

Total No. of Questions : 12]

SEAT No. :

**P2635**

**[5154]-1**

[Total No. of Pages : 2

**B.E. (Civil)**

**ENVIRONMENTAL ENGINEERING-II**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Write short note on collection and conveyance of sewage. [8]  
b) Explain effect of change of life with respect to sewage quality. [8]

OR

- Q2)** a) Write the design procedure for circular sewer and check to be taken. [8]  
b) Draw and explain process flow diagram of sewage treatment plant. [8]

- Q3)** a) Write effluent standards for domestic sewage as per BIS 2490. [8]  
b) Write short note on grit chamber. [8]

OR

- Q4)** a) Write short note on screen chamber. [8]  
b) Write short note on primary sedimentation tank. [8]

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

- Q5)** a) Explain biological principle of aerobic and anaerobic sewage treatment plant. [9]  
b) Define sludge bulking. Explain causes and remedial measures of sludge bulking. [9]

OR

- Q6)** a) Write short note activated sludge process. [9]  
b) Write short note trickling filter. [9]

### **SECTION-II**

- Q7)** a) Explain with a neat sketch, the working principle of a oxidation pond. [8]  
b) Write short note on root zone cleaning system. [8]

OR

- Q8)** a) Explain advantages and disadvantages of stabilization pond. [8]  
b) Write design steps of aerated lagoon for semi-arid region. [8]

- Q9)** a) Write short note on septic tank. [8]  
b) Explain with a neat sketch the pathway of anaerobic digestion. [8]

OR

- Q10)**a) Write short note on anaerobic digester. [8]  
b) Write principle and explain advantages and disadvantages of UASBR. [8]

- Q11)**a) Explain methods of sampling for domestic sewage and industrial wastewater. [9]  
b) Draw and explain flow sheet for treating sugar industry waste water. [9]

OR

- Q12)**a) Draw and explain flow sheet for Paper and pulp mill industry wastewater. [9]  
b) Write short note on treatment of automobile industry wastewater. [9]



Total No. of Questions : 12]

SEAT No. :

**P2636**

**[5154]-2**

[Total No. of Pages : 3

**B.E.(CIVIL)**

**DAMS AND HYDRAULIC STRUCTURES**

**(2008 Pattern) (Semester-I) (401002)**

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

**SECTION-I**

- Q1)** a) Explain the factors which govern the selection of site for dam construction. [8]
- b) Briefly explain the meaning of storage dam, diversion dam, overflow dam and rigid dam. [6]

OR

- Q2)** a) Write the concept of arch dam. Types of arch dams and explain any one type with sketch. [8]
- b) Write different types of instruments used to monitor dams and explain any one. [6]

- Q3)** a) Derive an expression for limiting height of a gravity dam [6]
- b) What is meant by elementary profile of gravity dam? Obtain an expression for base width. [6]
- c) Discuss various mode of failure of a solid gravity dam. [6]

OR

- Q4)** a) Determine the stability analysis of a gravity dam with following data:

- i) Overturning moment at toe =  $1 \times 10^6$  KN-m
- ii) Total resisting moment at toe =  $2 \times 10^6$  KN-m
- iii) Total vertical force above box =  $50 \times 10^3$  KN
- iv) Base width of dam = 50 m
- v) Slope of downstream surface 0.8H:1V

Calculate the maximum and min. Vertical stresses on foundation and also determine the max. principal stresses at toe of the dam. Assume that there is no tailwater and V|s face is vertical. [10]

**P.T.O.**

- b) Write short note on: [8]  
i) Earthquake forces on gravity dam with the help of sketch.  
ii) Drainage gallery.

- Q5)** a) Draw a neat sketch of an earthen dam homogeneous in section of 24 m height and name the various parts. Assume necessary data. Draw to the scale. [6]  
b) Classify earthen dams according to the method of construction. [6]  
c) Discuss briefly various causes of failure of earthen dam. [6]

OR

- Q6)** a) Derive an expression for determining the seepage i.e discharge passing through the body of an earthen dam of homogeneous section. [8]  
b) Explain with a neat sketch the Swedish slip circle method of analysing the stability of downstream slopes of an earthen dam under steady seepage. [10]

### SECTION-II

- Q7)** a) Compare Khoslas and Blighs creep length theory for seepage. [5]  
b) Write types of gates on spillway and Explain any one . [5]  
c) A Ogee type spillway has 12 crest gates each having 10 m clear span. Find the max. flood that can be safely passed by lifting all the gates when the max. reservoir level is 105.00m. and crest level is 101.00m. Take coeff.  $C=2.16$   
Coeff. of end contraction of piers= $0.05$   
Coeff. of contraction for abutment = $0.1$   
Also design downstream profile of this spillway of gravity dam having downstream face slope  $0.7H:1V$  [8]

OR

- Q8)** a) Explain Lanes weighted creep theory. [5]  
b) Discuss the merits and demerits of bucket type energy dissipator. [5]  
c) Write notes on: [8]  
i) Types of gates  
ii) Maintenance of outlet structures

- Q9)** Write short note on: [4×4=16]  
a) Discuss various design consideration in case of cross drainage work.  
b) Draw a neat sketch of syphon aqueduct and state the condition under which this type of C.D. work can be adopted.  
c) Lacey's theory for design of alluvial canal.  
d) Losses in irrigation canal.

OR

**Q10)a)** Design a channel using Kennedys theory carrying a discharge of  $30 \text{ m}^3/\text{s}$  with critical velocity ratio and Mannings constant equal to 1.0 and 0.0225 respectively. Assume that bed slope is equal to 1 in 5000. **[8]**

b) Write notes on: **[4×2=8]**

- i) Rapid falls
- ii) Notch falls
- iii) Stepped falls
- iv) Glacis type falls.

**Q11)a)** Write short note on: **[4×2=8]**

- i) Objective and methods of river training
- ii) Objective and methods of Levees

b) Distinguish between high head power development scheme and low head schemes with the help of neat sketch. **[8]**

OR

**Q12)a)** Draw a neat sketches and explain the types of guide banks for river training works. **[8]**

b) Derive the terms: **[4×2=8]**

- i) Load factor
- ii) Capacity factor
- iii) Plant use factor
- iv) Power factor.



Total No. of Questions : 8]

SEAT No. :

P2637

[Total No. of Pages : 3

[5154]-3

B.E. (Civil)

STRUCTURAL DESIGN - III

(2008 Course) (Semester - I)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, From Section - I.
- 2) Answer Q.5 or Q.6, Q.7 or Q.8, From Section - II.
- 3) Answers to the two sections should be written in separate answer-books.
- 4) Figures to the right indicates full marks.
- 5) IS 1343, IS 456, IS 3370 are allowed.
- 6) Assume suitable data wherever necessary and mentioned it clearly.

**SECTION - I**

- Q1)** a) Explain need of high strength steel and high strength concrete in prestressed concrete. [5]
- b) A post tensioned pre stressed Concrete beam section has top flange  $400 \times 200$  mm, web  $300 \times 900$  mm and bottom flange  $500 \times 300$  mm is simply supported over an effective span of 15 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 both end, Calculate total loss of prestress at the age of 100 days if  $K = 0.0026/m$  length of cable, slip of anchorage = 2mm,  $C_c = 1.8$ ,  $E_s = 2 \times 10^5$  Mpa, Concrete grade M 40, Creep and relaxation = 2% of initial prestress. [20]

OR

- Q2)** a) Explain various concepts of analysis of prestressed concrete section.[8]
- b) An unsymmetrical prestressed concrete section has top flange  $450 \times 200$ mm, bottom flange  $500 \text{ mm} \times 300 \text{ mm}$ , and web  $200 \text{ mm} \times 1000$ mm, it is supported over a span of 16m carries super imposed load of 15 KN/m, the effective prestressing force is 1200 KN located at 100 mm from soffit of the section at mid span, cable profile is parabolic and concentric at support. Calculate extreme fiber stresses in concrete at mid span at initial and final stage. Take loss ratio as 0.85 and unit weight of concrete as 25 KN/m<sup>3</sup>. [17]

**P.T.O.**

**Q3)** Design a Post tensioned Pre stressed concrete beam using I - section for flexure to carry a live load of 18 KN/m over a simply supported span of 16m with M 45 grade of concrete and Freyssinet cables of 12/5 ( $f_y = 1750$  Mpa) or 12/7 ( $f_y = 1500$  Mpa), Design the End block also. Draw sketches showing details of cable profile, end block reinforcement Check for fiber stresses in concrete and deflection is must. [25]

OR

- Q4)** a) Explain any one method of post tensioning with neat sketches. [5]
- b) A post tensioned pre stressed concrete Two-way slab of 6m × 5m with discontinuous edge to support imposed load of 4 KN/ m<sup>2</sup> using S3 strands each having cross sectional area 100 mm<sup>2</sup> and  $f_y = 1900$  Mpa check the safety of the slab at collapse and deflection at service load. Use M45 grade of concrete. [20]

**SECTION - II**

**Q5)** Fig (1) shows an intermediate frame of multistoried building the frames are spaced at 5m centre to centre analyze the rigid jointed frame taking live load as 4 KN/m<sup>2</sup> and dead load as 5 KN/m<sup>2</sup> for panel AB and BC respectively. The self weight of beam AB is taken as a 4 KN/m and for BC as 3.0 KN/m. The relative stiffness of all members is same. use Portal method for horizontal load and Proper Substitute frame for vertical loading. Design the Beam ABC for combined effect of horizontal and vertical loading using 20% redistribution of moments for vertical load moments. Use M25 and Fe 500. [25]

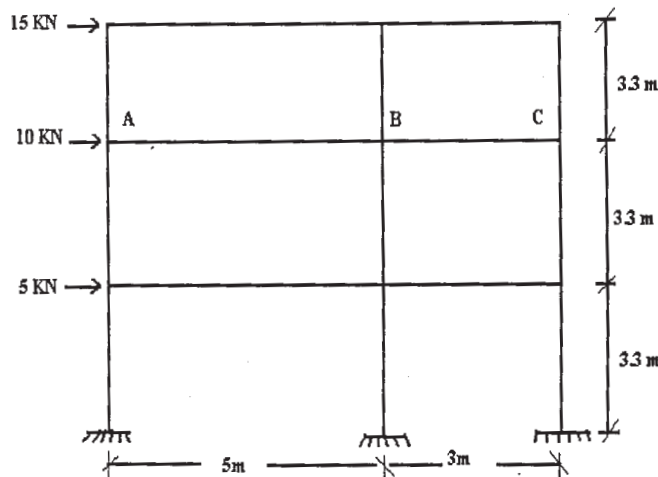


Fig. 1

OR

- Q6) a)** Explain in detail Cantilever Method of analysis. [7]
- b) Analyze the rigid jointed frame as shown in fig (2) by Cantilever Method for lateral loads. Flexural rigidity of all members is same. Analyze beam GHI using proper substitute frame method if it is subjected to vertical ultimate dead load and live load of intensities 18 KN/m and 20 KN/m on Span GH and 16 KN/m and 20 KN/m on HI respectively. The Horizontal forces are as shown in figure. Calculate maximum span moment for GH and Support moment at H. Design Beam GHI for combined effect of horizontal and vertical loading Using 20% redistribution of moments for vertical loading. Use M25 and Fe 500. [18]

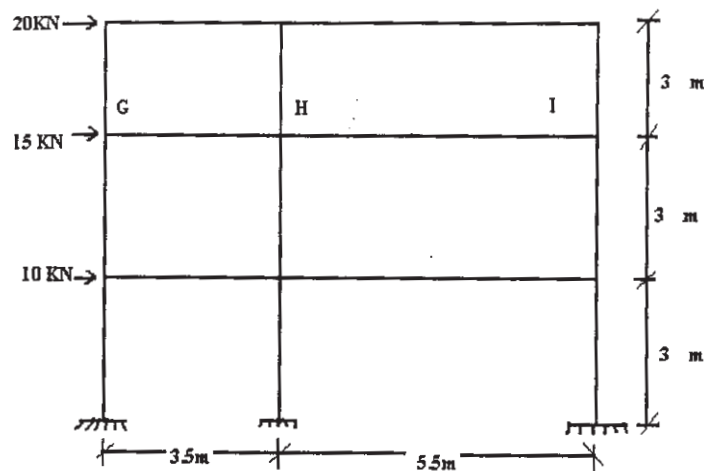


Fig 2

- Q7) a)** Explain with neat sketches various types of combined footing and state in what situation these are used. [5]
- b) Design a Rectangular water tank resting on ground of 2.5 lack Liter capacity, open at top, the joint between wall and base slab is rigid, taking L/B ratio as 1.85 the safe bearing capacity of supporting strata is 200 KN/m<sup>2</sup>, Design the wall and bottom slab of the tank. Draw details of reinforcement, use approximate method. [20]

OR



**Q8)** Design a T-Shape Cantilever retaining wall with following data:

**[25]**

- a) Height of soil to be retained above base = 5.0 m.
- b) Unit weight of Soil = 18 KN/m<sup>3</sup>.
- c) Angle of repose = 30°.
- d) SBC of Soil = 210 KN/m<sup>2</sup>.
- e) Coff. of friction between base & soil = 0.48.
- f) Material - M25 & Fe - 500.
- g) Leveled Backfill.

Show all necessary stability checks & details of reinforcement in stem, heel & toe.



Total No. of Questions : 8]

SEAT No. :

**P3596**

[Total No. of Pages : 4

**[5154]-4**  
**B.E.Civil**  
**STRUCTURAL DESIGN OF BRIDGES**  
**(2008 Course)**

*Time : 3 Hours]*

*[Maximum Marks : 100*

*Instructions to the candidates:*

- 1) Answer Q1 or Q2, Q3 or Q4, from section -I.*
- 2) Answer Q5 or Q6, Q7 or Q8, from section -II.*
- 3) Answer to the two sections should be written in separate answer-books.*
- 4) Figures to the right indicates full marks.*
- 5) IS 1343, IS 456, IS 3370 are allowed.*
- 6) Assume suitable data wherever necessary and mentioned it clearly.*

**SECTION -I**

- Q1)** a) Write detail classification of Bridges. **[10]**
- b) How will you calculate economic span of bridge and what is its importance. **[10]**
- c) Explain scour depth of a bridge? **[5]**

OR

- Q2)** a) Explain various types of IRC loadings. **[10]**
- b) Explain Piguard's method. **[10]**
- c) Explain importance of impact load in design of bridges. **[5]**

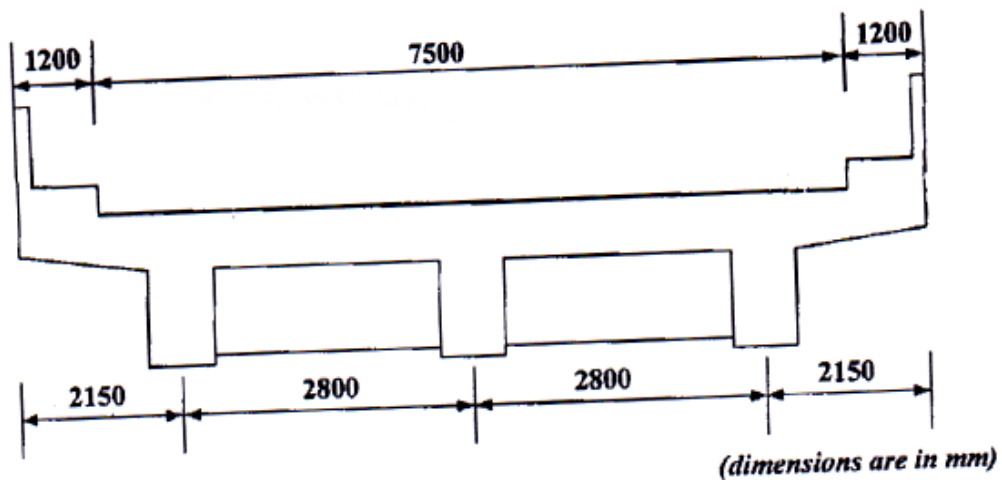
**P.T.O**

**Q3)** An R.C.T.-Beam deck slab bridge shown in Fig. 3 has the following details.

[25]

- Thickness of railings -100 mm.
- Thickness of footpath - 180 mm.
- Thickness of wearing coat -80 mm.
- Span of main girder -15.0m.
- Spacing of cross-beams -3.0 m c/c.
- Live load -IRC class AA Tracked Vehicle.
- Materials -M30 grade of concrete and Fe 500 grade of steel Adopt  $m_1 = 0.08$  and  $m_2 = 0.059$ .

Design the deck slab and also sketch the details of reinforcement.



OR

**Q4)** For the R.C. T-beam deck slab Bridge given in Q.3, design the intermediate post-tensioned prestressed girder. Use M45 grade of concrete and high tension strands of 9 ply 15.2 mm diameter having an ultimate tensile strength of 1400 N/mm<sup>2</sup>. Use Fe 415 steel for supplementary reinforcement. Consider loss ratio as 0.85. Sketch the cable profile for the girder.

[25]

**SECTION -II**

- Q5)** a) Explain various types of steel bridges with suitable sketches. [12]  
b) Explain various types of Bridge bearings. [13]

OR

- Q6)** a) Design a rocker and roller bearing for the given data. [18]  
i) Reaction from the girder = 3500 kN.  
ii) Allowable pressure on bearings = 6 N/mm<sup>2</sup>  
iii) Allowable pressure on bearing plate = 2500 N/mm<sup>2</sup>  
iv) Allowable pressure on concrete bed = 7 N/mm<sup>2</sup>  
sketch the details.
- b) What are the factors considered during the selection of bearing for steel bridges? [7]

- Q7)** Using channel sections, design the members U2-U3, U2-L3 and U3-L3 for the railway steel truss bridge shown in Fig. 7. Also draw a neat sketch of the connection of members at U3, [25]
- i) Weight of stock rail -0.75 kN/m.  
ii) Weight of check rail -0.55 kN/m.  
iii) Timber sleepers of size - (0.25 × 0.25 × 2.5)m @ 0.45 m c/c.  
iv) Unit weight of timber - 7.5kN/m<sup>3</sup>  
v) Spacing of truss -5.0 m c/c.  
vi) The bridge supports a Eudl of 2950 kN.  
Assume height of truss is 5.0m.

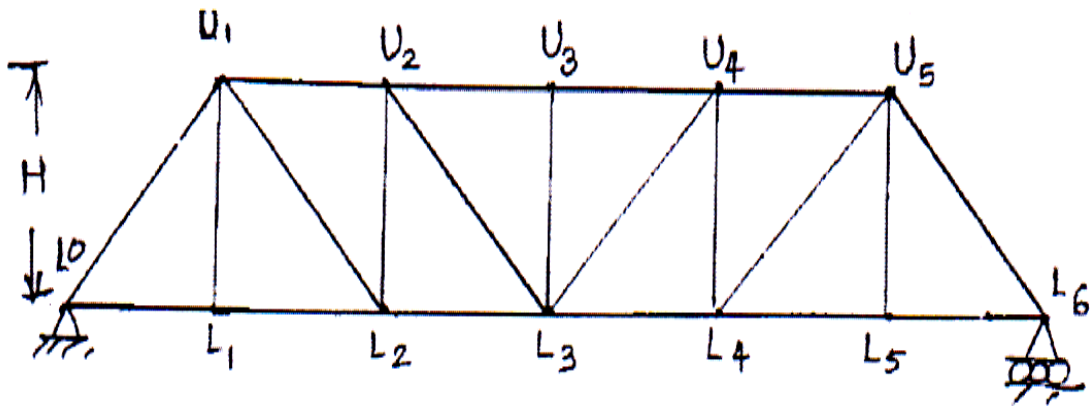


Fig.7 6panels @4m each

OR

- Q8)** For the railway bridge shown in Fig. 7, design the top and bottom lateral bracing with the given data. The rails are 850 mm above the c.g. of bottom chord. The chord members are 500 mm deep and 600 mm wide. The end posts are 475 mm deep and 475 mm wide. The web members are 475 mm deep and 240 mm wide. [25]



Total No. of Questions : 11]

SEAT No. :

P4835

[Total No. of Pages : 4

[5154]-5

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

**SYSTEMS APPROACH IN CIVIL ENGINEERING**

**(2008 Pattern) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve Q.1 or Q. 2, Q.3or Q. 4, Q. 5, Q.6 or Q. 7, Q. 8 or Q.9, Q. 10 or Q.11.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Use of Calculator is allowed.*
- 4) *Assume Suitable data jf necessary.*

**Q1) A)** Write at least five application areas of Linear Programming. [5]

**B)** A company sells two different products A and B. the company makes a profit of Rs 40 and Rs 30 per unit respectively on the two products. The products are produced by a common production process and sold in two different markets. The production process has a capacity of 30,000 manhours; It takes 3 hours to produce a unit of product A and 1 hour to produce a unit of product B. It is found that the maximum units that can be sold for product A and Bare 8,000 and 12,000 respectively. Formulate the above as LP problem. [5]

**C)** Solve the above problem using graphical method. [6]

OR

**Q2) A)** Solve the following problem using Big M method [8]

$$\text{Maximize } Z = 2x_1 + 3x_2 + 4x_3$$

Subject to

$$3x_1 + x_2 + 4x_3 \leq 600$$

$$2x_1 + 4x_2 + 2x_3 \geq 480$$

$$2x_1 + 3x_2 + 3x_3 = 540$$

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

**P.T.O.**

B) State which of the following functions are convex or concave [8]

i)  $F(x) = x_1^2 + x_2^2$

ii)  $F(x) = x_1^2 + 4x_1x_2 + x_2^3$

Q3) A) Explain the degeneracy in transportation problem. [6]

B) Solve the following assignment problem to minimize assignment cost. [6]

	J1	J2	J3	J4
A1	25	27	15	11
A2	20	25	16	17
A3	22	24	18	15
A4	29	25	19	20
A5	28	22	20	19

C) Solve following transportation problem using row minima and column minima method. [6]

		Destination				
		D1	D2	D3	D4	
Origins	O1	12	16	12	10	200
	O2	08	09	12	11	300
	O3	12	11	10	09	150
	O4	08	15	12	05	250
Demand		300	300	100	200	supply

OR

Q4) A) Write the steps followed in VAM method [6]

B) Explain how following variations in transportation problem are solved by giving suitable examples [12]

i) Unbalanced transportation, problem

ii) Maximization problem

iii) No allocation in a particular cell

Q5) A) What are the applications of Dynamic Programming? [8]

B) Find the longest path from 1-12 through the network given below [8]

i-j	distance	i-j	distance	i-j	distance
1-2	5	3-8	10	6-11	7
1-3	4	4-5	8	7-9	4
1-4	2	4-6	9	7-10	10
2-5	8	4-7	6	7-11	6
2-6	10	4-8	4	8-9	12
2-7	5	5-9	8	8-10	5
2-8	7	5-10	4	8-11	2
3-5	6	5-11	3	9-12	7
3-6	3	6-9	5	10-12	3
3-7	8	6-10	2	11-12	6

**Q6) A)** Define Fibonacci numbers. Describe Fibonacci method of one dimensional optimization problems. [8]

B) write the steps used in steepest descent method of minimization [8]

OR

**Q7) A)** find the optima of the function [8]

$$f(x) = x_1^2 + x_2^2 - 16$$

B) Describe the Langragian multiplier technique in detail [8]

**Q8) A)** A firm is engaged in both shipping and receiving activities. The arrival distribution of trucks is found to be Poisson with arrival rate 3 trucks per hour. The service time distribution is exponential with unloading rate of 4 trucks per hour. Determine. [8]

i) Expected number of trucks in a queue

ii) Expected Waiting time of the truck in the queue

iii) Probability that the loading and unloading dock and workers will be idle.

B) Give any two applications of sequencing model. Explain the process, in detail. [8]

OR

**Q9) A)** A bakery shop keeps a stock of cakes. Daily demand based on past experience is as given below. [10]



daily demand	0	15	25	35	45	50
probability	0.01	0.15	0.20	0.50	0.12	0.02

consider following sequence of random numbers

48, 78, 09, 51, 77,15, 14,68,09

Using the sequence, simulate the demand for next 10 days.

Find the stock situation if the owner of the bakery decides to make 35 cakes every day

Also, estimate the daily average demand for the cakes on the basis of this simulated data.

B) Define a queue and explain the various queue disciplines. [6]

**Q10)A)** Discuss the algebraic method of solving  $2 \times 2$  games by taking suitable example. [9]

B) Explain how the theory of replacement is used in replacement of items whose maintenance cost varies with time [9]

OR

**Q11)A)** How the concept of dominance used in simplifying the solution of a rectangular game? Explain the rules. [9]

B) A firm is thinking of replacing a particular machine whose cost price is Rs 12,200. The scrap price of this machine is only Rs 200. The maintenance costs are found to be as follows. Determine when the firm should get the machine replaced. [9]

year	1	2	3	4	5	6	7	8
maintenance cost (Rs)	220	500	800	1200	1800	2500	3200	4000



Total No. of Questions : 12]

SEAT No. :

**P2638**

**[5154]-6**

[Total No. of Pages : 3

**B.E. (Civil)**

**AIR POLLUTION AND CONTROL**

**(2008 Pattern) (Semester - I) (Elective - I) (401004 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) *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 following:

- 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

**Q3)** Answer the following:

- a) What is Air pollution survey? Discuss. [8]
- b) What sampling of gases? How it is carried? [8]

OR

**P.T.O.**

**Q4)** Answer the following:

- a) What are the methods available in air sample analysis? Explain any one in details. [8]
- 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. [9]

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. [9]

## 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 m<sup>3</sup>/sec of air, and the appropriate filtering velocity has been determined to be 2.0 m/min. Determine the number of bags required for a continuously cleaned operation. [10]
- b) Discuss about Wet scrubber. [7]

**Q9)** Answer the following:

- a) What is land use planning? Discuss. [8]
- 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. [8]
- 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? [9]
- 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. [9]
- b) Explain in details Environmental management plan. [8]



Total No. of Questions : 12]

SEAT No. :

**P2639**

**[5154]-7**

[Total No. of Pages : 2

**B.E. (Civil)**

**ARCHITECTURE AND TOWN PLANNING**

**(2008 Pattern) (Semester - I) (Elective - I) (401004 D)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Use separate answer sheets for Section one and two.*
- 2) *Assume Suitable data if necessary.*
- 3) *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.*

**SECTION-I**

- Q1)** a) State the differences between the vision for the development by a town planner and an architect. [9]
- b) Elaborate different garden styles. [8]

OR

- Q2)** a) Explain in detail the elements of design and mention the impact of these on architectural composition by giving suitable examples. [9]
- b) Why and How water body conservation & creation is responsible for the development of an area? Explain with a suitable example in your area. [8]

- Q3)** a) Explain the importance of the prevailing byelaws for enriching the spaces and hence to arrive at a beautiful "Built Environment", with in a town. [9]
- b) State the differences between URBAN DESIGN & URBAN RENEWAL. [8]

OR

- Q4)** a) Explain the necessity of the concept "Built Environment", in relation with development of metrocities. [8]
- b) Enlist the factors on which Quality of Life is based and establish the relation of the same with Urban Renewal proposal. [9]

- Q5)** a) Write a short note on : Advantages and usage of sustainable materials. [8]
- b) Enlist and elaborate aspects contributing for designating a building as a "Green Building"? [8]

OR

**P.T.O.**

- Q6)** a) Enlist different sustainable technologies and explain the advantages and usage of any two. [8]  
b) Write a short note on any one “Green building in India”. [8]

**SECTION-II**

- Q7)** a) Explain the contribution of any three town planners for deciding the levels of development. [9]  
b) Explain “town planning scheme and garden city”. with appropriate examples. [8]

OR

- Q8)** a) Explain different theories of developments with the help of suitable sketch [9]  
b) Explain the concept of new towns: by giving appropriate example. [8]

- Q9)** a) Explain different 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 different categories of surveys and the importance of the same while finalizing DP Proposal when you are working as a planner. [9]  
b) Explain different urban road objectives and importance of traffic management in achieving the same. [8]

- Q11)**a) Write a short note on : SEZ, giving the status in India. [8]  
b) Elaborate applicability of modern tools for : i) Land Use Analysis ii) traffic management. [8]

OR

- Q12)**a) Write short notes on i) LA Act ii) MHADA. [8]  
b) Elaborate the applicability of modern tools for : i) disaster management ii) traffic regulation. [8]



Total No. of Questions : 12]

SEAT No. :

**P2640**

**[5154]-8**

[Total No. of Pages : 2

**B.E. (Civil)**

**ADVANCED GEOTECHNICAL ENGINEERING**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed & its codes are not allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) Explain 'clay minerals'. [8]  
b) Explain 'A - line chart'. [8]
- Q2)** Discuss in detail 'soil classification'. [16]
- Q3)** a) Explain AEP, PEP & EP at nest. [9]  
b) Explain 'Modified culman's method'. [8]
- Q4)** a) Derive the expression for KO, Ka & KP. [8]  
b) Explain the steps for 'Anihared sheet pile design. [9]
- Q5)** a) Explain 'Soil Nailing' & Roch Bothing. [9]  
b) Discuss 'geosynthetics'. [8]
- Q6)** a) Explain 'geosynthetics in geoenvironment'. [9]  
b) Discuss 'Prinquet & Lee' theory. [8]

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

## SECTION-II

- Q7)** a) Discuss different 'Vibrations'. [8]  
b) Explain 'Basken's method'. [8]
- Q8)** a) Explain 'Paul's Analysis'. [8]  
b) Explain 'Block vibration Test'. [8]
- Q9)** a) Discuss different 'Soil stabilization techniques'. [9]  
b) Explain Vibro-floatation.. [8]
- Q10)**a) Explain stages in inserting reinforcement for vibro-expanded pile. [8]  
b) Discuss 'Double-underreamed pile. [9]
- Q11)**Discuss 'Rheology' & 'Rheological models'. [17]
- Q12)**Explain. [17]
- a) Creep
  - b) Secondary consolidation
  - c) Pring-ham model
  - d) Kelvin model.





Total No. of Questions : 12]

SEAT No. :

P2641

[5154]-9

[Total No. of Pages : 3

B.E. (Civil)

**MATRIX METHODS OF STRUCTURAL ANALYSIS**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1)** Write a note on (Any two):

**[16]**

- a) Ill conditioned matrix.
- b) Gauss Jordan & Gauss Seidel iteration method.
- c) Gauss Elimination Method.

OR

**Q2)** a) Write a note on “Importance of Matrix Algebra in Matrix Methods of Structural analysis”. **[4]**

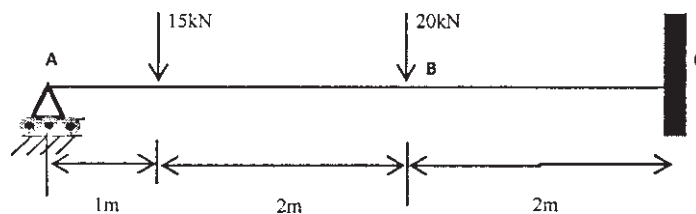
b) Solve the following equations by Gauss Elimination Method **[12]**

$$X_1 - 0.4X_2 + 0.8X_3 = 5$$

$$-2X_1 + X_2 + X_3 = 1$$

$$8X_1 + 2X_2 = 12$$

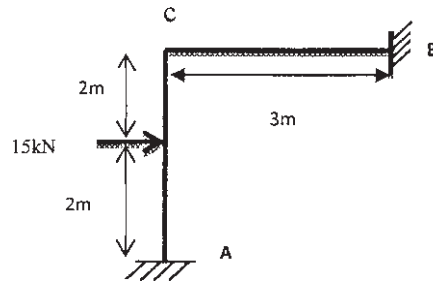
**Q3)** Analyze the beam shown below by flexibility method (EI is constant) **[18]**



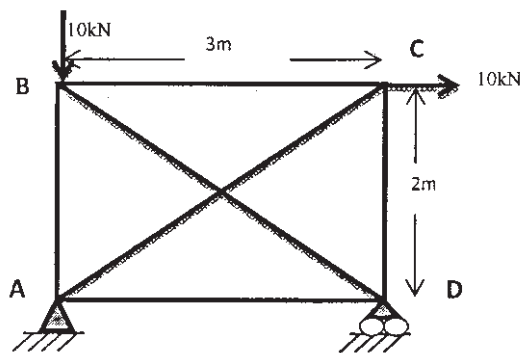
OR

**P.T.O.**

**Q4)** Analyze the portal frame using Flexibility Method (EI constant): [18]



**Q5)** Analyze the truss by Flexibility Method (EI constant). [16]



OR

**Q6)** Analyze the beam shown in Ex. 3 by Stiffness Method (EI is constant). [16]

### SECTION - II

**Q7)** Write a note on: [16]

- Displacement Method of structural analysis.
- Effective node numbering.

OR

**Q8)** a) Explain structure and member approaches. [8]

- Using first principles, establish relationship between local & global stiffness matrix of portal frame member. State clearly transformation matrix. [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. [16]

- a) Prepare the flowchart and state input required.
- b) How will you input support conditions.

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. :

**P2642**

**[5154]-10**

[Total No. of Pages : 3

**B.E. (Civil Engineering)  
HYDROINFORMATICS**

**(2008 Pattern) (Semester - I) (Elective - II) (401005 B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn 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 Hydroinformatics. What are the techniques used in Hydroinformatics? Explain any one in short. [6]
- b) Explain scope of web based modeling in water resources engineering. [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) Discuss various methods of simulations in Hydroinformatics. [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 possible simulation model for predicting stream flow in a river. [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)** 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. [6]

c) Define cross validation. State step by step procedure for carrying out the same. [6]

OR

**Q8) a)** Define a transfer function. Discuss various types of transfer functions. [6]

b) What is normalization? What is its need? What are typical ranges of normalization? [6]

c) What is the necessity of cross validation in ANN modeling? Explain any method of cross validation in detail. [6]

- Q9)** a) What is real coded Genetic Algorithm? How it differs from standard Genetic Algorithm? [8]
- b) Why Genetic Algorithm is used as an optimizing function? Can it be used to train a neural network? How? [8]

OR

- Q10)**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]

- Q11)**a) Discuss a study about application of Artificial Neural Networks in Water Resources Engineerine 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. :

P3618

[Total No. of Pages : 3

[5154]-11

B.E. (Civil)

**TQM & MIS IN CIVIL ENGINEERING  
(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) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 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) *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)** In the era of fierce global competition in the construction industry, TQM approach is the only solution for successful business growth. Explain the validity of this statement with practical examples. **[18]**

OR

**Q2)** Explain ten reasons for poor quality of construction in India. As quality Manager, suggest remedial measures for the same. **[18]**

**Q3)** Classify the various defects in construction with examples. What preventive measures would you suggest to avoid above defects at your site? **[8 + 8]**

OR

**Q4)** Explain the eight principles of ISO: 9001 and explain how each principle is useful in achieving TQM. **[16]**

**P.T.O.**

**Q5)** Explain concepts of internal customers, external customers, quality function deployment and non conformities with appropriate examples from any construction project involving various stake holders. **[16]**

OR

**Q6)** Explain in brief (any 4) : **[16]**

- a) Significance of SCM in TQM.
- b) Customers satisfaction.
- c) Application of six sigma in construction.
- d) Quality Circles.
- e) DMAIC & DMADV.

### **SECTION - II**

**Q7)** With a flow chart explain the various components of any MIS, their interrelationships and their functions. **[18]**

OR

**Q8)** a) Differentiate between DATA & INFORMATION with suitable examples from construction industry. **[8]**

b) What are Decision Support System? Explain its advantages with an example from a construction firm. **[4 + 6]**

**Q9)** Project Managers have to take strategic decisions, tactical decisions and operational decisions. Enlist examples of each type of decision with respect to construction industry. **[16]**

OR

**Q10)** Explain in detail : **[8 + 8]**

- a) ERP software applications in construction.
- b) Manual control and MIS based control of construction operations.



**Q11)** Explain with a flow diagram, the acquisition, storing, processing and validation of the information necessary to develop an MIS for a construction organisation executing Road Project. **[16]**

OR

**Q12)** Explain integration of Hardware, Software data communication & processing, information gathering & processing with examples from construction field. **[16]**



Total No. of Questions : 12]

SEAT No. :

**P2643**

**[5154]-12**

[Total No. of Pages : 3

**B.E. (Civil)**

**EARTHQUAKE ENGINEERING**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) What are the causes of 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. [6]
- c) Explain philosophy behind earthquake resistant design of structures? Describe the difference between magnitude and intensity of an earthquake? [4]

OR

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

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

OR

**P.T.O.**

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

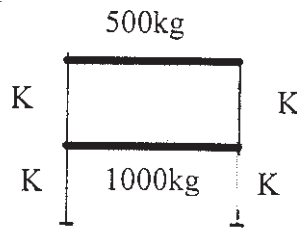


Figure 4.1

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

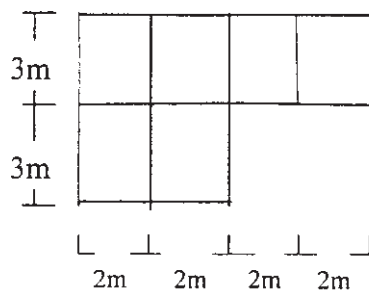


Figure 5.1

OR

**Q6)** Calculate the distribution of base shear at each floor level as per seismic coefficient method for the OMF with brick infill building shown in Fig. 6.1. The building is located in Zone V. The frames are spaced at 4m c/c. Assume  $m = 3000\text{kg}$  and soil of Type III. [18]

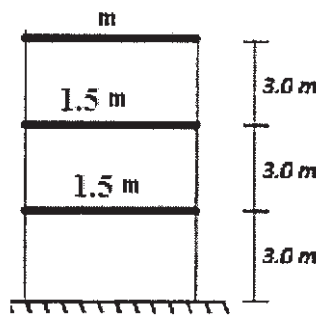


Figure6.1

### SECTION - II

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

OR

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

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

OR

- Q10)**a) Explain Tuned Mass Dampers? [8]
- b) Explain various techniques for local retrofitting of RC buildings? Give reasons for poor performance of masonry buildings? [8]

- Q11)**a) Differentiate between retrofitting and strengthening? What are techniques for retrofitting of RC buildings? [8]
- b) A 400mm × 400mm column is supported on an isolated footing. The load coming on footing is 600kN and a moment 30kN.m. The SBC is 150kN/m<sup>2</sup>. Using M25 grade of concrete and steel grade Fe500, design footing and sketch the details. [8]

OR

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

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



Total No. of Questions : 12]

SEAT No. :

**P2644**

**[5154]-13**

[Total No. of Pages : 3

**B.E. (Civil)**

**ADVANCED CONCRETE TECHNOLOGY**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Explain workability as a quality measure of green concrete. Enlist any five factors affecting workability of concrete. [6]
- b) Write in detail how flaky and elongated particles of coarse aggregates affect the overall quality of concrete. [6]
- c) Explain how water cement ratio is to be modified if concrete is to be manufactured in monsoon and in summer. [6]

OR

- Q2)** a) Explain the terms internal friction, bleeding and segregation in relation with performance of concrete in wet and hardened state. [9]
- b) Write any five types of cement with their suitability. [5]
- c) Explain the utility of particle size analysis in concrete making theory. [4]

- Q3)** a) Explain aerated concrete. Explain any one way for the manufacture of it. [8]
- b) Discuss the importance and effects of water absorption and moisture content of lightweight aggregate concrete. [8]

OR

**P.T.O.**

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

b) Write in detail what do you mean by light weight concrete. Name any six naturally occurring light weight aggregates. [8]

**Q5) a)** Write notes on: i) Acoustic emission method ii) Pulse echo method. [10]

b) Enlist various non-destructive methods with their utility in brief. [6]

OR

**Q6) 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 the limitations of following non - destructive tests: [8]

i) Windsor Probe test.

ii) Pulse echo method

## **SECTION - II**

**Q7) a)** Differentiate between cracking, spalling and staining. [6]

b) Explain in detail the classification of artificial and natural fibers. [8]

c) Fiber matrix interfacial bond. [4]

OR

**Q8) a)** Explain: Quality control tests to ensure good performance of polymer concrete. [6]

b) Write a note on self compacting concrete. Write the various ways in which it is obtained. [8]

c) Write a note on relative fiber matrix stiffness. [4]

**Q9) a)** Write a note on Fibers with respect to Volume, aspect ratio and orientation of fibers. [6]

b) What are various types of fibers? Explain any two of them. [6]

c) What are the various applications of polymer concrete. [4]

OR

- Q10)**a) What are the basic properties of FRC which can be made use of in the design of structural properties? [6]
- b) What is compact cube test? How it is useful in determining the efficiency of FRC in shear? [6]
- c) Explain how steel fiber reinforced concrete behaves in shear. [4]

- Q11)**a) Write a note on fiber reinforced polymeric meshes (FRP) along with merits and demerits. [8]
- b) Explain integral mould method of ferrocement along with its advantages. [8]

OR

- Q12)**a) Explain how ferrocement differs than concrete. Write about tensile property of ferrocement. [8]
- b) Write the advantages and applications of ferrocement. [8]



Total No. of Questions :12]

SEAT No. :

**P2645**

[Total No. of Pages :7

[5154] - 14

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

**QUANTITY SURVEYING, CONTRACTS & TENDERS**

**(2008 Pattern) (Semester - II) (401009)**

*Time : 4 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain the need for making estimation of any Civil Engineering work. Explain the difference between estimator and quantity surveyor. [6]
- b) Explain the various data required for preparing different types of estimate. What is meant by Item of work. Enlist the item of work in the sub structure part of residential building. [4]
- c) Explain Provisional cost and Prime cost, Centage charges. [6]

OR

- Q2)** a) Write short notes on [6]
- i) Approximate estimate for Road.
  - ii) Approximate estimate for water supply and sanitary scheme.

**P.T.O.**



- b) Prepare the approximate estimate for a building with the following details  
Plinth area = 3500 sq-m, Rate per sq-m=500 sq-m [6]

Additional cost for the following is required to be considered in the total cost

- i) Architectural finishes = 1.5%
  - ii) Water supply and sanitary = 8%
  - iii) Electrification = 6%
  - iv) Miscellaneous and Contingencies - 15%
- c) What is significance of DSR in the estimation for any construction?  
What are the details available in DSR? [4]
- Q3)** a) What are the methods of taking out detailed estimates? Briefly explain central line method. [6]
- b) For the plan and sectional details given in fig 1 & 2, prepare a detailed estimate for the following item of work.
- i) PCC (1:4:8) for foundation [4]
  - ii) I class brick work in super structure in cm 1:6. [4]
  - iii) Door D, with frame size 75cm×5cm [4]

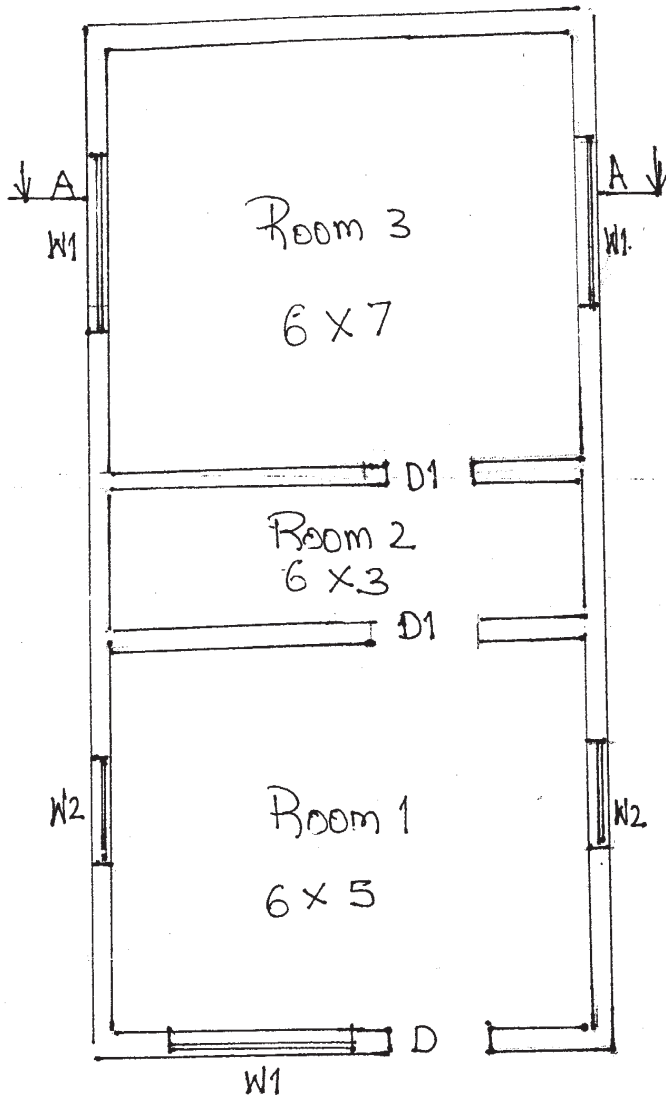


fig 1. Plan

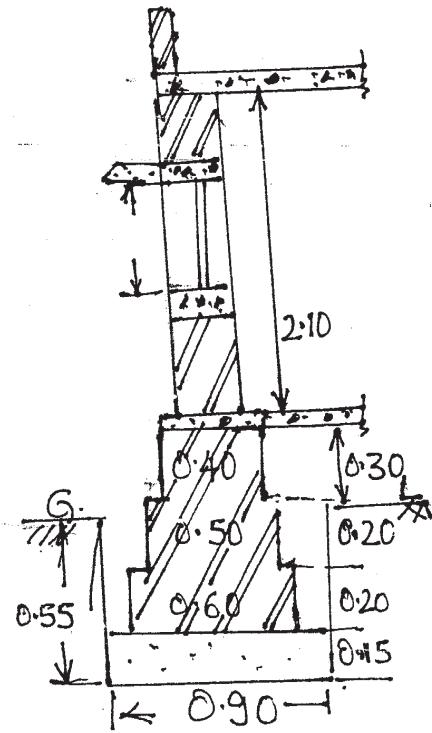


fig 2. Section on AA

### Schedule of Opening

$$D = 0.90 \times 2.1$$

$$D1 = 0.60 \times 1.8$$

$$W1 = 1.80 \times 1.5$$

$$W2 = 1.50 \times 1.2$$

(Note :- All dimensions in metre)

OR

- Q4)** a) What do you understand by bar bending schedule and explain how length of bar is worked out considering, hook, overlap and cranking. [8]
- b) Explain the method for estimating the quantity of earth work for road and canal works. What are lead and lift and explain their significance in estimation for road or canal. [6]
- c) What are the different type of and number of labours required for the following item of work [4]
- i) 10m<sup>3</sup> of PCC (1:4:8) in foundation.
- ii) 10m<sup>3</sup> of I class brick masonry in super structure in cm 1:6.

- Q5)** a) State importance and uses of specification and analysis of rates. Explain how specification affects the rate of item of work. [6]
- b) Write note on any 2 of the following: [4]
- i) General or brief specification,
- ii) Detailed specification,
- iii) Standard specification.
- c) Write detailed specification for [6]
- i) Internal plastering in CM 1:6.
- ii) Centering and shuttering.

OR

- Q6)** a) Explain the term task work. State the task work for the following item of works [6]
- i) I class Brickwork in cm 1:6 for superstructure.
- ii) PCC (1:4:8) in plinth of building.

- b) Work out the quantity of material required for following: [4]
- i) First class brick work in CM 1:6---1 m<sup>3</sup>
  - ii) Plastering 12mm thick in CM 1:6 10sq-m
- c) Find out the cost per unit forcement concrete (1:4:8) in foundation [6]
- The following rates for material & labour may be considered for rate analysis
- i) Cement = Rs. 300/bag,
  - ii) Sand = Rs.1400/m<sup>3</sup>
  - iii) Aggregate= Rs, 1400/m<sup>3</sup>
  - iv) Bricks = Rs. 4500/1000No,
  - v) Steel = Rs. 38,500/MT.
- Labour rates/ day
- 1) Head mason = Rs.600/-,
  - 2) Mason = 450/-,
  - 3) Mazdoor = Rs. 300/-,
  - 4) Helper = Rs. 350/-

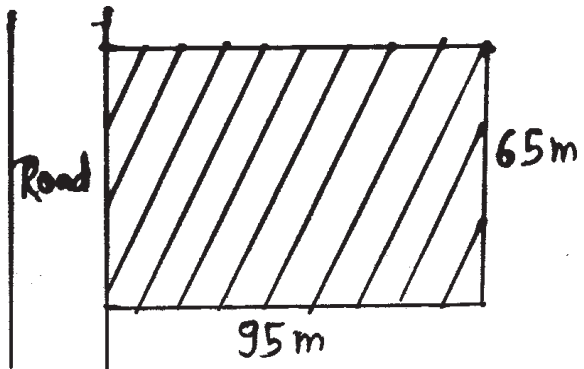
## SECTION-II

- Q7)** a) A newly constructed bungalow stands on a plot having cost of Rs. 60,000/- and the construction costs Rs.2,00,000/- if estimated life of bungalow is 66 years and the owner desires 8% returns on the construction cost and 5% returns on the land cost, determine the annual rent that should be charged. Assume annual installment of sinking fund for 66 years' life to be 0.5 paisa per Rupee, annual repair cost 0.5% of the construction cost and other outgoings 30% of the gross rent. [10]
- b) What is the necessity of calculating 'Depreciation'? State four methods of calculating depreciation and explain any one method clearly. [4]
- c) Discuss eight factors on which value of a land depends. [4]

OR

- Q8) a)** Determine value of the land shown in Fig. Q.8 (a) using belting methods. Assume three belts of standard depths and value of the first (front) belt Rs.120/- per m<sup>2</sup>. [10]

**Fig. Q.8(A) ⇒**



- b) Write two differences between: [4]
- Distress value – Scrap Value, and
  - Valuation of Building – Valuation of Land.
- c) State merits and demerits of following types of property ownership: [4]
- Leasehold Property, and
  - Freehold Property.
- Q9) a)** Enlist the methods of minor works execution in P.W.D. Discuss any one method in details. [6]
- b) What is meant by a tender? Discuss the advantages and disadvantages of ‘Public Tender’. [5]
- c) Detail out the ‘four-envelope system’ of tender submission. [5]

OR

- Q10)a)** Explain six precautions to be taken at the time of scrutiny of tenders. [6]
- b) Clarify the terms: Revocation of Tender, Rejection of Tenders. [5]
- c) State the meaning and necessity of ‘Draft Tender Papers’ to be prepared before assigning any Government Work to a Contractor. [5]

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

- i) A building contract is void in a case an 80 years old lady signed it in the hospital when she is admitted for treatment for high blood pressure.
  - ii) A building repairs contract is legal and valid even if a young contractor of 21 year age signs it with the owner, who is a widow having age 50 years and presently undergoing a treatment for multiple fractures after a severe road accident.
  - iii) A contractor appoints his step-brother as an arbitrator for his dispute with an owner.
- b) Briefly explain administrative and organizational responsibilities of contractors. [5]
- c) What is meant by an 'Arbitrator'? Briefly discuss two types of arbitration. [5]

OR

**Q12)a)** Explain liquidated damages, unliquidated damages in case of breach of contract. [6]

- b) State the necessity of arbitration. Discuss the powers of an arbitrator. [5]
- c) Explain with examples the following with reference to Civil Engineering works: [5]
- i) Conditions of contract related to labour and personnel, and
  - ii) Conditions of contract related to execution of work.

