
A ₂	40	16
A ₃	50	35
A ₄	75	45
A ₅	100	50

(j) Oil reservoirs:

Model	Capacity (litres)
T ₁	40
T ₂	100
T ₃	250
T ₄	400
T ₅	600



Total No. of Questions : 8]

SEAT No. :

P3767

[5059]-330

[Total No. of Pages : 3

B.E. (Petroleum Engineering)
NON-CONVENTIONAL HYDROCARBON RESOURCES
(2008 Course) (Semester - I) (Elective - II) (412385-C)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Question no. 1 of Section I and Question no 5 of Section II is compulsory. Solve any two questions each from remaining questions from Section I and Section II.*
- 3) Figures to the right indicate marks.*
- 4) Draw neat diagrams whenever necessary.*

SECTION - I

Q1) Define and describe any five of the following:

[20]

- a) Tar Sand and Bituminous.
- b) Langmuir isotherm.
- c) Basin Centered Gas.
- d) Organic Richness and Thermal Maturity.
- e) Shale Oil and Oil shale.
- f) Tight Gas Reservoirs.
- g) Classification of heavy and extra heavy oil on API and viscosity.
- h) Cleats in CBM.

Q2) a) Draw a schematic diagram of methane flow dynamics in a coal seam system. **[10]**

- b) Describe the risk and planning associated with drilling horizontal wells drilled in tight reservoirs. **[5]**

P.T.O.

Q3) a) Following mineralogical variation is observed during detailed petrophysical studies of the potential shale horizon. **[10]**

No.	Depth in meters	Mineralogy percent Quartz	Carbonate	Clay Minerals	Others
1	1500m	20	28	45	07
2	1510	14	27	49	10
3	1520	20	14	62	06
4	1530	44	10	41	05
5	1540	54	12	27	07
6	1550	58	10	27	05

Evaluate behavior of shale for given depths to understand brittleness. Give justification. What additional information is required to realize potential of this horizon?

b) What are the basic characteristics of gas bearing shale reservoirs? **[5]**

Q4) a) Write in brief about formation and occurrence of gas hydrates in various conditions. **[9]**

b) Write a note on Gas Hydrate resources. **[6]**

SECTION - II

Q5) Write notes on any four of the following: **[20]**

- a) Components of produced water.
- b) Elastic properties of shale.
- c) Relative permeability curves.
- d) Dual water system in shale.
- e) Prevention and control methods in gas hydrate formation.
- f) Cambay shale as resource of shale gas.

- Q6)** a) Describe the CBM gas production profile with the help of neat diagram. [10]
- b) A homogeneous isotropic rock plate of width 40 mm and length 500 mm, thickness 10 mm with original unreformed volume $0.2 \times 10^6 \text{ mm}^3$ has Young's modulus $5 \times 10^{10} \text{ Pa}$ and Poisson's ratio of 0.25. The plate is subjected to compressive force of 500 N at the faces of its lateral end. Find out change in volume during loading. [5]
- Q7)** a) An undersaturated coal system has the following reservoir parameters:[6]
Drainage area = 160 acres, thickness = 15 ft, porosity = 3% Initial pressure = 650 psia, desorption pressure = 450 psia, total compressibility = $16 \times 10^{-5} \text{ psi}^{-1}$.
Estimate the total volume of water that must be produced for the reservoir pressure to decline from initial pressure to desorption pressure.
- b) What are the environmental consequences of conversion processes?[9]
- Q8)** a) Write a detailed note on Decline curve analysis for unconventional gas reservoirs. [10]
- b) What are the direct and indirect methods of Coal Liquefaction? [5]



Total No. of Questions : 12]

SEAT No. :

P3768

[5059]-331

[Total No. of Pages : 2

B.E. (Petroleum)

CARBON MANAGEMENT IN PETROLEUM INDUSTRY

(2008 Course) (Semester - I) (Elective - II) (412385, D)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, from Section - I and Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12 from Section - II.*
- 2) *Answers to the two Sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) What is Kyoto Protocol? Write in detail, objectives and commitment of Kyoto Protocol. Also explain in brief the role and responsibility of various categories of countries to control the global warming and achieve sustainable development. **[18]**

OR

Q2) What is carbon credit and carbon trading? Explain with examples, how buyers and sellers can use this platform for exchange. **[18]**

Q3) Discuss the characteristics of major green house gases and write in detail, the impact of methane, nitrous oxide and ozone on global warming. **[16]**

OR

Q4) Which are the primary sources of greenhouse gas emission? Which industries and activities emit the most carbon? Discuss the environmental impact of each industrial sector in detail. **[16]**

Q5) Explain in detail issues, feasibility and operational challenges in carbon dioxide storage into depleted oil reservoirs. **[16]**

OR

P.T.O.

Q6) What is carbon sequestration? Write various methods of carbon capture and sequestration. Discuss their advantages and disadvantages in detail. [16]

SECTION - II

Q7) What is renewable energy? What are the benefits of using renewable energy systems? Write their types and explain in detail working of any three methods of renewable energy resources. [18]

OR

Q8) What is sustainable development? What are the goals and objectives of sustainable development program at global level? Write and discuss in detail, key features of sustainable development. [18]

Q9) How biomass can provide consistent supply of the required energy through biogas, biodiesel, and by directly burning the biomass? Explain in detail. [16]

OR

Q10) Discuss in detail, renewable energy in India status and future prospects. Also write economic opportunities in this sector. [16]

Q11) Discuss in detail various methods to reduce the amount of CO₂ in the atmosphere. [16]

OR

Q12) How clean development mechanism allows a country with emission reduction commitment to implement an emission reduction project in developing countries? Describe with at least four examples and applications of it. [16]



Total No. of Questions : 8]

SEAT No. :

P3039

[5059]-332

[Total No. of Pages :4

B.E. (Petroleum Engineering)
IMPROVED OIL RECOVERY AND RESERVOIR SIMULATION
(2008 Course) (412387) (Semester-II)

Time : 3 Hours]

[Max. Marks :100

Instructions to candidates:

- 1) *Answer to the two sections must be written in separate answer books.*
- 2) *Questions No 2 (two) and 8 (eight) are compulsory.*
- 3) *Figure to the right indicate full marks.*
- 4) *Answer 3 questions from Section 1 and 3 questions from Section II*
- 5) *Neat diagrams Should be drawn wherever necessary.*
- 6) *Use of a non-programmable calculator, log-log, and semi-log paper is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION-I

- Q1)** a) Explain the central role of reservoir simulation in the entire reservoir management strategy. **[6]**
- b) What do you exactly achieve by discretization? What are the advantages of discretizing an equation? **[10]**

- Q2)** a) Explain in detail 3 implicit and 3 explicit methods of discretizing an equation. Discretize the following equation given below, using 1 of above defined explicit and 1 implicit scheme **[10]**

$$\frac{\partial u}{\partial t} - \alpha \frac{\partial^2 u}{\partial x^2} = 0$$

- b) Explain what you mean by AIM and IMPES, in detail by giving examples of a PDE. **[8]**
- Q3)** a) Using a 1D reservoir block, and show six types of block ordering techniques used in reservoir simulation **[6]**
- b) Using any of the finite difference schemes, solve the following differential equation. Consider a 3 element system with four nodes, u₁ to u₄, with both these being boundary nodes. Boundary conditions are provided for these nodes: **[10]**

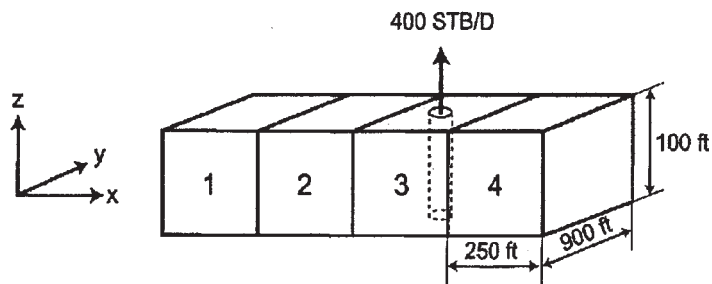
P.T.O.

$$\frac{\partial^2 u}{\partial x^2} - 2u = 0 \text{ where } 0 < x < 1 \text{ and } f(x) = 4x^2 - 2x - 4$$

Boundary Conditions are:

$$u_1 = 0 @ x = 0 \text{ and } u_4 = -1 @ x = 1$$

- Q4) a)** A well produces @ 400 STB/D. Dimensions of the block are- $\Delta x=250$ ft; $w=900$ ft; $h=100$ ft; $kx=270$ md. $Fv_f=1.0$ rb/stb; viscosity=2 cp. Write the flow equation for block 3, as shown in the figure below: [8]



- b)** What all information is needed for building a reservoir simulation model, and what are the steps involved in building a model? [8]

SECTION-II

- Q5)** Describe Polymer EOR in detail with the screening criteria. Why does such a screening criteria exist. [16]
- Q6)** Explain In-Situ combustion in detail with an appropriate figure. [16]
- Q7)** What are the advantages and disadvantages of various water-flooding techniques available? Explain in detail. [16]
- Q8)** Write short notes on (any Three) [18]
- a) Microbial EOR
 - b) Well site layout for Surfactant Polymer EOR
 - c) Fractional flow theory
 - d) Buckley Leveret Model

Formulas / Equations for the exam

$$\int_{t^n}^{t^{n+1}} \{T_{x_{i-1/2}} [(p_{i-1} - p_i) - \gamma_{i-1/2} (Z_{i-1} - Z_i)]\} dt + \int_{t^n}^{t^{n+1}} \{T_{x_{i+1/2}} [(p_{i+1} - p_i) - \gamma_{i+1/2} (Z_{i+1} - Z_i)]\} dt$$

$$+ \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \frac{d}{dp} \left(\frac{\phi}{B} \right)_i [p_i^{n+1} - p_i^n],$$

$$\int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{m_i} dt = m_{a_i}$$

$$T_{z_{i,j,k-1/2}}^m [(p_{i,j,k-1}^m - p_{i,j,k}^m) - \gamma_{i,j,k-1/2}^m (Z_{i,j,k-1} - Z_{i,j,k})]$$

$$+ T_{y_{i,j-1/2,k}}^m [(p_{i,j-1,k}^m - p_{i,j,k}^m) - \gamma_{i,j-1/2,k}^m (Z_{i,j-1,k} - Z_{i,j,k})]$$

$$+ T_{x_{i-1/2,j,k}}^m [(p_{i-1,j,k}^m - p_{i,j,k}^m) - \gamma_{i-1/2,j,k}^m (Z_{i-1,j,k} - Z_{i,j,k})]$$

$$+ T_{x_{i+1/2,j,k}}^m [(p_{i+1,j,k}^m - p_{i,j,k}^m) - \gamma_{i+1/2,j,k}^m (Z_{i+1,j,k} - Z_{i,j,k})]$$

$$+ T_{y_{i,j+1/2,k}}^m [(p_{i,j+1,k}^m - p_{i,j,k}^m) - \gamma_{i,j+1/2,k}^m (Z_{i,j+1,k} - Z_{i,j,k})]$$

$$+ T_{z_{i,j,k+1/2}}^m [(p_{i,j,k+1}^m - p_{i,j,k}^m) - \gamma_{i,j,k+1/2}^m (Z_{i,j,k+1} - Z_{i,j,k})]$$

$$+ q_{sc_{i,j,k}}^m = \frac{V_{b_{i,j,k}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j,k}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j,k}^n \right],$$

$$T_{y_{i,j-1/2}}^m [(p_{i,j-1}^m - p_{i,j}^m) - \gamma_{i,j-1/2}^m (Z_{i,j-1} - Z_{i,j})]$$

$$+ T_{x_{i-1/2,j}}^m [(p_{i-1,j}^m - p_{i,j}^m) - \gamma_{i-1/2,j}^m (Z_{i-1,j} - Z_{i,j})]$$

$$+ T_{x_{i+1/2,j}}^m [(p_{i+1,j}^m - p_{i,j}^m) - \gamma_{i+1/2,j}^m (Z_{i+1,j} - Z_{i,j})]$$

$$+ T_{y_{i,j+1/2}}^m [(p_{i,j+1}^m - p_{i,j}^m) - \gamma_{i,j+1/2}^m (Z_{i,j+1} - Z_{i,j})] + q_{sc_{i,j}}^m = \frac{V_{b_{i,j}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j}^n \right]$$

$$\int_{t^n}^{t^{n+1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right]$$

$$T_{x_{i-1/2}}^m [(p_{i-1}^m - p_i^m) - \gamma_{i-1/2}^m (Z_{i-1} - Z_i)] + T_{x_{i+1/2}}^m [(p_{i+1}^m - p_i^m) - \gamma_{i+1/2}^m (Z_{i+1} - Z_i)]$$

$$+ q_{sc_i}^m = \frac{V_{b_i}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right]$$

$$T_{x_{i+1/2}, j, k} = \left(\beta_c \frac{k_x A_x}{\mu B \Delta x} \right) \Big|_{x_{i+1/2}, j, k} = \left(\beta_c \frac{k_x A_x}{\Delta x} \right)_{x_{i+1/2}, j, k} \left(\frac{1}{\mu B} \right)_{x_{i+1/2}, j, k} = G_{x_{i+1/2}, j, k} \left(\frac{1}{\mu B} \right)_{x_{i+1/2}, j, k}$$

$$T_{y_{i,j+1/2}, k} = \left(\beta_c \frac{k_y A_y}{\mu B \Delta y} \right) \Big|_{y_{i,j+1/2}, k} = \left(\beta_c \frac{k_y A_y}{\Delta y} \right)_{y_{i,j+1/2}, k} \left(\frac{1}{\mu B} \right)_{y_{i,j+1/2}, k} = G_{y_{i,j+1/2}, k} \left(\frac{1}{\mu B} \right)_{y_{i,j+1/2}, k}$$

$$T_{z_{i,j,k+1/2}} = \left(\beta_c \frac{k_z A_z}{\mu B \Delta z} \right) \Big|_{z_{i,j,k+1/2}} = \left(\beta_c \frac{k_z A_z}{\Delta z} \right)_{z_{i,j,k+1/2}} \left(\frac{1}{\mu B} \right)_{z_{i,j,k+1/2}} = G_{z_{i,j,k+1/2}} \left(\frac{1}{\mu B} \right)_{z_{i,j,k+1/2}}$$

✓ ✓ ✓

Total No. of Questions : 12]

SEAT No. :

P3744

[Total No. of Pages : 2

[5059]-333
B.E. (Petroleum)
PETROLEUM PRODUCTION ENGINEERING - II
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Answer Q. No. 1 or Q. No. 2., Q. No. 3. or Q. No.4, Q. No.5 or Q. No. 6 from Section - I and Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12 from Section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

Q1) Explain the selection criteria for various types of oil and gas separators and their features in detail. **[18]**

OR

Q2) Discuss working and design of two phase vertical and horizontal separator in detail. **[18]**

Q3) a) Write the advantages and disadvantages of horizontal heater treater over vertical heater treater. **[8]**

b) Draw neat schematic sketch and explain in brief working of any one type of emulsion treater. **[8]**

OR

Q4) a) Explain LACT unit. **[8]**

b) Explain in brief working of a group gathering system. **[8]**

P.T.O.

Q5) Describe in detail various methods to prevent oil field corrosion. [16]

OR

Q6) Discuss corrosion mechanism and different factors that contribute to corrosion process in an oilfield. Also write a note on corrosion inhibitors in brief. [16]

SECTION - II

Q7) What is sand control? Explain any one method of sand control and design considerations for it in detail. [18]

OR

Q8) What is problem well analysis? Describe it with examples in detail. [18]

Q9) Explain any four workover problems and their solution in brief. [16]

OR

Q10) What is formation damage? Explain its causes and solution in detail. [16]

Q11)a) Discuss various methods of horizontal and multilateral well completion. [8]

b) Explain subsurface separation and downhole processing of oil gas and water. [8]

OR

Q12) Write a note on, [16]

- a) Subsea production
- b) Heavy oil production
- c) SAGD
- d) CHOPS



Total No. of Questions : 8]

SEAT No. :

P3041

[5059]-339

[Total No. of Pages : 3

B.E.(Petroleum Engineering)
PETROLEUM PRODUCTION ENHANCEMENT AND
OPTIMIZATION
(2008 Pattern)(Elective-IV)(Semester-II) (412390B)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer Books.*
- 2) *Answer three questions from section I and three questions from section II.*
- 3) *Figures to the right indicate full marks.*
- 4) *Q2 in section I and Q5 in sections II is compulsory.*
- 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)** Write a detailed note on acid fracturing and hydraulic fracturing. [6]
- b) What impact does brittleness and ductility have on hydraulic fracturing? Also explain the effect of Young's Modulus on the hydraulic fracture.[10]
- Q2) a)** Estimate the surface pressure and horse power requirements considering the following scenario: [10]
- i) $FG=0.8$ psi/ft
 - ii) MD Perforations = Top: 9,780 ft; Bottom: 9,810ft
 - iii) 3 1/2" tubing 6.5 lb/ft
 - iv) YF 130 with SG= 1
 - v) Rate = 40 bpm
 - vi) Frictional pressure gradient = 400 psi/1000ft
 - vii) Number of Perforations=4 perfs/ ft; Diameter of Perforations=0.4"
 - viii) Perforation friction=12.7 psi
 - ix) $P_{NET}=240$ psi
- b) Write detailed notes on ISIP, Net pressure and Closure Pressure. [8]

P.T.O.

- Q3)** a) How is a Data Frac different from a calibration test? Explain in detail. [10]
 b) Write short notes on: [6]
 -Nolte Plot
 -Step Rate Test
- Q4)** a) Calculate the fracture gradient under the following conditions:
 i) Casing 7", #29 to 3,500 ft
 ii) M.D top perf 3,250 ft
 iii) M.D bottom perf 3,348 ft
 iv) Fluid being pumped-OIL API gravity 35°
 v) ISIP = 1,400 psi [10]
- b) What are the types of fracture models, and how are they different from each other? Explain with appropriate diagrams. [6]

SECTION-II

- Q5)** a) Draw the generic nature of following graphs and explain their role in optimization in brief
 i) Intermittent gas lift
 ii) Inflow vs VLP
 iii) Pressure drop in tubing Vs Production rate at optimum GLR and for various GLR values. [12]
- b) How is a continuous gas lift different from an intermittent gas lift? Explain in detail. [6]
- Q6)** Give a detailed explanation of annular flow, bubble flow, stratified flow and slug flow, with appropriate diagrams. [16]
- Q7)** Discuss in brief, how long term planning and optimization techniques of well completion or well design for a high pressure, high permeability reservoir will help you to minimize following problems along with better production management and minimum water and gas coning.
 a) Well stimulation
 b) Re-perforation with reference to OWC and GOC
 c) Water and gas shut off jobs [16]

Q8) Discuss any one case study , in detail to explain the application and scope of production optimization that was applied either for a well bore or a field to improve the productivity **[16]**

- a) Write the objective or problem statement of the case study
- b) Describe the challenges involved, data available, techniques and step by step approach that was taken to utilize the available resources and improve the overall efficiency of the production facility under consideration.
- c) Indicate the findings or results of discussion using graph and explain them with mathematical equations if any.



Total No. of Questions : 6]

SEAT No. :

P2140

[Total No. of Pages : 1

[5059]-335

**B.E. (Petroleum Engineering)
DEEP WATER TECHNOLOGY
(2008 Course)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All Questions are compulsory.*
- 2) *Write Section-I and Section-II on separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Discuss different types of offshore rigs. [9]
b) Explain Mooring system of station keeping in detail. [9]
- Q2)** a) Draw subsea well head system. [8]
b) Discuss different riser components in detail. [8]
- Q3)** a) Explain Mohr's theory of rock failure. [8]
b) Write short note on HPHT wells. [8]

SECTION-II

- Q4)** a) Describe spar platform and design considerations in detail. [9]
b) Write short note on Offshore logistic during drilling operations. [9]
- Q5)** a) Discuss water flooding technique in detail. [8]
b) Explain Pipe line design for offshore. [8]
- Q6)** Write short note on: [16]
a) FLNG b) Well completion



Total No. of Questions : 12]

SEAT No. :

P3747

[Total No. of Pages : 3

[5059]-336
B.E. (Petroleum)
TRANSPORT OF OIL AND GAS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. 1 or Q. 2 Q.3 or Q. 4, Q.5 or Q.6 from. section - I.*
- 2) *Answer 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) *Assume Suitable data, if necessary.*

SECTION - I

Q1) Late in the field life it is desirable to compress the 100 MMscfd for the example field downstream of the separator from 800 psig at 100°F to 1,000 psig. An engine-driven separable compressor is available from surplus. The engine is rated for 1,600 hp at 900 rpm. Horsepower is proportional to speed. The compressor frame has six 7-in. bore by 6.0-in. stroke double-acting cylinders with a minimum clearance of 17.92%, a rod load limit of 25,000 lb, and rod diameter of 1.75 in. Assume $k = 1.26$, $Z_s = 0.88$, and $Z_d = 0.85$. Compute discharge temperature, volumetric efficiency required clearance, rod load, and required horsepower for the given conditions. Also calculate the lowest suction pressure at which this unit can compress 100 MMscfd. **[18]**

OR

- Q2)** a) Find pressure drop in a 2 inch and 4 inch I.D. line using the general equation and Hazen - William's equation. Data given: Flow rate of condensate and water is 800 and 230 bpd. Specific gravity of condensate and water is 0.87 and 1.05, Viscosity = 3cp, Length = 7,000 ft, inlet pressure = 900 psi, temperature = 80F. $\epsilon = 0.004$, $C = 120$, $f = 0.032$ and 0.034 for 2" and 4" respectively. **[10]**
- b) Explain heat transfer and thermal insulation for subsea and offshore pipeline systems. **[8]**

- Q3)** Write a note on following (any four) **[16]**
- a) API Multistage split case pump.
 - b) Controlling pulsating flow for suction and discharge piping.
 - c) Pipe vibrations
 - d) Piping hookup
 - e) Equivalent stress criterion for pipelines
 - f) Hydrostatic collapse

P.T.O.

OR

Q4) a) Given following information of a centrifugal compressor answer the following conditions; Operating conditions: $P_s = 750$ psia, $P_d = 1046.4$ psia, $T_s = 529.7$ deg R, $T_d = 582.6$ deg R, $Q_{g,sc} = 349$ MMSCFD Gas properties: $SG = 0.6$, $k = 1.3$, $Z_{ave} = 0.95$ [8]

Calculate

- i) Isentropic efficiency?
 - ii) Actual volumetric flow rate?
 - iii) Isentropic head?
 - iv) Power requirement (assume 98% mechanical efficiency)?
- b) Explain with help of process diagram Gas to Gas monetization. [8]

Q5) a) Explain with help of process diagram Gas to liquids. [8]

b) Explain intelligent pigs for purposes other than metal loss detection. [8]

OR

Q6) a) Find the horsepower required with and without intercooling when compressing 16,000cfm of natural gas, $k = 1.28$ measured at 60 F and 14.7 psia from atmospheric pressure of 14.4 to 125 psig. Inlet temperature is 70 F. Allow a 4 % discharge at each stage. [8]

b) Draw fig and explain construction, working and principle dynamic compressors. [8]

SECTION - II

Q7) a) What is the HP required in compressing 1 MMSCFD from 100 psia and 80 F to 1600 psia using adiabatic equation? The gas is cooled to 80 F between stages.

What is the discharge temperature of the gas? $k = 1.28$, gas gravity = 0.6 Z at 400 and 1600 psia are 0.985, 0.94 respectively. [8]

b) Draw fig and explain construction, working and principle reciprocating compressors. [8]

OR

Q8) a) Find pressure drop in a 8 inch and 12 inch I.D. line using the general equation. Panhandle A, Panhandle B equation. Data given: Flow rate of condensate and water is 400 and 130 bpd. Specific gravity of condensate and water is 0.87 and 1.05, Viscosity = 3 cp, length = 7,000 ft, inlet pressure = 700 psi, temperature = 80F. $\epsilon = 0.004$, $C = 120$, $f = 0.032$ and 0.034 for 2" and 4" respectively. [12]

b) Explain friction factor for various flow types. [4]

- Q9)** a) Write about route optimization, Tie-in and protection for subsea pipelines? [8]
b) Discuss Metal loss inspection techniques for subsea pipeline. [8]

OR

- Q10)** a) Draw fig and explain construction, working and principle reciprocating pumps. [8]
b) What are different subsea production and transportation challenges. [8]

- Q11)** a) Explain with neat sketches horizontal and vertical flow maps. [9]
b) Write in detail about Risk analysis applied to subsea pipelines. [9]

OR

- Q12)** a) Explain with a neat sketch amine process for natural gas sweetening. [9]
b) What is multi staging? What is the use of inter-stage cooling? Explain design procedure for compressor. [9]



Total No. of Questions : 10]

SEAT No. :

P3040

[5059]-337

[Total No. of Pages : 3

B.E. (Petroleum Engineering)
ENVIRONMENTAL TECHNOLOGY AND SAFETY IN
PETROLEUM INDUSTRY
(2008 Course) (Elective - III) (Semester - II) (412389 - D)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers 3 questions from each section.*
- 2) *Que 5 & Que 10 are compulsory.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of non programmable electronic pocket calculator is allowed.*
- 7) *Assume Suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss classification of Air pollutants in details. [6]
b) Discuss the impact of natural gas flaring on Environment in details. What are the majors taken to reduce the impact. [6]
c) What are the types of solids contained in waste water? Give detailed classification. [6]

OR

- Q2)** a) What is HAZOP Analysis? What are merits and demerits of HAZOP? [6]
b) Discuss hazardous materials used in petroleum industry. [6]
c) What are characteristics of produced waters in Petroleum industry? How are these harmful to environment? [6]

- Q3)** a) What are Indian and international produced water discharge standard with reference to petroleum industry. [8]
b) Write note on Accidental discharges of petroleum fields to environment. [8]

OR

- Q4)** a) Explain any four important parameters used internationally to assess quality of produced wastewater. [6]
b) What are physical principles used in following equipment Plate condensers, Gas / Air filtration units, hydro cyclones, skim pipes. [6]
c) Draw a simple flow sheet showing all aspects of produced water treatment. [4]

P.T.O.

Q5) a) Design skimmer TPI std. tank followed by DGF & (20 mg/lit) skim pile. [6]

Input = 50,000 bbl/day

Maximum = 2% oil

Oil = 40° API & 20° API

Water salinity = 35,000 ppm

Rainfall = 2 inch / hr

Deck area = 1000 m²

(Finding d_m is discretionary)

b) What are equipment used for treatment of produced water? What are demerits of DGF equipment? [6]

c) What are methods to curb noise pollution from: [4]

i) Seismic operations

ii) Compressions

SECTION - II

Q6) a) Write short note on OHSAS 18001. [4]

b) What are Safety audits? What are benefits of safety audits? [6]

c) What are the procedures for onshore / offshore well abandonment? [6]

OR

Q7) a) Write short notes on: [9]

i) Work Permit system

ii) Root cause analysis

iii) Job safety analysis

b) What are objectives of well abandonment and plugging? [3]

c) Write merits and demerits of FMEA, JSA, what-if analysis. [4]

- Q8)** a) What are environmental aspects of oil field operations with respect to:[6]
- i) Seismic
 - ii) Drilling
 - iii) Production
 - iv) Offshore
- b) What are the different types of primary & Secondary treatment available for wastewater treatment? Write in details about any two treatments. [6]
- c) What are effects of emulsification on the oil spills. [6]

OR

- Q9)** a) What are reactive / proactive system models of HSE management? [6]
- b) What are common legislation applicable to oil field operations. [6]
- c) What are effects of oil spills on aquatic life. [6]

- Q10)**a) Discuss “Biochemical Oxygen demand and Chemical Oxygen demand” in details. [6]
- b) Define term “Sludge volume index” and give formula to calculate the same. Also, give values for good as well as poor sludge. [6]
- c) Discuss factors affecting oil spill movements. [4]



Total No. of Questions : 6]

SEAT No. :

P3750

[Total No. of Pages : 4

[5059]-338
BE. (Petroleum)
PETROLEUM ECONOMICS
(Elective - IV) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Solve any two questions each from section I and II.*
- 3) *Use of graph paper is allowed.*
- 4) *Figures to the right indicate marks.*
- 5) *Assume additional data if necessary.*

SECTION - I

- Q1) a)** List the projects which would be acceptable under payout period (PP), Actual Value Profit / Investment Ratio (AVI), and net Present Value (NPV) at 12%. If a budget of \$ 2000 M is available for investment, which two projects would be recommended by using above investment, yardsticks? **[15]**

Table 1 : Net Cash Flow, in \$ M (M = 10⁶ \$)

Year	A	B	C	D	E
0	-1000	-1000	-1000	-1000	-1000
1	600	700	210	10	900
2	400	500	210	20	200
3	300	200	210	50	100
4	200	100	210	100	50
5	50	50	210	200	50
6	20	10	210	300	10
7	10	10	210	400	10
8	10	10	210	500	10
9	5	10	210	500	0
10	5	10	210	400	0

- b) Explain Exponential decline and Hyperbolic Decline models with suitable diagrams. **[10]**

P.T.O

- Q2) a)** The company management is interested in investing fifteen million dollars in a medium size field, which has economically producing capacity of 12 years. The project would require an investment of \$ 150,000 at year 6 and again at year 9 of \$ 70,000. Annual maintenance cost will be \$ 35,000 throughout the tenure of the project. The interest rate for the first six years is 10%, and for the next six years will be 12%. **[15]**

What is the Present Worth of this cash flow? Draw a cash flow diagram for the above data.

- b) What is oil differential and oil price differential? Explain with suitable examples. **[10]**

- Q3) a)** Write in brief on Resource Classification System recommended by SPE with a suitable diagram (also show possible project status categories in the diagram) **[10]**

- b) Oil is currently sold for \$ 60 /bbl from an oil field. It is anticipated that the price will increase at a rate of general inflation, which is forecast to be at the rate of 4.25 % per year for first three years and then drop to an annual rate of 3.75 % thereafter. Develop a forecast of oil prices for the period of 6 years from the level of \$ 60/bbl. It is believed that particularly for last two years of production, produced oil will have low API and, higher sulphur content. As a result price differential of 6 % would be anticipated. What would be the oil price during last two years if oil differential is encountered? **[15]**

SECTION - II

- Q4) a)** A piece of equipment having a negligible salvage is estimated to have a service life of 10 years. The original cost of equipment is \$ 80,000. **[15]**

Determine the following:

- i) Depreciation charge for the fifth year, if Double Declining Balance (DDB) and Sum of Years Digit Depreciation (SYD) are used.
- ii) Percent of the original investment paid off in the first half of the service life using DDB and SYD method.

- b) 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]

Q5) a) How cost in E and P business varies as a function of different factors like climate and depth of water. [10]

- b) Company A owns complete Working interest(W.I.) For a petroliferous basin. For some reason A leases its land for oil and gas development to D, retaining its 1/8 royalty interest. In order to hedge against non-productive development A sells 1/4th of its royalty to B and 1/8th of its royalty to C. D, the original lessee, then conveys the lease to E, retaining 1/16th of 7/8 Overriding Royalty Interest (ORI). To support D with its development and operating cost, E now sells one-fourth of its interest in the lease to F.

A, B, C, D, E and F, thus, become the royalty owners for the hydrocarbon development project. Calculate the Overriding Royalty Interest (ORI) and Working Interest (W.I.) for each of them. [15]

Q6) a) Construct a critical path to develop a medium size field for which details are given below: [15]

- i) Twenty four development wells (\$1.5 MM each) - One third will be injectors.
- ii) Three platforms - two for wells, the other for production/injection equipment and pipeline terminus.(\$ 200MM each).
- iii) Wells take about one month to drill. Up to two rigs/platform.

- iv) Platforms manufactured in one and a half years- two out time one month during weather window in Summer. (Two out costs \$10 MM) Setup time is three months for drilling/well platform, five months for production platform.
- v) Pipeline lay time is about 14 months. (cost \$ 150 MM).
- vi) Production ‘commissioning’ and final permit take two months, (\$ 5 MM).
- vii) Overhead and other ongoing costs = \$1 MM/month.

The main idea of this exercise is to avoid waste of time. labor and material.

- i) Draw a critical path diagram for this project. Assume a starting date of December, 1, 2010.
 - ii) Determine the time length of the critical path.
 - iii) Plot cumulative costs as a function of time.
- 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%. The data acquired, the interpretations and the cost of the exploration well will amount to 20 million USD. If a discovery is made, the NPV will be 90 million USD. Calculate the expected monetary value. Find the break-even POS. [10]



Total No. of Questions : 8]

SEAT No. :

P3041

[5059]-339

[Total No. of Pages : 3

B.E.(Petroleum Engineering)
PETROLEUM PRODUCTION ENHANCEMENT AND
OPTIMIZATION
(2008 Pattern)(Elective-IV)(Semester-II) (412390B)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer Books.*
- 2) *Answer three questions from section I and three questions from section II.*
- 3) *Figures to the right indicate full marks.*
- 4) *Q2 in section I and Q5 in sections II is compulsory.*
- 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)** Write a detailed note on acid fracturing and hydraulic fracturing. [6]
- b) What impact does brittleness and ductility have on hydraulic fracturing? Also explain the effect of Young's Modulus on the hydraulic fracture.[10]
- Q2) a)** Estimate the surface pressure and horse power requirements considering the following scenario: [10]
- i) $FG=0.8$ psi/ft
 - ii) MD Perforations = Top: 9,780 ft; Bottom: 9,810ft
 - iii) 3 1/2" tubing 6.5 lb/ft
 - iv) YF 130 with $SG= 1$
 - v) Rate = 40 bpm
 - vi) Frictional pressure gradient = 400 psi/1000ft
 - vii) Number of Perforations=4 perfs/ ft; Diameter of Perforations=0.4"
 - viii) Perforation friction=12.7 psi
 - ix) $P_{NET}=240$ psi
- b) Write detailed notes on ISIP, Net pressure and Closure Pressure. [8]

P.T.O.

- Q3) a)** How is a Data Frac different from a calibration test? Explain in detail. **[10]**
- b)** Write short notes on: **[6]**
- Nolte Plot
 - Step Rate Test
- Q4) a)** Calculate the fracture gradient under the following conditions:
- i) Casing 7", #29 to 3,500 ft
 - ii) M.D top perf 3,250 ft
 - iii) M.D bottom perf 3,348 ft
 - iv) Fluid being pumped-OIL API gravity 35°
 - v) ISIP = 1,400 psi **[10]**
- b)** What are the types of fracture models, and how are they different from each other? Explain with appropriate diagrams. **[6]**

SECTION-II

- Q5) a)** Draw the generic nature of following graphs and explain their role in optimization in brief
- i) Intermittent gas lift
 - ii) Inflow vs VLP
 - iii) Pressure drop in tubing Vs Production rate at optimum GLR and for various GLR values. **[12]**
- b)** How is a continuous gas lift different from an intermittent gas lift? Explain in detail. **[6]**
- Q6)** Give a detailed explanation of annular flow, bubble flow, stratified flow and slug flow, with appropriate diagrams. **[16]**
- Q7)** Discuss in brief, how long term planning and optimization techniques of well completion or well design for a high pressure, high permeability reservoir will help you to minimize following problems along with better production management and minimum water and gas coning.
- a) Well stimulation
 - b) Re-perforation with reference to OWC and GOC
 - c) Water and gas shut off jobs **[16]**

Q8) Discuss any one case study , in detail to explain the application and scope of production optimization that was applied either for a well bore or a field to improve the productivity **[16]**

- a) Write the objective or problem statement of the case study
- b) Describe the challenges involved, data available, techniques and step by step approach that was taken to utilize the available resources and improve the overall efficiency of the production facility under consideration.
- c) Indicate the findings or results of discussion using graph and explain them with mathematical equations if any.



Total No. of Questions : 12]

SEAT No. :

P1786

[Total No. of Pages : 4

[5059]-34

B.E. (Mechanical)

ENERGY AUDIT AND MANAGEMENT

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Unit - 1

- Q1)** a) Write short notes on : **[10]**
- i) Energy security and reliability
 - ii) Principles of energy management
- b) Explain current energy consumption pattern in global and Indian industry. **[8]**

OR

- Q2)** a) Write short notes on : **[10]**
- i) Energy and environment
 - ii) Need of energy efficient systems
- b) Discuss different aspects of Energy Policy and strategy in energy Conservation systems. **[8]**

Unit - 2

- Q3)** a) Write short note on : **[8]**
- i) Responsibility of energy auditor
 - ii) Energy Audit software

P.T.O.

- b) List the various equipments required for energy audit purpose. Explain the following instruments used for energy audit with their applications [8]
- i) Mass flow meter
 - ii) Gas analyzer

OR

- Q4)** a) Describe Energy conservation opportunities in steam systems used in process industries. [8]
- b) Explain the aim of energy audit. Accurate measurement is very important in energy audit. Why? [8]

Unit - 3

- Q5)** a) Explain following financial analysis methods. [8]
- i) Return on Investment
 - ii) NPV
- b) Explain following financial analysis methods. [8]
- i) Present value of money
 - ii) Sensitivity analysis

OR

- Q6)** a) How you will determine cost of electricity generated in case of steam power plant? [8]
- b) Describe advantages and drawbacks of simple payback period financial technique. [8]

SECTION - II

Unit - 4

- Q7)** a) Explain in brief steam trap and why it is important in thermal power plant? [8]
- b) A brewery chilling system, ethylene glycol is used a secondary refrigerant. The designed capacity is 40 TR. A test was conducted to find out the operating capacity and energy performance ratios. The flow was measured by switching off the secondary pump and measuring the tank level difference in hot well.

Measured data:

Temperature of ethylene glycol entering evaporator = (-) 1°C

Temperature of ethylene glycol leaving evaporator = (-) 4 °C

Ethylene glycol flow rate = 13200 kg/hr

Evaporator ethylene glycol pressure drop (inlet to outlet) 0.7kg/cm²

Power input to compressor electrical power kW = 39.5 kw

Specific heat capacity of ethylene glycol = 2.34 kcal/kg °C [8]

OR

- Q8)** a) What are the measures to be taken for efficient operation of large refrigeration plants. [8]
- b) Describe Energy conservation opportunities compressed air systems (pneumatic systems) [8]

Unit - 5

- Q9)** a) What are the types of lamps used in lighting system? Write down their features with typical application. [9]
- b) What are different types of motor? Explain motor speed control systems. [9]

OR

- Q10)a)** Explain the following terms : [10]
- i) Power Factor
 - ii) Maximum Demand
 - iii) Copper losses
 - iv) Stray losses
 - v) Luminous efficiency
- b) What possible improvement measure you would look for general lightening system. [8]

Unit - 6

Q11)a) Explain cogeneration systems using the back pressure turbine, extraction-condensing turbine and double extraction back pressure turbine. [8]

b) Explain potential for waste-heat recovery in industry. [8]

OR

Q12)a) Explain in brief: [8]

i) CDM projects

ii) Carbon credit calculation

b) Explain how cogeneration is advantageous over conventional power plant.