*EEE*

**[5154]-15**  
**B.E. (Civil)**  
**TRANSPORTATION ENGINEERING**  
**(2008 Course)**

**Solution/Scheme of Marking**

**SECTION I**

Q.3 (a) <sup>(i)</sup> Length of transition curve  $L_s$  based on rate of change of centrifugal acceleration  $= \frac{0.0215V^3}{CR}$

Rate of change of centrifugal acc<sup>n</sup>  $C = \left( \frac{80}{75+V} \right)$   
 $= \frac{80}{(75+65)} = 0.57 \text{ m/sec}^3 < 0.8 \therefore \text{o.k.}$

$L_s = \frac{0.0215V^3}{CR} \text{ OR } \frac{V^3}{CR}$   
 $= \frac{0.0215 \times (65)^3}{0.57 \times 220} = 47.1 \text{ m}$

(ii)  $L_s$  by allowable rate of introduction of S.E.  $= \frac{EN}{2} = L_s$

$e = \frac{V^2}{225R} = \frac{(65)^2}{225 \times 220} = 0.085 > 0.07$

$\therefore f = \frac{V^2}{127R} - 0.07 = \frac{(65)^2}{127 \times 220} - 0.07 = 0.08 < 0.15 \therefore \text{OK}$

(iii)  $L_s = \frac{EN}{2} = \frac{B \cdot e \cdot N}{2} = \frac{7.5 \times 0.07 \times 150}{2} = 39 \text{ m}$

(iv) Mini. value of  $L_s$  as per IRC for plain & rolling terrain

$L_s = \frac{2.7V^2}{R} = \frac{2.7 \times (65)^2}{220} = 51.9 \text{ m}$

Adopt highest value of the three i.e. 51.9 m as the design length of transition curve

(v) Shift of Curve (S)  $= \frac{L_s^2}{24R} = \frac{(52)^2}{24 \times 220} = 0.51 \text{ m}$

Q.4 (c)

Finding Minimum Radius

$$e+f = \frac{V^2}{127R} \text{ or } e+f = \frac{v^2}{gR}$$

$$\therefore R = \frac{V^2}{127(e+f)} \text{ or } R = \frac{v^2}{(e+f)g}$$

Assume rate of superelevation = 7.0% i.e. 0.07 = e  
coefficient of friction in lateral direction = 0.15 = f

$$\therefore R = \frac{(100)^2}{127(0.07+0.15)} = 357.9 \text{ m} \approx 360 \text{ m}$$

Q.5 (6)

Cummulative standard Axles  $N_s$  in msa

$$N_s = \frac{365 A (1+r)^n - 1}{r} \times LDF \times VDF$$

A = Traffic after completion of construction = 500

r = rate of growth of traffic = 7.5%

n = Design life of pavement = 15 yrs

LDF = Lane Distribution Factor = 0.75

VDF = Vehicle Damage Factor = 1.9

$$N_s = \frac{365 \times 500 [1 + 0.075]^{15} - 1}{0.075 \times 10^6} \times 0.75 \times 1.9$$

= 6.792 million standard axles i.e. msa



Q.9 (a) Rational Formula SECTION II

$$Q = 100 p f A I_c \text{ m}^3/\text{hour}$$

OR

$$Q = 0.028 p f A I_c \text{ m}^3/\text{sec}$$

$Q$  = Design Discharge or Runoff  $\text{m}^3/\text{sec}$

$p$  = Coeff. to account for absorption

$f$  = coeff. to account for variation of rainfall in space

$A$  = Catchment Area in Hectares

$I_c$  = Critical Intensity of Rainfall  $\text{cm}/\text{hour}$

$$\text{Time of Concentration (Tc)} = \left[ 0.89 \times \frac{L^3}{H} \right]^{0.385}$$

$$= \left[ 0.89 \times \frac{(4)^3}{25} \right]^{0.385}$$

~~One Ho.~~

~~Critical Inten.~~

$$= 1.37 \text{ Hours.}$$

$$\text{One Hour Rainfall (I}_0) = \frac{F}{T} \left[ \frac{T+1}{2} \right] \text{ cm/hour}$$

$$= \frac{16}{2} \left[ \frac{2+1}{2} \right]$$

$$= 12 \text{ cm/hour}$$

Critical Intensity of Rainfall

$$I_c = \left[ \frac{2 I_0}{T_c + 1} \right] = \left[ \frac{2 \times 12}{1.37 + 1} \right] = 10.12 \text{ cm/hour}$$

$$\text{Runoff (Q)} = 100 \times 0.3 \times 0.97 \times 1000 \times 10.12$$

$$= \del{296820} \text{ m}^3/\text{hr. } 294492 \text{ m}^3/\text{hour}$$

$$= \del{82.45} \text{ m}^3/\text{sec. } 81.80 \text{ m}^3/\text{sec.}$$

Note 1 Hect. =  $10^4 \text{ m}^2$

$$\therefore 10 \text{ km}^2 = \frac{10 \times 1000 \times 1000 \text{ m}^2}{10^4} = 1000 \text{ Hectares.}$$

$$\therefore A = 1000 \text{ Hectares.}$$

Q.10 (a)

Constant of variation 'a' for various spans,

$$\text{For 4 m Span, } a_1 = 1700/16 = 106.25$$

$$8 \text{ m Span, } a_2 = 7000/64 = 109.37$$

$$12 \text{ m Span, } a_3 = 16000/144 = 111.11$$

$$15 \text{ m Span, } a_4 = 24500/225 = ~~109.0~~ 108.88$$

Avg. value of constant of variation 'a'

$$= \frac{106.2 + 109.37 + 111.11 + ~~109.0~~ 108.88}{4}$$

$$= ~~108.875~~ 108.89$$

The Avg. Cost of pier,

$$P = \frac{22,200 + 23,200 + 23,000 + 23,600}{4}$$

$$= 23,000$$

$$\text{Economic Span, } l = \sqrt{P/a}$$

$$= \sqrt{\frac{23,000}{108.89}}$$

$$= \underline{\underline{14.53 \text{ m}}}$$

RRRR

Total No. of Questions : 12]

SEAT No. :

**P2647**

**[5154]- 17**

[Total No. of Pages : 3

**B.E. (Civil)**

**ADVANCED FOUNDATION ENGINEERING**

**(2008 Pattern) (Semester - II) (Elective - III) (401007 B)**

*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)** Explain the following; **[8]**

- i) Significant Depth
- ii) IS code provisions for subsoil exploration?

b) Discuss IRC provisions for number of borings & different guidelines, for depth of exploration. **[8]**

OR

**Q2) a)** Discuss in brief different case studies for failure of foundation. **[8]**

b) Explain **[8]**

- i) Seismic Refraction Method
- ii) Electrical Resistivity Method

**Q3) a)** Explain the following with comparison, for Raft Foundation, **[8]**

- i) Conventional method.
- ii) Soil line method

b) Explain the consideration in the design of combined footings. **[8]**

OR

**P.T.O.**

- Q4)** a) Discuss the steps for ‘Hansen’s Method’ for shallow foundation design, subjected to inclined loads. [8]
- b) Discuss the utility of various softwares, for Geotechnical design, w.r.t. ‘Geo-slope’. [8]

- Q5)** a) How the  $Q_a$  is determined, for the pile, under test, in a cyclic pile load test? Explain by drawing a sample graph. [9]
- b) How is the testing of pile subjected to tensile loads carried out? Explain. [9]

OR

- Q6)** a) Explain the steps for ‘Reese & Matlock’ method. [9]
- b) What is ‘LLP’? How  $E_s$ ,  $T$  &  $\eta_z$  is determined for a LLP. [9]

- Q7)** a) Explain the methods for determination of LCC, of Under reamed pile, for following cases, i. Clayey soil ii. Sandy soil. [8]
- b) Discuss design aspects of double under reamed pile foundation. [8]

OR

- Q8)** a) Explain the design steps for construction of sand chains. [8]
- b) Explain the step by step procedure for construction on double under reamed pile foundation with sketches. [8]

- Q9)** a) Explain the design provisions for, [8]
- i) well curb
  - ii) cutting edge
  - iii) steining thickness
  - iv) bottom plug
- b) Discuss the method for scour level, according to IRC & explain the Lacey’s design for, i. Grip length ii. Normal scour depth [8]

OR

- Q10)**a) Discuss the provisions made as per IRC for Caisson design. [8]  
b) Explain 'Banerjee' & 'Gangopadhyay' Analysis. [8]

- Q11)**a) Explain the steps for 'Anchor sheet pile design'. [9]  
b) Describe in detail the design considerations in well design. [9]

OR

- Q12)**a) Discuss construction of common types of 'cofferdams'. [9]  
b) What are the measures to be taken to avoid failure of well foundation. [9]



Total No. of Questions : 6]

SEAT No. :

**P2648**

**[5154]-18**

[Total No. of Pages : 2

**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) *All questions are compulsory.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams should be drawn wherever necessary.*

**SECTION - I**

**Q1)** Write notes on.

- a) Engineering significance of Precambrian metamorphic rocks. [8]
- b) Characters of Fractures in deccan trap area. [4]
- c) Flow Groups. [6]

OR

- a) Width of dykes in deccan traps area. [4]
- b) Engineering significance of older sedimentary rocks. [8]
- c) Regional distribution of deccan trap Basalt. [6]

**Q2)** How location of spillway is decided on geological grounds? Discuss case histories of tail channel erosion due to Columnar basalt and volcanic breccias. [16]

OR

Discuss with suitable examples suitability of Compact Basalt and Amygdaloidal basalts from dam foundation point of view. [16]

**Q3)** Write notes on.

- a) Influence of Climate on formation of Soil. [6]
- b) Water bearing characters of Compact Basalt. [6]
- c) Giant Phenocryst Basalt as a construction material. [4]

OR

*P.T.O.*

- a) Multi aquifer System. [4]
- b) Characters of transported & residual soil. [6]
- c) Artificial recharge of ground water. [6]

**SECTION - II**

**Q4)** Write notes on:

- a) Compressive strength of rocks masses. [6]
- b) Stand up time of Rock masses during tunneling. [4]
- c) Bieniawski's Geomechanical Classification. [8]

OR

Write notes on:

- a) RQD system of classification of rock masses. [6]
- b) RSR system of classification of rock masses. [8]
- c) Electrical resistivity method. [4]

**Q5)** a) Discuss with suitable examples, tunneling through Deccan Trap rocks. [16]

OR

- a) Determination of SBC of bridge during its foundation. [5]
- b) Treatment to be given to the dyke occurring below the foundation of a bridge pier. [5]
- c) Tunneling through folded rocks. [6]

**Q6)** a) Dam building activity & earthquakes in deccan trap area. [8]  
 b) Types of faults an recognition of them. [8]

OR

- a) Fault zone treatment. [6]
- b) Problems with made ground in cities. [6]
- c) Foundation of monumental buildings. [4]



Total No. of Questions : 12]

SEAT No. :

**P2649**

**[5154]-20**

[Total No. of Pages : 3

**B.E.(Civil Engineering)**  
**CONSTRUCTION MANAGEMENT**  
**(2008 Pattern) (Semester - II) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section II.*
- 2) *Answer any 3 questions from each section.*
- 3) *Answer 3 questions from section I and questions from section II.*
- 4) *Answers to the two sections should be written in separate books.*
- 5) *Neat diagrams must be drawn wherever necessary.*
- 6) *Figures to the right indicate full marks.*
- 7) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 8) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Explain role of Project Management Consultants on any infrastructure project with an example. **[8]**
- b) With a diagram explain the communication needed by a project manager with various internal and external stake holders associated with a major construction project. Explain the necessity of such a communication with examples. **[10]**

OR

- Q2)** a) Enlist the various types of infrastructure projects and explain how these projects contribute to national development. **[10]**
- b) Discuss various reasons for project time and cost over runs and suggest a few remedies to overcome them. **[8]**

- Q3)** a) With an example, explain work breakdown structure upto 3 levels, in detail. **[8]**
- b) Apply time - motion studies to an earthmoving operation and discuss the advantages of conducting these studies for the earthwork activity. **[8]**

OR

**P.T.O.**



- Q4)** a) Explain LOB technique with an example and discuss its advantages. [8]  
b) Explain in brief. [4 + 4]  
i) Objectives of work study  
ii) String Diagrams

- Q5)** a) Explain the basic objectives and basic provisions of the building and other construction workers Act (1996). [8]  
b) Explain utility of the project balance sheet with an example of construction organisation / project. [8]

OR

- Q6)** a) Explain the basic objectives and basic provisions of the workers Compensation Act (1923). [8]  
b) An infrastructure project of Rs 1000/- crores estimated cost is to be executed. Discuss the various ways in which the funds required for the same may be raised make suitable relevant assumptions. [8]

### **SECTION - II**

- Q7)** Explain any 9 types of risks with proper examples from construction sector and how to mitigate them. [18]

OR

- Q8)** Define “Value”. Explain importance of value Analysis. Discuss any three methods used in value engineering in detail. [1 + 2 + 15]

- Q9)** Graphically explain EOQ. Discuss modifications to EOQ. With an example of any construction material, explain the procedure adopted to economise on material by balancing between discounts offered by Suppliers and the other material costs. [2 + 2 + 13]

OR

- Q10)** Explain the HRD and HRM associated with a site Engineer who is selected through Campus interviews by a major construction company, in order to make him competent for strategic functional and generic roles which he has to effectively perform. [16]

**Q11)** Explain any 4 applications in civil Engineering where in 'Fuzzy Logic' is certainly very useful. **[16]**

OR

**Q12)** Explain any 4 applications in Civil Engineering wherein "Artificial Neural Networks" are certainly very useful. **[16]**



Total No. of Questions : 12]

SEAT No. :

**P2650**

[5154]-21

[Total No. of Pages : 2

**B.E. (Civil)**

**INTEGRATED WATER RESOURCES AND PLANNING  
(2008 Course) (Semester-II) (Elective-IV) (401008 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) Write a short note on scope for privatization in the field of water resources. [4]  
b) What is National water policy? Explain the difference between national water policy 2007 and 2010. [6]  
c) What is the role of National water Laws? How these laws helps to integrate the water development in the society? [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) Distinguish between probability density function and probability distribution function. [8]

OR

- Q4)** a) Write short note on: Application of ANN in flood prediction with four suitable examples. [8]  
b) Define mean, mode, median, standard deviation and coefficient of a distribution. [8]

**P.T.O.**

- Q5)** a) What is the use of geoinformatics in flood forecasting explain with suitable examples. [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 any two drought indices. [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 'Inter Basin Water Transfer', enumerate it with suitable example. [9]  
b) Write a short note on Aquaculture. [9]

- Q9)**a) Correlate direct and indirect benefits of water resource development to employment generation. [8]  
b) Explain 'Co-operative movement in the water resource development' with the help of case study. [8]

OR

- Q10)**a) Write a note on control of water logging and its different types. [8]  
b) Explain how the social impact of water resource development is related to agroindustry. [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) Explain the scope of Artificial Neural Network in water resource planning and development. [8]  
b) Explain the concept of perspective plan for basin development and management. [8]

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Total No. of Questions : 12]

SEAT No :

**P 2651**

**[5154]-22**

[Total No. of Pages :2

**B.E. (Civil)**

**ADVANCED TRANSPORTATION ENGINEERING**

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

*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, Molliès 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 is regression analysis? Why is it useful in traffic and transportation planning? Explain with an example. [6]  
b) Explain how O-D surveys are carried out and how the data is documented and used in transportation planning. [6]  
c) Explain in brief the following: [6]  
i) Golden quadrilateral                      ii) Mono Rail

OR

- Q2)** Explain in detail following projects:  
i) Eastern Freeway link.                      ii) NHDP various phases. [18]  
iii) Mumbai Mono-rail project

- Q3)** a) Discuss in brief the importance of traffic planning for any city. [6]  
b) Explain in brief House hold survey and O-D Survey. [10]

OR

- Q4)** a) Discuss in brief the challenges faced by local authorities in implementation of BRT system in developing cities of our country. [6]  
b) What do you mean by intelligent Transportation system? What are the different components of ITS? How it helps to reduce burden on traffic department. [10]

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

- Q5) a)** Explain how to use NPV as an effective tool along with the PBP in deciding various investment alternatives for transport projects with an example. [12]
- b) What is PCU? Enlist PCU values for any three types of vehicles suggested by IRC. [4]

OR

- Q6) a)** Explain the merits and demerits of BOT projects. [10]
- b) Write a short note on Internal Rate of return Method. [6]

### **SECTION-II**

- Q7) a)** Explain in brief Floating Car Method of speed and delay study. [8]
- b) Enlist the various methods of on street parking. Also state the merits and demerits of each method. [10]

OR

- Q8) a)** Explain in brief the factors affecting capacity and level of service. [10]
- b) Explain in brief the Cordon Line survey and Screen Line survey. [8]

- Q9) a)** Determine the thickness of concrete pavement using Westergaard's corner load formula to support a maximum wheel load of 4100 kg. Allow 10 percent for impact. The tyre pressure may be taken as 5.5 kg/cm<sup>2</sup>. The modulus of subgrade reaction is 5.5 kg/cm<sup>3</sup>. The flexural strength of concrete may be taken as 40 kg/cm<sup>2</sup>. Use a factor of safety of TWO. [10]
- b) Discuss the guidelines given by IRC for design of flexible pavement design by CBR method. [6]

OR

- Q10) a)** Discuss the various types of failures in flexible pavement. [10]
- b) What measures you will suggest to avoid delay at Toll collection Points. [6]

- Q11) a)** Why joints are necessary in rigid Pavements? Discuss in brief various types of joints in Rigid pavements. [10]
- b) Define Unevenness Index. How its measured. [6]

OR

- Q12) a)** What is overlay? Why it is provided? Discuss in brief methodology of design. [10]
- b) Discuss in brief assumptions made by Mr H M Westergaards while doing analysis of Cement concrete Pavements. [6]

→ → →  
2

Total No. of Questions : 12]

SEAT No. :

**P2652**

[Total No. of Pages : 4

[5154]-23

**B.E. (Civil)**

**STATISTICAL ANALYSIS & COMPUTATIONAL  
METHODS IN CIVIL ENGINEERING**

**(2008 Course) (Elective - IV) (401008C) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

**Q1) a)** The following data show the temperatures of effluent at discharge from a sewage treatment plant. Calculate. **[12]**

- i) Sample mean, median, variance and standard deviation.
- ii) Construct a box-plot for this data and comment on the information in this display.

Temp.	40– 42	42– 44	44– 46	46– 48	48– 50	50– 52	52– 54	54– 56
No. of observations	1	1	6	3	7	4	1	1

b) Enlist various methods of sampling and explain any one. **[4]**

OR

**Q2) a)** Calculate mean, median, variance and standard deviation for the following data. Construct a stem and leaf diagram for this data and comment on it. **[12]**

Range	450– 950	950– 1450	1450– 1950	1950– 2450	2450– 2950	2950– 3450	3450– 3950
No. of Observations	7	9	4	0	4	2	1

b) Explain applications of statistics in civil engineering. **[4]**

**P.T.O.**

**Q3) a)** In a testing center, an experiment needs 1.41 cm thick aluminium cylinder. Assume that the thickness of the cylinder has a normal distribution with a mean of 1.41 cm and a standard deviation of 0.01 cm. **[12]**

- i) What is the probability that thickness is greater than 1.42 cm.
- ii) What thickness is exceeded by 95% of the samples.
- iii) What proportion of samples lie between 1.38 cm and 1.44 cm.

Use the standard normal distribution table given below.

Z	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Area	0.00	0.0398	0.0793	0.1179	0.1554	0.1915	0.2257	0.2580	0.2881	0.3159

Z	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
Area	0.3413	0.3643	0.3849	0.4032	0.4192	0.4332	0.4452	0.4554	0.4641	0.4713

Z	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
Area	0.4772	0.4821	0.4861	0.4893	0.4918	0.4938	0.4953	0.4965	0.4974	0.4981	0.4987

b) State the properties of normal distribution. **[4]**

OR

**Q4) a)** The compressive strength of samples of concrete can be modelled by a normal distribution with a mean of 6000 kg/cm<sup>2</sup> and a standard deviation of 100 kg/cm<sup>2</sup>. **[12]**

- i) What is the probability that a sample's strength is less than 6250 kg/cm<sup>2</sup>.
- ii) What is the probability that a sample's strength is between 5800 and 5900 kg/cm<sup>2</sup>.
- iii) What strength is exceeded by 95% of the samples.

Use the standard normal distribution table given in Q.3a.

b) State the properties of binomial and poisson distribution. **[4]**



**Q5) a)** Find the correlation coefficient for the following data. [12]

x	0.66	1.32	1.98	2.64	3.3	3.96	4.62	3.28	5.94	6.6
y	7.32	12.22	16.34	23.66	28.06	33.39	34.12	39.21	44.21	47.48

b) Explain linear and multiple regression. [6]

OR

**Q6) a)** Using interpolation formula, find  $f(0.25)$  for the following data. [12]

x	0.1	0.2	0.3	0.4	0.5
f(x)	9.98	4.96	3.28	2.43	1.91
	33	67	36	39	77

b) What do you mean by coefficient of correlation. Write the equation to determine it and explain all the terms in it. [6]

### SECTION-II

**Q7) a)** Solve the following by Gauss elimination method. [8]

$$y + z = 2 ; \quad 2x + 3z = 5 ; \quad x + y + z = 3$$

b) Solve using Gauss - Seidel method (3 iterations) [8]

$$12x_1 + 3x_2 - 5x_3 = 1 ; \quad x_1 + 5x_2 + 3x_3 = 28 ;$$

$$3x_1 + 7x_2 + 13x_3 = 76.$$

OR

**Q8) a)** Solve the following using Gauss-Jordan method. [8]

$$x + y + z = 5 ; \quad 2x + 3y + 5z = 8 ; \quad 4x + 5z = 2$$

b) Solve using Gauss-Seidel method (3 iterations). [8]

$$4x_1 + x_2 - x_3 = 3 ; \quad 2x_1 + 7x_2 + x_3 = 19 ; \quad x_1 - 3x_2 + 12x_3 = 31.$$

**Q9) a)** Explain false position method. [8]

b) Using bisection method, find the root of  $2x - \log_{10} x = 7$ . [8]

OR

**Q10) a)** Explain Secant method. [8]

b) Find the root of the following equation using Newton-Raphson method.  $4x - e^x = 0$ . [8]

- Q11)a)** Explain simpson's 3/8 method. **[8]**  
b) Integrate the following using Trapezoidal method. **[10]**

$$\int_0^{\pi} \sin x \cdot dx ; n = 10.$$

OR

- Q12)a)** Explain 2 point Gauss-Quadrature method. **[8]**  
b) Evaluate the following using simpson's 3/8 method. **[10]**

$$\int_0^{0.6} e^x \cdot dx ; n = 6.$$

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Total No. of Questions : 12]

SEAT No :

P 2653

[5154]-24

[Total No. of Pages :4

B.E. (Civil Engineering)

**FINITE ELEMENT METHOD IN CIVIL ENGINEERING**  
**(2008 Course) (Elective-IV) (Semester-II) (Open Elective) (401008 DA)**

Time : 3 Hours]

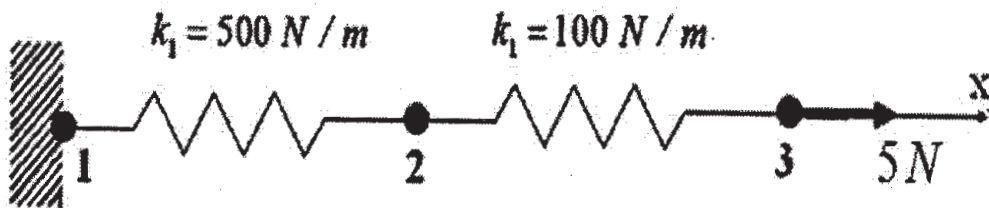
[Max. Marks : 100

Instructions to the candidates:

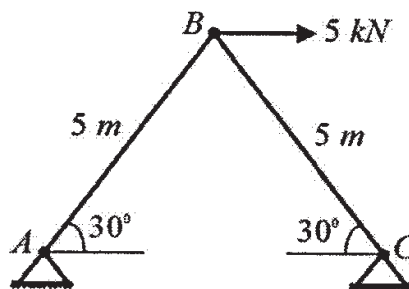
- 1) Answer to the two sections should be written in separate books.
- 2) Figures to the right side indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of non programmable calculator is allowed.
- 5) Assume suitable data, if necessary.

**SECTION-I**

- Q1) a) Determine the axial displacements at nodes 2 and 3 for the spring assembly given below. [8]



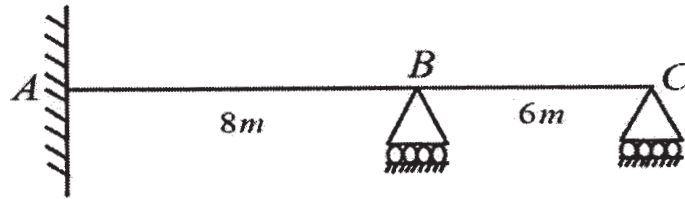
- b) Determine displacements at loaded joint and member forces of truss shown in figure using finite element method. Take  $A = 1000 \text{ mm}^2$  and  $E = 200 \text{ GPa}$ . [10]



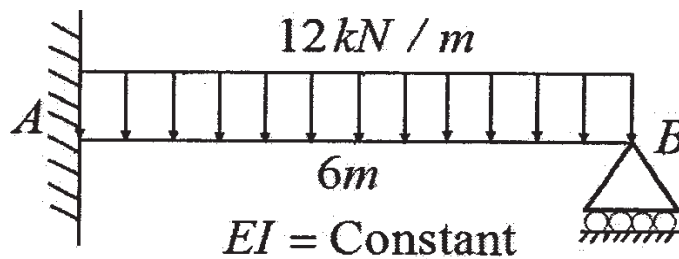
OR

P.T.O.

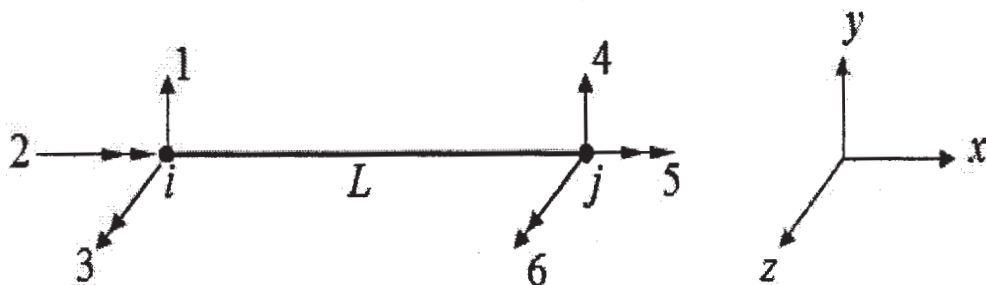
- Q2) a)** Determine rotations at supports B and C of continuous beam ABC if support B sinks by 10 mm. Take  $EI = 6000 \text{ kN.m}^2$ . Use finite element method. [8]



- b)** Obtain fixed end moment at support A using finite element method. Take  $E = 2 \times 10^8 \text{ kN/m}^2$  and  $I = 4 \times 10^{-6} \text{ m}^4$ . [10]



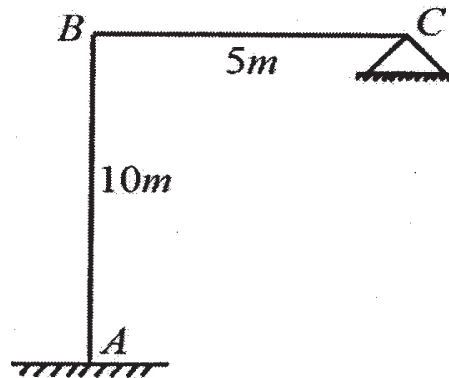
- Q3) a)** Derive the stiffness matrix for the grid element considering six degrees of freedom. [12]



- b)** Derive the transformation matrix for the two noded grid element. [6]

OR  
2

- Q4) a)** Derive the stiffness matrix of portal frame ABC as shown in figure using finite element method. [12]



- b) Derive the transformation matrix for two noded frame element having six degrees of freedom. [6]

- Q5) a)** Derive differential equations of equilibrium for 3D elasticity problem. [8]  
 b) Derive Saint Venant's strain compatibility conditions. [8]

OR

- Q6) a)** Explain plane stress and plane strain elasticity problem with example. Write stress-strain relationship. [8]  
 b) Derive the stress compatibility conditions for 2D plane stress elasticity problem. [8]

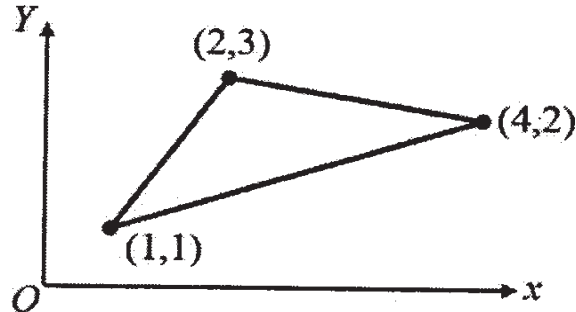
### SECTION-II

- Q7) a)** Write short note on principle of minimum potential energy and principle of virtual work. [6]  
 b) Derive  $4 \times 4$  stiffness matrix for the truss member using finite element formulation. [10]

OR

- Q8) a)** Write short note on. [6]  
 i) Discretization of structure  
 ii) Aspect ratio of element  
 b) State and explain the convergence criteria for the choice of the displacement function in FEM with examples. [10]

- Q9)** a) Derive shape functions for the nine noded rectangular elements in natural coordinate  $(\xi, \eta)$  system using Lagrange's interpolation function. [8]
- b) Derive the area coordinates for the three noded CST element as shown in figure. [8]



OR

- Q10)** a) Derive shape functions for the eight noded serendipity element in natural coordinate  $(\xi, \eta)$  system. [8]
- b) Derive the relationship between the natural (area) and Cartesian coordinates of a triangular element. [8]

**Q11)** Derive the jacobian matrix for the four noded quadrilateral isoparametric element having Cartesian coordinates at node 1(1, 1), node 2(4, 1), node 3(1, 2) and node 4(4, 2). [16]

OR

**Q12)** Write short note on.

- a) Isoparametric, sub-parametric and super-parametric elements. [5]
- b) Theorems of isoparametric formulations. [5]
- c) Jacobian matrix. [6]



Total No. of Questions : 6]

SEAT No. :

[Total No. of Pages :2

**P2654**

[5154]-25

**B.E. (Civil)**

**Geoinformatics**

**(2008 Course) (Semester-II) (Open Elective) (401008 DB)**

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

**SECTION-I**

**Q1) a)** Explain EMR. State the characteristics of different frequencies. [8]

b) Define resolution and explain any 2 types. [8]

OR

a) Describe characteristics of LANDSAT 1,2, & 3. [8]

b) What are the elements of visual image interpretation? Explain their significance and factors influencing them. [8]

**Q2) a)** What is false colour composite (FCC) Images? What are its advantages? [8]

b) Write a note on: [8]

i) Image Rectification.

ii) Geo referencing.

OR

a) Explain supervised and Unsupervised Classification. [8]

b) Explain any two satellite images and its application. [8]

**Q3) a)** Describe characteristics of IR images. [10]

b) "Geometric" Corrections in Images under processing. [8]

OR

*P.T.O.*

- a) What is Digital Image Processing and briefly explain its application. [10]
- b) Write a note on 'System Pour 1' Observation de la Terre. [8]

### SECTION-II

**Q4) a)** What is 'MAP'? Describe different types of maps in brief. What are its limitations? [8]

- b) Explain. [8]
  - i) Vector Model.
  - ii) Resolution.

OR

- a) Define GIS? Explain in detail its components. [8]
- b) Write a note on: [8]
  - i) Data types in DBMS.
  - ii) Attributes.

**Q5) a)** Explain any one GIS software's and write a detail account on its modules. [8]

b) What is RDBMS? Explain the normal form with one example. [8]

OR

- a) Write a note 'Buffering'. [8]
- b) Describe 'Raster' data structure. Write advantages and disadvantages. [8]

**Q6) a)** Explain application of Geo informatics in following areas: [10]

- i) Geotechnical Engineering.
- ii) Water Resource management through canal irrigation.

b) Write a brief note on "Role of GIS in Terrain Analysis" [8]

OR

- a) Explain application of Geo Informatics with working flow charts in following areas: [10]
  - i) Road survey and Investigations.
  - ii) Infrastructure Development
- b) Write in detail Satellite Data acquisition. [8]





Total No. of Questions : 12]

SEAT No. :

**P2655**

**[5154]-26**

[Total No. of Pages :3

**B. E. (Civil)**

**HYDROPOWER ENGINEERING**

**(2008 Pattern)(Semester-II)(401008DC)(Open Elective)(Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1) a)** What is meant by hydrological analysis of power plant? Explain with an example. **[8]**
- b) What is meant by hydropower? Compare Hydropower with thermal power with respect to Indian conditions. **[8]**

OR

- Q2) a)** Which are six major hydropower potential river systems exists in India? State the examples and significant hydropower stations established these systems. **[8]**
- b) Explain process of Nuclear power generation why Nuclear power is considered as positive power source of future? **[8]**

- Q3) a)** Explain classification of Hydropower plant based on. **[8]**
- i) Function
  - ii) Plant capacity
  - iii) Head
  - iv) Location

- b) Differentiate between base load and peak load plant. **[8]**

OR

- Q4) a)** What are components of pumped storage plants and its classification based on inflow and reservoir capacity. **[8]**

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

- b) What is valley dam plant? Draw its layout and explain the components of storage power plant with its function. [8]

**Q5) a)** Explain the significance of load prediction. What are the different methods of load prediction. Explain any one. [8]

- b) A run of river hydro electric power station is proposed across a river at a site where a net head of 15 m is available on the turbine. The river carries a sustained minimum flow of 20 cumecs with the load factor of 71%. Plant efficiency is 60%. Determine the maximum generating capacity of the generator to be installed at the power house. If the daily load pattern includes 21 hrs average load and 3 hrs peak load. Determine the volume of pondage to be provided to supply the daily demand. [10]

OR

**Q6) a)** What is load duration curve? With the help of graph explain its significance and applications. [8]

- b) The load on hydal plant varies from a min. of 10,000 kW to maximum of 35,000 kW. Two turbo generator of capacities 22,000 kW each have been installed. Calculate [10]

- i) Total installed capacity of the plant
- ii) Plant factor
- iii) Maximum demand
- iv) Load factor
- v) Utilisation factor

### **SECTION-II**

**Q7) a)** Differentiate between surface power house and underground power house. [8]

- b) What are the safety requirements of power house. [8]

OR

**Q8) a)** State any four power plant equipments and their functions with sketch. [8]

- b) Sketch the typical layout of power house and show all components. State function of all components. [8]

**Q9) a)** What is the significance of surge tank and state its advantages. [8]

- b) Determine the number of turbines and diameter of the runner for a power plant having 30 cumecs inflow, 15 m head. The efficiency of the turbine is 80% with the speed of 200 rpm. Assume the specific speed as 225 and speed ratio as 0.8. [10]

OR

- Q10)**a) State the design steps of different parameters of Impulse turbine. [8]  
b) Pelton wheel of mean bucket speed 10 m/s with a jet of water rate 700 lit/sec under head of 30m, deflection angle is  $160^\circ$ . Calculate power given by water to runner and hydraulic efficiency of turbine take  $C_v = 0.98$ . [10]

- Q11)**a) What are the provisions related to safety and electricity supply as per electricity act 2003? [8]

- b) What is the concept of carbon credits? Explain its significance. [8]

OR

- Q12)**a) Enlist duties of transmission Licences. [8]

- b) As per electricity Act 2003. State the function of load dispatch centre. [8]



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 3

**P2656**

[5154]-27

**B.E. (Civil)**

**INDUSTRIAL WASTE WATER MANAGEMENT  
(2008 Pattern) (Semester-II) (Open Elective)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data if necessary.*

**SECTION-I**

**Q1)** Explain the following processes for the removal of colloidal dissolved solids in waste water: **[18]**

- a) Ultra filtration.
- b) Reverse-osmosis.
- c) Electro-Dialysis.

OR

**Q2)** Attempt the followings.

- a) Discuss in detail about the physical unit processes commonly used in waste water treatment. **[10]**
- b) Explain the process for removal of color and Odour from waste water by activated carbon filtration. **[8]**

**Q3)** Attempt the followings.

- a) State & draw the single stage and two stage lime treatment process flow diagram for phosphorus removal. **[9]**
- b) Discuss in detail about the chemical oxidation with ozone for the reduction in COD & colour in waste water? **[7]**

OR

**P.T.O.**

**Q4)** Attempt the followings.

- a) Explain briefly how wetland could be used for waste water treatment system? [9]
- b) Explain chemical process for removal of heavy metals from waste water. [7]

**Q5)** Attempt the followings

- a) Explain briefly about the biological process for removal of phenol from industrial waste water? [9]
- b) Discuss the recycling of treated sewage after tertiary treatment? [7]

OR

**Q6)** Write in brief about: [4+4+4+4=16]

- a) Membrane reactor with submerged membrane
- b) Cyclic reactor.
- c) Nitrification process.
- d) De-nitrification process.

### **SECTION-II**

**Q7)** Attempt the followings

- a) Draw & describe the schematic diagram of a waste treatment plant to reuse the sewage in residential complex. [9]
- b) Describe the methods of three R principles to convert waste in to wealth? [9]

OR

**Q8)** Attempt the followings

- a) Explain how waste water could be used for irrigation? Also discuss about preventive measures and health aspects? [9]
- b) Explain the mechanism of soda recovery in pulp and paper mills? [9]

**Q9)** Attempt the followings

- a) Explain the concept of zero Discharge of effluent? [8]
- b) Discussed the application of zero discharge technology based on three R Principles for pulp & paper industries. [8]

OR

**Q10)** Attempt the followings

- a) Draw & discuss the flow sheet for the zero discharge of waste water produced in Sugar cane industries? [8]
- b) Explain about the zero discharges of solid waste from residential complex? [8]

**Q11)** Attempt the followings

- a) Discuss the pollution hazards due to radioactive materials? [8]
- b) Explain the sorption mechanism & BDST model? [8]

OR

**Q12)** Attempt the followings

- a) Explain in brief the standards related to solid waste from residential complex. [6]
- b) Discuss about the green processes adopted in the industries? [10]

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Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages :3

**P2657**

**[5154]-28**

**B.E. (Civil)**

**WAVE MECHANICS**

**(Semester-II) (2008 Course) (Elective-IV) (Open Elective) (401008DE)**

*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.*

**Q1) a)** Discuss the corrections required to be done in wind velocity measured 10 m above mean sea level ( $U_{10}$ ). **[8]**

b) Write a short note on SWAN and MIKE: as numerical models. **[8]**

OR

**Q2) a)** Define fully developed sea, partially developed sea, swell, wave number, wave length, wave period, significant wave height, zero cross. Draw neat diagrams wherever necessary. **[8]**

b) What are the types numerical models. Explain any one of them in detail. **[8]**

**Q3) a)** Derive expression for group wave velocity. **[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)** For a wave height of 2.5 m and 10 sec period obtain maximum horizontal and vertical displacement of water particle with mean position at

i) SWL.

ii) Sea bed. Depth of sea bed = 12 m. **[10]**

b) Derive equation for celerity starting from linear dispersion relationship. **[8]**

**P.T.O.**

**Q5) a)** Enlist assumptions in the theory of refraction. Draw neat diagrams to explain the refraction. [8]

b) A wave of significant height 3.5 m and period 10 sec 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, wave reflection, wave breaking, wave set up. [8]

b) A wave has 3m height and 7 seconds period in deep water. It travels towards shore over parallel bed contours. If its crest line makes an angle of 30 with the bed contour of 10m before refraction. Calculate the wave height after crossing this contour line. [8]

**Q7) a)** Annual data of significant wave heights collected for a site along the East coast of India is given below: [6]

$H_s$ (in m)	0	1	2	3	4	5
No. of observations	1500	1020	988	522	45	12

Obtain the design  $H_s$  value corresponding to 200 years return using the Gumbel distribution.

b) Write short note on Pierson-Muskowitz Spectrum. [4]

c) What is long term wave height statistics? Name various distribution used to achieve the same while explaining Log Normal distribution in detail. [6]

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)** Draw neat figure for describing typical beach profile and explain the terms: the beach and near shore zone. [4]

b) What is the dynamic response to the beach? Explain two cases in details. [6]

c) What are the different shore protection methods, explain in detail. [6]

OR



- Q10)**a) What are the man made causes of shore line erosion, elaborate in detail. **[5]**
- b) Define the sea, surf zone, currents, tides, storm surge, tsunamis. **[5]**
- c) Draw sketches for pressure distribution of non breaking wave forces using Miche - Rundgren method. **[6]**

- 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 breakwater 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]**

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Total No. of Questions : 12]

SEAT No. :

**P2658**

[5154]-29

[Total No. of Pages : 3

**B.E. (Civil Engineering )**  
**FERROCEMENT TECHNOLOGY**  
**(2008 Course) (Semester-II) (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 in brief “ Ferrocement as a material of construction”. **[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 the effect of creep and shrinkage on ferrocement structures and also the protective surface treatment given to the same. **[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) Explain in detail specific surface method and crack control method. **[8]**

OR

**Q4) 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. **[8]**

- b) Write a note on “ Forming of Ferrocement structures”. **[8]**

**P.T.O.**

- Q5) a)** Enlist and explain factors governing cost and value of ferrocement in building constructions. Also compare cost of ferrocement structures with conventional structures. [9]
- b) Explain the design and construction of hoses with following ferrocement building accessories: cavity walls, hollow floors, 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 counterforth retaining wall with reference to conventional counterforth 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 ferrocement cylindrical shell. [8]
- b) State any four advantages of Ferrocement as precast product. [8]

OR

- Q12)a)** Sketch any four forms of folded plates and state assumptions in design of folded plate. [8]
- b) State four points to be considered while casting precast Ferrocement water tank. [8]



Total No. of Questions : 12]

SEAT No :

**P 2659**

**[5154]-30**

[Total No. of Pages :2

**B.E. (Civil)**

**PLUMBING ENGINEERING**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1) a)** Describe the role of Plumber while executing plumbing work in the building industry. **[9]**

b) Comment on coordination of plumbing agency with other construction agencies while execution of plumbing. **[9]**

OR

**Q2) a)** Describe the role of Plumbing contractor while executing plumbing work in the building industry. **[9]**

b) What are prohibited fittings and explain its role in plumbing. Explain your answer with neat sketch? **[9]**

**Q3) a)** Explain any two plumbing fixtures with neat sketch. **[8]**

b) What are various plumbing tools? Explain any three tools with sketch. **[8]**

OR

**Q4) a)** Explain PEX and HDPE pipes in plumbing industry and state their advantages and disadvantages. **[8]**

b) What is WSFU? State at least four WSFU and how will you use it in plumbing design? **[8]**

**Q5) a)** Why it necessary to provide various traps in plumbing engineering ? Explain with neat sketch S-Trap, P-Trap and Nahani Trap. **[8]**

b) State various types of traps in plumbing engineering? Explain with neat sketch Grease Trap, Prohibited Trap and Gully Trap. **[8]**

OR

**P.T.O.**

- Q6)** a) Why vents are required in plumbing engineering. Explain with neat sketch various parts of vents for double and single stack system. [8]  
b) What is trap seal? How it is protected? Explain with neat sketch sewer trap. [8]

### SECTION-II

- Q7)** a) State four types of sanitary systems of plumbing and explain any two systems. [8]  
b) State the different types of building drainage pipes explain any two with sketches. [8]

OR

- Q8)** a) Why inspection of chamber is necessary and differentiate between soil and waste verses black and grey water. [8]  
b) State four DFU values and how will you use it in drainage design? [8]

- Q9)** a) What is storm water drainage system explain with sketch layout of storm drainage system and highlight its importance. [9]  
b) State the design steps for rain water harvesting system. [9]

OR

- Q10)**a) State the advantages of solar water heating. State various components of solar water heating system. [9]  
b) Draw a neat sketch (elevation of wall) of hot and cold concealed piping for bathroom, stating standard levels and spacing's of fixtures and fittings as per standards. [9]

- Q11)**a) Explain RCC, PVC, Nu-Drain and stoneware in building sewer system. [8]  
b) How will you carry out testing of drain pipe in drainages line. [8]

OR

- Q12)**a) Explain how you will supervise execution of drainage line for G+3 Apartment. [8]  
b) What care you will take while designing plumbing system for high rise buildings and what is the role of pressure reducing valves (PRV),? [8]



Total No. of Questions : 12]

SEAT No :

**P 2660**

**[5154]-30-A**

[Total No. of Pages :2

**B.E. (Civil Engg.)**

**GREEN BUILDING TECHNOLOGY**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from Section I and Section II.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Your answers will be valued as a whole.*
- 4) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) Explain and discuss sustainable site selection criteria. [7]  
b) Discuss the uses of following [3+3+3]  
i) Building layout plan  
ii) Solar Energy  
iii) Fresnel Lens

OR

- Q2)** a) Differentiate between direct and indirect lighting. [6]  
b) What is solar concentrator? Discuss. [5]  
c) Why the ventilation is necessary? Explain how natural ventilation utilized. [6]

- Q3)** a) Compare the active and passive architecture. [6]  
b) Explain the concept of Embodied Energy. [5]  
c) Give the selection criteria for material of surface treatment. [6]

OR

- Q4)** a) Explain hybrid system of active and passive refrigeration and air conditioning. [8]  
b) Explain the Energy audit of building in detail. [8]

- Q5)** a) Discuss the Green rating of Building. [8]  
b) What you understand by environmental clearance of buildings? Discuss. [8]

OR

**P.T.O.**

- Q6)** a) Discuss the improvement for thermal comfort. [6]  
b) Discuss the followings. [6+5]  
i) LEED Criteria & its application  
ii) Carbon credit.

**SECTION-II**

- Q7)** a) Explain water efficient landscaping. [6]  
b) Explain any one method with suitable sketch for bore well recharging. [6]  
c) Discuss the minimization of water use. [5]

OR

- Q8)** a) Give the note on following [3+4+4]  
i) Smart water taps  
ii) Anaerobic filters  
iii) Ion exchanger  
b) Discuss about advanced biogas plant. [5]

- Q9)** a) Explain what is indoor environmental quality. [8]  
b) Discuss how the quality of indoor environment is maintained? [8]

OR

- Q10)** a) Differentiate the following.  
i) Adhesives and Sealants                      ii) Paints and Coatings [4+3]  
b) Discuss the uses of following. [4+3+3]  
i) Composite Wood  
ii) Bamboo  
iii) Jute

- Q11)** a) How the recycling of building materials is beneficial? Discuss. [8]  
b) Discuss the Life cycle analysis in brief. [8]

OR

- Q12)** a) Explain the following. [4+3+3]  
i) Operation Phase  
ii) Construction Phase  
iii) Use of Foundry sand  
b) Explain in details about Construction waste management. [7]

→ → →



Total No. of Questions : 12]

SEAT No. :

**P2661**

[5154]-31

[Total No. of Pages :4

**B.E. (Mechanical)**  
**CAD / CAM & AUTOMATION**  
**(2008 Course) (Semester-I) (402041)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q.No.1 OR Q.No.2 Q.No.3, OR Q.No.4, and Q.No.5 OR Q.No.6 from section-I and Q.No.7 OR Q.No.8 Q.No.9 OR Q.No.10, Q.No.11 OR Q.No. 12 from section-II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of electronic pocket non programmable calculator is allowed.*
- 6) *Assume Suitable data, if necessary and mention it clearly.*

**SECTION-I**

- Q1) a)** Explain homogeneous transformation matrices to represent orthographic projections. **[4]**
- b) A triangle has vertices A (2, 2) B(4, 4) and C(3, 5) Find the new coordinates of the triangle, It is. **[12]**
- i) Mirrored about  $y = x$ ,
  - ii) Scaled with respect to point A Using scale factor  $S_x=2$  and  $S_y=1.5$ .

OR

- Q2) a)** Write Open GL syntax for the following commands. **[6]**
- i) Rotation,
  - ii) Translation
  - iii) Scaling.
- b) A rectangle is having vertices A(10, 10), B(40, 10) C(40,30) and D(10,30).
- i) Mirrored about  $y=x$ ,
  - ii) Rotate by  $30^\circ$  about point A. Write concatenated transformation matrix and find the new coordinates of the triangle. **[10]**

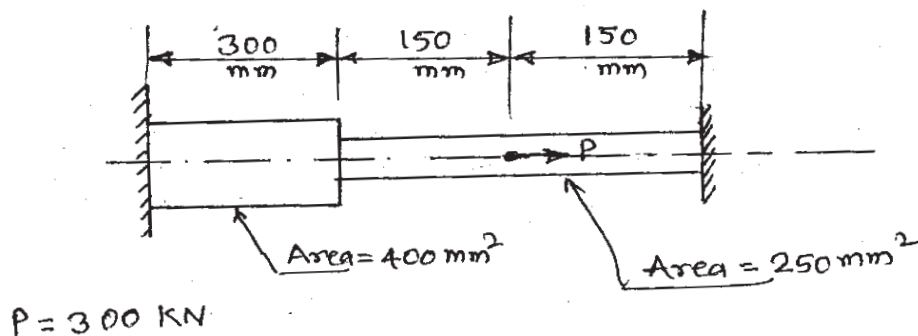
**P.T.O.**

- Q3)** a) Compare between B\_rep and c\_rep modeling techniques. [8]  
 b) A line joins two points  $P_1(3,6)$  and  $P_2(7,6)$ . Write: [8]  
 i) Parametric equation of the line.  
 ii) Tangent Vector of the line, and.  
 iii) Unit vector in the direction of the line.

OR

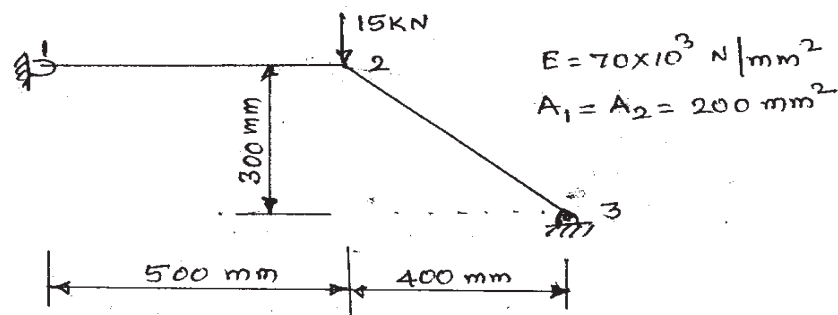
- Q4)** a) Explain any three entities used for surface modeling. [6]  
 b) The coordinates of four data points  $P_0, P_1, P_2, P_3$  are  $(2,2,0), (2,3,0), (3,3,0)$  and  $(3,2,0)$  respectively. Find the equation of the Bezier curve and determine the coordinates points on curve for  $u=0.0, 0.25, 0.5, 0.75$  and  $1.0$ . [10]

- Q5)** a) Explain briefly, why meshing is required for analysis of engineering systems. [4]  
 b) A stepped bar is subjected to an axial load of 300 kN, as shown in Fig. 1 using finite element method. Determine nodal displacements, stresses in each elements and reaction forces. Take  $E=200 \times 10^3 \text{ N/mm}^2$ . [14]



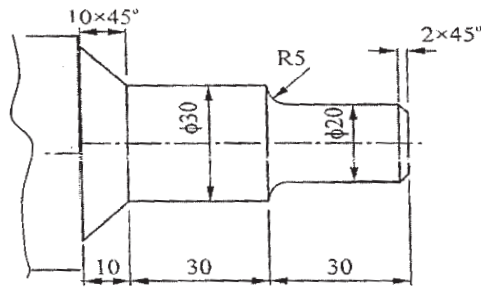
OR

- Q6)** a) Derive the elemental stiffness matrix for 1 D bar element. [6]  
 b) For the two - bar truss shown in Fig. 2, determine the displacement of node 2 and the stress in element 2-3. [12]



**SECTION-II**

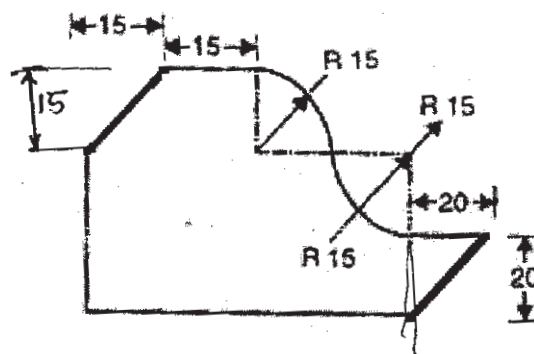
- Q7)** a) Explain components of NC machine. [6]  
 b) Write a CNC part program to turn a MS bar of size and shape as shown in following figure. Use canned cycles only for both rough turning and finish cut. Assume feed rate (0.8mm/rev.) and spindle speed (1000 RPM). [12]



All dimensions are in mm

OR

- Q8)** a) Explain the meanings of following codes used in NC programming. [6]  
 i) G41,  
 ii) M14 and iii) T00.001  
 b) Write a CNC part program to machine the end profile for the component as shown in fig. 3, assume suitable data for feed and speed. Also use left cutter radius compensation and incremental programming mode. Take thickness of plate 100mm. [12]



All dimensions are in mm

- Q9)** a) Explain the general configuration and functions of DNC system. [8]  
 b) Explain Generative type of process planning. [8]

OR

- Q10)a)** Enlist part classification and coding systems used in group technology and explain any one in detail. **[10]**  
b) What are the limitations and advantages of flexible automation. **[6]**

- Q11)a)** Explain different types of mechanical grippers. **[8]**  
b) List different types of robot configurations and explain SCARA configuration in detail. **[8]**

OR

- Q12)a)** Explain the terms workspace, precision and accuracy related to the robotics. **[8]**  
b) Compare between electric and pneumatic drives used in robots. **[8]**

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Total No. of Questions : 12]

SEAT No. :

**P2662**

**[5154]-32**

[Total No. of Pages :5

**B.E. (Mech.)**

**DYNAMICS OF MACHINERY**

**(2008 Pattern) (402042) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION - I**

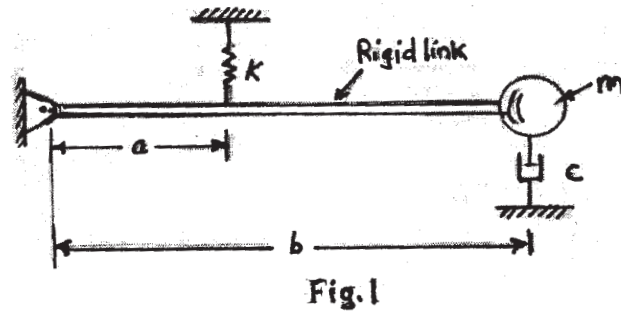
- Q1) a)** Four masses A, B, C and D are completely balanced. Masses C and D make angles of  $90^\circ$  and  $210^\circ$  respectively with B in the same sense. The planes containing B and C are 300 mm apart. Masses A, B, C and D can be assumed to be concentrated at radii of 360 mm, 480 mm, 240 mm and 300 mm respectively. The masses B, C and D are 15 kg, 25 kg and 20 kg respectively. Determine: mass A and its angular position. **[10]**
- b) With the help of neat sketch, explain the working of dynamic balancing of machine. **[6]**

OR

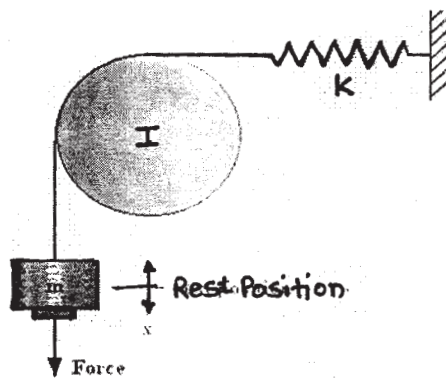
- Q2)** A four stroke five cylinder in-line engine has firing order 1-4-5-3-2-1. Centre lines of cylinders are spaced at equal intervals of 150 mm. The reciprocating part per cylinder have mass of 1.5 Kg, Piston stroke is 100 mm and connecting rod are 175 mm long. The engine rotates at 600 rpm. Discuss the primary and secondary balancing values and maximum unbalanced couples about central plane and position of first crank from its inner dead centre position at which these values occurs. **[16]**

**P.T.O.**

- Q3) a) Calculate frequency of damped oscillation of the system as shown in Fig. 1 for the given values,  $m = 1750 \text{ Kg}$ ;  $C = 3500 \text{ Ns/m}$ ;  $K = 7 \times 10^5 \text{ N/m}$ ;  $a = 1.25 \text{ m}$ ;  $b = 2.5 \text{ m}$  [8]



- b) Determine natural frequency for the given system as shown in Fig.2 [8]



OR

- Q4) a) Explain the term 'Vibration isolation' with practical example of any machine. State the suitable materials commonly used as vibration isolation. [6]
- b) The disc of torsional pendulum has a mass moment of inertia of  $600 \text{ Kg-m}^2$  and immersed in a viscous fluid. The brass shaft attached to it is of  $10 \text{ cm}$  diameter and  $40 \text{ cm}$  long. When pendulum is vibrating, the observed amplitudes on the same side of rest position for successive cycles are  $9^\circ$ ,  $6^\circ$  and  $4^\circ$  respectively.

Determine:

- i) Logarithmic decrement
- ii) Damping torque at unit velocity.
- iii) Periodic time of vibration.

Assume for the brass shaft,  $G = 4.4 \times 10^{11} \text{ N/m}^2$ .

[10]

- Q5) a)** Explain following terms: [8]
- Under damped system
  - Critical damped system
  - Over damped system
  - Critical damping coefficient.
- b) An air compressor weighs 450N and is operated at a constant speed of 1750 rpm. The unbalanced reciprocating part weigh 10N and rotating part are well balanced. The crank radius is 10 cm. If damper used for mounting introduce a damping factor 0.15, then
- Specify the spring for the mounting such that only 20% of the unbalance force is transmitted to the foundation
  - Determine amplitude of transmitted force. [10]

OR

- Q6) a)** An automobile trailer which moves over the road surface making approximately sinusoidal profile with wavelength of 8m and amplitude of 6 cm. Trailer is pulled on road surface with a velocity of 60 km/hr. Find the critical speed if the vibration amplitude is 1.5 cm and for trailer mass of 60 Kg. [6]
- b) Write short note on any two of following: [12]
- Types of vibrations.
  - Transmissibility.
  - Dry friction damping.

**SECTION - II**

- Q7) a)** Explain principal mode of vibration with example. [4]
- b) Determine natural frequencies and amplitude ratios for the given system as shown in fig.2. Also comment on the following cases;  $k = \infty$ ,  $m_2 = 0$ ;  $L = 0$ ;  $K = 0$  [12]

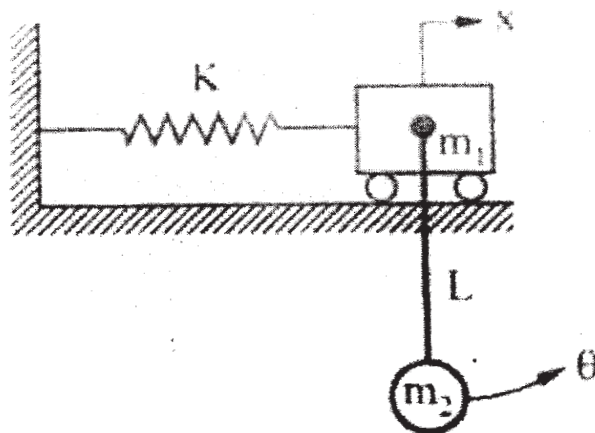


Fig.2

OR

- Q8)** a) Draw mathematical model of two wheeler. [4]  
 b) Determine natural frequency and corresponding mode shapes of given system as shown in Fig. 3. Assume each spring stiffness is  $k$ . [12]



Fig.3

- Q9)** a) The static deflection of an automobile on its spring is 10cm under. Find the critical speed when the trailer is travelling over a road with a profile approximated by a sine wave of amplitude 8 cm and wavelength of 16 m. Assume damping to be given by  $\xi = 0.05$ . What will be the amplitude of vibration at 75 km/hr? [6]  
 b) Write short note on any two of following: [12]  
 i) Frequency measuring instruments.  
 ii) FFT analyzer.  
 iii) Vibration Exciters.

OR

- Q10)** a) Write short note on vibration absorber. [6]  
 b) A commercial type vibration pickup has a natural frequency of 6Hz and a damping factor of 0.65. What is the lowest frequency beyond which the amplitude can be measured within  
 i) One percent error  
 ii) Two percent error? [6]  
 c) An undamped vibration pickup having natural frequency of 1Hz is used to measure harmonic vibration of 4Hz. If the amplitude recorded is 0.52 mm, what is the correct amplitude. [6]

- Q11)** a) Explain the terms [10]  
 i) Decibel scale  
 ii) Sound pressure level  
 iii) Sound power level  
 iv) Sound intensity level  
 v) Frequency range of sound sources  
 b) Show that as the distance from point source doubles, the sound intensity level decreases by 6 dB. [6]

OR



**Q12)a)** A worker is exposed to noise according to the following schedule: **[6]**

Exposure level [dB]	92	95	97	102
Period of exposure [hrs]	3	2	2	1

Does the daily noise dose is exceeded as per OSHA standards.

**b)** Write short note on the following (any two). **[10]**

- i) Noise measurement system.
- ii) White noise.
- iii) Sound level meter.



Total No. of Questions : 12]

SEAT No. :

**P2663**

**[5154]-33**

[Total No. of Pages : 4

**B.E. (Mech.)**

**INDUSTRIAL FLUID POWER**

**(2008 Course) (402043) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Figures to the right indicate 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)** Write a short note on “ISO symbols”. **[8]**

b) Classify “Hydraulic oils” in details. **[8]**

OR

**Q2) a)** Write a short note on “Types of pipes, Hoses, Fittings”. **[8]**

b) What are the various Applications of “Industrial Fluid Power”? **[8]**

**Q3) a)** Explain with neat sketch “Weight Loaded Accumulator”. **[8]**

b) Write a short note on “Types of pressure Intensifiers”. **[8]**

OR

**Q4) a)** Explain with neat sketch working of “Gerotor Pump”. **[8]**

b) Explain with neat sketch working of “Internal Gear Pump”. **[8]**

**Q5) a)** Explain with neat sketch working of “Unloading Valve”. **[8]**

b) Write a short note on “Types of Direction Control Valves”. **[10]**

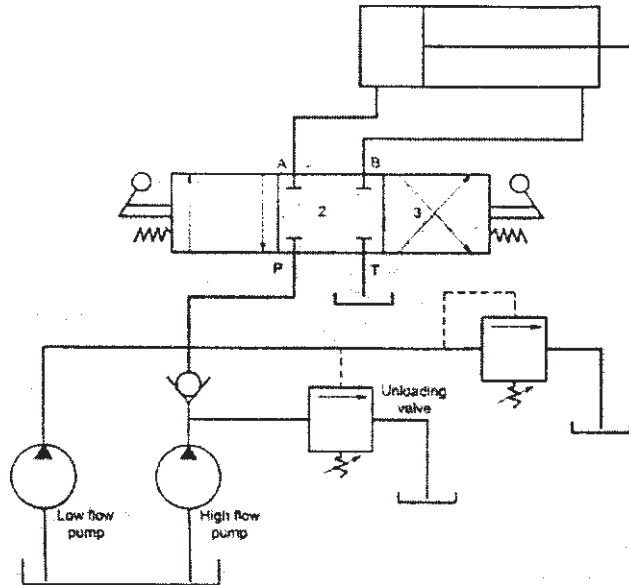
OR

**P.T.O.**

- Q6) a)** Write a short note on “Types of Flow Control Valves”. [8]
- b)** Write a short note on “Types of Pressure Control Valves”. [10]

**SECTION - II**

- Q7) a)** Analyze the below given hydraulic circuit. [8]



- b)** Draw and explain a circuit for automatic reciprocating of a double acting cylinder using solenoid actuation. [8]

OR

- Q8) a)** Draw a typical regenerative circuit. What are its advantages? [8]
- b)** Explain the working of hydraulic vane motor with neat sketch. [8]

- Q9) a)** Explain with a neat sketch working of shuttle valve with a typical application. [8]
- b)** Explain the working of a typical air motor. [8]

OR

- Q10) a)** Explain the purpose of quick exhaust valve in pneumatic system with a circuit. [8]
- b)** Explain with a neat sketch the working of FRL unit used in pneumatic circuit. [8]

**Q11)a)** Which are the different actuators used in pneumatics? Draw symbols of them. [6]

b) The automatic door of a school bus is operated by a double acting cylinder. Both the opening and closing of the door is performed with a selector switch. The time duration for which the door is kept open is decided by the bus driver. The variable speed arrangement of closing and opening the door is required. Draw the pneumatic circuit. [12]

OR

**Q12)** In a typical hydraulic circuit, two identical cylinders C and D are to be moved simultaneously. Both cylinders have a stroke of 1.2m and it is to be completed in 30 seconds. The cylinder a moves against a load of 30 KN while the cylinder B has a load of 25 KN.

After complete retraction of cylinder A, the return stroke of the cylinder B should start. The return speeds are expected to be as fast as possible.

Draw the circuit which will fulfill these requirements. Select different components from the data given in data sheet. In case the component is not available in the data given, mention its range. [18]

DATA SHEET

(a) Suction strainer:

Model	Flow Capacity (lpm)
S <sub>1</sub>	38
S <sub>2</sub>	76
S <sub>3</sub>	152

(b) Pressure gauge:

Model	Range (bar)
PG <sub>1</sub>	0 - 25
PG <sub>2</sub>	0 - 40
PG <sub>3</sub>	0 - 100
PG <sub>4</sub>	0 - 160

(c) Vane pump:

Model	Delivery in lpm		
	At 0 bar	At 35 bar	At 70 bar
P <sub>1</sub>	8.5	7.1	5.3
P <sub>2</sub>	12.9	11.4	9.5
P <sub>3</sub>	17.6	16.1	14.3
P <sub>4</sub>	25.1	23.8	22.4
P <sub>5</sub>	39.0	37.5	35.6

(d) Relief valve:

Model	Flow capacity (lpm)	Max. working pressure & bar
R <sub>1</sub>	11.4	70
R <sub>2</sub>	19.0	210
R <sub>3</sub>	30.4	70
R <sub>4</sub>	57.0	105

(e) Flow control valve:

Model	Working pressure (bar)	Flow range (lpm)
F <sub>1</sub>	70	0 - 4.1
F <sub>2</sub>	105	0 - 4.9
F <sub>3</sub>	105	0 - 16.3
F <sub>4</sub>	70	0 - 24.6

(f) Directional control valve:

Model	Max. working pressure & bar	Flow capacity (lpm)
D <sub>1</sub>	350	19
D <sub>2</sub>	210	38
D <sub>3</sub>	210	76

(g) Check valve:

Model	Max. working Pressure & bar	Flow capacity (lpm)
C <sub>1</sub>	210	15.2
C <sub>2</sub>	210	30.4
C <sub>3</sub>	210	76

(h) Pilot operated check valve:

Model	Max. working Pressure (bar)	Flow capacity (lpm)
PO <sub>1</sub>	210	19
PO <sub>2</sub>	210	38
PO <sub>3</sub>	210	76

(i) Cylinder (Max. working pressure 210 bar)

Model	Bore diameter (mm)	Rod diameter (mm)
A <sub>1</sub>	25	12.5
A <sub>2</sub>	40	16
A <sub>3</sub>	50	35
A <sub>4</sub>	75	45
A <sub>5</sub>	100	50

(j) Oil reservoirs:

Model	Capacity (litres)
T <sub>1</sub>	40
T <sub>2</sub>	100
T <sub>3</sub>	250
T <sub>4</sub>	400
T <sub>5</sub>	600

Total No. of Questions : 12]

SEAT No. :

**P2664**

**[5154]-34**

[Total No. of Pages : 3

**B.E. (Mechanical)**

**ENERGY AUDIT AND MANAGEMENT**

**(2008 Pattern) (Semester - I) (Elective - I) (402044A)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to candidates:*

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

**SECTION - I**

- Q1)** a) What are the various steps in the implementation of energy management in an organization? [8]
- b) Explain current energy consumption pattern in global and Indian industry. [8]

OR

- Q2)** a) State the importance of energy policy for industries. [8]
- b) What are the benefits of benchmarking energy consumption? [8]
- Q3)** a) List an energy efficiency improvement options in a refrigeration plant. [8]
- b) What do you understand by the term “benchmarking” and list its benefits? [10]

OR

- Q4)** a) Write short note on energy conservation opportunities in boiler. [8]
- b) In 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 tank level difference in hot well. The measured data are as follows:

Temperature of ethylene glycol entering and leaving the evaporator is  $-1^{\circ}\text{C}$  and  $-4^{\circ}\text{C}$  respectively. Ethylene glycol flow rates is 13200 kg/hr,

**P.T.O.**

pressure drop of ethylene glycol in evaporator is  $0.7 \text{ Kg/cm}^2$ , electrical power input to compressor is  $39.5 \text{ kW}$ , specific heat capacity of ethylene glycol is  $2.34 \text{ kcal/kg}^\circ\text{C}$ . Estimate (i) Net refrigeration capacity, (ii) kW/ton rating (iii) COP and (iv) EER. [10]

- Q5)** a) Which are the important technical parameters for cogeneration? [8]  
b) Explain in detail with suitable examples the following terms. [8]  
i) Simple Payback Period(SPP)  
ii) Return of Investment(ROI)  
iii) Internal Rate of Return(IRR)

OR

- Q6)** a) Write a short note on Net Present Value (NPV) and Cash Flow. [8]  
b) Explain in detail the basic criteria for financial investment appraisal. [8]

## SECTION - II

- Q7)** a) A chemical plant operates a cooling water pump for process cooling and refrigeration applications. During the performance testing the following operating parameters were measured.  
Pump flow,  $Q = 0.4 \text{ m}^3/\text{s}$ , power absorbed,  $P$  (motor input) =  $325 \text{ kW}$ , Suction head (Tower basin level),  $h_1 = 1 \text{ m}$ , delivery head,  $h_2 = 50 \text{ m}$ , type of drive = direct coupled, motor efficiency at the operating loading =  $88\%$ , density of water =  $996 \text{ kg/m}^3$ . Calculate pump efficiency. [10]

- b) Describe energy saving opportunities in steam system. [8]

OR

- Q8)** a) Write a note on industrial steam traps. [10]  
b) Testing coal fired boiler is more difficult than oil fired boiler. Give reasons. [8]

- Q9)** a) List the energy savings opportunities in industrial lighting systems? [8]  
b) Name the two fixed losses in an electric motor and what are the approaches for reducing these losses? [8]

OR

- Q10)a)** Explain in detail about power factor improvement and benefits. [8]  
b) Write step by step approach for assessing energy efficiency of lighting system. [8]

- Q11)a)** What are the direct and indirect benefits of waste heat recovery? [8]  
b) Which are the relative merits of cogeneration systems? [8]

OR

- Q12)a)** Explain with diagrams cogeneration systems using the back pressure turbine, extraction condensing turbine and double extraction back pressure turbine. [8]  
b) Enlist different commercial waste heat recovery devices and explain in detail any one of them. [8]





Total No. of Questions : 12]

SEAT No. :

**P2665**

**[5154]-35**

[Total No. of Pages : 2

**B.E. (Mechanical Engineering)**

**PRODUCT DESIGN AND DEVELOPMENT**

**(New 2008 Pattern) (402044B) (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 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 is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a) Explain morphology of product design? [10]**

b) Explain product development planning with reference to ISO standard? [8]

OR

**Q2) a) What is product design? Write evolution in product design? [10]**

b) Distinguish between product development and product design? [8]

**Q3) a) Write in detail Technology Forecasting? [8]**

b) Explain in detail about customers population? [8]

OR

**Q4) a) What is Mission Statement and Technical questioning? [8]**

b) Why there is need of economic analysis of product? [8]

**Q5) a) Explain in detail FMEA? [8]**

b) Write in detail Pugh's concept, and selection charts. [8]

OR

**Q6) a) What is product benchmarking? Explain steps involved in product benchmarking? [8]**

b) Explain in detail augmentation and aggregation? [8]

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

## SECTION - II

- Q7)** a) Write note on product portfolio and Architecture? [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) What are the Applications of Product Teardown? [8]

- Q9)** a) What is design for assembly? Write its steps in detail? [8]  
b) Explain in detail life cycle assessment method? [8]

OR

- Q10)**a) Explain in detail design for piece part production? [8]  
b) Explain in detail manufacturing cost analysis? [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. :

**P2666**

**[5154]-36**

[Total No. of Pages : 2

**B.E. (Mechanical Engineering)**

**DESIGN OF PUMPS, BLOWERS AND COMPRESSORS**

**(2008 Pattern) (Semester - I) (402044C) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to candidates:*

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6 from section-I and Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 section - II.*
- 2) *Use two separate answer book for section-I and section-II.*
- 3) *Use of scientific calculator, steam table, mollier chart is allowed.*
- 4) *Figures to right indicate full marks.*

**SECTION - I**

**UNIT - I**

- Q1)** a) Write a note on Dimensionless parameters. [8]  
b) Explain the following terms  
i) Stage velocity  
ii) Velocity triangles [8]

OR

- Q2)** a) Derive the expression for the energy transfer between fluid and rotor. [8]  
b) Explain the use of performance characteristics curves for pumps. [8]

**UNIT - II**

- Q3)** a) Write a note on losses in pumps. [8]  
b) The diameters of an impeller of a centrifugal pump at inlet & outlet are 30 mm & 60 mm respectively. Determine the minimum starting speed of the pump if it works against the head of 30 m. [8]

OR

- Q4)** a) Explain axial thrust methods to minimize axial thrust. [8]  
b) For a single acting reciprocating pump piston diameter is 150 mm, stroke is 300 mm, rotational speed is 50 RPM and water is to be raised through 18 m. determine theoretical discharge, if the actual discharge is 4 lit / sec. Determine volumetric efficiency and slip if mechanical efficiency is 80%. [8]

**P.T.O.**

### **UNIT - III**

- Q5)** a) Write the steps involve in thermal designing of the pump. [8]  
b) How to select a pump for corrosive fluid applications? [10]

OR

- Q6)** a) Write the steps involve in hydraulic designing of the pump. [8]  
b) Explain procedure for design optimization of the pumps. [10]

### **SECTION - II**

#### **UNIT - IV**

- Q7)** a) Classify blowers. [8]  
b) Write a note on rotor design airfoil theory. [8]

OR

- Q8)** a) Explain the terms surge and stall with respect to blowers. [8]  
b) Enlist the various applications of the fans & blowers. [8]

#### **UNIT - V**

- Q9)** a) Enlist the steps involved for selection of blowers. [8]  
b) How computer programs for iterative and interactive design helps in designing the fans & blowers. [8]

OR

- Q10)**a) Write a note on computer programs for iterative and interactive design. [8]  
b) Write a note on [8]  
i) Stage pressure rise  
ii) Stage parameters

#### **UNIT - VI**

- Q11)**a) Draw & explain enthalpy - entropy diagram for centrifugal compressors. [8]  
b) Explain working of axial flow compressors with diagram. [10]

OR

- Q12)**a) Draw & explain performance curves of centrifugal compressors. [8]  
b) Enlist the design features of axial flow compressors. [10]



Total No. of Questions : 12]

SEAT No. :

**P2667**

**[5154]-37**

[Total No. of Pages : 3

**B.E. (Mechanical)**

**TRIBOLOGY**

**(2008 Pattern) (Elective - I) (402044D) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to candidates:*

- 1) *Answer any 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** State and explain applications and importance of tribology in industries. **[8]**
- b) Explain the use of following additives- **[8]**
- i) Anti-wear additives.
  - ii) Anti-foam additives.
  - iii) Anti-friction additives.
  - iv) Anti-scuff additives.

OR

- Q2) a)** Discuss the effect of pressure on lubricating oil and also explain why excessive amount of E.P. additives is harmful for material. **[8]**
- b) Explain the following terms related to used motor oil- **[8]**
- i) Re-refining
  - ii) Reconditioning
  - iii) Reprocessing
- Q3) a)** Using the Bowden and Tabor's theory of simple adhesion prove that coefficient friction due to adhesion is- **[8]**

$$f_a = \frac{kS_{sy}}{S_{yc}} \text{ and } f_a = 0.1667 \text{ for } k = 0.5$$

**P.T.O.**

- b) Show that the volume of abrasive wear per unit sliding distance with conical abrasive particles is given by- [8]

$$Q = \left[ \frac{2k_w \cot \alpha}{\pi} \right] \frac{W}{P} \text{ with usual notations}$$

OR

- Q4)** a) Discuss the effect of following on coefficient of friction between two surfaces-
- i) Surface finish                      ii) Sliding velocity                      [8]
- b) Classify and explain different friction tests with their application. [8]

- Q5)** Derive equation for pressure distribution and load carrying capacity for short bearing. Draw the pressure distribution curve for longitudinal and transverse direction. [18]

OR

- Q6)** a) State assumptions and derive two dimensional Reynolds equation. [12]
- b) Differentiate between long journal bearing and short journal bearing. [6]

## SECTION - II

- Q7)** Derive relation for load carrying capacity in terms of supply pressure for thrust bearing. State and explain different types of energy losses in hydrostatic bearing. [18]

OR

- Q8)** a) A circular plate is approaching an oily fixed plane surface with velocity 'V' at the instant, the film thickness is  $h_1$ , if both the surfaces are separated by a lubricant of viscosity ' $\mu$ '. Derive the expression for the time 't' taken to reduce the film thickness from  $h_1$  to  $h_2$ . [12]
- b) A circular plate of 120 mm is approaching to a plane at velocity of 0.1 m/s, at the instant maximum pressure is 5 MPa, if two plates are separated by lubricating oil of viscosity 0.025 Pa-s then calculate: [6]
- i) The maximum pressure
- ii) The load carrying capacity

- Q9) a)** Explain the phenomenon of Elastohydrodynamic lubrication. [4]  
b) Write a short note on: lubrication in Rolling, Drawing and Extrusion with neat sketch. [12]

OR

- Q10)a)** Write short note on-  
i) Labyrinth seal ii) Metallic Gasket [8]  
b) What is self lubricating bearing? Discuss the property of any two materials which are used for making self lubricating bearing. [8]

- Q11)a)** What are the different parameters of coating, explain in brief. [4]  
b) What are the different methods for manufacturing surface layers? [6]  
c) Explain electroplating and also write its advantages and limitations. [6]

OR

- Q12)a)** Define the term ‘Superficial layers’, discuss the development of concept and structure of superficial layers. [10]  
b) Discuss the importance of “Surface Engineering” in Tribology. [6]



Total No. of Questions : 12]

SEAT No. :

**P2668**

**[5154]-38**

[Total No. of Pages : 3

**B.E. (Mechanical)**

**AUTOMOBILE ENGINEERING**

**(2008 Pattern) (402045 A) (Elective - II) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) What are vehicle specifications? Describe specification of any one medium vehicle of your choice. [8]
- b) What is chassis? What are the various components of chassis? Indicate their functions. [8]

OR

- Q2)** a) Discuss various types of car bodies and explain any one in details. [8]
- b) Sketch a neat layout of a front wheel drive and explain its working. [8]
- Q3)** a) Describe with neat sketch function and working of multi-plate clutch. [8]
- b) What is the purpose of clutch plate? Explain with sketch kinds of clutch plates used in automobile. Explain function of various components of it. [8]

OR

- Q4)** a) Describe the operation of non-slip differential used in automobiles. [8]
- b) Explain with neat sketch the following: [8]
- i) Epicyclic
  - ii) Overdrive.

**P.T.O.**



- Q5)** a) Describe Live rear axle and Dead rear axle. [6]  
b) Explain in detail construction features of tubed and tubeless tyres in vehicles. [6]  
c) Sketch recirculating ball type steering gear and explain its working. [6]

OR

- Q6)** a) Explain how the wheel Alignment and its balancing performed in a service station. [8]  
b) What do you understand from terms: Oversteering, Understeering, Cornering Force and Slip Angle? [10]

### **SECTION - II**

- Q7)** a) Distinguish between independent suspension and conventional suspension system. [10]  
b) Explain self leveling suspension system. [8]

OR

- Q8)** a) Classify Brakes and explain Anti-skid Braking System (ABS) with neat sketch. [10]  
b) Explain Hydro gas suspension system in details. Also state its advantages over other brake system. [8]

- Q9)** a) Explain with neat sketch charging system used in automobiles. [8]  
b) Explain in brief electrical car layout. [8]

OR

- Q10)** a) Describe vehicle electrical systems with neat labelled layout. [8]  
b) Explain starting system used in automobile vehicle. [8]

- Q11)** a) List instruments used for active and passive safety in vehicles. Explain any two (either active or passive) of them in detail. [8]  
b) Write note on Vehicle Performance Parameters. [8]

OR

**Q12)a)** Write note on Vehicle Performance Parameters [6]

b) The coefficient of rolling resistance for a truck weighing 62293.5 N is 0.018 & the coefficient of air resistance is 0.00281 in the formula  $R = K_w + K_a A V^2 N$ , where A is  $m^2$  of frontal area and V. The speed in Km/h. The transmission efficiency in the top gear of 6.2:1 is 90% and that in second gear of 15:1 is 80%. The frontal area is 5.574  $m^2$ . If the truck has to have a minimum speed of 88Km/h in the top gear, calculate : [10]

- i) The engine B.P. required.
- ii) The engine speed, if the driving wheels an effective diameter 0.8125m.
- iii) The max grade the truck can negotiate at the above engine speed in second gear.
- iv) The max drawbar pull, available on level road engine speed in second gear.



Total No. of Questions : 12]

SEAT No. :

**P2669**

**[5154]-39**

[Total No. of Pages : 2

**B.E. (Mechanical S/W)**

**MACHINE TOOL DESIGN**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to candidates:*

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

**SECTION - I**

**UNIT - I**

- Q1)** a) Differentiate between the design considerations for continuous and intermittent power drives. [9]
- b) Write short note on : Preferred number series as applied for machine drives. [7]

OR

- Q2)** Draw Structure Diagrams for following structure formulae, find out optimum formula out of them and draw the gearing diagram for the optimum formula:  
2(1)3(2), 2(3)3(1), 3(1)2(3), 3(2)2(1) [16]

**UNIT - II**

- Q3)** a) What is the effect of stiffeners on bending and torsional stiffness of structures? [8]
- b) Write short note on: Design Considerations of Beds and Columns. [8]

OR

- Q4)** Write short note on: Static and dynamic stiffness of bases and tables. [16]

**UNIT - III**

- Q5)** a) Explain positional error caused by stick slip and the parameters on which it depends. [9]
- b) Write short note on: Reconditioning of machine tool guide ways. [9]

OR

**P.T.O.**

- Q6)** a) Write short note on Hydrostatic lubrication systems for guide ways. [9]  
b) Write short note on: Wear compensation in guide ways. [9]

**SECTION - II**

**UNIT - IV**

- Q7)** Write short notes on: [16]  
a) Analysis and preloading of antifriction bearing  
b) Types of Spindle supports.

OR

- Q8)** Explain the requirements of machine tool spindles. [16]

**UNIT - V**

- Q9)** a) Explain the process of stability analysis of machine tools. [8]  
b) Explain Adaptive control systems. [8]

OR

- Q10)** Compare different control systems for different machine tools and give relative merits and demerits. [16]

**UNIT - VI**

- Q11)**a) Explain the process of retrofitting. [9]  
b) Write short note on: Design Layout of machine tool using matrices. [9]

OR

- Q12)**a) Explain the Design considerations NC/CNC Machines. [9]  
b) What are Recent trends in machine tools? [9]



Total No. of Questions : 12]

SEAT No. :

**P2670**

**[5154]-40**

[Total No. of Pages : 5

**B.E. (Mechanical Engg.)**

**QUANTITATIVE AND DECISION MAKING TECHNIQUES  
(2008 Pattern) (Semester - I) (Elective - II) (402045C) (Theory)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to candidates:*

- 1) *All the questions are compulsory.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Use of calculator is permitted.*
- 4) *Assume suitable data if necessary.*

**SECTION - I**

**Q1) a)** Define terms of Linear Programming: Basic Solution, Feasible Solution and Artificial Variables. **[6]**

- b) Two products  $P_1$  and  $P_2$  are to be manufactured by a firm. Profits on  $P_1$  and  $P_2$  are Rs.30 and 20 respectively. The products are to be processed on two machines, i.e., first on milling machine and other on surface grinder. The capacities and the time required to produce a unit are as follows: **[12]**

	$P_1$	$P_2$	Capacity
Milling machine	3 hours	1 hour	1500man hours/month
Surface machine	1hour	1hour	1000man hours/month

OR

**Q2) a)** What is optimization? Explain various applications of linear programming. **[6]**

- b) Solve LPP by Suitable Method **[12]**

Maximize:

$$Z=100X_1 + 60X_2 + 40X_3$$

Subject to:

$$X_1 + X_2 + X_3 \leq 100$$

$$10X_1 + 4X_2 + 5X_3 \leq 600$$

$$2X_1 + 2X_2 + 6X_3 \leq 300$$

$$\text{Where, } X_1, X_2, X_3 \geq 0$$

**P.T.O.**

**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]**

		Destinations			Supply
		1	2	3	
Sources	1	1	4	8	10
	2	7	2	3	20
	3	5	4	2	15
Demand		23	12	10	

OR

**Q4) a)** What is unbalanced assignment problem? How is it solved by the Hungarian Method? **[6]**

b) A company is faced with the problem of assigning six Machines to five different Jobs. The costs estimated in hundreds of rupees are given in the table below. Solve the problem assuming that the objective is to minimize the total cost. **[10]**

		Jobs				
		1	2	3	4	5
Machines	1	2.5	5	1	6	2
	2	2	5	1.5	7	3
	3	3	6.5	2	8	3
	4	3.5	7	2	9	4.5
	5	4	7	3	9	6
	6	6	9	5	10	6

**Q5) a)** Explain payback period method. **[6]**

b) We have five jobs, each of which must go through A, B and C. Processing times (in hours) are given in the following table: **[10]**

Machines	JOBS						
	1	2	3	4	5	6	7
A	3	8	7	4	9	8	7
B	4	3	2	5	1	4	3
C	6	7	5	11	5	6	12

Determine the optimal sequence of jobs that minimizes the total elapsed time. Also find the idle time for machines A, B and C.

OR

- Q6)** a) What is dynamic programming? Explain detailed procedures to solve problems of dynamic programming. [6]
- b) The annual demand of parts is 3200. The unit cost is Rs.6 and inventory carrying charges are estimated as 25% per annum. If the cost per procurement is Rs.150 find: [10]
- Economic order quantity
  - Time between two consecutive orders.
  - Number of orders per year.
  - The optimum cost.

### 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
- Replacement of items whose maintenance cost varies with time.
  - 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	
		B1	B2
Player A	A1	1	-3
	A2	3	5
	A3	-1	6
	A4	4	1
	A5	2	2
	A6	-5	0

- Q9) a)** What is the need of simulation? How can you use simulation to solve industrial problems? Discuss with example. **[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.
- What is the average number of customers waiting for the service?
  - 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. **[6]**

b) Estimated time for the jobs of a project are given below **[10]**

Job	A	B	C	D	E	F	G	H	I	J	K	L
Time (Weeks)	13	5	8	10	9	7	7	12	8	9	4	17

The constraints governing the job are

A & B are start jobs; A controls C, D & E; B controls F & J; G depends on C; H depends on D; E & F controls I & K; K follows J; L is also controlled by K; G, H, I & L are the last jobs. Draw the network, determine float for each activity, project duration and the critical path.

OR

**Q12)** Consider the project having following activities and their time estimates:

Job	A	B	C	D	E	F	G	H	I	J	K	L	M
Optimistic Time	3	4	5	9	4	3	5	1	2	7	4	8	6
Most likely Time	4	8	6	15	6	4	6	3	4	8	5	9	7
Pessimistic Time	5	10	8	10	8	5	8	4	5	10	6	13	8
Immediate Predecessors	--	--	B	A, C	B	D, E	D, E	D, E	G	F, I	G	H	J, K, L

- Draw the network for the project
- Compute the expected project completion time
- What should be the due date to have 0.9 probability of completion. Find the E & L values for all events.

**[16]**



Total No. of Questions :12]

SEAT No. :

**P2671**

[Total No. of Pages :4

[5154] - 41

**B.E. (Mechanical)**

**POWER PLANT ENGINEERING**  
**(2008 Pattern) (Semester - II) (402047)**

*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.*
- 6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION-I**

- Q1)** a) Compare the steam, hydro, gas and diesel power plant on the basis of site, cost, reliability & life cycle. **[4]**
- b) Define: **[4]**
- i) Load Factor
  - ii) Demand Factor
  - iii) Capacity Factor
  - iv) Plant Use Factor
- c) The load on a power plant with respect to time for 24 hours are as below:

Time Hours	0-6	6-8	8-12	12-14	14-18	18-22	22-24
Load (MW)	40	50	60	50	70	80	40

Draw the load curve. Find the load factor of the plant. If the loads above 60 MW are taken by a standby unit of 20 MW capacity, find the load factor and the use factor of the standby unit. **[8]**

OR

**P.T.O.**

- Q2)** a) Explain various tariff methods in detail. [8]
- b) Determine the generating cost per unit of 80 MW power station with the following data: Capital cost = Rs.  $160 \times 10^7$ , annual cost of fuel = Rs.  $32 \times 10^6$ , annual load factor = 45%. Interest & depreciation = 10% of capital cost, annual wages and taxes = Rs.  $36 \times 10^6$ , Assume maximum demand equal to capacity of the power plant. [8]
- Q3)** a) Discuss in detail 'In plant handling of coal' in a Thermal Power plant. [6]
- b) Discuss the principle of operation of overfeed and underfeed stokers with the help of simple diagrams. [6]
- c) Calculate: [6]
- vacuum efficiency,
  - condenser efficiency,
  - corrected vacuum against standard barometer reading of 76 cm of Hg.

Consider following data available related to a steam condenser. Cooling water amount 4900 kg/hr, Condenser vacuum = 68 cm of Hg, Barometer reading = 76.8 cm of Hg, Mean condenser temperature =  $38^\circ\text{C}$ , condensate collected = 2300 kg/hr, rise in cooling water temperature =  $19^\circ\text{C}$ . Cooling water inlet temperature is  $8.5^\circ\text{C}$ .

OR

- Q4)** a) Write a note on Fluidized Bed Combustion. [6]
- b) Explain the working of electrostatic precipitator with neat sketch. [6]
- c) The steam at 90 bar and  $480^\circ\text{C}$  is supplied to a steam turbine. The steam is reheated to its original temperature by passing through a re-heater at 12 bar. The expansion after the reheating take place to condenser pressure of 0.07 bar. Find the efficiency of reheat cycle and work output if the flow of the steam is 1 kg/s. Neglect the pressure loss in the system and the assume the expansion through the turbine isentropic. Do not neglect the pump work. [6]

**Q5) a)** Derive an expression for maximum work in Brayton cycle and prove that

$$W_{\max} = C_p (\sqrt{T_{\max}} - \sqrt{T_{\min}})^2 \quad [8]$$

b) Draw a typical schematic layout of Hydro-electric power plant and explain it in detail. [8]

OR

**Q6) a)** Describe governing of any one hydro turbine with neat sketch. [8]

b) In a gas turbine plant, air at 0.9 bar and 303 K is admitted to the compressor and compressed to 4.5 bar with an isentropic efficiency of 85%. Its temperature is raised further by using exhaust gases passing through a re-heater. The maximum temperature of the cycle is limited to 1000°C. The gas is then expanded to 1.1 bar with an isentropic efficiency of 80%. Find the thermal efficiency of the system assuming effectiveness of the re-heater as 0.8. Neglect the fuel mass and pressure losses. If the air flow is 5 kg/s, find the power developing capacity of the system. [8]

### SECTION-II

**Q7) a)** Draw a neat sketch of CANDU type reactor. Explain its working and state its advantages and disadvantages. [8]

b) 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]

OR

**Q8) a)** Explain the working of pressurised water reactor with neat sketch. [8]

b) Draw performance characteristic curves of diesel power plants. [4]

c) Discuss various losses in I.C. engines. [4]

**Q9) a)** Explain single basis and double basis tidal power plant with neat diagrams. [6]

b) State the advantages and disadvantages of fuel cell. [6]

c) Explain with the help of a neat diagram a solar pond electric power plant. [6]

OR

**Q10)** Write short notes on any three of following:

**[18]**

- a) Geothermal power plants.
- b) Magneto hydro dynamic systems.
- c) Necessity and methods of cooling of transformers.
- d) Primary and secondary electrical distribution systems.
- e) High temperature solar thermal power plants.

**Q11)a)** What do you mean by ‘Thermal pollution’? What is ‘Thermal Discharge Index’ (TDI). **[8]**

- b) Discuss the various methods in brief to control pollutants of power plants. **[8]**

OR

**Q12)a)** What is ‘Particulate emission’? How it is controlled? **[8]**

- b) Explain Pre & Post treatment for controlling oxides of sulphur. **[8]**

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2672**

**[5154]-42**

[Total No. of Pages : 5

**B.E. (Mechanical)**

**MECHANICAL SYSTEM DESIGN**

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

*Time : 4 Hours]*

*[Max. Marks : 100*

*Instructions to candidates:*

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

**SECTION - I**

**Q1) a)** The piston rod of a hydraulic cylinder exerts an operating force of 10 kN. The friction due to piston packing and stuffing box is 10% of the operating force. The pressure in the cylinder is 10 MPa. The cylinder is made up of FG 200 and factor of safety is 5. Determine the internal diameter and thickness of the cylinder.

The flange thickness is 10 mm and CI cover plate of thickness 10 mm is fixed to the cylinder by means of 4, M10 bolts and a zinc gasket of 3 mm thickness. The bolts are made up of Fe400. Determine the factor of safety for bolts.

$$E_{\text{steel}} = 207 \text{ GPa}$$

$$E_{\text{CI}} = 100 \text{ GPa}$$

$$E_{\text{zinc}} = 90 \text{ GPa}$$

Assume a preload of 20 kN in each bolt.

Std. Dia. of cylinder 20, 30, 40, 50, 60 mm

Std. Thickness 2, 4, 5, 6, 7, 8, 10 mm B.

**[12]**

b) State and explain various categories of welded joints used in unfired pressure vessels. Draw a neat sketch. **[6]**

OR

**P.T.O.**

**Q2) a)** A cylindrical pressure vessel shell of inside diameter 1500 mm is subjected to an internal pressure of 2 MPa. The shell as well as the heads are made of low alloy steel with  $S_{ult} = 450$  MPa. Double welded butt joints which are spot radiographed are used to fabricate the vessel. Corrosion allowance is 3 mm. Determine the thickness of the cylindrical shell and thickness of head if the heads are **[12]**

- i) Flat
- ii) Plain formed
- iii) Torispherical with crown radius of 1125 mm.

b) Derive Clavarino's equation for thick cylinder subjected to internal pressure. **[6]**

**Q3) a)** The cylinder of a 4 stroke diesel engine has the following specifications:  
Brake power = 7.5 kW

Speed = 1400 RPM

IMEP = 0.35 MPa

Mechanical efficiency = 80%

Maximum gas pressure = 3.5 MPa

The cylinder liner and head are made of grey cast iron with  $S_{ut} = 250$  MPa and  $\mu = 0.25$ . The studs are made of plain carbon steel with  $S_{yt} = 380$  MPa. Factor of safety for all parts is 6.

Calculate:

- i) Bore and length of cylinder liner
- ii) Thickness of cylinder liner
- iii) Thickness of cylinder head
- iv) Size, number and pitch of stud. **[12]**

b) Explain the desirable properties of the materials used for cylinder, head and studs. **[4]**

OR

**Q4) a)** The following data is given for a four-stroke diesel engine: [12]

Cylinder bore = 250 mm

Length of stroke = 300 mm

Speed = 600 rpm

Indicated mean effective pressure = 0.6 MPa

Mechanical efficiency = 80%

Maximum gas pressure = 4 MPa

Fuel consumption = 0.25 kg/kW-hr.

Higher calorific value of fuel = 44000 kJ/kg

Assume that 5% of total heat developed in the cylinder is transmitted by the piston. The piston is made of gray C.I FG 200 ( $S_{ut} = 200 \text{ N/mm}^2$  and  $K = 46.6 \text{ W/m}^\circ\text{C}$ ) and the factor of safety is 5. The temperature difference between the center and the edge of the piston head is  $220^\circ\text{C}$ .

- i) Determine the thickness of piston head by strength consideration and thermal consideration.
- ii) State whether the ribs are required, if so calculate the number and thickness of ribs.
- iii) State whether a cup is required in the top of piston head, if so calculate the radius of the cup.

b) Explain the desirable properties of the materials used for piston. [4]

**Q5) a)** Differentiate between optimum design problems with normal specifications and redundant specifications. [4]

b) A shaft is to be used to transmit a torque of 900 N-m. The required torsional stiffness (rigidity) of shaft is 90 N-m/degree while the factor of safety based on the yield strength is 1.5. Using the maximum shear stress theory, design the shaft with the objective of minimizing the weight. [12]

Material	Mass density( $\text{kg/m}^3$ )	Modulus of rigidity(GPa)	Yield strength(MPa)
M1	8500	80	130
M2	3000	26.5	50
M3	4800	40	90

OR

3



- Q6) a)** Explain: **[4]**
- i) Adequate design
  - ii) Optimum design
- b) A tensile bar of length 200 mm is subjected to the constant tensile force of 5000 N. Design the bar with the objective of minimizing the material cost, out of the following materials: **[12]**

Material	Mass density (kg/m <sup>3</sup> )	Material cost (Rs/kg)	Yield strength (N/mm <sup>2</sup> )
Plain carbon steel	7500	16	130
Aluminum alloy	3000	32	50
Titanium alloy	4800	480	90

### SECTION - II

- Q7) a)** Describe using a schematic a Man-Machine System and the factors influencing efficiency. **[6]**
- b) Three rods with length of 40 mm each have to be assembled to form a total length of  $120 \pm 0.6$  mm and each one has the same standard deviation as well as design and natural tolerances. Find the tolerances of each component. **[10]**

OR

- Q8) a)** Describe in detail the basic principles of design for manufacture and assembly that are employed in a well setup production line. **[6]**
- b) A metal shaft of yield strength 180 MPa has a mean stress of 140 MPa. How many shafts will fail if the stresses and the yield strength are normally distributed with standard deviation of 20 MPa? Draw neat figures and use Area under the standard normal distribution curve from 0 to Z as, **[10]**

Z	1.0	1.2	1.4	1.6	1.8	2.0
Area	0.3413	0.3849	0.4192	0.4452	0.4641	0.4772

Z	2.2	2.4	2.6	2.8	3.0
Area	0.4861	0.4918	0.4953	0.4974	0.4987

- Q9)** a) Using a neat sketch explain what is a Gear Box and its purpose. [5]  
b) Classify Gear Boxes and provide brief explanations of each. [5]  
c) Sketch the Kinematic Diagram of a Gear Box and describe the concept of Structural Formulae. [6]

OR

**Q10)** Tabulate the eight speed steps of a gear box for a speed range of 100 rpm to 1800 rpm using geometric progression and then arrive at the optimum structure diagram. [16]

- Q11)** a) What are the guidelines in selecting Material Handling System? [6]  
b) Discuss the advantages and disadvantages of Conveyors. [6]  
c) Mineral of mass density  $1200 \text{ kg/m}^3$  is transported by a horizontal 650 mm wide flat belt conveyor with 0.16 as the surcharge factor for the belt drive and belt speed 1.75 m/s. Determine the conveyor capacities. (Effective width  $b$  of material carried by belt safely is,  $b = 0.9B - 0.05$  and  $B$  is belt width) [6]

OR

- Q12)** a) Discuss Belt Take-up Devices and their different types with neat sketches. [5]  
b) Describe in detail types of pulleys used in conveyors. [5]  
c) A conveyor carrying ore at 300,000 kg/hr has its 4 ply belt moving at 10 km/hr. The bulk density and the angle of surcharge of ore are  $800 \text{ kg/m}^3$  and 15 respectively. Taking the material factor for plies ( $k_1$ ) as 2.0 and the belt tension and arc of contact factor ( $k_2$ ) as 63, Find: [8]  
i) Belt width  
ii) Drive pulley diameter and length.



Total No. of Questions : 12]

SEAT No. :

**P2673**

**[5154]-43**

[Total No. of Pages : 3

**B.E. (Mechanical/Sandwich)**  
**COMPUTATIONAL FLUID DYNAMICS**  
**(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) *Figures to the right indicates full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables, Mollier charts, electronic calculator is allowed.*
- 6) *Your answer will be valued as a whole.*
- 7) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Define computational domain for the fluid flow problem with suitable examples. **[10]**
- b) Justify significance of substantial derivative in terms of physical interpretation. **[6]**

OR

- Q2)** a) How is CFD being used in the sports and chemical industry? **[8]**
- b) Explain each term of force balance equation for all the forces acting on a differential control volume. **[8]**

- Q3)** a) Name the sources of energy that contribute to the momentum equation. **[9]**
- b) Given the function  $f(x) = 0.15X^2$ ; find the first derivative of  $f(x)$  at  $x = 3$ ; using forward, backward and central differencing of order  $(\Delta x)$ . Use a step size of  $\Delta x = 0.1$ . **[9]**

OR

- Q4)** a) Derive Fourier's law of heat conduction differential equation for two dimensions. **[10]**
- b) What is an iteration process and how is it performed? **[8]**

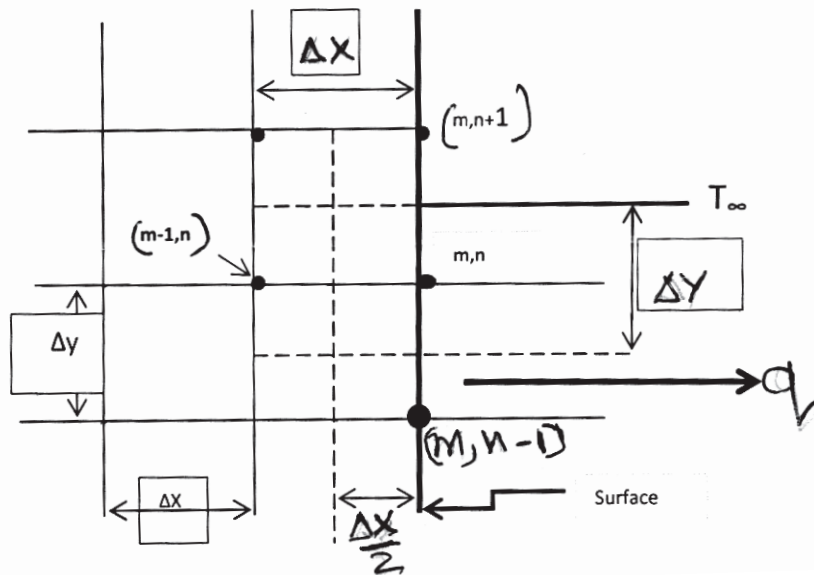
**P.T.O.**

- Q5) a)** What are the differences between solving a fluid-flow problem analytically compared to numerically. [6]
- b) What are the advantages and disadvantages of each method of Q.5 (a)? [10]

OR

- Q6) a)** In a finite difference scheme, data is resolved at nodal points, how is this different to finite volume scheme? [8]
- b) Derive an expression for the equation of a boundary node subjected to a constant heat Flux from the environment. Use Fig. 6 (B) shown below for nomenclature. [8]

Fig.6(B) for Q. 6(b)



## SECTION - II

- Q7)** Derive an expression for the heat loss per square meter of the surface area of furnace wall of thickness ( $\delta$ ) when the thermal conductivity varies with temperature as:  $k = (a + bt^2)$ . W/m-degree where  $t$  is in degree centigrade. [16]

OR

- Q8) a)** Differentiate the explicit and implicit finite difference approach. [8]
- b) How Courant numbers applied to establish stability requirement of a finite difference method? [8]

**Q9)** Describe the following types of grids: **[16]**

- a) Elliptic grid
- b) Square grid
- c) 'C' grid
- d) H grid

OR

**Q10)a)** Considering the steps of SIMPLER algorithm, justify the need for this algorithm. **[8]**

b) Describe the need of pressure correction approach incompressible viscous flow. **[8]**

**Q11)a)** What is the Neumann boundary condition? Explain how is it used as an outlet boundary condition. **[9]**

b) Explain predictor step in the McCormack techniques. **[9]**

OR

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

- a) Finite Difference method
- b) Finite Volume method
- c) Compare and contrast between Finite difference and Finite Volume method considering advantages and limitations.