[8]



Total No. of Questions : 6]

SEAT No. :

P2141

[Total No. of Pages : 1

[5059]-340

**B.E. (Petroleum Engineering)
WELL CONTROL METHODS
(2008 Course)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All Questions are compulsory.*
- 2) *Write Section-I and Section-II on separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION-I

- Q1)** a) Discuss pore pressure calculation using sonic log. [8]
b) Describe Hard shut in with suitable sketch. [8]
- Q2)** a) Explain formation integrity test in brief. [8]
b) Write short note on [8]
i) Trip margin ii) Gas cut mud
- Q3)** a) Explain use of Hydroelectric and pneumatic pressure switch in details. [9]
b) Explain U tube concept with suitable sketch. [9]

SECTION-II

- Q4)** a) Discuss volumetric method of well control in brief. [9]
b) Describe unusual problems of well control in brief. [9]
- Q5)** a) Draw Subsea BOP Stack. [8]
b) Describe pressure test of surface BOP. [8]
- Q6)** Write short note on: [16]
a) Snubbing operation b) Underground blow out



Total No. of Questions : 8]

SEAT No. :

P3769

[5059]-341

[Total No. of Pages : 2

B.E. (Petro chemical)
REACTION ENGINEERING - II
(2008 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Answer to the two sections should be written in two separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, wherever necessary.*
- 5) *Use of steam tables and electronic calculator is allowed.*

SECTION - I

Q1) Tertiary Butyl Alcohol (TBA), an important octane enhancer, is produced by liquid phase hydration of isobutene over a catalyst. Derive a rate law based on Langmuir - Hinshelwood theory assuming **[16]**

- a) Desorption of TBA is rate limiting.
- b) Adsorption of isobutene is rate - limiting.

Q2) A laboratory packed bed reactor, housing 1 Kg catalyst, yields following kinetic data using completely back-mixed reactor. Feed concentration of A may be taken as 10 mol/m³. **[18]**

C _A mol/m ³	1	2	3	6	9
v ₀ lit/hr	5	20	65	133	540

Reaction is $A + B \rightarrow R + S$. Find the amount of catalyst needed for 85% conversion for a flow rate of 1000 kmol/hr stoichiometric feed stream having total concentration of 8mol/m³ assuming the reactor to be:

- a) Fixed Bed
- b) Fluidised Bed

Q3) Diffusion - free rate law of a gas phase catalytic reaction $A \rightarrow 2R + S$ is given as $-r_A = 0.5 C_A^{1.5}$ mol/m³ cat.s. Calculate the catalyst volume needed to achieve 90% conversion of pure A fed at the rate of 1000 Kmol/hr assuming that the reaction takes place in strong pore diffusion resistance regime. (Data : catalyst pellet size is 10 mm and effective pore diffusivity is 1.0×10^{-6} m²/m cat.s). **[16]**

P.T.O.

- Q4)** Discuss in brief **[16]**
- a) Choice of catalyst pellet diameter.
 - b) Effects of pore diffusion on kinetic studies.
 - c) Merits of fluidized bed reactor.
 - d) Catalyst promoters.

SECTION - II

- Q5)** a) Discuss and draw typical concentration profiles for gas and liquid films for various regimes obtained in gas-liquid reactions. **[8]**
- b) Derive relationship giving enhancement factor when all reaction involving an acidic gas absorbed with the base from the solvent occurs very slowly in the bulk liquid. **[8]**
- Q6)** An acidic impurity A in a gaseous feed is to be removed so as to reduce its partial pressure from 1500 Pa to 200 Pa (total pressure is 150 KPa) by reacting it with a base B dissolved in water in a tower having regular packings. Overall gas side mass transfer coefficient is $0.0055 \text{ mol/hr.m}^3\text{.Pa}$. Gas side resistance to mass transport in absence of the reaction is 40% whereas the liquid film contributes the remaining resistance. Henry's constant is $125 \text{ Pa.m}^3\text{/mol}$. L/G ratio is 3 mol/mol. Calculate minimum height of the tower required. **[18]**
- Q7)** Spherical particle of ZnS with initial diameter of 12cm is subjected to roasting in presence of oxygen at 103 KPa and 200 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 $0.05 \text{ cm}^2\text{/s}$. Calculate the time required for 75% reduction in diameter of the core. **[16]**
- Q8)** a) Give merits of fixed bed and fluidized bed reactors with examples from process industry. **[8]**
- b) Discuss non-ideal reactors. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3042

[5059]-343

[Total No. of Pages : 3

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

- 1) *Answers 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) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss in details about “Kyoto Protocol”. Discuss the role of UNFCCC. [6]
b) Elaborate on ‘Adsorption of Gaseous Pollutants on Solids’. [6]
c) Discuss in detailed about separation, handling and transportation of Biomedical waste. [6]

OR

- Q2)** a) Explain impact of Petroleum & Petrochemical industry on environment starting from crude oil production to refining. [9]
b) How the project is decided for CDM? What are its criteria? What are examples of projects in CDM? [9]

- Q3)** a) A conventional cyclone with diameter 2 m handles 6 m³/s of standard air carrying particles with a density of 2000 kg/m³. for effective number of turns (Ne) = 6. Determine the cut size. What will be the cut size for a high efficiency cyclone? Take viscosity of gas (μ_g) as 1.81×10^{-5} kg/(m.s.). Neglect the density of the gas. [12]
b) With the help of flow diagram, explain working, advantages & disadvantages of suspended particulate matter (SPM) removal in Electrostatic precipitator (ESP). [4]

OR

P.T.O.

- Q4)** a) Give the detailed classification of Primary and Secondary air pollutants with their adverse effects for any two each. [10]
- b) What is the basis used for selecting the air pollution control equipment? What are the factors affecting choice of air pollution control equipment?[6]

- Q5)** a) Discuss with neat sketches five types of 'Plume Behaviors' with the conditions required for formation of these plumes and impact created on surrounding. [8]
- b) Discuss the Meteorology factors influencing air pollution. [8]

OR

Q6) Write a short note on following: (Any 4) [16]

- a) Carbon credits.
- b) Source Correction method for air pollution.
- c) Control of NO_x in a complex fertilizer plant.
- d) Environmental laws for air pollution.
- Temperature lapse rates and stability.
- e) Adsorption technique for air pollution control.
- f) Impact of climate change on human life.

SECTION - II

- Q7)** a) Discuss the general limits/norms specified for disposal of treated wastewater on land, in river and in sea water? [8]
- b) Show the interrelationship of solids found in wastewater with help of diagram. [8]

OR

- Q8)** a) Discuss the various operations for generation of wastewater in any process plant. [8]
- b) What is the significance of COD/BOD ratio? Give the limitations of BOD test. [8]

- Q9)** a) Discuss principle, construction, working, advantages and disadvantages of ‘Activated Sludge Process’ (ASP) with neat sketch. [10]
- b) Differentiate between Anaerobic and Aerobic process (Minimum 5 points)[6]

OR

- Q10)**a) What do you mean by Suspended growth process and Attached growth process? Explain with example. What are preconditions needed to operate these processes. Which process you will recommend municipal sewage treatment and why? [8]
- b) What do you understand by “SMOG”? Give its classification. What are the favorable situations to form SMOG? What are its ill effects on environment and human body? [8]

- Q11)**a) Discuss the sources and method of treatment for dairy industry waste with neat sketch. [9]
- b) Discuss principle, construction, working, advantages and limitations of ‘Up-flow Anaerobic Sludge Blanket’ (UASB) process with neat sketch.[9]

OR

Q12) Write a short note on (Any four) [18]

- a) ISO 14000.
- b) Importance of regulations for hazardous waste.
- c) Difference between aerobic and anaerobic process.
- d) OSHA.
- e) Hazardous waste classification.
- f) Facultative pond system.
- g) Difference between attached growth process and suspended growth process.

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Total No. of Questions : 8]

SEAT No. :

P1942

[Total No. of Pages : 3

[5059]-345

B.E. (Petrochemical Engineering)

NOVEL SEPARATION PROCESSES

(2008 Pattern) (Elective - I) (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) Discuss in detail the energy criteria for separation processes by giving suitable examples. **[10]**
- b) Discuss in detail various separation processes by giving suitable examples. **[8]**
- Q2)** Write short notes on : **[18]**
- a) Adsorptive Bubble Separations
 - b) Froth Flotation
 - c) Surfactant Based Separations
- Q3)** Derive the model equation for cross current model for gas separation by membranes. Discuss the solution strategy for the model equations. **[16]**

P.T.O.

- Q4) a)** Reverse osmosis of salt solution at 22°C is tested with a $4.0 \times 10^{-3} \text{ m}^2$ cellulose acetate membrane. On one side of the membrane is 1 mol NaCl/kg H₂O solution at 50 atmospheres (abs.) pressure, on the other is 0.02 mol NaCl/kg H₂O at atmospheric pressure. The permeation rate is 90.50 ml/hour. Find the solvent permeability and the rejection rate. [8]
- b)** A heart-lung machine uses a 0.17 mm silicone rubber membrane with a permeability of $6.07 \times 10^{-7} \text{ cm}^3 \text{ O}_2 \text{ (STP) mm/s.cm}^2\text{cmHg}$. The machine is to supply 352 cm³/min of oxygen to a patient, where the partial pressure of oxygen in the blood is the equivalent of 36 mmHg. The machine is supplied with pure oxygen at 710 mmHg, 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

- Q5)** The data on adsorption of ethane as Linde molecular sieve 5A°, 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 solid, if density of ethane = 0.35 gm/cc.
- Q6) a)** Explain different types of adsorbents with their properties used in industrial operations. [6]

- b) A colored substance (B) is to be removed from a mineral oil by adsorption with clay particles at 25 °C. The original oil has a color index of 200 units / 100 kg oil, while the decolorized oil must have an index of only 20 units / 100 kg oil. The following experimental adsorption equilibrium data have been measured in a laboratory : [12]

Data :

C_B , color units / 100 kg oil	q_B , color units / 100 kg clay
200	10
100	7.0
60	5.4
40	4.4
10	2.2

Fit the experimental data to the Freundlich adsorption isotherm $q_B^* = A c_B^{1/n}$. Compute the mass in kg of clay needed to treat 500 kg of oil if one equilibrium contact.

- Q7) a)** In gas chromatography, a plot of HETP as a function of the mobile phase velocity is described by the Van Deemter equation : [6]

$$\text{HETP} = A + B/u + Cu$$

Physically, what do the terms A, B and C represent? Calculate the optimum value of the mobile phase velocity and the plate height in terms of these parameters.

- b) Define the following terms in connection with chromatographic separations and give appropriate equations. [10]
- Partition coefficient (K)
 - Retention Volume (V_R)
 - Retention Ratio (R)
 - Capacity factor (k)
 - HETP

Q8) Write Short notes on : [16]

- Reactive Distillation
- Zone Melting
- Bioseparation
- Super Critical Fluid Extraction



Total No. of Questions : 12]

SEAT No. :

P2142

[5059]-346

[Total No. of Pages : 2

**B.E. (Petrochemical Engineering)
ELEMENTS OF FLUIDIZATION ENGINEERING
(2008 Course) (Semester-I) (Elective-I) (412404-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.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

Q1) a) Write a note on the quality of fluidization. [9]

b) Draw the various contacting schemes of solid and gas. [9]

OR

Q2) a) Give the design of industrial gas distributors. [9]

b) Give the advantages and disadvantages of fluidization. [9]

Q3) a) Explain the need for classification of particles. [8]

b) Write a mathematical expression of flow through packed bed. Derive the formula for minimum fluidization velocity. [8]

OR

Q4) a) Describe the Geldart classification for the Group B and D with their characteristics. [8]

b) Write a note on the terminal velocity of particles. [8]

Q5) a) Classify the measurement techniques in fluidization. [8]

b) Write a note on the generalized wake model. [8]

OR

P.T.O.

- Q6)** a) Write a note on mapping of fluidization regimes. [8]
b) Calculate u_t for the sharp irregular sand particles having the following data: [8]

Air: $\rho_g = 1.2 \times 10^{-3} \text{ g/cm}^3$, $\mu = 1.8 \times 10^{-4} \text{ g/cm.s}$

Sand: $d_p = 160 \text{ }\mu\text{m}$, $\phi_s = 0.67$, $\rho_s = 2.6 \text{ g/cm}^3$.

SECTION-II

- Q7)** a) Discuss the liquid solid mass transfer in fluidized bed. [8]
b) Write a note on heat transfer in circulating fluidized bed. [8]

OR

- Q8)** a) Write a note on immersed horizontal cylinder to bed heat transfer. [8]
b) Describe the heat transfer in vertical cylinder to bed. [8]

- Q9)** a) Give the effect of pressure on fluidized bed. [8]
b) Write a note on particle entrainment and carryover in fluidization. [8]

OR

- Q10)**a) Discuss Coalescence and Splitting of bubbles in a dense bed. [8]
b) Discuss the Davidson model. [8]

- Q11)**a) Describe the working of a chemical looping reactor. [9]
b) Give the factors affecting the design of catalytic reactors. [9]

OR

- Q12)**a) Discuss the various types of fluidized bed dryers in detail. [9]
b) Write a note on axial and radial gas mixing in fluidized bed catalytic reactors. [9]



Total No. of Questions : 8]

SEAT No. :

P3770

[5059]-347

[Total No. of Pages : 1

B.E. (Petrochemical Engineering)
GREEN CHEMISTRY
(2008 Course) (Semester-I) (Elective - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from section I and three questions from section II.*
- 2) *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)** Discuss the concept, technology, and applications of super-critical extraction. **[16]**
- Q2)** Explain how biomass can be converted in to useful chemical products. Give pertinent real life examples. **[16]**
- Q3)** State and discuss in detail the twelve principles of green chemistry. **[16]**
- Q4)** Mention challenges in use of the following as green processes: **[18]**
- a) Photochemical synthesis
 - b) Phase Transfer Catalysis.

SECTION - II

- Q5)** a) Discuss green synthesis of adipic acid. **[16]**
b) Discuss chemical engineering challenges in electroorganic synthesis.
- Q6)** Write a note on different process intensification strategies presently available to a process designer. **[16]**
- Q7)** Discuss how process safety is part and parcel of green chemistry approach. **[16]**
- Q8)** Write notes **[18]**
- a) Solar energy potential for India
 - b) Global warming.



Total No. of Questions : 12]

SEAT No. :

P1787

[Total No. of Pages : 2

[5059]-35

B.E. (Mechanical Engineering)

PRODUCT DESIGN AND DEVELOPMENT (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 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 types of design and redesign? [10]
b) Explain Modern product development? [8]

OR

- Q2)** a) What is product? Write innovation in product design? [10]
b) Distinguish between product development and product design? [8]

- Q3)** a) Write in detail Analysis of Gathered Information? [8]
b) Explain in detail types of customers needs? [8]

OR

- Q4)** a) What is product design? Explain in detail steps involved in it? [8]
b) Why there is need of economic analysis of product? [8]

- Q5)** a) Explain in detail functional modeling and decomposition? [8]
b) Write in detail morphological analysis? [8]

P.T.O.

OR

- Q6)** a) What is product benchmarking? Explain steps involved in product benchmarking? [8]
b) Explain in detail estimation of technical feasibility? [8]

SECTION - II

- Q7)** a) Write note on Product Teardown Process and Trend Analysis? [10]
b) Explain in detail step involved in product teardown process? [8]

OR

- Q8)** a) Write in detail Benchmarking Approach and its Detailed Procedure? [10]
b) Explain the Setting Product Specifications? [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 are Design guidelines? Explain it in detail? [8]
b) Explain in detail design for manufacture? [8]

- Q11)**a) Write short notes on : [8]
i) Need of Product life cycle
ii) Significance of PLM
b) Write in detail different phases of product life cycle [8]

OR

- Q12)**a) Write note on Product Data and Product Workflow. [8]
b) What is importance of product data management in industry? [8]



Total No. of Questions :12]

SEAT No. :

P3043

[Total No. of Pages :4

[5059] - 350

B.E. (Petrochemical Engineering)

NATURAL GAS TECHNOLOGY

(2008 Course) (Elective - II) (Semester - I) (412405)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer Q. No. 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right side indicate full marks.*
- 5) Use of Calculator is allowed.*
- 6) Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) Discuss the outlook for world gas production. [8]
- b) Describe origin of natural gas. [8]

OR

- Q2)** a) Elaborate on different types of natural gas composition and regional disparities. [8]
- b) Elaborate on geographic distribution by type of gas. [8]

- Q3)** a) Explain in detail method for measuring interfacial tension. [8]
- b) Discuss sour gas and sweet gas. [6]
- c) Elaborate on viscosity of gas mixtures. [4]

OR

P.T.O.

- Q4)** a) Discuss the phase diagram of a reservoir fluid. [8]
- b) Find the viscosity for a gas with composition in mole % of $C_1 = 90.5$, $C_2 = 2.3$, $C_3 = 2.3$ at 3000 psia and 540° R. [6]

Date:

Mi	Pci	Tci	μ_{gi}
16.043	667.8	343.1	0.0110
30.070	707.8	549.8	0.0092
44.097	616.3	665.7	0.0082

- c) Elaborate on heating value of natural gas. [4]

- Q5)** a) Explain in detail predicting hydrate formation by equilibria chart method. [6]
- b) Explain in detail phase diagram for hydrate formation. [6]
- c) Write a short note on hydrate growth. [4]

OR

- Q6)** a) Discuss kinetics of hydrate formation. [6]
- b) Discuss modeling and kinetics of hydrate formation based on semi empirical correlation. [6]
- c) Write a short note on hydrate inhibitors. [4]

SECTION - II

- Q7)** a) Explain in detail dehydration of natural gas by adsorption. [8]
- b) Give different properties of suitable solvent. [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) Explain with flow sheet acid gas removal by selexol process. [8]

Q9) a) Explain with flow sheet natural gas liquefaction using TEALARC process with one pressure level. [6]

b) Explain in detail construction and working of reciprocating compressor. [6]

c) Write a short note on flow measuring devices. [6]

OR

Q10) a) Discuss safety precautions for natural gas pipeline. [6]

b) Discuss gas pipeline transport systems. [6]

c) Write a short note on design of pipeline transport installations. [6]

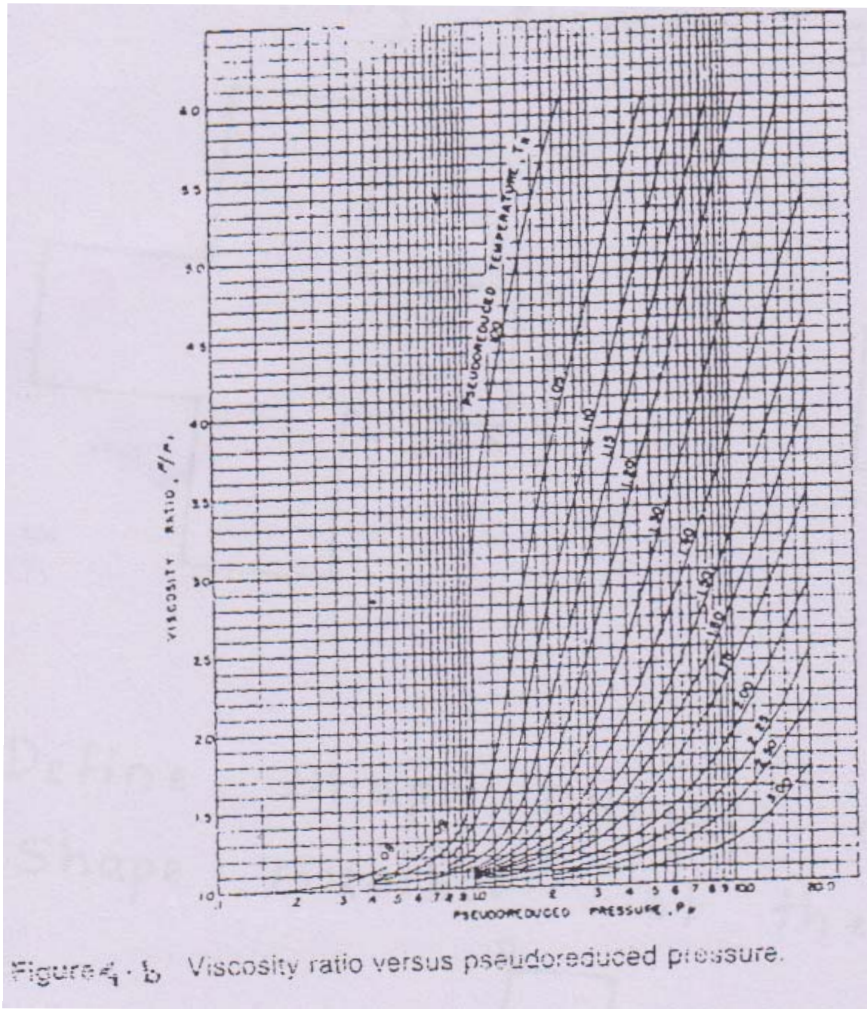
Q11) a) Explain in detail cryogenic storage and underground storage for natural gas. [8]

b) Elaborate on downstream utilization technologies for natural gas in petrochemical. [8]

OR

Q12) a) Explain in detail methanol production using ICI process. [8]

b) Write a short note on natural gas storage. [8]



Total No. of Questions : 8]

SEAT No. :

P3742

[Total No. of Pages : 5

[5059] - 352
B.E. (Petrochemical)
REFINERY PROCESS DESIGN
(2008 Pattern)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Attempt any three questions from each section.*
- 2) *Answer to the two sections should be written in two separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of steam tables and electronic calculator is allowed.*
- 5) *Make use of K Charts, LMTD correction factor curves and Gilliland Curve given in the end wherever appropriate.*
- 6) *Assume suitable data wherever necessary.*

SECTION - I

Q1) Vapor leaving the topmost tray in a multicomponent distillation column consists of 60 Mol% n-butane 100 Mol% n-pentane and 30 Mol% n-hexane. Column pressure is 5 bar. Vapor is fed to a total condenser from which reflux is returned to the column. If reflux ratio is 4, calculate vapor and liquid compositions for 3 theoretical plates below the top plate. [18]

Q2) Feed to a C2 splitter is 30% vaporized liquid having 52% ethylene and 48% ethane (Mol%). The column operates at 8 bar pressure. Purities of both top and bottom products are expected to be 99%. Calculate minimum reflux ratio needed. Assuming operating reflux to be 1.5 times the minimum, calculate the theoretical stages needed for the separation. Use FUG method. [16]

Q3) a) Discuss rating and design problems. [8]
b) Explain how coil outlet temperature (COT) for ATU feed can be determined. [8]

Q4) a) Discuss flooding and weeping problems in distillation column. [8]
b) Explain feed-back control scheme used in distillation operation. [8]

P.T.O.

SECTION - II

- Q5)** a) Explain the procedure used in the design of a shell and tube heat exchanger touching upon the following: [14]
- i) Placement of corrosive fluids
 - ii) Overall Heat transfer coefficient
 - iii) Choice of number of passes
 - iv) Tube side pressure drops
 - v) Baffle spacing
- b) State the approximate heat transfer coefficients you will assume in the following situations : [2]
- i) Steam condensing on shell side
 - ii) Hydrocarbon liquid boiling on tube side.
- Q6)** a) Discuss in brief a method for fired heater design. [10]
- b) Draw constructional features of fired heater used in refinery operations. [6]
- Q7)** With reference to centrifugal pump operation and design, discuss : [18]
- a) NPSH.
 - b) Energy saving measures.
 - c) Operating curves.
- Q8)** Discuss :
- a) Anti-surge control in Centrifugal Compressor. [5]
 - b) Centrifugal pump operating point. [5]
 - c) Choice of a process pump. [6]

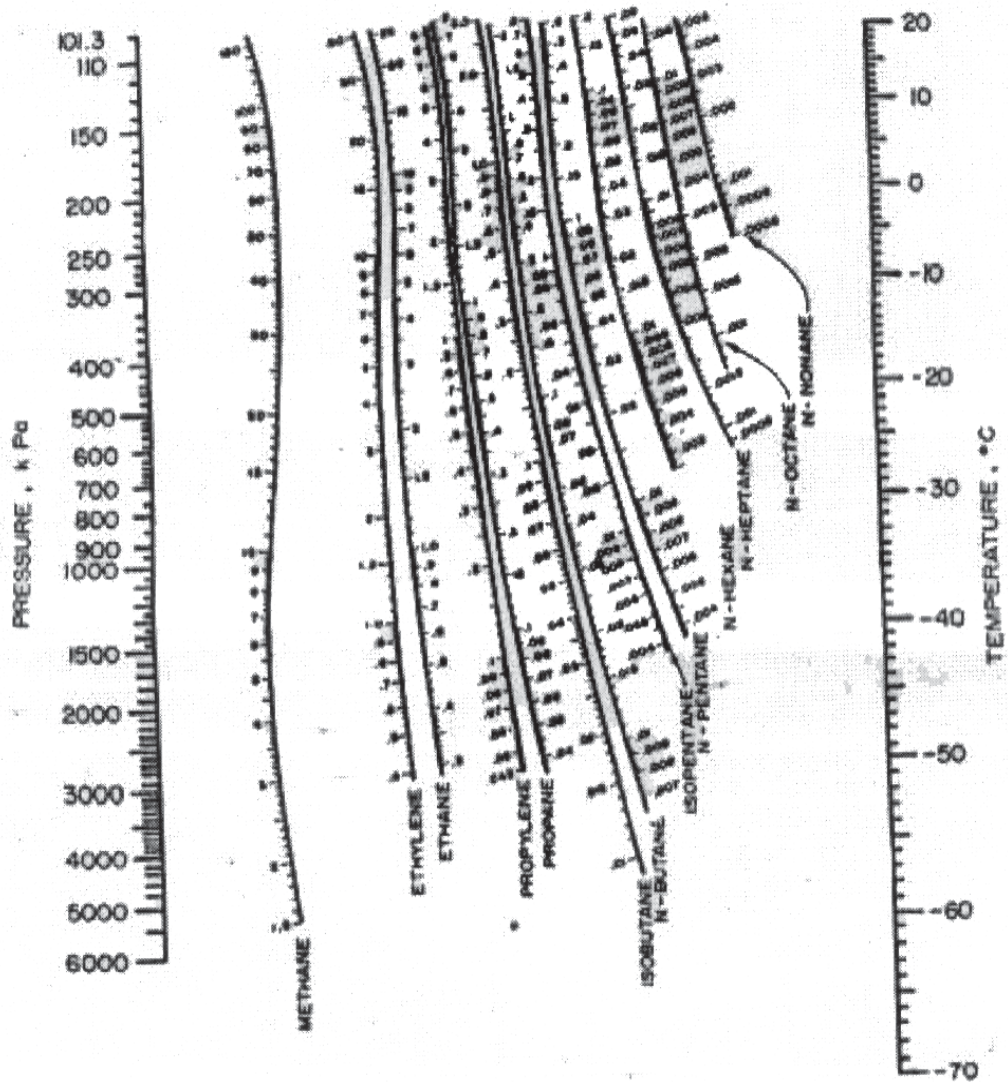


FIG 1: K-Chart for low temperature range

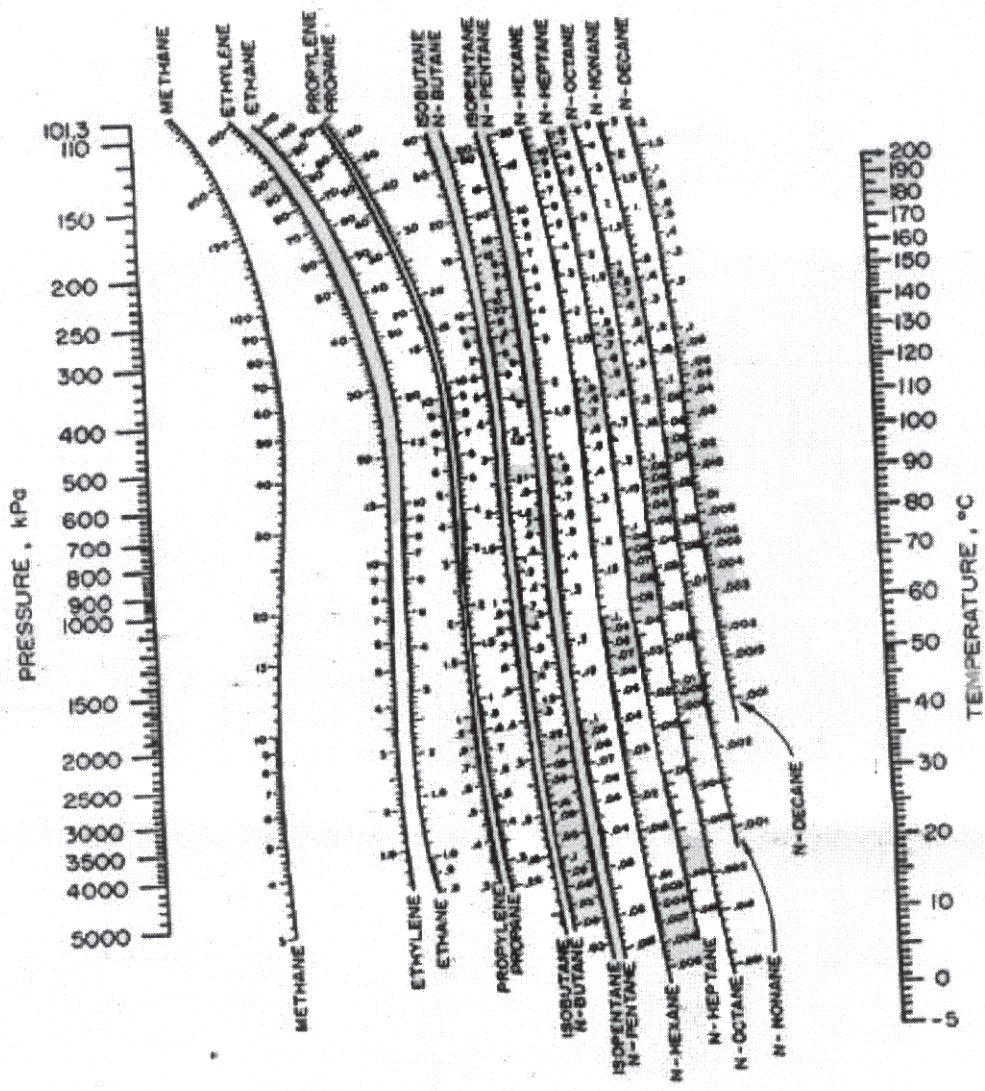


FIG 2: K-Chart for high temperature range

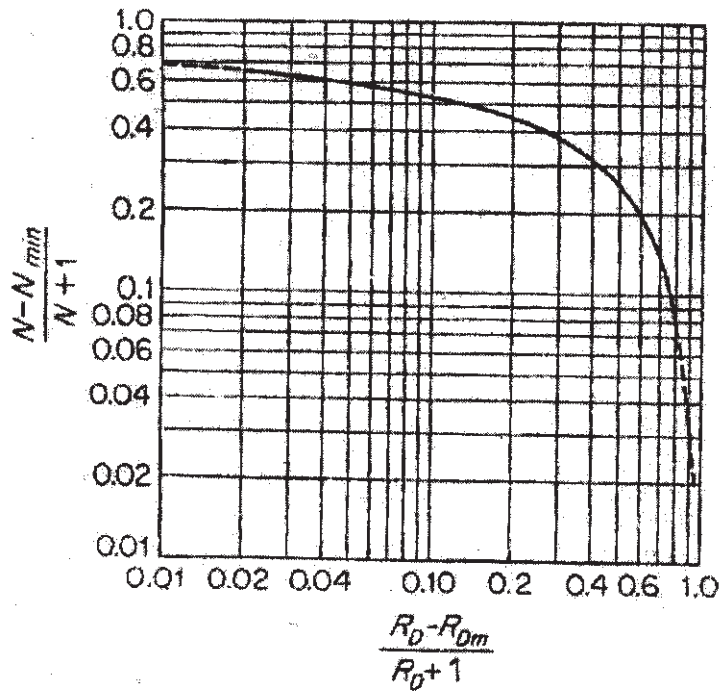


FIG 3: Gilliland Curve



Total No. of Questions : 8]

SEAT No. :

P1943

[Total No. of Pages : 2

[5059]-353

B.E. (Petrochemical Engineering)
PLANT DESIGN & PROCESS ECONOMICS
(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) Explain process design codes. [6]
b) Explain color code of pipelines. [6]
c) Distinguish between process flowsheet and piping and instrumentation diagram (P & ID). [6]
- Q2)** a) With suitable example, explain anatomy of chemical engineering project. [8]
b) Explain the steps involved in process creation for manufacturing given product. [8]
- Q3)** a) Explain fire protection systems used in a petrochemical plant. [8]
b) Explain the steps involved in HAZOP study. [8]
- Q4)** a) Explain the requirements of a good plant layout. [8]
b) Explain PERT & CPM techniques used for project monitoring and control. [8]

P.T.O.

SECTION - II

- Q5)** a) Explain the components of total cost and standard methods of cost estimation. [8]
- b) A factory is producing 1000 samples per hour. It has material cost Rs. 375, direct expense Rs. 80, labour cost Rs. 245. The factory overheads are 150% of total labour. Cost and administration cost is 30% of total factory cost. If the selling price of each unit is Rs. 2 per sample, calculate whether management is going to loss or gain and by what amount? [8]
- Q6)** a) Explain methods of profitability analysis. [8]
- b) A company has total product cost of Rs. 20 lacs and annual production is 5,60,000 units with selling price of Rs. 40 per unit. What are net annual earnings if taxes are implemented as - normal tax of 22% of GAE, surtax of 26% for GAE over 25 lacs to 4 crores, central income tax of 48% of GAE. [8]
- Q7)** An existing plant has been operating in such a way that a large amount of heat is being lost in waste gases. Four different heat exchangers are designed to recover heat being lost. The prices involved for these heat exchangers are given in the table. If company incharge expects at least 16% annual RoI, then which one of the following four designs should be recommended? [16]

Item	Design I	Design II	Design III	Design IV
Initial installed cost (Rs.)	25000	40000	50000	65000
Operating cost (Rs.)	7500	7500	7500	7500
Fixed charges (% of initial cost/yr)	10%	10%	10%	10%
Value of heat saved (Rs./yr)	10000	14000	16000	20000

- Q8)** Write short notes on the following : [18]
- a) Direct / indirect manufacturing costs
- b) William's six tenth rule
- c) Break even analysis



Total No. of Questions : 12]

SEAT No. :

P3044

[5059]-354

[Total No. of Pages : 2

B.E. (Petrochemical Engineering)
PROCESS MODELING AND SIMULATION
(2008 Course) (Elective - III) (Semester - II) (412410 - A)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Draw the Onion diagram describing Reactor to Utilities. Explain how various steps in process building are governed by various physical laws. **[16]**

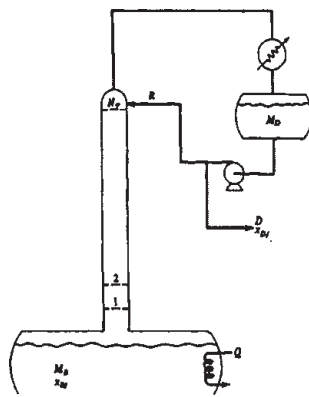
OR

Q2) With neat diagram, note the assumptions and deduce the model of biochemical reactor. **[16]**

Q3) The liquid in a jacketed, non isothermal CSTR is stirred by an agitator whose mass is significant compared with the reaction mass. The mass of the reactor wall and the mass of the jacket wall are also significant. Write the energy equations for the system. Neglect radial temperature gradients in the agitator, reactor wall, and jacket wall. **[18]**

OR

Q4)



Above schematic represents batch distillation operation. Develop a process model describing mass and energy balance for this unit. **[18]**

P.T.O.

Q5) Explain the mathematical convergence of a system using Newton-Raphson Method. [16]

OR

Q6) Solve: [16]

$$2\frac{d^2y}{dx^2} = 3\frac{dy}{dx} + 9y + 9$$

Use Taylor's series method to calculate y at $x = 0.1$, $x = 0.2$ in two steps. Initial values are $y(0) = 1$ and $y'(0) = -2$.

SECTION - II

Q7) With neat sketch, explain functioning of Supervisory Control And Data Acquisition System. [18]

OR

Q8) Explain working methodology of Process Simulation packages by commercial process simulator developers. [18]

Q9) Apply state space model for level control in propylene tank supplying raw material for polypropylene material. [16]

OR

Q10) Note in details the construction of State Equations from a Differential Equation. [16]

Q11) Note the usage of Analog Programme in developing ANN models. [16]

OR

Q12) Write in details on usage of Fuzzy Logic Control in maintaining appropriate temperature in Naphtha cracker unit in a refinery. [16]



Total No. of Questions : 9]

SEAT No. :

P3751

[Total No. of Pages : 2

[5059]-358

B.E. (Petrochemical Engineering)

**422411 A : PETROLEUM EXPLORATION AND PRODUCTION
OPERATIONS**

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) *Figures to the right indicate full marks.*
- 4) *Draw suitable diagrams wherever necessary.*

SECTION - I

Q1) a) What is meant by maturation and degradation of oil and gas in the reservoir. **[10]**

b) Write in brief on Prognostication of hydrocarbon reserves. **[5]**

Q2) Give a detailed account of the present upstream petroleum industry in the world with particular reference to the thrust areas for exploration, production scenario, natural gas, economics, business and status in India. **[15]**

OR

Q3) Write short notes on any three of the following :

- a) Kerogen and Different types
- b) Source rocks
- c) Migration of hydrocarbons
- d) Geological risk analysis

Q4) a) Describe important properties of reservoir rocks with suitable example. **[10]**

b) Explain the following terms in brief : Formation Volume Factor (FVF), Solution gas-Oil Ratio (GOR), API specific gravity, Bubble point pressure, Critical point. **[10]**

P.T.O.