**x      x      x**

Total No. of Questions : 12]

SEAT No. :

P2674

[5154]-44

[Total No. of Pages : 6

B.E. (Mechanical)

FINITE ELEMENT METHOD

(2008 Course) (Semester - II) (402049 - B) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer to the two sections should be written in separate answer books.
- 2) Figures to the right indicates full marks.
- 3) Use of calculator is allowed.
- 4) Assume suitable data if necessary.
- 5) Additional data sheet is attached for the reference.

**SECTION - I**

**UNIT - I**

- Q1)** a) Write a short note on numbering nodes for band width minimization. [6]  
b) List and briefly describe the general steps of the finite element method. [4]  
c) What is meant by plane stress and plane strain condition? State the relationship between stress-strain for plane stress and plane strain condition in 2D elasticity. [6]

OR

- Q2)** a) With the help of neat sketch explain axisymmetric formulations in elasticity? State stress-strain relation for axisymmetric problems. [6]  
b) State and explain the principle of minimum potential energy (PMPE). [4]  
c) Explain the term skyline storage technique. [6]

**UNIT - II**

- Q3)** a) Derive equation for load vector due to body force and traction force for two noded (linear) bar element. [6]  
b) Find slopes and deflections of beam subjected to uniform distributed load as shown in Figure 1. Take modulus of elasticity,  $E = 2 \times 10^{11} \text{ N/m}^2$  and  $I = 5 \times 10^{-6} \text{ m}^4$  [12]

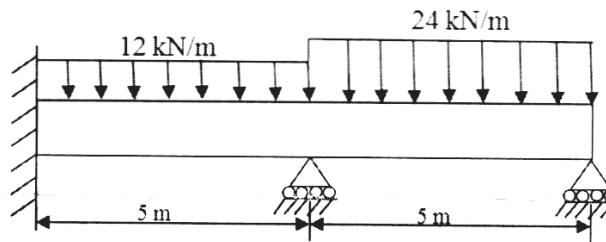


Figure 1

OR

P.T.O.

- Q4) a)** Derive the expression for load vector for beam element due to distributed load P. [6]
- b) For the bar as shown in Figure 2, determine the nodal displacements and element stresses. Take modulus of elasticity  $E = 2 \times 10^{11} \text{ N/m}^2$ . Take maximum displacement at free end as 3.5 mm. Use elimination approach for boundary conditions. [12]

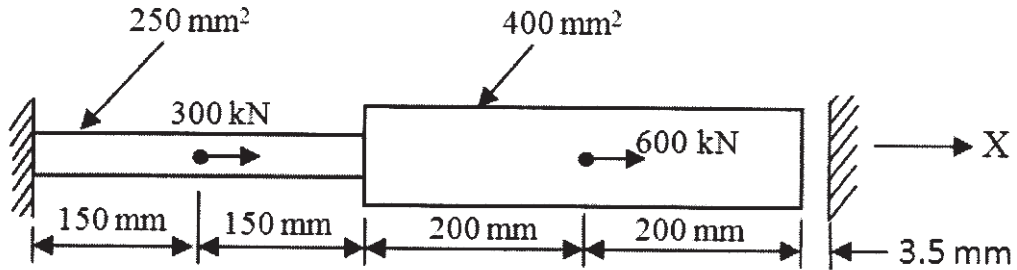


Figure 2

### UNIT - III

- Q5) a)** Derive the elements of Jacobian matrix of transformation for 2D plane stress condition using four noded quadrilateral element. [8]
- b) For four node quadrilateral element, find the x and y coordinates of point P whose location in parent element are given by  $\xi = 0.5$  and  $\eta = 0.5$ . Also find u, v displacements of point P in X and Y directions respectively if displacement vector is  $\{q\} = [0 \ 0 \ 0.20 \ 0 \ 0.15 \ 0.10 \ 0 \ 0.05]^T$ . [8]

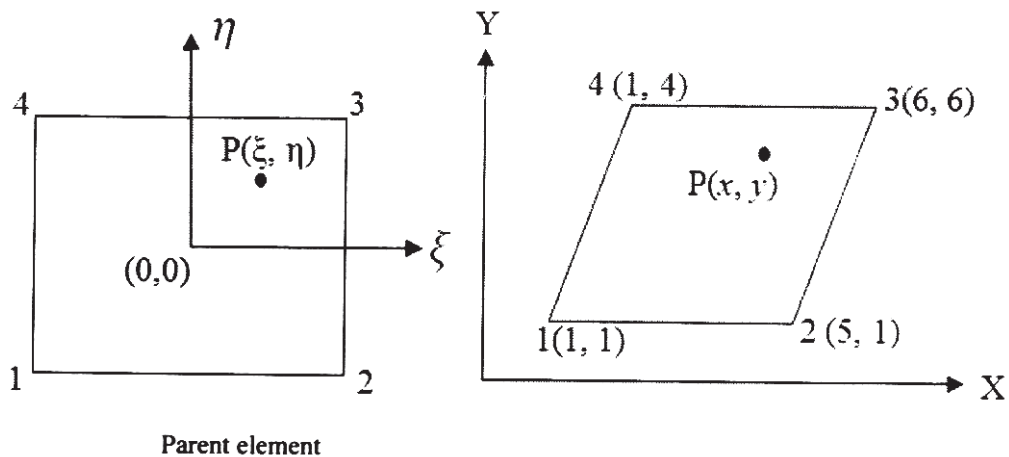


Figure 3

OR

- Q6)** a) Write a note on substructuring. [4]  
 b) Explain one dimensional Gauss Quadrature rule for numerical integration. [6]  
 c) Solve following integration using two point Gauss Quadrature method. [6]

$$I = \int_{-1}^1 \int_{-1}^1 (2\xi^2\eta + \eta^2\xi - 3\xi\eta + 7) d\xi d\eta$$

## SECTION - II

### UNIT - IV

- Q7)** a) Derive elemental stiffness matrix formulations for one dimensional steady state heat conduction problems. [8]  
 b) Consider a brick wall of thickness 0.3 m,  $k = 0.7 \text{ W/m}^\circ\text{K}$  and area  $A = 1 \text{ m}^2$  perpendicular to the direction of heat flow. The inner surface is at  $28^\circ\text{C}$  and the outer surface is exposed to cold air at  $-15^\circ\text{C}$ . the heat transfer coefficient associated with the outside surface is  $40 \text{ W/m}^2 \text{ }^\circ\text{K}$ . Determine the steady state temperature distribution within the wall. Use two elements and use elimination approach for boundary conditions. [10]

OR

- Q8)** a) Derive elemental stiffness matrix (conduction + convection) formulations for 1D steady state heat transfer problems. [8]  
 b) A metallic fin, with thermal conductivity  $70 \text{ w/m}^\circ\text{K}$ , 1 cm radius and 5 cm long extends from a plane wall whose temperature is  $140^\circ\text{C}$ . Determine the temperature distribution along the fin if heat is transferred to ambient air at  $20^\circ\text{C}$  with heat transfer coefficient of  $5 \text{ W/m}^2 \text{ }^\circ\text{K}$ . Take two elements along the fin. Assume that the tip of fin is insulated. [10]

### UNIT - V

- Q9)** Estimate natural frequencies of axial vibrations of bar shown in figure 4. using both consistent and lumped mass matrices and compare the results. Bar is having uniform cross-section with cross-sectional area  $A = 30 \times 10^{-6} \text{ m}^2$ , length  $L = 1 \text{ m}$ , modulus of elasticity  $E = 2 \times 10^{11} \text{ N/m}^2$  and density  $\rho = 7800 \text{ kg/m}^3$ . Model the bar by using two elements. [16]

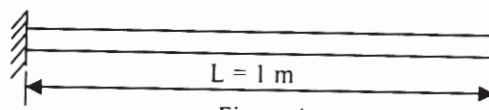


Figure 4

OR



- Q10)a)** Derive consistent mass matrix for truss element and one dimensional bar element. [8]
- b) Explain eigen value problem for un-damped free vibration system. [8]

**UNIT - VI**

- Q11)a)** Explain various types of analysis in finite element method. [8]
- b) What are the symmetric, and antisymmetric boundary conditions in finite element method? Illustrate with examples. [8]

OR

- Q12)a)** Define: Aspect ratio, warp angle, Skews, Jacobian. Explain their significance in finite element method. [8]
- b) What are the advantages and limitations of free and mapped meshing in Finite Element Method? Which is most suitable for meshing complex geometries? [8]

## DATA SHEET

### Shape Functions:

#### 1 Bar Element

Cartesian coordinates

$$N_1 = 1 - \frac{x}{L}; \quad N_2 = \frac{x}{L} \quad ;$$

Natural coordinates

$$N_1 = \frac{1-\xi}{2}; \quad N_2 = \frac{1+\xi}{2}$$

#### 2 Beam Element

In Cartesian coordinate

$$N_1 = \frac{1}{L^3}(2x^3 - 3x^2L + L^3);$$

$$N_2 = \frac{1}{L^3}(x^3L - 2x^2L^2 + xL^3);$$

$$N_3 = \frac{1}{L^3}(-2x^3 + 3x^2L);$$

$$N_4 = \frac{1}{L^3}(x^3L - x^2L^2);$$

In Natural coordinate

$$N_1 = \frac{1}{4}(2 - 3\xi + \xi^3);$$

$$N_2 = \frac{1}{4}(1 - \xi - \xi^2 + \xi^3);$$

$$N_3 = \frac{1}{4}(2 + 3\xi - \xi^3);$$

$$N_4 = \frac{1}{4}(-1 - \xi + \xi^2 + \xi^3);$$

### Element Stiffness Matrices:

#### 1. Bar Element

$$k_{bar} = \frac{AE}{L} \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$$

#### 2. Beam Element

$$k_{beam} = \frac{EI}{L^3} \begin{bmatrix} 12 & 6L & -12 & 6L \\ 6L & 4L^2 & -6L & 2L^2 \\ -12 & -6L & 12 & -6L \\ 6L & 2L^2 & -6L & 4L^2 \end{bmatrix}$$

#### 3 Truss Element

$$k_{truss} = \frac{AE}{L} \begin{bmatrix} C^2 & CS & -C^2 & -CS \\ CS & S^2 & -CS & -S^2 \\ -C^2 & -CS & C^2 & CS \\ -CS & -S^2 & CS & S^2 \end{bmatrix};$$

$C = \text{Cos}(\theta)$  and  $S = \text{Sin}(\theta)$ ,  $\theta$  is positive in anti - clockwise direction

**Element Mass Matrices:**

**1. Bar Element**

(a) Consistent mass matrix:

$$m_{consistent} = \frac{\rho AL}{6} \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix};$$

(b) Lumped mass matrix:

$$m_{lumped} = \frac{\rho AL}{2} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

**2. Beam Element**

(a) Consistent mass matrix:

$$m_{consistent} = \frac{\rho AL}{420} \begin{bmatrix} 156 & 22L & 54 & -13L \\ 22L & 4L^2 & 13L & -3L^2 \\ 54 & 13L & 156 & -22L \\ -13L & -3L^2 & -22L & 4L^2 \end{bmatrix};$$

(b) Lumped mass matrix:

$$m_{lumped} = \frac{\rho AL}{2} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

**Heat Transfer Matrices:**

K matrix for conduction + convection problem for bar element

$$K = \frac{kA}{L} \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix} + \frac{hPL}{6} \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}; \text{ when end of fin is insulated}$$

$$K = \frac{kA}{L} \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix} + \frac{hPL}{6} \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} + hA \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}; \text{ when end of fin is not insulated}$$

Where  $A$  = cross-sectional area,  $k$  = Thermal conductivity,  $L$  = length of element,

$h$  = convection coefficient, and  $P$  = perimeter

**Gauss Quadrature:**

Table for Gauss points for integration from -1 to +1

Number of Gauss Points	Location $\xi_i$	Associated weights
1	$\xi_1 = 0.0$	2.0
2	$\xi_1, \xi_2 = \pm 0.57735$	1.0
3	$\xi_1, \xi_3 = \pm 0.77459$ $\xi_2 = 0.0$	$5/9 = 0.55556$ $8/9 = 0.88889$
4	$\xi_1, \xi_4 = \pm 0.86113$ $\xi_2, \xi_3 = \pm 0.33998$	0.34785 0.65214

x      x      x

Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 3

**P2675**

**[5154]- 45**

**B.E. (Mechanical)**

**ROBOTICS**

**(2008 Pattern) (Semester - II) (Part -II) (Elective - III) (402049 C)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Define a robot and state its related three laws. **[8]**  
b) Give classification of robot in detail. **[8]**

OR

- Q2)** a) Explain the anatomy of a robot. **[8]**  
b) What are the socio economic aspects of robotisation? **[8]**
- Q3)** a) Which sensor can be used along with the gripper to sense whether the object is falling? Explain the working principle. **[8]**  
b) Explain the criteria for gripper design. **[8]**

OR

- Q4)** a) Discuss in brief “ classification of grippers used in robotics”. **[8]**  
b) Discuss the various characteristics of sensing devices used in industrial robot. **[8]**

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

- Q5)** a) Explain different types of controllers used in industrial robots. [8]
- b) A revolute joint in a PTP robot moving with velocity of 20 deg/sec traverses from an initial position of  $20^\circ$ . Determine the position and velocity of the joint at the end of each second and plot the results. The range of initial and final position is covered in 4 seconds with a finite acceleration of  $6 \text{ deg/sec}^2$  [10]

OR

- Q6)** a) What is point-to-point and continuous path planning? Enlist at least two applications for each. [8]
- b) Explain types of control systems used in present industrial robots. [10]

**SECTION - II**

- Q7)** a) The coordinates of a point qabc is given by  $[7 \ 5 \ 3]^T$  which is rotated about the OX-axis of the reference frame OXYZ by an angle of  $60^\circ$ . Determine the coordinates of the point qxyz? [10]
- b) Explain the procedure for Denavit - Hartenberg parameters representation. [8]

OR

- Q8)** a) A mobile body reference frame OABC is rotated about  $60^\circ$  about OY-axis of reference frame OXYZ. If  $P_{xyz} = [2 \ 4 \ 6]^T$  and  $Q_{xyz} = [3 \ 5 \ 7]^T$  are the coordinates with respect to OXYZ plane, What are the corresponding coordinates of P and Q with respect to OABC frame. [10]
- b) Explain the terms [8]
- i) direct kinematics
- ii) Indirect kinematics

- Q9)** a) Explain the image Processing techniques. [8]
- b) Explain typical vision system for a robot. [8]

OR

- Q10)a)** Explain the following (Any 2). **[10]**
- i) Image acquisition
  - ii) Sampling
  - iii) Edge detection
- b) Write various technical features required of robot for spot welding and spray coating application. **[6]**
- 
- Q11)a)** Explain various characteristics of induction motor. **[8]**
- b) Explain WAIT, DELAY, SIGNAL command with suitable example. **[8]**
- 
- Q12)a)** Write a note on stepper motor. **[8]**
- b) Explain generations of robot programming language. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P2676**

**[5154]-46**

[Total No. of Pages : 4

**B.E. (Mechanical)**

**ADVANCED AIR CONDITIONING & REFRIGERATION**

**(2008 Course) (Semester - II) (Elective - III) (402049D)**

*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 and Q.11 or Q.12.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Figures to the right indicates full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

**SECTION - I**

- Q1) a)** Compare subcritical cycle with transcritical cycle of refrigeration. Explain working of refrigeration system with transcritical cycle. **[8]**
- b) A R134a refrigeration system consists three evaporators of capacities 20TR, 30TR and 10TR with individual expansion valve and individual compressors. The evaporator operates at  $-10^{\circ}\text{C}$ ,  $5^{\circ}\text{C}$  and  $10^{\circ}\text{C}$  respectively. Vapours inlet to compressors are dry and saturated. Condenser operates at  $40^{\circ}\text{C}$  and there is no subcooling. Assuming isentropic compression in compressor, find **[10]**
- i) mass flow rate in each evaporator
  - ii) power required to drive compressors
  - iii) overall COP

OR

- Q2) a)** List various defrosting methods. Explain the followings in detail. **[10]**
- i) Hot-gas defrosting
  - ii) Re-evaporator coil defrosting
- b) With neat diagram explain pumped circulation system. **[8]**

**P.T.O.**

- Q3)** a) What do you mean by rating of compressors? Give the selection criteria of compressors for air conditioning system. [8]
- b) Draw the neat schematic of evaporative condenser. Explain its working principle. [8]

OR

- Q4)** a) Explain the psychrometry involved in cooling tower design. Explain the types of cooling towers. [8]
- b) What is mean by diabatic and adiabatic flow in capillary? Explain capillary selection procedure for refrigeration system. [8]
- Q5)** a) Explain construction and working of HP/LP cutouts. [8]
- b) Why solenoid is used in refrigeration system? Construct the diagram for solenoid valve and describe its working principle. [8]

OR

- Q6)** a) List the advantages of various frequency drive over the other drives. Describe how frequency is controlled in VFD. [8]
- b) Write short note on : IAQ controls. [8]

## **SECTION - II**

- Q7)** a) Draw New ASHRAE comfort chart and explain its significance. [8]
- b) With appropriate examples give the selection criteria for indoor and outdoor design conditions. [10]

OR

- Q8)** a) Describe the CLTD/CLF method of cooling load calculation in details. justify the calculations with simple examples. [12]
- b) Explain ECBC codes. [6]
- Q9)** a) Describe design considerations for air conditioning system used for hospitals. [8]
- b) Explain the working of heat pump with neat schematic. [8]

OR

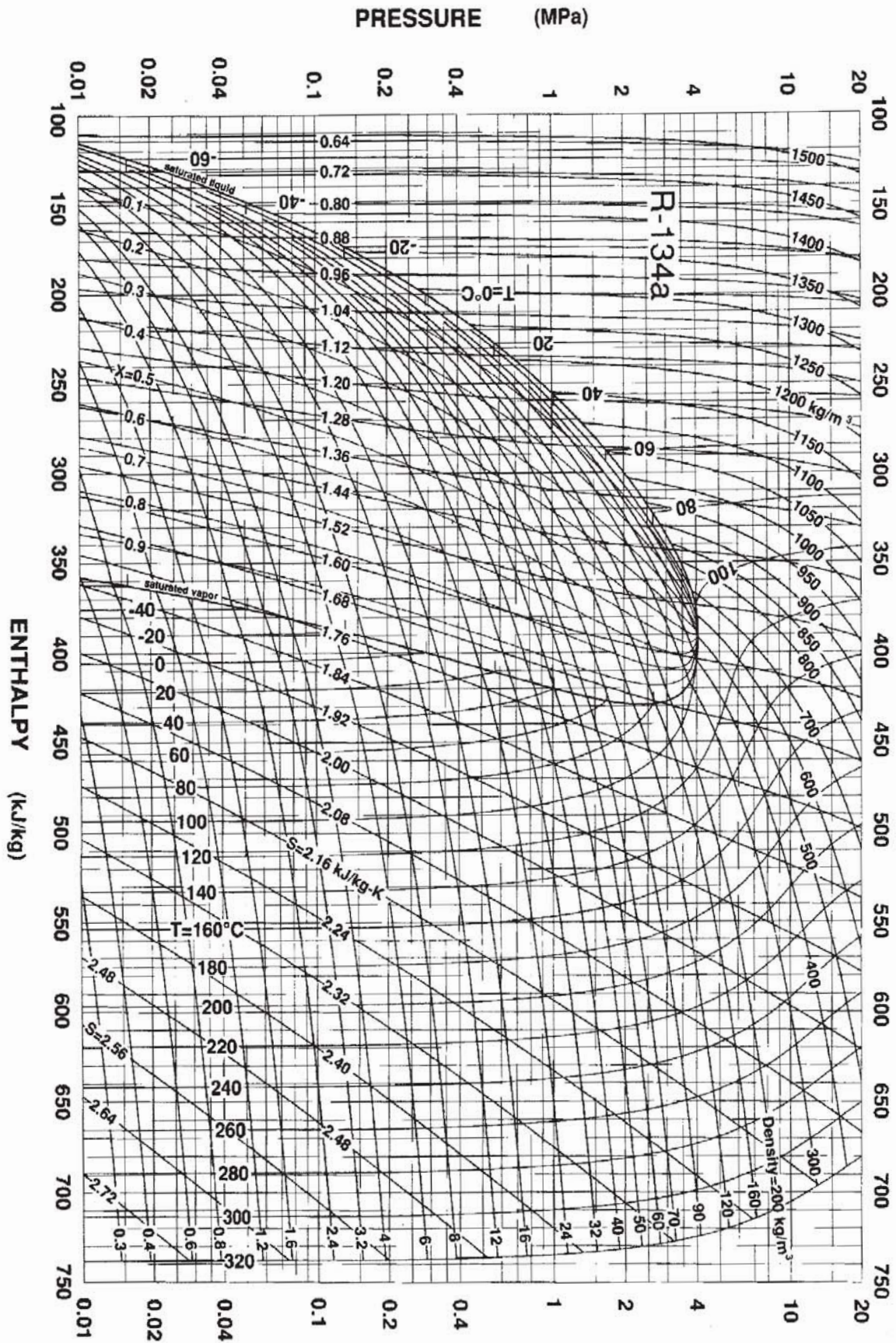


- Q10)a)** State the procedure for evaluating the performance of heat pump. [8]  
b) Explain the important features of air conditioning system for IT centers.[8]

- Q11)a)** What are the limitations of VCS for production of low temperature?  
What is FOM? [8]  
b) Explain the properties of cryogenics fluids in details. [8]

OR

- Q12)a)** Explain the system for production of liquid N<sub>2</sub>. [8]  
b) Write short note on : Insulating materials. [8]



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Total No. of Questions : 12]

SEAT No. :

**P2677**

**[5154]-47**

[Total No. of Pages : 4

**B.E. (Mechanical)**

**INDUSTRIAL HEAT TRANSFER EQUIPMENTS  
(2008 Course) (Elective - IV) (402050) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1) a)** Classify heat exchanger based on transfer processes and geometry of construction. **[6]**

- b) A 15°C of hot water temperature drop is allowed while heating cold water with a flowrate of 4500 kg/hr from 25°C to 40°C. Hot water inlet temperature is 135°C. A 3.5m double-pipe heat exchanger of 3 inch (ID = 0.0779m) by 2 inch (ID = 0.0525m, OD = 0.0603m) is used for this purpose. Hot water flows through the inner tube.

Assume that the pipe is made up of carbon steel ( $K = 54 \text{ W/mk}$ ). Neglect heat loss if any and Find: **[12]**

- i) The hydraulic diameter ( $D_h$ )
- ii) The equivalent diameter ( $D_e$ )
- iii) Heat Transfer coefficient in annulus ( $h_o$ )
- iv) Clean overall heat transfer coefficient ( $u_o$ )

for fully developed turbulent flow,  $pr > 0.5$

$$Nu_b = \frac{(f/2)Re_b Pr_b}{1 + 8.7(f/2)^{1/2} \cdot (Pr_b - 1)}$$
 where 'f' is flonenko friction factor given by

$$f = (1.58 \text{ Ln}(Re) - 3.28)^{-2}.$$

**P.T.O.**

Properties of water at 127.5°C:

$$\rho = 936.5 \text{ kg/m}^3, C_p = 4.266 \text{ kJ/kgK}, K = 0.687 \text{ W/mK}$$

$$\mu = 0.207 \times 10^{-3} \text{ Pa-S}, Pr = 1.343$$

at 32.5°C:

$$\rho = 997.5 \text{ kg/m}^3, C_p = 4.178 \text{ kJ/kgK}, K = 0.609 \text{ W/mK},$$

$$\mu = 0.841 \times 10^{-3} \text{ Pa-S}, Pr = 5.68$$

OR

- Q2)** a) Enumerate various criteria for selection of Heat exchanger. [6]
- b) What is fouling? How does it affect the performance of heat exchanger? Explain analytically. [4]
- c) Outline step-by-step procedure for thermal design of Double-pipe Heat Exchanger. [8]

- Q3)** a) What are the various leakage & bypass streams on the shellside. How do they affect the performance of STHE? [8]
- b) Explain stepwise the procedure of heat exchanger design using Bell-Delaware method. [8]

OR

- Q4)** a) Explain how a decision of allocating streams is made in STHE. [6]
- b) Crude oil at a flowrate of 63.77 kg/s enters the heat exchanger at 102°C and leaves at 65°C. The heat will be transferred to 45 kg/s of tube side water coming from the supply at 21°C. The exchanger data is given below. [10]

3/4" OD 18BWG tubes (OD = 0.0191m, ID = 0.01776m) on a 1 inch square pitch. Tube material is carbon steel (K = 43W/mK). The Heat exchanger has one shell of ID 0.889m. Baffle spacing is 275mm. No. of tubes is 845 with single pass calculate the length of heat exchanger for clean surfaces. The following properties are given.

	Shell side	Tube side
Specific heat (J/kgK)	2177	4186.8
Dynamic Viscosity (Ns/m <sup>2</sup> )	0.00189	0.00072
Thermal conductivity (w/mK)	0.122	0.605
Density (kg/m <sup>3</sup> )	786.4	995
Prandtl Number	33.73	6.29
Dynamic Viscosity of Shellside fluid at 59°C = 0.00196Ns/m <sup>2</sup>		

$$\frac{hoDe}{k} = 0.36 \left( \frac{DeGs}{\mu} \right)^{0.55} \left( \frac{\mu C_p}{k} \right)^{1/3} \left( \frac{\mu_b}{\mu_w} \right)^{0.14} \quad \text{for } 2 \times 10^3 < Re < 10^6.$$

Gnielinski's correlation for  $Re > 10^4$  is given by

$$Nu = \frac{(f/2)(Re-1000)pr}{1+12.7(f/2)^{1/2}(Pr^{2/3}-1)} \quad \text{and } f = (1.58 \ln Re - 3.28)^{-2}.$$

- Q5)** a) What are the characteristics of compact heat exchanger? [8]  
b) What are the salient features of plate fin Heat exchanger (PFHE). [8]

OR

- Q6)** a) What are different forms of individually finned tubes? [8]  
b) "Brazed Aluminium PFHE are an obvious choice for cryogenic applications"-Comment. [8]

### SECTION - II

- Q7)** a) What is the purpose of providing a vent on condensers? [4]  
b) Explain the types of baffles commonly used in shell and tube condensers. [6]  
c) Comment upon choice of vertical shell side condensers. [6]

OR

- Q8)** a) Write explanatory note on 'Reflux Condenser'. [6]  
b) Explain different considerations while designing/selecting a condenser. [10]



- Q9) a)** Explain salient features of hyperbolic cooling tower with the help of a neat diagram. [6]
- b) Warm water at 45°C enters a cooling tower @6kg/S. An ID fan draws 10m<sup>3</sup>/S of air through the tower and absorbs 4.9 kW. The air enters the tower at 20°C and 60% relative humidity and leaves saturated at 26°C. Calculate the final temperature of water and the amount of make-up water required per hour. State clearly the assumptions made. [12]

OR

- Q10)a)** What is meant by carry over loss? Explain different methods used to reduce the same. [6]
- b) Explain the following terms mentioning their significance w.r.t. cooling tower: [8]
- i) Approach
  - ii) Range
  - iii) Cooling duty
  - iv) Effectiveness
- c) Following observations are recorded on a cooling tower of an industrial site: cooling water flow = 5000m<sup>3</sup>/h water inlet temperature = 42°C, Water outlet temperature = 36°C, WBT = 29°C. What is the effectiveness of this cooling tower? [4]

- Q11)a)** With the help of a neat labelled diagram explain construction of a heat pipe heat exchanger. [8]
- b) Explain the common methods of condensate return in heat pipes [4]
- c) Suggest suitable method for cooling of PCB. [4]

OR

- Q12)a)** Enumerate the desired characteristics of working fluid for heat pipes.[6]
- b) Explain different configurations of heat sinks. [4]
- c) Describe any one application of heat pipe giving a neat sketch of proposed layout. [6]



Total No. of Questions : 12]

SEAT No. :

**P2678**

**[5154]-48**

[Total No. of Pages : 3

**B.E. (Mechanical)**

**MANAGEMENT INFORMATION SYSTEM**

**(2008 Pattern) (Semester - II) (402050B) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*

**SECTION - I**

- Q1)** a) Explain MIS with Organizational Structure. Explain how MIS supports the management. [8]
- b) What is the essentiality of strategic planning? How information can be a Strategic resource? [8]

OR

- Q2)** a) Explain Operation Support system and management support system in details. [8]
- b) Explain the role of MIS in a Business Enterprise. [8]
- Q3)** a) What is Decision? Explain role of MIS in decision making. [8]
- b) Explain Distributed data management system in details. [8]

OR

- Q4)** a) What is expert system in MIS? Write a note on charting tools and data flow diagrams. [8]
- b) Explain spiral SDLC model. [8]

*P.T.O.*

- Q5)** a) Draw a E-R diagram for an Airline Co. Consider the following entities and their attributes. [6]
- i) Pilot
  - ii) Airline
  - iii) Aircraft
  - iv) Employee
- b) What is the difference between data mining and data warehousing. [6]
- c) Explain ESS with architecture. [6]

OR

- Q6)** a) What are the components of DBMS? Explain file model of Database. [6]
- b) Explain Behavioral, Administrative model in Decision making models. [6]
- c) Explain DFD for on line examination system of engineering students. [6]

**SECTION - II**

- Q7)** a) Write a short note on object oriented system development. [4]
- b) Explain Capability Maturity model in details. [10]
- c) What are modern software design techniques? [2]

OR

- Q8)** a) What is software matrix? Explain software models in short. [4]
- b) What is software performance system? Explain software matrix and models. [10]
- c) What is software verification? [2]

- Q9)** a) Describe software testing tools, approaches and software reliability. [8]
- b) Write a short note on: [8]
- i) Errors in software testing.
  - ii) Security issues in software.

OR



- Q10)** a) Compare Black box testing and white box testing. [8]  
b) Write a short note on software reliability and maintenance. [8]

- Q11)** a) Explain MIS with supply chain management and marketing management. [10]  
b) Write applications of MIS in manufacturing management. [8]

OR

- Q12)** Write short note on: [18]  
a) MIS in Hr management.  
b) E-Enterprise management.  
c) MIS in SCM.



Total No. of Questions : 12]

SEAT No. :

**P2679**

**[5154]-49**

[Total No. of Pages : 5

**B.E. (Mechanical)**

**RELIABILITY ENGINEERING**

**(2008 Course) (Semester - II) (Elective - IV) (402050C)**

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

**SECTION - I**

**Q1) a)** What is Reliability? Explain different reliability measures. How to select particular reliability measure? **[8]**

b) Following table shows the results of life test carried out on 200 components simultaneously for 100 Hrs. **[10]**

Operating time [Hrs.]	0	10	20	30	40	50	60	70	80	90	100
No. of surviving components	200	180	160	145	130	110	98	80	76	68	50

Evaluate Hazard rate, failure density & Reliability. Plot these functions against time.

OR

**Q2) a)** Explain maintainability with practical applications. **[8]**

b) The random variation with respect to time in the O/P voltage of systems are exponentially distributed with mean value of 150V. What is the probability that the O/P voltage will be found at any time to lie in the range of 140-160V. **[10]**

**P.T.O.**

**Q3) a)** Explain total probability theorem with suitable example. Explain any one distribution used in probability theory. [8]

**b)** Fig. No. 1 shows a reliability block dig. for the system.  $R(1) = 0.90$ ,  $R(2) = 0.94$ ,  $R(3) = 0.88$ ,  $R(4) = 0.80$ ,  $R(5) = 0.90$ . Find the system reliability using conditional probability method. [8]

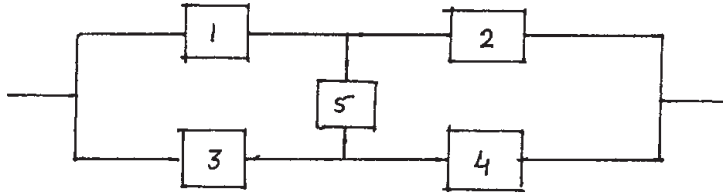


Fig. No. 1

OR

**Q4) a)** Explain system Redundancy. [8]

**b)** Evaluate the reliability of the system as shown in Fig. No. 2 using Tie-set & cut set method.

Reliability of each component  $R(A) = R(B) = R(C) = R(D) = 0.98$ . [8]

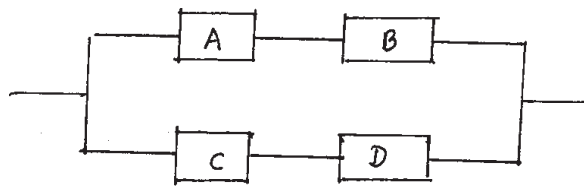


Fig. No. 2

**Q5) a)** Describe some methods of enhancing the reliability of a multicomponent system. [8]

**b)** A system is composed of Five subsystem with details as indicated in the following table: [8]

Sub system	No. of Components	Operating period [Hrs.]	Probability of system failure due to failure of subsystem
1	5	10	0.15
2	2	25	0.10
3	8	05	0.20
4	6	20	0.05
5	4	18	0.25

Determine the mean lives of the component of various subsystems so as to have a system reliability of 0.99 using AGREE method.

OR

- Q6)** a) Explain in detail Reliability Apportionment technique. [8]  
 b) Explain with practical example reliability predictions from predicted unreliability. [8]

**SECTION - II**

- Q7)** a) Define the terms reliability, availability and maintainability. What is the difference between Inherent availability and operational availability? [8]  
 b) The following data relates to a plant on predictive preventive maintenance.  
 Mean time between failure = 28 hours.

Mean time to repair = 12 hours

Calculate :

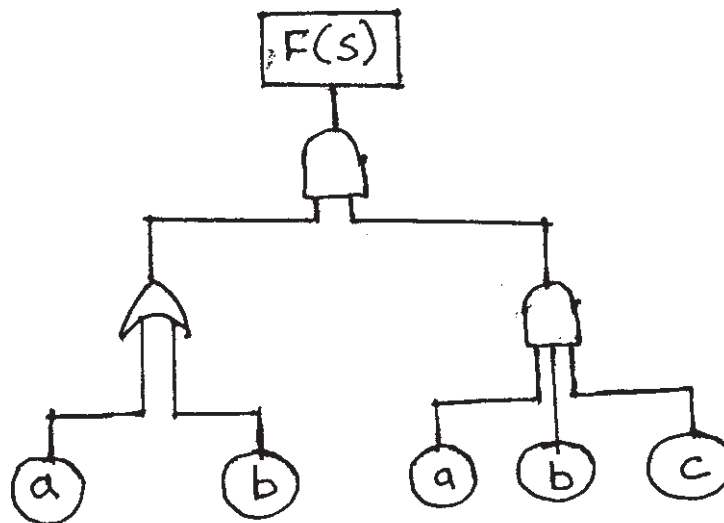
- i) Operational availability and  
 ii) Inherent availability of the plant

Assuming administrative logistics times add upto 60% of the mean time to repair. [8]

OR

- Q8)** a) What is meant by reliability centred maintenance? [8]  
 b) A component has to be so designed, that it has to have a reliability value of 0.95 for an operation of 800 hrs. The availability value over the same period of time is required to be 0.98. Assuming constant hazard for failure and repairs estimate the time to failure and mean repairs time. [8]

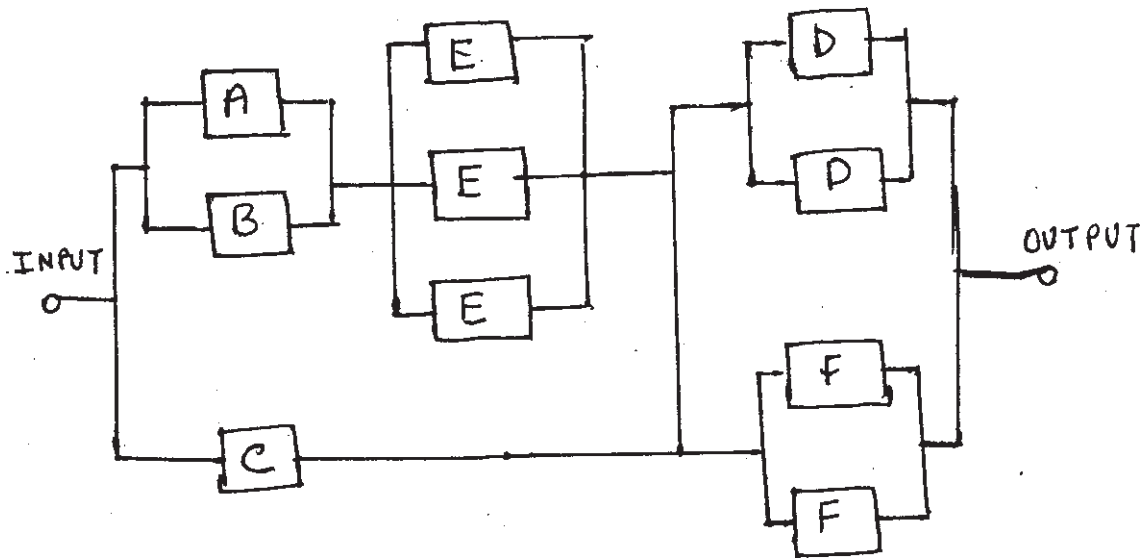
- Q9)** a) Figure shows a fault tree diagram. The failure rate of each basic element is given as  $\lambda(a) = 0.025$ ,  $\lambda(b) = 0.01$  and  $\lambda(c) = 0.005$ . Find out the failure rate of the system. [8]



- b) Explain the methodology of constructing fault tree diagram as a part of F.M.E.A. and F.M.E.C.A. Write down the specific advantages and field of applicability of F.M.E.A. and F.M.E.C.A. [8]

OR

- Q10)a) What is 'Risk Priority Number' and how it can be determined? [6]
- b) Construct a fault tree for the system shown in Figure. If all the elements are having failure probability of 0.1, Calculate system failure using fault tree analysis. [10]



- Q11)a) Define safety margin, arising out of load-strength interaction and discuss its significance on the assessment of design reliability. [8]
- b) The mean strength and standard deviation of a bolted joint are 3000 kgf/cm<sup>2</sup> and 300 Kgf/cm<sup>2</sup> respectively. The joint is loaded such that stress induced has a mean value of 2500 kgf/cm<sup>2</sup> with standard deviation of 50 kgf/cm<sup>2</sup>. Assuming that shear strength and the induced stresses are independent and normally distributed, find out the probability of survival of bolted joint. Statistical data given below: [10]

Z	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Q(Z)	0.8849	0.9032	0.9192	0.9331	0.9452	0.9550	0.9640

OR

**Q12)a)** Explain how markov models are applied in reliability analysis of a system having constant hazard rate? **[8]**

b) From the following data, find the reliability based on: **[10]**

i) Mean ranking

ii) Median ranking methods.

Plot the two curves and comment on deviation if any

Failure No.	1	2	3	4	5	6	7	8	9
MTTF (hrs)	24	22	12	28	35	38	30	19	25



Total No. of Questions : 12]

SEAT No. :

**P2680**

**[5154]-50**

[Total No. of Pages : 3

**B.E. (Mechanical)**

**CRYOGENIC ENGINEERING**

**(2008 Course) (Semester - II) (402050DA) (Open Elective)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Explain the working and thermodynamic analysis of Linde system with the help of neat diagram and develop the expression for liquid yield. **[10]**
- b) Explain, briefly the variation of thermal properties of solids in cryogenic range of temperature. **[6]**

OR

- Q2)** Write Short Notes on: **[16]**
- a) Meissner Effect.
  - b) Collins Heat Exchanger.
  - c) Vacuum shielded vessels.
  - d) Kapitza System.

- Q3)** a) State the different landmarks in the history of Cryogenics since its inception. **[4]**
- b) Explain the concept of Superconductivity observed at Cryogenic temperature. **[6]**
- c) State with neat sketch Super-fluidity phenomena observed in case of liquid Helium. **[6]**

OR

**P.T.O.**

- Q4)** a) What are the system performance parameters in liquefaction systems. [6]  
b) Explain the Simple Linde Hampson system. [6]  
c) Explain effect of Cryogenic temperature on thermal properties of gases in detail. [4]

- Q5)** a) Determine the ideal work requirement for the liquefaction of nitrogen beginning at 101.3 kPa and 300K. From the T-s chart of nitrogen, following property values are given: [10]

$$h_1 = 46.2 \text{ J/g at 101.3 kPa and 300K}$$

$$h_f = 29 \text{ J/g at 101.3 kPa and Sat. Liquid,}$$

$$s_1 = 4.42 \text{ J/g K at 101.3 kPa and 300K}$$

$$s_f = 0.42 \text{ J/g K at 101.3 kPa and Sat. Liquid.}$$

Derive the expression you use.

- b) Represent Stirling Cycle on P-V and T-s diagram. Develop an expression for C.O.P. of the Stirling Cycle. When used as a liquefier. What is its efficiency? [8]

OR

- Q6)** a) Explain the working of Gifford McMahon Cryorefrigerator with neat diagram. [8]  
b) Explain the difference between high performance vessels and low performance vessels, with a neat sketch. Explain the features of a typical cryogenic storage vessel. Outline the design procedure of outer and inner vessel and support systems. [10]

### SECTION - II

- Q7)** a) Name and explain the instruments used for measuring strain in cryogenic temperature range. Also discuss the effect of low temperature on strain measurements. [8]  
b) Discuss: [8]  
i) Cryogenic fluid Storage vessel piping arrangements.  
ii) Methods of draining the vessels.

OR



- Q8)** a) Discuss the statements: [10]
- i) One of the most critical components in any liquefaction system is the heat exchanger - Why?
  - ii) Heat exchanger effectiveness should be always more than 0.869 why? Explain.
- b) Explain in detail, what is meant by J-T effect and Inversion Curve. [6]

- Q9)** a) Explain, briefly the variation of thermal properties of solids in cryogenic range of temperature. [8]
- b) Explain in detail, what is meant by J-T effect and Inversion Curve. [8]

OR

- Q10)**a) Explain different present day applications in the field of Cryogenics.[8]
- b) Explain the cryogenics principle used in recycling of automobiles tyres. [8]

- Q11)**Discuss the problems and scope of cryogenic instrumentation. Explain with neat sketches the instruments used for cryogenic measurements of [18]
- a) Strain,
  - b) Flow
  - c) Liquid level
  - d) Temperature.

OR

- Q12)**a) Explain with neat sketches the working of different compressors and expanders used in cryogenic practice. [12]
- b) Discuss the effect of compressor and expander efficiency on system performance. [6]



Total No. of Questions : 12]

SEAT No. :

**P2681**

[Total No. of Pages :2

[5154]-52

**B.E. (Mechanical)**

**INDUSTRIAL AUTOMATION**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 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) Explain pressure converter & TRANSMITTER. [8]  
b) Explain primary and secondary transducer. [8]

OR

- Q2)** a) Explain FMS in detail. [8]  
b) Explain Transducer with temperature measurment. [8]

- Q3)** a) Explain Dynamic characteristics of Mechanics in Industrial Automation. [8]  
b) Explain PLC Diagram for Industrial Application. [8]

OR

- Q4)** a) Draw ladder diagram with Ex-on, Ex-off and PLC output symbol. [8]  
b) Discuss in brief DCS. [8]

- Q5)** a) Discuss in brief advantages of CNC machines used in FMS. [8]  
b) Write note on FMS. [10]

OR

- Q6)** a) Discuss the role of SCADA in Industrial automation. [8]  
b) Explain Direct numerical control. [10]

*P.T.O.*

## SECTION-II

- Q7)** a) Explain in brief features & Configuration of HMI. [8]  
b) Discuss the role of SCADA in Industrial Automation. [8]

OR

- Q8)** a) Explain in brief stepper motor used in control element in automation. [8]  
b) Explain selection criterions of BLDC used as prime mover in speed control application. [8]

- Q9)** a) Explain stepper motor applications in Industrial Automation. [8]  
b) Explain role of HMI used in PLC. [8]

OR

- Q10)**a) Explain Automation in welding. [8]  
b) Discuss use of automation with respect to elevator such as used in material handling equipment. [8]

- Q11)**a) Write a note on Remote centre of compliance. [8]  
b) Explain automation in hydraulic press. [10]

OR

- Q12)**a) Explain Hydraulic CKT used in Industrial Automation. [10]  
b) Explain DNC. [8]

☆ ☆ ☆

Total No. of Questions : 12]

SEAT No. :

**P2682**

[5154]-54

[Total No. of Pages :4

**B.E. (Mechanical Sandwich)  
MACHINE & COMPUTERAIDED DESIGN  
(2008 Course) (Semester-I) (Part-I)**

*Time : 4 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data; if necessary.*

**SECTION-I**

- Q1)** a) Derive the expression of beam strength of straight bevel gear tooth. How is the wear strength expression modified for straight bevel gear. [8]
- b) For a spur gear, a Pinion having 21 teeth meshes with 60 teeth gear. 7.35 KW motor at 1140 rpm to pinion. Application factor 1.25 & load concentration factor 1.2. Gear pair of 55C8 of  $S_{ut} = 720\text{Mpa}$ , module 3mm while the face width is 35 mm. The pinion and gear material has surface hardness of 300 BHN. Assume dynamic load accounted by Barth's factor Calculate.
- i) Factor of Safety against bending failure.
  - ii) Factor of Safety against pitting. [8]

OR

- Q2)** a) Derive expression for Efficiency of worm & worm gear Drive. [4]
- b) A pair of worm gear designated as 2/52/10/4 transmits 10 KW power from worm shaft rotating at 720 rpm to the worm gear shaft. The coefficient of friction is 0.04 and pressure angle is  $20^\circ$ . Assume worm is placed above the worm gear and rotates clockwise direction when viewed from left. If worm is left hand determine:
- i) The components of tooth force acting on worm and worm gear and.
  - ii) The efficiency of worm gear. [12]

*P.T.O.*

- Q3) a)** What are the methods of Pre-stressing of thick cylinder? Explain any one. [6]
- b) An air receiver consists of a cylindrical shell of an internal diameter 500mm and length 1000mm, closed by hemispherical heads. The air pressure inside the vessel is limited to 40 bar. Allowable tensile stress is 80 N/mm<sup>2</sup>, determine. The efficiencies of the welded joint for the shell and ends are 90% and 80% respectively. Determine. [12]
- i) The thickness of the vessel shell;
  - ii) The thickness of the hemispherical head;
  - iii) The storage capacity of the vessel.

OR

- Q4) a)** Explain the various categories of the welded joints used in unfired pressure vessel. [6]
- b) A hydraulic cylinder made of gray cast iron FG300 is subjected to internal pressure 15 MPa. If the inner and outer diameter of cylinder are 200mm and 240mm respectively. Determine factor of safety. If the cylinder pressure is further increased by 50%, what will be the factor of safety. [12]
- Q5) a)** Explain the basic principle of DFME. [4]
- b) Cantilever beam is made of plain carbon steel 25C8 having the mean yield strength of 280 N/mm<sup>2</sup> and a standard deviation of 40 N/mm<sup>2</sup>. It is subjected to a bending stress with a mean of 180N/mm<sup>2</sup> and standard deviation of 20N/mm<sup>2</sup> determine:
- i) The reliability of the beam;
  - ii) The minimum factor of safety available; and
  - iii) The average factor safety available.

From the table for the areas below the standard normal distribution take:

$$A1 = 0.4875 \text{ and } A2 = 0.5 \quad [12]$$

OR

- Q6) a)** Enumerate and explain the role of different aspects in the aesthetic and ergonomics design principle. [8]
- b) Explain factors to be considered while designing the component for forging. [8]

## SECTION-II

- Q7) a)** Enumerate and explain the objectives of Material Handling system. [6]  
**b)** A belt conveyor is to be design to carry the bulk material at the rate.  
 $300 \times 10^3$  kg/hr with following details:

Bulk density of material	=800 kg/ m <sup>3</sup>
Angle of response of bulk material	=15°
Belt speed	=10 km/hr
Material factor for plies, $k_1$	=2.0
Belt tension and arc of contact factor, $k_2$	=63
No. Of plies for the belt	=4

Determine:

- i) The suitable width of the length
- ii) Diameter of the drive pulley.
- iii) Length of the drive pulley. [12]

OR

- Q8) a)** What is adequate design and optimum design? Explain with the suitable example. [6]  
**b)** A simple tensile bar of length 200 mm is subjected to a constant tensile force of 5000N. If the factor of safety is 3, design the bar with the objective of minimizing the material cost, out of the following materials:

Material	Mass density , kg/m <sup>3</sup>	Material cost per unit mass c, Rs./kg	Yield strength $S_{yt}$ , N/mm <sup>2</sup>
Steel	7800	28	400
Aluminium Alloy	2800	132	150
Titanium Alloy	4500	2200	800
Magnesium Alloy	1800	150	100

[12]

- Q9) a)** A beam of length 10 m, fixed at one end and supported by a roller at the other end carries a 20KN concentrated load at the centre of the span. By taking the modulus of elasticity of material as 200 GPa and moment of inertia as  $24 \times 10^{-6}$ m<sup>4</sup>, determine:
- i) Deflection under load.
  - ii) Shear force and bending moment at mid span.
  - iii) Reactions at supports. [8]
- b)** Explain the concept of Plane Stress and plane Strain in Finite Element method. [8]

OR  
3

- Q10)a)** Given the truss structure shown in figure 1, calculate the stress and strain in truss element 1 if:  $A_1 = 0.0004 \text{ m}^2$ ,  $E_1 = 200 \times 10^9 \text{ Pa}$ ,  $L_1 = 2 \text{ m}$ .

$$D = \begin{Bmatrix} u_1 \\ v_1 \\ u_2 \\ v_2 \\ u_3 \\ v_3 \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ -1 \times 10^{-3} \\ -2 \times 10^{-3} \end{Bmatrix}$$

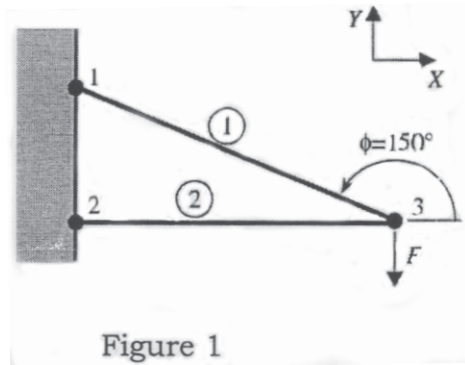


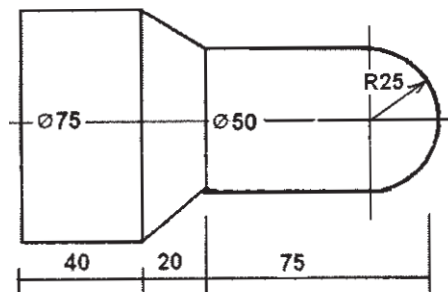
Figure 1

[8]

- 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 of the natural coordinates and the shape function at point P (77, 96) within the element. [8]

- Q11)a)** State the comparison between NC and CNC machines. [6]

- b) Write a CNC part program to turn a MS bar of size and shape as shown in following figure 2. Use canned cycles only for both rough turning and finish cut.