SECTION - II

Q5) What is drilling fluid? Explain its important properties and procedures to measure them. **[15]**

OR

Q6) Draw neat figure to show various components of a typical oil well drilling rig and explain different parts.

Q7) What is “well completion”? Explain in brief well completion operations. **[15]**

OR

Q8) What is meant by casing? What are the different types of casing? Why is it necessary? How is casing cemented?

Q9) a) What is artificial lift? Explain the terms : beam pumping, submersible pumping, gas lift and hydraulic pumping. **[12]**

b) Write a note on unconventional hydrocarbon resources. **[8]**



Total No. of Questions : 8]

SEAT No. :

P1944

[Total No. of Pages : 3

[5059]-359

B.E. (Petrochemical Engineering)
CATALYST SCIENCE AND TECHNOLOGY
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) *Answer Any Two questions each from remaining question from section - I and section - II.*
- 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 and electronic pocket Calculator is allowed.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss the mechanisms of homogeneous catalysis with two examples. **[8]**
- b) Discuss in brief catalytic reaction pathways with respect to selectivity, functionality and active site. **[8]**
- Q2)** a) Explain in brief important characteristics of Industrial catalysts and their industrial applications by giving suitable examples. **[10]**
- b) Discuss various adsorption isotherms by giving their mathematical equations. **[8]**
- Q3)** a) Batch tests were performed in the laboratory using solutions of phenol in water and particles of granular activated carbon. The equilibrium data at room temperature are shown in table below. Determine whether the Freundlich isotherm fits the data and find the constants. **[8]**

P.T.O.

Equilibrium data :

$c, \left(\frac{\text{kg phenol}}{\text{m}^3 \text{ solution}} \right)$	$q, \left(\frac{\text{kg phenol}}{\text{kg carbon}} \right)$
0.322	0.150
0.117	0.122
0.039	0.094
0.0061	0.059
0.0011	0.045

b) Discuss in brief different rate and kinetics models of catalytic reactions. [8]

Q4) a) Write a brief note on: Poisoning and deactivation of Catalysts. [8]

b) Describe the general method for the preparation of metal catalysts. [8]

SECTION-II

Q5) a) Explain the correlations between acidity and catalytic activity. [6]

b) Explain in brief mechanism of catalytic cracking. [6]

c) Write a brief note on : Shape selectivity in Zeolites. [6]

Q6) a) Discuss catalyst dual functionality and reactor configuration for processing of petroleum and hydrocarbons. [10]

b) Explain in brief kinetics of hydrodesulfurizations. [6]

Q7) a) Discuss the mechanisms and catalysts used in Fischer-Tropsch synthesis. [8]

b) Explain the reactor configuration for ammonia synthesis. [8]

Q8) Write notes on :

[16]

- a) Water gas shift reaction.
- b) Catalysts used in steam reforming
- c) Acid-base catalysts



Total No. of Questions : 12]

SEAT No. :

P1788

[Total No. of Pages : 3

[5059]-36

B.E. (Mechanical Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2008 Pattern) (Elective - 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,Q.7 or Q.8,Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Answer Three questions from section I and Three questions from section II.*
- 3) *Answer to the two sections should be written on separate.*
- 4) *Neat diagram must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain performance characteristics of pump. [8]
b) Write a note on stage velocity triangle. [8]

OR

- Q2)** a) What is specific speed? Explain its significance. [8]
b) Explain the difference between fan, blower & compressor. [8]

- Q3)** a) Write short note on losses in pumps. [8]
b) Draw operating characteristics curves for reciprocating pump. [8]

OR

- Q4)** a) Write down steps involved in calculation of axial thrust methods to minimize axial thrust. [8]
b) Enlist different applications of rotary & reciprocating pumps. [8]

P.T.O.

- Q5)** a) Write down steps for design procedure and design optimization of Pumps. [10]
b) Explain various forms of corrosion occur in hydraulic machines. [8]

OR

- Q6)** a) Enlist steps for selection of impeller and casing dimension using industrial manuals for hydraulic design of pumps. [10]
b) Explain following terms. [8]
i) Static suction head
ii) Static discharge head
iii) Total suction head

SECTION - II

- Q7)** a) Explain design procedure & selection, optimization of blower. [8]
b) Write a short note on “Applications of Fans & Blowers”. [8]

OR

- Q8)** a) What are main cause for noise generation? What are methods for reducing the fan noise? [8]
b) How does dust erosion of centrifugal impeller occurs? What is its effect on the Performance? [8]

- Q9)** a) State design consideration and imperial relations used to determine various for design Parameters in fan & blowers? [8]
b) Explain the terms Surging and Stalling. [8]

OR

- Q10)**a) Write a short note on “ Design procedure for selection and optimization of Blowers”. [8]
b) Write a short note on “Design of Impeller and casing dimensions in aerodynamic design. [8]

Q11)a) Explain the terms degree of reaction & Slip factor? **[8]**

b) An Axial compressor stage has the following data **[10]**

- | | | |
|-------|-------------------------------------|----------------|
| i) | Temperature and Pressure at Entry | 300 K, 1.0 bar |
| ii) | Degree of Reaction | 50 % |
| iii) | Mean Blade ring diameter | 36 cm |
| iv) | Rotational Speed | 18000 rpm |
| v) | Blade Height at entry | 6 cm |
| vi) | Air angles at rotor and stator exit | 25° |
| vii) | Axial velocity | 180 m/s |
| viii) | Work done factor | 0.88 |
| ix) | Stage Efficiency | 85 % |
| x) | Mechanical Efficiency | 96.7 % |

Determine:- 1) Air angles at the stator and rotor entry 2) The mass flow rate of air 3) The power required to drive the compressor 4) The loading coefficient 5) The pressure ratio developed by the stage 6) Mach number at the rotor entry.

OR

Q12)a) Draw the velocity triangles at the entry and exit for the following axial compressor stage:- **[8]**

- i) $R = \frac{1}{2}$
- ii) $R < \frac{1}{2}$
- iii) $R > \frac{1}{2}$

b) Air enters the inducer of centrifugal compressor at $P_{o1} = 1.02$ bar, $T_{o1} = 335$ K. The hub and tip diameters of the impeller eye are 10 and 25 cm respectively. If the compressor runs at 7200 rpm and delivers 5.0 kg/s of air. Determine the air angle at the inducer blade entry and the relative Mach number. If IGVs are used to obtain a straight inducer section, determine the air angle at IGVs exit and the new value of the relative mach number. **[10]**



Total No. of Questions : 12]

SEAT No. :

P3045

[5059]-361

[Total No. of Pages : 2

B.E. (Biotechnology)

BIOSEPARATION - II

(2008 Course) (Semester-I) (415463)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

Q1) What is downstream Processing? Discuss the major concepts in relevance to industrial application of Downstream Processing. **[16]**

OR

Q2) What are the different categories of products purified using downstream processing. Write a note on high volume low value product purification. **[16]**

Q3) What is basic principle of NMR? Describe quantitative analysis using NMR with its instrumentation and applications. **[16]**

OR

Q4) Describe in details: **[16]**

- a) Spectroflurometry
- b) Spectrophotometry

Q5) Explain the concepts of Ion Exchange chromatography with the detailed procedure. **[18]**

OR

Q6) Explain the concepts of Gel Filtration Chromatography with the detailed procedure. **[18]**

P.T.O.

SECTION-II

Q7) Write short notes on: (8 M Each) **[16]**

- a) Gas Chromatography
- b) Liquid Chromatography

OR

Q8) Explain theory of Mass Spectrometry in details. **[16]**

Q9) What are 'Hyphenated Techniques'. explain it with one example. **[16]**

OR

Q10) What do you mean by Precipitation? Explain in detail technique with case study **[16]**

Q11) Write and explain flow sheet of separation of following bioproducts (9 M each) **[18]**

- a) Microbial Polysaccharide
- b) Citric Acid

OR

Q12) Write a flow sheet of any peptide Antibiotic production process. Elaborate each step with detailed explanation. **[18]**

✓ ✓ ✓

Total No. of Questions : 12]

SEAT No. :

P3046

[5059]-362

[Total No. of Pages : 4

B.E. (Biotechnology)

INSTRUMENTATION AND PROCESS CONTROL

(2008 Pattern) (Semester - I) (415464)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

SECTION - I

Q1) Explain in brief, working principle of the following instruments **[18]**

- a) Thermocouple.
- b) Hot wire anemometer.
- c) McLeod Pressure Gauge.

OR

Q2) Explain in brief working principle of following instruments **[18]**

- a) Electromagnetic flow meter.
- b) Optical Pyrometer.
- c) Radiation Pyrometer.

Q3) a) Derive the transfer function for a single tank liquid level system having linear resistance. **[8]**

- b) Derive the transfer function for a liquid level system with constant flow output. Also derive it's response for a unit step input and state the characteristics of the output. **[8]**

OR

P.T.O.

Q4) a) With a neat sketch, For a first order system explain the effect of change in [6]

i) Gain

ii) Time Constant

b) With the help of neat sketch explain the characteristic response of first order system to a sine input. [10]

Q5) a) Derive the transfer function for a two tank interacting system. [8]

b) A step change of magnitude 6 is introduced in to a system having the transfer function [8]

$$\frac{Y(S)}{X(S)} = \frac{15}{(S^2 + 3.6S + 6)}$$

Determine

i) Percent Overshoot

ii) Maximum value of Y (t)

iii) Rise Time

iv) Ultimate Value of Y(t)

OR

Q6) a) Why does the step response of interacting and non-interacting tank system, vary from that of a single tank system? Why? [6]

b) For a second order under damped response, explain [10]

i) Overshoot

ii) Decay Ratio

iii) Rise Time

iv) Response Time

v) Transportation lag

SECTION - II

Q7) a) Explain in brief control action of **[10]**

i) PD Controller.

ii) PI Controller.

b) What is mean by feedback control? Enlist the major components of feedback control system. Explain in brief how a feedback system works? **[8]**

OR

Q8) a) With the help of a block diagram of a control system, derive the transfer function for a Servo and Regulator problem. **[10]**

b) State advantages and Disadvantages of **[8]**

i) P Controller

ii) PD Controller

iii) PI Controller

iv) PID Controller

Q9) a) Draw the Root locus for the following system **[8]**

$$G(s) = \frac{K}{S(S^2 + 2S + 2)}$$

b) Write a note on Open loop tuning method. **[8]**

OR

Q10)a) Draw the Bode Plot for the following system **[8]**

$$G(s) = \frac{10}{(0.4S + 1)(3.5S + 4)}$$

b) Write a note on Closed loop tuning method. **[8]**

Q11) Write short note on

[16]

- a) Split range Control.
- b) Auctioneering control system.
- c) pH Controller.
- d) Cascade Control.

OR

Q12) Write short note on

[16]

- a) Ratio control System.
- b) Fuzzy Logic.
- c) Foam Controller.
- d) Override control system.

x x x

Total No. of Questions : 12]

SEAT No. :

P3047

[5059]-363

[Total No. of Pages : 3

**Final Year. B.Tech.
BIOTECHNOLOGY
Bioprocess Equipment Design
(2008 Pattern) (Semester - I) (415465)**

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 or 10, Q11 or 12 from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1) a)** Draw and explain Stress strain curve for **[10]**
- i) Ductile material and
 - ii) Brittle material
- b) Explain Maximum shear stress theory. **[6]**

OR

- Q2) a)** Define and explain Design Stress and Young's Modulus. **[6]**
- b) Discuss about procedure used to design process equipment. **[10]**

- Q3) a)** The inside diameter of cylinder is 15 cm and subjected to an internal pressure of 500 kg/cm². Allowable tensile stress of the material is 1500 Kg/cm². What should be the minimum thickness of the vessel? **[9]**
- b) A vessel having 2 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 75%. Calculate the thickness required for a cylindrical vessel and Spherical vessel? Which vessel should be selected for operation? Operating pressure is 5 Kg/cm². **[9]**

OR

P.T.O.

Q4) a) Describe the design of shallow head and hemispherical head with neat sketches. [9]

b) Explain auto frottage and shrink fit construction for high pressure vessel. [9]

Q5) a) Give classification and selection criteria of agitators. [8]

b) Explain various types of jackets with neat sketches. [8]

OR

Q6) With the classification of agitator discuss in detail the selection criteria of agitator. [16]

SECTION - II

Q7) 11000 kg/hr of water available at 90°C is to be cooled to 40°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 1550 w/m²°K. Fouling resistance and metal wall resistance may be neglected. Suggest a suitable design for the shell and tube heat exchanger. [16]

OR

Q8) a) 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) Define Murphree plate, Overall plate (column) efficiency. [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.[9]

b) State the need of downstream processing in biological processes. [9]

OR

Q12)Write short note on: [18]

a) Filter integrating testing

b) Commissioning and validation of filter I and

c) Downstream processing operation used in fermentation process.

x x x

Total No. of Questions : 12]

SEAT No. :

P 3048

[5059] - 364

[Total No. of Pages :2

B.E. (Biotechnology)

ENVIRONMENTAL BIOTECHNOLOGY

(2008 Course) (Semester -I) (Elective - I) (415461 A)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Answer Q.1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right side indicate full marks.*
- 4) Assume suitable data if necessary.*

SECTION - I

Q1) Describe in detail about various physical and chemical characteristics of waste water. **[18]**

OR

Q2) What are the water quality standards mentioned by ICMR and WHO. **[18]**

Q3) Describe the principle, advantages, disadvantages of oxidation ditches used in waste water treatment. **[16]**

OR

Q4) Enlist the basic treatment steps applied for industrial effluent treatment and describe in detail about neutralization and proportioning process. **[16]**

Q5) What is air pollution? What are the different methods used to control it describe any three in brief. **[16]**

OR

Q6) Write a detail note on Chemical reactions in the atmosphere due to various air pollutants. Describe the effects of air pollution on human health. **[16]**

P.T.O.

SECTION - II

Q7) What is hazardous waste? What are the different methods used to treat the hospital acquired hazardous waste. **[16]**

OR

Q8) Describe in detail the mechanism for biological degradation of cyanide in waste water. **[16]**

Q9) Explain in detail Biostimulation and bioaugmentation. **[16]**

OR

Q10) Answer the following: **[16]**

- a) What is phytoremediation? Describe the process with one suitable example.
- b) Describe in detail about bioventing and biosparging.

Q11) Describe in detail about Degradation of pesticide by using any microorganism. Can microorganisms degrade toxins explain with examples of microbes and toxins. **[18]**

OR

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

- a) What is bioreactor? Describe the working principle and role of suspended bioreactor in waste water treatment.
- b) Describe the advantages and limitations of fixed biofilm reactors membrane.



Total No. of Questions :10]

SEAT No. :

P3049

[Total No. of Pages :2

[5059] - 366

B.E. (BIOTECHNOLOGY)

Bio-Therapeutics Technology

(2008 Course) (Semester - I) (Elective - I) (415461)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Both sections compulsory.*
- 2) *Draw diagrams wherever necessary.*
- 3) *Maximum marks for each questions is given in brackets.*

SECTION - I

Q1) What are biopharmaceuticals? Giving examples describe two major classes of biotherapeutics. Compare and contrast Biologic and traditional pharmaceutical drugs. **[18]**

OR

Q2) With the help of flow chart give overview of pre-clinical studies in drug discovery. **[18]**

Q3) Discuss the advantages and disadvantages of using different host and vector systems for production of biotherapeutics. **[16]**

OR

Q4) Describe methods of transfection in mammalian cell line and transfer of recombinant plasmids in bacterial cells. **[16]**

Q5) What are monoclonal antibodies? With the help of flowchart describe the process of production of MAb. **[16]**

OR

P.T.O.

Q6) Discuss the use of transgenic plants as source of recombinant biopharmaceuticals. [16]

SECTION - II

Q7) Describe in detail decontamination and sanitation and Generation of water for biopharmaceutical processing. [16]

OR

Q8) Attempt ANY TWO (8 marks each):

- a) QC tests for impurity detection. [8]
- b) CDS [8]
- c) Pyrogen testing [8]

Q9) Write short notes on ANY TWO (8 marks each): [16]

- a) Slow release drug delivery systems.
- b) Accelerated stability.
- c) Nanoparticles for drug delivery.

Q10) Write notes on any TWO of following (9 marks each): [18]

- a) Hierarchical structure in Indian biotechnology.
- b) Phase 1 Clinical Trial
- c) IPR
- d) GMP



Total No. of Questions : 12]

SEAT No. :

P3050

[5059]-367

[Total No. of Pages : 2

B.E.(Biotechnology)

BIOENERGY AND RENEWABLE RESOURCES

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

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1or Q2,Q3or Q4,Q5or Q6,Q7or Q8, Q9or Q10,Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

SECTION-I

Q1) a) Write down the principle, advantages and disadvantages of the following. **[10]**

- i) Photovoltaic
 - ii) Hydrogen energy system
- b) What are the advantages and limitations of renewable energy sources?**[8]**

OR

Q2) Write down the principle, advantages and disadvantages of the following[18]

- a) Fuel Cells
- b) Geothermal energy& Tidal Energy

Q3) a) What are the various methods of tidal power of generation? Explain each briefly. **[8]**

- b) What are advantages and disadvantages of wind energy conversion system? **[8]**

OR

Q4) a) Enlist limitations of flashed steam system **[8]**

- b) What is the basic principle of wind energy conversion system, explain briefly. **[8]**

Q5) a) With the help of neat sketch describe solar heating system using water heating solar collector, Give it's advantages and disadvantages. **[10]**

- b) Describe passive solar space heating system. **[6]**

OR

P.T.O.

- Q6)** a) Describe briefly possibilities of utilizing following method of power generation [10]
- i) Solar cookers
 - ii) Solar distillation
- b) Describe briefly the different methods of producing hydrogen from solar energy. [6]

SECTION-II

- Q7)** a) Describe the methods used to treat fatty acids in vegetable oil during biodiesel production. [9]
- b) What are the steps involved in biodiesel production at industrial level? Explain with a neat flow chart. [9]

OR

- Q8)** a) Explain transesterification process and problems faced while implementing at industrial level. [9]
- b) Write a brief note on biomass and biogas. [9]
- Q9)** a) What is detoxification? Enlist the various methods of detoxification and explain any two methods in detail. [8]
- b) Explain any two challenges in lignocelluloses to ethanol production process [8]

OR

- Q10)** Describe the process of biobutanol production. What are the different methods for removal of butanol from broth? [16]
- Q11)** a) How are biogas plants classified, explain each briefly with a diagram. [8]
- b) Enlist and briefly describe main design consideration for optimum size biogas plant. [8]

OR

- Q12)** What is biogas? Describe the anaerobic process of biogas production Illustrate the advantages of anaerobic digestion and the factors affecting generation of gas. [16]



Total No. of Questions : 12]

SEAT No. :

P3051

[5059]-368

[Total No. of Pages : 2

B.E. (Biotechnology)

BIOMATERIALS

(2008 Pattern)(Elective-II)(Semester-I) (415462)

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.*

SECTION-I

Q1) What are medical fibers? Name and explain processes for preparation of biofibers with its application and importance. **[16]**

OR

Q2) Explain production of L-homophenylalanine using membrane bioreactor. **[16]**

Q3) What are the different classes of polymers? Describe methods of polymerization and Draw structures of following polymers. **[16]**

PMMA

PTFE

Cellulose

Polyethylene

PVC

OR

Q4) Write are various types and properties of metals which are being used during implants? Explain processing steps involved for metallic implant device with one case study. **[16]**

Q5) Explain the properties and biomedical applications of three natural polysaccharides. **[18]**

OR

P.T.O.

- Q6)** a) Describe the synthesis of polylactic acid starting from lactic acid highlighting the intermediate products. [9]
b) Discuss the biomedical application of Pullulan in targeted drug delivery. [9]

SECTION-II

Q7) What is a biocatalyst? Explain in detail application of biocatalyst in production of aromatic precursors with one suitable case study? [16]

OR

Q8) What are PHA and PHB? Discuss in detail production of PHA with its applications. [16]

Q9) Write a short note on: (Any Three) [18]

- a) Dental implants
- b) Porous materials
- c) Ceramics
- d) Nanobiomaterials

OR

Q10) Explain the optical properties of quantum dots and enumerate their applications in biomedicine. [18]

Q11)a) What are the characteristics of bioadhesives? Describe various applications of bioadhesives. [8]

- b) How can we use stress strain diagram in selecting the most appropriate materials for orthopedic biomaterials. [8]

OR

Q12) What is a biomaterial? Define biocompatibility and host response with examples? Name some types of materials with its applications? [16]



Total No. of Questions : 12]

SEAT No. :

P3052

[5059]-369

[Total No. of Pages : 2

B.E(Biotechnology)

**STEM CELL BIOLOGY AND REGENERATIVE MEDICINE
(2008 Course)(End Semester)(Semester-I) (415462C)(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 answer- books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION-I

Q1) Describe the in detail with suitable examples how regenerative medicine is practiced. **[18]**

OR

Q2) What are stem cells? Why are they so important in the organism's life? Which are the different properties of stem cells which can be harnessed for the betterment of human life? **[18]**

Q3) Write a note on lineage tracing technique in identification of stem cells. **[16]**

OR

Q4) How is the DNA sequencing carried out? What is the difference in the sequencing technique of microorganism and that of Human? **[16]**

Q5) Explain what Embryonic stem cells are. How are they isolated, what are the growth factors and other requirements to keep them as ESCs. **[16]**

OR

Q6) How are hematopoietic stem cells isolated and cultured? **[16]**

SECTION-II

Q7) Describe in brief the guidelines laid down by the government for stem cell research in India. **[18]**

OR

P.T.O.

Q8) How is the stem cell research categorised in India? What are the guidelines for stem cell banking and distribution of Human Embryonic Stem Cells? [18]

Q9) Explain how the stem cell research can help in curing of the wounds caused due to burns? [16]

OR

Q10) Discuss and comment on the use of stem cells for the treatment of Parkinsons disease. [16]

Q11) Describe in detail how tissue engineering is helping generate tissues which are lost due to wounds and burn injuries. [16]

OR

Q12) Write a note on gene therapy. [16]



Total No. of Questions : 12]

SEAT No. :

P1789

[Total No. of Pages : 4

[5059]-37

B.E. (Mechanical)

TRIBOLOGY

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) State applications of Tribology in industry. [6]
b) Write comparison of sliding and rolling contact bearing. [6]
c) State desirable properties of lubricants. [4]

OR

- Q2)** a) What is additives. Explain the different additives used to improve the properties of lubricating oils. [8]
b) An oil of viscosity of 62 cp and relative density of 0.75 is used for lubrication. Convert the viscosity in cSt, SUS. [4]
c) Explain multi grade oil. What do you understand by 10W/30 motor oil. [4]
- Q3)** a) What is stick-slip friction. [4]
b) Discuss any three friction measuring methods. [6]
c) Show that adhesive wear rate is proportional to load and inversely proportional to hardness of two rubbing material. [6]

P.T.O.

OR

- Q4)** a) Using modified adhesion theory of friction, show that the coefficient of friction due to adhesion is 0.2886. (Assume material strength ratio, $K = 0.5$). [8]
- b) Explain in brief, factors affecting wear rate. [8]

- Q5)** a) Derive two dimensional Reynold's equation with usual notations. State the assumptions made in the equation. [12]
- b) What is tilting pad thrust bearing. Explain hydrodynamic action in fixed pad thrust bearing. [6]

OR

- Q6)** Following data is given for 360°C hydrodynamic bearing. (refer Table1) [18]

Radial load : 10KN

Journal speed: 1450 rpm

$l/d = 1$

Bearing length = 50 mm

Radial clearance = 20 microns

Eccentricity = 15 microns

Specific gravity of lubricant = 0.86

Specific heat of lubricant = 2.09 KJ/Kg°K

Calculate:

- i) Minimum oil film thickness;
- ii) Coefficient of friction;
- iii) Power lost in friction;
- iv) Viscosity of lubricant in cp;
- v) Total flow rate of lubricant in l/min;
- vi) Side leakage;
- vii) Average temperature, if make up oil is supplied at 30°C

Table:1

l/d	h_o/C	ϵ	S	$(r/c)f$	$Q/rcnsl$	Q_s/Q	P_{max}/P
1.0000	0.0000	1.0000	0.0000	0.0000	0.0000	1.000	0.000
	0.0300	0.9700	0.00474	0.5140	4.8200	0.973	6.579
	0.1000	0.9000	0.0188	1.0500	4.7400	0.919	4.048
	0.2000	0.8000	0.0466	1.7000	4.6200	0.842	3.195
	0.4000	0.6000	0.1210	3.2200	4.3300	0.680	2.409
	0.6000	0.4000	0.2640	5.7900	3.9900	0.497	2.066
	0.8000	0.2000	0.6310	12.8000	3.5900	0.280	1.890
	0.9000	0.1000	1.3300	26.4000	3.3700	0.150	1.852
	1.0000	0.0000	∞	∞	3.1420	0.000	0.000

SECTION - II

- Q7)** a) Explain squeeze-film effect in case of circular plate approaching a plane. [6]
 b) Derive expression for flow rate through rectangular slot. Also state the assumptions while deriving the equation. [12]

OR

- Q8)** a) A step bearing supports the vertical shaft of a turbo-generator. The recess diameter to shaft diameter ratio is 0.6 and supply pressure is 5MPa. The thrust load is 400 KN. The shaft rotates at 800 rpm. If the viscosity of oil is 30 cp, Calculate optimum oil-film thickness to be maintained so that the total power loss in the bearing is minimum. [12]
 b) Discuss different type of energy losses in hydrostatic bearings. [6]

- Q9)** a) Explain lubrication requirements in case of [10]
 i) Rolling operation
 ii) Forging operation
 iii) Drawing operation
 iv) Extrusion

- b) Explain the principle of Elasto-hydrodynamic lubrication. State the applications. [6]

OR

Q10)a) Explain principle of air bearing. [4]

b) Write the merits and demerits of Gas lubrication. [6]

c) How elasto-hydrodynamic lubrication differ from hydrodynamic lubrication. [6]

Q11)a) Explain the general characteristics of superficial layers obtained by matching, strengthening and weakening of superficial layers. [8]

b) Write notes on : [8]

i) Cladded coating

ii) Crystalling Coating.

OR

Q12)a) Explain the concept and scope of Surface Engineering. [4]

b) Write short notes on following : [12]

i) Diffusion

ii) Hot dip coating

iii) Metal Spraying



Total No. of Questions :12]

SEAT No. :

P3053

[5059]-370

[Total No. of Pages :2

B.E.(Biotechnology)

BIOPROCESS MODELING AND SIMULATION
(2008 Course) (Semester-II) (415469)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.

SECTION-I

Q1) What is model building? Explain four phases of model building with a neat sketch. [16]

OR

Q2) Define and explain: [16]

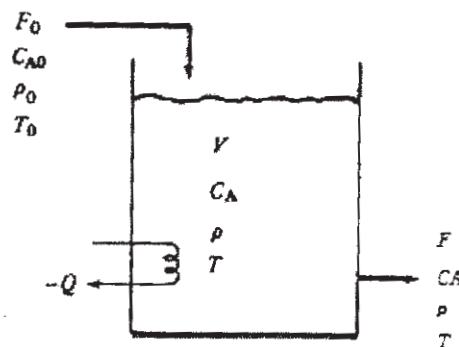
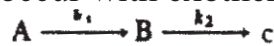
- a) Process Model
- b) Simulation of a model
- c) Mathematical modeling
- d) Linear model

Q3) Write short notes on. [18]

- a) Equation of state.
- b) Activity Coefficient

OR

Q4) Write the modelling equations for the CSTR in which consecutive first order reactions occur with exothermic heats of reaction λ_1 and λ_2 . [18]



P.T.O.

Q5) Write a brief note on “Boundary conditions”. Give suitable examples. What are the advantages of using boundary conditions? [16]

OR

Q6) How do you classify models based on the state of the process? Explain in detail. [16]

SECTION-II

Q7) In a chemostat with cell recycle, the feed flow rate and culture volumes are $F=100\text{ml/hr}$ and $V = 1000 \text{ ml}$ respectively. The system is operated under glucose limitation, and the yield coefficient, $Y_{x/s}^M$, is $0.5 \text{ gdw cells/g substrate}$. Glucose concentration in the feed is $S_0=10\text{g glucose/l}$. The kinetic constants of the organisms are $\mu_m = 0.2 \text{ h}^{-1}$, $K_s = 1 \text{ g glucose/l}$. The value of C is 1.5 , and the recycle ration is $\alpha=0.7$. The system is at steady state. [18]

- Find the substrate concentration in the recycle stream (S).
- Find the specific growth rate (μ_{net}) of the organisms.
- Find the cell (biomass) concentration in the recycle stream.
- Find the cell concentration in the centrifuge effluent (X_2).

OR

Q8) Write a short note on modeling of a continuous culture. [18]

- Q9)** a) Define the following terms. [8]
- MLSS
 - F/M
 - SVI
 - Sloughing
- b) Distinguish between Trickling bed filters and Activated sludge systems. [8]

OR

Q10) Write short notes on the following. [16]

- Agitated Bioreactor
- Sparged Bioreactor.

Q11) Model a gravity tank system with proper assumptions and a neat sketch. [16]

OR

Q12) Model Multi component Batch distillation columns. [16]



Total No. of Questions : 12]

SEAT No. :

P3054

[5059]-371

[Total No. of Pages : 2

B.E.(Biotechnology)

**PLANT ENGINEERING AND PROJECT COSTING
(2008 Pattern) (Semester - II) (415470)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answers Q1 or 2, Q3 or 4, Q 5 or 6 from section I and Q 7or 8, Q9 or 10, Q11 or 12 from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION-I

- Q1)** a) Explain the steps by which a biochemical plant design project moves to completion. [8]
b) Discuss about the importance of process flow diagram preparation. [8]

OR

- Q2)** a) Draw a neat P & ID of any one process equipment. [8]
b) Discuss in details about qualitative and quantitative type of process flow diagram. [8]

- Q3)** a) Explain in detail the different factor affecting process selection. [8]
b) Draw a flow diagram illustrating hierarchical process. [8]

OR

- Q4)** a) Explain the check list for safe plant design. [8]
b) Prepare a plant layout of any biodiesel plant having enzymatic process.[8]

- Q5)** a) Discuss the different steps of process piping design. [9]
b) Explain the procedure of biodiesel plant to prepare a bill of material.[9]

OR

P.T.O.

- Q6)** a) Discuss the capacity estimation and economic factors for various utilities. [9]
 b) Discuss colour codes used for transportation of fluids in plant. [9]

SECTION-II

- Q7)** a) Write short note on pipe sizing. [6]
 b) Explain the different factors affecting on fixed capital and working capital? [12]

OR

- Q8)** a) A company manufacturing plant and equipment for Glycerol manufacturing plant is quoting a tender. The delivery date is fixed. The project manager has listed down the activities in project as under: [10]

Sr.No	Activity	Immediate Precedence Activity	Activity time in week
1	A	-	1
2	B	-	4
3	C	A	5
4	D	A	6
5	E	C	7
6	F	D	8
7	G	B	9
8	H	E,F,G	2

Develop the network. Calculate time estimates, Identify the critical path.

- b) Discuss about CPM and PERT technique. [8]
Q9) Explain each in brief the methods for raising finance. [16]

OR

- Q10)**a) Write note on: [8]
 i) Discount factor and
 ii) Capital recovery factor.
 b) Explain the various methods for the determination of depreciation? [8]

- Q11)** Discuss in detail about: [16]
 a) Sinking fund and
 b) Current value

OR

- Q12)**a) Discuss the different practical factors used in alternative- Investment and replacement analysis? [8]
 b) Explain in detail about Junk value, replacement value. [8]



Total No. of Questions : 12]

SEAT No. :

P3055

[5059]-372

[Total No. of Pages : 2

**B.E.(Biotechnology)
FOOD BIOTECHNOLOGY**

(2008 Course)(Elective-III)(Semester-I) (415467A)

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 indicat full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION-I

Q1) How are biotechnology techniques used in commercial food industry? Describe various processes which make use of these techniques. **[16]**

OR

Q2) What are the intrinsic and extrinsic factors affecting spoilage in foods? Explain in detail. **[16]**

Q3) Explain the technique of Modified Atmosphere Packaging in detail. What are its advantages and applications? **[18]**

OR

Q4) Explain the following processes in detail: **[18]**

- a) High pressure cooking
- b) Food irradiation

Q5) Explain the design and working of: **[16]**

- a) Freezer
- b) Dryer

OR

P.T.O.

Q6) a) What is thermal death kinetics of micro-organisms? Explain in brief the following: [8]

i) Thermal Death Time

ii) D value

iii) Z value

b) Pooled raw milk at the processing plant has bacterial population of 4×10^5 /mL. It is to be processed at 79°C for 21 seconds. The average D value at 65°C for the mixed population is 7 min. The Z value is 7°C . How many organisms will be left after pasteurization? What time would be required at 65°C to accomplish the same degree of lethality? [8]

SECTION-II

Q7) What are microbial polysaccharides? State different micro organisms having ability to produce edible polysaccharides. Explain applications of these polysaccharides in food. [16]

OR

Q8) Write a note on microbial production of oils and fats. [16]

Q9) Explain the use of enzymes in beer mashing and chill proofing. [18]

OR

Q10) Explain the classes of industrially important enzymes used in food industries. [18]

Q11) What are the different waste disposal methods? Explain in brief. [16]

OR

Q12) Explain in brief the following treatments: [16]

a) Activated sludge process

b) Anaerobic processes for treatment of food waste.



Total No. of Questions : 12]

SEAT No. :

P3056

[5059]-374

[Total No. of Pages : 2

B.E.(Biotechnology)

INTRODUCTION TO SYSTEMS BIOLOGY

(2008 Course)(Elective-III)(Semester-II)(End Semester) (415467)

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

SECTION-I

Q1) What is Human Genome Project? What impact it has had on medicine and research? **[18]**

OR

Q2) How mathematical modeling is used in systems biology research? What is the significance and how does it aid in research, explain with an example. **[18]**

Q3) Explain: **[16]**

- a) Shotgun sequencing method
- b) Sanger's sequencing method

OR

Q4) What was the strategy used in Human Genome sequencing, describe the entire procedure. **[16]**

Q5) Write in brief about Comparative Genomics what are the applications. **[16]**

OR

Q6) How is genome annotation done? Explain the procedure. What is the significance? **[16]**

P.T.O.

SECTION-II

Q7) What are epigenetic modifications? Explain with respect to cancer. [18]

OR

Q8) Write notes on: [18]

- a) Epigenetics and diseases (any 2 diseases in details)
- b) Techniques to study epigenomics

Q9) How can pharmacogenomics approach be used to increase the efficacy of traditional medicine? Explain with an example. [16]

OR

Q10) Answer the following: [16]

- a) Describe slow and fast metabolizing drugs, giving examples.
- b) What is Toxicogenomics?

Q11) What are the different types of methodologies used for the proteomics studies and protein protein interactions? [16]

OR

Q12) Describe with a diagram the working of a mass spectrometer and give its applications. [16]



Total No. of Questions : 12]

SEAT No. :

P3057

[5059]-376

[Total No. of Pages : 4

B.E.(Biotechnology)
IPR, BIOETHICS AND REGULATIONS
(2008 Course)(Elective-IV)(Semester-I)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q1 or Q 2, Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10, Q11 or Q12 .*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Answers 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) Enlist the general principles laid down by ICMR for research using the human beings as participants. Describe any two in detail. **[18]**

Q3) What are the ethical issues involved in the use of genetic technology in agriculture. Describe the effect of this on environment. **[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 banned from a five-mile stretch of the scenic water way. 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

P.T.O.

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 regulator measures target only one possible source, the regulations might unfairly cause producers to go out of 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 is patent cooperation treaty(PCT)? Who coordinates the activities of PCT? What is the need for PCT? Describe the functions of PCT. [16]

OR

Q6) Answer the following [16]

- a) What are the conditions to be satisfied by an invention to be patentable?
- b) What are the types of inventions which are not patentable in India?

SECTION-II

Q7) Explain in detail about **[18]**

- a) Copyright registration
- b) Domain name and its registration

OR

Q8) Write a short note on **[18]**

- a) Benefits of Trademark Registration.
- b) Trade secret

Q9) Answer the following **[16]**

- a) Functions of drugs controller general(India)DCGI
- b) Hierarchy for biotechnology in India

OR

Q10) What is trade mark act 1999? What does trademark indicate? What does a trademark guarantees? What is the significance of trademark? **[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) Differentiate between **[16]**

- a) Phase I and II clinical trial
- b) Import and export of good



Total No. of Questions : 12]

SEAT No. :

P3058

[5059]-377

[Total No. of Pages : 2

B.E.(Biotechnology)

INDUSTRIAL ORGANIZATION AND MANAGEMENT

(2008 Pattern)(Elective-IV)(Semester-II) (415468)

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 or 10, Q11 or 12 from section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) Explain in detail functional approach management. [8]

b) Explain Management By Objectives. [8]

OR

Q2) a) Explain cooperative societies in detail. [8]

b) What are the various functions of managers in an organization? Explain. [8]

Q3) a) Write a note on Industrial dispute. [8]

b) Explain the selection process in a large scale biochemical industry. [8]

OR

Q4) a) Explain in detail classification of Job Evaluation. [8]

b) Write a detail note on Trade Unions. [8]

Q5) a) What is inventory built up? Explain in detail A-B-C policy and its objectives. [9]

b) State various functions of purchase department. [9]

OR

P.T.O.