**All dimensions are in mm**

Figure 1

Assume feed rate,  $F = 0.5 \text{ mm/rev}$ . and spindle speed,  $S = 200 \text{ RPM}$ . [10]

OR

- Q12)a)** Explain 2, 2 ½ and 3 axes CNC machines with neat sketch. [6]  
 b) Discuss the significance of Flexibility in Automation system. [4]  
 c) Explain FMS. Describe the various layouts used in FMS. [6]



Total No. of Questions : 12]

SEAT No. :

**P2683**

**[5154]-56**

[Total No. of Pages : 2

**B.E. (Mechanical - SW)**

**INDUSTRIAL HYDRAULICS & PNEUMATICS**

**(2008 Pattern) (Semester - I) (402062)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to candidates:*

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

**SECTION - I**

**Q1) a)** What are the applications of fluid power system. **[8]**

b) Compare Hydraulic and Pneumatic system. **[8]**

OR

**Q2) a)** Classify hydraulic oils in details. **[8]**

b) Write a short note on types of Seals. **[8]**

**Q3) a)** Classify hydraulic pump in details. **[8]**

b) Explain with neat sketch working of external gear pump. **[8]**

OR

**Q4) a)** Explain with neat sketch reservoir assembly. **[8]**

b) Write a short notes on pipings & fittings. **[8]**

**Q5) a)** Classify pressure control valves in details. **[8]**

b) Write a short note on types of direction control valve. **[10]**

OR

**Q6) a)** Explain with neat sketch working of spring loaded accumulator. **[8]**

b) Write a short notes on types of pressure intensifier. **[10]**

**P.T.O.**



## SECTION - II

- Q7)** a) Write a short note on “Hydraulic motors”. [8]  
b) Write a short note on “Types of cylinder Mountings”. [8]

OR

- Q8)** a) Explain with neat sketch “Sequencing circuit”. [8]  
b) Explain with neat sketch “Motor Breaking circuit”. [8]

- Q9)** a) Write a short note on “Selection of compressors”? [6]  
b) Write a short note on “Types of Filters and Lubricators for Pneumatic systems”. [10]

OR

- Q10)**a) Explain with neat sketch “Pneumatic clamp circuit”. [8]  
b) Write a short note on “Applications of Pneumatics for Low cost Automation”. [8]

- Q11)**a) What are the factors considered for Designing of “Hydraulic systems”? [9]  
b) Write a short note on “Trouble shooting & Maintenance for Hydraulic systems”. [9]

OR

- Q12)**a) What are the Factors considered for Designing of “Pneumatic systems”. [9]  
b) Write a short note on “Trouble shooting & maintenance Procedures for “Pneumatic systems”. [9]



Total No. of Questions : 12]

SEAT No. :

**P2684**

**[5154]-57**

[Total No. of Pages : 5

**B.E. (Mechanical S/W) (Part - I)**

**REFRIGERATION AND AIR CONDITIONING**

**(2008 Course) (Semester - I) (402063 - A) (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 diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicates full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, Electronic pocket calculator, 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  $-6^{\circ}\text{C}$  and  $25^{\circ}\text{C}$ . Determine the mass of ice produced per day from water at  $25^{\circ}\text{C}$ . 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]**

**UNIT - II**

- Q3) a)** What are the essential properties of good refrigerants? How the refrigerants are classified? **[6]**
- b) Explain the terms: **[6]**
- i) ODP;
  - ii) GWP;
  - iii) TEWI
- c) Write a note on alternative refrigerants. **[6]**

OR

**P.T.O.**

- 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  $-60^{\circ}\text{C}$  and a condenser temperature of  $25^{\circ}\text{C}$ . The load at  $-60^{\circ}\text{C}$  is absorbed by a unit using R22 as the refrigerant and is rejected to a cascade condenser at  $-20^{\circ}\text{C}$ . The cascade condenser is cooled by a unit R12 as the refrigerant and operating between  $-30^{\circ}\text{C}$  evaporating temperature and  $25^{\circ}\text{C}$  condenser temperature. The refrigerant leaving the R12 condenser is subcooled to  $20^{\circ}\text{C}$ , 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: [8]
- i) Compression ratio for each unit,
  - ii) Quantity of refrigerant circulated per minute for each unit,
  - iii) COP of each unit,
  - iv) COP of the whole unit and
  - v) Theoretical power required to run the system

Properties for R12 and R22 are as follows:

Refrigerant	R12
At evaporator temperature ( $-30^{\circ}\text{C}$ )	
Pressure at compressor inlet	$p_5 = 1.044 \text{ bar}$
Enthalpy at compressor inlet	$h_5 = 174.2 \text{ kJ/kg}$
Entropy at compressor inlet	$s_5 = 0.7171 \text{ kJ/kg K}$

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]**

i) Absorber;

ii) Rectifier;

iii) Analyzer;

iv) Heat Exchangers

## SECTION - II

### UNIT - IV

- Q7)** a) Explain the following with hand drawn psychrometric chart. [8]
- i) ADP;
  - ii) RSHF;
  - iii) GSHF;
  - iv) 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:
- i) DPT;
  - ii) Relative humidity;
  - iii) Specific humidity;
  - iv) Degree of saturation;
  - v) Vapour density;
  - vi) 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 CA MA storages. [4]
- c) Write in short about Transport and Marine refrigeration. [6]

OR

- Q12)a)** What is Cryogenics? What are the limitations of VCRS 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]

x x x

Total No. of Questions : 12]

SEAT No. :

P2685

[5154]-59

[Total No. of Pages : 4

**B.E. (Mechanical Sandwich)  
FINITE ELEMENT METHOD**

**(2008 Course) (402063 - C) (Semester - I) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**UNIT - I**

- Q1)** a) Define the term FEM. Explain the applications of FEM in various field. [8]  
b) What are the shape functions? Derive the shapes functions for a linear spring element of length L. Use direct equilibrium approach. [8]

OR

- Q2)** a) Write short note on (Any 2) [8]  
i) Rayleigh - Ritz Method  
ii) Galerkin method  
iii) Finite Difference Method  
b) A system of spring as shown in fig 2b. Using Finite element method, determine [8]  
i) The Stiffness matrix of each element  
ii) The Global stiffness matrix  
iii) The Deflection at nodal points  
iv) The reaction force at support.

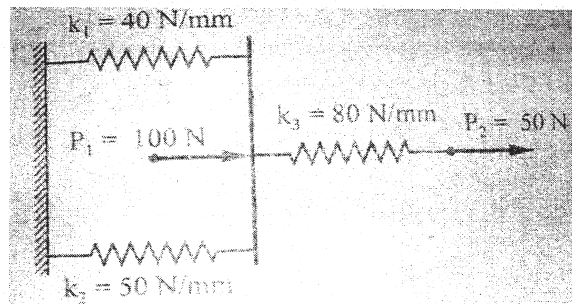


Fig. 2b

**P.T.O.**

## UNIT - II

- Q3)** a) Write short notes on elimination approach and penalty approach. [8]  
 b) An axial load  $P = 200 \times 10^3 \text{ N}$  is applied on a bar as shown. Using the penalty approach for handling boundary conditions, determine [10]
- i) Elemental stiffness matrix
  - ii) Global stiffness matrix
  - iii) Nodal Displacements
  - iv) Stresses in each element
  - v) Reaction forces

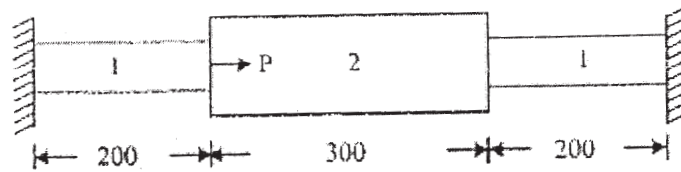


Fig. 3b

$$A_1 = 2400 \text{ mm}^2 ; E_1 = 70 \times 10^9 \text{ N/m}^2$$

$$A_2 = 600 \text{ mm}^2 ; E_2 = 200 \times 10^9 \text{ N/m}^2$$

OR

- Q4)** a) The two bar truss made of steel ( $E = 200 \text{ GPa}$ ) is as shown in the fig. 4a. Using finite element method, determine [10]
- i) Stiffness matrix for each element
  - ii) Global stiffness matrix
  - iii) Nodal displacement
  - iv) Stresses in each element
  - v) The reaction forces at the support

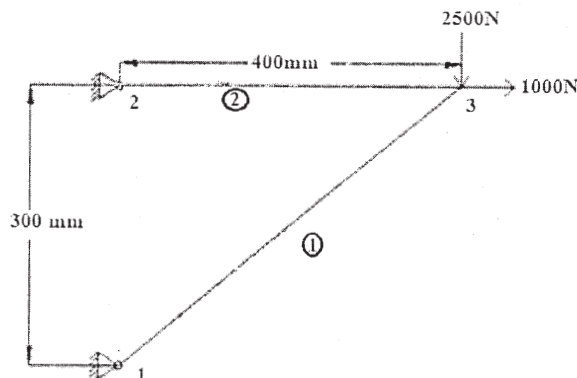


Fig. 4a

$$A_1 = 250 \text{ mm}^2 \quad A_2 = 200 \text{ mm}^2$$

- b) Derive an expression for elemental stiffness matrix for truss element. [8]



### UNIT - III

- Q5)** a) What is an isoparametric Representation. Explain mapping of Cartesian to natural coordinates. [8]
- b) Explain Following terms. [8]
- Constant Strain Triangle (CST)
  - Linear Strain Triangle (LST)

OR

- Q6)** a) Explain the concept of Plane stress and Plane strain in finite element Method with suitable examples. [8]
- b) In a CST element, the node 1,2 and 3 have the Cartesian coordinates (0,0), (20,0) and (10,10) respectively. The temperatures, in degree Celsius, at nodes 1,2 and 3 are 48, 84 and 126 respectively. For a point P (10,5) within the element, determine: [8]
- The natural coordinates
  - Shape functions
  - Temperature

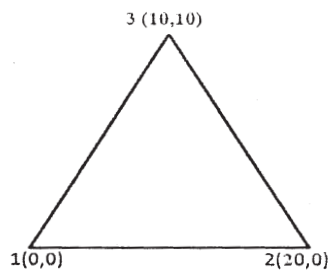


Fig. 6b

### SECTION - II

### UNIT - IV

- Q7)** a) For the beam shown in figure 7a, determine the displacements and the slopes at element nodes. Also find the reactions and moments at elemental nodes. The modulus of Elasticity is  $E = 20 \times 10^6 \text{ N/mm}^2$ . The cross section is as shown in fig. [10]

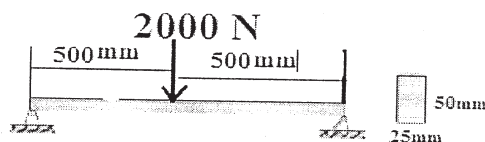


Fig. 7a

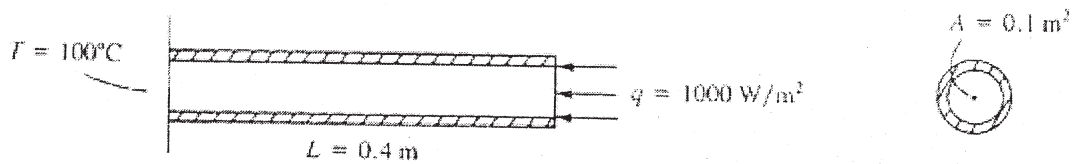
- b) Explain potential energy approach to derive beam element equations. [6]

OR

- Q8)** a) Derive stiffness matrix of plane frame element. [10]  
 b) Explain Hermite shape functions of beam element. [6]

**UNIT - V**

- Q9)** The fin shown in Figure 9a is insulated on the perimeter. The left end has a constant temperature of  $100^{\circ}\text{C}$ . A positive heat flux of  $q = 1000 \text{ W/m}^2$  acts on the right end. Let  $K_{xx} = 6 \text{ W/(m}^{\circ}\text{C)}$  and cross-sectional area  $A = 0.1 \text{ m}^2$ . Determine the temperatures at  $L/4$ ,  $L/2$ ,  $3L/4$ , and  $L$ , where  $L = 0.4 \text{ m}$ . [16]



OR

- Q10)** a) Formulate the two dimensional Heat transfer equations. [10]  
 b) Write short notes on boundary conditions that prevail in 1D steady state heat conduction. [6]

**UNIT - VI**

- Q11)** a) What is NVH analysis? State the advantages of NVH analysis. [10]  
 b) Explain crash analysis. What is the necessity of crash analysis? [8]

OR

- Q12)** Write short note on (Any Three) [18]  
 a) Commercial FEA software.  
 b) Fatigue analysis.  
 c) Quality checks in meshing.  
 d) Modal Analysis.

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2686**

**[5154]-60**

[Total No. of Pages : 3

**B.E. (Mechanical Sandwich)  
AUTOMOBILE ENGINEERING  
(2008 Course) (Semester - I) (402064A) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Discuss vehicle layouts and list one example of each. **[8]**  
b) What are the various resistances to motion of vehicle? how does these resistances affect power required by vehicle? **[8]**

OR

- Q2)** a) Discuss constructional details of Automotive chassis system. **[8]**  
b) Explain with sketch the following layouts and also include advantages and disadvantages. **[8]**  
i) Four wheel Drive.  
ii) Rear Engine and Rear wheel Drive.

- Q3)** a) What is the purpose of clutch plate? Explain with sketch kinds of clutch plates used in automobile. Explain function of various components of it. **[8]**  
b) Compare Synchromesh gear box with Constant mesh gear box. Explain the purpose of Synchronizer in a gear box. **[8]**

OR

**P.T.O.**

- Q4)** a) Explain with neat sketch: [8]  
i) Semi floating rear axle.  
ii) Full floating rear axle.  
b) Write note following: [8]  
i) Semiautomatic gearbox  
ii) Torque Convertor

- Q5)** a) Draw a schematic diagram showing leaf spring, coil & torsion bar spring in suspension system and explain its working with advantages and disadvantages. [10]  
b) What are different factors contributing to A.C. load on engine performance in Cars? [8]

OR

- Q6)** a) What do you understand from terms: Center point steering, Cornering Force Slip Angle and Scrub Radius? [8]  
b) Classify Brakes and Discuss operation of any one type of Brake. [10]

### **SECTION - II**

- Q7)** a) Explain servicing of auxiliary systems in view of vehicle maintenance. [8]  
b) List out common steering troubles, their possible causes and remedies. [8]

OR

- Q8)** a) How vehicle tyres can be maintained, serviced and reconditioned. [8]  
b) List out common suspension troubles, their possible causes and remedies. [8]

- Q9)** a) Justify importance of ergonomics in automotive safety. [8]  
b) Enlist all kinds of lighting systems in vehicle with their necessity in vehicle. [10]

OR

- Q10)a)** What is Adaptive Front Lighting System (AFLS)? Explain its necessity and working. [8]
- b) Sketch various types of body structures used in automobiles. Describe importance of vehicle structure regards to crashworthiness of it. [10]

- Q11)a)** Explain various microprocessor applications in today's automobile. [8]
- b) Explain with the help of block diagram the electronic engine control system used in automobile. [8]

OR

- Q12)a)** Explain in detail electronic antilock braking system. [8]
- b) Write short note on the following (any two): [8]
- i) Warning Devices.
  - ii) Stepper motor - relays.
  - iii) Digital Cruise Control.
  - iv) Digital Engine Control System.



Total No. of Questions : 12]

SEAT No. :

P2687

[5154]-61

[Total No. of Pages : 5

B.E. (Mechanical S/W)

OPERATIONS RESEARCH (BOS)

(2008 Pattern) (Theory) (Elective - III) (Semester - I) (402064 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 answer books.
- 3) Neat diagrams must be drawn whenever necessary.
- 4) Figures to the right indicate full marks.
- 5) Use of non programmable calculator is allowed.
- 6) Assume suitable data if necessary.

**SECTION - I**

**Q1)** a) Define OR and explain its scope. [6]

b) Solve following LPP Problem with Simplex Method. [12]

$$\text{Maximize } Z = 4x_1 + 3x_2 + 6x_3$$

$$\text{Subjected to } 2x_1 + 3x_2 + 2x_3 \leq 440$$

$$4x_1 + 3x_3 \leq 470$$

$$2x_1 + 5x_2 \leq 430$$

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

OR

**Q2)** a) Sketch special cases in graphical solution of LPP. [4]

b) Solve following problem by Big M method. [14]

$$\text{Minimize } Z = 5x_1 + 3x_2$$

$$\text{Subjected to } 2x_1 + 4x_2 \leq 12$$

$$2x_1 + 2x_2 = 10$$

$$5x_1 + 2x_2 \geq 10$$

$$x_1, x_2 \geq 0$$

**P.T.O.**

- Q3) a)** Explain Hungarian method of solving assignment problem. [6]
- b) Five different machines can do any of five required components with different machining time resulting from each assignment as shown in table below. Find out minimum machining time possible through optimum assignment. [10]

		Machine				
		1	2	3	4	5
Component	A	160	130	175	190	200
	B	135	120	130	160	175
	C	140	110	155	170	185
	D	50	50	80	80	110
	E	55	35	70	80	105

OR

- Q4) a)** Explain North West Corner method of allocation for transportation problem. [4]
- b) A company has factories at F1, F2 and F3 that supply products to warehouses at W1, W2 and W3. The weekly production of factories is 200, 160 and 90 units respectively and the weekly demand of warehouses is 180, 120 and 150 units respectively. The unit shipping costs in rupees is below. Justify your answer by  $u_i, v_j$  (MODI) Method. [12]

	W1	W2	W3
F1	16	20	12
F2	14	8	18
F3	26	24	16

- Q5) a)** A company uses Rs. 10,000 worth of an item during the year. The ordering cost are Rs. 25 per order and carrying cost are 12.5% of the average inventory value. Find the economic order quantity in Rs., Number of orders, time period per order, and the total cost. [8]

- b) In a factory, there are six jobs to perform, each of which should go through two machines A and B in order AB. The processing timings in hours for the jobs are given here. You are required to determine the sequence for performing the jobs that would minimize the total elapsed time. Find value of minimum elapsed time and idle time for each. [8]

Job	1	2	3	4	5	6
Machine A	7	4	2	5	9	8
Machine B	3	8	6	6	4	1

OR

- Q6) a) A particular item has a demand of 9000 units per year. The ordering cost is Rs. 100/order, holding cost is Rs. 2.4 per unit per year and the cost of shortage is Rs. 5 per unit per year. Determine economic lot size, the no. of orders per year, the time period and total cost if unit cost is Rs. One. [8]
- b) Explain Any Two: [8]
- Assumptions of Sequencing Model.
  - Graphical Method for solving sequencing problems.
  - Characteristics of queuing system.

### SECTION - II

- Q7) a) Solve following Problem by Sub-Game or Graphical Method. [8]

		B's Strategies	
		B1	B2
A's Strategies	A1	4	2
	A2	3	8
	A3	2	12

- b) The purchase price of a machine is Rs. 52,000. The installation charges amount to Rs. 14,400 and its scrap value is Rs. 6,400. The maintenance cost in various years is as below: [8]

Year	1	2	3	4	5	6	7
Maintenance Cost	1000	3000	4000	6000	8400	11600	16000

After how many years should the machine be replaced? Assume that the machine replacement can be done only at the year ends.

OR



- Q8) a)** The following failure rates have been observed for a certain type of transistor in a digital computer. **[12]**

Week	1	2	3	4	5	6	7	8
Probability of failure	0.03	0.13	0.25	0.43	0.68	0.88	0.96	1.00

The cost of replacing an individual failed transistor is Rs. 1.25. The decision is made to replace all these transistors simultaneously at fixed intervals and the individual transistors as they fail in service. If cost of group replacement is Rs. 0.3 per transistor what is the best interval between group replacements. Assume Number of transistors 1000 at start.

- b) Explain “Two Person Zero Sum Game”. **[4]**

- Q9) a)** Workers come to tool store room to receive tool. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time is 40 seconds. Determine: **[10]**

- i) Average queue length.
- ii) Average length of non empty queues.
- iii) Average number of workers in system including the worker being attended.
- iv) Mean waiting time of an arrival.
- v) Average waiting time of worker.

- b) Explain briefly Integer and dynamic Programming. **[6]**

OR

- Q10)a)** A bakery keeps stock of a popular brand of cake. Daily demand based on past experience is given below: **[12]**

Daily Demand	0	15	25	35	45	50
Probability	0.01	0.15	0.2	0.5	0.12	0.02

Consider the following sequence of random numbers: 48, 78, 09, 51, 56, 77, 15, 14, 68 and 09.

- i) Using the sequence, simulate the demand for the next 10 days.
  - ii) Find the stock situation if the owner of the bakery decides to make 35 cakes every day. Also estimate the daily average demand on the basis of the simulated data.
- b) Write a note on Goal Programming. [4]

**Q11)a)** The utility data for a network are given below. Draw network diagram and determine the total, free, independent float and identify critical path. [14]

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration	2	8	10	6	3	3	7	5	2	8

- b) Differentiate between PERT and CPM. [4]

OR

**Q12)**The time estimates in weeks for the activities of a PERT network are given below: [18]

Activity	To	Tm	Tp
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

- a) Draw Project network.
- b) Determine expected project length.
- c) Calculate expected time for each path.
- d) Calculate the standard deviation and variance of the project length.
- e) What is the probability that the project will be completed
  - i) At least 4 weeks earlier than expected time?
  - ii) No more than 4 weeks later than expected time?



Total No. of Questions : 12]

SEAT No. :

**P2688**

**[5154]-62**

[Total No. of Pages : 3

**B.E. (Mech. - Sandwich)**

**ROBOTICS**

**(2008 Course) (Semester - I) (402064C) (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) *Neat diagram must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Figures to the right indicates full marks.*
- 6) *Use of non-programmable electronic calculator is allowed.*

**SECTION - I**

- Q1) a)** Explain the following terms associated with robot: **[8]**
- i) Accuracy
  - ii) Robot Work Envelope
  - iii) Repeatability
  - iv) Resolution
- b) Explain six degrees of freedom associated with the robot manipulator. **[8]**

OR

- Q2) a)** Define Robot and with neat sketch explain robot anatomy. **[8]**
- b) Explain socio-economic aspects of robotisation. **[8]**
- Q3) a)** A vacuum gripper is used to lift flat steel plates  $8 \text{ mm} \times 650 \text{ mm} \times 950 \text{ mm}$ . The gripper uses two suction cups, 140 mm in diameter each, and they are located 500 mm apart for stability. Assume a factor of safety of 1.8 to allow for acceleration of the plate. Determine the negative pressure required to lift the plates if the density of the steel is  $8.0543 \times 10^{-6} \text{ kg/mm}^2$ . **[8]**
- b) Discuss the design aspects of mechanical grippers. **[8]**

OR

**P.T.O.**

- Q4)** a) What are the various important parameters considered for selecting sensors. [8]
- b) Write a short note on: [8]
- i) Mechanical gripper
- ii) Hydraulic gripper

- Q5)** a) Compare three basic types of drives enlisting their merits and demerits. [10]
- b) Explain in detail: [8]
- i) PD
- ii) Feedback controller

OR

- Q6)** a) A rotary arm of a manipulator is to rotate from  $23^\circ$  to  $117^\circ$  in 9 seconds. Determine coefficients of cubic polynomial to interpolate the smooth trajectory. Plot the position velocity and acceleration variation against time. [10]
- b) Explain control law partitioning for second order system. [8]

**SECTION - II**

- Q7)** a) A camera locates an object by the matrix: [10]

$$\begin{bmatrix} 0 & -1 & 0 & 50 \\ 1 & 0 & 0 & -75 \\ 0 & 0 & 1 & 20 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

The camera is then translated by 15 units along z axis of the object, then rotated about its own x axis by  $-90^\circ$ . Determine the new rotation between camera and object.

- b) Explain Lagrangian - Euler formulation for single link with rotary joint. [8]

OR

- Q8)** a) Discuss forward and inverse kinematics with suitable examples. [10]
- b) Explain Denavit - Hartenberg parameters with a suitable example and sketches. [8]

- Q9) a)** What is a vision system? How can vision system be classified? [8]  
b) Explain different types of transmission systems for robotic system. [8]

OR

- Q10)a)** Explain: [8]  
i) Image processing techniques  
ii) Edge detection  
b) Explain in detail functions of machine vision system. [8]

- Q11)a)** Explain various techniques of AI. [8]  
b) Explain WAIT, DELAY and SIGNAL command. [8]

OR

- Q12)a)** Explain role of AI with reference to various applications. [8]  
b) Explain in detail various programming methods used in robot programming. [8]



Total No. of Questions : 12]

SEAT No. :

**P2689**

**[5154]-63**

[Total No. of Pages : 3

**B.E. (Mechanical - Sandwich)  
COSTING & COST CONTROL**

**(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 1 to 6 questions from Section I and 7 to 12 questions from Section II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Differentiate between Financial Accounting & Cost accounting. [8]  
b) Explain in brief about cost accounting. [8]

OR

- Q2)** a) Differentiate between cost allowcation and cost absorption. [8]  
b) State and explain the limitations of financial accounting. [8]

- Q3)** a) Explain the followings: [8]  
i) Manufacturing over heads.  
ii) Sales & distribution over heads.  
b) What is mean by direct expenses? Explain the characteristics. [8]

OR

- Q4)** a) Explain the different methods of costing in Manufacturing Industries. [8]  
b) Explain the detail various parameter used for classification of costs. [8]

- Q5)** a) Distinguish between fixed overheads and variable overheads. [8]  
b) Explain the treatment of over and absorption of over heads in cost accounting. [10]

OR

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

- Q6)** a) Explain the cost accounting treatment of unsuccessful Research & Development cost. [8]
- b) Discuss the difference between allocation and apportionment of overhead. [10]

**SECTION - II**

- Q7)** Compute a conservative estimate of profit on contract (which has been 90% complete) from the following particulars: [16]

	Rs.
Total Expenditure to date	2,50,000/-
Estimated further expenditure to complete the contract (including contingencies)	2,50,000/-
Contract price	32,50,000/-
Work certified	27,50,000/-
Workd uncertified	1,75,000/-
Cash received	21,25,000/-

OR

- Q8)** a) What are the methods of apportioning joint cost? Explain any one in brief. [8]
- b) Discuss the distinguish features of process cost system. [8]
- Q9)** a) A company sells two products J and K. The sales mix is 4 units of J and 3 units of K. The contribution Margins per Unit are Rs. 40 for J and Rs. 20 for K. Fixed cost are 6,16,000 per month. Compute the break-even point. [8]
- b) Explain & illustrate cash break-even-chart. [8]

OR

**Q10)a)** Explain the concept of contribution & contribution to sales ratio in marginal costing. [8]

b) Difference between Adsorption costing & Marginal costing. [8]

**Q11)** Write short note on:

a) Techniques of Marginal Costing. [9]

b) Types of Standard in Costing. [9]

OR

**Q12)a)** State the basis of standard costing. [9]

b) State the need for standard costs. [9]





Total No. of Questions : 12]

SEAT No. :

**P2690**

**[5154]-65**

[Total No. of Pages : 3

**B.E. (Mechanical Sandwich)**  
**ENERGY MANAGEMENT & INDUSTRIAL POLLUTION**  
**(2008 Course) (Semester - II) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Discuss world energy scenario. Explain need and important of energy conservation and energy management. **[9]**
- b) Discuss energy security and energy strategy for the future of the nation. **[9]**

OR

- Q2)** a) What are different types of Motors? Explain in detail the energy efficiency improvements in Energy Efficient Motors. **[9]**
- b) Write short notes on: **[9]**
- i) power factor improvement.
  - ii) Energy efficient lighting.

- Q3)** a) What is the need of Energy Audit? Explain in detail methodology for conducting detailed energy audit. **[8]**
- b) How benchmarking of energy consumption can be useful in improving performance of an industry? Explain. **[8]**

OR

- Q4)** a) Briefly 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. 1,000/- after 3 years if the interest rate is 10%? **[8]**

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

- Q5) a)** Explain the opportunities for improving energy efficiency in the furnaces. [8]
- b) Enlist the types of stream trappers and explain anyone of its with a neat sketch. [8]

OR

- Q6) a)** Enlist the methods to improve the performance of compressed air system. [8]
- b) Write the areas for improving the thermal efficiency of the HVAC systems. [8]

**SECTION - II**

- Q7) a)** Write a note on Industrial Pollution and its effect of environment. [9]
- b) Discuss the concept of Emission Trading. [9]

OR

- Q8) a)** Discuss various global environmental issues and ways to control it. [9]
- b) Write short notes on: [9]
- i) Acid rain
- ii) Loss of biodiversity

- Q9) a)** What are the sources of water pollution and air pollution? Discuss effects of pollution on human life. [10]
- b) Explain in short about different air quality control techniques. [6]

OR

- Q10)a)** Write short notes on: [10]
- i) Thermal Pollution.
- ii) Water pollution laws and standards.
- b) Write a short note on waste Water Treatment. [6]

- Q11)a)** What are the direct and indirect benefits of waste heat recovery? [8]
- b) Write a note on waste minimization techniques. [8]

OR

- Q12)a)** What are the objectives of EIA? [8]
- b) Write short notes on: [8]
- i) Incineration
  - ii) Cogeneration



Total No. of Questions : 12]

SEAT No. :

**P2691**

**[5154]-71**

[Total No. of Pages : 4

**B.E. (Automobile)**

**Automotive Refrigeration & Air Conditioning  
(2008 Pattern) (Semester-I)**

*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.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of non-programmable calculator is allowed and psychrometric chart is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) Explain Vapour and gas as a refrigerant in reverse Carnot cycle. [8]  
b) Write Application of RAC & Difference between VAC & VCC. [8]

OR

- Q2)** a) Explain with neat sketch practical vapour absorption cycle. [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 vapour 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 vapour,(kJ/kg K)
		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. [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 evaporator 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 fan. Explain any two types in detailed. [8]

### **SECTION-II**

- Q7)** a) Why filters are provided in A/C system? Describe the popular types of filters used in small A/C. [8]  
b) The atmospheric air at 30°C dry bulb temperature and 75% relative humidity enters a cooling coil at the rate of 200m<sup>3</sup>/min. The coil dew point temperature is 14°C and the bypass factor of the coil is 0.1. Determine 1. the temperature of air leaving the cooling coil; 2. the capacity of the cooling coil in tonnes of refrigeration 3. the amount of water vapour removed per minute; and 4. the sensible heat factor for the process. [8]

OR

- Q8)** a) What is function of Humidifier? Give various types of humidifiers and explain any one of them with a neat sketch. [8]  
b) At a certain locality, the dry bulb temperature of air is 30°C and the relative humidity is 40%. Determine the specific humidity and the dew point and wet bulb temperature of air if this air is cooled in an air washer using recirculated spray washer and having a humidifying efficiency of 0.9, what are the dry bulb temperature and dew point temperature of air leaving the air washer?

(Use steam table) [8]

**Q9) a) Define following with neat sketch: [9]**

i) ERSHF

ii) GSHF

iii) OASH

b) The following are design data for an air conditioning system proposed for vehicle: [9]

Outside design conditions= $34^{\circ}\text{C}$  DBT,  $28^{\circ}\text{C}$  WBT

Inside design condition= $24^{\circ}\text{C}$  DBT, 50% RH

Solar heat gain through vehicle body= $4.7\text{ kW}$

Solar heat gain through glass area= $4.7\text{ kW}$

Occupants=0.5

sensible heat gain per person= $85\text{ W}$

Latent heat gain per person= $105\text{ W}$

Internal lighting load=4 fluorescent fixture of  $20\text{ W}$  each

sensible heat gain from other sources= $11.6\text{ kW}$

infiltration air= $14\text{ m}^3/\text{min}$

By pass factor of the cooling coil used= $0.15$

If return and outdoor air are adiabatically mixed in ratio of 3:2 (by mass) and then passed through the conditioner, Determine

i) DBT AND WBT of supply air

ii) ADP

iii) capacity of air conditioning plant

OR

**Q10)** The following data supply to an air conditioning system.

**[18]**

Room sensible Heat=5.8kW

Room latent Heat=5.8kW

Outside design conditions=35°C DBT, 28°C WBT

Inside design condition=25°C DBT, 50% RH

An air within the vehicle is mixed with outside air before entering the cooling coil in the ratio 4:1. The coil by pass factor is 0.1 and ADP is 10°C. The vehicle inside air is again mixed with the air leaving cooling coil in the ratio 1:4 and the mixture is then allowed to enter the reheater before being supplied into the vehicle. Determine:

- a) Supply air condition to the vehicle cabin.
- b) Reheater capacity.
- c) Refrigeration capacity of cooling coil.
- d) Quality of fresh air supplied.

**Q11)a)** Explain Any 2 from the following.

**[8]**

- i) Retrofitting
- ii) Odour removal
- iii) Temperature measurement.

b) Write a short note on refrigerant recycle and charging.

**[8]**

OR

**Q12)a)** Compare the open type and hermetically sealed type compressors with respect to construction, sealing, cost, noise level.

**[8]**

b) Write a short note on:

**[8]**

- i) Refrigerant handling
- ii) Sight glass



Total No. of Questions : 11]

SEAT No. :

P2692

[5154]-72

[Total No. of Pages :3

**B.E. (Automobile Engineering)**  
**MACHINE & VEHICLE DYNAMICS**  
**(2008 Course) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

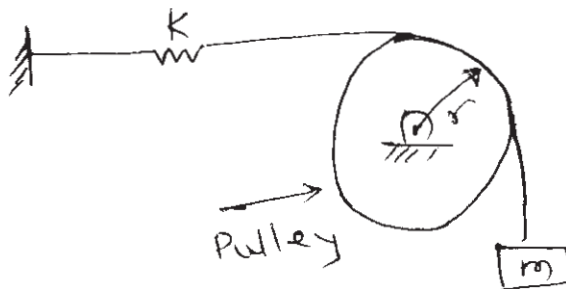
**SECTION - I**

**Q1)** A four cylinder inline engine has cranks at  $90^\circ$  interval. The speed of engine is 200 rpm each crank is 600 mm long. Masses of the reciprocating part of each cylinder is 200 kg. The outer cylinders are 4m apart & Inner cylinders are 2 m apart and are symmetrically placed between outer crank. Determine the firing order of cylinder for best balancing of reciprocating masses. What would be the magnitude of unbalancing couple. [16]

OR

- Q2)** a) The axis of three cylinder air compressor at  $120^\circ$  to one another and there connecting rods are coupled to single crank. Length of each connecting rod is 240 mm & stroke is 160 mm. The reciprocating mass having 2.4 kg per cylinder. Determine primary & secondary forces if engine run at 2000 rpm. [10]
- b) Write a short note on dynamic balancing machine. [6]

**Q3)** a) Find the natural frequency of the system, [8]



- b) Write a short note on “viscous damping”. [8]

OR

*P.T.O.*



- Q4)** a) Explain critical damping coefficient & Derive equation for the same. [8]  
b) A spring-mass-damper system consists of spring of stiffness 1000 N/m & mass 20 kg. The mass is displaced 25 mm beyond the equilibrium position & released. Find equation of motion of mass if damping coefficient is 100 Ns/m. [8]

- Q5)** a) Explain the term 'Magnification factor'. [4]  
b) A machine part of 5 kg vibrates in viscous medium. Determine damping coefficient when harmonic excited force of 50N results in resonance - amplitude of 12.5 mm. with period of 0.20 seconds. If the system is excited by harmonic force of frequency 4 cycle/sec; determine percentage increment in amplitude of force vibration when the damper is removed. [14]

OR

- Q6)** a) Explain the term "transmissibility". [4]  
b) A system having rotating unbalance of mass 25kg. The unbalance mass of 1 kg rotate with radius of 0.4m. It has been observed that speed of 1000 rpm. The system has eccentric mass phase difference of  $90^\circ$ . When amplitude is 0.015 m. Find out, [14]  
i) Natural frequency  
ii) Damping factor.  
iii) Amplitude of 1500 rpm.  
iv) Phase angle at 1500 rpm.

### SECTION - II

- Q7)** a) Write a brief note on ground effect produced due to aerodynamics. [8]  
b) Write a short note on tractive effort & draw bar pull. [8]

OR

- Q8)** a) How to modify car profile to minimize drag of vehicle. [8]  
b) Differentiate vehicle fixed co-ord. system & earth fixed co-ord. system. [8]

- Q9)** a) Derive mathematical model of ride. [8]  
b) Explain excitation sources of ride. (vehicle) [8]

OR

- Q10)**a) Derive quarter car model in brief. [8]  
b) Write a short note on vibration absorber & isolators. [8]

**Q11)** Write a brief note on any three from following: (6 M each) [18]

- a) Neutral steer, under steer, oversteer.
- b) Tyre wear patten.
- c) Constant radius method.
- d) Constant steer angle method.
- e) Ackerman steering vs Davis steering.



Total No. of Questions : 12]

SEAT No. :

**P2693**

**[5154]-73**

[Total No. of Pages : 3

**B.E. (Automobile)(Part - I)**  
**AUTOMOTIVE SYSTEM DESIGN**  
**(2008 Pattern) (Semester - I) (416490)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer sheets.*
- 2) *Answer six questions from the following.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume Suitable data, if required.*

**SECTION - I**

- Q1)** a) Explain the Aesthetic considerations in design. [6]  
b) Explain the Ergonomic considerations in design. [6]  
c) Explain the Johnson's method of optimum design. [6]

OR

**Q2)** Write short note on:

- a) Adequate and optimum design. [6]
- b) Design for natural tolerances. [6]
- c) Statistical considerations in design. [6]

- Q3)** a) Derive an expression for torque transmitting capacity by assuming uniform wear for single plate clutch. [8]  
b) A single plate clutch consists of only one pair of contacting surfaces. It is used for an engine, that develops a maximum torque of 120Nm. Assuming a factor of safety of 1.5 to account for slippage at full engine torque. The permissible intensity of pressure is 0.35 Mpa and the coefficient of friction is 0.35. Assuming uniform wear theory, calculate the inner and outer diameters of the friction lining. [8]

OR

**P.T.O.**

- Q4)** a) Derive an expression for torque transmitting capacity of single plate clutch by assuming uniform pressure. [8]
- b) What are the properties of lining materials? [3]
- c) An oil immersed multi-disk clutch, with moulded asbestos on one side and steel disks on the other, is used in an application. The torque transmitted by the clutch is 75Nm. The coefficient of friction between asbestos lining and steel plate is wet condition is 0.1. The permissible intensity of pressure on asbestos lining is 0.5Mpa. The outer diameter of the friction lining is kept as 100mm due to space limitation. Assuming uniform wear theory, calculate the inside diameter of disks, the required number of disks, and the clamping force. [5]
- Q5)** a) Write a note on gear train with types. [6]
- b) A four speed gear box is to have the following gear ratios 1,1.5,2.48 and 3.93. The centre distance between the lay shaft and the main shaft is 73.12mm and the smallest pinion is to have at least 12 teeth with a diametral pitch of 3.25mm. Find the number of teeth of the various wheels. find the exact gear ratios. [10]

OR

- Q6)** a) Explain the parameters considered for selection of bearing. [6]
- b) Design a 3 speed constant mesh gear box having a gear ratio of 3.6 in bottom and reverse gear. The main shaft and lay shaft are 120 mm apart approximately. Take the module 3.25mm. The top gear has got unity gear ratio. Find the exact gear ratio. [10]

### SECTION - II

- Q7)** a) Explain the construction of any one type universal joint with neat sketch. [8]
- b) An automobile engine develops 27.93 kW at 1500 rpm and its bottom gear ratio is 3.06. If a propeller shaft of 40mm outside diameter is to be used, determine the inside Diameter of mild steel tube to be used, assuming a safe shear stress of 56.25 Mpa for the mild steel. [8]

OR

- Q8)** a) Explain the construction of full floating axle with neat sketch. [8]
- b) An engine develops 29.4 KW at 200rpm when the torque is maximum.

The bottom gear ratio is 3:1 and the back axle reduction is 4.5:1. The load on each driving axle is 7475.22 N, when the car is fully loaded. Diameter of road wheel over the tyre is 710 mm and the coefficient of friction between tyre and road is 0.6 of the permissible stress in the material of the shaft is not allowed to exceed 225 Mpa, find the diameter of the axle shaft. [8]

**Q9) a)** Explain the following. [8]  
Brake lining, brake efficiency, brake torque and stopping distance.

b) Explain the theory of internal shoe brake with neat sketch: [8]

OR

**Q10)a)** Explain the hydraulic braking system with neat sketch. [8]

b) A motor car has a wheel base of 2640 mm, the height of its C.G above the ground is 0.61m and it is 1120mm in front of the rear axle if the car is travelling at 40km/Hr on a level track, determine the minimum distance in which the car may be stopped when [8]

i) The front wheels are braked

ii) The rear wheels are braked

iii) All wheels are braked

The coefficient of friction between tyre and road may be taken as 0.6.

**Q11)a)** Explain general design considerations of suspension system. [6]

b) What are the requirements of suspension system? [6]

c) What are the disadvantages of independent front suspension? [6]

OR

**Q12)a)** Explain the heavy duty truck rear end suspension with neat sketch. [8]

b) A truck spring has 12 number of leaves two of which are full length leaves. The spring supports are 1.05m apart and the central band is 85 mm wide. The central load is to be 5.4 KN with a permissible stress of 280N/mm<sup>2</sup>. Determine the thickness and width of the steel spring leaves. The ratio of the total depth to the width of the spring is 3. Also determine the deflection of the spring. [10]



Total No. of Questions : 10]

SEAT No. :

**P2694**

**[5154]-74**

[Total No. of Pages : 2

**B.E. (Automobile Engg.)**

**AUTOMOTIVE AERODYNAMICS & STYLING  
(2008 Pattern) (Semester - I) (Elective - I) (416491)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1) a) Derive energy equation for fluid flow. [8]**

b) Explain 'Classification of drag force' in brief. [8]

OR

**Q2) Explain following terms in brief, [4 × 4 = 16]**

- a) Stream lines.
- b) Rotational flow.
- c) Turbulent flow.
- d) Flow through diverging passage.

**Q3) a) Write a short note on 'flow around circular cylinder'. [8]**

b) Explain 'Match Number' & its significance. [8]

OR

**Q4) a) What is 'shock induced separation'? Explain in brief. [8]**

b) Write any 4 characteristics of swept wings. [8]

**Q5) Explain any three in brief. [3 × 6 = 18]**

- a) Aerodynamics of vans.
- b) Drag forces & lift forces.
- c) Optimization of car body.
- d) Historical development of car aerodynamics.
- e) Flow field around cars.

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

**SECTION - II**

- Q6)** a) Explain 'dirt accumulation on vehicle'. [8]  
b) Write a short note on 'Wind noise'. [8]

OR

- Q7)** a) Explain 'Vehicle aerodynamics under side wind'. [8]  
b) Write a short note on 'effect of gap configuration an aerodynamics'. [8]

- Q8)** a) Write a short note on open & closed type of wind tunnel. [8]  
b) Explain any two pressure measuring equipments used in wind tunnel test. [8]

OR

- Q9)** a) Write a short note on scale model testing. [8]  
b) Explain any two velocity measuring equipments used in wind tunnel test. [8]

**Q10)** Write short notes on (any 3) [3 × 6 = 18]

- a) Headlight shapes.
- b) Brand image.
- c) Rear side shape of car.
- d) Styling of front hood.
- e) A sthetic features of car body.

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2695**

**[5154]-76**

[Total No. of Pages : 4

**B.E. (Automobile Engg.)  
CAD/CAM & AUTOMATION**

**(2008 Course) (Semester - I) (416491 C) (Elective - I (C))**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) With an example, explain the significance of inverse transformation. [6]
- b) A quadrilateral ABCD whose coordinates are A(5,5), B(10,10), C(12,8) & D(8,3) calculate the new coordinates of rectangle if: [10]
- i) it is translated by 10 units in x direction and 4 units in y direction.
  - ii) Rotated about the origin by 30° CCW.
  - iii) Scaled by factor 0.6 uniformly.
  - iv) Reflected about X-axis.

OR

- Q2)** a) Explain the transformation matrix required to generate the isometric views of object in the viewing plane. [8]
- b) A triangle has coordinates A(3,2,3), B(4,8,4) & C(6,5,2). The orthographic views of this triangle is to be projected along the three axes. Write the transformation matrix and determine the coordinates of front view and top view. [8]

**P.T.O.**



- Q3) a)** Write short note on, (Any three) [12]
- Geometry & topology.
  - FBM.
  - Types of surfaces.
  - Analytical curves.
  - Parametric & constraint base modeling.

- b) A line passing through point  $P_1(2,7,3)$  has a length of 20 units in the direction given by the unit vector  $0.213\hat{i} - 0.839\hat{j} + 0.5\hat{k}$ . Determine the endpoint of the line. Also find the new end point if the length of the line is  $-10$  units in the same direction as before. [6]

OR

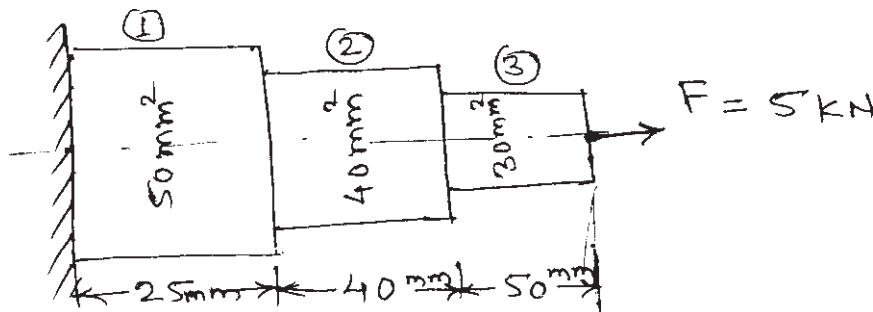
- Q4) a)** Enlist the solid representation techniques. Compare CSG and Boundary representation techniques. [8]

- b) Plot the hermite cubic curve having end points  $P_0(1,3)$  &  $P_1(7,2)$  the tangent vector for end  $P_0$  is defined by a line joining  $P_0$  & another point  $P_2(10,8)$ , where as the tangent vector for end  $P_1$  is defined by a line joining  $P_1$  and another point  $P_3(6,0)$ . Also plot the curve, if the point  $P_3$  is changed to  $(9,6)$  with the other things remains the same. [10]

- Q5) a)** Explain with example, the meaning of plane stresses & plane strain. [4]

- b) An axial stepped bar is as shown in figure if material of the bar is uniform & has modulus of elasticity a 200 GPa. Determine, [12]

- Displacement
- Stresses of each of the section.

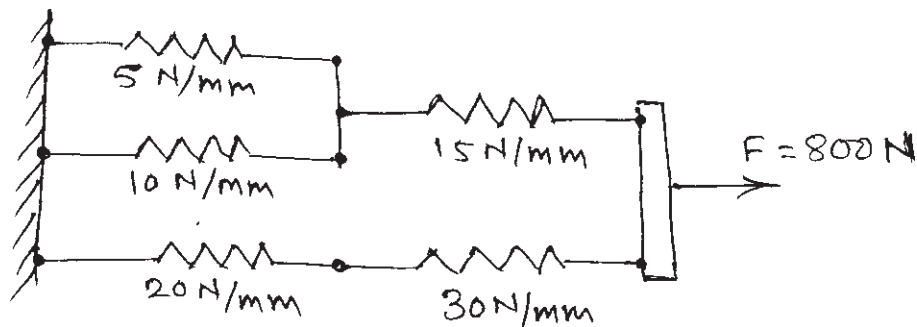


OR

**Q6) a)** Write short note on “Boundary conditions” in Finite Element Analysis with suitable example. [8]

**b)** Figure shows a cluster of 5 springs. One end of assembly is fixed & a force of 800 N is applied at the end. Using finite element method Determine, [8]

- i) Deflection of each spring
- ii) Reaction forces at support

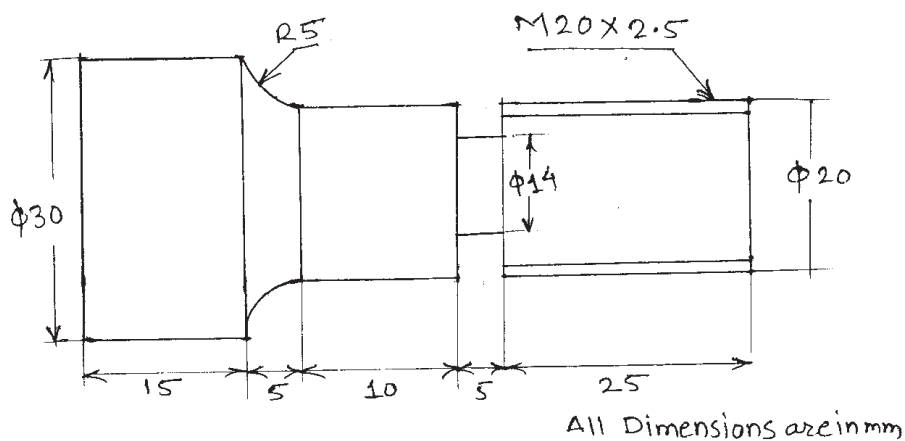


**SECTION - II**

- Q7) a)** What are the major features and advantages of CNC machine tool? [6]
- b)** Explain, tool length & cutter diameter compensation. [8]
- c)** Enlist the steps involved in Integration of CAD, NC & CAM. [4]

OR

- Q8) a)** Explain the use of subprograms in case of manual part programming. [6]
- b)** Develop a program using G and M codes to turn MS bar of size & shape shown in figure. Use various canned cycles for roughing, grooving & threading operation. Raw material size is  $\phi 30 \times 60$  mm. Assume suitable data for speed, feed & depth of cut. [12]



- Q9)** a) Compare fixed, programmable & flexible automation. [8]  
b) Explain with neat sketches, the different layouts for automated flow in FMS. [8]

OR

- Q10)** a) What are the advantages and limitations of Automation? [8]  
b) Explain, concept of Group Technology. Highlight its merits and demerits. [8]

- Q11)** a) Enlist the robot configurations & Explain any two in detail with neat sketch. [8]  
b) Explain different types of mechanisms used as mechanical grippers with neat sketch. [8]

OR

- Q12)** Write short note on, (any four) [16]
- a) PTP & continuous path robot.
  - b) Robot programming.
  - c) Grippers.
  - d) Robot accuracy & repeatability.
  - e) Industrial application of robot.
  - f) Parameters in robot selection
  - g) Robot Drives.

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2696**

**[5154]-77**

[Total No. of Pages : 3

**B.E. (Automobile Engineering)**

**AUTOMOTIVE NVH**

**(2008 Course) (Semester - I) (Elective - I) (416491 D)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) Discuss the source of vibration and noise in Automobile. [8]  
b) Explain the physiological effect of noise and vibration. [8]

OR

- Q2)** a) Write note on co-ordinate coupling. [8]  
b) Displacement the plot for:- [8]  
i) Over damped system.  
ii) Under damped system.

- Q3)** a) Explain the coulomb damping in Detail. [8]  
b) The spring of Automobile trailer is compressed 0.1 m under its own weight wave. Find the critical speed when the trailer is travelling over a road with a profile approximated by a sine wave of amplitude 0.08 m and a wavelength of 14 m. What will the amplitude of vibration at 60 km/hr? [8]

OR

- Q4)** a) Describe in detail untuned dry friction damper & draw its frequency response curve. [8]  
b) How to control torsional oscillations amplitude in engine crank shaft? Describe its procedure in detail? [8]

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

- Q5) a)** Write note on: [9]
- i) Vibration isolation.
  - ii) Vibration absorber.
- b) A 40 kg machine is supported by four springs each of stiffness 250 N/m. The rotor is unbalanced effect is equivalent to a mass of 5 kg located at 50 mm from the axis of rotation find the amplitude of vibration when the rotor rotates at 1000 rpm & 60 rpm assume damping co-efficient to be 0.15. [9]

OR

- Q6) a)** Differentiate in between tuned and untuned viscous dampers. [9]
- b) Explain engine isolation in detail. [9]

### **SECTION - II**

- Q7) a)** Derive the relation for sound pressure intensity and power level. [8]
- b) Explain octave band analysis. [4]
- c) Discuss noise as causes of stress. [4]

OR

- Q8) a)** Explain air born and & structure born sound. [8]
- b) Determine the approximated wavelength of 3.5 khz frequency producing at room temp in. [8]
- i) Water
  - ii) Lead
  - iii) Glass
  - iv) Steel

- Q9) a)** List various types of microphone & Explain condenser microphone.[8]
- b) An undamped seismic instrument is used to find the magnitude of vibration of a machine tool structure. It's give a reading of relative displacement of 0.8 micron meter. The natural frequency of the instruments is 5 Hz. The machine tool structure is subject to an excitation at a frequency of 2 Hz find the magnitude of the acceleration of the vibration machine tool structure. [10]

OR

**Q10)a)** Explain noise generation and noise transmission in interior of the vehicle in details. **[10]**

b) Write a note on pass by drive noise measurement procedure in brief.**[8]**

**Q11)a)** Explain method of control noise of: **[8]**

i) Engine noise

ii) Intake and exhaust noise

iii) Interior noise

b) Write a note on: **[8]**

i) Isolation

ii) Damping

iii) Balancing

OR

**Q12)**How one can apply noise control method: **[16]**

a) At source.

b) Along the path.

c) At receiver.

**x x x**

Total No. of Questions : 10]

SEAT No. :

**P2697**

**[5154]-78**

[Total No. of Pages : 2

**B.E. (Automobile)**

**AUTOMOTIVE MATERIALS**

**(2008 Pattern) (Semester - I) (416492 - A) (Elective - II) (End Sem.)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** a) Explain Stress-Strain adiation in engineering Materials. [8]

b) How to analyse laminated composite material? [8]

OR

**Q2)** a) Write a short note on fibre & texture strengthening. [8]

b) Explain Iron-carbon diagram in brief. [8]

**Q3)** a) Write a short Note on normalizing. [8]

b) Explain procedure of hot dipping in brief. [8]

OR

**Q4)** a) Explain any 2 surface hardening processes. [8]

b) Write a short note on electroplating. [8]

**Q5)** Write any 3 from following: [3 × 6 = 18]

- a) Material selection for piston.
- b) Material selection for cylinder block.
- c) Material selection for brake lining.
- d) Composite material.
- e) Ceramic.
- f) Material selection for radiator.

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

**SECTION - II**

- Q6)** a) Write a short note on Polymers. [8]  
b) Explain rule of mixture in brief. [8]

OR

- Q7)** a) Write a short note on fibers. [8]  
b) Explain compression Moulding in brief. [8]

- Q8)** a) Write a short note on fabrication of composite. [8]  
b) Explain fabrication process of metal matrix. [8]

OR

- Q9)** a) Write a short note X-radiography. [8]  
b) Explain thermoplastic resin matrix in brief. [8]

**Q10)** Write any three in brief. [3 × 6 = 18]

- a) Carbon composite.
- b) Bueky Papee.
- c) UD composite.
- d) Application of composite in aerospace.
- e) Application of composite in automotive.





Total No. of Questions : 11]

SEAT No. :

**P2698**

**[5154]-79**

[Total No. of Pages : 2

**B.E. (Automobile Engineering)**

**VEHICLE SAFETY**

**(2008 Course) (Elective - II) (Semester - I) (416492B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section. Q1 is Compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Logarithmic tables, Sliderule, 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]**

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.

**P.T.O.**

**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 of 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 the 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. :

**P2699**

**[5154]-80**

[Total No. of Pages : 2

**B.E. (Automobile)**

**OFF ROAD VEHICLES**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

**SECTION - I**

- Q1)** a) Explain the history of off road Vehicles? [9]  
b) Why multi-axle used in some off vehicles, explain. [9]

OR

- Q2)** a) Which type of transmission system used in off road vehicle? Justify. [9]  
b) Which type of chassis used for off road vehicle and which section is selected normally to manufacture chassis? Justify. [9]

- Q3)** a) Which factor affecting the efficiency & out put of tractors. [8]  
b) Explain construction and working of dump truck with neat sketch. [8]

OR

- Q4)** a) Explain with neat sketch hydraulic dozer. [8]  
b) Explain different types of earth moving equipments with application. [8]

- Q5)** a) How to decide capacity of shovels? What are the different capacity shovels available in market? [8]  
b) What is the difference in revolving & stripper shovels give suitable example & specification of both. [8]

OR

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

- Q6)** a) Where is the application of elevating grader write down the function and specification of it. [8]
- b) Explain construction and working of scrapper also write down the specification of any one scrapper. [8]

**SECTION - II**

- Q7)** a) Explain with neat sketch construction detail of tanker. [8]
- b) Explain the special features of tanker and gun carrier? [8]

OR

- Q8)** a) Explain in detail the special features of transport vehicle. [8]
- b) What is the meaning of power take off explain in detail. [8]

OR

- Q10)**a) Explain with neat sketch brake system and actuation of OCDB. [8]
- b) What is body hoist & bucket operational hydraulics explain in detail.[8]

OR

- Q11)**a) Explain in detail term the mobility index (MI). [9]
- b) Define traction performance & factor affecting traction performance.[9]
- Q12)**a) Explain the term vehicle cone index [VCI] & rated cone index [RCI].[9]
- b) Explain following terms in relation to vehicle evaluation mobility number & traction on wet soil. [9]



Total No. of Questions : 12]

SEAT No. :

**P2700**

**[5154]-81**

[Total No. of Pages : 3

**B.E. (Automobile Engineering)**  
**AUXILIARY ENGINE SYSTEMS - I**  
**(2008 Course) (Semester - I) (Elective - II) (416492 D)**

*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.*

**Q1) a)** Which factors should be consider while designing supercharging for Petrol engines? **[8]**

b) What are the different types of compressors used in supercharging? Explain any one of them in details. **[8]**

OR

**Q2) a)** How gas exchange works in case of Turbo charging? Explain it with necessary graphs. **[8]**

b) Explain in brief principal of Supercharging. How engine performance enhances by using Supercharging? **[8]**

**Q3) a)** Explain in brief factors affecting the nozzle area of turbocharger. **[8]**

b) Compare Turbo charging performance in case of Petrol engines and Diesel engines. **[8]**

OR

**Q4) a)** Explain various factors that affects the engine performance related with supercharging. **[8]**

b) How efficiency of engine can be increased by using turbo charging in IC engine? **[8]**

**P.T.O.**

- Q5) a)** Which thermodynamic parameters varies when one uses Turbo charging in IC engine and how these parameters affects overall engine performance? [10]
- b) Compare Pulse turbo chargin with Mechanical Turbo charging with at least 8 points. [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)** How manifold arrangement affects performance of Turbo charger? State different factors to be considered 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 modified forms of Pulse Turbo charging. [8]
- b) Explain with graphs Torque characteristics of engine with turbo charging. [8]

- Q9) a)** Explain Charge boosting with example. [8]
- b) Which material is useful for Turbine 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 explains any one of them in detail with neat sketch. [10]
- b) Explain in brief the methods for lubrication for the cooling of IC engines. [8]

**Q11)a)** What is the role of Heat exchanger in IC engine? Explain any one of them in details. [8]

b) What is EGR? Explain with schematic diagram. [8]

OR

**Q12)a)** Discuss about various aspects of Radiator failure on IC engine. [8]

b) How engine cooling system and EGR reduces emission from IC engine? [8]



Total No. of Questions :12]

SEAT No. :

**P2701**

[Total No. of Pages :3

[5154] - 82

**B.E. (Automobile)**

**ALTERNATIVE FUELS AND EMISSION CONTROL**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Compare Diesel And Gasoline fuels with their properties. [6]  
b) Enlist any five alternative fuels and write their properties. [10]

OR

- Q2)** a) Why additives are used? What are the additives for SI and CI engines.[6]  
b) What is enthalpy of formation and enthalpy of combustion? [10]
- Q3)** a) What are the different synthetic fuels used in vehicle? Explain its effect on engine performance. [6]  
b) Explain biodiesel with its properties? [6]  
c) Write a note on Ethanol as a fuel. [6]

OR

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



- Q4)** a) Differentiate between CNG and LPG and gasoline fuels. [6]  
b) Write a note on Alcohol as a fuel for IC engines. [6]  
c) Explain the properties of hydrogen fuel & give its advantages and disadvantages over conventional fuels. [6]

- Q5)** a) Explain use of synthetic fuels for Automobile engines? [8]  
b) Write note on Dimethyl Ether as alternative fuel? [8]

OR

- Q6)** a) Explain Syngas in detail. [8]  
b) Write production, properties, storage and handling, dispensing advantages, disadvantages of GTL. [8]

### **SECTION-II**

- Q7)** a) Explain the methods for reducing the NO<sub>x</sub> emission? [8]  
b) Explain emission formation in SI engines. [8]

OR

- Q8)** a) How you will reduce the unburned hydrocarbon emission from automobile engines? [6]  
b) Write effect of design and operating variables in SI Engine emission. [10]

**Q9)** Explain effect of design and operating parameters on CI engine emission. [16]

OR

- Q10)** a) Explain Exhaust gas recirculation system of CI engine. [8]  
b) Write measurement & test procedure NDIR analyzers. [8]

**Q11)** Write a note on:

- a) Emission effects on human health. [6]
- b) Emission inventory. [6]
- c) Ambient air quality monitoring. [6]

OR

- Q12)**
- a) What are emission norms explain in detail. [9]
  - b) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? [9]

*EEE*

Total No. of Questions : 10]

SEAT No. :

**P2702**

**[5154]- 83**

[Total No. of Pages : 2

**B.E. (Automobile Engineering)**  
**VEHICLE PERFORMANCE & TESTING**  
**(2008 Pattern) (Semester - II)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1) a)** Explain following performance parameter in brief. **[8]**

- i) Fuel economy
- ii) Life durability

b) Explain Any one suspension system with its components. **[8]**

OR

**Q2) a)** Explain following performance parameter in brief. **[8]**

- i) Acceleration
- ii) Comfort.

b) With neat sketch explain any one braking system with its components. **[8]**

**Q3) a)** With neat sketch explain working of diaphragm clutch. **[8]**

b) Write a short note on 'Final Drive'. **[8]**

OR

**Q4) a)** With neat sketch explain working of multiplate clutch. **[8]**

b) Write a short note on 'Differential'. **[8]**

**P.T.O.**

- Q5)** Write in brief (any three): **[18]**
- a) Free acceleration test.
  - b) high speed track.
  - c) Virtual testing with CAE software
  - d) Oil consumption testing
  - e) Proving Ground.

**SECTION - II**

- Q6)** a) Write a difference between active safety & passive safety. **[8]**  
b) Write a brief note on ESP. **[8]**

OR

- Q7)** a) Explain working of roll-over protection system in brief. **[8]**  
b) Write a short note on 'Seat belts'. **[8]**

- Q8)** a) Write a short note on 'crash test sensor'. **[8]**  
b) Explain 'Human testing' in brief. **[8]**

OR

- Q9)** a) Write a short note on 'Sensor mounting'. **[8]**  
b) Explain 'Dummies testing' in brief. **[8]**

- Q10)** Explain following in brief. (any 3) **[18]**
- a) Engine noise & remedies.
  - b) Tyre noise & remedies.
  - c) Model testing.
  - d) Full scale testing.
  - e) Type of sensor used in Vehicles.



Total No. of Questions : 12]

SEAT No. :

**P2703**

**[5154]-86**

[Total No. of Pages : 4

**B.E. (Automobile)**

**HYDROULICS & PNEUMATICS**

**(2008 Course) (Semester - II) (Elective - III) (416497 C)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Compare Electrical power, mechanical power and Fluid power w.r.t. energy source, energy storage, energy transportation, energy cost, environmental harmful effects, noise, intensity factor, action factor. [8]
- b) What do you mean by High water content Fluids? Describe them. List advantages and disadvantages. [8]

OR

- Q2)** a) Write down different sources of leakage. List adverse effects and useful effects of oil leakage. [8]
- b) List down the practical and performance requirements of a filtration system. [8]

- Q3)** a) Describe with neat sketch double acting intensifiers. [8]
- b) A gear pump has outside diameter = 75 mm, inside diameter = 50 mm, and width = 25 mm. Calculate the volumetric efficiency, if the pump has an actual flow of 100 litres per min, at 1800 rpm and rated pressures. [8]

OR

- Q4)** a) Explain with neat sketch Balanced, Fixed displacement vane pump. [8]
- b) Describe with neat sketch Diaphragm type accumulator. [8]

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

- Q5)** a) What do you mean by Bleed-off circuit? Describe with neat sketch. [8]  
b) Describe construction and working of pilot operated Relief valve. [10]

OR

- Q6)** a) Describe shuttle & Fast exhaust valves with neat sketch. [8]  
b) Explain Meter-in & Meter-out circuit with sketch. [10]

### **SECTION - II**

- Q7)** a) Describe Application of Hydraulic circuits in drilling machine and milling machine. [8]  
b) Explain the radial piston motors and wheel motors. [8]

OR

- Q8)** a) Describe with neat sketch Fail safe circuits with overload protection. [8]  
b) Describe with neat sketch External Gear motor. [8]

- Q9)** a) What do you mean by Depth type filter, Dry filter & wet filter, micro filter/coalescent filter. [8]  
b) Explain the construction & working of Axial Flow compressors with neat sketch. [8]

OR

- Q10)** a) i) Compare between seat valve and spool valve. [4]  
ii) Draw the symbolic representation for Diaphragm cylinder and Rolling Diaphragm cylinder. [4]  
b) Describe following types of double acting cylinders. [8]  
i) Through Rod cylinder  
ii) Cushion End cylinder

**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 any where in between the end positions. Select different components from the data given specify ratings of the components in case it is not available. [18]

OR

**Q12)** A machine slide is moved by means of a hydraulic cylinder. The motion of the cylinder is as follows. **[18]**

- a) Initially it moves through a distance of 200 mm against a load of 12 kN in about 3 seconds.
- b) It is followed by a working stroke of 100 mm against an effective load of 35 kN. The feed rate during this part of the stroke is required to be between 0.5 to 1 m/min.
- c) The return stroke is to be as fast as possible. A meter out type of circuit is used. Draw a circuit which will fulfill these requirements. Select different components you have used in the circuit from the data given.

DATA

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S <sub>1</sub>	38
S <sub>2</sub>	76
S <sub>3</sub>	152

2. Pressure Gauge :

Model	Range (bar)
PG <sub>1</sub>	0 - 25
PG <sub>2</sub>	0 - 40
PG <sub>3</sub>	0 - 100
PG <sub>4</sub>	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P <sub>1</sub>	8.5	7.1	5.3
P <sub>2</sub>	12.9	11.4	9.5
P <sub>3</sub>	17.6	16.1	14.3
P <sub>4</sub>	25.1	23.8	22.4
P <sub>5</sub>	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R <sub>1</sub>	11.4	70
R <sub>2</sub>	19	210
R <sub>3</sub>	30.4	70
R <sub>4</sub>	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F <sub>1</sub>	70	0-4.1
F <sub>2</sub>	105	0-4.9
F <sub>3</sub>	105	0-16.3
F <sub>4</sub>	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D <sub>1</sub>	350	19
D <sub>2</sub>	210	38
D <sub>3</sub>	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C <sub>1</sub>	210	15.2
C <sub>2</sub>	210	30.4
C <sub>3</sub>	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO <sub>1</sub>	210	19
PO <sub>2</sub>	210	38
PO <sub>3</sub>	210	76

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

Model	Bore dia. (mm.)	Rod dia (mm)
A <sub>1</sub>	25	12.5
A <sub>2</sub>	40	16
A <sub>3</sub>	50	35
A <sub>4</sub>	75	45
A <sub>5</sub>	100	50

10. Oil Reservoirs :

Model	Capacity (litres)
T <sub>1</sub>	40
T <sub>2</sub>	100
T <sub>3</sub>	250
T <sub>4</sub>	400
T <sub>5</sub>	600

x x x



Total No. of Questions : 12]

SEAT No. :

**P2704**

**[5154]-87**

[Total No. of Pages : 2

**B.E.(Automobile)**

**PRODUCT DEVELOPMENT AND COSTING**

**(2008 Pattern) (Semester - II) (Elective - III D) (416497)**

*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 the front end process with block diagram. [8]  
b) Write a short note on AFM Development Process. [8]

OR

- Q2)** a) What are the objectives of product development organization? Explain in brief. [8]  
b) Explain the product planning process in detail. [8]

- Q3)** a) How to identify the customer needs? Explain in detail. [8]  
b) Explain the documentation process of interaction with customers. [8]

OR

- Q4)** a) Explain the importance of needs in the organization. [6]  
b) Explain the procedure of establishing the product specification & how to set the final specifications? [10]

- Q5)** a) Explain the five step method to clarify the problem. [10]  
b) write a short note on following:  
i) Concept classification tree [4]  
ii) Concept combination table [4]

OR

**P.T.O.**

- Q6)** a) What are the benefits of structured method? [6]  
b) Explain the activity generation concept. [6]  
c) Explain the benchmarking process of related products. [6]

**SECTION - II**

- Q7)** a) Write a short note on product development & costing. [8]  
b) How to manage the trade-off between differentiation and commonality? [8]

OR

- Q8)** a) Explain the procedure of establishing the Architecture of the Chunk. [8]  
b) Explain the types of modularity. [8]

- Q9)** a) How to assess the need & expenditure of industrial design. [10]  
b) Write a short note on Ergonomic Needs and Aesthetic Needs in industrial design. [6]

OR

- Q10)** a) Explain the procedure of assessing the quality of industrial design. [8]  
b) Write a short note on Design for Manufacturing. (DFM). [8]

- Q11)** a) How to estimate the manufacturing costs, Explain in brief. [8]  
b) Explain the impact of DFM on development time & cost. [10]

OR

**Q12)** Write short note on the following:

- a) Qualitative Analysis. [6]  
b) Quantitative Analysis. [6]  
c) Economics analysis process. [6]



Total No. of Questions : 12]

SEAT No. :

**P2705**

**[5154]-88**

[Total No. of Pages :3

**B. E. (Automobile)**

**TRANSPORT MANAGEMENT & MOTOR INDUSTRIES**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Define the terms **[9]**
- i) Good vehicle
  - ii) Public place
  - iii) Transport place
- b) State the particulars that have to be collected for the purpose of preparing a accident report. **[9]**

OR

- Q2)** a) Detail out the responsibility of Driver in case of accident. **[9]**
- b) List out document detail procedure for the Licensing of driver and conductor. **[9]**
- Q3)** a) Describe the taxation and objective of taxation in detailed. **[6]**
- b) Give brief discussion on taxes on motor vehicles. **[4]**
- c) Short note on: **[6]**
- i) One time tax on non transport vehicles.
  - ii) One time tax on transport vehicle.

OR

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

- Q4)** a) Why road tax is laid on vehicles? [6]  
b) Under what circumstances the motor vehicle tax is refundable? How do you get the refund. [6]  
c) Explain the taxation structure for passenger and goods transport vehicles. [4]
- Q5)** a) Give detailed about insurance & type of insurance. [6]  
b) Give detail difference between Insurance and assurance. [4]  
c) Detailed description about motor vehicle insurance. [6]

OR

- Q6)** a) Explain in detail accident claim procedure. [6]  
b) What are the duties of surveyor and loss assessor. [6]  
c) What is third party insurance? What are the advantages & disadvantages. [4]

### SECTION-II

- Q7)** Attempt any three [18]  
a) Passenger transport operation.  
b) Classification of transport operation.  
c) Scheduling of transport operation.  
d) Modes of Road transport.

OR

- Q8)** a) Give the detailed about theory of fares in passenger transport operation. [6]  
b) How do you select the vehicle for a particular operation? [6]  
c) What is the use of computer in passenger transport operation. [6]
- Q9)** a) Explain in brief good transport operation. [6]  
b) Give function of good transport organisation and also explain the structure. [6]  
c) Describe the schedule structure of good transport organisation. [4]

OR

**Q10) Describe the following [16]**

- a) Management information system.
- b) Storage and transportation of petroleum product.

**Q11) Write short note on (any two) [16]**

- a) Control of traffic
- b) Advance techniques in traffic management
- c) Alternative fuel for vehicle.

OR

**Q12) Describe in brief [16]**

- a) Global position system
- b) Traffic control in towns.



Total No. of Questions : 12]

SEAT No :

**P 2706**

**[5154]-90**

[Total No. of Pages :2

**B.E. (Automobile)**

**ELECTRIC, HYBRID & FUEL CELL VEHICLE**

**(2008 Course) (Elective-IV) (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.*

**SECTION-I**

- Q1)** a) Explain the construction and working of AC synchronous motor. [8]  
b) Explain the construction and working of AC induction motor with neat sketch. [8]

OR

- Q2)** a) Explain the configuration and operating modes of parallel mild hybrid electric drive train. [8]  
b) What are the components of an electric vehicle? Give advantages and disadvantages of electric vehicle. [8]

OR

- Q3)** a) Define road load force and illustrate the forces acting on vehicle. [8]  
b) Explain series hybrid vehicle with its advantage and disadvantage. [8]

- Q4)** a) What is mild hybrid technology? Explain the energy recuperation in mild hybrid. [8]  
b) Draw typical performance characteristic of electric motor for traction. [8]

- Q5)** Compare in detail the hybrid vehicles, electric vehicles & conventional vehicles. [18]

OR

- Q6)** a) Classify the hybrid vehicle & explain any one. [9]  
b) What are the advantages and disadvantages of hybrid vehicle over the conventional vehicle. [9]

**[5154]-90**

**P.T.O.**



Total No. of Questions : 12]

SEAT No. :

**P2707**

**[5154]-91**

[Total No. of Pages : 3

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain the Pilot Production batch. Why it is necessary in Electronics Product design. **[8]**
- b) State the criteria for selection of frequency bands requirements of Voice and multimedia application. **[6]**
- c) Explain different reliable soldering practices. **[4]**

OR

- Q2)** a) How will you increase the reliability of the system. Differentiate between MTBT and MTTF. **[8]**
- b) Differentiate between Quality and reliability. **[6]**
- c) Explain bath tube curve indicating all its regions. **[4]**
- Q3)** a) Explain error budget analysis with one example of an electronic product. **[8]**
- b) Explain the following in terms of DAC **[8]**
- i) Resolution.
  - ii) Maximum sampling rate.
  - iii) Monotonicity.
  - iv) Total harmonic distortion and noise.

OR

**P.T.O.**



- Q4)** a) Explain Instrumentation amplifier for temp. measurement. Explain its need in analog signal conditioning. [8]
- b) Explain following ADC characteristic: [8]
- i) Full-scale-input-range.
  - ii) Number of bits.
  - iii) Analog and/or digital gain capability.
  - iv) Power consumption.

- Q5)** a) Explain interfacing between LED and relay with microcontroller. [8]
- b) What are the factors affecting on selection of buses and protocols in high speed electronic product. [8]

OR

- Q6)** a) Explain working principle of analog resistive touch screen. Interface 4 wire touch screen with any one microcontroller. [8]
- b) Explain the selection of microcontroller for particular DAS Application. Justify selection based on number of IOs. [8]

### SECTION-II

- Q7)** a) Write note on- [10]
- i) Compiler.
  - ii) Emulator.
  - iii) Simulator.
  - iv) Assembler.
- b) With the help of suitable example explain in detail how waterfall model is used for software development. [8]

OR

- Q8)** a) Explain in detail debugging tools and techniques used in software design. [10]
- b) Write short notes on- [8]
- i) Structured Programming.
  - ii) Real time software.

- Q9)** a) What are the different PCB Design issues of analog and mixed signal Circuits. Explain in details. [8]  
b) Define crosstalk? What should be the remedy to minimize crosstalk?[8]

OR

- Q10)**a) Explain the difference between PCB design practices of low speed and high speed digital circuits. [8]  
b) Write a notes on grounding and shielding. [8]

- 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) What is need of DC analysis? comment on the stability. [6]



Total No. of Questions : 12]

SEAT No. :

**P2708**

**[5154]-92**

[Total No. of Pages : 2

**B.E.(Electronics Engineering)**

**VLSI DESIGN**

**(2008 Pattern) (Semester-I) (404202)**

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

**SECTION-I**

**Q1)** a) Enlist non-idealities in MOS transistor and explain Channel length modulation in detail. [8]

b) Draw CMOS inverter circuit and explain Voltage transfer characteristics. [8]

OR

**Q2)** a) Explain DRC (Design rule check) in detail. [8]

b) Explain Power Consumption in CMOS? [8]

A CMOS circuit operate with  $V_{DD}=2.5$  V operating at frequency of 2,4 GHz and load capacitance of 0.1 pf. Calculate dynamic power consumption.

**Q3)** a) Write a short note on RAM. [8]

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

OR

**Q4)** a) Explain SRAM in detail. [8]

b) What are the refresh circuits in detail. [8]

**Q5)** a) What are synthesizable and non-synthesizable statements in VHDL? With suitable examples explain in detail. [9]

b) What are subprograms? Explain function with VHDL code for any one circuit. [9]

OR

**P.T.O.**

- Q6)** a) Differentiate between signals and variables. [5]  
b) Write short note on metastability. [5]  
c) Explain with example different modeling styles in VHDL programming. [8]

**SECTION-II**

- Q7)** a) Compare PROM, PLA, PAL and CPLD. [9]  
b) How logic is getting implemented in CPLD and FPGA? Explain with example. [9]

OR

- Q8)** a) With suitable diagram explain structure of FPGA. [9]  
b) Explain need of PLD technologies? Enlist important limitations of CPLD? [9]

- Q9)** a) What is need of Design for testability? [8]  
b) Explain TAP Controller in detail. [8]

OR

- Q10)** a) Explain different types of faults? [8]  
b) Write short note on Boundary scan check. [8]

- Q11)** a) Give different clock distribution techniques in detail. [8]  
b) Enlist and explain interconnect routing techniques. [8]

OR

- Q12)** a) What is signal integrity? Explain important issues in chip design. [8]  
b) Write short note on Supply and ground bounce. [8]



Total No. of Questions : 12]

SEAT No. :

**P2709**

**[5154]-93**

[Total No. of Pages : 2

**B.E. (Electronics)**

**EMBEDDED SYSTEM**

**(2008 Pattern) (404203) (Semester - I)**

*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) Define embedded system. Explain Characteristics of embedded system. [8]
- b) Explain following design metrics [10]
- |                  |                    |
|------------------|--------------------|
| i) NRE cost      | ii) Time to market |
| iii) Flexibility | iv) Power          |
| v) Size          |                    |

OR

- Q2)** a) Explain following communication protocol. [10]
- |               |             |
|---------------|-------------|
| i) Blue-tooth | ii) Zig-bee |
|---------------|-------------|
- b) Explain software development process of embedded system. [8]
- Q3)** a) What is RISC Design philosophy? Why RISC architecture is more popular for embedded system? [8]
- b) What are processor selection criterion for embedded application. [8]

OR

- Q4)** a) What are memory selection criterion for embedded application. [8]
- b) Compare GPP, SPP and ASIP processor technologies [8]
- Q5)** a) Explain data flow model of ARM-7 processor. [8]
- b) With reference to programming model of ARM-7, explain various registers used in user and supervisor mode of operation. [8]

OR

**P.T.O.**

- Q6)** a) Explain CPSR and SPSR status register in ARM-7. [8]  
 b) Explain following register w.r.t ARM-7 [8]  
 i) PINSEL ii) IODIR  
 iii) IOSET iv) LOPIN

**SECTION - II**

- Q7)** a) With neat diagram explain LPC 2148 architecture. [8]  
 b) Explain 16×2 LCD interface with LPC 2148. Also write ALP to display 'Hello' on LCD. [8]

OR

- Q8)** a) Explain following on-chip ADC registers. [8]  
 i)ADDR ii)ADCR. Also write algorithm for A to D conversion.  
 b) How embedded C is different than C? Explain with example. [8]

- Q9)** a) What is RTOS? Explain features of  $\mu$ cos-II. [8]  
 b) With the help of state transition diagram, explain multitasking in  $\mu$ cos-II. [8]

OR

- Q10)**a) What is Semaphore? Explain Semaphore management functions in  $\mu$ cos-II. [8]  
 b) With an example explain shared data problem. How this problem can be avoided. [8]

- Q11)**a) With block diagram explain cruise control system in automotive. [10]  
 b) What is priority inversion problem? How this problem can be solved?[8]

OR

- Q12)**a) With block diagram explain digital camera. [10]  
 b) Explain following functions in  $\mu$ cos-II  
 i) OSQPend( ) ii) OSMempart( )  
 iii) OSMboxPost( ) iv) OS TimeDly( ) [8]



Total No. of Questions : 12]

SEAT No. :

**P2710**

**[5154]-94**

[Total No. of Pages : 3

**B.E. (Electronics)**

**ADVANCED MEASUREMENT SYSTEMS**

**(2008 Pattern) (Elective - I) (404204) (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) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6 from Section - I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.*
- 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 different features of MSO and its applications in electronics measurements. **[8]**
- b) What are signal integrity testing challenges and possible solutions? **[8]**

OR

- Q2) a)** Draw and explain Arbitrary Waveform generator and its typical applications. **[8]**
- b) State and explain Electrical Validation and debug with MSO series oscilloscopes. **[8]**
- Q3) a)** Elaborate the different trigger capabilities of logic analyzer that differentiate it from other equipments. **[8]**
- b) What is meant by spectrum analysis? List types of spectrum analyzer. What are the applications of spectrum analyzer? What are its limitations? **[8]**

OR

- Q4) a)** Draw and explain block diagram of network analyzer and state its applications. **[8]**
- b) Explain the triggering controls used in analog and digital oscilloscope. What are the special trigger settings available only in digital oscilloscope. **[8]**

**P.T.O.**

- Q5)** a) Explain role of Electronic measurements for Electronic Central Unit [ECU] in automotive system. [8]
- b) Write a short note on: (Any two) [10]
- i) USB standard.
- ii) CAN bus.
- iii) PCI Express.

OR

- Q6)** Write short notes on: [18]
- a) Role of I2C standard in embedded system.
- b) GSM modem and AT command.
- c) RF modules in embedded system.

### **SECTION-II**

- Q7)** a) Draw and explain the fundamental set up for advanced radar system. [8]
- b) Explain single line cavity coupling system for wavelength measurement. [8]

OR

- Q8)** a) Explain different attenuation measurement techniques in microwave network. [8]
- b) Explain measurement of microwave power bridge circuit using thermistors and barraters. [8]

- Q9)** a) Discuss in details of Virtual instruments and its components. [8]
- b) Explain lab view based data acquisition system design. [8]

OR

- Q10)** a) What are advantages and disadvantages of virtual instruments. [8]
- b) Explain SCPI coding with respect to virtual instrumentation.. [8]



**Q11)**a) Explain the concept of ADC. List various types and explain any two types of ADC in detail. **[10]**

b) Explain the following terms:

i) Measurement errors in counter.

ii) Application of counter for capacitance meter. **[8]**

OR

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

a) Universal counter.

b) V to F converter.

c) Sample and hold.

d) Analog Multiplexer.



Total No. of Questions : 12]

SEAT No. :

**P2711**

**[5154]-95**

[Total No. of Pages : 3

**B.E. (Electronics)**

**ADVANCED POWER ELECTRONICS**

**(2008 Pattern) (Elective - I) (404204 B) (Semester - I) (Theory)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain with circuit diagram & waveforms, working 3 phase IGBT based PWM rectifier with suitable load. [10]
- b) Explain the working of 12 - pulse converter with its advantages. [6]

OR

- Q2)** a) Explain the working of double sided PWM converter system. [10]
- b) Explain working of cycloconverter based induction motor drive. [6]
- Q3)** a) Explain microcontroller based DC drive system. [8]
- b) What is Phase Locked Loop Control System? Explain with diagram speed control of DC Motor using PLL for varying load conditions. State its advantages & disadvantages. [8]

OR

- Q4)** a) Explain direct vector control method of induction motor. [8]
- b) Explain working of sliding mode bi-directional controlled boost inverter. [8]

**P.T.O.**

- Q5) a)** What are different types of advanced modulation techniques used in inverters? Explain any two types. State its advantages. [10]
- b) Explain working of variable DC-Link inverter? State its advantages and disadvantages. [8]

OR

- Q6) a)** What is the concept of Multi-Level Inverters? Explain with circuit diagram working of cascaded Multi-level inverter and state its features. [10]
- b) Write short notes on any two : [8]
- i) Adaptive control technique of induction motor
  - ii) Space vector modulation.
  - iii) Single phase series converters.

### **SECTION-II**

- Q7) a)** Explain with circuit diagram & waveforms working of ZCS Resonant converter. Compare ZCS and ZVS Resonant converters. [10]
- b) What is Hot Swappable Redundant Power Supply? Explain. [6]

OR

- Q8) a)** What are low drop out Regulators? Explain. [8]
- b) What are Bi-Directional Power Supplies? Explain. [8]

- Q9) a)** What are different types of Renewable energy sources? Explain the role of DC to DC converters in variable wind energy conversion system. [10]
- b) What are traction drives. Explain. [6]

OR

- Q10) a)** Explain solar battery powered drives. [8]
- b) Explain Z-source inverters. [8]

- Q11)**a) What is solar power conditioning? Explain in brief. [8]
- b) What is power quality? Mention different power line disturbances. Suggest preventive & nullifying measures for these disturbances. [10]

OR

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

- a) Energy Audit.
- b) HVDC system.
- c) FACTS (Flexible AC Transmission System).
- d) Battery chargers.



Total No. of Questions : 12]

SEAT No. :

**P2712**

**[5154]-96**

[Total No. of Pages : 2

**B.E. (Electronics)**

**BIOMEDICAL INSTRUMENTATION**

**(2008 Pattern) (Semester - I) (404204 C) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any three questions from section I and Section II*
- 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) Discuss ten most important factors to be considered in the design of medical instruments. **[10]**

b) With the Block schematic explain the Finger Plethysmography for peripheral pulse Monitoring. **[8]**

OR

**Q2)** a) Discuss chemical sensor for measurement of PH, Po<sub>2</sub>, Glucose & O<sub>2</sub>. **[10]**

b) Explain action potential, resting 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) Explain the effect of various artifacts on recording of BioMedical Signals. **[8]**

OR

**Q4)** a) Name the different type of EMG. Explain the procedure to perform EMG with the help of neat block diagram. **[8]**

b) Draw and explain the 10 – 20 Electrodes Systems for EEG Recording? **[8]**

**Q5)** a) Amplitude of R wave in lead I = 12mm, Lead III =6mm, Sensitivity = 10mm/mV. What is value of Lead II, aVR, aVL & aVF. **[8]**

b) Explain the Bipolar Limb leads with their configuration and standard Waveforms. **[8]**

OR

**P.T.O.**

- Q6)** a) Write a short note on Stress Test System. [8]  
b) Explain with neat diagram Cardio Vascular system. [8]

**SECTION-II**

- Q7)** a) Write short note on power sources for implantable pacemakers. [8]  
b) Write short note on DC defibrillator. [8]

OR

- Q8)** a) Draw the Block diagram and explain the essential features of Central Monitoring System for an critical care unit in the Hospital. [8]  
b) Draw and explain Echocardiography. [8]

- Q9)** a) Explain the automatic optical method for measurement of RBC & WBC. [8]  
b) Describe the working of Flame photometer. [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) Explain the working principle of MRI. Draw the block diagram of MRI machine & explain it in detail. [10]  
b) Write short note on Amalgamator. [8]

OR

- Q12)**a) Name the detector used in CT scanner. Explain each of them with their feature. [10]  
b) Explain how LASER is used in vision correction. [8]



Total No. of Questions : 12]

SEAT No. :

**P2713**

**[5154]-97**

[Total No. of Pages : 2

**B.E. (Electronics Engg.)  
MECHATRONICS**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** a) Define mechatronics systems. Explain the key elements of mechatronics in detail. **[8]**

b) What are different mechanical components? With their major functions. **[8]**

OR

**Q2)** a) State different types of gears. With their applications in detail. **[8]**

b) Explain the stepwise design procedure for any one mechatronic system with suitable example. **[8]**

**Q3)** a) Explain working principle of LVDT for pressure measurement in detail. **[8]**

b) What do you mean by elastic system modelling. Explain in detail. **[8]**

OR

**Q4)** a) Compare DC motors and servomotors. **[8]**

b) Explain in detail proximity sensor. **[8]**

**Q5)** a) What are the important specifications of ADC and DAC? Explain in detail. **[8]**

b) Define the term mechanical actuators? Explain different types of mechanical actuators with suitable examples. **[10]**

OR

**P.T.O.**

- Q6)** a) Explain variable frequency drives with neat block diagram. [8]  
b) Write short note on [10]  
i) Pneumatic system  
ii) Hydraulic system

**SECTION - II**

- Q7)** a) Explain in detail the conceptual design of mobile robot. [8]  
b) What are special requirements of mechatronics that differentiate from classic system and control design. [8]

OR

- Q8)** a) Explain RS - 232 standard in detail. [8]  
b) Explain in detail principle and working of magnetic recorder. [8]

- Q9)** a) Explain UART in detail. [8]  
b) Explain in detail the operation of CNC machine. [8]

OR

- Q10)**a) Describe General purpose Interface Bus standard. [8]  
b) Explain in detail the architecture of PLC. [8]

- Q11)**a) Write short notes on: [8]  
i) Signal conditioning  
ii) Signal conversion  
b) Explain a data logger for a milk filling plant having conveyor based filling and sealing system. [10]

OR

- Q12)**a) Explain a data logger for a coffee vending machine using its standard accessories. [8]  
b) Explain a data acquisition system using any three standard parameters as a mechatronics case study. [10]

**x x x**



Total No. of Questions : 12]

SEAT No. :

**P2714**

**[5154]-98**

[Total No. of Pages : 3

**B.E. (Electronics)**

**ADVANCED COMPUTER ARCHITECTURE**

**(2008 Pattern) (Semester - I) (Elective - II) (404205 A)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

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

OR

- Q2)** a) Explain in brief Feng's classification and Handler's classification for parallel computer architectures. [8]
- b) State various applications of parallel processing. Explain the application of parallel processing in weather forecasting. [8]
- c) Explain instruction level parallelism. [2]

- Q3)** a) What are different types of hazards caused in pipeline? How can these hazards be detected and resolved? [8]
- b) Explain the following terms w.r.t pipeline processor. [8]
- i) Data buffering                      ii) Job sequencing  
iii) Internal forwarding              iv) collision prevention

OR

**P.T.O.**

- Q4)** a) Compare [8]  
i) Superscalar & VLIW processor  
ii) static & Dynamic pipeline  
b) What do you mean by EPIC? State and explain features of EPIC [8]

- Q5)** a) What are the issues in vector processing? Explain. [8]  
b) Explain pipeline chaining with example. [8]

OR

- Q6)** a) What are array processor? Explain parallel sorting on array processor. [8]  
b) Explain [8]  
i) Vector loops.  
ii) Vector processing.

### **SECTION - II**

- Q7)** a) Explain static and dynamic network topologies used in interconnection networks. [10]  
b) Explain matrix multiplication algorithm to multiply two matrix using array processor. [8]

OR

- Q8)** a) Explain cube interconnection network & hypercube interconnection network. [10]  
b) Explain SIMD architecture. [8]

- Q9)** a) Explain loosely and tightly coupled multiprocessor system with example. [8]  
b) Give typical architecture for massively parallel processor (MPP). Explain in detail. [8]

OR

- Q10)a)** What is memory contention? What are the different techniques for reducing memory contention? Explain [8]
- b) Explain in detail chip multiprocessing. [8]

- Q11)a)** Discuss in brief latency hiding techniques. [8]
- b) Explain synchronous & asynchronous message passing in parallel programming. [8]

OR

- Q12)a)** Explain following primitive w.r.t parallel programming. [8]
- i) Send ( );
  - ii) Receive ( );
  - iii) Fork ( );
  - iv) Join ( );
- b) Explain: Data parallel programming techniques. [8]



Total No. of Questions : 12]

SEAT No. :

**P2715**

**[5154]-99**

[Total No. of Pages : 3

**B.E. (Electronics)**

**ENTREPRENEURSHIP AND BUSINESS PLANNING**

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

*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) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn whenever necessary and Figure 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) Enumerate the various characteristics of the Successful Entrepreneurs. [8]  
b) State the Financial and Non-Financial Goals of an Entrepreneur. [5]  
c) Explain how are the entrepreneurs different from employees. [5]

OR

- Q2)** a) What are the basic rules to be followed in writing the business Letters. [8]  
b) Explain in brief any four Transactions of Sales. [6]  
c) Explain the terms: [4]  
i) Consensus Based Decision Making.  
ii) Brainstorming.

- Q3)** a) Explain the terms: [8]  
i) Fixed Cost and Variable Cost.  
ii) Marginal Benefit and Marginal Cost.  
b) State the role of Government in Market Economy. [8]

OR

**P.T.O.**

- Q4)** a) Explain the Partnership Business, its advantages, Dis Advantages and its Partnership agreement in Detail. [8]  
b) Explain the Family Business, its advantages, Dis Advantages in detail. [8]

- Q5)** a) Explain the concept of Business Plan. [8]  
i) Purpose of Business Plan.  
ii) Importance of Business Plan.  
iii) Creating effective Business Plan.  
b) Explain the steps involved in performing Market Research. [8]

OR

- Q6)** a) State the Advantages and Disadvantages of Newspaper and Television Advertising. [8]  
b) Write a short note on: Assets and Liabilities. [4]  
c) Write a short note on : Short Term, Mid Term and Long Term Goals. [4]

**SECTION - II**

- Q7)** a) How can you motivate the employees? Why should you delegate and listen to your employees. [6]  
b) Explain any three types of Non-Salary benefits your Business might offer to employee. [6]  
c) State the various sources of Recruitments. [6]

OR

- Q8)** a) What is an Income Statement? Explain the four parts of the income Statement. [6]  
b) What are the different training techniques. [6]  
c) State the various leadership characteristics. [6]

- Q9) a)** Explain types of Professionals that provide the Financial Managements Services. Also state how to choose the financial advisor. [8]
- b) Explain the concept related to e-Tendering. Also specify the steps related to registering for e-Tender. [8]

OR

- Q10)a)** Assume your office is to be set up with modern computing facilities having a LAN of 06 Workstations. So suggest the best configuration of PC's, Networking, Printers, Scanners, Security Cameras, Billing Systems etc. [8]
- b) What is meant by Break Even Analysis. Explain with Diagram. [8]

- Q11)a)** Explain the laws that protect the interest and right of the Employees. [8]
- b) Write a short note on: Business Ethics. [8]

OR

- Q12)a)** What is an International Business Plan? Also state what it should include. [8]
- b) What factors should be considered before deciding to expand your business. [8]



Total No. of Questions : 12]

SEAT No. :

**P2716**

**[5154]-100**

[Total No. of Pages : 2

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

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** a) Elaborate the process of MEMS fabrications in detail. [8]

b) Discuss the various micromachining processes. [8]

OR

**Q2)** a) Explain the working principle of mechanical transducers in detail. [8]

b) Enlist the issues encountered in micro-machining process. [8]

**Q3)** a) Discuss the various digital controls of MEMS design. [8]

b) Compare the sliding controls and analog controls of MEMS. [8]

OR

**Q4)** a) Enlist the various properties and piezo-resistors electric materials. [8]

b) Explain the material selection strategy for a typical MEMS design. [8]

**Q5)** a) Write a technical note on MEMS biosensors. [9]

b) Describe the principle operation and fabrication process of electromagnetic and thermal micro actuators. [9]

OR

**Q6)** a) Explain the principle of chemical and biological transducers. [9]

b) Describe the principle operation and applications of chemical actuators. [9]

**P.T.O.**

**SECTION - II**

- Q7)** a) Explain in detail the Microsystems technology and applications. [8]  
b) What are the various issues in design of digital media. [8]

OR

- Q8)** a) Explain the step wise process of System on chip design. [8]  
b) What are the various compilation techniques of digital media. [8]

- Q9)** a) What are the advantages and disadvantages of structural synthesis. [8]  
b) Explain the need of design for testability. [8]

OR

- Q10)**a) Write a short technical note on ASIC micromachining processes. [8]  
b) Give the general overview of physical design automation. [8]

- Q11)**a) Elaborate the concept of hardware software co-design issues. [9]  
b) Explain the process of testing the microsystems. [9]

OR

- Q12)**a) With proper example explain the stuck at 1 fault model. [9]  
b) Write a note on mechanical packaging of MEMS systems. [9]





Total No. of Questions : 12]

SEAT No. :

**P2717**

**[5154]-101**

[Total No. of Pages : 3

**B.E. (Electronics Engineering)  
ROBOTICS AND AUTOMATION  
(2008 Course) (Elective - II) (Semester - I) (404205 D)**

*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 answer 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]**
- 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

**P.T.O.**

- Q4) a)** For the point  $4i + 2j + 10k$ , perform following operations [8]
- i) Rotate 30 deg about x-axis.
  - ii) Translate 3 units along y-axis
  - iii) Rotate 45 deg about x-axis & translate 4 units along y-axis.
  - iv) 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]
- i) Slider - Crank mechanism
  - ii) 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  $50 \text{ degrees/second}^2$ . Calculate all segment velocities, blend times and linear time. [10]
- b) Explain how straight line motion can be achieved using an Articulated Robot. [8]

- 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]

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2718**

**[5154]-102**

[Total No. of Pages : 3

**B.E.(Electronics)**

**COMPUTER NETWORK AND SECURITY**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, from Section - I*
- 2) *Attempt Q.7 or Q.8, Q9 or Q10, 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) Define four types of network and give applications of each. [8]  
b) Draw TCP/IP reference model and explain the function of each layer.[8]

OR

- Q2)** a) Enlist the advantages and disadvantages of computer networks. [4]  
b) Justify the horizontal and vertical communication in a network. [4]  
c) How does ATM work? [8]

- Q3)** a) Draw a network model depicting protocols at each layer. [4]  
b) Describe the working of FTP, TELNET and give its application. [8]  
c) What is POP3 and where does it work? [4]

OR

- Q4)** a) Discuss ICMP. [6]  
b) Write a note on WWW. [6]  
c) What is the significance of TFTP and PING? [4]

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

- Q5)** a) How to classify Class A, B, C, D and E addresses? Explain with example. [6]  
b) Explain Shortest path algorithm. [8]  
c) What is intradomain and interdomain routing? [4]

OR

- Q6)** a) Explain connection oriented and connectionless service with an example. [6]  
b) Explain how jitter and delay contribute to Quality of Service. [6]  
c) Write a short note on Gigabit Ethernet. [6]

**SECTION-II**

- Q7)** a) What are the design issues at Data link layer? Explain in brief. [6]  
b) Discuss any two elementary protocols at Data link layer. [6]  
c) How does CSMA work? What is the difference between CSMA and CSMA/CD? [6]

OR

- Q8)** a) With appropriate diagram explain the working of IEEE 802.4. [6]  
b) Draw a network model depicting components used at various layers. [6]  
c) Draw the architecture of 802.11 and explain working of each layer. [6]

- Q9)** a) Explain the working of Optical fiber as transmission media with an application. [6]  
b) What is Shannon's theorem? When and why is it used in computer networks? [4]  
c) How does cable over internet work? Explain with a diagram. [6]

OR

- Q10)**a) With example explain the working of Circuit switching. [6]  
b) Compare Circuit and virtual switching. [6]  
c) What are various DSL technologies? [4]

- Q11)**a) Explain the cryptography model with diagram. [4]  
b) Explain AES algorithm. [6]  
c) What is the need of a security model? Explain with diagram. [6]

OR

- Q12)**a) What is Asymmetric key cryptography? explain with an example. [6]  
b) why is a network simulator needed? [4]  
c) List and briefly explain various methods to access internet. [6]



Total No. of Questions : 12]

SEAT No. :

**P2719**

[Total No. of Pages : 2

**[5154]-103**

**B.E. (Electronics)**

**PROCESS AUTOMATION**

**(2008 Course) (Semester-II) (404208)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three questions from each section.*
- 2) *Answer three questions from Section I and three questions from Section II.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *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 a diagram of temperature control loop and explain the functions of each component. [8]
- b) Explain the standard electronic and pneumatic signals. Also explain the concept of elevated zero and suppressed zero. [8]

OR

- Q2)** a) Explain the following performance evaluation indices
- |            |           |     |
|------------|-----------|-----|
| i) ISE,    | ii) IAE,  |     |
| iii) ITSE, | iv) ITAE. | [8] |
- b) Explain human aided control and automatic control with the help of suitable examples. [8]

- Q3)** a) Explain the open loop transient response ziegler Nichol's method for PID tuning. [8]
- b) Draw and explain pneumatic PI controller. [8]

OR

- Q4)** a) Explain the concept of proportional band and offset in proportional action. How integral action removes the offset? [8]
- b) Draw and explain op-amp based PI controller. [8]

**P.T.O.**

- Q5)** a) List different control valves and give their applications. [10]  
b) Write a note on valve positioner. [8]

OR

- Q6)** a) Explain different noises in control valve. [10]  
b) Draw a typical control valve and explain its functioning. [8]

**SECTION-II**

- Q7)** a) Explain feed forward control scheme and gives its features. [10]  
b) Explain self tuning regulator with the help of neat block diagram. [8]

OR

- Q8)** a) Explain internal model control (IMC) and its design process. [10]  
b) Explain ratio control with the help of block diagram. Give its two examples. [8]

- Q9)** a) Classify robots and gives their applications. [8]  
b) Explain feed forward control scheme for heat exchangers. [8]

OR

- Q10)** Explain boiler instrumentation for feed back and feed forward control schemes. [16]

- Q11)** Write short notes on [16]  
a) Recorders  
b) Alarm annunciator

OR

- Q12)** Write short notes on [16]  
a) Distributed Control System (DCS)  
b) Direct Digital Control (DDC)





Total No. of Questions : 12]

SEAT No :

**P2720**

**[5154]-104**

[Total No. of Pages :3

**B.E (Electronics)**

**AUDIO & VIDEO ENGINEERING**

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

*Time : 3 Hours*

*Max. Marks : 100*

*Instructions to candidates:*

- 1) *Attempt Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8, Q.9 OR Q.10, Q.11 OR Q.12.*
- 2) *Answers to the two sections should be written in separate 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 following terms- **[10]**
- i) Horizontal resolution.
  - ii) Vertical resolution.
  - iii) Interlaced scanning.
  - iv) Kell factor.
  - v) CFF.
  - vi) Aspect ratio.
- b) State the various display devices & explain operation of any one display device indicating advantages & drawbacks. **[8]**

OR

- Q2) a)** Sketch the composite video signal used in color TV transmission, and explain various terms associated with it. **[8]**
- b) Explain - **[10]**
- i) Mixing of colors.
  - ii) Chromaticity diagram.

*P.T.O.*

**Q3) a)** Draw a neat block diagram of NTSC decoder & explain function of each block. [8]

b) Explain the use of wobbuloscope & pattern generator while identifying the faults in color TV. [8]

OR

**Q4) a)** Compare high level transmitter with low level transmitter. [8]

b) With the help of neat block diagram explain SECAM system, used for color TV. [8]

**Q5) a)** State the advantages of digital TV. Explain the digital TV signals & parameters associated with it. [8]

b) Draw a neat block diagram of MPEG -2 decoder & explain function of each block. [8]

OR

**Q6) a)** Explain operation of digital TV transmitter using neat block diagram. [8]

b) Compare - [8]

i) Analog TV with Digital TV.

ii) MPEG-1 with MPEG-4

## SECTION-II

**Q7) a)** State the advantages of HDTV. With the help of neat block diagram explain HDTV transmitter and receiver. [10]

b) Explain the operation of set top box with recording facility using neat block diagram. [8]

OR

**Q8) a)** Explain the CCTV & CATV system. [10]

b) Draw a neat block diagram of DTH service & explain function of each block. [8]

**Q9) a)** Explain the playback process of compact disc with suitable diagram. [8]

b) Discuss the various audio compression standards. [8]

OR

**Q10) a)** Draw a neat block schematic of DVD player & explain function of each block. [8]

b) Compare - [8]

i) CD player with DVD player.

ii) Analog sound recording with digital sound recording.