- Q6)** a) A fertilizer company needs 700 units of consumables as annual requirement ordering one month usage time. Each consumable costs Rs.170/-, the ordering cost per order is Rs.40/-. inventory carrying cost per year is 18% per year. Suggest economical purchasing policy for the company. What advice one should offer and how much would be annual saving. [12]
- b) Write notes on: [6]
- i) Bin Cards and
- ii) Stores Ledger

SECTION-II

- Q7)** a) Explain each channel of distribution with an appropriate example. [9]
- b) Write an explanatory note on Marketing Mix. [9]

OR

- Q8)** a) Give various roles and advantages of advertising in marketing. [9]
- b) Explain any two Pricing Strategies in detail. [9]
- Q9)** a) Explain the role of International Trade in supporting economic growth of Developing Countries. [8]
- b) Write an explanatory note on Total Quality Management(TQM). [8]

OR

- Q10)**a) Explain the role of Quality Circles for Quality Management of a process industry. [8]
- b) Explain any two duties related to Import and Export of goods. [8]
- Q11)**a) Explain the various types of Contract according to enforceability, formation and performance. [8]
- b) Write note Monopolies Restrictive Trade Practices (MRTP) [8]

OR

- Q12)**a) Discuss on: SIMO charts. [8]
- b) Explain the term Agreement in Contract Act. [8]



Total No. of Questions : 12]

SEAT No. :

P1790

[Total No. of Pages : 3

[5059]-38

B.E. (Mechanical Engineering)
AUTOMOBILE ENGINEERING
(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) What is chassis? Compare conventional chassis frame with frameless type chassis frame. [8]
- b) Explain with neat sketch layout of a four wheel drive. [8]

OR

- Q2)** a) What are vehicle specifications? Describe specification of any one light motor vehicle of your choice. [8]
- b) Explain the various sections used for side members and cross members of chassis frame. [8]

- Q3)** a) How do you classify clutches? Explain with neat sketch operation of electromagnetic clutch. [8]
- b) Explain the working of synchromesh gear box with the help of neat sketch. Also state its advantages & Disadvantages. [8]

OR

- Q4)** a) Explain the fluid flywheel with neat sketch? [8]
- b) Explain with neat sketch the function of differential in rear axle. [8]

P.T.O.

- Q5)** a) Write the purpose and requirement of front axle. [6]
b) Explain with neat sketch construction of stub axle and wheel mounting. [6]
c) Sketch recirculating ball type steering gear and explain its working. [6]

OR

- Q6)** a) Explain with neat sketch construction and working of collapsible steering. [6]
b) How are the tyres classified? What are the advantages of tubeless tyre over tubed tyre. [6]
c) Explain wheel alignment and wheel balancing in details. [6]

SECTION - II

- Q7)** a) What is interconnected suspension? Sketch and describe in briefly. [9]
b) Explain air brake system in detail. Also state its advantages over hydraulic brake system. [9]

OR

- Q8)** a) Explain ABS brake system in detail. Also state its advantages over other braking system. [9]
b) Explain Hydro gas suspension system in details. Also state its advantages and other brake system. [9]

- Q9)** a) Explain with neat sketch charging system used in automobiles. [6]
b) Explain with neat sketch lead acid battery. [5]
c) Explain with neat sketch wiper mechanism. [5]

OR

Q10) Write short notes on any Four : [16]

- a) Hybrid Drives
- b) Vehicle starting system
- c) Electronic stability control
- d) Sensors and actuators
- e) Dash board instruments

Q11) Write short notes on any Four :

[16]

- a) Vehicle safety
- b) Seat belts
- c) Vehicle interior
- d) Vehicle performance curve
- e) Air bags

OR

Q12)a) Explain different vehicle body moments.

[8]

b) Necessity of NVH analysis in Automobiles, explain in details.

[8]



Total No. of Questions : 12]

SEAT No. :

P2113

[5059]-40

[Total No. of Pages : 6

B.E. (Mechanical Engineering)

QUANTITATIVE AND DECISION MAKING TECHNIQUES

(Theory) (2008 Pattern) (402045C) (Elective - II) (Semester - I)

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

UNIT-I

- Q1) a) Explain :** **[6]**
- i) Pure and Mixed Strategies
 - ii) Dominance Rules
- 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	I
	II	3	4	2	4	II
	III	4	2	4	0	III
	IV	0	4	0	8	IV

OR

P.T.O.

- Q2) a)** Explain the steps in Decision Theory Approach. [6]
- b)** Solve the following (2×3) game by graphical method & find the optimum strategies & value of game. [10]

		B			
		y_1	y_2	y_3	
		I	II	III	
A	X_1	1	3	11	I
	$1 - X_1$	8	5	2	II

UNIT - II

- Q3) a)** Distinguish between slack, surplus & artificial variable. [6]
- b)** Solve L.P.P. by Simplex Method. [10]

Maximize: $Z = 2x_1 + 3x_2 + 10x_3$

Subject to $x_1 + 2x_3 = 0$

$x_2 + x_3 = 1$

$x_1, x_2, x_3 \geq 0$

OR

- Q4) a)** Explain assumptions in Linear Programming Models. [6]
- b)** A Firm uses lathes, milling machines and grinding machines to produce two machine parts. Table represents the machining times required for each part, the machining times available on different machines and the profit on each machine part. [10]

Types of Machine	Machining time required for the machine part (minutes)		Maximum time available per week (minutes)
	I	II	
Lathes	12	6	3,000
Milling Machines	4	10	2,000
Grinding Machine	2	3	900
Profit per unit	Rs.40	Rs.100	

Find the number of parts I and II to be manufactured per week to maximize the profit.

UNIT - III

- Q5) a)** Discuss the similarities & difference between the transportation & assignment problem. **[6]**
- b) Find the optimum solution the following transportation problem in which the cells contain the transportation cost in rupees. **[12]**

	W ₁	W ₂	W ₃	W ₄	W ₅	Available
F ₁	7	6	4	5	9	40
F ₂	8	5	6	7	8	30
F ₃	6	8	9	6	5	20
F ₄	5	7	7	8	6	10
Required	30	30	15	20	5	100(Total)

OR

- Q6) a)** What is the unbalanced assignment problem? How it is solved by Hungarian Method? **[6]**
- b) A car hire company has one car at each of five depots a, b, c and e. A customer require a car in each town, namely A, B, C, D and E. Distance (in kms) between depots (origins) are given in the following distance matrix. **[12]**

	a	b	c	d	e
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

How should car be assigned to customers so as to minimize the distance travelled?

SECTION - II

UNIT - IV

Q7) a) Explain assumptions and limitations of Queuing model. **[6]**

b) In the central railway station 15 computerised reservation counters are available. A customer can book his/her ticket in any train on any day in any one of these computerised reservation counters. The average time spent per customer by each clerk is 5 minutes. Average arrival per hour during three types of activity periods have been calculated and customers have been surveyed to determine how long they are willing to wait during each type of period. **[10]**

Type of period	Arrivals/hr	Customer's acceptable waiting time
Peak	110	15 minutes
Normal	60	10 minutes
Low	30	5 minutes

Making suitable assumptions on this queuing process, determine how many counters should be kept open during each type of period.

OR

Q8) a) Explain Monte Carlo Simulation with applications. **[6]**

b) On the average 96 patients per 24-hour day require the service of an emergency clinic also on the average a patient requires 10 minutes of active attention. Assume that the facility can be handled only one emergency at a time. Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average servicing time of 10 minutes, and that each minute of decrease in this average time would cost the clinic Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from $1\frac{1}{3}$ patients to $\frac{1}{2}$ patient?

[10]

UNIT - V

- Q9) a)** Explain Pay Back Period method and IRR method. [6]
- b) A plant is manufacturing 3000 heavy duty lathes per year and is operating at 75% of its capacity. The annual sales return is Rs. 1,05,00,000. The fixed cost of the plant is Rs. 40,00,000 and variable cost is Rs. 4,150 per unit. There is proposal to utilize spare capacity by the manufacturing precision lathes which would increase fixed cost by Rs. 8,00,000 but reduce the variable cost by Rs. 750 per unit. [10]
- i) Is the proposal economical? Give reason for your answer.
- ii) If a reduction in selling price by Rs. 500 per unit requires the plant to be run at 90% of its capacity to break-even, would this be a better proposal than earlier one?

OR

- Q10)a)** Describe the replacement of items that fail suddenly. [6]
- b) A taxi owner estimates from his past records that the costs per year for operating a taxi whose purchase price when new is Rs. 60,000 are as given below. [10]

Age	1	2	3	4	5
Operating Cost(Rs.)	10,000	12,000	15,000	18,000	20,000

After 5 years, the operating cost is Rs. 6,000 K, where $K = 6,7,8,9,10$ (K denoting age in years). If the resale value decreases by 10% of purchase price each year, what is the best replacement policy?

UNIT - VI

- Q11)a)** Differentiate between CPM and PERT. [6]
- b) A project has a following time schedule:

Activity	Time in months	Activity	Time in months
(1-2)	2	4-6	3
(1-3)	2	5-8	1
(1-4)	1	6-9	5
(2-5)	4	7-8	4
(3-6)	8	8-9	3
(3-7)	5		

Construct PERT network and compute :

- i) Total float for each activity.
- ii) Critical path and its duration.

Also find the minimum number of cranes the project must have for its activities 2-5, 3-7 and 8-9 without delaying the project. Then, is there any change required in PERT network? If so indicate the name. [12]

OR

Q12)a) Explain Dynamic Programming. [6]

b) A project has the following characteristics: [12]

Activity	Most Optimistic Time (a)	Most Pessimistic Time (b)	Most Likely Time (m)
(1-2)	1	5	1.5
(2-3)	1	3	2
(2-4)	1	5	3
(3-5)	3	5	4
(4-5)	2	4	3
(4-6)	3	7	5
(5-7)	4	6	5
(6-7)	6	8	7
(7-8)	2	6	4
(7-9)	5	8	6
(8-10)	1	3	2
(9-10)	3	7	5

Construct PERT network. Find the critical path and variance for each event. Find the project duration at 95% probability.



Total No. of Questions : 12]

SEAT No. :

P1791

[Total No. of Pages : 4

[5059] - 41
B.E. (Mechanical) (Semester - II)
POWER PLANT ENGINEERING
(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) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss the role and participation of private sector and Government sector in development of power sector in India. **[8]**
- b) The peak load on a power plant is 60MW. The loads having maximum demands of 30MW, 20MW, 10MW and 14MW are connected to the power plant. The capacity of power plant is 80MW and the annual load factor is 0.50. Estimate (i) the average load on the power plant, (ii) the energy supplied per year. (iii) the demand factor, (iv) the diversity factor. **[8]**

OR

- Q2)** a) Discuss in details the various factors which must be considered in selecting a site for steam power plant. **[5]**
- b) Explain the term load shedding with details. **[5]**
- c) A thermal power plant of 210MW capacity has the maximum load of 160MW. Its annual load factor is 0.6. The coal consumption is 1kg per kWh of energy generated and the cost of coal is Rs. 450.00 per tonne. Calculate (i) the annual revenue earned if energy is sold at Rs. 1 per kWh and (ii) the capacity factor of the plant. **[6]**

P.T.O.

- Q3)** a) Explain construction and working of fluidized bed combustion system for power plant. [5]
- b) Draw a chart showing operations and devices used in coal handling plant. [5]
- c) The following readings were taken during a test on a surface condenser:
 Mean condenser temperature = 35°C, Hot well temperature = 30 °C, condenser vacuum = 69 cm Hg. Condensate collected I 6 kg/mm. Cooling water enters at 20 °C and leaves at 32.5 °C, flow rate being 37500 kg/h. Calculate (i) mass of air present per cubic meter of condenser (ii) quality of steam at condenser inlet, (iii) vacuum efficiency, and (iv) condenser efficiency. [6]

OR

- Q4)** a) Discuss the principle of operation of overfeed and underfeed stokers with the help of simple diagrams. [5]
- b) Explain the principle of working of electro static dust collector with the help of a neat diagram. [5]
- c) In a cogeneration plant, the power load is 5.6MW and the heating load is 1.163MW. Steam is generated at 40bar and 500°C and is expanded isentropically through a turbine to a condenser at 0.06bar. The heating load is supplied by extracting steam from the turbine at 2 bar, which condensed in process heater to saturated liquid at 2 bar and then pump back to the boiler. Compute (i) the steam generation capacity of the boiler in t/h, (ii) the heat input to the boiler in kW, (iii) the fuel burning rate of the boiler in t/h if a coal of calorific value 25MJ/kg is burned and the boiler efficiency is 88%, (iv) the heat rejected to the condenser, (v) the rate of flow of cooling water in the condenser if the temperature rise of water is 6 °C. Neglect pump work [6]
- Q5)** a) What do you mean by (i) hydrograph (ii) flow duration curve and (iii) power duration curve? What is primary power and secondary power?[6]
- b) Explain with the neat sketch the governing principle of an impulse turbine, What are the function of needle valve and the deflector. [6]
- c) What are the topographical and other conditions decide the setting of turbine either vertical or horizontal (i) in case of reaction turbine (ii) in case of pelton turbine. [6]

OR

- Q6)** a) State the function of dam. How dams classified? Briefly describe the few important types of dams. How would you select the site and the type of dam? [6]
- b) Explain with a neat sketch the combustion chamber of a gas turbine plant. What are dilution holes? How is flame stabilization secured by (i) a swirler (ii) a bluff body? [6]
- c) A gas turbine power plant consists of two stage compressor and single stage turbine with a regenerator. The air is taken into the compressor at 20 °C and 1 bar. The maximum temperature of the cycle is limited to 700 °C and maximum pressure ratio is 6. The effectiveness of regenerator is 0.7. Assuming the following data, find (i) The air fuel ratio used , (ii) Thermal efficiency of the cycle and (iii) Specific fuel consumption of the plant and fuel consumption per hour. Take: Air flow through the plant is 200kh/ sec. Isentropic efficiency of both compressor is 0.82, Isentropic efficiency of turbine is 0.92, combustion efficiency is 0.96, Mechanical efficiency is 0.96, Generation efficiency is 0.95, Calorific value of fuel used is 35000kJ/kg. Take : $C_p = 1\text{kJ/kgK}$ and $\gamma = 1.4$ for both air and gases . An intercooler is used between the two compressors and assume that there is perfect intercooling. Neglect the heat and pressure losses in the system. [6]

SECTION - II

- Q7)** a) What are the advantages and disadvantages of diesel power plant? Which factors should be considered while selecting a site for a diesel power plant? [8]
- b) What is a CANDU - type reactor? Explain with a sketch its main features. What is a calandria? [8]

OR

- Q8)** a) Why the supercharging is necessary in diesel plant? What are the methods are used for supercharging the diesel engine? What are the advantages of supercharging as fuel consumption and overall efficiency of plant are concerned? [8]
- b) Explain the terms: (i) breeding ratio, (ii) burner,(iii) converter, (iv)doubling. [8]

- Q9)** a) What are the different types of switch gear installation? Discuss their relative merits and demerits. [8]
- b) Explain with a neat sketch the geothermal power plant. [8]

OR

- Q10)** a) Why excitation is necessary for synchronous generator? Draw a neat line diagram used for excitation and explain its working. [8]
- b) What are the recent developments in methods of power generation? and explain fuel cell. [8]
- Q11)** a) What do you mean by 'Thermal pollution'? What is 'Thermal Discharge Index' (TDI) [6]
- b) Explain the meaning of greenhouse effect and how it is related with earth. Explain how CO₂ is responsible for greenhouse effect and why? [6]
- c) Explain the method suggested to reduce pollution. [6]

OR

- Q12)** a) Name important gaseous pollutants discharged by thermal power plants. How are they classified? [6]
- b) Write a short note on, "Thermal Pollution of Water and its control". [6]
- c) What are the different methods used to control NO_x in the flue gases? Explain any two. [6]



Total No. of Questions : 12]

SEAT No. :

P1792

[Total No. of Pages : 5

[5059] - 42
B.E. (Mechanical)
MECHANICAL SYSTEM DESIGN
(2008 Pattern)

Time :4 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) *Answers to the two sections should be written in separate answer book.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Your answer will be valued as a whole.*
- 5) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data, if necessary*
- 7) *Answer any 3 questions from section - I and 3 questions from section-II*

SECTION - I

UNIT - I

- Q1)** a) With neat sketches explain different types of pressure vessel supports[8]
b) A high pressure cylinder consists of steel tube with inner and outer diameters of 45mm and 65mm respectively. It is jacketed by outer steel tube with an outer diameter 85mm. The tubes are assembled by shrinking process in such a way that maximum principal stress induced in any tube is limited to 150N/mm². Calculate the interference pressure and original dimensions of tubes. Assume $E = 207000 \text{ N/mm}^2$. [10]

OR

- Q2)** a) Explain different methods of pre-stressing a cylinder. [6]
b) A cylindrical pressure vessel of 1500mm ID is provided with a nozzle of 330mm inner diameter and 10mm thickness. Protruding lengths of nozzle inside and outside the vessel are 10mm and 40mm respectively and it is made up of seamless tube. The thickness of shell is 20mm. Internal pressure in the shell is 5MPa. The corrosion allowance is 2mm. Permissible tensile stress for shell and nozzle material is 200MPa. Design the dimensions of reinforcing pad if required. The reinforcing material is of same quality as that of the shell and is available in thickness of 18mm. (Assume weld efficiency as 90%) [12]

P.T.O.

Unit - II

Q3) a) Explain the step by step procedure for designing of cylinder of I C engine [6]

b) Determine the dimensions of the cross section of the connecting rod for a diesel engine with following data: [10]

Cylinder bore = 95mm

Length of connecting rod= 350mm

Maximum gas pressure = 4 MPa

Factor of safety = 5

OR

Q4) a) Explain the procedure for designing of crank shaft of I C engine [6]

b) Cylinder of four stroke diesel engine has following specifications:

Cylinder bore = 145mm

Cylinder material =FG200

Maximum gas pressure =3.5 MPa

Factor of safety =6

Poisson's ratio =0.25

Determine thickness of cylinder wall and calculate stresses in the cylinder wall [10]

Unit - III

Q5) A tensile bar of length 600mm is subjected to constant tensile force of 4000N. If the factor of safety is 3, design the bar diameter, using Johnson's method, with the objective of minimizing material weight using optimum material from the list given in Table 1. [16]

Material	Density (ρ) Kg/ m^3	Cost (c) Rs/Kg	Syt N/mm ²
Steel	7800	28	400
Aluminum alloy	2800	132	150
Titanium Alloy	4500	2200	800

Table - 1

OR

- Q6)** a) Explain the method of solving optimum design problem with redundant specifications. [12]
b) Differentiate between optimum and adequate design. [4]

SECTION - II

- Q7)** a) Explain design and natural tolerances. [4]
b) A shaft and hole assembly of nominal diameter 40 mm have following dimensions. **Hole**- Max diameter 40.1 mm; Minimum diameter 40.0 mm; **Shaft**- Max diameter 39.9mm ; Minimum diameter 39.85 mm. Assuming the shaft and hole dimensions are normally distributed determine; [12]
i) the % of assemblies having clearance less than 0.15 mm ; and
ii) the % of assemblies having clearance greater than 0.22 mm

The areas under the standard normal distribution curve from zero to Z are as follows;

Z	1.0	1.1	1.2	1.3	1.4	1.6	1.8	2.0	2.2
Area	.3413	.3643	.3849	.4032	.4192	.4452	.4641	.4772	.4861
Z	2.3	2.4	2.5	2.6	2.8	3.0			
Area	.4893	.4918	.4938	.4953	.4974	.4987			

OR

- Q8)** a) What do you understand by sampling distribution? [4]
b) A straight tensile bar of diameter 10 ± 0.1 mm are made of plain carbon steel 40C8 having tensile yield strength of 330 ± 30 N/mm². The load on the bars is 23.5 ± 5 kN. If the diameters, strength and loads are normally distributed, estimate the reliability of withstanding the load by the bars. (Refer above table for areas under the standard normal distribution curve from zero to Z) [12]

- Q9)** a) Explain various speed laws used in design of machine tool gear box. [6]
b) Explain with neat sketch compound ray diagram. [6]
c) How the nodal sum method is used for selecting optimum structure diagram? [6]

OR

Q10) A three stage twelve speed gear box is to be used in machine tool for spindle speeds ranging between 25 rpm and 1500 rpm. The second stage of gear box consist of three speed steps. If the gear box is driven by 3.7 kW,750 rpm electric motor through the belt drive: [18]

- i) Draw the ray diagram and prepare the gearing diagram
- ii) Determine maximum torque acting on shaft

The standard pulley diameters are:

80, 90, 100, 112, 125, 140, 160, 180, 200, 224,250, 280, 290, 300, 310, 355, 375, 400, 450, 500mm

Q11) a) Describe with neat sketch any two types of tension take up systems used for belt conveyors. [6]

b) A triple belt conveyor is required to transport 4 tons of iron ore per hour at a conveyor speed of 3m/sec. If the mass density of iron ore is 2.5 tons/ m^3 Suggest; [10]

- i) The maximum suitable inclination for the conveyor which can be given
- ii) Diameter of the drive pulley.
- iii) Gear box reduction ratio if motor speed is 1440 rpm. Use following data.

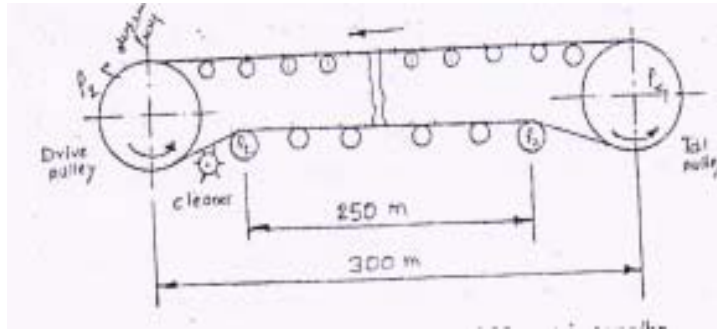
Belt inclination	16-20°	21-25°	26-30°	31-35°
Flowability 'K' factor	2.5×10^{-4}	2.35×10^{-4}	2.20×10^{-4}	2.05×10^{-4}

Material factor for plies for belt $K_1 = 2.0$

Belt tension anr arc of contact factor : $K_2 = 80$

OR

Q12) The following data refers to a belt conveyor for carrying bulk material. [16]



- Capacity of conveyor - 250 metric tons/hr
- Belt speed 1.5 m/sec
- Width of the belt -1200mm
- Belt mass per unit length -18.6kg/m
- Mass of each carrying run idler -30.0kg
- Mass of each return run idler -25.0kg
- Pitch of carrying run idler - 1.0m
- Pitch of return run idler -2.0m
- Friction factor for idlers - 0.02
- Snub factor for snub pulley - 0.03
- Snub factor for drive and tail pulley - 0.06
- Drive and tail pulley diameters - 500mm
- Frictional resistance due to belt cleaner - (100 B)N
Where, B is in meters
- Angle of lap on drive pulley -200°
- Coefficient of friction between belt and drive pulley 0.4
- Drive efficiency -90%
- Motor speed - 1440 rpm

Assuming that the bulk material is carried over length of 300 meters and neglecting resistance at the loading station.

- i) Determine reduction ratio of gear box
- ii) Power required to drive the belt conveyor.



Total No. of Questions : 12]

SEAT No. :

P1793

[Total No. of Pages : 5

[5059]-43

B.E. (Mech.)

COMPUTATIONAL FLUID DYNAMICS
(2008 Pattern) (Semester - II) (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 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) Derive the continuity equation in differential conservation form for a 3-D, unsteady, compressible flow. [12]
- b) Develop 1D, steady state convective - diffusion equation from the generalised energy equation, in partial differential form. Give the justification for cancellation of different term from the energy equation. Also write Boundary conditions. [6]

OR

- Q2)** a) Explain models of flow using control volume & state what are conservation & non-conservation form of equation. [8]
- b) What is substantial derivative? How it is different than ` derivative in differential calculus? [8]
- c) In short explain meaning of 'Divergence of velocity'? [2]

- Q3)** a) Using Taylor's series, derive the first order forward difference, backward difference and central difference approximation for the term $\frac{\partial u}{\partial y}$. [6]

P.T.O.

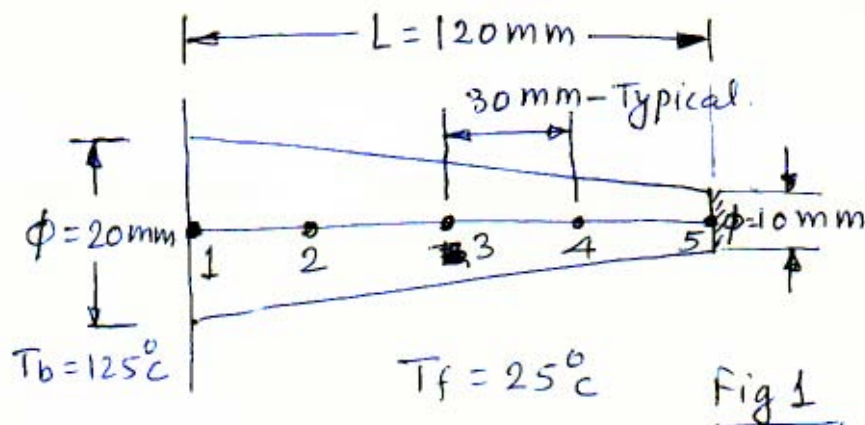
- b) Flow between two plates can be expressed with relation $\mu \frac{\partial^2 u}{\partial y^2} = \frac{\partial P}{\partial x}$

Assuming constant, such that, $\frac{\partial^2 u}{\partial y^2} = 1$; find velocity distribution in a slit

having width of 10 units and upper plate moving at a velocity of 10 units with respect to stationary lower plate. Use 5 nodes for finite differencing. Use Gauss Siedel implicit method. [10]

OR

- Q4) a) Consider steady state heat loss through circular cross-sectioned, tapered in length, fin with temperature of the fin base and the surrounding fluid as $T_b = 125^\circ\text{C}$ and $T_f = 25^\circ\text{C}$ respectively. (Ref. fig. 1) Assume the heat loss from the end face to be negligible. Obtain temperatures of nodes 2, 3, 4, 5.



Assume $k = 1 \text{ w/mk}$ for fin material & $h = 10 \text{ w/m}^2\text{k}$ for the surrounding fluid. Derive the governing equation from the basic energy equation. Use numerical techniques. [12]

- b) What do you understand by the word 'Descritization' in reference to finite difference approach? [4]

- Q5) Two parallel plates extended to infinity are a distance of 40mm apart. The fluid within the plates has kinematic viscosity of $2.17 \times 10^{-4} \text{ m}^2/\text{s}$ and density

of 800 kg/m^3 . The lower plate is stationary and the upper plate is suddenly set in motion in a constant velocity of 40 m/s . Find the velocity distribution within fluid in y direction for one time step (Δt). Use 5 nodes for finite differencing and apply Crank-Nicolson's implicit method. Take $\Delta t = 0.55$. Recall that the governing equation is reduced from Navier - Stokes equation and is given by

$$\rho \frac{\partial u}{\partial t} = \mu \frac{\partial^2 u}{\partial y^2} \text{ with usual notations.} \quad [16]$$

OR

- Q6)** a) What are explicit and implicit approaches used in CFD analysis? State merits and demerits of these approaches. [8]
 b) Explain Thomas Algorithm for solution of Tridiagonal matrix. Solve the following tridiagonal system with Thomas Algorithm to find T_1, T_2, T_3, T_4 . [8]

$$\begin{bmatrix} 2.04 & -1 & 0 & 0 \\ -1 & 2.04 & -1 & 0 \\ 0 & -1 & 2.04 & -1 \\ 0 & 0 & -1 & 2.04 \end{bmatrix} \times \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \end{bmatrix} = \begin{bmatrix} 40.8 \\ 0.8 \\ 0.8 \\ 200.8 \end{bmatrix}$$

SECTION - II

- Q7)** Following 2D equation is valid over the interval

$$0 \leq x \leq 1, 0 \leq y \leq 1, t \geq 0, \frac{\partial T}{\partial t} = \frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} \text{ Initial distribution of } T \text{ at } t = 0 \text{ is}$$

given by,

$$T(x, y, 0) = \sin(2\pi y) * \sin(2\pi x)$$

The value of T over the boundary remains at $T = 0$, for $t > 0$. Find temperature variation using $h = \frac{1}{3}$ along x and y and choosing $\Delta t = \left(\frac{1}{20}\right) \text{S}$. Explain use of 'Alternate Direction Implicit Method' (ADI) for such problem. Find values at intermediate step i.e. $t = \left(\frac{1}{40}\right) \text{S}$. At fixed value in y direction (i.e. j), "sweep"

$$\text{in } x \text{ direction to calculate } T \text{ at } t = \frac{\Delta t}{2}. \quad [16]$$

OR

Q8) Compute the solution of the equation $\frac{\partial u}{\partial t} = -C \frac{\partial u}{\partial x}$, $C = \text{constant} > 0$, for the first two - steps, using

- i) Lax - Wendroff scheme
- ii) Mac - Cormack scheme

With initial condition

$$u(x,0) = \begin{cases} x - x^2, & 0 \leq x \leq 1, \\ 0 & x > 1, \end{cases}$$

and boundary condition $u(0,t) = 0$ for all t , taking $\Delta x = 1/4$ and $r = \frac{C\Delta t}{\Delta x} = \frac{1}{2}$.

[16]

- Q9)** a) Develop the solution methodology for 2D, unsteady Convection-Diffusion equation giving practical example. Explain about the possible boundary conditions. [12]
- b) What is the necessity of using upwind scheme over central difference scheme, in the solution of 1D, steady, Convection- Diffusion equation. [6]

OR

- Q10)** a) Consider a thin rod moving with a velocity 10^{-5} m/s as shown in fig2. The periphery of the rod is perfectly insulated,

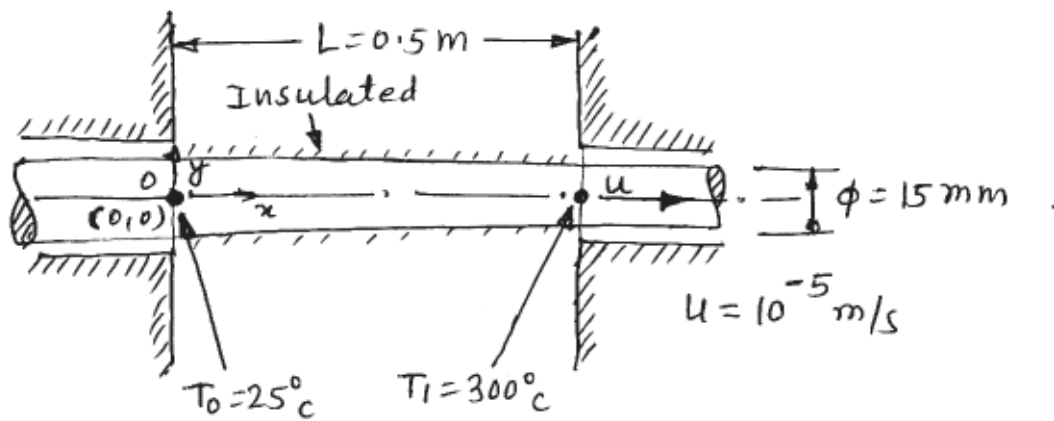


Fig 2

The rod is subjected to a specified temperature $T_0 = 25^\circ\text{C}$ for $x \leq 0$ and $T_1 = 300^\circ\text{C}$ for $x \geq L$.

Model the domain into 4 elements and find the temperature of rod at the node points. You may assume the governing equation as 1D, steady state, Convection-Diffusion equation. Solve using upwind difference approach. Derive the formulae used for finding the solution. Assume

$$\alpha = 10^{-5} \text{ m}^2/\text{s} \text{ for rod.} \quad [12]$$

- b) Give advantages and disadvantages of finite volume method. [6]

Q11)a) Why is staggered grid adopted for incompressible flows? [2]

- b) Show how the staggered grid is implemented for the pressure equation (SIMPLE). Draw the grid. [4]

- c) Present the SIMPLE algorithm and show how the pressure and velocity field is determined. [10]

OR

Q12)a) What is difference between boundary conditions and initial conditions used in CFD. Explain about Dirichlet, Neumann and mixed boundary conditions. [8]

- b) What are the main elements involved in a complete CFD analysis? Explain these steps in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P1794

[Total No. of Pages : 4

[5059] - 44
B.E. (Mechanical) Theory
FINITE ELEMENT METHODS
(2008 Pattern) (Elective - III) (Semester - II)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

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

SECTION - I

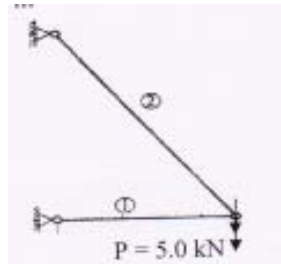
- Q1)** a) Explain with examples different types of co-ordinates used in finite element method to define location of points in element. Hence obtain relation for natural co-ordinates for two noded elements when range is (-1 to +1). **[8]**
- b) Write short note on (any two): **[8]**
- i) Stress-strain-temperature relations
 - ii) Plain stress and plain strain problem
 - iii) Characteristics of Global Stiffness Matrix

OR

- Q2)** a) Explain in brief, steps involved in Finite Element Methods. State various applications of FEM? **[8]**
- b) Explain the principle of Minimum potential energy used in deriving element stiffness matrix and equations. **[8]**

P.T.O.

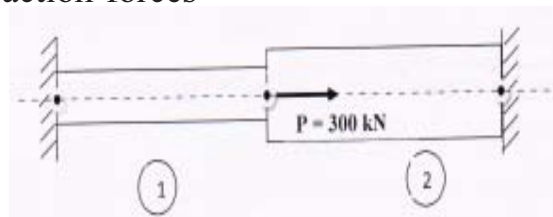
- Q3) a)** A two member truss is as shown in fig. 1. The cross sectional area of each member of the truss is 200 mm^2 and the modulus of elasticity is 200 GPa . Determine the deflections, reactions and stresses in each of the members. Assume length of Link '1' = 4 m and Link '2' = 5 m [12]



- b) Derive elemental stiffness matrix for a plane truss element using variational approach. [6]

OR

- Q4) a)** Derive expression for stiffness matrix of truss element. [8]
 b) An axial load $P = 300 \text{ kN}$ is applied as shown in fig. determine: [10]
 i) Nodal displacements
 ii) Stresses in each element
 iii) Reaction forces



Element No.	Material	Modulus of Elasticity	C/s Area	Length
1	Aluminum	$80 \times 10^9 \text{ N/mm}^2$	100 mm^2	100 mm
2	Steel	$210 \times 10^9 \text{ N/mm}^2$	250 mm^2	150 mm

- Q5) a)** Using Gaussians quadrature with two points to evaluate the integral [8]

$$I = \int_{-1}^1 [\cos x(1 - x^2)] dx$$

The Gaussian points are ± 0.5774 and weights at the two points are equal to unity.

- b) Distinguish between Subparametric elements and Superparametric elements [8]

OR

- Q6)** a) Explain following terms (any three): [10]
- i) Langrangean elements
 - ii) Serendipity elements
 - iii) Isoparametric elements
 - iv) Higher Order elements
 - v) Refined Mesh
- b) For a one - dimensional bar element with two nodes 'i' and 'j' along x - direction, assuming linear behavior of bar element, derive bar element stiffness equation based on Potential Energy approach. Use the shape functions N_i and N_j as, [6]

$$N_i = \frac{x_j - x}{L} \text{ at node 'i' and } N_j = \frac{x - x_i}{L} \text{ at node 'j'.$$

'L' be the length of the bar element.

SECTION - II

- Q7)** a) Formulate the one - dimensional heat transfer equations using a variational method. [10]
- b) Write a short note on 2-D element used for heat transfer problem. [8]

OR

- Q8)** a) Discuss - Temperature effects in One-Dimensional Problems. [8]
- b) An insulated circular fin has cross sectional area $A = 0.15 \text{ m}^2$ and length $L = 0.5 \text{ m}$. The left end has a constant temperature of $120 \text{ }^\circ\text{C}$. A positive heat flux of $q = 4500 \text{ W/mm}^2$ acts on the right end. Let $K_{xx} = 7.5 \text{ W/(m-}^\circ\text{C)}$. Determine the temperature at $L/4$, $L/2$, $3L/4$ and L . [10]
- Q9)** a) What is model analysis? What are mode shapes? [6]
- b) Explain lumped mass matrix and consistent mass matrix with suitable example. [6]
- c) What is difference between time domain and frequency domain? [4]

OR

- Q10)** a) Explain how symmetry is used in FEA with applications. [4]
b) Write short note on different methods to improve quality of poor elements in FEA. [6]
c) Differentiate between dynamic and static analysis. [6]
- Q11)** a) What are the functions and phases of Finite Element Analysis software?[4]
b) Explain how axisymmetric and rotational symmetry is used in FEA with suitable applications. [6]
c) What are types of boundary conditions and how they are treated in finite element method? [6]

OR

- Q12)** a) Explain how discretization is carried out using software with suitable example. [5]
b) State and explain governing equation of a dynamic system in FEA. [5]
c) Write short note on Isoparametric representation of CST Elements. [6]



Total No. of Questions : 12]

SEAT No. :

P1795

[Total No. of Pages : 3

[5059] - 45

B.E. (Mechanical Engineering) (Part - II)
ROBOTICS (Elective - III)
(2008 Pattern)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) *Answer Q 1 or Q 2, Q 3 or Q 4, Q5 or Q 6, Q 7 or Q 8, Q 9 or Q 10, Q 11 or Q 12.*
- 2) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Describe various characteristics used to specify Industrial Robot. [8]
b) Define and Explain: [8]
i) Stability
ii) Compliance
iii) Control resolution
iv) Spatial resolution.

OR

- Q2)** a) In a robot, a twisting joint wrist assembly can rotate through 12 full revolution and is required to bare a resolution of 0.24° . Find out the required bit storage capacity for achieving the resolution. [8]
b) How does the SCARA arm geometry differ from the vertical articulated arm? [4]
c) Why is the SCARA arm more ideal for assembly applications? [4]
- Q3)** a) Discuss various types of grippers used in robotics. What is the meaning of the term end effector. [8]
b) Which sensor can be used along with the gripper to sense whether the object is falling? Explain its working principle. [8]

P.T.O.

OR

- Q4)** a) Explain the design consideration of gripper selection. [8]
b) Compile a list of sensors that might be used in robotic systems. For each sensor, give an application. [8]

- Q5)** a) Explain different types of controllers used in industrial robots. [8]
b) The second joint of the SCARA manipulator is required to move from $\alpha_2 = 30^\circ$ to 180° in 5 seconds. Find the cubic polynomial to generate smooth trajectory of the joint. What is the maximum velocity possible for this trajectory? [10]

OR

- Q6)** a) Explain different types of actuators used in industrial robots. [10]
b) What do you understand by path planning for an industrial robot? Explain linear path with parabolic blend. [8]

SECTION - II

- Q7)** a) $\{UVW\}$ is obtained from $\{x y z\}$ by rotation about 90° about Z axis followed by rotation of 60° about U axis. Then $\{UVW\}$ locates a point p at $U = 30, V = 40, W = 50$. Determine its coordinates with respect to $\{xyz\}$. [10]
b) With the help of suitable illustration, explain the significance of singularity. [8]

OR

- Q8)** a) Explain the D - H parameters used in robotics. How it differs from ordinary method. [10]
b) Write short notes on [8]
i) Trajectory planning and its importance.
ii) Difference between forward & Inverse kinematics.
- Q9)** a) Explain different edge detection techniques used in machine vision system. Explain its need. [8]
b) Write short note on “features of languages for recent robot systems.” [8]

OR

- Q10)** a) Write a short note on Image processing techniques. [8]
b) Explain the logic of motion interpolation. [8]

- Q11)** a) What are the advancements in Robotics? How it affects the industry and mankind? [8]
b) Write short note on “Artificial Intelligence Techniques” used in robotics. [8]

OR

- Q12)** a) Discuss the economical aspects of Robot. [8]
b) Write a short note on “need of simulation” and types of simulation used in Robotics. [8]



Total No. of Questions : 12]

SEAT No. :

P1796

[Total No. of Pages : 4

[5059] - 46

B.E. (Mechanical)

ADVANCED AIR CONDITIONING AND REFRIGERATION

(2008Pattern) (Elective - III)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) Figures to the right indicate full marks.
- 2) Assume suitable data if necessary.

SECTION - I

- Q1)** a) With neat diagram explain Multi compression transcritical cycle. [6]
- b) A Freon 22 condensing units is specified to give 40 TR capacity for air-conditioning under standard operating conditions of 60°C condensing and 5°C evaporating temperature. What would be its capacity in TR for food freezing for which the evaporator temperature is -35°C? Also obtain the capacity of air- conditioner for condensing temperature of 40°C.[12]

Ts (°C)	h _f (kJ/kg)	h _g (kJ/kg)	S _f (kJ/kg)	S _g (kJ/kg)	v (m ³ /kg)
-35	158.76	390.85	-	1.8140	0.1655
5	194.4	407.15	-	1.7645	0.04035
40	249.7	415.95	1.1666	1.6995	0.0151
60	276	416.49	1.2504	1.6721	0.0090

OR

- Q2)** a) Explain actual vapour compression cycle using p-h and T-s diagram.[10]
- b) Explain ejector-expansion transcritical refrigeration cycle. [8]
- Q.3)** a) Discuss the various methods of capacity controls of reciprocating compressor. [6]
- b) Discuss the design procedure of shell and tube condenser [10]

P.T.O.

OR

- Q4)** a) What is Pumped circulation system? Explain with neat schematic. [6]
b) Discuss the procedure for obtaining the length of capillary tube. [10]

- Q5)** a) Explain the construction working of pilot-operated solenoid valve [6]
b) Discuss the main characteristics of filter. [6]
c) Explain the followings;
i) Motor over current protection ii) adjustable speed drives [4]

OR

- Q6)** a) Draw & explain electric circuit for oil pressure failure control. [8]
b) List the pollutants & contaminants present in the air with source. [4]
c) Discuss the types of safety valves. [4]

SECTION - II

- Q7)** a) Explain the purpose and scope of ECBC. [8]
b) Discuss the time lag and decrement method. [10]

OR

- Q8)** a) Draw and discuss modified ASHRAE comfort chart. [8]
b) Write a short note on:
i) “Choice of Supply Design Conditions” [6]
ii) Sol-air temperature [4]

- Q9)** a) Explain the design features of “Air-conditioning of Multiplexes” [8]
b) Draw and explain air-to-air heat pump circuit [8]

OR

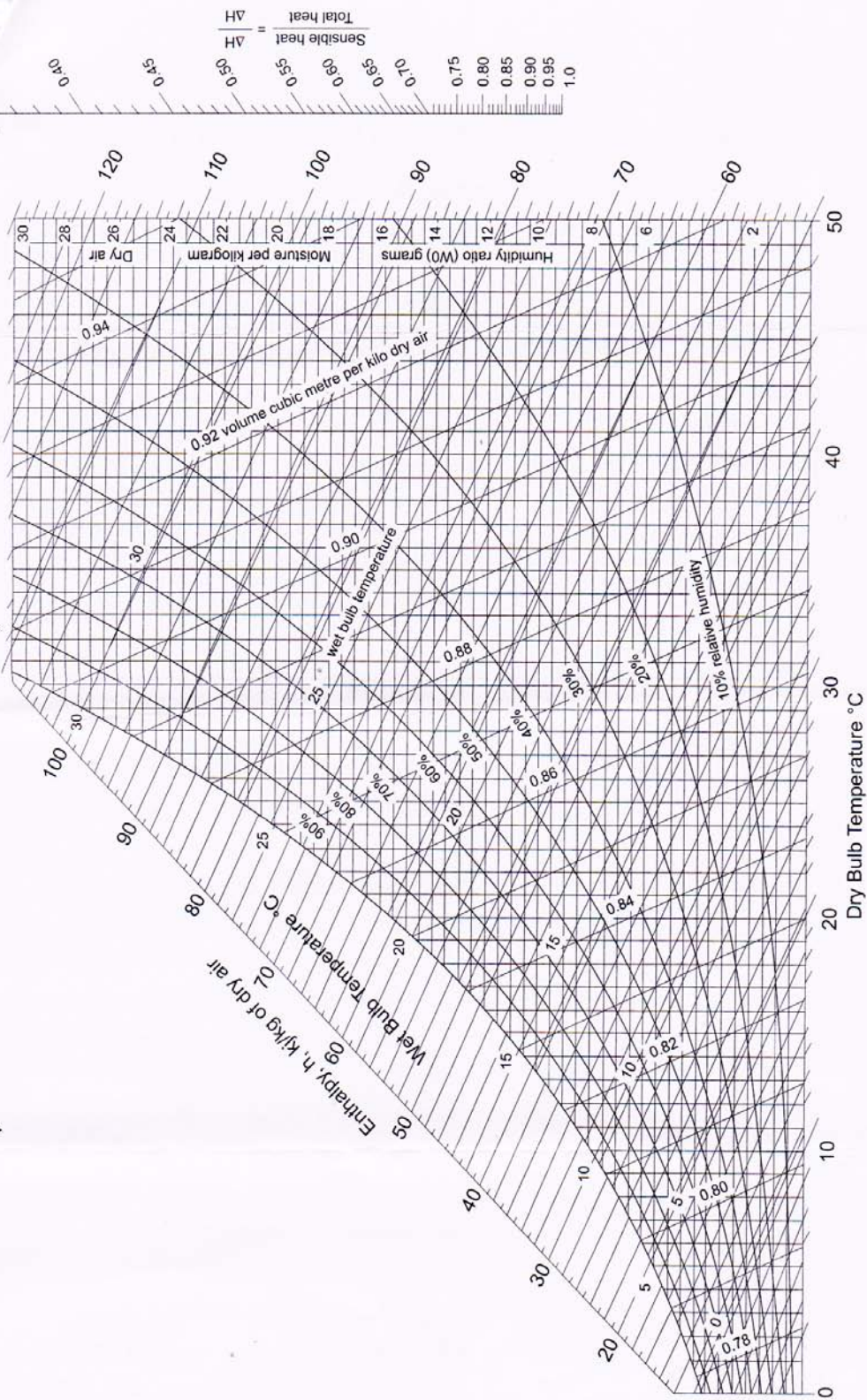
- Q10)** a) What is Clean Room? Discuss the requirements of clean room. [6]
b) Discuss in brief ‘HVAC design criteria for hospital’. [6]
c) State applications of heat pump. [4]

- Q. 11)**a) Draw circuit of Liquefaction process of helium. List the functions of its components. [8]
- b) Discuss various applications of cryogenics [8]

OR

- Q.12)**a) What is FOM? Discuss the analysis of Claude cycle with neat sketch.[8]
- b) Discuss various properties of cryogenic fluids. [8]

Psychrometric Chart



Total No. of Questions : 12]

SEAT No. :

P1797

[Total No. of Pages : 3

[5059] - 47

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

INDUSTRIAL HEAT TRANSFER EQUIPMENTS

(2008Pattern) (Elective - IV)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) How heat exchanger classified according to construction features? [6]
b) State advantages and limitations of plate heat exchanger. [4]
c) Explain heat exchanger design methodology. [6]

OR

- Q2)** a) Explain fluidised bed heat exchanger? [5]
b) What are baffle plates how they classified? [5]
c) Explain methods to determine heat exchanger effectiveness. [6]

- Q.3)** a) Explain Shell and tube heat exchanger basic design procedure. [5]
b) Printed-Circuit Heat Exchangers? [3]
c) In shell and tube feed water heater, cold water at 15°C flowing at the rate of 180kg/h is preheated to 90°C by flue gases from 150°C flowing at the rate of 900 kg/h. The water flows inside the copper tubes ($d_i = 25$ mm, $d_o = 32$ mm) having thermal conductivity $k_w = 381$ W/mK. The heat transfer coefficients on gas and water sides are 120 and 1200 W/m²K, respectively. The fouling factor on gas and water sides is 0.002m²K/W. Determine the flue gas outlet temperature, the overall heat transfer coefficient based on the outside tube diameter, and the true mean temperature difference for heat transfer. Consider specific heats C_p for flue gases and water as 1.05 and 4.19 J/gK respectively, and the total tube outside surface are as 5m². There are no fin inside or outside the tubes, and there is no fouling on gas side. [8]

OR

- Q4)** a) What is TEMA standards? [5]
b) Explain Shell and tube heat exchanger in detail. [5]
c) Explain Kern Method. [6]

- Q5)** a) Explain plate fin heat exchanger. [8]
b) Air enters the core of finned-tube exchanger at 1 atm and 30°C. The air flow at a rate of 1500kg/h perpendicular to the tube and exit with a mean temperature of 100°C. The core is 0.5m long with a 0.25 m² frontal area. Calculate the total pressure drop between the air inlet and outlet and the average heat transfer coefficient on the air side. [8]

OR

- Q6)** a) Explain tube fin heat exchanger. [8]
b) Air at 2 atm and 500K with a velocity of $u_{\infty}=20\text{m/s}$ flows across a compact heat exchanger matrix having the configuration (surface 11.32-0737-S-R). Calculate the heat transfer coefficient and the frictional pressure drop. The length of the matrix is 0.8m. [8]

SECTION - II

- Q7)** a) Explain horizontal shell type condensers with diagram. [8]
b) Which are the common heat exchanger types used in refrigeration and air conditioning industry. [8]

OR

- Q8)** a) Explain vertical tube side condensers with diagram. [8]
b) Explain
i) Water cooling evaporator [4]
ii) Air cooling evaporator [4]

- Q9)** a) What is the principle of operation of cooling tower? [6]
b) State and explain different cooling tower material. [6]
c) What is hyperbolic cooling tower? [6]

OR

- Q10)** a) Explain Psychometric Analysis of Air Passing through cooling tower [8]
b) Explain Combined Flow Coil Evaporative Cooling Tower [4]
c) Factors to be considered for selecting cooling tower [6]

- Q. 11)** a) What is liquid cooling? [6]
b) Why we need to cool electrical applications? [6]
c) Explain wick structure of heat pipe [6]

OR

- Q.12)** a) What is forced electronic cooling [6]
b) Explain ‘cooling personal computers’ [6]
c) What is immersion cooling and explain in brief two closed loop System? [6]



Total No. of Questions : 12]

SEAT No. :

P1798

[Total No. of Pages : 3

[5059] - 48

B.E. (Mechanical) (Semester - II) (Elective - IV)

MANAGEMENT INFORMATION SYSTEM

(2008Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) *Figures to the right indicate full marks.*
- 2) *Assume suitable data if necessary.*

SECTION - I

Unit I

- Q1)** a) Define Management, Information and system. Explain role of MIS in manufacturing organization. [8]
- b) What are the various types of Organizational structures? Explain MIS - organization. [8]

OR

- Q2)** a) Define System. Explain various types of systems. [8]
- b) Classify the following system (open or closed) - [8]
- i) A chemist shop
 - ii) Security system at gate
 - iii) Milk distribution
 - iv) Mail delivery
 - v) ATM
 - vi) ERP
 - vii) Stock trading
 - viii) Hospital

Unit II

- Q.3)** a) What is decision? Discuss decision making in MIS. [6]
- b) Explain waterfall model of SDLC with diagram. State its advantages and disadvantages. [6]

P. T. O.

- c) Draw a logical flow diagram of OPD system of hospital systems [4]

OR

- Q4)** a) Explain spiral model with a block diagram for SDLC. [8]
b) Write a short note on Behavioral decision making. [4]
c) What are the Building blocks of information system? [4]

Unit - III

- Q5)** a) Explain knowledge management systems architecture? [6]
b) Explain the concept of Decision support system (DSS). List types of DSS [6]
c) Write a short note on DFD with example [6]

OR

- Q6)** a) Write a case study on Data warehouse and MIS in IT firm. [6]
b) Describe E-R diagrams [4]
c) Define GDSS & its components [8]

SECTION - II

Unit - IV

- Q7)** a) Explain software design. Explain the steps involved in software design. [6]
b) What are the different levels of CMM? Explain any three. [8]
c) Explain OOSAD lifecycle methodology with a block diagram. [4]

OR

- Q8)** a) Justify the statement “There is the need of standardization in software organization.” [4]
b) List with details steps involved in Software matrices design [6]
c) What are the types of software performance testing? [8]

Unit - V

- Q9)** a) Mention advantages and disadvantages of White box testing over Black box testing. [4]
- b) Explain with neat sketch — Bath tub curve for software reliability [6]
- c) Write a short note on [6]
- i) Inspection
 - ii) Software Error
 - iii) Repair

OR

- Q10)** a) State types of software maintenance, Explain any one in detail [6]
- b) List types of White box testing. [4]
- c) Write a short note on [6]
- i) Faults,
 - ii) Availability
 - iii) Maintenance

Unit - VI

- Q. 11)**a) Explain the application of MIS in supply chain management with block diagram and flow chart [8]
- b) Explain the case study on 360° Feedback system. [8]

OR

- Q.12)**a) Explain the case study E-Enterprise management. [8]
- b) Explain the application of MIS in financial management with block diagram and flow chart. [8]



Total No. of Questions : 12]

SEAT No. :

P1799

[Total No. of Pages : 5

[5059] - 49

B.E. (Mechanical) (Semester - II)
RELIABILITY ENGINEERING
(2008Pattern) (Elective - IV (C))

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) *Answers to the two sections should be writtlen on separate answer sheets.*
- 2) *Figures in bracket to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of Electronic pocket calculator is allowed.*
- 5) *Assume suitable data. if necessary and mention it.*

SECTION - I

Q1) a) Define the terms.

[6]

- i) Failure rate
- ii) Mean time to failure
- iii) Reliability
- iv) Mean time between failure

- b) The data received after studying performance of 900 spark plugs is as given below. Plot the hazard rate, failure density & reliability. Show the relationship of these functions with time graphically. **[10]**

Operating time (Hrs.)	10	20	30	40	50	60	70	80	90	100
No. of Failures	350	200	120	70	40	35	28	22	18	17

OR

Q2) a) Give eight different applications of reliability and explain its importance in each field. **[8]**

- b) Explain different modes of failure in detail with the help of a diagram.**[8]**

P.T.O.

Q3) a) Explain the Weibull distribution and its use to find the reliability and failure rate. [8]

b) Find the probability that bulb will last at least for 210 hrs if the life of bulb is normally distributed with mean of 150 hrs and standard deviation of 30 hrs. What is the reliability of bulb lasting for at least 180 hrs if the mean and standard deviation changes to 140 hrs and 25 hrs. [8]

OR

Q4) a) The life testing of 800 crankshafts is conducted and following observations are made. 632 crank shafts survive 250 cycles of operations. 398 crank shafts out of these. survive for 400 cycles of operation. Find

i) Probability that the crank shaft will survive for 250 as well as 400 cycles.

ii) Probability of survival of crank shaft for 400 cycles when it has already survived for 250 cycles of operation. [8]

b) Explain in detail.

i) Stand by redundancy and its types

ii) Total probability theorem [8]

Q5) a) Write a note on

i) ARINC apportionment technique.

ii) Minimum effort method. [8]

b) A system consists of five subsystems whose details are as given in the table below. The reliability of the system is required to be 0.92 for 20 hrs time of continuous working. Find the allocated subsystem and a system reliabilities. [10]

Subsystem	No. of modules	Importance factor	Operating time
1	12	1	20
2	16	0.92	15
3	78	0.98	18
4	54	1	20

OR

- Q6)** a) Five components in series make a working system. The minimum desired reliability of the system is 0.9 Find the reliability goal of individual components in a system from the predicted values of reliability given in the table below. [10]

Component	1	2	3	4	5
Predicted Reliability	0.992	0.994	0.993	0.995	0.97

- b) What is long form of 'AGREE' ? State the assumptions made and explain stepwise procedure of AGREE apportionment technique for allocating reliabilities to subsystem for achieving system reliability. [8]

SECTION - II

- Q7)** a) What is the objective of carrying out maintenance of the system? Explain the different types of maintenance with advantages and limitations of each type. [8]

- b) The following observations were recorded for the generator used for power supply to the elevator. Find operational availability and inherent availability, the failure rate and mean repair rate of the generator assuming constant hazards for failure and repair.

Mean time between failures (MTBF): 720hrs.

Mean time to repairs (MTTR): 35hrs

Mean waiting time for spares: 5 hrs.

Mean administrative and logistic time : 4 hrs. [8]

OR

- Q8)** a) Define and explain in brief.

i) Achieved Availability

ii) Maintainability

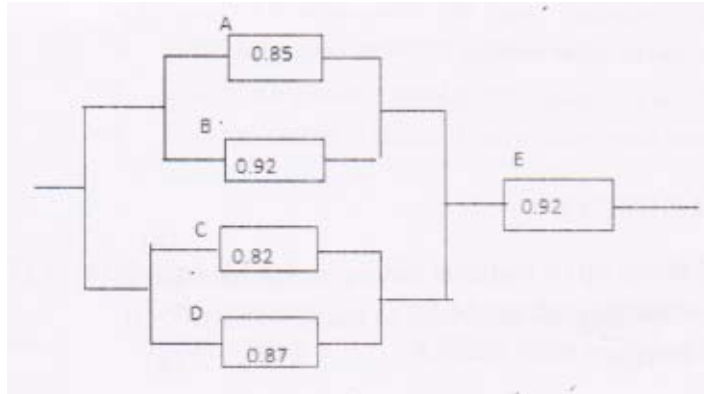
iii) Reliability

ii) System downtime [8]

- b) An engine is to be designed for 5000 hrs of operating life and reliability of 0.97. The availability of an engine during the same time period should be 0.99. Find MTTR and MTBF assuming constant hazard for failure and repair. Give the meaning of MTTR and MTBF. [8]

Q9) a) Explain the use of Ishikawa diagram for failure representation and analysis with the help of an example. [8]

b) The block diagram of the system and the reliabilities of its elements A to E are as given in the figure. Construct Fault Tree Diagram & find out the reliability of the system. If reliabilities of B and D are changed to 0.94. What will be the new reliability of the system? Write the minimal cut sets. [10]

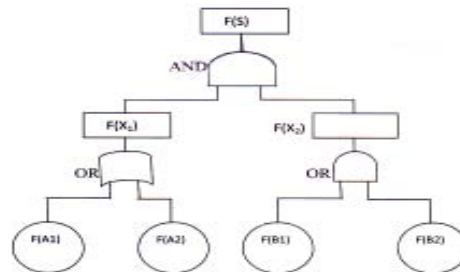


OR

Q10) a) Explain the use of following.

- i) Monte carlo evaluation
- ii) Delphi method [8]

b) The fault tree diagram of the system is as shown below. Construct the block diagram. [10]



Of the system and find the reliability of the system if the reliability of the elements is as given $R(A1) = 0.9$, $R(A2) = 0.85$, $R(B1) = 0.92$, $R(B2) = 0.87$. Write the minimal cut and tie sets.

OR

Q11) a) The test results of ball bearings are as given below. Use the results to plot the variation of reliability against time as per

- i) Mean ranking
- ii) Median ranking method. [8]

Failure number	1	2	3	4	5	6	7	8	9
MTTF (hrs)	34	12	54	23	44	8	67	88	71

b) What is accelerated life testing? How is it different from highly accelerated life testing? Give application of each. [8]

OR

Q12) a) Write short notes on

i) Human reliability

ii) Safety factor and safety margin. [8]

b) Find the failure probability of a stud made up of material having mean strength of 285N/mm^2 and standard deviation of 44N/mm^2 subjected to mean stress of 210N/mm^2 and standard deviation of 60N/mm^2 [8]

Z	1.55	1.56	1.57	1.58	1.59
ϕz	0.9394	0.9406	0.9418	0.9429	0.941



Total No. of Questions : 12]

SEAT No. :

P1773

[Total No. of Pages : 5

[5059]-5

B.E. (Civil)

SYSTEM APPROACH IN CIVIL ENGINEERING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any one from Q.No.1 or 2, Q.No. 3 or 4, Q.No. 5 or 6, Q.No. 7 or 8, Q.No. 9 or 10, Q.No. 11 or 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 logarithmic tables, slide rule, Mollier charts, electronic pocket calculator is allowed.

Q1) a) Use graphical method to solve LP problem [12]

$$\text{Maximize } z = 10x_1 + 15x_2$$

Subject to

$$2x_1 + x_2 \leq 25$$

$$2x_1 + 4x_2 \leq 56$$

$$-x_1 + x_2 \leq 5$$

$$\text{And } x_1 \geq 0, x_2 \geq 0$$

- b) Explain [6]
- i) Unique solution
 - ii) Infinite solution
 - iii) Unbalanced solution

OR

Q2) a) Minimize $z = 40x_1 + 60x_2$ [12]

$$x_1 + 2x_2 \geq 80$$

$$2x_1 + x_2 \geq 75$$

$$\text{And } x_1, x_2 \geq 0$$

- b) What is the role of 'operation research' in decision making? Give names of different or techniques. [6]

P.T.O.

Q3) The unit cost of transporting precast units from 4 factories to 3 sites is given the following table along with the availability at each factory and requirement of each site. Obtain the optimal solution to minimize the total cost of transportation. Use North West Corner Method and VAM Method. **[16]**

	Sites			
Factories	1	2	3	Supply
1	2	7	4	5
2	3	3	7	8
3	5	4	1	7
4	7	6	2	14
Demand	1	9	18	

OR

Q4) a) A departmental head has four subordinates and four tasks for completion. The subordinates differ in their capabilities and tasks differ in their work contents. His estimate of time for each subordinate and each task is given in the matrix below. **[8]**

Task	Subordinates			
	Processing Time (Hrs)			
	I	II	III	IV
A	17	25	26	20
B	28	27	23	25
C	20	18	17	14
D	28	25	23	19

How the tasks should be assigned to minimize requirement of man hours.

b) The table gives the cost of employing different types of earth moving equipment in different types of jobs. Find the assignment of equipment to various jobs such that the overall cost is minimum. **[8]**

Equipment	Job				
	1	2	3	4	5
A	14	12	15	9	11
B	17	9	13	15	4
C	9	11	16	14	13
D	12	8	14	4	15
E	5	7	9	10	2

Q5) a) Explain the following terms used in dynamic programming. **[8]**

- i) Bellman's Principle of optimality
- ii) Stages and States

b) A Pipe line proposed to be laid between placed numbered as 1 to 11 the pipeline can be laid along different routes. The costs of laying the pipe possible routes from places i to j are given below. **[8]**

$C_{1,2} = 25$	$C_{1,3} = 29$	$C_{1,4} = 31$
$C_{2,5} = 24$	$C_{2,6} = 22$	$C_{2,7} = 25$
$C_{3,5} = 26$	$C_{3,6} = 20$	$C_{3,7} = 18$
$C_{4,5} = 23$	$C_{4,6} = 22$	$C_{4,7} = 21$
$C_{5,8} = 16$	$C_{5,9} = 28$	$C_{5,10} = 28$
$C_{6,8} = 17$	$C_{6,9} = 19$	$C_{6,10} = 24$
$C_{7,8} = 28$	$C_{7,9} = 27$	$C_{7,10} = 29$
$C_{8,11} = 32$	$C_{9,11} = 33$	$C_{8,11} = 31$

Use dynamic programming to determine the minimum cost and the carriers on ding route laying pipeline. Write recursive equation to each state.

OR

Q6) a) Give the procedure adopted in the analysis of dynamic programming problems. **[8]**

b) What is mean by dynamic programming? State the application of dynamic programming in Civil Engineering. **[8]**

Q7) a) Use Method of Lagrangian multiplier to solve the following. **[8]**

$$\text{Minimize } z = 3x_{12} + 2x_2 + 3x_{32} + 10x_1 + 9x_2 + 16x_3 - 50$$

$$\text{Subjected to } 2x_1 + x_2 + 2x_3 = 40$$

$$x_1, x_2, x_3 > 0$$

b) Use Langrage multiplier technique to and solve **[8]**

$$\text{Minimize } z = x_{12} + 2x_{22} + 3x_{32} + 3x_1 + 7x_2$$

$$\text{Subjected to } x_1 + x_2 = 5$$

OR

- Q8) a)** What is mean by Non linear Programming? What is practical application of NLP. [8]
- b) Explain following terms- [8]
- Local and global optima
 - Concave and Convex function.
 - Local and Global Maxima
 - Hessian Matrix

- Q9) a)** What is sequence? What are assumptions in sequencing problem? Give any two applications of simulation in field of Civil Engineering. [8]
- b) What is Monto Carlo method of simulation? State Limitations of simulation techniques. [8]

OR

- Q10)a)** A sample of 100 arrivals of automobile of both is found to be according to the following distribution. [8]

Time Between Arrivals in Min	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Frequency	2	6	10	24	20	15	10	7	3	2

The time take for service follows the distribution.

Service time in Min	0.5	1.0	1.5	2.0	2.5
Frequency	13	22	37	24	20

Estimate the average% waiting time and ideal time of customer simulation for next ten arrivals. Use the following random number.

Arrivals	16	77	23	2	77	28	6	24	25	93
Service	56	65	5	61	86	90	92	10	79	80

- b) State advantages and limitations of simulation techniques. [8]

- Q11)a)** The cost of machine is Rs. 6100 and its scrap value is Rs. 100. The maintenance cost is found from experience are as follows : [12]

Year	1	2	3	4	5	6	7	8
Maintenance Cost	100	250	400	600	900	1200	1600	2000

When should the machine be replaced?

- b) Explain how theory of replacement is used in replacement of items whose maintenance cost varies with time. [6]

OR

Q12)a) Reduce the following game by dominance property and solve it. **[12]**

Player A	I	1	2	4	5
	II	1	3	7	4
	III	3	4	5	6
	IV	6	5	6	5
	V	2	0	3	1

b) Explain Two-Person Zero-Sum Game. Distinguish between pure strategies & mixed Strategy. **[6]**



Total No. of Questions : 12]

SEAT No. :

P1800

[Total No. of Pages : 2

[5059] - 52

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

INDUSTRIAL AUTOMATION (Open Elective - IV)

(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) Discuss the role of mechanisation in Industrial Automation with respect to production volume, manpower optimization in India. [10]
- b) What do you understand by primary and secondary transducer? Explain with suitable example. [6]

OR

- Q2)** a) Explain the static characteristics of measuring instrument. [8]
- b) Explain PLC based Automation over conventional automation. [8]

- Q3)** a) Explain PLC with block Diagram. [8]
- b) Explain role of PLC in SCADA. [8]

OR

- Q4)** a) Develop a physical ladder for an automatic washing machine with front loading system. Assume suitable washing sequence. [8]
- b) Explain architecture of PLC. [8]

P.T.O.

- Q5)** a) Explain in detail FMS. [8]
b) Compare FMS and transfer line. [10]
OR
- Q6)** a) Explain Direct numerical control. [8]
b) Explain adoptive control system. [10]

SECTION - II

- Q7)** a) Explain the roll of common system components of SCADA. [8]
b) Explain timers and counters in PLC. [8]

OR

- Q8)** a) Explain ladder diagram of bottle filling plant. [8]
b) Explain HMI used in PLCs. [8]

- Q9)** a) Discuss advantages of Induction motor. [8]
b) Discuss in brief the stepper motor used in control element in automation.[8]

OR

- Q10)** a) Explain two applications of hydraulic circuits used in Industrial automation. [10]
b) Explain automation in welding. [6]

- Q11)** a) Explain use of automation in material handling equipment. [8]
b) Explain automation in speed control system. [10]

OR

- Q12)** a) Write a note on Remote centre compliance. [8]
b) Explain automation in hydraulic press machine [10]



Total No. of Questions : 12]

SEAT No. :

P1801

[Total No. of Pages : 6

[5059] - 54

B.E. (Mechanical -Sandwich)

MACHINE AND COMPUTER AIDED DESIGN

(2008 Pattern)

Time : 4 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) Answer any three questions from each section.
- 2) Answer to the two sections should be written in separate answer book.
- 3) Figures to the right indicate full marks.

SECTION - I

- Q1) a)** Derive an expression for beam strength of straight bevel gear in the following form, **[8]**

$$F_b = m b \sigma_b Y \left[1 - \frac{b}{A_0} + \frac{b^2}{3A_0^2} \right]$$

- b) A pair of straight bevel gears with 20° pressure angle consist of 20 teeth pinion meshing with 30 teeth gear. The module is 4mm while the face width is 20 mm. the pinion and gear material has a surface hardness of 400 BHN. The pinion rotates at 720 rpm and receives 3KW power from a motor. Taking service factor of 1.5 and Barth's factor for dynamic loading determine the factor of safety in pitting. **[8]**

OR

- Q2) a)** Explain the following terms for the worm and worm wheels. **[4]**

- i) Self locking worm
- ii) Rubbing velocity

P.T.O.

- b) A pair of worm and worm wheel is designated as 2/72/10/6. The worm is transmitted 8 KW at 1800 rpm to a worm wheel. The permissible bending strength is 110 N/ mm². The wear load factor is 0.83 N/mm². The coefficient of friction is 0.05 and normal pressure angle is 20°. Find[12]
- factor of safety in bending.
 - factor of safety in wearing.
 - factor of safety in heat dissipation.

Use following data,

$$Y = \left[0.484 - \frac{2.85}{Z_G} \right], \text{ Barth factor } C_v = \frac{6}{6+v}$$

$$\text{Input KW} = \left[\frac{a^{1.7}}{34.5(i + 5)} \right] \text{ where } a = \text{center distance and } i = \text{gear ratio.}$$

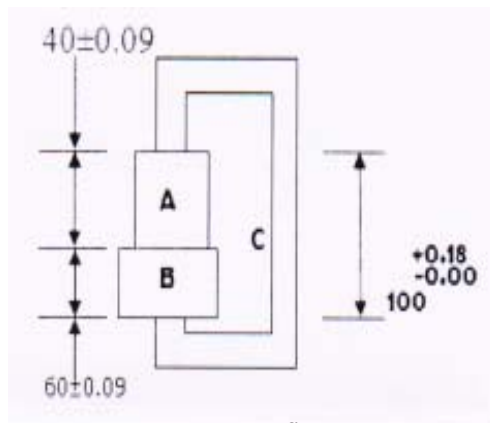
- Q3)**
- Described the various types of supports for pressure vessels. [6]
 - Derive the Clavarinos's equation. State it's application [6]
 - A receiver of the reciprocating compressor consists of 1000 mm length and 500 mm inner diameter. It is closed by the hemispherical ends. The air pressure is limited to 40 bar. The efficiencies of the welded joints for the shell and ends are 0.9 and 0.8 respectively. If the allowable tensile stress is 80N/mm², determine: [6]
 - thickness of cylindrical shell
 - thickness of the hemispherical end
 - storage capacity of the receiver

OR

- Q4)**
- How are pressure vessels classified according to IS 2825? [6]
 - A cylindrical pressure vessel shell of inside diameter 1500 mm is subjected to an internal pressure of 2MPa. The shell as well as heads is made of low alloy steel with an ultimate tensile strength of 450N/mm². The double welded butt joints which are spot radio graphed, are used to fabricate the vessel. The corrosion allowance is 3 mm. determine the thickness of the cylindrical shell and the thickness of the head if the heads are: [12]

- i) Flat
- ii) Plain formed
- iii) Torispherical with crown radius of 1125 mm
- iv) Semi-elliptical, with ratio of major axis to minor axis as 2
- v) Hemispherical, and
- vi) Conical, with semi-cone angle of 30°

- Q5)** a) Explain the difference between ‘design tolerance’ and ‘natural tolerance’. How the designer would select the tolerances for the minimum rejection of the components. [4]
- b) State the guidelines to be followed in the design of castings. [4]
- c) An assembly of three components A,B,C is shown in Fig 1. the dimensions of the three components are normally distributed and natural tolerance is equal to design tolerance as shown in the figure. Determine the percentage of assemblies where interference is likely to occur. [8]



OR

- Q6)** a) It has been observed from a sample of 200 bearing bushes that the internal diameters are normally distributed with a mean of 30.010 mm and a standard deviation of 0.008 mm. the upper and lower limits for the internal diameter, as specified by the designer, are 30.02 and 30.00 mm respectively. Calculate the percentage of rejected bushes. [8]
- b) What do you understand by ‘aesthetic feeling’? Explain the various aspects which contribute to the aesthetic appeal of the product. [8]

SECTION - II

- Q7)** a) Explain the procedure to estimate power requirement for belt conveyors. [6]
b) A belt conveyor is to be design to carry the bulk material at the rate 300×10^3 kg/hr with following details: [10]

Bulk density of material	= 800 kg / m ³
Angle of response of bulk material	= 15°
Belt speed	= 10 km/hr
Material factor for plies, k1	= 2.0
Belt tension and arc of contact factor, k2	= 63
No. of plies for the belt	= 4

Determine:

- i) The suitable width of the length
- ii) Diameter of the drive pulley
- iii) Length of the drive pulley

OR

- Q8)** a) What is adequate design and optimum design? Explain with the suitable example. [6]
b) A shaft is to be used to transmit the torque of 1500 Nm. The require torsional stiffness of the shaft is 100 Nm/ degree, while the factor of safety based on yield strength in shear is 2.0. Using the maximum shear stress theory design the shaft with objective of minimizing the weight, out of the following materials: [10]

Material	Weight density w, N/m ³	Tensile Yield strength s_{yt} , N/mm ²	Modulus of Rigidity G, N/mm ²
Chromium Steel	77×10^3	420	84×10^3
Plain Carbon Steel	76.5×10^3	230	84×10^3
Titanium Alloy	44×10^3	900	42×10^3
Magnesium Alloy	17.5×10^3	225	15×10^3

- Q9)** a) For a stepped bar subjected to an axial compressive loads as shown in Figure 2, find stresses in each bar. Assume young's modulus of material of bar as 200G Pa. [8]

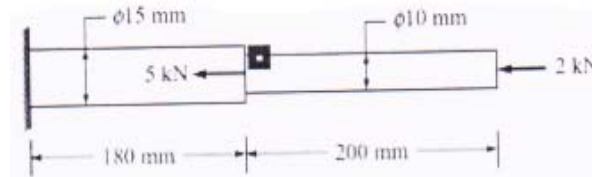


Figure 2

- b) Explain the concept of Plane Stress and Plane Strain in Finite Element Method. [8]

OR

- Q10)** a) Given the truss structure shown in figure 3, calculate the stress and strain in truss element 1 if: $A_1 = 0.0004 \text{ m}^2$, $E_1 = 200 \times 10^9 \text{ Pa}$, $L_1 = 2 \text{ m}$ [8]

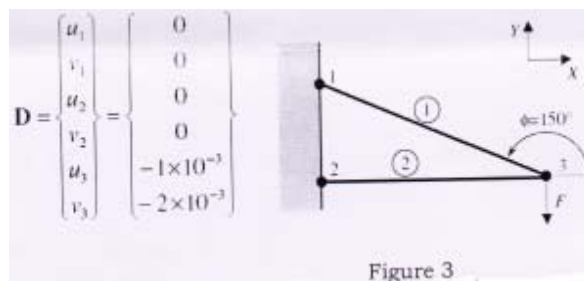


Figure 3

- 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. [8]

- Q11)** a) What are advantages and limitations of Automation. [6]
 b) Write a manual part program for finishing a forged component as shown in the figure 4. [12]

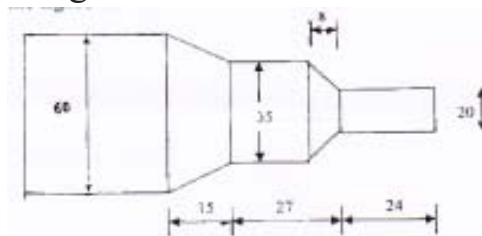


Figure 4

Assume the speed and feed on the turning centre as 450 rpm and 0.4 mm/rev. assume 1mm material is to be removed radially from external diameter.

OR

- Q12)** a) Write major advantages and Disadvantages of Computer Integrated Manufacturing(CIM). [6]
- b) Discuss the significance of Flexibility in Automation System. [6]
- c) Explain FMS. Describe the various layouts used in FMS. [6]



Total No. of Questions : 12]

SEAT No. :

P1802

[Total No. of Pages : 2

[5059] - 56

B.E. (Mechanical) (SW) (Semester - II)
INDUSTRIAL HYDRAULICS & PNEUMATICS
(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) 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) 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 sources of contamination in hydraulic system. How they can be avoided? [6]
b) State type of filters and where they are located in hydraulic system. [6]
c) Explain the purpose & construction of a good connecting fitting with neat sketch. [6]
- Q3)** a) What are the functions of reservoirs? Draw a neat sketch of standard reservoir by showing all its features. [8]
b) Explain with sketch the operation of a balanced vane pump. [8]

P.T.O.