- Q11)a)** Discuss in detail the various requirements of PA system. [8]  
b) Explain the special type of speakers indicating their advantages, drawbacks & applications. [8]

OR

- Q12)a)** What is reverberation time? Explain its importance & the factors on which reverberation time depends. [8]  
b) What is the purpose of equalizers & digital filters? Explain any one equalizer with suitable diagram. [8]



Total No. of Questions : 12]

SEAT No :

**P2721**

**[5154]-105**

[Total No. of Pages :3

**B.E.(Electronics)**

**IMAGE PROCESSING AND MACHINE VISION  
(2008 Course)(Semester-II) (Elective-III) (404209 B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to candidates:*

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

**SECTION-I**

**Q1)**a) Explain the phenomena of brightness adaptation and simultaneous contrast. **[8]**

b) Explain one technique for Image Acquisition in detail. **[10]**

OR

**Q2)**a) Explain monochrome vision model. **[10]**

b) With the help of block diagram explain the fundamental steps in Digital Image processing. **[8]**

**Q3)** a) What is power Law Transformation and where is it used? **[8]**

b) What is histogram equalization? Perform the equalization of the image segment I. **[8]**

$$I = \begin{vmatrix} 10 & 12 & 8 & 9 \\ 10 & 12 & 12 & 14 \\ 12 & 13 & 10 & 9 \\ 14 & 12 & 10 & 12 \end{vmatrix}$$

OR

**P.T.O.**

**Q4)**a) Filter the given image  $F(m,n)$  using 3x3 averaging using zero padding. [8]

$$F(m,n) = \begin{vmatrix} 1 & 2 & 3 & 2 \\ 4 & 2 & 5 & 1 \\ 1 & 2 & 6 & 3 \\ 2 & 6 & 4 & 7 \end{vmatrix}$$

b) Discuss the homomorphic approach for image enhancement. [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) With the help of neat block diagram explain Lossless Predictive coding. [10]

b) Explain the Image Pyramid used for Multiresolution image Analysis. [8]

OR

**Q8)** a) Enlist different variable length coding techniques? Explain any one with example. [10]

b) With the help of block diagram explain two band subband coding and decoding system. [8]

**Q9)** a) Give the algorithm for 4- neighborhood & 8-neighborhood region identification. What is Label Collision? [8]

b) What is Texture? Explain how it can be described with statistical parameters. [8]

OR

- Q10)a)** Define [8]
- i) Eulers's number
  - ii) Projection
  - iii) Eccentricity
  - iv) Elongatedness
- b) Differentiate between contour based and region based shape representation. [8]

- Q11)a)** Discuss the basic principles of Syntactic pattern Recognition. [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) Explain the terms world co-ordinates, camera co-ordinates and image co-ordinates with respect to single perspective camera. [8]



Total No. of Questions : 12]

SEAT No :

**P2722**

**[5154]-106**

[Total No. of Pages :3

**B.E.(Electronics)**

**OPTICAL AND MICROWAVE COMMUNICATION**

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

*Time : 3 Hours*

*Max. Marks : 100*

*Instructions to 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 section 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)** Define and explain the following terms of fibers. **[8]**
- i) Critical angle.
  - ii) Index profile.
  - iii) Refractive index.
  - iv) Numerical aperture.
- b) State and explain the advantages and disadvantages of fiber optic communication system. **[8]**

OR

- Q2) a)** Compare the following terms. **[8]**
- i) Single mode fiber and multimode fiber
  - ii) Pin photodiode and Avalanche photodiode
- b) Explain in detail the different types of fiber optic sensors. **[8]**
- Q3) a)** List three major causes of attenuation in an optical fiber and explain their mechanisms. **[8]**
- b) Describe in detail the pulse broadening in graded index fibers. **[8]**

OR

- Q4) a)** Explain any two passive components in optical network. **[8]**
- b) Write a short note on SONET/SDH optical network. **[8]**

*P.T.O.*

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

OR

- Q6)** a) Write short notes on the following . [12]  
 i) Laser melting and trimming of material  
 ii) Removal of tumours of vocal cards  
 iii) Moire fringes  
 b) Describe the various laser instruments used for surgery. [6]

## SECTION II

- Q7)** a) State and explain the properties of S parameter. [6]  
 b) The  $TE_{10}$  mode is propagated in a rectangular waveguide of dimensions  $a=6$  and  $b=4$  cm. Distance between maximum and minimum is found to be 4.55cms. Find the frequency of the wave. [6]  
 c) Describe any two applications of Magic Tee. [4]

OR

- Q8)** a) Explain the construction and working of an Circulator in detail. [6]  
 b) Explain the performance parameters of directional coupler. [6]  
 c) Write scattng matrix of E plane, H plane and EH plane tee. [4]

- Q9)** a) Explain the construction and working of reflex klystron in detail. [8]  
 b) What are slow wave structures? Explain how a helical travelling tube amplifies the input signal [6]  
 c) Write a short note on TWT. [4]

OR

- Q10)**a) A reflex klystron operates at 8 GHZ at peak of  $n=2$  mode with  $V_0=300$  V,  $L=1$ mm,  $R_{sh}=20$  k $\Omega$ . If the gap transit time and beam loading are neglected, find [8]  
 i) Repeller voltage  
 ii) Beam current necessary to obtain an RF gap voltage of 200V.  
 b) Explain the working of cylindrical magnetron with neat diagram. [6]  
 c) Can we vary the frequency of reflex klystron oscillations? If yes, how? [4]



- Q11)** a) What is the varactor diode? Give its construction, working principle and explain any one application. [8]
- b) Explain terrestrial and satellite based microwave communication system in detail. [8]

OR

- Q12)** Write short notes on the following along with applications. [16]
- a) Tunnel diode as an oscillator
  - b) LSA mode of gunn diode
  - c) Schottky diode
  - d) PIN diode as an modulator



Total No. of Questions : 12]

SEAT No :

**P2723**

**[5154]-107**

[Total No. of Pages :3

**B.E.(Electronics Engineering)**

**SOFT COMPUTING TOOLS**

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

*Time : 3 Hours]*

*[ Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION I**

**Q1)** Write short notes on any three .

**[18]**

- i) Hard Computing and its limitations.
- ii) Role of Neural networks in soft computing.
- iii) Intelligent system
- iv) What is fuzzy set theory? Explain with examples

OR

**Q2) a)** What is fuzzification? Enlist various methods of membership value assignments and explain any one method with suitable example. **[8]**

- b) It is required to compare two sensors based on their detection levels and gain settings. The following table of gain settings and sensor detection levels with a standard item being monitored provides typical membership values to represent detection levels for each of the sensors. **[10]**

Gain setting	sensor1 detection levels	sensor 2 detection levels
0	0	0
15	0.40	0.25
30	0.55	0.45
45	0.75	0.70
60	0.90	0.85
75	1.00	1.00

The universe of discourse is:  $X = \{0, 15, 30, 45, 60, 75\}$

**P.T.O.**

Compute the membership functions for two sensors and the following membership functions using standard set operations.

- i)  $\mu_{S_1 \cup S_2}(x)$
- ii)  $\mu_{S_1 \cap S_2}(x)$
- iii)  $\mu_{\overline{S_1}}(x)$
- iv)  $\mu_{\overline{S_2}}(x)$
- v)  $\mu_{\overline{S_1 \cap S_2}}(x)$

**Q3) a)** Consider fuzzy relations:

$$R = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \begin{bmatrix} 0.75 & 0.55 \\ 0.80 & 0.40 \end{bmatrix} \end{matrix}, \quad S = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \begin{bmatrix} 0.8 & 0.6 & 0.3 \\ 0.2 & 0.7 & 0.5 \end{bmatrix} \end{matrix}$$

Find the relation T= ROS using max-min and max - product composition. [8]

- b) Explain the following terms with a suitable example: [8]
  - i) Support
  - ii) Core
  - iii) Boundary
  - iv) Normal and subnormal fuzzy sets.

OR

- Q4) a)** What is composite linguistic variable? Explain the use of concentration and dilation operations. [8]
- b) What is fuzzy rule? Explain different forms of fuzzy rules in detail. [8]

- Q5) a)** Which are the principle design parameters of a fuzzy logic controller? Explain with a suitable example [8]
- b) What are the advantages of fuzzy logic controllers over that of a conventional controllers. [8]

OR

- Q6) a)** Design a fuzzy inference system for inferring the speed of a motor in rpm(range 0 to 2000), the inputs being temperature (range 0 to 80°C) and humidity (range 0 to 100%RH). Use suitable membership functions and use Mamdani inference rule. [10]
- b) Explain the TSK fuzzy Model with a suitable example. [6]

**SECTION II**

- Q7)** a) What is a perceptron network? State the algorithm for perceptron learning. [8]  
 b) Draw and explain the structure of a biological neuron. Draw its electrical model. [8]

OR

- Q8)** a) Using Mc Culloch pitts neuron implement a bipolar AND function. Assume initial weights to be [1,1]. [8]  
 b) Train a preceptron network for learning a binary OR gate function. Workout two complete iterations. [8]

- Q9)** State the applications of Artificial Neural Network and explain any two in details. [16]

OR

- Q10)** Train a radial basis function Network to solve the XOR problem shown below. [16]

Input - output table	Network parameters															
<p>X1, X2 are inputs and Y is output</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th>X1</th> <th>X2</th> <th>Y</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	X1	X2	Y	0	0	0	0	1	1	1	0	1	1	1	1	<p>Assume two cluster with centers as <math>C1=[0,0]</math> and <math>C2=[1,1]</math>, select the two <math>\phi</math> functions as Gaussian with <math>\mu = 0</math> and <math>\sigma = \sqrt{1/2}</math></p> <p>Use direct solution approach instead of gradient descent for the supervised learning.</p>
X1	X2	Y														
0	0	0														
0	1	1														
1	0	1														
1	1	1														

- Q11)**a) What are the pros and cons of an ANFIS network? [9]  
 b) Describe the self organising map network architecture and explain the Kohonen model. [9]

OR

- Q12)**a) State and explain the essential processes in self organising feature Map network. [9]  
 b) Write short note on Modular Neural Networks. [9]



Total No. of Questions : 12]

SEAT No. :

**P3619**

[Total No. of Pages : 3

**[5154]-108**

**B.E. (Electronics)**

**ADVANCED COMMUNICATION SYSTEM**

**(2008 Pattern) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Discuss the operation of Mobile system in detail. [6]  
b) Explain Mobile point to point Lee model. [6]  
c) Describe how Spectral Capacity is increased using Cell Splitting? [6]

OR

- Q2)** a) Explain Elevation angle and reflection angle. [6]  
b) Describe different propagation paths in Mobile transmission. [6]  
c) Discuss Delay Spread and Coherence Bandwidth. [6]

- Q3)** a) Describe the following w.r.t. mobile communication [8]  
i) Handoff  
ii) Frequency Reuse  
b) Derive free space path loss equation for wireless communication. [8]

OR

**P.T.O.**

- Q4)** a) Discuss Directional antennas and Space diversity antenna [8]  
b) Explain architecture of GSM in detail. [8]

- Q5)** a) Explain security algorithm used in Mobile communication. [8]  
b) With the help of suitable example describe various interferences occurred in reception of signal. [8]

OR

- Q6)** a) “Macro cells & microcell enhances the capacity” Discuss. [8]  
b) Which are the approaches used at the cell site to increase the coverage? [8]

**SECTION - II**

- Q7)** a) Compare LEO, MEO and GEO Satellite w.r.t. orbital height, velocity, orbital period and applications. [8]  
b) Draw the block diagram and explain Communication subsystem of a satellite. [6]  
c) State and explain Kepler’s three laws of planetary motion. [4]

OR

- Q8)** a) Explain with neat block diagram double conversion transponder. [8]  
b) Explain the following terms: [6]  
i) Apogee and Perigee  
ii) Mean and True anomaly  
c) What is the function of Look angles? [4]

- Q9)** a) A satellite transponder has a bandwidth of 358.4 MHz. Earth stations use RRC filters with  $\alpha = 0.4$ . What is the maximum bit rate that can be sent through this transponder with BPSK and QPSK? [8]

b) Define & explain the following terms with reference to the digital modulation techniques used on satellite links. [8]

i) Non-uniform Quantization

ii) Symbol Error Rate

OR

**Q10)a)** Derive Bit rate and C/N ratio for BPSK System. [8]

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

i) Signal to Noise Ratio

ii) Pre-emphasis & De-emphasis

**Q11)a)** Explain with a neat diagram the TDMA frame structure. [8]

b) Explain the terms with respect to VSAT. [8]

i) Link budget

ii) Free space path loss

OR

**Q12)a)** Define and explain the meaning of VSAT? Explain various VSAT network configurations with the help of a hub. List the applications of VSAT. [8]

b) What are the various 'Multiple Access Techniques' used in modern satellite communications? Compare them. [8]



Total No. of Questions :12]

SEAT No. :

**P2724**

[Total No. of Pages :3

**[5154] - 109**

**B.E. (Electronics)**

**AUTOMOTIVE ELECTRONIC SYSTEMS**

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

*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)** What is petrol engine? Explain with neat diagram four cycle engine. [10]
- b) State & explain various system components of basic automotive system. [8]

OR

- Q2) a)** What are the various types of batteries? Compare them based on voltage range, energy content, discharge power & safety. [10]
- b) Define transmission system. Explain stages of automatic & manual transmission system. [8]
- Q3) a)** State the working principle & application of temperature sensor, accelerator pedal module, knock sensor, yaw rate sensor. [8]
- b) What are the various power train development activities where sensors are successfully used? [8]

OR

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



**Q4) a)** What is the necessity for measuring the crank, cam shaft positions, throttle position and engine speed in SI engine management system? [8]

b) Explain how the tyre pressure and brake pressure are measured in automobiles systems? [8]

**Q5) a)** What do you meant by cruise control? How do you use cruise control? Do cars with manual transmission have cruise control? [8]

b) State the types of ignition systems. Explain electronic ignition system with neat sketch. [8]

OR

**Q6) a)** Explain the following: [8]

i) Antilock braking system

ii) Anti theft system

b) State eight different ways of improving engine performance & efficiency. [8]

### **SECTION-II**

**Q7) a)** What are the biggest challenges in software development from automotive perspective? Explain any two in detail. [10]

b) State & explain factors which drive automotive processor selection?[8]

OR

**Q8)a)** Draw & explain basic block diagram of microcontroller. State various applications of microcontroller in automotive. [10]

b) Enlist Programming guidelines for automotive system development. [8]

**Q9) a)** Write a note on: [8]

i) GPS

ii) GPRS

b) Explain any two examples of automotive LIN applications. [8]

OR

- Q10)a)** State advantages & applications of any four automotive buses. [8]  
b) What do you mean by CAN arbitration & CAN error handling. [8]

- Q11)a)** Explain in brief: Safety aspects in automotive. [8]  
b) Explain future trends in automotive electronics. [8]

OR

- Q12)a)** Why is EMC important to automotive industry? What are automotive EMC requirements? [8]  
b) What are the limitations of on-boards & off-board diagnosis system?[8]

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2725**

[Total No. of Pages :3

**[5154] - 110**

**B.E. (Electronics)**

**ARTIFICIAL INTELLIGENCE (Elective - IV)**

**(2008 Course) (Semester - II) (404210 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) *Figures to the right indicate full marks.*
- 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) Formulate missionaries and cannibals problem to derive solution. Draw complete state space diagram. [8]
- b) Explain problem characteristics in detail. What are the functionalities of an agent function? [8]

OR

- Q2)** a) List the characteristics of intelligent agents. [8]
- b) Use toy problem to illustrate various problem solving methods. [8]
- Q3)** a) What is the significance of adding alpha-beta cutoffs in min-max search? Explain with example. [10]
- b) Explain constraint satisfaction problem as an incremental formulation and need of backtracking in CSP. [8]

OR

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

**Q4) a)** Elaborate on games that include an element of chance. Draw and explain game tree for backgammon game position. [10]

b) Justify relevance of game playing theory in AI with example games explored under AI domain. [8]

**Q5) a)** What is first order logic? Show with an example how it is used to represent knowledge. [8]

b) Represent the following sentences in first order logic: [8]

- Some students take French in spring 2011
- Every student who takes French passes it
- Only one student took Greek in spring 2011
- The best score in Greek is always higher than the best score in French

OR

**Q6) a)** State the rules and steps for converting a given well predicate logic statements to clausal form. [8]

b) Explain the working of unification algorithm with suitable example. [8]

### SECTION-II

**Q7) a)** What are the different learning methods? Explain them in short. [8]

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

OR

**Q8) a)** Explain the decision tree algorithm with suitable example. [8]

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

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

OR

- Q10)**a) How reinforcement learning differs from statistical learning. [10]  
b) Explain learning by decision trees. [8]
- Q11)**a) Why use NLP? What are the phases of NLP? [8]  
b) What is augmented grammar? [8]

OR

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

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2726**

[Total No. of Pages :3

**[5154] - 110-A**

**B.E. (Electronics)**

**NANOTECHNOLOGY IN ELECTRONICS**

**(2008 Pattern) (Semester - II) (Elective - IV) (404210 D)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1) a)** Explain fundamental science behind Nanotechnology. **[9]**
- b) List out the limitations of Nanotechnology with respect to semiconductor material. **[9]**

OR

- Q2) Write short notes on** **[18]**
- a) Nano sphere lift of Lithography.
  - b) Dip pen Nano Lithography.
  - c) Spectroscopy.

- Q3) a)** Explain scanning tunneling microscopy. **[8]**
- b) What are the applications of super computing devices, explain in detail. **[8]**

OR

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

- Q4)** a) Explain single electron transistor devices. [8]  
b) Draw energy band diagram of Nano crystal memory under positive gate bias of 4V. [8]
- 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 note on: [8]  
i) Single wall carbon nano tube  
ii) Multi wall

### SECTION-II

- Q7)** a) Explain Nano-electromechanical system. [6]  
b) Explain optical lithography. [6]  
c) Explain fabrication technique used for MEMS. [6]

OR

- Q8)** a) Explain electron-beam lithography. [6]  
b) Explain in detail MEMS. [6]  
c) Explain bio-morph cantilever. [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 (any two): [8]
- i) Drug delivery
  - ii) Protein engineering
  - iii) Nano-electronics interfaces
  - iv) Drugs
- b) List out & explain applications of Nano-electronics. [8]

OR

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

*EEE*



Total No. of Questions : 12]

SEAT No. :

**P2727**

**[5154]-111**

[Total No. of Pages : 3

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

**ELECTRONIC PRODUCT DESIGN  
(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each Section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *All questions carry equal marks.*
- 6) *Your answers will be valued as a whole.*
- 7) *Use of logarithmic tables slide rule. Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 8) *Assume Suitable data, if necessary.*

**SECTION-I**

- Q1)** a) What is failure rate? Explain with Both tub Curve. [10]  
b) What are different types of environmental conditions of testing of an electronic product? Explain. [8]

OR

- Q2)** a) Explain in brief.  
i) MTBF                      ii) MTTF                      iii) Reliability [6]  
b) What are the basic ergonomics requirement for product design. [12]

- Q3)** a) What are the technocommercial feasibility of a product? Discuss in details with examples. [10]  
b) Explain in brief grounding, shielding & noise reduction techniques for electronic Circuits. [6]

OR

- Q4)** a) What are the factors to be considered while designing high speed PCB design. [10]  
b) Explain important considerations for EMI/EMC in designing PCB. [6]

**P.T.O.**





Total No. of Questions : 12]

SEAT No. :

**P2728**

**[5154]-112**

[Total No. of Pages : 3

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

**VLSI Design & Technology**

**(2008 Pattern) (Semester-I) (404182) (Theory)**

*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)** Draw and explain push pull CMOS Inverter also draw small signal model of push pull Inverter. **[8]**

b) Draw and Explain non-ideal Opamp model in detail. **[8]**

OR

**Q2) a)** Explain MOS device as resistor and diode with the help of equivalent diagram. **[8]**

b) Draw schematic and explain various types of CMOS differential Amplifier? **[8]**

**Q3) a)** Explain static, dynamic and short circuit power dissipation in CMOS. **[8]**

b) Explain in details CMOS transmission gate and Design 4:1 Mux using transmission gate. **[8]**

OR

**Q4) a)** Explain CMOS Inverter's DC transfer characteristics in details. **[8]**

b) Write short note **[8]**

- i) Body effect.
- ii) Hot effect.
- iii) Technology scaling
- iv) CMOS parasitics capacitance.

**P.T.O.**

- Q5)** a) What are different Modeling styles of architecture. How to make a decision to use style of coding an architecture. [9]  
b) Write VHDL code for Traffic light controller. Assume suitable data. [9]

OR

- Q6)** a) What is the purpose of Test bench? What do you mean by full test bench? [9]  
b) Write short note on: [9]  
i) Function.  
ii) Procedure.  
iii) Configuration.

### **SECTION-II**

- Q7)** a) Write the difference between CPLD & FPGA. [8]  
b) Draw and explain detailed architecture of CPLD. [8]

OR

- Q8)** a) Explain following [8]  
i) PAL  
ii) PLA  
iii) SRAM  
iv) ASIC  
b) Draw and explain detailed architecture of FPGA [8]

- Q9)** a) Explain different types of faults? Explain stuck open and stuck short faults in details. [8]  
b) What is the need of Boundary scan check. Explain Boundary scan in details. [8]

OR

- Q10)a)** Explain Built-In-self test with examples & with suitable schematic. [8]
- b) Explain the concept of controllability and observability with the help of an example. [8]

**Q11)a)** What is clock distribution? Explain H tree and balance tree for clock distribution. [9]

- b) Write short note on I/O architecture. [9]

OR

**Q12)a)** What is power optimization? Explain the methods of optimization at various levels. [9]

- b) Explain the concept of single phase clocked and two phase clocked system. [9]



Total No. of Questions : 12]

SEAT No. :

**P2729**

**[5154]-113**

[Total No. of Pages : 3

**B.E.(Electronics & Telecommunication)  
COMPUTER NETWORKS  
(2008 Pattern) (Semester-I) (404183)**

*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 Q.7 or Q.8, Q9 or Q10, 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) Draw OSI reference model and explain functions of data link layer and presentation layer. [8]
- b) Compare circuit switching and packet switching network. [6]
- c) Explain client server network. [4]

OR

- Q2)** a) Draw and explain typical cable TV system. How cable video signal and internet data can be send over the same cable. [8]
- b) Draw TCP/IP protocol suite. List with example addresses present at every layer. [6]
- c) What is DSL? Explain. [4]

- Q3)** a) Explain Go-back - N ARQ and selective repeat ARQ protocols. [6]
- b) Explain the control field in HDLC frame. [6]
- c) Explain token bus protocol. [4]

OR

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

- Q4)** a) Explain CSMA/CD. [6]  
b) What are the common standard Ethernet implementations? Explain. [6]  
c) List the different framing methods and explain any one of them in detail. [4]

- Q5)** a) What is backbone network? What are its types? Explain with necessary diagrams. [8]  
b) With the help of diagram explain functions of ATM layers and also explain the structure of ATM cells. [8]

OR

- Q6)** a) What is IEEE 802.11? Explain wireless LAN in brief. [8]  
b) Write short notes on: [8]  
i) Gateway.  
ii) Hub.  
iii) NIC.  
iv) Routers.

## **SECTION-II**

- Q7)** a) List the various protocols giving their significance at network layer. [8]  
b) Explain the various classes of IP addressing with their respective ranges. Also list the range of private IP addresses. [8]

OR

- Q8)** a) Give the classification of commonly used Unicast Routing protocols and explain Distance Vector Routing protocol with an appropriate example. [8]  
b) With the help of diagram explain IPv4 header format in detail. [8]

- Q9)** a) Explain connection establishment and connection releasing with respect to transport layer. [8]  
b) What are the duties of transport layer? List the services provided by transport layer to upper layers. [8]

OR



- Q10)**a) Draw the TCP header. Explain the function of each field. [8]  
b) Explain QoS at transport layer, Also write about transport service primitives. [8]

- Q11)**a) Explain: FTP and Telnet protocols. [8]  
b) What is DNS? Explain the components of DNS system. [6]  
c) Write short note on electronic mail system. [4]

OR

- Q12)**a) What are the main responsibilities of Application layer? Explain in brief. [8]  
b) Explain the RSA algorithm. [6]  
c) What is URL and what are its component. [4]



Total No. of Questions : 12]

SEAT No. :

**P2730**

**[5154]-114**

[Total No. of Pages : 3

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

**DIGITAL IMAGE PROCESSING**

**(2008 Pattern) (Elective-I) (404184A) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 .*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Use separate answer sheet for each section.*
- 5) *Use of electronic pocket calculator is allowed.*

**SECTION-I**

- Q1)** a) Explain concept of connectivity between pixels in detail. [8]  
b) With the help of neat diagram explain various steps in image processing. [10]

OR

- Q2)** a) What is Brightness adaption? Explain in detail with one example. [8]  
b) Explain statistical parameters Mean, Standard Deviation, PSNR and Histogram with respect to image. Write application of statistical parameters. [10]

- Q3)** a) What are the non-linear filters? Explain with an example how median filter removes salt and pepper noise. [8]  
b) Perform histogram equalization of following 3 bit image. Plot histogram of original image & processed image. [8]

$$\begin{bmatrix} 4 & 4 & 3 & 4 & 3 \\ 3 & 5 & 5 & 5 & 4 \\ 4 & 4 & 4 & 3 & 3 \\ 5 & 5 & 3 & 3 & 4 \\ 4 & 5 & 3 & 4 & 4 \end{bmatrix}$$

OR

**P.T.O.**

- Q4)** a) What is meant by smoothing filter? Explain with the help of averaging filter. [8]  
b) Explain in brief: [8]  
i) Power law transformation  
ii) Contrast stretching.

- Q5)** a) A  $2 \times 2$  block of an image is given. Determine DCT coefficients. [8]

$$\begin{bmatrix} 4 & 4 \\ 4 & 4 \end{bmatrix}$$

- b) Write a note on 2D-Discrete Fourier transform. Explain its application in image filtering. [8]

OR

- Q6)** a) Explain properties and applications of K-L transform. [8]  
b) Compare DFT and DCT. State applications of DCT. [8]

### SECTION-II

- Q7)** a) What is meant by redundancy? List & explain any three types of redundancies. [8]  
b) Draw and explain block diagram of lossless predictive encoder & decoder. [10]

OR

- Q8)** a) What is the significance of variable length coding? State and explain its application in image processing with reference to Huffman coding. [8]  
b) Explain JPEG standard (encoder and decoder) of image compression with the help of neat block diagram. [10]

- Q9)** a) What is opening & closing operation in image morphology? Explain with its application. [8]  
b) Explain in detail: [8]  
i) Chain codes  
ii) Line Detection.

OR

**Q10)a)** What is thresholding? Explain the difference between global threshold and local threshold. State application of thresholding. [8]

b) Write a note on edge detection operation in image processing. [8]

**Q11)a)** With the help of neat block diagram explain image restoration. [8]

b) Describe remote sensing with the help of one application. [8]

OR

**Q12)a)** Explain any four noise models with respect to image processing. [8]

b) Describe finger-print recognition system with the help of block diagram. [8]



Total No. of Questions : 12]

SEAT No. :

**P2731**

**[5154]-115**

[Total No. of Pages : 3

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

**EMBEDDED SYSTEM AND RTOS**

**(2008 Pattern) (404184) (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 answer books.
- 3) Neat diagrams must be drawn wherever necessary.

**SECTION-I**

**Q1) a)** Explain following design metrics **[9]**

- i) NRE cost
- ii) Time to market
- iii) Flexibility.

b) Explain Win-CE and Android. Why Android is popular? **[9]**

OR

**Q2) a)** Compare CAN and LIN protocol. **[6]**

- b) Why RISC architecture is more preferred in embedded system. **[6]**
- c) With suitable example explain how design metric compete with each other. **[6]**

**Q3) a)** Explain on-chip ADC programming in LPC 2148. **[8]**

- b) Explain Typical usage of following memory system. **[8]**
  - i) ROM
  - ii) FLASH
  - iii) OTP ROM
  - iv) EEPROM

OR

**P.T.O.**

**Q4)** a) With neat interfacing diagram explain 4×4 keyboard interfacing with LPC-2148. [8]

b) Compare ARM7, ARM9 and cortex architecture. [8]

**Q5)** a) How embedded OS is different than traditional OS. [8]

b) Explain any two semaphore management functions in  $\mu$ cos-II [8]

OR

**Q6)** a) Explain memory management in  $\mu$ cos-II. [8]

b) With an example, explain priority inversion problem. How priority inheritance protocol resolve this problem? [8]

## **SECTION-II**

**Q7)** a) Explain Linux kernel configuration. What are different kernel configuration utilities? [8]

b) What is journaling file system? Why it is needed? [8]

OR

**Q8)** a) Explain development tools required for Linux application. [8]

b) What is RTLinux? Explain RTLinux construction. [8]

**Q9)** a) Explain features of Vxworks real time OS. [8]

b) Compare Waterfall and Vmodel for system development. [8]

OR

**Q10)**a) What are features of Symbian OS? Why it is used in smart mobile phones? [8]

b) Explain features of QNX that makes it suitable for embedded applications. [8]

- Q11)a)** Explain case study of smart phone w.r.t. **[9]**
- i) Processor
  - ii) Memory
  - iii) Operating system
  - iv) I/O devices
- b) Explain embedded system for fuel efficiency management in automotive. **[9]**

OR

- Q12)a)** Explain features of processor, memory & I/O devices required for point of sale (POS) terminal. **[9]**
- b) Explain need and use of RTOS in mobile phone. **[9]**



Total No. of Questions : 12]

SEAT No. :

**P2732**

**[5154]-116**

[Total No. of Pages : 3

**B.E. (Electronic & Telecommunication)**  
**INDUSTRIAL DRIVES AND CONTROL**  
**(2008 Pattern) (Semester - I) (Elective - I) (404184 C)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three Questions from section I and three Questions from section II*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume Suitable data, if necessary.*

**SECTION-I**

- Q1)** a) Explain source inductance effect on the operation of single phase converter. Derive expression for average output voltage ( $V_{dc}$ ) and average output current (IDC) [9]
- b) What is the need of phase controlled converter. Explain with circuit diagram and wave forms the working of three phase controlled converter with Inductive load, comment on power factor. [9]

OR

- Q2)** a) Explain with chart diagram and wave forms working of three phase half controlled converter using R-L load. Comment on power factor. Derive the equation for average load Voltage. [9]
- b) Three phase fully controlled SCR bridge converter operating from 400v, 3 phase Ac supply. Calculate average DC output voltage for firing angle  $\alpha = 45^\circ$ . [9]

- Q3)** a) What are Inverters? Explain with circuit diagram and wave forms the working of three phase voltage source Inverter operating in  $180^\circ$  mode with R.L load. [8]
- b) Three phase voltage source Inverter is operating in  $180^\circ$  mode conduction mode has star connected resistive load  $R=10 \Omega$ . The inverter frequency is  $50\text{Hz}$  and DC input voltage is 200V. Determine: [8]
- i) RMS line voltage.
  - ii) Total power in the load.

OR

**P.T.O.**



- Q4)** a) Draw the schematic of three phase current source Inverter. Describe its operation with current wave form. [8]
- b) What are different techniques of voltage control and harmonic reduction in Inverter circuits. [8]

- Q5)** a) Explain in detail, closed loop speed control of DC drive with neat block schematic. [8]
- b) Starting from basic control equations, develop control block diagram for open loop control of DC series motor and calculate: [8]

$$\frac{\Delta W}{\Delta V} \text{ and } \frac{\Delta W}{\Delta T}$$

OR

- Q6)** a) What are requirements of drive circuit in power control applications. Explain with diagram and wave forms the working of microcontroller based control of DC drives. [8]
- b) Explain field failure and under voltage protection for DC motor. [8]

### SECTION-II

- Q7)** a) Derive expression for maximum torque and maximum slip for induction motor assuming  $R_s = 0$  also explain braking method for Induction motor. [9]
- b) What is slip power recovery in AC motor drives. Explain torque speed characteristics of three phase Induction motor. [9]

OR

- Q8)** a) Explain direct vector control and Indirect vector control technique for Induction motor drive. [9]
- b) Which are different speed control techniques of A.C motors. Explain the operation of any one method in details. [9]

- Q9)** a) Draw and explain torque-speed characteristics of synchronous reluctance motor at constant voltage and frequency. [8]
- b) Explain the operation of cylindrical rotor motor with neat diagram. [8]

OR

**Q10)a)** Describe construction and working of variable reluctance stepper motor. List down its advantages and disadvantages. [8]

b) Explain the operation of switched Reluctance motor (SRM). Why SRM is used as adjustable drive. [8]

**Q11)a)** Explain the operation of fuzzy logic based wind generation system. [8]

b) What is energy Audit. Explain required procedure for energy Audit. [8]

OR

**Q12)a)** Explain traction drive with an application of Road Railway. [8]

b) What is necessity of power quality. Explain different types of power line disturbances. [8]



Total No. of Questions : 12]

SEAT No. :

**P2733**

**[5154]-117**

[Total No. of Pages : 3

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

**MICROWAVE COMMUNICATION & RADAR**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1) a)** An air-filled rectangular waveguide has dimension of  $a=7\text{cm}$  and  $b=3.5\text{cm}$  operates in the dominant  $\text{TE}_{10}$  mode. Compute the following: [9]
- i) The cutoff frequency
  - ii) The phase velocity of the wave in the guide at a frequency of 3.5 GHz.
  - iii) The guided wavelength at the same frequency.
- b) What are Microwave? Explain advantages and applications of microwave. [9]

OR

- Q2) a)** Explain the following terms w.r. to RWG [9]
- i) Cutoff frequency.
  - ii) Phase constant.
  - iii) Characteristic wave impedance.
- b) Discuss the power losses and power transmitted in rectangular waveguide. [9]

**P.T.O.**

- Q3)** a) What is the significance of scattering matrix? Write the properties of s-matrix. [8]
- b) Explain in detail construction & operation of H-plane tee. [8]

OR

- Q4)** a) Write short notes on: [8]
- i) Magic Tee.
- ii) Matched termination.
- b) Explain the working of ferrite circulator & write down its applications. [8]

- Q5)** a) Discuss the limitations of conventional tube at microwave frequencies and explain the remedy for these. [8]
- b) How the oscillations are sustained in cavity magnetron? Explain the process of phase focusing effect. [8]

OR

- Q6)** a) Draw the schematic diagram of a TWT amplifier and describe its principle of operation. [8]
- b) Explain the construction & operation of Reflex klystron. [8]

## **SECTION - II**

- Q7)** a) Draw equivalent ckt. of varactor diode. Explain in detail its construction & operation. [9]
- b) Write a short note on: [9]
- i) Microwave transistor.
- ii) Parametric amplifier.
- iii) PIN diode.

OR

- Q8)** a) Draw equivalent ckt. of Gunn diode. Explain in detail its construction & operation. [9]

- b) Write a short note on: [9]
- i) Microwave oscillator.
  - ii) IMPATT diode.
  - iii) TRAPATT diode.

**Q9) a)** Explain attenuation measurement technique with the help of microwave bench set-up. [8]

- b) Explain the following terms: [8]
- i) VSWR & ISWR.
  - ii) Reflection coefficient.

OR

**Q10)a)** What is Vector Network Analyzer? Give comparison between VNA & Spectrum Analyzer. [8]

b) Explain with neat block diagram power meter. [8]

**Q11)a)** Draw & explain the block diagram of basic radar. [8]

- b) Explain the following: [8]
- i) Antennas & Scanning.
  - ii) Radar becons.

OR

**Q12)a)** Explain the factors that affect the maximum range of radar. [8]

- b) Explain the following: [8]
- i) Phased array radars.
  - ii) Planar array radars.

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Total No. of Questions : 12]

SEAT No. :

**P2734**

**[5154]-118**

[Total No. of Pages : 2

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

**ENTREPRENEURSHIP DEVELOPMENT  
(2008 Pattern) (Semester-I) (404185A) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) What is entrepreneurship? How are entrepreneurs different from employees? [8]
- b) Explain in brief:  
Markup, Markdown and discounts. [8]

OR

- Q2)** a) What are four types of sales transactions? [8]
- b) How does brainstorming differ from consensus building? [8]

**Q3)** Write a note on:

- a) Monopoly [4]
- b) Command economy and market economy. [4]
- c) Advantages of buying an existing business. [4]
- d) Taxes and subsidies. [4]

OR

- Q4)** a) How is price determined in a market economy? [8]
- b) What are some of the advantages and disadvantages of entering a family business? [8]

**P.T.O.**

- Q5)** a) What is a business plan? Consider any business as an example and prepare a business plan for it? [10]  
b) Write a note on: [8]  
i) Direct and Indirect competition.  
ii) Assets and liabilities.

OR

- Q6)** a) What resources are available to help you develop your business plan?[8]  
b) How can you protect your business against employee theft? How can you help to prevent robberies and bounced checks? [10]

### **SECTION-II**

- Q7)** a) Explain different way you can recruit employees? [8]  
b) What kind of bank, payroll and tax records do you have to keep? [8]

OR

- Q8)** a) Write a note on: Journals and Ledgers. [10]  
b) Describe the two different inventory tracking methods. [6]

- Q9)** a) What are the different types of computers you should consider for your business? [8]  
b) What are some services financial expert provide? [8]

OR

- Q10)**a) What are some ways to improve your cash flow? [8]  
b) Explain some technological items that you may use in your business?[8]

- Q11)**a) How can you familiarize yourself with different cultures? [8]  
b) Explain business ethics with an example. [10]

OR

**Q12)** Write short note on:

- a) International business plan. [6]  
b) Exports and Imports. [6]  
c) Strategy for growth. [6]



Total No. of Questions :12]

SEAT No. :

P2735

[Total No. of Pages :4

[5154] - 119

B.E. (E & TC)

JOINT TIME FREQUENCY ANALYSIS

(2008 Pattern) (Semester - I) (Elective - II) (404185)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) Answer to the two sections should be written in separate books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.
- 4) Figures to the right indicate full marks.

**SECTION-I**

Q1) a) Consider the continuous time function  $x(t)$  defined as follow, [14]

$$x(t) = 1 - t^2 \quad -1 < t < 1$$

$$= 0 \quad \text{otherwise}$$

Find the time - bandwidth product for this function.

b) Discuss the difference between wave & wavelet. [2]

OR

Q2) a) Discuss the Heisenberg's uncertainty principle. [6]

b) Why a signal can not be time limited & band limited simultaneously?  
Explain with examples. [10]

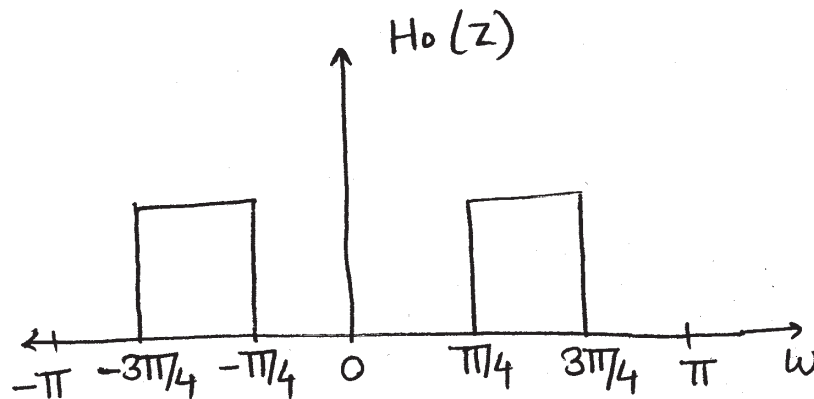
Q3) a) Define the basis functions. Write down the bases for spaces  $V_1, V_{-1}, W_{-1}$  of Haar MRA [8]

Draw the diagram of nested subspaces.

P.T.O.



- b)  $H_0(z)$  is an ideal band pass filter with cut-offs  $\pi/4$  &  $3\pi/4$  as shown in figure. Sketch the spectrum of  $H_0(-z)$ . [8]



OR

- Q4)** a) Prove the power complementary property of analysis or synthesis filters. [8]
- b) Consider the two channel filter band whose two filters are given below: [8]

$$H_0(z) = 1 + z^{-1} + z^{-2}$$

$$H_1(z) = 1 - z^{-1} + z^{-2} - z^{-3}$$

Find out the filter expressions  $G_0(z)$  &  $G_1(z)$  using alias cancellation condition.

- Q5)** Given Haar wavelet function,  $\psi(t)$  [18]

- a) Find its Fourier Transform  $\hat{\psi}(\Omega)$ .
- b) Sketch the spectrum of  $\psi(2t-1)$ .
- c) Sketch the spectrum of  $\psi(t/2)$ .
- d) Prove that this function is orthogonal with its corresponding scaling function by finding out  $\langle \phi(t), \psi(t) \rangle$ .

OR

**Q6)** Write short note on: [18]

- a) MRA Axioms
- b) Tiling diagrams

**SECTION-II**

**Q7)** a) Write the conditions for wavelet function. [4]

b) Discuss the design procedure for Daub-4 filter. [12]

OR

**Q8)** Signal  $x(t)$  is defined as, [16]

$$x(t) = \begin{cases} t/2 & 0 \leq t \leq 2 \\ -t/2 + 2 & 2 \leq t \leq 4 \end{cases}$$

- a) Find the projection of  $x(t)$  so that it belongs to subspace  $V_0$ .
- b) Find the projection of  $x(t)$  so that it belongs to subspace  $V_1$ .

Prove perfect reconstruction.

**Q9)** What is lifting scheme? Develop the wavelet lifting scheme for the signal given, [18]

$$x[n] = \{4, 5, 9, 3\} \in V_2$$

Show the 'split', 'update', & 'predict' stages & verify the perfect reconstruction.

OR

**Q10)** Write short notes on: [18]

- a) JPEG - 2000
- b) Wavelet Packet Trees

**Q11)** Given  $x[n] = \{1, 0, -2, 2, 0, 1, 2, 1\} \in V_3$ . **[16]**

- a) Develop complete packet tree till  $V_0$ .
- b) Calculate the coefficients along with their bases.
- c) Show perfect reconstruction.

OR

**Q12)** Draw & explain the complete Haar-2 band filter bank structure. **[16]**

- a) Derive the Alias Cancellation condition.
- b) Find the condition for perfect reconstruction.

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2736**

**[5154]-120**

[Total No. of Pages : 2

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

**MICRO ELECTROMECHANICAL SYSTEM AND SYSTEM  
ON CHIP**

**(2008 Pattern) (Semester-I) (404185C) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate 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)** What are the types of wet etching? Explain following techniques in detail. [16]

- a) Anisotropic etching.
- b) Isotropic etching.

OR

**Q2)** Write a short note on each of the following: [16]

- a) Bulk micromachined pressure sensor.
- b) Surface micromachined pressure sensor.

**Q3)** a) Mention any 8-types of pressure sensors and explain any two out of that in detail. [9]

- b) Write a short note on each of the following: [9]
  - i) Metal film thermoresistor
  - ii) Semiconducting thermoresistor.

OR

**Q4)** a) Define Lorentz force. Explain Hall effect principle and its modes of operation. [9]

- b) Explain capacitive accelerometer in detail. [9]

**P.T.O.**

- Q5)** a) What are the material requirements and fabrication techniques for biomedical microsystems? [8]  
b) Write a short note on piezoelectric transducer. [8]

OR

- Q6)** a) Explain the transduction principle and sensing characteristics of voltametric sensors and potentiometric sensors in detail. [10]  
b) What are the figure of merits of microsystem? [6]

### **SECTION-II**

- Q7)** a) Explain MPEG-2 encoder for digital media application. [10]  
b) What are the applications of microsystems? [6]

OR

- Q8)** a) Enlist various packaging technologies and explain in detail. [8]  
b) What are the pros and cons of behavioural synthesis? [8]

- Q9)** a) Explain any two routing techniques in detail. [8]  
b) Explain design flow with respect to, [10]  
i) Generic methodology problems.  
ii) Alternative solution for layout synthesis.

OR

- Q10)**a) Write a short note on 'core based integrated circuits'. [9]  
b) What is 'built in self Test'? Explain in detail. [9]

- Q11)**a) Explain various steps in Hardware/Software codesign. [8]  
b) Explain standard cell approach for layout synthesis problem. [8]

OR

- Q12)** Write a short note on: [16]  
a) Design for testability  
b) Faults & fault simulation



Total No. of Questions : 12]

SEAT No. :

**P2737**

[Total No. of Pages : 3

**[5154]-121**

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

**MOBILE COMMUNICATION**

**(2008 Course) ( 404185 D) (Elective - II) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *All questions carry equal marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Briefly explain with diagram, examples of wireless communication system. **[8]**
- b) Describe the following terms of cellular: **[8]**
- i) Handoff strategies
  - ii) Channel Assignment strategies

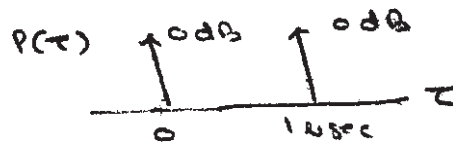
OR

- Q2)** a) Classify and explain different types of Interferences in GSM. **[8]**
- b) Explain with neat diagram techniques to improve coverage and capacity in cellular system. **[8]**
- Q3)** a) Compare free space propagation model with ground reflection model. **[8]**
- b) List three important effects due to multipath in the radio channel and explain following factors influencing small scale fading: **[10]**
- i) Multipath propagation
  - ii) Speed of mobile
  - iii) Speed of surrounding objects
  - iv) Transmission bandwidth of signal.

OR

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

- Q4)** a) With neat diagram, explain the working of spread spectrum channel impulse response system for small scale multipath measurements. [9]
- b) Compute RMS delay spread for following power delay profile. [9]



If BPSK modulation is used, what is the maximum bit rate that can be sent through channel without needing on equaliser.

- Q5)** a) List out and explain the factors influencing the choice of modulation. [8]
- b) With neat diagram, explain the working of BPSK receiver using carrier recovery circuits. [8]

OR

- Q6)** a) Describe with block diagram, DS-SS Transmitter and receiver system with binary phase modulation. [8]
- b) Explain following factors determining the performance of an algorithm for adaptive equalizers:- [8]
- i) Rate of convergence
  - ii) Misadjustment
  - iii) Computational complexity
  - iv) Numerical properties.

### SECTION - II

- Q7)** a) Describe the working operation of ADPCM encoder with neat diagram. [8]
- b) Define Narrow band and wide band system. Compare multiple access techniques used in GSM and CDMA. [8]

OR

- Q8)** a) Define vocoders and draw the diagram of speech generation model. Briefly explain following vocoders [8]
- i) Channel vocoders
  - ii) Formant vocoders [8]
- b) Define the term “capacity of cellular systems” and derive an expression for carrier to interference ratio (C/I). [8]

- Q9)** a) Draw and explain in detail the functionality of every blocks in GSM system architecture. [10]
- b) Classify GSM logical channels. Explain full Rate and Half Rate Traffic channels. [8]

OR

- Q10)**a) Classify Handover mechanism in GSM and explain any one in detail with neat diagram. [8]
- b) Describe with neat diagram, working of circuit switched data transmission technique. Derive an expression for time required in connection. [10]

- Q11)**a) Describe air interface in IS. 95 CDMA system with neat diagram. [8]
- b) Classify and explain the significance of logical and physical channel in IS.95 CDMA. [8]

OR

- Q12)**a) Describe with neat diagram, soft handover mechanism in IS. 95 CDMA mobile system. [8]
- b) Compare IS.95 CDMA and CDMA 2000 system. [8]

**x x x**



Total No. of Questions : 12]

SEAT No. :

**P2738**

**[5154]-122**

[Total No. of Pages : 3

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

**TELECOMMUNICATION SWITCHING SYSTEM**

**(2008 Pattern) (Semester-II) (404187)**

*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) *In Section-I: Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6 and  
Section-II: Answer Q.7 OR Q.8, Q.9 OR Q.10, Q.11 OR Q.12.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figure to the right indicate full marks.*
- 6) *Use of electronic pocket calculator is allowed.*
- 7) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) State and explain switching functions of switching system? [8]  
b) Explain in detail message switching and Circuit switching? [8]

OR

- Q2)** a) State and explain issues of Digital switching in an analog environment? [8]  
b) Derive and calculate the unavailability for dual processor system with MTBF=1500 HRS. and MTTR=8 HRS. in 30 years? [8]

- Q3)** a) Define and explain: [10]  
i) Grade of Service.  
ii) Holding Time.  
iii) Call completion rate.  
iv) Erlang and CCS.  
v) Congestion.

**P.T.O.**

- b) A group of five trunks is offered 2E of traffic. Find: [6]
- i) The grade of service.
  - ii) The probability that only one trunk is busy.
  - iii) The probability that only one trunk is free.

OR

- Q4)** a) Explain following terms with reference to lost-call systems: [8]
- i) Pure chance traffic.
  - ii) Statistical equilibrium.
  - iii) Full availability.
  - iv) Calls which encounter congestion are lost.
- b) On average one call arrives every 5 seconds. During a period of 10 seconds, what is the probability that: [8]
- i) No call arrives?
  - ii) One call arrives?
  - iii) Two calls arrive?
  - iv) More than two calls arrive?

- Q5)** a) Explain in detail progressive grading, Skipped grading and homogeneous grading? [8]
- b) Design a two stage switching network for connecting 200 incoming trunks to 200 outgoing trunks? [10]

OR

- Q6)** a) Explain in band signaling, out band signaling? Draw and explain PCM signaling? [10]
- b) What is mean by common channel signaling? Explain the advantages of common channel signaling? [8]

## SECTION-II

**Q7) a)** State different types of jitter? How elastic store is used to remove the accumulated jitter with neat diagram? [8]

b) What is clock instability? Explain main sources of clock instability? [8]

OR

**Q8) a)** Explain the routing control in network Management? [8]

b) Explain synchronization of a clock in a transmitter and receiver system using PLL? [8]

**Q9) a)** Explain the data transmission in PSTN with the help of a diagram? [8]

b) Explain numbering and addressing in ISDN? [8]

OR

**Q10)a)** Draw and explain the architecture of ISDN? [8]

b) Explain the terms with reference to ISDN: [8]

i) Functional groups.

ii) Reference points.

**Q11)a)** Explain in brief two methods of increasing capacity in cellular networks?[10]

b) Explain call procedure in completing a call from mobile (cellular) to landline (PSTN)? [8]

OR

**Q12)a)** Draw and explain in detail the GSM system architecture? Explain the different types of services provided by GSM? [10]

b) Justify whether CDMA is having better security than GSM or not? [8]



Total No. of Questions : 12]

SEAT No. :

P3620

[Total No. of Pages : 4

[5154]-123

B.E. (E & TC)

OPTICAL FIBER COMMUNICATION

(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) Figures to the right indicate full marks.
- 4) Your answer will be valued as a whole.
- 5) Neat diagrams must be drawn wherever necessary.
- 6) Assume suitable data, if necessary.