OR

- Q4)** a) What are the various efficiencies of a pump? [4]
b) Compare positive displacement and nonpositive displacement pumps. [4]
c) Explain the working, advantages and disadvantages of a external gear pump with a neat sketch. [8]

- Q5)** a) What is a pilot operated check valve? Draw its sketch and explain its typical use. [8]
b) Sketch and explain a pressure compensation type of flow control valve. [8]

OR

- Q6)** a) What are the centre positions used in DCV. Give advantages and disadvantages of each. [8]
b) What is an accumulator ? Explain with a sketch a gas charged accumulator. [8]

SECTION - II

- Q7)** a) What is “mounting of a cylinder”? Explain different types of mountings. [8]
b) Draw & Explain “synchronization circuit”. [8]

OR

- Q8)** a) Explain with neat sketch “Bleed off circuit”. [8]
b) Explain with neat sketch “Sequencing CKT”. [8]

- Q9)** a) Explain the differences between “hydraulic & pneumatic systems”. [8]
b) Differentiate between pneumatic and electropneumatic systems. [8]

OR

- Q10)** a) Write a short note on “Airdryers” used in the pneumatic system. [8]
b) Enlist different applications of pneumatic systems for “Low cost automation”. [8]

- Q11)** a) What is the manufacturer catalogue? How does the designer select components through it? [9]
b) Write a short note on trouble shooting methods for “hydraulic systems”. [9]

OR

- Q12)** a) What are the factors considered for designing of a “pneumatic system”. [9]
b) What are the factors considered for designing of “hydraulic system”. [9]



Total No. of Questions : 12]

SEAT No. :

P1803

[Total No. of Pages : 4

[5059] - 57

B.E. (Mechanical S/W) (Part - I) (Semester - I)
REFRIGERATION AND AIR CONDITIONING
(2008 Pattern) (Elective - II)

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 books.*
- 3) *Neat diagram 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, Steam tables and p — h chart is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

UNIT - I

- Q1)** a) Compare Vapour Compression Refrigeration with Air Refrigeration system. [5]
- b) Write short note on Magnetic Refrigeration. [5]
- c) Explain reverse Carnot cycle used for refrigeration with the help of p-V and T-s diagram. Also derive an expression for coefficient of performance. [6]

OR

- Q2)** a) What are the advantages and limitations of Air refrigeration systems? [5]
- b) Write a note on Thermoelectric Refrigeration. [5]
- c) The capacity of refrigerator is 200 TR when working between - 6°C and 25°C. Determine the mass of ice produced per day from water at 25°C. Also find the power required to drive the unit. Assume that the cycle operates on reverse Carnot cycle and latent heat of ice is 335 kJ/kg. [6]

P.T.O.

UNIT - II

- Q3)** a) What are the essential properties of good refrigerants? How the refrigerants are classified? [6]
- b) Explain the terms: (1) ODP; (2) GWP; (3) TEWI [6]
- c) Write a note on alternative refrigerants. [6]

OR

- Q4)** a) What is the difference between Primary and Secondary refrigerants? Why secondary refrigerants are used? List at least two secondary refrigerants. [6]
- b) Provide the list of alternative refrigerants for CFC's and HCFC's with proper justification. [6]
- c) What is the concept of green buildings. [6]

UNIT - III

- Q5)** a) What is the need of multi staging? Explain in detail about Cascade system with the help of sketch and P - h diagram. [8]
- b) A cascade system is designed to supply 10 tonnes of refrigeration at an evaporator temperature of -60°C and a condenser temperature of 25°C . The load at -60°C is absorbed by a unit using R22 as the refrigerant and is rejected to a cascade condenser at -20°C . The cascade condenser is cooled by a unit R12 as the refrigerant and operating between -30°C evaporating temperature and 25°C condenser temperature. The refrigerant leaving the R12 condenser is subcooled to 20°C , but there is no sub-cooling of R22 refrigerant. The gas leaving both the evaporators is dry and saturated and compressions are isentropic. Neglecting losses, determine: (1) Compression ratio for each unit, (2) Quantity of refrigerant circulated per minute for each unit, (3) COP of each unit, (4) COP of the whole unit and (5) Theoretical power required to run the system. [8]
- Properties for R12 and R22 are as follows:

Refrigerant	R12
At evaporator temperature (- 30°C)	
Pressure at compressor inlet	$p_5 = 1.044$ bar
Enthalpy at compressor inlet	$h_5 = 174.2$ kJ/kg
Entropy at compressor inlet	$s_5 = 0.7171$ kJ/kg K
At condenser temperature (25°C)	
Pressure at compressor outlet	$p_6 = 6.518$ bar
Enthalpy at compressor outlet	$h_6 = 207$ kJ/kg
Enthalpy at condenser outlet	$h_7 = 54.9$ kJ/kg
Refrigerant	R22
At evaporator temperature (- 60°C)	
Pressure at compressor inlet	$p_1 = 0.3745$ bar
Enthalpy at compressor inlet	$h_1 = 223.7$ kJ/kg
Entropy at compressor inlet	$s_1 = 1.054$ kJ/kg K
At condenser temperature (- 20°C)	
Pressure at compressor outlet	$p_2 = 2.458$ bar
Enthalpy at compressor outlet	$h_2 = 275$ kJ/kg
Enthalpy at condenser outlet	$h_3 = 22.2$ kJ/kg

OR

- Q6)** a) Explain Electrolux system with a neat sketch. [8]
- b) Define the function of the following components of Vapour Absorption Refrigeration System in detail: [8]
- 1) Absorber; (2) Rectifier; (3) Analyzer; (4) Heat Exchangers

SECTION - II

UNIT - IV

- Q7)** a) Explain the following with hand drawn psychrometric chart. [8]
- 1) ADP; (2) RSHF; (3) GSHF; (4) ERSHF
- b) What is human comfort? Explain in brief the factors influencing the human comfort. [4]
- c) Differentiate between ventilation and infiltration. [4]

OR

- Q8)** a) Write a short note on Automobile Air Conditioning System. [4]
- b) Compare Unitary Air Conditioning and Central Air Conditioning. [4]

- c) The readings from a sling psychrometer are as follows: [8]
DBT = 30°C; WBT = 20°C; Barometer reading = 740 mm of Hg. Using steam tables, determine: (1) DPT; (2) Relative humidity; (3) Specific humidity; (4) Degree of saturation; (5) Vapour density; (6) Enthalpy of mixture per kg of dry air.

UNIT - V

- Q9)** a) Enumerate the basic elements of the control system. Explain. [8]
b) Derive equation for the equivalent circular diameter of a rectangular duct. Take a and b are longer and shorter sides of a rectangular duct. [10]

OR

- Q10)** a) Write short notes on: [10]
i) Bimetal type thermostat for room temperature.
ii) Hair type humidistat for humidity control in air conditioning.
b) With neat sketch explain working of Thermostatic Expansion Valve. [8]

UNIT - VI

- Q11)** a) Describe the various methods of food preservation? [6]
b) Write short note on CAMA storages. [4]
c) Write in short about Transport and Marine refrigeration. [6]

OR

- Q12)** a) What is Cryogenics? What are the limitations of VCERS for production of low temperature. [8]
b) Explain Claude system for liquefaction of air with the help of block diagram and T- s diagram. [8]



[5059] - 59

B.E. (Mechanical) (Sandwich)
FINITE ELEMENT METHOD (Elective - II)
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:-

- 1) Answer to the two section should be written in separate books.
- 2) Figures to the right indicate full marks.

SECTION - I

- Q1)** a) Explain the difference between the Ritz method and the Finite Element Method [8]
 b) Describe the physical meaning of boundary conditions for a given DE [8]

OR

- Q2)** a) Discuss the importance of idealization and mathematical modeling in finite element analysis. [8]
 b) Explain the terms 'Plane stress and 'plane strain problems. Give constitutive laws for these cases [8]
- Q3)** a) Derive an expression for the element stiffness matrix of the two noded truss element. Also show the element stress calculations. [8]
 b) For the plane truss as shown in figure 1, $P = 1000\text{KN}$, $L = 1\text{m}$, $E = 210\text{ GPa}$, $A = 6.0 \times 10^{-4}\text{ m}^2$ for element 1 and 2, $A = 6\sqrt{2} \times 10^{-4}\text{ m}^2$ for element 3. Determine displacement and reaction solutions. [10]

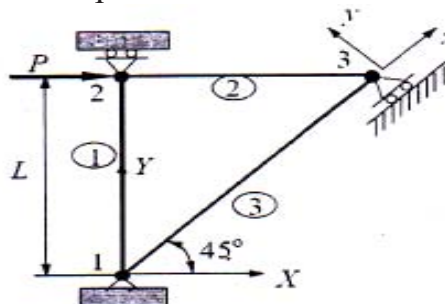


Figure 1

OR

- Q4) a)** Solve for the displacements and the reaction force at node 1 as shown in figure 2, if $k_1 = 4 \text{ N/mm}$, $k_2 = 6 \text{ N/mm}$, $k_3 = 3 \text{ N/mm}$, $F_2 = -30 \text{ N}$, $F_3 = 0$, $F_4 = 50 \text{ N}$ using minimum potential energy approach. [9]

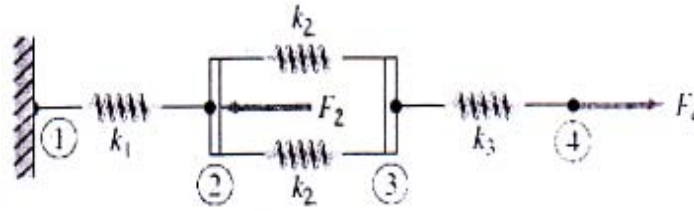


Figure 2

- b)** For the three - bar truss shown in fig. 3, determine the nodal displacements and the stress in each member. Find the support reactions also. Take modulus of elasticity as 200 Gpa . [9]

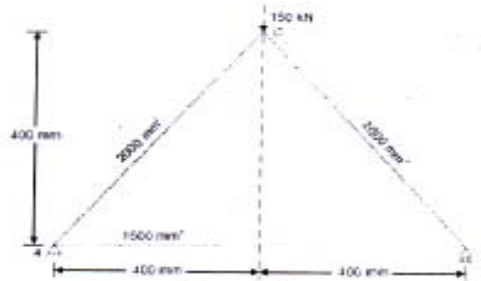


Figure 3

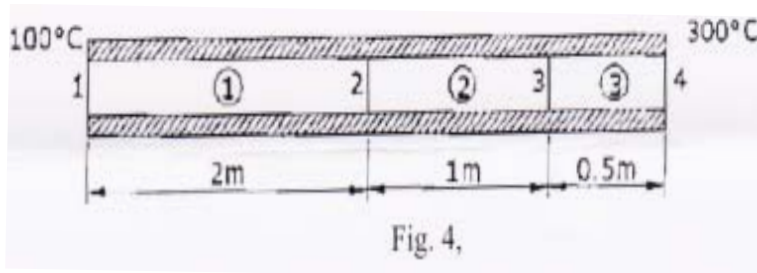
- Q5) a)** Explain two advantages of triangular elements over other elements. [6]
b) A CST element is defined by nodes at I (30,40), J (140,70), and K (80,140) and the displacements at these nodes are (0.1, 0.5), (0.6, 0.5), and (0.4,0.3) respectively . Determine the displacement the natural coordinates and the shape function at point P (77,96) within the element. [10]

OR

- Q6) a)** What is mesh refinement Explain h-refinement and p-refinement [7]
b) Explain the concept of isoparametric, sub parametric and super parametric elements and their uses. [9]

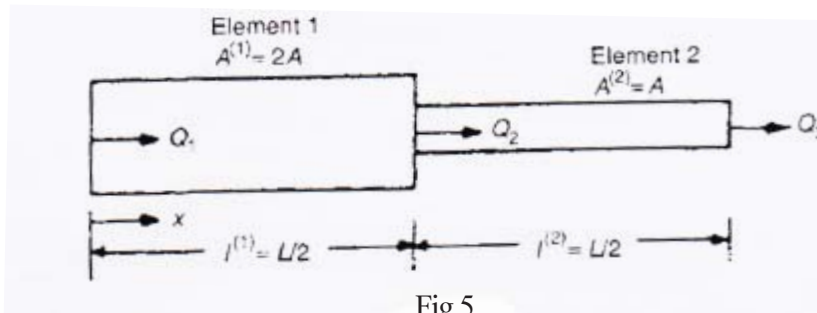
SECTION - II

- Q7) a)** Explain plain stress and plain strain conditions in thermal analysis [8]
b) For a one dimensional composite bar shown in Fig. 4, determine the interface temperatures. For element 1, let $K_{xx} = 200 \text{ W/m}^\circ\text{C}$; for element 2, let $K_{xx} = 100 \text{ W/m}^\circ\text{C}$; and for element 3, let $K_{xx} = 50 \text{ W/m}^\circ\text{C}$; Let $A = 0.1 \text{ m}^2$. The left end has a constant temperature of 100°C and the right end has a constant temperature of 300°C . [10]



OR

- Q8)** a) Explain the finite element modeling and shape functions for linear interpolation of temperature field of one dimensional heat transfer element. [9]
- b) In a triangular element with the nodes are having Cartesian coordinates (50, 60), (150, 90), (100,140) respectively. At the point P (100, 90) determine its natural coordinates, shape functions and temperature. [9]
- Q9)** a) Derive the lumped element mass matrix for 1 -D bar element. [6]
- b) Find the natural frequencies of longitudinal vibration of the unconstrained stepped bar as shown in Figure 5. [10]



OR

- Q10)** a) Derive the lumped element mass matrix for beam element. [6]
- b) Explain the procedure involved in deriving the finite element equation of a dynamic problem. [10]
- Q11)** a) Explain the terms aspect ratio, warp angle and skew used for quality checks of element in FEM. [9]
- b) Explain pre-processing in finite element analysis. [7]
- OR
- Q12)** a) Explain the terms distortion, stretch and taper used for quality checks of element in FEM. [9]
- b) Explain post - processing in finite element analysis. [7]



Total No. of Questions : 12]

SEAT No. :

P1774

[Total No. of Pages : 3

[5059]-6

B.E. (Civil)

AIR POLLUTION AND CONTROL
(2008 Pattern) (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) *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) Discuss the followings :

- a) Metrological Parameters [6]
- b) Scales of Metrology [5]
- c) Plume Behavior [6]

OR

Q2) Answer the following :

- a) How ground level concentration can be measured? Explain in brief. [9]
- b) Calculate effective stack height from following data. [8]
 - i) Physical stack is 203 m tall
 - ii) Inside Diameter 1.07 m
 - iii) Wind velocity is 3.56 m/s
 - iv) Air temperature is 13° C
 - v) Barometric pressure is 1000 millibars
 - vi) Stack gas velocity is 9.14 m/s
 - vii) Stack gas temperature is 149° C

P.T.O.

Q3) Answer the following :

- a) What is Air pollution survey? Discuss. [9]
- b) What is sampling of gases? How it is carried? [8]

OR

Q4) Answer the following :

- a) What are the methods available in air sample analysis? Explain any one in details. [9]
- b) Discuss Air Quality Monitoring. [8]

Q5) Answer the following :

- a) How you can modify the indoor air quality? Explain in brief. [8]
- b) What is air pollutant? Give its sources and effects. [8]

OR

Q6) Answer the following :

- a) What are the sources of odor? How odor can be measured? [8]
- b) Enlist the controlling methods for odor. Explain any one in detail. [8]

SECTION - II

Q7) Answer the following :

- a) Give note on air pollution control by [10]
 - i) Process Modification
 - ii) Change of Raw Material
- b) List out the types of control equipments. Explain settling chamber to remove minimum size of the particle. [7]

OR

Q8) Answer the following :

- a) A fabric filter is to be constructed using bags that are 0.3 m in diameter and 6.0m long. The bag house is to receive 10 m³/sec of air, and the appropriate filtering velocity has been determined to be 2.0 m/min. Determine the number of bags required for a continuously cleaned operation. [10]
- b) Discuss about Wet scrubber. [7]

Q9) Answer the following :

- a) What is land use planning? Discuss. [9]
- b) Give a note on economics of air pollution control. [8]

OR

Q10) Answer the following :

- a) Discuss Air (Prevention and Control) Pollution Act 1981 with recent amendment. [9]
- b) What are the emission standards in India for mobile and stationary sources? Discuss. [8]

Q11) Answer the following :

- a) Who are the regulatory agencies and their role to obtain environmental clearance for project? [8]
- b) How the public hearing and role of general public is important in environmental clearance? [8]

OR

Q12) Answer the following :

- a) In what way water resource project impact on environment? Discuss. [8]
- b) Explain in details Environmental management plan. [8]



Total No. of Questions : 12]

SEAT No. :

P1805

[Total No. of Pages : 3

[5059] - 60

**B.E. (Mechanical S/W) (Semester - I)
AUTOMOBILE ENGINEERING
(2008 Pattern)**

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

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

SECTION - I

- Q1) a)** Explain with neat sketch the following layouts **[10]**
- i) Transverse front mounted engine and front wheel drive
 - ii) Longitudinal front mounted engine and rear wheel drive
- b) Explain with neat sketch the construction of a typical truck chassis frame **[6]**

OR

- Q2) a)** Explain the following terms: **[9]**
- i) Air resistance
 - ii) Rolling resistance
 - iii) Grade resistance
- b) Compare the merits and demerits of the frameless construction with the conventional frame construction. **[7]**

- Q3)** a) Explain with neat sketch the operation of centrifugal clutch [8]
b) Explain with neat sketch the operation of full floating rear axle [6]
c) Explain the need of universal joints in propeller shaft [4]

OR

- Q4)** a) Explain with neat sketch the working of epicyclic gear box [8]
b) Explain with neat sketch the operation of torque tube drive [6]
c) Describe the operation of non-slip or limited slip differential used in automobile [4]

- Q5)** a) Explain with neat sketch: Castor, King pin inclination and Scrub radius [6]
b) Explain with neat sketch the working of power steering [6]
c) Write the advantages and disadvantages of independent suspension [4]

OR

- Q6)** a) Explain with neat sketch the working of disc brake [6]
b) Explain with neat sketch the working of shock absorber [6]
c) What are the requirements of automobile air conditioning system and how they are achieved? [4]

SECTION - II

- Q7)** a) What do you understand by servicing of brake system? Prepare the check point list for servicing of brake system. [8]
b) Describe the maintenance required for [8]
i) Tyres
ii) Steering system

OR

- Q8)** a) Classify various systems of engine lubrication. Draw flow diagram of oil showing various parts in a pressure feed system. [8]
b) Write the difference between following: [8]
i) Servicing and repairing
ii) Periodic maintenance and breakdown maintenance

- Q9)** a) Describe with neat sketch construction of vehicle structure and explain how it is made safety for crash worthiness. [8]
- b) What is the role of automobile Head lamp? Explain construction and working of Head lamp. [8]

OR

Q10) Write short note on any Four: [16]

- i) Ergonomics in automobile safety
- ii) Active and passive safety
- iii) Automobile seat
- iv) Head restraint
- v) Safety glass

- Q11)** a) List the various types of sensors used in electronic control system of vehicle. Explain any two sensors used in induction system. [10]
- b) Explain with neat sketch construction and working of electronic anti-lock braking system used in automobile. [8]

OR

Q12) Write short note on any Three: [18]

- i) Microprocessor application in automobiles
- ii) Components for engine management system
- iii) Digital engine control system
- iv) Digital cruise control



Total No. of Questions : 12]

SEAT No. :

P1806

[Total No. of Pages : 5

[5059] - 61

B.E. (Mechanical) (Sandwich) (Semester - I)
OPERATIONS RESEARCH (Elective - III)
(2008Pattern) (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) A firm manufactures three products S_1 , S_2 and S_3 on which the profits earned are Rs.2, Rs. 5 and Rs. 4 respectively. Each product need two types of raw materials R_1 and R_2 which the firm can purchase up to a maximum of 500 and 400 units respectively. Design production plan so as to maximize the profit. **[12]**

Raw Material	Consumption of raw materials per unit product		
	S_1	S_2	S_3
R_1	0.5	1	1
R_2	2	0.5	0.5

OR

- Q2) a)** Define terms of linear programming: Basic solution, feasible solution and artificial variables. **[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 : $X_1, X_2, X_3 \geq 0$

- 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) How is it solved Assignment problem by Hungarian Method. [6]
 b) Five jobs are to be assigned to 5 Machines to minimize the total time required to process the jobs on machines. The time is in hours for processing each job on each machine is given in the following matrix. Make assignment of jobs to machines so that total assignment cost should be reduced. [10]

		Machines				
		A	B	C	D	E
Jobs	1	2	4	3	5	4
	2	7	4	6	8	4
	3	2	9	8	10	4
	4	8	6	12	7	4
	5	2	8	5	8	8

- Q5) a)** Explain payback period method. [6]
b) We have five jobs each of which must go through A, B and C. Processing times (in hours) are given in the following table; [10]

Machine s	JOBS						
	1	2	3	4	5	6	7
A	3	8	7	4	9	8	7
B	4	3	2	5	1	4	3
C	6	7	5	11	5	6	12

Determine the optimal sequence of jobs that minimizes the total elapsed time. Also find the idle time for machines A, B and C.

OR

- Q6) a)** What is dynamic programming? Explain detailed procedures to solve problems of dynamic programming. [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.

SECTION - II

- Q7) a)** What are the situations which make replacement of items necessary? [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. [12]

OR

- Q8) 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) Obtain the optimal strategies for both persons and the value of game for two person zero sum game whose pay off matrix is as follows (Use graphical Method) [12]

	Player B	
Player A	B ₁	B ₂
A ₁	1	-3
A ₂	3	5
A ₃	-1	6
A ₄	4	1
A ₅	2	2
A ₆	-5	0

Q9) a) Discuss dynamic programming with suitable examples. Write step by step procedure to solve a general problem by dynamic programming approach. [6]

b) 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 paisa 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 need of simulation? How can you use simulation to solve industrial problems? Discuss with example. [6]

b) A warehouse has only one loading dock manned by three person crew. Trucks arrive at the loading doc at average rate of 4 trucks per hour and the arrival rate is Poisson distributed. The loading of the trucks takes 10 minute in average and can be assumed to be exponentially distributed. The operating cost of the truck is Rs. 20 per hour and the members of the loading crew are paid Rs. 6 each per hour. What you advise the truck owner to add another crew of three persons? [10]

- Q11)** a) Explain the rules devised by Fulkerson. **[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. **[12]**

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.

OR

Q12) Construct a PERT network from the following information.

Job	A	B	C	D	E	F	G	H	I	J	K	L
Optimistic Time	1	2	2	6	4	6	8	12	4	10	2	6
Most likely Time	2	4	6	8	6	10	10	14	8	12	4	10
Pessimistic Time	3	6	10	10	8	14	12	16	12	14	6	14
Immediate Predecessors	--	A	A	B	C	C	E	F	G, H	G, H	I	J

- a) Construct the network and find critical path
- b) Assume that the schedule allows 50 days to complete the project, calculate the probability of completion by the scheduled date
- c) Contractor wants scheduled completion date that will give him 98% chance of completing the project, how many days should be allowed in his schedule. **[16]**



Total No. of Questions : 10]

SEAT No. :

P1807

[Total No. of Pages : 3

[5059] - 62
B.E. (Mechanical S/W)
ROBOTICS (Elective - III)
(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) *Q 1 & Q 6 are compulsory.*
- 2) *Solve three questions from each section.*

SECTION - I

Q1) Solve any three from (a), (b), (c) & (d)

- a) Discuss various socio-economic issues associated with robotisation [6]
- b) Explain the terms [6]
 - i) stability
 - ii) control resolution
- c) Sketch & explain the working of cylindrical robot. State it's applications [6]
- d) Explain with neat sketch the work volume [6]
 - i) For a spherical robot
 - ii) For a Cartesian robot

- Q2)** a) Explain with neat sketch any two types of Mechanical grippers [8]
b) Discuss various functions performed by sensors in robots [8]

OR

- Q3)** a) What are different considerations in design/selection of grippers? [8]
b) Explain with neat sketch [8]
 - i) A rotary position sensor
 - ii) A force sensor

P.T.O.

- Q4)** a) Explain with neat sketch the working of stepper motor. State it's advantages [8]
b) Explain different steps involved in trajectory planning [8]

OR

- Q5)** a) State limitations of Pneumatic & Hydraulic actuators used in robots [6]
b) Explain briefly with the help of basic equation [10]
i) Proportional Control
ii) Integral Control

State the characteristics of the processes where they can be used

SECTION - II

NOTE: (Solve any 3 out of(a), (b), (c), (d), & (e) of Q.No6)

- Q6)** a) Explain six degrees of freedom associated with arm, body and wrist of the robot. [6]
b) Explain the following terms (Any 2) [6]
i) Fixed Angle Representation
ii) Euler Angle Representation
iii) Composite Homogeneous Transformation Matrix
c) Define the term 'Workspace'. Explain the categories of workspace with reference to a planar 2R manipulator. [6]
d) Explain 'Denavit-Hartenberg parameters' with suitable example. [6]
e) State the properties of Generalized Composite Rotation Matrix. [6]

An object tracking system identifies a flying object at (800 m, 500 m, 1500 m) in it's current co-ordinate system, which is oriented by

i. 30° of rotation about the X-axis,

ii. 25° of rotation about the Y-axis. & finally

iii. -35° of rotation about the Z-axis of the Universal co-ordinate System. Map the object in the Universal co-ordinate system.

- Q7)** a) What are the functions of 'Machine Vision System'? Draw a block diagram showing typical vision system. [6]
- b) Explain various imaging devices and image processing techniques used in a robot. [10]

OR

- Q8)** a) What is a robot vision system? How can vision systems be classified? Explain the categories. [10]
- b) Explain the need of a vision in a robotic system. [6]

- Q9)** a) Enlist various robot programming languages and discuss the elements of Robot Programming language. [8]
- b) Describe various search techniques used with respect to Artificial Intelligence in robots. [8]

OR

- Q10)** a) Explain the importance of Artificial Intelligence in the context of Robotics. [4]
- b) State various modes of robot programming. Explain interpolation schemes. [6]
- c) Write short notes on (Any 2) [6]
- i) WAIT, DELAY & SIGNAL commands
 - ii) Motion commands
 - iii) Subroutines



Total No. of Questions : 12]

SEAT No. :

P1808

[Total No. of Pages : 5

[5059] - 63
B.E. (Mechanical Sandwich)
COSTING AND COST CONTROL
(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

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

SECTION - I

- Q1) a)** State the objectives and importance of cost accounting. **[8]**
b) Differentiate between financial accounting & cost accounting. **[8]**

OR

- Q2) a)** Calculate the prime cost, factory cost, cost of production cost of sales and profit from the following particulars: **[8]**

	Rs.		Rs.
Direct Materials	2,00,000	Office stationary	1000
Direct wages	50,000	Telephone charges	250
Direct expenses	10,000	Postage and telegrams	500
Wages of foreman	5,000	Salesmen's salaries	2500
Eclectic power	1,000	Travelling expenses	1,000
Lighting Factory	3,000	Repairs and renewal plant	7,000
office	1,000	Office premises	1,000
Storekeeper's wages	2,000	Carriages outward	750
Oil and water	1,000	Transfer to reserves	1,000
Rent: Factory	10,000	Discount on shares written off	1,000
:Office	5,000	Advertising	2,500
Depreciation Plant	1,000	Warehouse charge	1,000
Office	2,500	Sales	3,79,000
Consumable store	5,000	Income tax	20,000
Managers salary	10,000	Dividend	4,000
Directors fees	2,500		

P.T.O.

b) State the explain limitations of financial accounting [8]

Q3) a) Explain the different methods of costing used in manufacturing industries [8]

b) Explain the detail various parameters used for classification of costs [8]

OR

Q4) a) What do you understand by direct expenses? What are the characteristics? [4]

b) Are direct expenses more important than indirect expenses? Explain. [4]

c) Define and explain in details the following with suitable examples

Manufacturing overheads

Indirect labour cost

Sales and distribution overhead [8]

Q5) a) In a factory working six days in a week and eight hours each day, a worker is paid at the rate of Rs. 100 per day basic plus D.A. @ 120% of basic. He is allowed to take 30 minutes off during his hours shift for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to

Job X 15 hrs.

Job Y 12 hrs.

Job Z 13 hrs.

The time not booked was wasted while waiting for a job. In Cost Accounting, how would you allocate the wages of the workers for the week? [8]

b) State the method of allocation of administration overhead to cost centers or products. [10]

OR

Q6) A company has three production departments (M1, M2 and A1) and three service department, one of which Engineering services department, servicing the M1 and M2 only. The relevant information is as follows: [18]

Production department	Product X	Product Y
M1	10 Machine hours	6 Machine hours
M2	4 Machine hours	14 Machine hours
A1	14 Direct Labour hours	18 Direct Labour hours

The annual budgeted overhead cost for the year are

Production Department	Indirect Wages (Rs.)	Consumable Supplier (Rs.)
M1	46,520	12,600
M2	41,340	18,200
A1	16,220	4,200
Stores	8,200	2,800
Engineering Service	5,340	4,200
General Service	7,520	3,200

Depreciation on Machinery (Rs.) 39,600

Insurance of Machinery (Rs.) 7,20,019

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 deptt. Is located in a building owned by the company).

It is valued at Rs. 6,000 and is charged into cost at notional value of 8% per annum. This cost is additional to the rent shown above) The value of issues of materials to the production departments are in the same proportion as shown above for the consumable supplies.

The following data are also available:

Department	Book value Machinery (Rs.)	Area (Sq. ft)	Effective H.O. Hours	Production Direct Labour Hours	Capacity Machine hour
M1	1,20,000	5,000	50	2,00,000	40,000
M2	90,000	6,000	30	1,50,000	50,000
A1	30,000	8,000	05	3,00,000	
Stores	12,000	2,000	-		
Engineering Service	36,000	2,500	10		
General service	12,000	1,500	-		

- a) Prepare a overhead analysis sheet, showing the bases of apportionment of overhead to departments.
- b) Allocate service department overhead to production department ignoring the apportionment of service department cost among service departments.
- c) Calculate suitable overhead absorption rate for the productions.
- d) Calculate the overheads to be absorbed by two products, X and Y.

SECTION II

- Q7)** a) A cork manufacturing company produces the following products by using 5,000 tonnes of coal @ Rs. 15 Per tonne into a common process.
 Coke 3,500
 Tar 1,200 tonnes
 Sulphate of ammonia 52 tonnes
 Benzol 48 tonnes
 Apportion the joint cost amongst the products on the basis of the physical unit method. [8]
- b) Find out the cost of joint products A and B using contribution margin method from the following data:
 Sales
 Product A: 100kg @ Rs. 60 per kg
 Product B: 120kg @ Rs. 30 per kg
 Joint costs
 Marginal cost Rs. 4,400
 Fixed cost Rs. 3,900 [8]

OR

- Q8)** a) Discuss the distinguishing features of process cost system. [8]
 b) What are the methods of apportioning joint costs? Explain any one in brief. [8]
- Q9)** a) A manufacturing company incurs fixed costs of Rs. 3,00,000 per annum. It is a single product company with annual sales budgeted to be 70,000 units at a sales price of Rs. 300 per unit. Variable costs are Rs. 285 per unit. Draw a point volume graph. and use it to determine the breakeven point. [8]
 b) State the limitations of breakeven analysis [8]

OR

- Q10)* a) Explain the concept of contribution and contribution to sales ratio in marginal costing. [8]
b) Difference between absorption costing and marginal costing. [8]

- Q11)* a) State the basis of standard costing [9]
b) State the need for standard costs [9]

OR

- Q12)* Write a short note (Any two) [18]
a) Controllable and uncontrollable variances
b) Techniques of marginal costing
c) Types of standards in standard costing



Total No. of Questions : 12]

SEAT No. :

P2114

[5059]-64

[Total No. of Pages : 2

**B.E.(Mechanical S/W)
MACHINE TOOL DESIGN
(2008 Course) (402066B)**

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) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6. Q7 or Q8 , Q9 or Q10 & Q11 or Q12.*

SECTION-I

Q1) a) Compare Geometric, Harmonic and Arithmetic Progressions for stepped Regulation [9]

b) Write short note on: Selection of motor for machine drives. [7]

OR

Q2) a) Decide the number of teeth of all gears from a 9 speed gearbox with speeds starting from 100 rpm and based on R5, to transmit 10KW power from a motor running at 1440rpm.(Assume that the minimum number of teeth in all stages is 20 and that the design is based on symmetric structure diagram only) [10]

b) Draw the deviation diagram of designed gearbox. [6]

Q3) a) What are the advantages of CI over fabricated structures for beds of machine tools? [8]

b) Give design considerations in column of drilling machine [8]

OR

Q4) Explain the procedure of analyzing the forces on machine tool structures[16]

Q5) a) Explain method of relieving load on guides to avoid stick slip. [9]

b) Write short note on: Combination friction Slides [9]

OR

P.T.O.

- Q6)** a) Compare load carrying capacities of Hydrostatic and Hydrodynamic lubrication systems [9]
b) Write short note on: Requirements of guide ways and their types. [9]

SECTION-II

- Q7)** Explain the process of design of spindle and spindle support using deflection and rigidity analysis [16]

OR

- Q8)** Explain optimization of spacing between spindle supports [16]

- Q9)** a) Explain the Dynamic characteristic of the cutting process [8]
b) What are different control systems of machine tools [8]

OR

- Q10)** What are the causes of vibrations in machine tools? Explain methods of reducing the vibrations [16]

- Q11)** a) Explain the Design considerations NC/CNC Machines [9]
b) What are Recent trends in machine tools? [9]

OR

- Q12)** a) Explain the process of retrofitting [9]
b) Write short note on : Design Layout of machine tool using matrices [9]



Total No. of Questions : 12]

SEAT No. :

P2115

[5059]-65

[Total No. of Pages : 2

B.E.(Mechanical Sandwich)

ENERGY MANAGEMENT & INDUSTRIAL POLLUTION

(2008 Course)(Elective-IV)(Semester-II) (402066)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Assume suitable data, if necessary.*

SECTION-I

Q1) a) What are the benefits of energy efficiency? Write your comments on use of renewable energy sources. [9]

b) Discuss energy security and energy strategy for the future of a nation.[9]

OR

Q2) a) Write short note on Energy Efficient Motors. [9]

b) Explain the concept of power factor improvement? Discuss about the location of capacitor for power factor improvement. [9]

Q3) a) Explain in detail methodology for conducting detailed energy audit. [8]

b) With suitable example, explain the need for fuel substitution. [8]

OR

Q4) a) Discuss the various financial analysis techniques for investments in energy efficiency projects. [8]

b) A cogeneration system installation is expected to reduce an annual company's bill by Rs.20 Lacks. If the capital cost of the new cogeneration installation is Rs. 60 Lacks. & Rs.5 Lacks per year on an average required maintaining & operating plant. Calculate simple payback period & % return on Investment (%ROI). What is the future value of Rs.1000/- after 3 years if the interest rate is 10%? [8]

Q5) a) Explain the opportunities for improving energy efficiency in the boilers.[8]

b) Write short note on Insulating materials. [8]

OR

P.T.O.

- Q6)** a) How energy conservation is possible in pumping systems? [8]
b) Write the areas for improving the thermal efficiency of the HVAC systems. [8]

SECTION-II

- Q7)** a) Write a note on Environmental pollution. [9]
b) Discuss the concept of Clean Development Mechanism [9]

OR

- Q8)** a) Discuss various global environmental issues. [10]
b) Write short note on Fossil fuel related pollutants. [8]
- Q9)** a) What are the sources of water pollution? [10]
b) Explain in short, different air quality control techniques? [6]

OR

- Q10)a)** Write short notes on [10]
i) Noise Pollution
ii) Air pollution laws and standards
- b) Write a short note on Waste Water Treatment [6]
- Q11)a)** Write a note on waste minimization techniques [8]
b) What are the direct and indirect benefits of waste heat recovery? [8]

OR

- Q12)a)** What do you understand by the sustainable development? [8]
b) Write short notes on [8]
i) Climate change
ii) Cogeneration



Total No. of Questions : 12]

SEAT No. :

P1775

[Total No. of Pages : 3

[5059]-7

B.E. (Civil)

ARCHITECTURE AND TOWN PLANNING

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Sec. I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Sec. II.*
- 2) *Assume suitable data if necessary.*
- 3) *Use separate answer sheets for Section one and two.*

SECTION - I

Q1) A) What is the difference between the vision for the development by a town planner and an architect? [9]

B) Write a short note on different garden styles. [8]

OR

Q2) A) Explain in detail the elements of design and mention the effectivity of these on architectural composition giving suitable examples. [9]

B) How and why water body conservation & creation is responsible for the development of an area? Explain with a suitable example. [8]

Q3) A) Explain the significance of the prevailing byelaws for enriching the spaces and hence to arrive at a beautiful "Built Environment", within a town.[9]

B) Explain the differences between URBAN DESIGN & URBAN RENEWAL. [8]

OR

Q4) A) What is the necessity of the concept "Built Environment", in relation with development of megacities. [8]

B) Enlist the parameters on which Quality of Life is based and establish the relation of the same with Urban Renewal proposal. [9]

P.T.O.

- Q5) A)** Write a short note on : Advantages and usage of sustainable materials. [8]
- B)** Enlist and elaborate aspects contributing for designating a building as a “Green Building”? [8]

OR

- Q6) A)** Enlist different sustainable technologies and explain the advantages and usage of the same. [8]
- B)** Write a short note on any one “Green build case study.” [8]

SECTION - II

- Q7) A)** Explain about the contribution of any three town planners for deciding different levels of development. [9]
- B)** Write short notes on : town planning scheme and garden city with appropriate examples. [8]

OR

- Q8) A)** Explain various theories of developments with the help of suitable sketch. [9]
- B)** Explain the concept new towns ; by giving suitable example. [8]

- Q9) A)** Explain various levels of Planning and elaborate 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 the types of surveys and the importance of the same while finalizing DP Proposal when you are working as a planner. [9]
- B)** Explain various urban road objectives and importance of traffic management. [8]

- Q11)A)** Write a short note on: SEZ, giving its status in our country. [8]
- B)** Elaborate applicability of modern tools for:
- a) Land Use Analysis
 - b) Traffic management [8]

OR

- Q12)A)** Write short notes on [8]
- a) LA Act
 - b) MHADA.
- B)** Elaborate applicability of modern tools for [8]
- a) disaster management
 - b) traffic regulation.



Total No. of Questions : 12]

SEAT No. :

P1809

[Total No. of Pages : 4

[5059] - 71

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

**AUTOMOTIVE REFRIGERATION AND AIR CONDITIONING
(2008 Pattern)**

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

- 1) *Figures to the right side indicate full marks.*
- 2) *Use of steam tables, slide rule, electronic calculator, and psychrometric chart is allowed.*
- 3) *Assume suitable data if necessary.*
- 4) *Solve 6 questions 1 or 2, 3 or 4, 5 or 6,7 or 8,9 or 10 & 11 or 12.*

SECTION - I

Q1) a) Explain Vapor and gas as a refrigerant in reverse Carnot cycle. [8]

b) Explain Reversed Carnot cycle with neat sketch. [8]

OR

Q2) a) Explain Bell Coleman cycle with neat sketch. [8]

b) A refrigeration machine using R-12 as refrigerant operates between the pressures 2.5 bar & 9 bar. The compression is an isentropic and there is no undercooling in the condenser. The vapor is in dry saturation condition at the beginning of the compression. Estimate the theoretical coefficient of performance. If the actual coefficient of performance is 0.65 of theoretical value. Calculate the net cooling produced per hour. The refrigerant flow is 5 kg per min. properties of refrigerant are: [8]

Pressure (bar)	Temp. °C	Enthalpy (kJ/kg)		Entropy of saturated vapor, (kJ/kgK)
		Liquid	Vapor	
9	36	70.55	201.8	0.6836
2.5	-7	29.62	184.5	0.70001

P.T.O.

- Q3)** a) Explain the types of refrigerants explain in detail primary & secondary [9]
b) Describe Accumulators, receiver driers used in refrigerating system. [9]

OR

- Q4)** a) Explain the refrigerant charge capacity determination with neat sketch. [9]
b) State and explain the different types of condensers used in refrigeration system. [9]

- Q5)** a) Describe the different air distribution modes in car with neat sketch, [8]
b) Write short note on comfort condition in the car A/C system. [8]

OR

- Q6)** a) Explain the Vehicle operation modes & Cool-down performance. [8]
b) Write a short note on (ANY TWO) [8]
i) A/C ducts
ii) Air filter
iii) Blower fans

SECTION - II

- Q7)** a) Discuss the any two psychrometric processes with the help of hand drawn psychrometric chart. [8]
i) Sensible cooling & sensible heating
ii) Evaporative cooling
iii) Adiabatic chemical dehumidification
iv) Adiabatic mixing of two air stream for fog formation
b) Air at 10°C DBT & 90% RH is to be heated & humidified to 35°C DBT & 22.5°C WBT. The air is preheated sensibly before passing to the air washer in which water is recirculated. The RH of air coming out of the air washer is 90%.this air is again reheated sensibly to obtain the final desired condition. [8]

Find:

- i) The temp. to which air should preheated.
ii) The total heating required
iii) The make-up water required in the air washer
iv) The humidifying efficiency of the air washer.

OR

- Q8)** a) Explain the following psychrometric relation [8]
- i) Humidity ratio
 - ii) Relative humidity
 - iii) Degree of saturation
 - iv) Daltons law of partial pressure
- b) For a sample of air having 28°C DBT and relative humidity 40% at barometric pressure of 760 mm of Hg, Calculate: [8]
- i) Vapour pressure of air
 - ii) Humidity Ratio
 - iii) Vapour density or absolute humidity
 - iv) Enthalpy
- Verify your result by psychrometric chart.

- Q9)** a) Define following with neat sketch: [9]
- i) OASH
 - ii) ERSHF
 - iii) GSHP
- b) The following data refer to summer air conditioning of building: [9]
- Outside design conditions = 43°C DBT, 27°C WBT
Inside design condition = 25°C DBT, 50% RH
Room sensible heat gain = 84000 kJ/h
Room Latent heat gain = 21000 kJ/h
By pass factor of the cooling coil used = 0.2
The return air from the room is mixed with outside air before entry to cooling coil in the ratio of 4:1 by mass. Determine
- i) Apparatus Dew Point of cooling coil
 - ii) Condition of the air entering & exit for cooling coil
 - iii) Fresh air mass flow rate
 - iv) Refrigerant load on cooling coil

OR

- Q10)** a) Explain the effect of air conditioning load on engine performance. [9]
b) Explain the air conditioning electrical and electronic control with sketch.[9]

- Q11)** a) Explain Any 2 from the following [8]
i) Initial vehicle inspection
ii) Temperature measurement
iii) Retrofitting
iv) Odour removal
b) Write a short note on refrigerant recovery, recycle and charging [8]

OR

- Q12)** a) Explain the refrigerant oil giving at least 2 examples of oil. [8]
b) Explain various detection test. [8]



Total No. of Questions : 10]

SEAT No. :

P1810

[Total No. of Pages : 3

[5059]-72

B.E. (Automobile Engg.)

MACHINE & VEHICLE DYNAMICS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) A three cylinder radial engine driven by common crank has the cylinders spaced at 120° . The stroke is 125mm, length of connecting rod 225mm & the mass of reciprocating parts per cylinder 2kg. Calculate primary & secondary forces at crank shaft speed of 1200rpm. [10]
- b) Explain the effect of partial balancing of single cylinder engine. [6]

OR

- Q2)** a) A shaft carries four masses A, B, C, D which are placed parallel perpendicular planes to longitudinal axis. The unbalanced masses at plane B & C are 3.6 kg, 2.5kg respectively & both are assumed to be concentrated at a radius of 25mm while the masses in planes A & d are both at radius of 40 mm. The angle between the planes B & C is 100° & that betn., B & A is 190° , both angles being measured in counter clockwise direction from plane B, the planes containing A & B are 250mm apart & these containing B & C are 500mm. If the shaft is to be completely balanced determine [12]
- i) Masses at the planes A & D.
 - ii) The distance betn., the plane C & D.
 - iii) The angular position of mass D
- b) What is static & dynamic Balancing. [4]

P.T.O.

Q3) a) The measurement of mechanical vibrating system show that it has a mass of 8kg on that spring can be combined to give on equivalent spring stiffness of 5.4 N/mm. If the vibrating system has a dash pot attached which has damping coefficient of N-S/m. [8]

Determine :

- i) Critical damping coefficient
- ii) Damping factor
- iii) Logarithmic decrement
- iv) Ratio of two consecutive amplitude.

b) Define the following with examples. [8]

- i) Degree of freedom
- ii) Phase angle
- iii) Time period
- iv) Resonance

OR

Q4) Derive the equation for damped free vibration for under damped, over damped & critically damped system to find out root of governing equation of vibration. [16]

Q5) Solve any two : [2 × 9 = 18]

- a) Derive expression of force transmissibility & impact of resonance on it.
- b) Write a note on vibration Isolation.
- c) Find out generalize equation of motion & phase angle by analytical method for single degree damped forced vibration having harmonic excitation force on the system.

SECTION - II

Q6) a) Explain in brief about ground effect in racing vehicles. [8]

b) Write a short note on aerodynamic lift & its control parameters. [8]

OR

Q7) a) Explain braking performance characteristics of vehicle in brief. [8]

b) Write a short note on vehicle forces & moments. [8]

- Q8)** a) Draw & explain mathematical model for ride. [8]
b) Differentiate active & semiactive suspension. [8]

OR

- Q9)** a) Write a note on under steer, oversteer & neutral steer. [8]
b) Enlist vibration excitation sources responsible for vehicle ride. [8]

Q10 Write a note on any three from following : [3 × 6 = 18]

- a) Ackerman steering mechanism.
- b) Lateral acceleration gain
- c) Characteristic speed
- d) Handling characteristics of vehicle (any 2)
- e) Yaw velocity response.



Total No. of Questions : 12]

SEAT No. :

P1811

[Total No. of Pages : 3

[5059] - 73

B.E. (Automobile Engineering) (Semester - I)
AUTOMOTIVE SYSTEM DESIGN
(2008 Pattern)

Time :3 Hours]

[Max. Marks :100

Instructions to the candidates:-

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

SECTION - I

- Q1)** a) Explain the aesthetic and ergonomics considerations in design. [8]
b) A hollow shaft is required to transmit 600 KW at 110 rpm, 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 meters 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. [10]

OR

- Q2)** a) Explain about mechanical reliability. [6]
b) Explain the role of natural tolerances in design. [6]
c) Explain optimization techniques in design. [6]
- Q3)** a) What causes the clutch to slip? [4]
b) What are the design requirements of a clutch? [4]
c) A single dry plate clutch is to be designed to transmit 10 HP at 900 rpm. Find [8]
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

P.T.O.

- iii) Outer and inner radii of the clutch plate
- iv) Axial force required to engage the clutch

OR

- Q4)** a) Why multi-plate clutch is preferred in two wheelers? [4]
- b) Why is centrifugal clutch more suitable for heavy duty application? [4]
- c) A centrifugal clutch is to be designed to transmit 20 HP at 900 rpm. The shoes are four in numbers. 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 Ferrodo for which the coefficient of friction may be taken as 0.25. Determine weight of the shoes and size of the shoes. [8]

- Q5)** a) What is the purpose of gearing system in a vehicle? [4]
- b) A four speed gear box is to have the ratios of 1, 1.5, 2.48 and 3.93. The center distance between the lay shaft and the main shaft is 73.12 mm and the smallest pinion is to have at least 12 teeth with a diametral pitch of 3.25 mm. Find the number of teeth of the various wheels and exact gear ratios. [12]

OR

- Q6)** a) Explain the selection of bearing in gearboxes. [6]
- b) The maximum gear ratio of an engine 75 mm bore and 100 mm stroke is 4. The pitch diameter of the constantly meshing gear is 75% of the piston stroke. If the module is 4.25 mm, calculate the size and number of teeth of gears for a three speed gear box. Calculate the face width of the constantly meshing gear using the modified Lewis formula. The engine torque is 910 kgf-cm, value of constant in the Lewis formula is 0.7 and the allowable stress is 900 kgf/cm². [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 Mpa, find the cross-section of shafts. Take gear box reduction as 5. [10]

OR

- Q8)** a) Explain the general design procedure of front axle. [10]
b) A car has one of its rear wheels jacked up of the ground. With top gear engaged, the engine is turned by hand and it is found to make 11 turns while the jacked up wheel turns 4 times. With first gear engaged, 19 turns of the engine correspond to 2 turns of the road wheel. Assuming direct drive through the gear box in top drive, calculate the rear axle ratio and the first gear ratio of the gear box. [6]
- Q9)** a) Explain braking of a vehicle on a curved path. [6]
b) What are the components of hydraulic braking system? Explain their functions. [10]

OR

- Q10)** a) What happens if coefficient of friction in the brake lining material becomes extremely high? [6]
b) Calculate the mean lining pressure and heat generated during braking operation. [10]
- Q11)** a) Explain the following.
i) Over-steer
ii) Stiff steering [8]
b) A vehicle spring of semi elliptical type has leaves of 75 mm width and 10 mm thickness and effective length 900 mm. If the stress is not to exceed 220725000Pa when the spring is loaded to 4905N, estimate the required number of leaves and the deflection under this condition. If the spring is just flat under load, what is the initial radius? Take $E=196.2 \times 10^9 \text{Pa}$. [10]

OR

- Q12)** a) Explain any one steering gear mechanism. [6]
b) Explain the design considerations of steering system. [6]
c) How are steering gear ratio and number of turns determined? [6]



Total No. of Questions : 12]

SEAT No. :

P2116

[5059]-74

[Total No. of Pages : 2

**B.E. (AUTOMOBILE ENGINEERING)
Automotive Aerodynamics and styling (Elective-I)
(2008 Course) (416491-A) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Derive momentum equation for fluid flow. [8]
b) Write a short note on stream lines, path lines and streak lines. [8]

OR

- Q2)** a) Write a short note on vehicle performance under various back pressure. [8]
b) Explain Flow phenomenon through divergent and convergent passage. [8]

- Q3)** a) How development of lift will generate on aerofoil. [8]
b) Write any four characteristics of swept wings in brief. [8]

OR

- Q4)** a) Explain lift and drag divergence. [8]
b) How mach number affects flow of air over the car? [8]

- Q5)** a) Explain flow path for internal and External flow of air for car. [8]
b) Enlist types of drag force and How to reduce them? [10]

OR

- Q6)** a) Write a short note on strategical development of car aerodynamics. [8]
b) How to optimize car body to lower the drag ? [10]

P.T.O.

SECTION-II

- Q7) a)** Explain origin of forces and moment in brief. [8]
b) How CFD improve designing of car? [8]

OR

- Q8) a)** Write a note on effect of gap configuration and fastener in brief. [8]
b) Explain the difference between hatch back and sedan vehicle in brief with diagram. [8]

- Q9) a)** Write a short note on open type wind tunnel. [8]
b) How velocity will be calculated in wind tunnels? [8]

OR

- Q10)a)** Explain Flow visualization techniques. used in wind tunnel testing. [8]
b) Write a short note on climatic wind tunnel. [8]

- Q11)a)** Write a short note on vehicle aesthetic. [10]
b) Explain color code for vehicle in brief. [8]

OR

- Q12)a)** How styling affects the overall profile of vehicle? [10]
b) Explain How noise will be measured around vehicle body? [8]



Total No. of Questions : 12]

SEAT No. :

P1812

[Total No. of Pages : 4

[5059] - 75

B.E. (Automobile/Mechanical)

TRIBOLOGY

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Discuss with suitable examples the significance of Tribology in design of Machine Element. **[8]**
- b) Determine viscosity of the lubricant in centipoise having viscosity 160SUS and specific gravity 0.86. **[4]**
- c) Explain extreme pressure lubricants. Where they are used. **[4]**

OR

- Q2)** a) Compare between sliding and rolling contact bearing considering any eight suitable parameter. **[8]**
- b) State and discuss the lubricants and lubrication methods used in following applications: **[8]**
- i) I. C. Engines
 - ii) Rolling contact bearings
 - iii) Refrigeration compressors
 - iv) Spur and Helical gears.

P.T.O

Q3) a) Using modified adhesion theory of friction, show that the coefficient of

friction due to adhesion is
$$fa = \frac{k}{\left[\propto (1 - k^2)\right]^{1/2}} \quad [8]$$

b) Explain any eight factors affecting wear rate. [8]

OR

Q4) a) Explain in brief Laws of friction. [4]

b) Write a note on stick-slip vibration. [4]

c) Show that the volume of abrasive wear per unit sliding distance with

conical abrasive particle is given by
$$Q = \frac{2 \cos \propto}{\pi} \left(\frac{W}{P} \right) \quad [8]$$

Q5) a) Derive two-dimensional Reynold's equation for Hydrodynamic lubrication with usual notations. Also state the assumptions. [10]

b) Explain how selection of following parameters affect performance of hydrodynamic journal bearing: [8]

- i) Length to diameter ratio
- ii) Unit bearing pressure
- iii) Radial clearance
- iv) Minimum oil film thickness

OR

Q6) The following data is given for 360° hydrodynamic bearing. (Refer Table 1) [18]

Radical Load=9 KN

Journal speed=2185rpm

l/d ratio=1

Permissible average bearing Pressure=2.5 N/mm²

Viscosity of lubricant=155 SUS

Specific gravity of lubricant = 0.86

Specific heat of lubricant=2.09 KJ/Kg⁰K

Calculate:

- i) Length of bearing
- ii) Diameter of journal
- iii) Coefficient of friction
- iv) Power lost in friction
- v) Total flow rate in l/min
- vi) Side leakage in l/min
- vii) Minimum oil film thickness
- viii) The temperature rise

Table : 1.

l/d	h_o/C	ϵ	S	$(r/c)f$	$Q/rcnsl$	Q_s/Q	P_{max}/P
1.0000	0.0000	1.0000	0.0000	0.0000	0.0000	1.000	0.000
	0.0300	0.9700	0.00474	0.5140	4.8200	0.973	6.579
	0.1000	0.9000	0.0188	1.0500	4.7400	0.919	4.048
	0.2000	0.8000	0.0466	1.7000	4.6200	0.842	3.195
	0.4000	0.6000	0.1210	3.2200	4.3300	0.680	2.409
	0.6000	0.4000	0.2640	5.7900	3.9900	0.497	2.066
	0.8000	0.2000	0.6310	12.8000	3.5900	0.280	1.890
	0.9000	0.1000	1.3300	26.4000	3.3700	0.150	1.852
	1.0000	0.0000	∞	∞	3.1420	0.000	0.000

SECTION - II

- Q7)** a) What is stiffness of hydrostatic step bearing? Obtain an expression for stiffness of hydrostatic step bearing in terms of thrust load. **[8]**
- b) A vertical shaft rotating at exceptionally low speed is supported by the hydrostatic step bearing. The thrust load acting on shaft is 900 KN. The diameter of shaft is 450 mm. The minimum oil film thickness required for avoiding the metal to metal contact is 95 microns. The fluid pump has efficiency of 90%. The pumping power loss should be minimum as possible, if frictional power loss in bearing is negligible. Calculate, **[10]**
- i) Recess Diameter
 - ii) Supply pressure of fluid
 - iii) Flow rate of fluid in lpm
 - iv) Pumping power required
 - v) Temperature rise

OR

- Q8)** a) Derive an equation for load carrying capacity for given velocity of approach and film thickness in case of rectangular plate approaching a plane. [8]
- b) A plate of 27.5 mm length and infinite width is separated from a plane by an oil film of 26 micron thickness and having viscosity of 0.05 Pa-Sec. If the normal load per unit width of 22 KN/M is applied on plate. Determine, [10]
- i) Time required to reduce the film thickness to 2.6 microns
 - ii) Maximum pressure
 - iii) Avg. Pressure
- Q9)** a) Explain Elasto-hydrodynamic lubrication between two long cylinders and hence derive equation of pressure distribution. [8]
- b) Explain the principle and application of elasto-hydrodynamic lubrication. [8]

OR

- Q10)**a) Derive an expression for volume flow rate of air in case of aerostatic step bearing [8]
- b) Write short notes on [8]
- i) Lubrication in wire drawing and extrusion.
 - ii) Self lubricated bush bearings.
- Q11)**a) What is surface engineering? Explain its concept and scope. [8]
- b) Explain the mechanism of electro and electro less plating with industrial application. [8]

OR

- Q12)**a) Explain different geometrical properties of surface and state various parameters used for measurement of surface properties. [8]
- b) What is the concept of PVD, CVD and PECVD. Explain with the help of schematic illustration by suitable industrial example. [8]



Total No. of Questions : 12]

SEAT No. :

P1813

[Total No. of Pages : 4

[5059] - 76

B.E. (Automobile Engineering)

CAD/CAM & AUTOMATION

(2008 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) *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) Explain the importance of Homogeneous representation in computer graphics & also explain inverse transformation. [8]
- b) A triangle PQR has its vertices at P(0,0), Q(6,0) & R(4,5) it is to be translated by 5 unit in X direction and 3 unit in Y direction then it is to be rotated in anticlock wise direction about the new position of point R through 90°. Find new position of triangle. [8]

OR

- Q2)** a) A Triangle XYZ has vertices as X(4,6), Y(6,8) & Z((4,8) it is desired to reflect through an arbitrary line L whose equation is $y = 0.5x + 2$. Calculate the new vertices of triangle XYZ and show the result graphically. [8]
- b) Write a short note on : [8]
- i) Perspective projection
 - ii) Isometric projection

UNIT - II

- Q3)** a) The end points of line L1 are $P_1(-2,3,5)$ & $P_2(4,6,-2)$. The end points of line L2 are $P_3(-5,8,9)$ & $P_4(1,11,2)$. [10]

P.T.O.

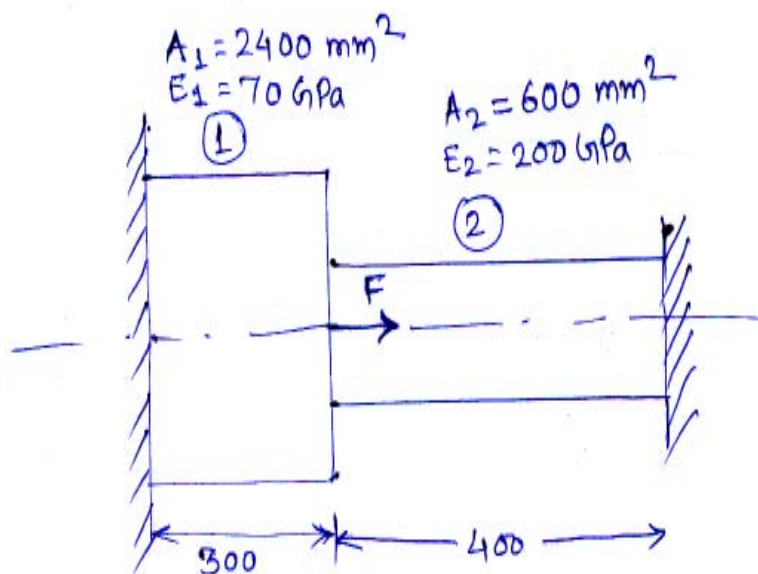
- Find
- Parametric equation of line
 - Are the two lines parallel or perpendicular
 - Find the co-ordinates of the point of intersection if any.
- b) Explain the method of representing the circle in parametric form also develop the equation. Further to calculate the various points on a circle by an incremental method. [8]

OR

- Q4)** a) Plot the Bezier curve having end points $P_0(1,4)$ & $P_3(7,2)$. The other control points are $P_1(5,6)$ & $P_2(6,0)$ plot the value of u at $0, 0.1, 0.2, \dots, 1$. If the characteristics polygon is drawn in the sequence $P_0 - P_1 - P_2 - P_3$. [12]
- b) Enlist the solid representation schemes and explain any one in detail. [6]

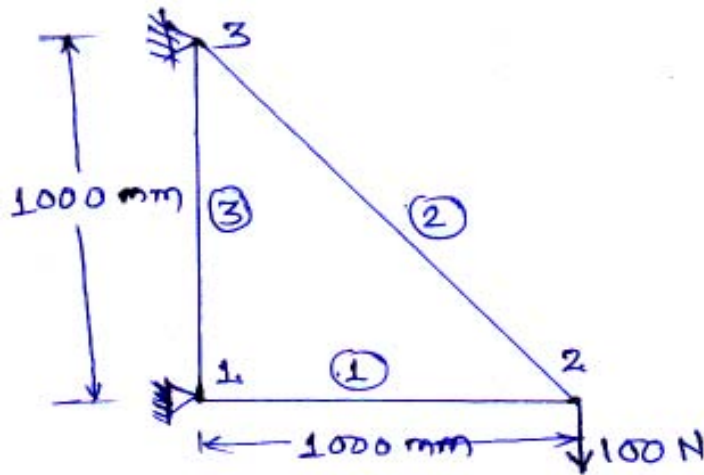
UNIT - III

- Q5)** a) What are the different steps involved in Finite Element Analysis? [4]
- b) Consider a bar as shown in figure. An axial load $F = 10000$ N is applied as shown. Using FEA method find the following. [12]
- Determine the Nodal displacement
 - Determine stress in each element
 - Determine Reaction Forces.



OR

- Q6) a) Figure shows a truss consisting of 3 elements whose $\frac{AE}{L}$ value is 1000 $\frac{N}{mm}$ calculate, deflection at nodes. [12]

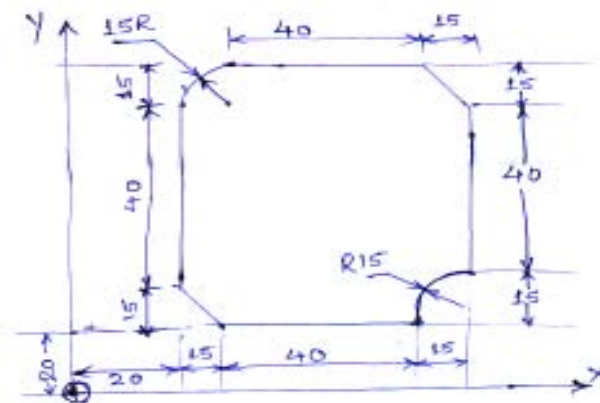


- b) Explain the properties of stiffness matrix. [4]

SECTION - II

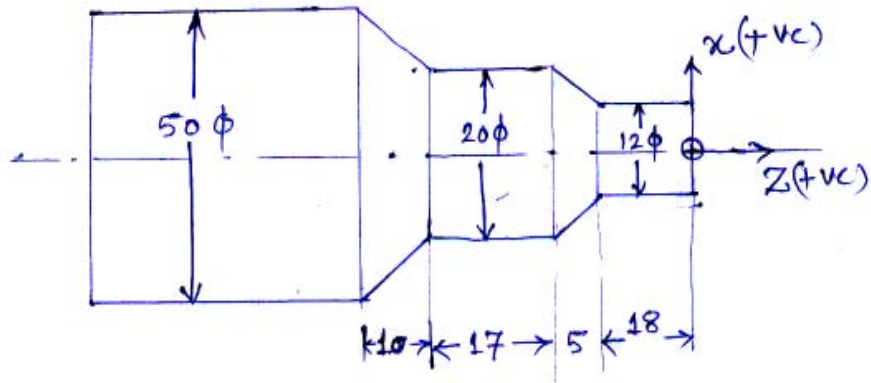
UNIT - IV

- Q7) a) Develop a part program for a part shown in figure the part is 15mm thk. Use the end mill cutter diameter 15mm cutting speed 700 rpm & feed is 100 mm/min [18]



OR

- Q8) a) Write a manual part program for finishing a forged component as shown in fig. (Assume suitable data) [12]



- b) Write short note on ATC [6]

UNIT - V

- Q9)** a) Explain FMS in detail with neat sketches. [8]
 b) Explain the types of automation and its stages. [8]

OR

- Q10)** Write short note on : [16]

- a) Computer Integrated Manufacturing
- b) AGV
- c) Machining center
- d) Group Technology

UNIT - VI

- Q11)** a) What is robot? State advantages and limitations of robots. [8]
 b) Write short note on : [8]
- i) P-T-P robots
 - ii) CP-robots

OR

- Q12)** a) Classify the actuators used in robots. Explain any one in detail. [8]
 b) Explain with neat sketches, type of robot configurations and their work envelop. [8]



Total No. of Questions : 10]

SEAT No. :

P1814

[Total No. of Pages : 2

[5059] - 77

B.E.

AUTOMOBILE ENGINEERING

Automotive NVH

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Figures to the right side indicate full marks.*
- 2) *Assume Suitable data if necessary.*
- 3) *Write Section I and Section II on separate answer sheet.*
- 4) *Q no 5 and Q no 10 is compulsory.*

SECTION - I

- Q1)** a) Explain concept of noise, vibration and harshness and role in vehicle design. [8]
- b) What are the types of noise in automobile vehicle? Explain in details. [8]

OR

- Q2)** a) What are the different Physiological effect of NVH? Explain remedies for it. [8]
- b) Explain the different source of noise and vibration in vehicle. Explain in details. [8]

- Q3)** a) Explain mathematical model. Draw the mathematical model for car. [8]
- b) What are the types of vibration? Explain any two in details. [8]

OR

- Q4)** a) What are different types of damping? Explain any one. [8]
- b) Derive the equation for single degree of freedom system to find out natural frequency with energy method. [8]

P.T.O

- Q5)** Write a short note : **[18]**
- a) Vibration Isolation
 - b) Vibration absorber
 - c) Coordinate Coupling

SECTION - II

- Q6)** a) Draw the Anatomy of Human Ear and explain Mechanism of hearing. **[10]**
b) Explain weighting networks in details. **[8]**

OR

- Q7)** a) What are the types of sound propagation? Effects of reflecting surfaces on sound propagation. **[8]**
b) Explain relation between sound power, sound intensity and sound pressure level. **[10]**

- Q8)** a) Explain pass by noise test with the help of neat sketch. **[8]**
b) What is mean by FFT? Explain FFT with neat sketch. **[8]**

OR

- Q9)** a) Explain Drive by noise test with the help of neat sketch. **[8]**
b) What are the different techniques use for vibration measurement? Explain any one. **[8]**

- Q10)** Write a short note : (any four) **[16]**

- a) Transmission noise
- b) Aerodynamics noise
- c) Tyre noise
- d) Noise control methods.
- e) Vibration control Techniques.



Total No. of Questions : 11]

SEAT No. :

P1815

[Total No. of Pages : 3

[5059] - 79

B.E. (Automobile Engineering) (Semester - VII)

VEHICLE SAFETY

(2008 Pattern) (Elective - II (B))

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section. Q.1 is compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Logarithmic tables, Slide rule, Electronic pocket calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) What are the characteristics of vehicle structure? [8]
b) Explain the importance of ergonomics in automotive safety. [8]

- Q2)** a) Explain the procedure for the Frontal Impact Test. [8]
b) What are the standard requirements of a Vehicle Body Structure. [8]

OR

- Q3)** a) Write a note on Crumple Zone in a Vehicle. [8]
b) Explain in detail Roll Over Test. [8]

- Q4)** a) Write a note on Location of Controls with respect to vehicle safety. [8]
b) Enlist the different types of dummies used for vehicle testing. Explain any one of them in detail. [10]

P.T.O.

OR

- Q5)** a) How do you determine injury threshold? Explain the procedure for the same in detail. [10]
- b) Write a note on : [8]
- i) Servicity Index
 - ii) Study of Acceptable Tolerances

SECTION - II

- Q6)** a) Differentiate in-between Active and Passive Safety. [8]
- b) Describe in detail Pedestrian Safety. [8]

OR

- Q7)** a) Enlist the different types of the safety glasses. Also give the standard requirements of these safety glasses. [8]
- b) Explain in detail Head Restraints safety system with neat sketch. [8]

- Q8)** a) Enlist the types of the Automotive Lamps. Explain the parabolic headlight with neat sketch. [10]
- b) Write a note on recent trends in Automotive Lighting. [8]

OR

- Q9)** a) Discuss the following with respect to Vehicle Safety [10]
- i) Direction Indicator
 - ii) Reverse Lamp
 - iii) Stop Lamp
- b) Explain in detail the procedure for the testing of Automotive Lamps. [8]

- Q10)a)** What are the general specifications applicable to all the Vehicle Tests. **[8]**
- b) What are AIS standards for Emergency Exit from an Automobile. **[8]**

OR

- Q11)a)** Write a note on following with respect to the AIS standards **[8]**
- i) Driver Cabin Lighting
- ii) Passenger Compartment Lighting
- b) Write down the general requirements for Body Structure Strength Test. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1776

[Total No. of Pages : 2

[5059]-8

B.E. (Civil)

ADVANCED GEOTECHNICAL ENGINEERING

(2008 Pattern) ((Elective - I) (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) *Your answers will be valued as a whole.*
- 5) *Use of logarithmic tables electronic pocket calculator is allowed & IS codes are not allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain different soil classification systems. [8]
b) Explain different 'clay minerals' & 'soil structures'. [8]

OR

- Q2)** a) Explain the steps for 'Unified soil classification' by giving sample example. [8]
b) Explain 'Montmorillonite' & 'Flocculated structures'. [8]

- Q3)** a) Explain the graphical method for 'Modified Culmann' by drawing sample graph. [10]
b) Explain K_a , K_p & K_o . [7]

OR

- Q4)** a) Explain the steps for 'Design of gravity retwall', using Rankine's theory. [9]
b) Explain 'Free Earth support' method. [8]

P.T.O.

- Q5)** a) Explain different 'types' & 'functional requirement' for geosynthetics. [9]
b) Explain 'Biquet & Lee' theory. [8]

OR

- Q6)** a) Explain the functions of each component of 'Rt' wall. [9]
b) Explain 'Soil nailing' & 'Rock Bolting'. [8]

SECTION - II

- Q7)** Explain the following : [4 × 4 = 16]
a) Different vibrations
b) Barken's method
c) Pauw's Analysis
d) Soil as a mass spring

OR

- Q8)** a) Explain the method for determination of 'Cu', for machine foundations. [8]
b) Discuss the design criteria for impact type machines as per IS-2974 (pt-II) - 1996. [8]

- Q9)** a) Explain different 'Piles'. [9]
b) Explain 'Vibrofloatation' & 'Sand drains'. [8]

OR

- Q10)** a) Explain the steps for design of sand drains. [10]
b) Explain the stages for construction of 'vibro-expanded' pile. [7]

- Q11)** a) Explain 'Rheology' & Different 'Rheological models'. [10]
b) Explain 'secondary consolidation' & 'creep'. [7]

OR

- Q12)** Explain the following :
a) Saint-Venant's model [5]
b) Kelvin model [4]
c) Burger's model [4]
d) Bingham's model [4]



Total No. of Questions : 12]

SEAT No. :

P1816

[Total No. of Pages : 3

[5059] - 80

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

OFF ROAD VEHICLES

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Why multiaxles used in some off road vehicle explain? [9]
b) Explain the history of off road vehicles. [9]

OR

- Q2)** a) Which type of transmission system used in off road vehicles? Justify. [9]
b) Write in details types of chassis used for off road vehicle? [9]

- Q3)** a) Explain construction and working dump truck with neat sketch. [8]
b) Discuss factor affecting the efficiency & output of tractor. [8]

OR

- Q4)** a) Explain with neat sketch hydraulic dozer. [8]
b) What are different types of earth moving equipment. [8]

P.T.O

- Q5) a)** What is the difference in revolving & stripper shovels give suitable example & specification of both. [8]
- b) How capacity of shovels decided? What are the different Capacity shovels available in market? [8]

OR

- Q6) a)** Explain the construction and working of scraper also write down the specification of any one scraper. [8]
- b) Where is the application of elevating grader write down the function and specification of it. [8]

SECTION - II

- Q7) a)** What is meaning of power take off? [8]
- b) Explain in detail the special features of transport vehicle. [8]

OR

- Q8) a)** Explain the special features of tanker & gun carrier. [8]
- b) Explain in detail with neat sketch construction and working of tanker.[8]

- Q9) a)** Explain with neat sketch brake system & actuation of OCDB. [8]
- b) What is body hoist & bucket operational hydraulics explain in details.[8]

OR

- Q10)a)** Explain design aspect of dumper body & loader bucket. [8]
- b) Explain the term hydro-pneumatic suspension cylinders. [8]

Q11)a) Explain in detail term the mobility index (MI). [9]

b) Define traction performance & factor affecting traction performance. [9]

OR

Q12)a) Explain the following term in relation to vehicle evaluation mobility - mobility number & traction on wet soil. [9]

b) Explain the terms vehicle cone index {VCI} & rated cone index {RCI} [9]



Total No. of Questions : 12]

SEAT No. :

P2991

[5059]-81

[Total No. of Pages : 2

B.E.(Automobile Engineering)(Part-I)

AUXILIARY ENGINE SYSTEMS

(2008 Course)(Elective-II)(Semester-I)(416492D)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

Q1) a) What is mean by Supercharging? Write different methods of Supercharging. **[8]**

b) Why compressor matching is important during design of supercharger for IC engine? **[8]**

OR

Q2) a) Derive an expression for relationship between air consumption by compressor and its power. **[8]**

b) Explain in brief principal of Exhaust Turbo charging. **[8]**

Q3) a) Explain various factors that affects the engine performance related with supercharging. **[8]**

b) Compare turbo charging performance in case of two stroke and four stroke engines. **[8]**

OR

Q4) a) Explain in brief factors affecting the nozzle area of turbocharger. **[8]**

b) What is Pulse Turbo charging? Explain it with neat sketch. **[8]**

P.T.O.

- Q5) a)** Compare Exhaust turbo charging with Mechanical Turbo charging with at least 10 points. [10]
b) How efficiency of engine can be increased by using turbo charging in IC engine? [8]

OR

- Q6) a)** Explain with neat graph, effect of cooling of charge air in case of exhaust turbo charging. [8]
b) Explain effect of back pressure on IC engine performance in case of Turbocharged engines. [10]
- Q7) a)** What is the best exhaust manifold arrangement for a four stroke 6 cylinder IC engine? State different factors while designing exhaust manifold having turbo charging facility. [8]
b) Compare constant pressure turbo charging with Pulse turbo charging. [8]

OR

- Q8) a)** Explain with neat sketch Constant pressure Turbo charging [8]
b) Explain with graphs Torque characteristics of engine with exhaust turbo charging. [8]
- Q9) a)** Explain Chargee boosting with example. [8]
b) Which material is useful for impeller of turbo charger and why? Also explain about the life of turbo charger in accordance with the material used. [10]

OR

- Q10) a)** List down various bearings used in Turbo charging and explain any one of them in detail with neat sketch. [10]
b) Explain in brief the methods for lubrication for the exhaust turbo charger used in IC engine. [8]
- Q11) a)** What is the necessity of engine cooling? Explain different types of engine cooling systems in details. [8]
b) Explain the following terms in details [8]
i) Filling
ii) De-aeration
iii) Drawdown

OR

- Q12) a)** Discuss about various aspects of Radiator failure on IC engine. [8]
b) How is the cooling system affects the overall performance and emission of IC engine. [8]



Total No. of Questions : 12]

SEAT No. :

P1817

[Total No. of Pages : 3

[5059] - 82

B.E. (Semester - II)

AUTOMOBILE

Alternative Fuels and Emission control

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) How SI and CI engine fuels are rated? [6]
b) Compare Diesel and Gasoline Fuels in detail. [10]

OR

- Q2)** a) Write the calorific value & general chemical formula of following fuels. (any four) [6]
i) Petrol
ii) Diesel
iii) LPG
iv) CNG
v) BIO GAS
b) Discuss any five important qualities of SI and CI engine fuel. [10]
- Q3)** a) Differentiate LPG & Petrol by its properties, advantages, disadvantages and applications. [6]
b) Explain engine modifications required while using bio-diesel as fuel for IC engine? [6]

P.T.O

- c) Explain the properties of hydrogen fuel & give its advantages and disadvantages over conventional fuels. [6]

OR

Q4) Write short note on

- a) Biogas as a fuel for IC engine. [6]
b) Alcohol as a fuel. [6]
c) CNG as fuel for I engines. [6]

- Q5)** a) Engine running on compressed air. [8]
b) Explain any two synthetic fuels with its properties, advantages, disadvantages & handling. [8]

OR

- Q6)** a) What are the different synthetic fuels used in vehicle? Explain its effect on engine performance. [8]
b) Write note on Water as fuel. [8]

SECTION - II

- Q7)** a) How will you reduce the NO_x emission in IC engine? [8]
b) What is positive crankcase ventilation? Explain. [8]

OR

Q8) Explain effect of design and operating parameters on SI engine emission?[16]

Q9) Explain effect of design and operating parameters on CI engine emission? [16]

OR

- Q10)**a) What is the use of turbocharger in automobile, explain its effects on engine emission? [8]
b) Describe the sources and causes of soot and particulet formation? [8]

Q11) Write a note on.

- a) Remedies for engine emission. [6]
- b) Indian emission norms. [6]
- c) Ambient air quality monitoring [6]

OR

- Q12)**
- a) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? [9]
 - b) Explain effects of NO_x emission on human as well as on environment? What are the remedies for it? [9]



Total No. of Questions : 10]

SEAT No. :

P1818

[Total No. of Pages : 3

[5059] - 83

B.E. (Automobile Engineering) (End Semester)

VEHICLE PERFORMANCE & TESTING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9, or Q10.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume Suitable data if necessary.*

SECTION - I

Q1) a) Explain any three vehicle performance parameter in brief. [9]

b) Explain any one suspension system in brief. [9]

OR

Q2) a) Explain any three types of sensors used in automobile. [9]

b) Explain any one braking system in brief. [9]

Q3) a) Write a short note on epicyclic gear box. [8]

b) Explain working & construction of differential in brief. [8]

OR

Q4) a) Explain working & construction of torque convertor in brief. [8]

b) Write a short note on vehicle clutches. [8]

P.T.O

Q5) Explain any four in brief :

[4 × 4 = 16]

- a) Gradient track
- b) Euro III
- c) Accelerated testing
- d) Deep wading through shallow water
- e) Steering pad
- f) Passer by noise test

SECTION - II

Q6) a) Write a short note on airbags. **[6]**

b) Explain particulate trap function. **[6]**

c) How GPS work to direct vehicle on road? **[6]**

OR

Q7) a) Explain any one energy absorption system. **[6]**

b) How roll over protection system improves safety of vehicle? **[6]**

c) Differentiate active & passive safety in brief. **[6]**

Q8) a) Write a short note on sensor mountings in brief. **[8]**

b) Explain Braking distance test in brief. **[8]**

OR

Q9) a) How crash test data acquisition system works? **[8]**

b) Write a short note on vehicle to vehicle impact test. **[8]**

Q10) Write a short note on any four in brief.

[16]

- a) Model test & full scale test
- b) Battery testing
- c) Vehicle measurement testing
- d) Endurance test
- e) Engine noise & vibration
- f) Brake efficiency measurement



Total No. of Questions : 12]

SEAT No. :

P1819

[Total No. of Pages : 5

[5059] - 85

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

FINITE ELEMENT ANALYSIS

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain in brief, steps involved in Finite Element Methods. What are the different sources of errors in FEM? **[8]**

b) Explain the principle of Minimum potential energy used in deriving element stiffness matrix and equations. **[8]**

OR

Q2) a) Explain difference between FDM & FEM. **[8]**

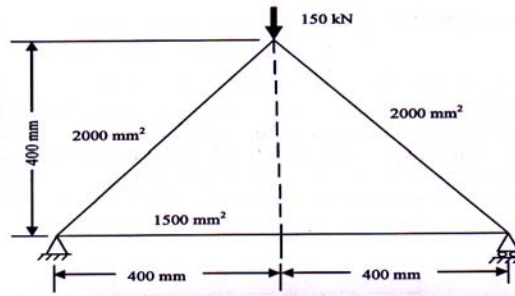
b) Write short note on (any two) : **[8]**

- i) Stress-strain-temperature relations
- ii) Plain stress and plain strain problem
- iii) Characteristics of Global Stiffness Matrix

Q3) a) Explain concept of Local and Global co-ordinate system with respect to truss elements. **[6]**

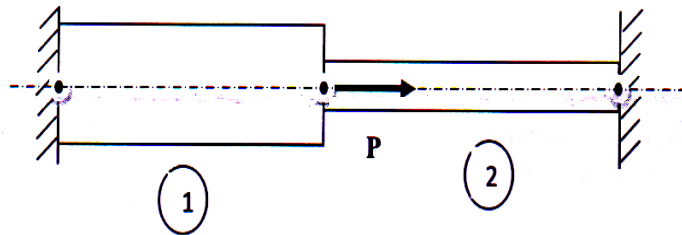
P.T.O

- b) For the three-bar truss shown in fig., determine the nodal displacements and the stress in each member. Find support reactions also. Take the modulus of elasticity as 200 GPa. [12]



OR

- Q4)** a) Explain assembly of global stiffness matrix for the banded and skyline solutions. [6]
- 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
 - Reaction forces



Element No.	Material	Modulus of Elasticity	C/s Area	Length
1	Aluminum	70×10^9 N/mm ²	2400mm ²	300mm
2	Steel	200×10^9 N/mm ²	600mm ²	400mm

- Q5)** a) Evaluate using 2 point Gaussians quadrature method. [16]

i)
$$I = \int_{-1}^1 \left[3e^x + x^2 + \frac{1}{(x+2)} \right] dx$$

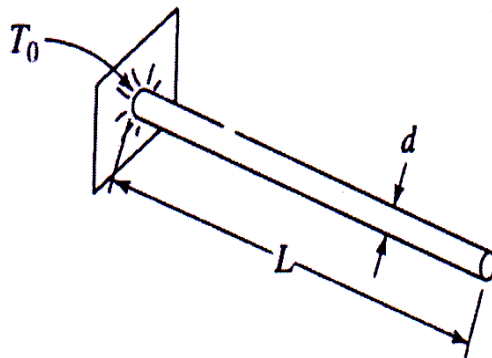
ii)
$$I = \int_{-1}^1 \left[\cos \frac{\pi x}{2} \right] dx$$

OR

- Q6) a)** Explain following terms : **[10]**
- i) Langrangean elements
 - ii) Serendipity elements
 - iii) Isoparametric elements
 - iv) Subparametric elements
 - v) Superparametric elements
- b) Explain the difference between p and h refinements in Finite Element Method. **[6]**

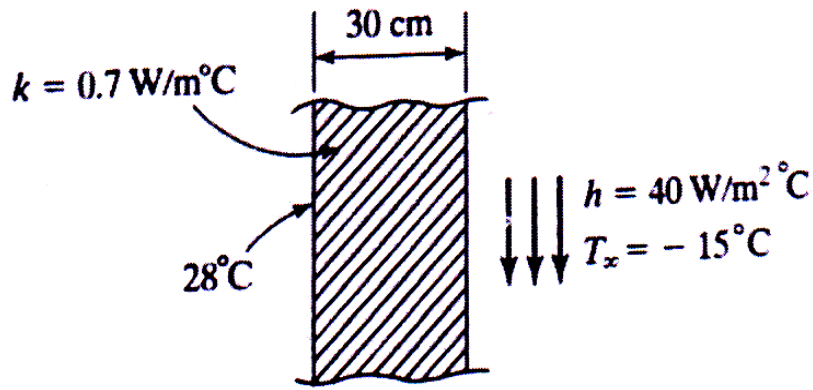
SECTION - II

- Q7) a)** A circular fin of 50 mm diameter (d) is fixed to a base maintained at 60°C (T_0) as shown in fig. the fin is insulated on the surface except end face which is exposed to air at 20°C . The length of the pin is 1200 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 300, 600, 900 and 1200 mm from base. **[18]**

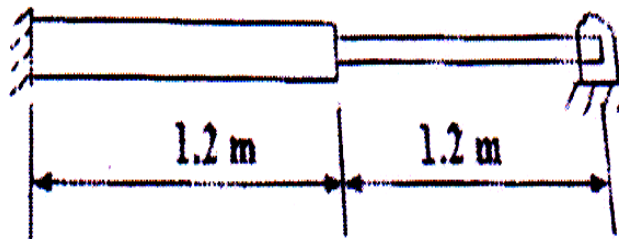


OR

- Q8) a)** State and explain the governing equation for 1D heat flow. **[8]**
- b) Consider a brick wall of thickness $L=30\text{ cm}$, $K=0.7\text{ W/m}^\circ\text{C}$. The inner surface is at 28°C and outer surface is at -15°C . The heat transfer coefficient associated with outer wall is $h = 40\text{ W/m}^2\text{ }^\circ\text{C}$. Determine the steady state temperature distribution Within the wall and also the heat flux through the wall. Use two element model. **[10]**

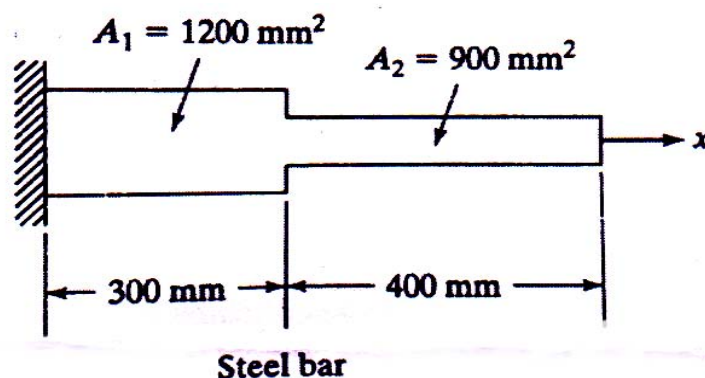


- Q9) a) For the stepped beam with fixed pin boundary conditions as shown in fig., find characteristic equations and determine first three natural frequencies, if modulus of elasticity $E = 200 \text{ GPa}$, density $\rho = 7800 \text{ kg/mm}^2$, moment of inertia $I_1 = 1.5 \times 10^{-6} \text{ m}^4$, $I_2 = 8.8 \times 10^{-7} \text{ m}^4$, Area $A_1 = 2.4 \times 10^{-3} \text{ m}^2$ and $A_2 = 8 \times 10^{-3} \text{ m}^2$. Use consistent mass matrix. [16]



OR

- Q10) a) Explain lumped mass matrix and consistent mass matrix with suitable example. [6]
 b) Find un-damped natural frequencies of longitudinal vibration of the stepped bar as shown fig. using consistent mass matrix. [10]



Assume Modulus of Elasticity $E = 210 \text{ GPa}$ and Density (ρ) = 7800 kg/m^3

Q11)a) Write short notes on (any four) :

[16]

- i) Boundary conditions
- ii) Modal analysis
- iii) Constant Strain Triangle
- iv) Linear strain triangle
- v) Equation solvers in FEA
- vi) Quality checks in meshing

OR

Q12)a) What are the functions and phases of Finite Element Analysis software? Explain the significance in Finite Element Method. **[8]**

- b) With the help of neat sketch, explain the concept of axi-symmetric problems in solid mechanics. How does axi-symmetric problems vary from planer symmetry? **[8]**



Total No. of Questions : 12]

SEAT No. :

P1820

[Total No. of Pages : 4

[5059] - 86

B.E. (Automobile)

HYDRAULICS & PNEUMATICS

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Write a short note on synthetic fluids. [8]
- b) Explain different types of pipe fittings with sketches. [8]

OR

- Q2)** a) Describe with neat sketch inlet strainers & filters. [8]
- b) List different sealing materials. Discuss about the guidelines for selection of compatible seals with the working fluid. [8]

- Q3)** a) Differentiate between Positive Displacement pump and Non - Positive Displacement Pump. [8]
- b) A Pump has a displacement volume of 98.4 cm³. It delivers 0.00152 m³/sec. at 1000rpm and 70 bar. If the prime mover input torque is 124.3 N-m. Find [8]
- i) Overall efficiency of the Pump.
 - ii) Theoretical torque required to operate the Pump.

P.T.O

OR

- Q4)** a) Describe with neat sketch Unbalanced, Fixed Displacement vane Pump. [8]
b) Describe with neat sketch air oil intensifier. [8]

- Q5)** a) Draw a sketch for Pilot operated DCV and solenoid Operated DCV.[8]
b) Describe with neat sketch construction & working of cartridge valve.[10]

OR

- Q6)** a) What is unloading valve? Draw its symbol. Explain its construction and working. [8]
b) Describe with neat sketch, valve type flow Divider and motor type flow Divider. [10]

SECTION - II

- Q7)** a) Calculate the diameter of a cylinder rod to be used in a cylinder with a bore diameter of 75mm operating at a maximum pressure of 138 bar, center trunion mounted with a 0.5m stroke. calculate the length of the stop tube, if applicable. [8]
b) Draw ANSI symbols of following hydraulic components. [8]
i) Single acting cylinder spring return.
ii) Double acting cylinder single rod end.
iii) Sequence valve
iv) Relief valve.

OR

- Q8)** a) Describe with neat sketch speed control of Hydraulic motor using flow control valve. [8]
b) Explain the Application of Hydraulic circuits in [8]
i) Grinding machine
ii) Shaping machine

- Q9) a)** Differentiate between Hydraulic system & Pneumatic system. [8]
- b) Explain liquid Ring compressor with neat sketch. [8]

OR

- Q10)a)** Describe the Relieving Pressure Regulator with sketch [8]
- b) Describe Pneumatic Grinder with sketch. [8]

Q11) Draw a simple hydraulic circuit which will operate a hydraulic cylinder of a machine. The load during the forward stroke is 15 kN, and that during the return stroke is approx. 9.5 kN. The forward and return speeds are about 3.5 m/min and 5.5 m/min respectively. Total stroke of the cylinder is 300 mm provision is required to hold the cylinder anywhere in between the end positions. select different components from the data given. Specify ratings of the components in case it is not possible. [18]

OR

Q12) A machine has two slides 'A' and 'B' which are to be operated hydraulically. The cylinder 'A' has a load of 10 kN and a stroke of 50 cm to be completed in 20 seconds. The cylinder 'B' has to overcome a load of 15 kN. and has a stroke of 50cm to be completed in 29 seconds. The two cylinders are to be moved simultaneously. They are to be retracted as soon as they reach the end position. the loads during returns strokes are 5 kN and 3.5 kN respectively. Individual direction control valves are provided for the two cylinders. Draw a suitable circuit to achieve this requirement. Select different components you have used in the circuit from the given data. Mention the rating of the components in case it is not available in the given data. Assume reasonable values of data in case if it is not provided in the problem. [18]

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. :

P1821

[Total No. of Pages : 3

[5059] - 88

B.E. (Automobile)

TRANSPORT MANAGEMENT AND MOTOR INDUSTRY

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) List out the document detail procedure for the licensing of driver and conductor. [9]
- b) State particulars that have to be collected for the purpose of preparing accident report. [9]

OR

- Q2)** a) Detail out the responsibility of driver in case of accident. [9]
- b) Define the terms [9]
- i) Good vehicle
 - ii) Public place
 - iii) Transport place

- Q3)** a) Explain the taxation structure for passenger and goods transport vehicles. [8]
- b) Why road tax is laid on vehicles? [8]

P.T.O

OR

- Q4)** a) What are the objective of taxation? Discuss brief on taxes on motor vehicle. [8]
- b) Short note on : [8]
- i) One time tax on transport vehicle
- ii) One time tax on non-transport vehicle

- Q5)** a) Give detail about insurance and type of insurance. [8]
- b) Detailed description about motor vehicle insurance. [8]

OR

- Q6)** a) What are the duties of surveyor and loss assessor. [8]
- b) What is third party insurance? What are the advantages and disadvantages? [8]

SECTION - II

- Q7)** a) Give detail about theory of fares in passenger transport operation. [9]
- b) What is the use of computer in passenger transport operation. [9]

OR

- Q8)** a) Give brief discussion about passenger transport operation. [6]
- b) Classification of transport operation. [6]
- c) What are the modes of road transport? [6]

- Q9)** Describe the following : [16]
- a) Management information system
- b) Storage and transportation of petroleum product

OR

Q10)a) Give function of good transport organisation and also explain the structure. **[8]**

b) Explain in brief good transport operation. **[8]**

Q11) Describe in brief. **[16]**

a) Global positioning system

b) Traffic control in towns

OR

Q12) Write short note on (any two) **[16]**

b) Control of traffic

b) Advance techniques in traffic management

c) Alternative fuel for vehicle.



Total No. of Questions : 12]

SEAT No. :

P2987

[5059]-9

[Total No. of Pages : 3

B.E.(Civil)

MATRIX METHODS OF STRUCTURAL ANALYSIS

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

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary*

SECTION-I

Q1) Write a note on(Any two):

[16]

- a) Gauss Jordan & Gauss Seidel iteration method.
- b) Gauss Elimination Method
- c) Importance of Matrix Algebra in Matrix Methods of Structural analysis.

OR

Q2) a) Write a note on “ill conditioned matrix”.

[4]

b) Solve the following equations by Gauss Elimination Method.

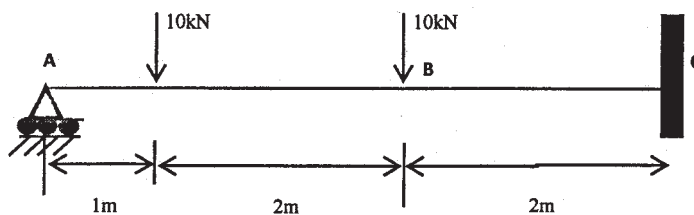
[12]

$$2X_1 - 0.8X_2 + 1.6X_3 = 10$$

$$-2X_1 + X_2 + X_3 = 1$$

$$4X_1 + X_2 = 6$$

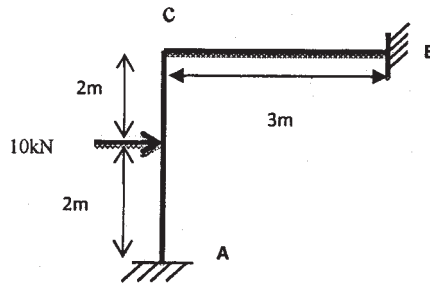
Q3) Analyze the beam shown below by flexibility method (EI is constant) **[18]**



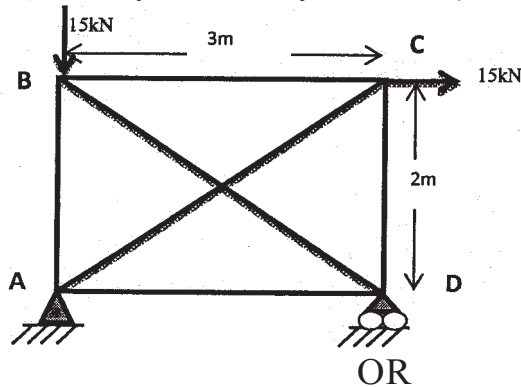
OR

P.T.O.

Q4) Analyze the portal frame using Flexibility Method(EI Constant) [18]



Q5) Analyze the truss by Flexibility Method (EI Constant) [16]



Q6) Analyze the beam shown in Ex.3 by Stiffness Method(EI is Constant) [16]

SECTION-II

Q7) Write a note on (Any two): [16]

- a) Displacement Method of structural analysis.
- b) Effective node numbering.
- c) Transformation matrix

OR

Q8) a) Explain structure and member approaches. [8]

- b) Using first principles, establish relationship between local & global stiffness matrix of portal frame member. [8]

Q9) a) Explain how stiffness matrix of a member of a structure in a structure co-ordinate system is obtained by transformation. [9]

- b) Using proper DOFs, write clearly stiffness matrix equation for a member of orthogonal grid structure. Explain various terms involved in matrix equation [9]

OR

Q10)a) State Maxwell's reciprocal theorem and indicate its effect in matrix analysis of structure. [9]

b) State importance of band width in stiffness analysis by computer and measures to keep it minimum. [9]

Q11)A single bay single storey frame is to be analysed by computer programme of stiffness matrix method.

a) Prepare the flow chart and state input required

b) How will you input support conditions [16]

OR

Q12) Stating clearly DOFs/node, explain stiffness matrices for space truss member & space frame member. In which case you need transformation matrix? Explain reason. [16]



Total No. of Questions :12]

SEAT No. :

P2992

[5059]-90

[Total No. of Pages :2

B.E.(Automobile)

ELECTRIC HYBRID & FUEL CELL VEHICLE

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

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.*

SECTION-I

Q1) a) Explain configuration and working modes of parallel mild hybrid electric drive train. **[8]**

b) Explain DC motors & its type with circuit diagram. **[8]**

OR

Q2) a) What are the component of electric vehicle. **[8]**

b) Explain construction and working of BLDC motors. **[8]**

Q3) a) Draw typical performance characteristic of electric motor for traction & explain in detail. **[8]**

b) Explain series hybrid vehicle with its advantage and disadvantages. **[8]**

OR

Q4) a) What is mild hybrid technology? Explain the energy recuperation in mild hybrid. **[8]**

b) Explain grid connected hybrid vehicles. **[8]**

Q5) a) What are the advantages and disadvantages of hybrid vehicle. **[9]**

b) Classify the hybrid vehicles and explain any one. **[9]**

OR

Q6) Compare in detail the hybrid vehicles, electric vehicles & conventional vehicles. **[18]**

P.T.O.

SECTION-II

- Q7)** a) Explain the sizing of an electric motor. [8]
b) What are the types of batteries? Explain lead acid battery. [8]
OR
- Q8)** a) What are the different battery parameters describe Nickel- cadmium battery with neat sketch. [8]
b) Describe & explain IC engine force velocity characteristic and road load characteristics. [8]
- Q9)** a) Explain construction and working & mollen carbonate fuel cell with neat sketch. [8]
b) Explain fuel cell electric vehicle with neat sketch. [8]
OR
- Q10)** a) Explain supercapacitors and ultracapacitors. [8]
b) What are the characteristic of fuel cell explain direct methanol fuel cell. [8]
- Q11)** a) Explain ultra high speed flywheel with neat sketch. [10]
b) Explain pneumatic hybrid engine system operation modes. [8]
OR
- Q12)** a) Explain CVT in brief. [9]
b) Explain hydraulic accumulators & pumps. [9]



Total No. of Questions : 12]

SEAT No. :

P3759

[5059]-91

[Total No. of Pages : 3

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

UNIT - I

- Q1)** a) What do you understand by kinematic structures in machine tools? [6]
b) 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 and gear box layout. [12]

OR

- Q2)** a) Show that for geometric progression the useful value of speed ratio ' ϕ ' lies between 1 & 2. Also prove that maximum loss of economic speed is constant in geometric progression. [8]
b) Discuss with neat sketch the feed gearbox, operated by Tumbler gear, showing three positions forward, neutral and reverse. [10]

UNIT - II

- Q3)** a) State the various systematic steps involved in designing a milling machine column having hollow rectangular cross-section. [8]
b) Explain the concept of static and dynamic stiffness of machine tool and state the procedure for estimating them. [8]

OR

- Q4)** a) In designing the bed of a machine tool, it is often found that the hollow rectangular cross-section is the most suitable one. Make a comprehensive

P.T.O.

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 method of designing a horizontal circular table of a vertical boring machine, where the cylindrical work piece is clamped. Average diameter of the guide is d and the width of the guide ways is b . [6]

UNIT - III

- Q5)** a) Classify the various types of configuration of the guides used in machine tools, based on material, lubrication system, drives control etc. [8]
- b) What is meant by a rigidity of a lubricated slide ways? Show that the rigidity of a hydrostatic 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

UNIT - IV

- Q7)** a) Make a sketch of at least two different types of spindle ends and make a comparative evaluation of their characteristics. State the method of analyzing the heat generated in the sleeve bearing in k calories per second and the method of finding out the consumption of oil per unit time. [10]
- b) Analyse 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 there of. [10]

UNIT - V

- Q9)** a) Why is damping of machine tools important? How is it accomplished? [6]
b) Write a note on dynamic characteristics 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]

UNIT - VI

- Q11)** a) Discuss the method of obtaining stepless speed variation of a machine tool having regulation upto 20, using epicyclic mechanism. [8]
b) Explain the principle of formation of: [8]
i) Conical pressure variator
ii) Torso variator
iii) ball variator

OR

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



Total No. of Questions : 12]

SEAT No. :

P1822

[Total No. of Pages : 3

[5059] - 92

B.E. (Production/Prod. Sandwich) (Semester - I)

MANUFACTURING ATOMATION

(2008 course)

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 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) Classify types of seals and define them. [8]
b) Draw hydraulic circuit showing the application of counter balance valve and explain its working. [10]

OR

- Q2)** a) For a meter in hydraulic circuit calculate the pump pressure required to achieve 40 bar pressure at full bore end of cylinder if the pressure loss across various elements is : Flow control valve: 15 bar, direction control valve (both side): 3bar, filter: 5 bar. [6]
b) Draw regenerative circuit and derive the expression for speed and load carrying capacity during extension and retraction of regenerative circuit with respect to that of normal circuit. [12]

- Q3)** a) Explain with neat sketch pressure and temperature compensated flow control valve [8]
b) A hydraulic system requires 350 l/min at 20 bar pressure for first 8 seconds and 40 l/min at 320 bar pressure for remaining 10 seconds. Determine the flow capacity of pump if intensifier is used in the system.[8]

P.T.O

OR

- Q4)** a) A hydraulic system having cycle time of 15 seconds requires 350 l/min at 20 bar pressure for first 8 seconds and 40 l/min at 320 bar pressure for remaining time. Draw the hydraulic circuits and calculate the efficiency of circuit when using two fixed displacement pumps. [8]
- b) Explain sequencing circuit with neat sketch [8]
- Q5)** a) Draw a pneumatic circuit using cascade method to actuate the two cylinders in following sequence: [8]
- i) Cylinder 1 extends
 - ii) Cylinder 2 extends
 - iii) Cylinder 2 retracts
 - iv) Cylinder 1 retracts
- b) Explain the working of FRL unit used in pneumatic system. [8]

OR

- Q6)** a) Explain with suitable application example the hydro-pneumatic system. [8]
- b) Design a pneumatic circuit for a machine head of a precision grinder which needs to continuously reciprocate over a cylinder head surface being finished. The speed of the stroke must be controlled in both directions. [8]

SECTION - II

- Q7)** a) Write a program to clear the accumulator, add 27H, subtract 45H, add 6CH, display the result at output port [8]
- b) With the help of block diagram explain application of 8085 microprocessor for measurement of voltage and current. [8]

OR

- Q8)** a) Write the program to perform following functions: [8]
- i) Load the number 6AH in register C
 - ii) Load the number 5BH in register D
 - iii) Increment the content of register D by one
 - iv) Add the content of register C and D and display the sum at port 1.
- b) Draw block diagram of Microcontroller Architecture. [8]

Q9) a) Draw a ladder diagram that can be used to start a motor and then after a delay of 100 sec. start a pump when the motor is switched off there should be a delay of 10 sec before the pump is switched off [8]

b) What are criteria for selection of a PLC? [8]

OR

Q10)a) Explain with suitable example use of timers in PLC. [8]

b) Explain linear feedback control system. [8]

Q11)a) Explain design considerations in automated storage and retrieval systems (AS/RS)? [9]

b) Explain the rotary disc feeder with neat sketch and suitable example.[9]

OR

Q12) Write short notes on [18]

a) Industrial applications of robots

b) Automated guided vehicles

c) Indexing mechanisms



Total No. of Questions : 12]

SEAT No. :

P1823

[Total No. of Pages : 5

[5059] - 93

B.E. (Prod. Eng.)

OPERATIONS RESERCH

(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.

Unit - I

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

Maximize $Z = 4x_1 + 10x_2$

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]

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

Minimize : $Z = 20x_1 + 16x_2$

$x_1 + x_2 \geq 12$

$2x_1 + x_2 \geq 17$

$x_1 \geq 2.5$

$x_2 \geq 6$

$x_1, x_2 \geq 0$

P.T.O

- 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. [10]

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

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

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

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

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]

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]

Strategies		Player B		
		b1	b2	b3
Player A	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]

OR

- Q10)a)** An automobile factory manufactures a particular type of gear within the factory. This gear is used in the final assembly. The particulars of the gear are:
- | | | |
|-----------------|-------|---------------------|
| 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[10]
- 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,G,H | F,G,H | I | J,K |
| Days | 2 | 6 | 4 | 3 | 6 | 8 | 3 | 7 | 2 | 5 | 4 | 3 | 13 | 7 |
- i) Draw a network and find critical activities and critical path
 - ii) How long is the project duration?
 - iii) Tabulate Early Start Schedule(ESS) and Late start schedule times(LSS)
 - iv) Tabulate all the floats for all the activities
- b) Discuss resource leveling [4]

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

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

a*_ Optimistic time estimate, b**_ Pessimistic time estimate,
m***_ most likely time estimate

- i) Construct the project network.
 - ii) Find the expected duration and variance of each activity?
 - iii) Find the critical path and the expected project completion time?
 - iv) Find the probability of completing the project on or before 20 weeks?
 - v) If the probability of completing the project is 0.8, find the expected project completion time?
- b) State different types of floats and discuss any three. **[4]**



Total No. of Questions :12]

SEAT No. :

P2993

[Total No. of Pages :2

[5059] - 94

B.E. (Production)

PLASTIC ENGINEERING (Elective - I)

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain concept of polymerization. [8]

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

OR

Q2) a) Discuss additives used in the plastic. [8]

b) Explain coloring of plastic. [10]

Q3) a) Explain different types of runners with suitable sketches. [8]

b) Discuss various design considerations in injection mould design. [8]

OR

Q4) a) Explain use of insert in core and cavity design with suitable sketches. [8]

b) Explain any two cooling methods of Injection moulds. [8]

Q5) a) Explain blown film extrusion with suitable sketch. [8]

b) Explain extrusion of pipes with suitable sketches. [8]

OR

P.T.O.

- Q6)** a) Explain working principle of vented barrel extruder. [8]
b) Discuss various problems observed in extrusion. [8]

SECTION - II

- Q7)** a) Explain bottle design concept with suitable sketches. [10]
b) Explain rotary blow molding system with suitable sketches. [8]

OR

- Q8)** a) Explain single station blow moulding with suitable sketches. [8]
b) Discuss design considerations in blow molding. [10]

- Q9)** a) Explain drape vacuum forming with suitable sketches. [8]
b) Explain thermoforming by skeleton tooling with suitable sketch. [8]

OR

- Q10)**a) Discuss twin sheet vacuum thermoforming with suitable sketch. [8]
b) Discuss process factors in thermoforming. [8]

- Q11)**a) Explain trimming and tapping in machining of plastics. [10]
b) Explain [6]
i) Polishing.
ii) Reaming.

OR

- Q12)**a) Explain important considerations in sawing, piercing operations in plastic. [10]
b) State guidelines for geometry of tool in machining of plastic in various operations. [6]



Total No. of Questions :12]

SEAT No. :

P2994

[Total No. of Pages :4

[5059] - 95

B.E. (Production)

INDUSTRIAL ROBOTICS

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

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) *Assume Suitable data, if necessary.*

SECTION - I

- Q1) a)** Define Industrial Robot. Describe three laws of robots and safety considerations. **[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)** Explain six degrees of freedom associated with the robot manipulator with neat sketch. **[8]**
- b) Find the worst spatial resolution of a spherical robot with 800 mm arm length. The robot is equipped with three encoders emitting 1200 pulses per revolution. The linear axis is actuated with the aid of 200 mm pitch lead screw having the encoder mounted on it. **[8]**

P.T.O.

Q3) a) Explain the Forward kinematics associated with planar 3R manipulator. **[8]**

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

i	α_{i-1}	a_{i-1}	d_{i-1}	θ_{i-1}
1	0	0	0	30°
2	-90	0	2	0°
3	0	3	0	90°

Determine the location of the end point of the link w.r.t. the base.

OR

Q4) a) List the steps involved in DH convention. **[8]**

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

i	α_{i-1}	a_{i-1}	d_{i-1}	θ_{i-1}
1	0	0	0	45°
2	-90	0	2	-90°
3	0	5	0	60°

Determine the location of the end point of the link 3 w.r.t. the base.

Q5) a) What is gripper? Discuss the various considerations in gripper design and selection. **[9]**

b) Classify gripper & describe magnetic gripper with neat sketch. **[9]**

OR

Q6) a) Explain vacuum grippers with its advantages and disadvantages. **[9]**

b) Vacuum pump used in a robot gripper creates a vacuum of 30 Kpa with reference to atmospheric pressure. The gripper is used to lift 20 Kg of steel plate of size 400 × 450 mm. Using factor of safety as 2, suggest cup size if two such grippers are to be employed to lift the plate. **[9]**

SECTION - II

Q7) a) Is there a need of Sensor in Robot? If yes, state why? **[8]**

b) Explain: **[8]**

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

OR

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

b) The given data represents 8×8 arrays of pixels. Each element in the array indicates the grey level value of the pixels. **[8]**

- i) Construct histogram for the array and obtain appropriate threshold value.
- ii) Convert the picture into a black and white image. The data is as:

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

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

OR

- Q10)**a) Compare hydraulic, electric and pneumatic drive system used in Industrial Robotic system. [8]
b) Explain following commands: [8]
GRASP 10, 100
DEPART P1 50
SPEED 40 IPS
MOVE P2

- Q11)**a) Write short note on RS 232C interface used in Robotics system. [9]
b) What is handshaking? Explain hardware handshaking of robot. [9]

OR

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



Total No. of Questions :12]

SEAT No. :

P2995

[Total No. of Pages :3

[5059] - 96

B.E. (Production Engg.)

POWDER METALLURGY (Elective - I)

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

Time : 3 Hours]

[Max. Marks :100

Instructions to candidates:

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

SECTION - I

- Q1)** a) What is the influence of Particle size and size distribution, tap density and compression ratio on the behavior of powders? [6]
- b) What are the factors which promote powdery deposits in electrolytic cell? [6]
- c) Describe the rotating electrode process. [6]

OR

- Q2)** a) Explain the permeability method and sedimentation method to characterize the size of powders. [6]
- b) Compare water atomization process with gas atomization process. [6]
- c) Explain the influence of Tap density, compressibility and compactibility on the behavior of powders. [6]

- Q3)** a) Write a short note on the equipments needed for die compacting. [8]
- b) Describe the double cone mixer and the V mixer. [8]

OR

P.T.O.

Q4) a) Compare the advantages of dry milling and wet milling. Explain the importance of lubrication. [8]

b) What are the factors which increase the green density of metal powders. Explain them. [8]

Q5) a) Explain the plastic - flow and surface diffusion theory in Sintering with the help neat diagram. [8]

b) Write shortnotes on: [8]

i) Roller hearth furnaces

ii) Walking beam furnaces.

OR

Q6) a) State the advantages and limitations of liquid phase sintering. [8]

b) Explain mechanical alloying of powders. [8]

SECTION - II

Q7) a) Write shortnotes on: [8]

i) Encapsulation.

ii) Spray Deposition.

b) Explain slip casting with a neat diagram. [8]

OR

Q8) a) Compare CIP process with HIP process. [8]

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

Q9) a) Explain the mercury porosimetry method and state the Washburn equation? [8]

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

OR

- Q10)** a) What are the advantages and limitations of the Infiltration process. [8]
b) Write shortnotes on: [8]
i) Thermal spraying
ii) Coining and Sizing.

Q11) With the help of a neat flow chart explain production details of the following: [18]

- a) Lamp Filaments
- b) One Aerospace application
- c) Gears

OR

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

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



Total No. of Questions :12]

SEAT No. :

P2996

[Total No. of Pages :3

[5059] - 97

B.E. (Production)

MICROPROCESSORS APPLICATIONS (Elective - I)

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Compare Microprocessor & Microcontroller. [8]
b) Draw Block diagram of Microcontroller & explain each block in detail. [8]

OR

- Q2)** a) Compare Harvard and Von Neumann architecture. [8]
b) Describe in brief application areas of microcontrollers. [8]

- Q3)** a) Explain the function of Address, Data and control bus, Also explain the function of pins [8]
i) RD
ii) IO/M
iii) WR
b) Which are the steps in instruction execution? Briefly explain. [8]

OR

P.T.O.

Q4) a) What is the advantage of interrupts over polling? Explain Hardware and software interrupts. [8]

b) Draw architecture of 8085 & explain it in detail. [8]

Q5) a) Draw the block diagram of 8051 & explain its architecture in detail. [10]

b) Explain the interrupts structure of 8051 with IVT. [8]

OR

Q6) a) Explain timer and counters & its modes of 8051 in detail with TMOD and TCON. [10]

b) With the help Diagram explains the flag register of 8051. [8]

SECTION - II

Q7) a) Explain addressing modes of 8051 in detail with the help of example. [8]

b) Explain following instructions of 8051. [8]

i) MOVX

ii) CJNE

iii) DJNZ

iv) LCALL

OR

Q8) a) Write a program to find largest no. from five 8 bit numbers stored in internal RAM locations 40 H onwards & store the result in location 50 H. [8]

b) Explain the different software development tools used in assembly language programming. [8]

Q9) a) Define PLC and state features of PLC. Explain the application of PLC. [8]

b) Interface 16×2 LCD display to 8051. Explain interface signals. Write assembly language program to display 'SPPU'. [8]

OR

- Q10)a)** Draw the ladder diagram for elevator system and explain it. [8]
- b) Interface ADC 0804 to 8051. Draw interfacing diagram. Write assembly program to display analog voltage on LCD. [8]
- Q11)a)** Design a system for Data acquisition using 8051 microcontroller for temperature, measurement. Draw circuit diagram with suitable sensor and signal conditioning. Display the temp. On LCD. Write the Flowchart and algorithm. [10]
- b) Explain RS 232 serial communication protocol with diagram. How to interface the RS 232 with 8051 explain with Diagram. [8]

OR

- Q12)a)** Design a Speed controller system for DC motor. Suggest suitable sensors, signal conditioning and microcontroller. Draw the flowchart for the system. [10]
- b) Explain features of I²C protocol. Also operation with timing diagram for communication between microcontroller and devices. [8]



Total No. of Questions :12]

SEAT No. :

P2997

[Total No. of Pages :3

[5059] - 99

B.E. (Production Engineering)

MATERIALS AND LOGISTICS MANAGEMENT

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

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, & Q11 or Q12.*
- 4) *Use of electronic pocket Calculator is allowed.*
- 5) *Assume Suitable data, if necessary.*

SECTION - I

Q1) a) What is value of a product from customers point view? Explain methods to improve the value of the product. **[9]**

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

OR

Q2) a) Master Production Schedule (MPS) is important document in Material Requirement Planning. Justify with suitable example. **[9]**

b) What are the factors influencing Make or Buy decision? **[9]**

Q3) a) Write note on Import Substitution in Indian context. **[8]**

b) Explain 5 R's in Purchasing in detail. **[8]**

OR

P.T.O.

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

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

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

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

OR

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

b) Explain stores ledger and stock verification. [8]

SECTION - II

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

b) Explain Logistics in Detail. [8]

OR

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

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

Q9) a) Explain different risk in supply chain. [8]

b) Define supply chain. State importance of supply chain management in industries. [8]

OR

Q10) a) What are supply chain drivers? Briefly discuss the forces of changing in SCM. [8]

b) Explain internal performance measurement for SCM. [8]

- Q11)a)** Explain the types of costs associated with inventory control. [6]
- b) Derive the formula for Economic Manufacturing Quantity when replenishment is non instantaneous (Gradual). State the assumptions made. [12]

OR

- Q12)a)** Explain Fixed Period (P) system of inventory control in brief. [6]
- b) Explain the effects of discounts on the cost of item if the quantity purchased is increased. [12]