**SECTION - I**

- Q1)** a) Explain the terms: mode field diameter, spot size and cut off wavelength for single mode fibers. [6]
- b) A multimode step index fiber with a core diameter of 80  $\mu\text{m}$  and a relative index difference of 1.5% is operating at a wavelength of 0.85  $\mu\text{m}$ . If the core refractive index is 1.48 estimate the normalized frequency for the fiber and number of guided modes. [6]
- c) State advantages and disadvantages of vapour phase decomposition in the preparation of glass for optical fiber. [6]

OR

- Q2)** a) Compare and Contrast Multimode and Single mode fiber. [6]
- b) A multimode step index fiber has a relative refractive index difference of 1% and a core refractive index of 1.5. the number of modes propagating at a wavelength of 1.3  $\mu\text{m}$  is 1100 [6]  
Estimate the diameter of the fiber core.
- c) With the help of neat diagram explain the principle of total internal reflection. [6]

**P.T.O.**

- Q3) a)** Explain the various attenuation mechanisms in optical fiber. Sketch attenuation characteristics w.r.t. wavelength for a fiber. Hence indicate the three windows of transmission for the optical fiber communication. [8]
- b) What are the major requirements of an optical source to be used as a light source in optical fiber communication. [8]

OR

- Q4) a)** What are advantages of LED over ILD as optical source? Why LED is preferred as light source for analog link rather than ILD? Support your answer with a suitable diagram. [8]
- b) Explain various types of Dispersion mechanisms observed in optical fiber. [8]
- Q5) a)** Explain Dispersion shifted fibers and dispersion flattened fibers. [8]
- b) Radiative and non-radiative recombination lifetimes for minority carriers in the active region of a double-heterojunction LED are 60ns and 100ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the peak emission wavelength is  $0.87 \mu\text{m}$  at a drive current of 40 mA. [8]

OR

- Q6) a)** Sketch and explain: [8]
- i) Insertion loss characteristics for jointed fibers with various types of misalignments.
- ii) Various mismatch losses at the fiber joints.
- b) Explain fiber optic splices. What are different types of splices? Draw diagram and explain any one type of splice. How splice differs from a connector? [8]

## SECTION - II

- Q7) a)** Explain the following factors limiting the speed of response of a photo diode: **[10]**
- i) Drift time of carriers
  - ii) Diffusion time
  - iii) Time constant

A silicon p-i-n photodiode has 25  $\mu\text{m}$  depletion layer width and carrier velocity  $3 \times 10^4$  m/s. Determine the maximum bandwidth and the corresponding response time for the device.

- b) Explain the terms quantum efficiency and responsivity of a photo detector. How are these terms related to each other? **[8]**

OR

- Q8) a)** Explain the working of PIN photo detector with relevant diagrams. Compare and contrast performance of PIN and APD as photo detector in optical fiber communication. **[10]**
- b) A photodiode has a quantum efficiency of 65% when photons of energy  $1.5 \times 10^{-19}$  J are incident upon it. **[8]**
- i) At what wavelength is the photodiode operating?
  - ii) Calculate the incident optical power required to obtain a photocurrent of 2.5  $\mu\text{A}$  when the photodiode is operating as above.

- Q9) a)** Draw the block diagram of an analog optical fiber link and state the major noise contributors. Explain carrier to noise ratio and relative intensity noise with reference to analog link. **[8]**
- b) 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  $\text{km}^{-1}$
  - Splice loss: 0.1 dB  $\text{km}^{-1}$
  - Connector losses at the transmitter and receiver: 1 dB each

Mean power required at the APD receiver:

when operating at 35 Mbit s<sup>-1</sup> (BER 10<sup>-9</sup>): – 55 dBm

when operating at 400 Mbit s<sup>-1</sup> (BER 10<sup>-9</sup>): – 44 dBm

Required safety margin: 7 dB

Estimate:

- i) The maximum possible link length without repeaters when operating at 35 Mbit s<sup>-1</sup> (BER 10<sup>-9</sup>). 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<sup>-1</sup> (BER 10<sup>-9</sup>) and assuming no dispersion– equalization penalty.

OR

**Q10)a)** Describe digital link budget. Explain link power budget analysis and system rise time budget. **[8]**

b) An optical fiber system is to be designed to operate over an 8km length without repeaters. **[8]**

The rise times of the chosen components are:

Source (LED): 8 ns

Fiber: Intermodal: 5 ns km<sup>-1</sup>

(Pulse broadening) intramodal: 1 ns km<sup>-1</sup>

Detector (p-i-n photodiode): 6 ns

From the system rise time considerations, estimate the maximum bit rate that may be achieved on the link when using an NRZ and RZ format.

**Q11)a)** Explain in detail the architecture and working of EDFA. What are noises observed in EDFA **[8]**

b) Draw block schematic of WDM and explain its working. Specify range of wavelengths commonly used for WDM. **[8]**

OR

**Q12)a)** Explain various applications of optical amplifiers. Support your answer with suitable diagram. **[8]**

b) Explain usage of optical couplers. How they differ from connectors?**[8]**



Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 3

**P2739**

**[5154]- 124**

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

**SOFT COMPUTING**

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

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to 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)** Write notes on (any three):

**[18]**

- a) Advantages of ANN.
- b) Characteristics of Neuro-fuzzy and Soft Computing.
- c) Compare Hard and Soft Computing.
- d) Applications of Soft Computing.

OR

**Q2)** Consider two fuzzy sets A & B

**[18]**

$$A = \left\{ \frac{1}{2} + \frac{0.5}{3} + \frac{0.3}{4} + \frac{0.2}{5} \right\}$$

$$B = \left\{ \frac{0.5}{2} + \frac{0.7}{3} + \frac{0.2}{4} + \frac{0.4}{5} \right\}$$

Perform the following operation on fuzzy sets

- a)  $A \cup B$
- b)  $A \cap B$
- c) complement of fuzzy set A

**P.T.O.**



- d) difference  $\left(\frac{A}{B}\right)$
- e) algebraic sum of given fuzzy sets.
- f) bounded sum of the given fuzzy set.
- g) algebraic product of the given fuzzy sets.
- h)  $\overline{A \cup B}$
- i)  $A \cup \bar{B}$

- Q3)** a) Describe in detail the process of defuzzification. What are various methods of defuzzification and explain any two methods in detail. [8]
- b) Explain the terms with reference to membership Function with a suitable example. [8]
- i) Core
  - ii) Boundary
  - iii) Support
  - iv) Height

OR

- Q4)** a) Explain the configuration of pure fuzzy system. [8]
- b) State and explain properties of fuzzy set. [8]
- Q5)** a) Draw and explain the architecture of a typical Fuzzy Logic Controller. [8]
- b) State the various applications of Fuzzy Logic Controller. [8]

OR

- Q6)** a) Explain the Mamdani Inference Model with a suitable example. [8]
- b) Define the following terms with reference to Fuzzy Inference system. [8]
- i) Premise (antecedent)
  - ii) Conclusion (Consequent)
  - iii) Rule - Base
  - iv) Fuzzification

## SECTION - II

- Q7)** a) What is artificial neural network? Using Mc-Culloch Pitts neuron, implement a binary AND function. Assume initial weights to be [1 1]. [10]  
b) Define activation function. List out and explain any three activation functions. [8]

OR

- Q8)** Explain any three: [18]  
a) Supervised Learning  
b) Unsupervised Learning  
c) Reinforcement Learning  
d) Weight and Bias

- Q9)** a) Draw and explain various network architectures. [8]  
b) Explain Back-propagation algorithm for MLP with neat diagram. [8]

OR

- Q10)** a) Explain single layer Perceptron architecture and training algorithm. [8]  
b) What are different learning laws? Explain any one in detail. [8]

OR

- Q11)** a) Explain the concept of ANFIS with architecture. [8]  
b) What are the different advantages of ANFIS? [8]

OR

- Q12)** a) Discuss two pass learning in ANFIS [8]  
b) Explain the architecture of self organizing feature map given by Kohonen. Describe training steps in SOFM. [8]





- Q6)** a) Explain auto regressive modelling for spectral smoothing . [8]  
b) Write short note on short time speech analysis. [8]

**SECTION - II**

- Q7)** a) Explain the comb filter in detail. [8]  
b) Explain speech enhancement scheme to remove 50 - 60 Hz hum from speech signal. [8]

OR

- Q8)** a) Explain spectral subtraction method with block diagram. [8]  
b) Explain winer filter? How it is used for echo cancellation. [8]

- Q9)** a) Explain the various conditions that are used for the optimization of DTW. [8]  
b) Explain HMM for speech recognition. [8]

OR

- Q10)**a) Explain DTW with suitable example. [8]  
b) Explain the challenges in Automatic speech recognition. [8]

- Q11)**a) Distinguish between speaker identification & speaker verification. [10]  
b) Explain with block diagram text to speech synthesis system. [8]

OR

- Q12)**a) With the help of block schematic explain formant based synthesizer.[10]  
b) Explain unit selection synthesis related to concatenative speech synthesis. [8]



Total No. of Questions : 12]

SEAT No. :

**P2741**

**[5154]- 126**

[Total No. of Pages : 2

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

**TELEVISION & VIDEO ENGINEERING**

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

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to candidates:*

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

**SECTION - I**

- Q1)** a) Define the Composite Video Signal. Draw the CVS with appropriate timing and amplitude levels. Explain the importance of Synchronization pulses and blanking pulses. **[10]**
- b) List all the CCIR-B standards for TV. **[8]**

OR

- Q2)** a) Why AM is used for picture signal in PAL system? On what basis is the decision of aspect ratio done? **[8]**
- b) Discuss the Sync Separator along with vertical and horizontal deflection circuits with current waveforms. **[10]**

- Q3)** a) Describe how various patterns are generated in a video pattern generator. Explain typical applications of this instrument for testing and aligning a TV receiver. **[8]**
- b) Compare the basic features of NTSC, PAL and SECAM system. **[8]**

OR

- Q4)** a) With neat and labelled diagram, explain the working of colour decoder sections of color TV receiver. **[8]**
- b) Discuss the advantages and disadvantages of the high level and low level modulation techniques. Which method is accepted for TV transmission and why? **[8]**

- Q5)** a) Discuss MPEG-2 compression standard with a suitable block diagram. **[8]**
- b) Sketch the Digital TV receiver block diagram and explain the role of individual block. **[8]**

OR

**P.T.O.**

- Q6)** a) With suitable block schematic, explain the working of MAC encoder. [8]  
b) Discuss the G.compression standard. Explain the working of G. encoder with neat labeled diagram. [8]

**SECTION - II**

- Q7)** a) Explain the live recording of a football match. Discuss the camera placement and other equipment set-up for its broadcasting. Draw suitable diagram. [8]  
b) Explain the basic principle of 3D television with neat diagram. Discuss different techniques involved in viewing 3D TV. [10]

OR

- Q8)** a) Draw the block schematic of DTH receiver, and explain the function of each block. Mention the frequency bands involved in transmission and reception. [8]  
b) Compare Analog TV and HDTV. [5]  
c) Write a short note on Video on Demand. [5]

- Q9)** a) What are the different types of video projectors? Explain the basic principle of video projection. [8]  
b) Discuss the IPTV and Internet TV systems in detail. [8]

OR

- Q10)** a) Write a short note on ipod. [8]  
b) Explain the Wi-Fi transmitter and receiver systems in detail. [8]

- Q11)** a) Compare CD, DVD and Blu ray DVD. What is the basic principle used in all the 3 techniques. [10]  
b) Draw the block schematic of DVD player and explain its working. [6]

OR

- Q12)** a) Give an overview of different digital recording formats. [8]  
b) Discuss the different display device technologies like LED, LCD and Plasma. [8]



Total No. of Questions : 12]

SEAT No :

**P2742**

**[5154]-127**

[Total No. of Pages :2

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

**TEST AND MEASUREMENT SYSTEMS**  
**(2008 Course) (Elective-III) (Semester-II)(404189 D)**

*Time : 3 Hours*

*Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1) a)** Draw and Explain typical instrument block diagram. What are the standards of calibrations. **[8]**
- b) Explain simple and distributing types of measurements. What are the types of signal processing used in measuring instrument. Explain each type in details. **[10]**

OR

- Q2) a)** Define the following terms with neat example. **[10]**
- i) Error
  - ii) Sensitivity
  - iii) Resolution
  - iv) Dynamic range
  - v) Settling time
- b) Explain human and computer interfaces used in measuring instruments. **[8]**

- Q3) a)** List the different problems associated with the impedance measurement at RF with the help of neat block diagram explain working of RF vector voltmeter **[8]**
- b) With the help of neat block diagram explain different types of DVM. Which specifications to be considered while section of DVM. **[8]**

OR

- Q4) a)** With the help of neat block diagram explain Q meter. What are the advantages and disadvantages of Q factor. **[8]**
- b) With the help of neat block diagram explain true RMS meters. **[8]**

**P.T.O.**

- Q5)** a) Explain working principles of Digital storage oscilloscope. [8]  
b) What are the types of CRO probes. Explain in details [8]

OR

- Q6)** a) Explain block diagram and working principle of Digital phosphor oscilloscope. [8]  
b) Draw block diagram of analog CRO. What is the difference between dual beam and dual trace CRO. [8]

**SECTION-II**

- Q7)** a) Explain with block diagram of harmonic distortion. [8]  
b) Explain FFT analyzer with neat block diagram. [8]

OR

- Q8)** a) Explain functional block diagram of Swept Super Heterodyne Spectrum analyzer. [8]  
b) Which capabilities of logic analyzer differentiate it from other equipments. What are the capabilities of MSO [8]

- Q9)** a) What are frequency synthesis techniques. Explain application of frequency synthesis. [8]  
b) Explain test setup for EMI measurement. [8]

OR

- Q10)** a) With the help of neat block diagram explain network analyzer and give application of network analyzer. [8]  
b) Give the composition between different solid state microwave signal sources. [8]

- Q11)** a) Write a short note on. [10]  
i) Software used in instrumentation.  
ii) Virtual instrumentation  
b) Explain with the help of neat block diagram automatic test system used for measuring different parameters in audio amplifier. [8]

OR

- Q12)** a) Explain complete measurement system used in microwave network. [10]  
b) Explain in detail network connection model. [8]





Total No. of Questions :12]

SEAT No. :

**P2743**

[Total No. of Pages :3

**[5154] - 128**

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

**ARTIFICIAL INTELLIGENCE**

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

*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 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 the architecture of a typical agent. What is rational agent? [8]
- b) Describe the four possible goals to pursue in artificial intelligence. [8]

OR

- Q2) a)** List the different properties of Task Environment. Give suitable example for each. [8]
- b) Which are the different search methods used in AI. Compare the major search methods with suitable examples. [8]
- Q3) a)** Explain A-star search algorithm by minimizing the total estimated solution cost. [8]
- b) What is problem formulation? Describe the components of problem with suitable example. [8]

OR

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

**Q4)** a) Define the following terms: State, state space, search node, search tree, Goal, action, successor function and branching factor. [8]

b) Explain steepest gradient hill climbing and simulated annealing in detail. [8]

**Q5)** a) Design a mini-max algorithm in determining the optimal strategy for playing a game. [8]

b) Explain the approaches for solving tree structured constraint satisfaction problem using a suitable example. [10]

OR

**Q6)** a) Write the rules for generating propagating constraints for solving the given Cryptarithmic problem: SEND + MORE = MONEY [10]

b) What is Alpha-Beta pruning? Explain Alpha - Beta search algorithm with suitable algorithm. [8]

### SECTION-II

**Q7)** a) Explain basic representation for planning. [8]

b) Explain the significance and impact of learning in problem solving. [10]

OR

**Q8)** a) Explain the procedure for conversion of FOL to CNG. [8]

b) Explain the current best hypothesis search algorithm in learning with suitable example. [10]

**Q9)** a) Explain the decision trees as performance element with a suitable example. [8]

b) Explain Waltz's algorithm in detail. [8]

OR

**Q10)a)** What is difference between Expert system and traditional system?  
Comment on advantages and disadvantages of expert system. [8]

b) What is perception? Give its typical structure. [8]

**Q11)a)** Explain the concept of symantic analysis in detail. [8]

b) What is NLP? Explain different phases of NLP. [8]

OR

**Q12)a)** Explain the steps in natural language processing. [8]

b) How knowledge acquisition is useful for building expert system? Explain the steps involved in knowledge acquisition. [8]

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2744**

[Total No. of Pages :3

**[5154] - 129**

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

**AUTOMOTIVE ELECTRONICS**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *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)** Explain 4 stroke cycle operation of SI engine. **[8]**
- b) What are characteristics of hybrid vehicle? Explain typical hybrid vehicle power train. **[8]**

OR

- Q2) a)** Explain in brief spark pulse generation and variable valve timing (VVT) in ignition system. **[8]**
- b) Compare and contrast SI and CI engine. **[8]**
- Q3) a)** What is principle of EGO sensor? Explain role of EGO sensor in electronic engine control. **[10]**
- b) Enlist types of actuator. Explain with diagram working principle of solenoid and it's role in fuel injection system. **[8]**

OR

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

- Q4) a)** Explain measurement technique for following parameters [10]
- i) Mass air flow (MAF)
  - ii) Throttle plate angle
  - iii) Coolant temperature
  - iv) Crankshaft angle
- b) With neat diagram explain instrumentation amplifier and its requirement as an interfacing circuit. [8]
- Q5) a)** What is drawback of proportional control in cruise control system? How PI control overcomes this drawback? [8]
- b) With the help of block diagram explain EGR control in automotive. [8]

OR

- Q6) a)** What are different methods to improve engine performance? Explain two methods in brief. [8]
- b) Explain in brief various forces during braking. Also explain antilock breaking system (ABS). [8]

### **SECTION-II**

- Q7) a)** Explain with block diagram typical Instrumentation architecture. [8]
- b) What are requirements and advantages of digital signal processing in automotive? [8]

OR

- Q8) a)** How embedded C is different than C? Highlight major differences. [8]
- b) Explain features of modern architecture that enables automotive operations in real time. [8]

- Q9)** a) Explain in brief CAN protocol. Also mention typical usage of CAN protocol in automotive. [8]
- b) What is role of telematics in automotive? Exemplify in context to automotive. [8]

OR

- Q10)**a) Explain the functions and benefits of In-Vehicle network. [8]
- b) Compare MOST and D2B with reference to following parameters. [8]
- i) Data Rate
  - ii) Interface ease
  - iii) Reliability
  - iv) Usage in automotive

- Q11)**a) Explain following diagnostic tools [8]
- i) Timing light
  - ii) Engine analyzer
- b) What is on-board diagnostic in automotive? With example explain limitations of on board diagnostic method. [10]

OR

- Q12)** Write short notes (any three): [18]
- a) Collision avoidance radar warning system.
  - b) Tyre pressure monitoring system.
  - c) Air-bag control system.
  - d) Expert system in diagnostic.

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2745**

[Total No. of Pages :3

**[5154] - 130**

**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 diagrams must be drawn wherever necessary.*
- 4) Figures to right indicate full marks.*

**SECTION-I**

- Q1) a)** Explain fundamental science behind Nanotechnology. **[9]**
- b) List out the limitations of Nanotechnology with respect to semiconductor material. **[9]**

OR

- Q2) Write short notes on:** **[18]**
- a) Nano sphere lift of Lithography.
  - b) Dip pen Nano Lithography.
  - c) Spectroscopy.

- Q3) a)** Explain scanning tunneling microscopy. **[8]**
- b) What are the applications of super computing devices, explain in detail. **[8]**

OR

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

- Q4)** a) Explain single electron transistor devices. [8]  
b) Draw energy band diagram of Nano crystal memory under positive gate bias of 4V. [8]
- 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 note on: [8]  
i) Single wall carbon Nano tube  
ii) Multi wall

**SECTION-II**

- Q7)** a) Explain Nano-electromechanical system. [6]  
b) Explain optical lithography. [6]  
c) Explain fabrication technique used for MEMS. [6]

OR

- Q8)** a) Explain electron-beam lithography. [6]  
b) Explain in detail MEMS. [6]  
c) Explain bio-morph cantilever. [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 (any two): [8]
- i) Drug delivery
  - ii) Protein engineering
  - iii) Nano-electronics interfaces
  - iv) Drugs
- b) List out & explain applications of Nano-electronics. [8]

OR

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

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2746**

[Total No. of Pages :3

**[5154] - 130-A**

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

**PLC & INDUSTRIAL PROCESS AUTOMATION**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answer any 3 questions from each section*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) Assume suitable data if necessary.*

**SECTION-I**

**Q1) a) Explain the followings with examples: [8]**

- i) Regulatory control.
- ii) Human Aided control.
- iii) Discrete state control.

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

- i) Process
- ii) Error Detector
- iii) Set point
- iv) Control Element

OR

**Q2) a) Explain Foundation field Bus (FFB) in industrial applications? Comment on advantages of FFB. [8]**

**b) Explain with neat diagram. [8]**

- i) DDC
- ii) DCS

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

- Q3)** a) Why linearization of the sensor is necessary? Discuss various techniques used for linearization? [8]
- b) Explain any one application of Differential pressure transmitter (DPT) in detail. [8]

OR

- Q4)** a) Suppose the temperature range 20°C to 120°C is linearly converted to the standard current range of 4 to 20 mA. What current will result from 66°C? What temperature does 6.5 mA represent? [8]
- b) Explain need of transmitter with the help of block diagram & explain two wire transmitter topology in detail. [8]
- Q5)** a) Discuss PID algorithm for Digital implementation. [8]
- b) Explain different process control loop tuning methods in detail. [10]

OR

- Q6)** a) Explain PID controller with analog circuit & draw its response for step input. [10]
- b) Explain proportional, Derivative & Integral mode of continuous controller. [8]

### SECTION-II

- Q7)** a) Explain principle and various type as of flow control valves explain with their flow characteristics? [8]
- b) Compare between pneumatic and hydraulic actuators. [8]

OR

- Q8)** a) Explain role of final control element? What are the required characteristics of final control element? [8]
- b) Explain with neat diagram stepper motor as an actuators? Explain its advantages and applications? [8]

- Q9) a)** Define PLC? List & explain types of PLC. [8]
- b) Draw a ladder diagram for two motor system having the following conditions. [8]
- i) Starting push button start motor - 1
  - ii) After 10 second, motor- 2 is ON
  - iii) Stopping the switch, stops motor 1 and motor 2.

OR

- Q10)a)** Explain following terms in context with PLC [8]
- i) I/P scan
  - ii) Logic scan
  - iii) O/P scan
- b) Draw the ladder diagram of Elevator system. [8]

- Q11)a)** Write short notes on: [10]
- i) ANN based controllers
  - ii) Fuzzy logic systems and controller
- b) Explain the use of ANN in industrial control with an application. [8]

OR

- Q12)a)** What are the various types of converters used in process control loop. Explain following converters: [10]
- i) I to P converters
  - ii) I to V converter
- b) What is fuzzy logic? Explain different fuzzy controller. [8]

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2747**

[Total No. of Pages :3

**[5154] - 130-D**

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

**PROGRAMMABLE SYSTEM ON CHIP**

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

**(404190 EC)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from section I and answer three questions from section II.*
- 2) *Answer to the two sections 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 electronics pocket calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) Draw the architectural blocks of PSoC and conventional microcontroller unit. Compare the features of PSoC and conventional microcontroller. **[8]**
- b) Explain and compare the features of PSoC1, PSoC2 and PSoC3 families. **[8]**

OR

- Q2)** a) Explain with neat schematic the analog and digital blocks used in PSoC architectures. **[8]**
- b) What is features of PSoC3 family and explain additional features of PSoC5. **[8]**
- Q3)** a) What are the difference between architectural features of PSoC3 and PSoC5 and explain each in detail. **[8]**
- b) Explain the architectures of following subsystems used in PSoC3 **[8]**
- i) CPU Subsystem
  - ii) I/O interfaces

OR

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

- Q4)** a) With neat schematic explain the architecture of PSoC5 device. [8]  
b) Comparison of analog and digital subsystem of PSoC5. [8]
- Q5)** a) Explain limitations of PSoC and how to improvement in PSoC. [8]  
b) What is the difference between PSoC memory management and conventional microcontroller memory management. Design PSoC memory module for interface 64 kB RAM with PSoC. [10]

OR

- Q6)** a) What is features of cypress PSoC & explain any one application in detail. [8]  
b) What is Cypress PSoC creator? Design and implement a data acquisition system using PSoC creator. [10]

### **SECTION-II**

- Q7)** a) Explain in detail hardware-software co-design system of PSoC. [8]  
b) What are the hardware and software subsystem used in mixed signal system using PSoC and explain each in detail. [8]

OR

- Q8)** a) Explain in detail PSoC express. Design any mixed signal embedded system using PSoC express. [8]  
b) Explain detail of PSoC hardware and software components. [8]
- Q9)** a) Write short note on: [8]  
i) Delta-sigma ADC topology  
ii) Digital filter blocks
- b) What are the difference between op-amps and programmable gain amplifiers? What is the use of switched capacitor in amplifiers? [8]

OR

**Q10)a)** Explain universal digital block and arrays and digital system interconnect. **[8]**

b) Write short note: **[8]**

i) CAN bus

ii) USB

**Q11)a)** Design and implement following system using PSoC **[10]**

i) DTMF decoder

ii) Time signal processing

b) Explain detail lower lower noise continuous time signal processing with PSoC. **[8]**

OR

**Q12)a)** Design and implement following system using PSoC. **[10]**

i) Ultrasonic parking assistant.

ii) Manchester decoder.

b) Explain ultra wide band RADAR. **[8]**

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2748**

**[5154]-131**

[Total No. of Pages : 2

**B.E. (Electrical)**

**PLC AND SCADA APPLICATIONS  
(2008 Pattern) (Semester-I)(403141)**

*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) Draw and explain overall PLC block diagram. [9]  
b) State applications of PLC [8]

OR

- Q2)** a) State advantages of PLC [9]  
b) Write a short note on CPU. [8]

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

Inputs-I1,I2

Outputs-Q1, Q2

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

OR

- Q4)** a) What is the difference between ON/OFF signal and analog Signal? [8]  
b) Explain thermocouple with proper construction diagram and it's working. [8]

- Q5)** a) What is effect of change in only proportional constant Kp of PID controller on the output of the system? [9]  
b) What is the necessity of tuning of PID controller? [8]

OR

**P.T.O.**



- Q6)** a) Draw and explain AC motor starter. [9]  
b) In which cases AC motor can get overloaded? [8]

**SECTION-II**

- Q7)** a) Define Supervisory control and data acquisition (SCADA), MTU, HMI, RTU. [8]  
b) State and explain different features of SCADA system. [9]

OR

- Q8)** a) Write a short note on SCADA server. [9]  
b) State and explain desirable properties of SCADA. [8]

- Q9)** a) Explain any one application of SCADA. [8]  
b) Explain any two generations of SCADA. [9]

OR

- Q10)** a) What are system operating states in electric power system? [9]  
b) Explain with block diagram use of SCADA in chemical plant [8]

- Q11)** a) Explain only the layered diagram of OSI model. [8]  
b) What are the functions of four layers of TCP/IP architecture? [8]

OR

- Q12)** a) Write a short note on DNP3 protocol. [8]  
b) Write a short note on Profibus standard. [8]



Total No. of Questions : 12]

SEAT No. :

**P2749**

**[5154]-132**

[Total No. of Pages : 3

**B.E. (Electrical Engineering)**  
**POWER SYSTEM OPERATION AND CONTROL**  
**(2008 Course) (Semester - I) ( 403142)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *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 with mathematical equations, the equal area criterion of stability analysis for the case of sudden increase in mechanical input to generator. Plot the P-delta curve. **[10]**
- b) Explain with definition **[8]**
- i) Steady state stability
  - ii) Dynamic stability
  - iii) Transient stability
  - iv) Critical clearing angle and Critical clearing time.

OR

- Q2)** a) Explain the equal area criterion of stability for sudden short circuit on one of the parallel lines away from line ends (in the middle of a line). Plot the P - delta curve. Derive the expression for critical clearing angle. **[10]**
- b) Explain the point by point method for the solution of swing equation. **[8]**
- Q3)** a) Draw a loading capability curve of a synchronous generator and explain reactive power generation and absorption. **[10]**
- b) Write a note on excitation control. **[6]**

OR

**P.T.O.**

**Q4)** a) Explain how series compensation is obtained for transmission lines. Explain the advantages and also problems associated with series compensation. [8]

b) Explain how Synchronous condenser is used for reactive power support. [8]

**Q5)** a) What are the different types of Static VAR Compensators (SVCs)? [8]

b) Explain the principle of operation of Thyristor Controlled Series Capacitors (TCSC) with its advantages. [8]

OR

**Q6)** Explain with diagram following devices, [16]

a) Principle of working of STATCOM and UPFC,

b) Advantages of STATCOM and UPFC,

c) Applications of STATCOM and UPFC.

### **SECTION - II**

**Q7)** a) Explain the necessity of Automatic Generation Control (AGC). Explain with transfer function model of speed governing system, turbine and generator load system. [10]

b) Explain the droop characteristic of speed governor system. [6]

OR

**Q8)** a) With neat block diagram and response, explain single area proportional plus integral load frequency control. Also explain the concept of Area Control Error (ACE). [10]

b) Explain following concepts with reference to automatic generation control; [6]

i) Free governor mode of operation.

ii) Generator rate constraint.

**Q9) a)** Define unit commitment and state different methods of Unit Commitment. Explain priority list method with example. **[10]**

b) Explain various constraints applied to unit commitment task. **[8]**

OR

**Q10)a)** Explain with mathematical formulation, the economic load dispatch without transmission loss and including equality constraint of meeting load. **[10]**

b) Explain the cost curve of thermal generator. State the mathematical equation of cost curve. What is incremental fuel cost? **[8]**

**Q11)** Explain any two types of power interchange: **[16]**

a) Energy banking.

b) Capacity interchange.

c) Diversity interchange.

OR

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

a) Emergency power interchange.

b) Inadvertent power exchange.

c) Power pool.

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Total No. of Questions : 12]

SEAT No. :

**P2750**

**[5154]-133**

[Total No. of Pages : 3

**B.E.(Electrical)**

**CONTROL SYSTEM - II**

**(2008 Pattern) (Semester - I) (403145 )**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answer any one question from each pair of questions: Q.1&Q.2, Q3&Q4, Q.5&Q.6, Q.7&Q.8, Q.9 &Q.10, Q.11&Q.12.
- 2) Figures to the right indicate full marks.

**SECTION-I**

**Q1) a)** Draw electrical circuit & derive transfer function of Lag Lead compensation network. **[8]**

b) A unity feedback system has an open loop transfer function,  $G(s) = \frac{5}{s(s+2)}$ . Design a suitable Lead compensator so that phase margin is  $55^\circ$  and  $K_v=20/\text{sec}$ . **[10]**

OR

**Q2) a)** Draw electrical circuit & derive transfer function of Lead compensation network. **[8]**

b) A unity feedback system has an open loop transfer function,  $G(s) = \frac{K}{s(1+s)(1+0.2s)}$ . Design a suitable Lag compensator so that phase margin is  $40^\circ$  and  $K_v=8/\text{sec}$ . **[10]**

**Q3) a)** Define and explain the terms: Eigen values, Eigen vectors, Diagonalisation and Vander Monde Matrix. **[8]**

b) The state equation of the system is given by:  $\dot{X}(t) = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} X + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u(t)$ .

Determine the STM by Inverse transform method. **[8]**

OR

**P.T.O.**

- Q4)** a) State and prove important properties of STM. [8]  
 b) For the given system obtain eigen values, eigen vectors, modal matrix &

diagonal matrix  $A = \begin{bmatrix} 0 & 1 & -6 \\ -6 & -11 & 6 \\ -6 & -11 & 5 \end{bmatrix}$  [8]

- Q5)** a) Define Controllability & Observability. Explain any one method to determine it. [8]

- b) A system is having T.F.  $\frac{Y(S)}{U(S)} = \frac{2}{S^3 + 6S^2 + 11S + 6}$ . Find the state and output equation in matrix form and also test the state controllability and observability of the following system. [8]

OR

- Q6)** a) Explain various types of state observer. [8]

- b) For a given system  $A = \begin{bmatrix} 0 & 15 \\ 1 & 0 \end{bmatrix}$ ;  $B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ ;  $C = [0 \quad 2]$

Determine observer gain matrix  $K_e$  such that  $S_1, S_2 = -2 \pm j3$  are Eigen values of observer gain matrix. [8]

### SECTION-II

- Q7)** a) Write short note on tuning of PID controller. [8]

- b) For a unity feedback system  $G(s) = \frac{125}{s(s+10)}$ , find

- i) Peak overshoot and  
 ii) Steady state error for an input of  $5u(t)$ . [8]

OR

- Q8)** a) Explain P,PI,PID controllers with their characteristics. [8]

- b) Write short note on design specifications in time domain and frequency domain. [8]

- Q9)** a) State and explain various types of non-linearities. [8]

- b) Derive the Describing function for Ideal Relay. [8]

OR

**Q10)a)** Compare the advantages and disadvantages of the Describing function method and the phase plane method for the analysis of non-linear control system. [8]

b) A system with  $G(s) = \frac{50}{s(s+1)(s+2)}$  includes ideal relay with output equal to  $\pm 1$  unit. Determine the amplitude and frequency of limit cycle by describing function method. [8]

**Q11)a)** Describe the construction of phase plane trajectory of a second order system using Delta method. [8]

b) Determine the kind of singularity, find the characteristic equation and draw phase portrait for the following differential equation.

$$x'' + 3x' + 3x = 0. \quad [10]$$

OR

**Q12)a)** Explain Liapunav's second method and Liapunav's stability theorem. [6]

b) Explain whether following quadratic form of system is positive definite or not using Sylverster's Criterion.

$$V(x) = 8X_1^2 + X_2^2 + 4X_3^2 + 2X_1X_2 - 4X_1X_3 - 2X_2X_3. \quad [6]$$

c) Explain the terms: Stability, Asymptotic Stability and Instability. [6]



Total No. of Questions : 12]

SEAT No. :

**P2751**

**[5154]-134**

[Total No. of Pages : 2

**B.E. (Electrical)**

**ROBOTICS AND AUTOMATION**

**(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) *Neat diagrams must be drawn in wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

**SECTION - I**

**Q1) a)** Explain Growth of Robot science and define as per ISO. [9]

b) Explain DOF with neat sketch. Also Explain work envelope. [9]

OR

**Q2) a)** Write in detail about Historical information of Robot science. [9]

b) Explain Yaw, pitch and roll. [9]

**Q3) a)** Explain Arm prosthesis Automation. [8]

b) Explain classification of robots. [8]

OR

**Q4) a)** Explain various links and joints in robot. [8]

b) Define and explain selection process of robot. [8]

**Q5) a)** Explain underwater Welding application in robot science. [8]

b) Write a short note on Robot intelligence based on robot programming. [8]

OR

*P.T.O.*



- Q6)** a) Explain parts sorting application of robot with selection criteria. [8]  
b) Explain online and off line robot programming. [8]

**SECTION - II**

- Q7)** a) Explain with neat sketch about Homogeneous coordinate. [8]  
b) Explain co-ordinate reference frame. [8]

OR

- Q8)** a) Explain Homogeneous matrix in detail. [8]  
b) How many parameters are required for specifying position and orientation of rigid body? Explain. [8]

- Q9)** a) Explain Euler-Lagrange method to control robot motions and hence comment on Euler angle. [9]  
b) Explain inverse kinematic problem using fixed frame rotation. [9]

OR

- Q10)** a) How end effector rotary motion about an arbitrary axis can be achieved using dynamic control. [9]  
b) Explain Kinematic Chain with neat sketch. [9]

- Q11)** a) Explain various linear control schemes. [8]  
b) Explain resolved motion position control. [8]

OR

- Q12)** a) Explain joint position control. [8]  
b) Explain resolved motion rate control. [8]

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Total No. of Questions : 12]

SEAT No. :

**P2752**

**[5154]-135**

[Total No. of Pages : 3

**B.E. (Electrical)**

**POWER QUALITY**

**(2008 Course) (Semester - I) (403143B) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *In section I, attempt Q 1 or Q 2, Q 3 or Q 4, Q 5 or Q 6. In section II, attempt Q 7 or Q 8, Q 9 or Q 10, Q 11 or Q 12.*
- 2) *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 [10]
- i) Long duration voltage variations
  - ii) Voltage swells
  - iii) Voltage sags
  - iv) Voltage interruptions and
  - v) Voltage Fluctuations.
- b) State and explain the relationship between immunity, emission and compatibility. [8]

OR

- Q2)** a) Explain various definitions of power quality with reference to each stake holders and why power quality is gaining importance now a day. [10]
- b) Explain various grounding practices as per IEEE standard. [8]
- Q3)** a) Explain voltage profile and reactive power management impact on it. [8]
- b) Define voltage flicker and explain various voltage flicker mitigation methods. [8]

OR

*P.T.O.*

- Q4)** a) State and explain the causes and mitigation methods of over-voltages and under-voltages. [8]
- b) Explain various factors responsible for RMS voltage variation. What is complex power? [8]

- Q5)** a) Explain voltage sag characteristics such as magnitude, duration, phase angle jump and missing voltage. [8]
- b) Explain step by step procedure for assessment of equipments sensitivity to voltage sags. [8]

OR

- Q6)** a) Explain various utility mitigation measures for voltage sags? [8]
- b) Explain influence of fault location and fault level on voltage sags and concept of area of vulnerability. [8]

### **SECTION - II**

- Q7)** a) Explain the following terms related with waveform distortion: [8]
- i) Harmonics
  - ii) Interharmonics
  - iii) Subharmonics
  - iv) Tripln harmonics
- b) Explain various harmonics mitigation methods. [10]

OR

- Q8)** a) What is harmonic filtering? Explain active and passive filters. [8]
- b) What are harmonic resonances? Explain consequences of harmonic resonances. [10]

- Q9)** a) Define and explain impulsive as well as oscillatory transients with their sources. [8]
- b) Explain basic principles of over voltage protection. Which are the devices used for over voltage protection? [8]

OR  
2

**Q10)a)** What are transients? Explain transient velocity, surge impedance and the effect of line terminations. **[10]**

b) Explain various computer tools used for transient's analysis. **[6]**

**Q11)a)** Explain the procedure of connection of power quality monitor, monitoring locations and its period. **[8]**

b) Explain selection procedure of transducers for power quality monitoring. **[8]**

OR

**Q12)a)** What are the different approaches followed in power quality monitoring? **[8]**

b) What are the requirements of power quality monitor to monitor various power quality parameters and various techniques of data collection? **[8]**

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Total No. of Questions : 12]

SEAT No. :

**P2753**

**[5154]-136**

[Total No. of Pages : 3

**B.E. (Electrical)**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.
- 2) Figures to the right indicate full marks.

**SECTION - I**

**Q1) a) Explain: [10]**

- i) Production of light.
- ii) Quantification & Measurement of light.

**b) Define: [8]**

- i) Plane angle.
- ii) Illumination.
- iii) Depreciation factor.
- iv) Glare.

OR

**Q2) a) State and explain the laws of illumination. Derive the relation between plane angle and solid angle. [10]**

**b) Explain human optical system. [8]**

**Q3) a) What are various characteristics of gaseous discharge lamp? [8]**

**b) Describe the construction and working of low pressure sodium vapour lamp. [8]**

OR

*P.T.O.*



- Q10)a)** Explain beam lumen method in case of outdoor lighting design. [8]  
b) Explain different pole arrangements for street lighting. [8]

- Q11)a)** Explain photovoltaic lighting with example. [10]  
b) Explain central systems in case of emergency lighting. [8]

OR

- Q12)a)** What is cold lighting? Explain optical fibre cable with neat diagram & applications. [10]  
b) Write on - Retrofits. [8]

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Total No. of Questions : 12]

SEAT No. :

**P2754**

**[5154]-137**

[Total No. of Pages : 4

**B.E. (Electrical)**

**PROJECT MANAGEMENT**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**UNIT - I**

**Q1) a)** Define Project Management. Explain its importance. **[8]**

b) Why Project Management is required? State the PLC stages. **[9]**

OR

**Q2) a)** Explain Project Appraisal. State the need for Project Appraisal? **[8]**

b) Explain Execution Phase and state all its characteristics. 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 inflows

cash out flows (in Rs. lacs)

(in Rs. lacs) at the end of

		Iyr	IIyr	IIIyr	IVyr	Vyr
Project A	20	-	10	15	17	20
Project B	45	20	25	30	40	45

OR

**P.T.O.**



- Q4) a)** State why Project selection is important? Explain the probable causes of project failure. [8]
- b) State ROI. What is Profitability Index? Why Project cost control is required? [8]

**UNIT - III**

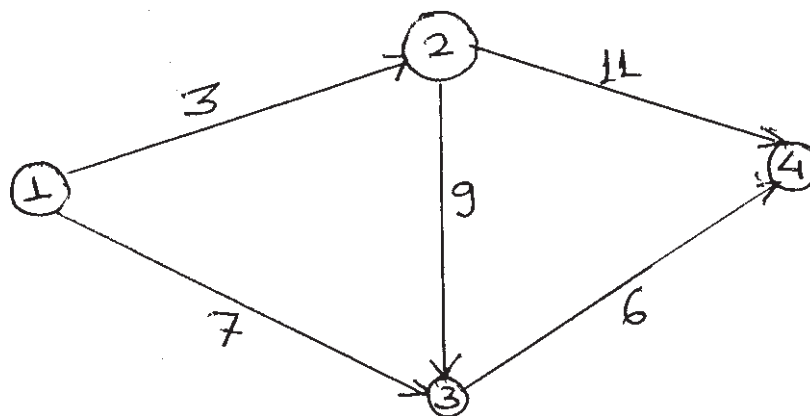
- Q5) a)** Write the differences between PERT and CPM. What is the significance of critical path? State the concept of crashing, with a well labeled diagram. [8]
- b) Write short notes on: [8]
- i) Critical Path Method.
  - ii) Gantt chart.

OR

- Q6)** The following data pertains to the network given below. It is desired to compress the project to the least possible duration day by day and estimate the extra cost. [16]

i-j	Normal Time (days)	Crash Time (days)	Cost slope (Rs. per day)
1-2	3	2	200
1-3	7	5	100
2-3	9	6	100
2-4	11	7	200
3-4	6	3	300

Network



#### UNIT - IV

- Q7) a)** Why Project Cost Estimation is required? State all its steps. Describe the Cost estimating process. [9]
- b) Explain Project cost accounting systems. State the features of Cost scheduling. [8]

OR

- Q8) a)** Write short notes on: [9]
- i) Budgeting.
- ii) Cost scheduling.
- b) Define direct cost, indirect cost & prime cost. What are different cost factors? [8]

#### UNIT - V

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

OR

- Q10)a)** Explain short notes on: [9]
- i) International project Management.
- ii) Quality of procured items.
- b) State all the characteristics of International Project Management? 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
20,000	0.30
40,000	0.50
30,000	0.30
25,000	0.20

The cash inflow acceptable for the project sponsor is Rs. 20,000. What is the certainty equivalent coefficient?

**b)** The expected cash inflows of a project are estimated as under. **[8]**

Year	Cash inflow (Rs.)
1	1,00,000
2	1,50,000
3	3,00,000
4	3,50,000
5	2,50,000

The initial investment required for the project is Rs. 4,00,000/-. The risk adjusted discount rate is 20%. 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) Capital Asset pricing model.
- ii) Correlation coefficient.

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Total No. of Questions : 12]

SEAT No. :

**P2755**

**[5154]-138**

[Total No. of Pages : 3

**B.E.(Electrical)**

**RESTRUCTURING & DEREGULATION  
(2008 Pattern) (Semester-I)(403144A) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any Q1 OR Q2, Q3 OR Q4, Q5 OR Q6 questions from Section I and Q7 OR Q8, Q9 OR Q10, Q11 OR Q12 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 table is allowed.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) What are the key objectives of “Electricity Act 2003” with reference to generation, transmission and distribution sector. [8]
- b) Discuss the institutional structures of Indian power sector before and after restructuring. [8]

OR

- Q2)** a) What are the functions of Ministry of power and PFC. [8]
- b) Explain the working of Indian Energy Exchange for day ahead market. [8]

- Q3)** a) Discuss the following economic terms of power sector [8]
- i) Fixed cost and variable cost
  - ii) Capital cost
  - iii) Depreciation
  - iv) Profitability indices.
- b) What are the tariff setting principles? [8]

OR

**P.T.O.**

- Q4)** a) Explain any two methods to assess the financial feasibility of any project. [8]
- b) What do you mean by [8]
- i) Subsidy & cross subsidy
- ii) O and M expenses.

**Q5)** Write short note on: [18]

- a) CERC
- b) Structure of regulatory process in India
- c) Role of State Electricity regulatory Commission.

OR

**Q6)** Discuss following methods of regulations: [18]

- a) Incentive regulation.
- b) Rate of return regulation
- c) Benchmarking Regulation

### **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) Explain in detail “The California Crisis”. [8]
- b) Compare between ‘Competition for the market’ and ‘Competition in the market’. [8]

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

OR

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

- a) Integrated  
b) Wheeling  
c) Decentralised

- Q11)** a) How ISO works? Explain in detail. [8]  
b) Explain the three parts of availability based tariff, how they are implemented. [8]

OR

- Q12)** a) Explain the concept of open access and transmission rights. [8]  
b) State the key features of Indian Grid code. Also explain transmission congestion issues. [8]



Total No. of Questions : 10]

SEAT No. :

**P2756**

**[5154]-139**

[Total No. of Pages : 3

**B.E.(Electrical)**

**EMBEDDED SYSTEM**

**(2008 Pattern) (403144B) (Elective-II) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q1 OR Q2, Q3 OR Q4, and Q5 questions from Section I and Q6 OR Q7, Q8 OR Q9, Q10 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) *Figure to the right indicate full marks.*

**SECTION-I**

- Q1)** a) What is an Embedded system. What are its main characteristics? [4]  
b) How does a DSP differ from a General Purpose Processor? [8]  
c) Write a note on the challenges faced in designing an embedded system.[4]

OR

- Q2)** a) With the help of a flowchart, explain the design process in an embedded system. [8]  
b) Give the main characteristics and features of a microcontroller. [8]
- Q3)** a) Explain the various types of ADC and give their advantages. [10]  
b) How is a pressure sensor interfaced in an embedded system? [6]

OR

**P.T.O.**

**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) Watchdog Timer

b) Interfacing a solenoid with microcontroller

c) Motordrive ICs

d) RISC and CISC Processors

## **SECTION-II**

**Q6) a)** Differentiate between Function, ISR and Task. [9]

b) Explain the concept of semaphores as an event signaling variable. [9]

OR

**Q7) a)** Explain in detail following scheduling algorithms [10]

i) First in first out

ii) Round robin with priority

iii) Shortest job first

iv) Non-Preemptive multitasking

v) Preemptive multitasking

b) Explain how a inter processor communication is done by a mailbox. [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. :

**P2757**

**[5154]-140**

[Total No. of Pages :3

**B.E.(Electrical)**

**EXTRA HIGH VOLTAGE TRANSMISSION**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any one from each unit of 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 answer books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of logarithmic tables slide rule, electronic pocket calculator is allowed.*
- 7) *Assume suitable data, if necessary.*

**SECTION-I**

**Unit-I**

**Q1)** a) A power of 2000 MW is to be transmitted over a distance of 900 km. Use 750 kV line for which reactance is 0.272 ohm/km and resistance is 0.0136 ohm/km. Suggest the number of the circuits required for uncompensated line with 30° phase difference between sending end and receiving end voltages. Also calculate line current, power loss per circuit and percentage power loss. **[8]**

b) Explain construction and working of different dampers and spacers. **[8]**

OR

**Q2)** a) Derive travelling wave equations and from the solution of the travelling wave equations prove that it consist of two waves travelling in opposite directions. **[8]**

b) Explain three types of vibrations of transmission lines due to wind and compare them on basis of wind velocity, frequency of oscillations and amplitudes. **[8]**

**P.T.O.**

## Unit-II

- Q3)** a) For three phase overhead ehv line derive potential to ground matrix in terms of Maxwell's potential coefficient matrix and hence state expression for capacitance matrix. [10]
- b) Explain bundle conductors. State their advantages. [6]

OR

- Q4)** a) For a fully transposed three phase ehv ac line derive the expression for positive sequence inductances in terms of self and mutual inductances. [8]
- b) Find Maxwell's coefficient matrix for 3 phase 400 kV line with horizontal configuration. The height of the conductors above the ground level is 15 meter, spacing between the phases is 11 meter. The diameter of each subconductor of two subconductor bundle is 3.18 cm and bundle spacing is 45.72 cm. [8]

## Unit-III

- Q5)** a) Derive maximum charge condition on three phase ac line and hence write expression for maximum charge. [10]
- b) A single conductor of ehv transmission line strung above the ground is made up of ACSR conductor with diameter 0.0635 meter and line height is 21 meter above the ground. The voltage gradient on the conductor is equal to coronainception gradient given by the equation

$$E = \frac{30}{\sqrt{2}} \frac{1}{m} \left( 1 + \frac{0.301}{\sqrt{r}} \right) \frac{\text{kV}}{\text{cm, rms}}, \text{ where } m=1.3, \text{ and } r \text{ is conductor radius in centimeter}$$

Find the voltage to ground of conductor. Also find capacitance to ground. [8]

OR

- Q6)** a) Derive the expression for maximum and minimum surface voltage gradient on subconductor. State the assumptions made in deriving these expressions. Hence write expression for the maximum voltage gradient when "n" subconductors are there. [10]
- b) Compare line charge with point charge. [8]

## SECTION-II

### Unit-IV

- Q7)** a) Explain what is meant by primary and secondary shock currents. Also define “threshold” value and let-go value of shock current. State the effect of shock currents of different magnitudes on human body. [8]
- b) Discuss the effects of electrostatic fields on human, animal and plants. [8]

OR

- Q8)** a) What is meant by electrostatic induction? With usual notations explain the procedure of calculating electrostatically induced voltage on the conductors of unenergised circuit of double circuit line. [10]
- b) Write note on ungrounded “ground wire”. [6]

### Unit-V

- Q9)** a) Draw the three phase full wave bridge circuit and derive the expression for dc voltage in terms of ac voltage with and without ignition angle delay. [10]
- b) Draw the equivalent circuit of bridge rectifier and explain the term equivalent commutating resistance. [6]

OR

- Q10)** a) Explain the operation of converter as inverter and the terms ignition advance angle and extinction advance angle. [8]
- b) Write note on twelve pulse converter circuit using bridges in series. Draw waveform of direct voltage and alternating current. [8]

### Unit-VI

- Q11)** a) Draw the diagram of one pole of bipolar link and corresponding equivalent circuit showing voltage profile. Explain how direct voltage is controlled by tap changing as well as by gate control. [10]
- b) Write note on ideal VI characteristics of HVDC system. [8]

OR

- Q12)** a) Write note on any one method of converter firing control system. [9]
- b) State the problems associated with operation a dc system when connected to weak ac system and remedial actions to overcome problems. What is meant by weak ac system? [9]



Total No. of Questions : 12]

SEAT No. :

**P2758**

**[5154]-141**

[Total No. of Pages :2

**B.E.(Electrical Engineering)**

**SMART GRID**

**(2008 Pattern) (Semester-I) (Elective-II) (403144D)**

*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 data, if necessary.*

**SECTION-I**

- Q1)** a) What is need of Smart Grid. Explain the functions of Smart Grid. [10]  
b) Explain the concept of resilient and self healing grid. [8]

OR

- Q2)** a) Highlight on evolution of electric grid and the concept of Smart Grid.[10]  
b) Write a note on present development in Smart Grid considering anyone case. [8]

- Q3)** a) Explain how smart meters can play an important role to make a system smart. [8]  
b) Explain the concept of plug in Hybrid Electric vehicles. [8]

OR

- Q4)** a) Explain how Smart Appliances can be the part of Smart Grid. [8]  
b) How home and building automation can be achieved. Explain step by step approach. [8]

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

- Q5) a)** Write a note on “IED”. [8]  
b) Explain WAMS and give its advantages. [8]

OR

- Q6) a)** Explain any two Smart storage equipments. [8]  
b) Write a note on Smart Substation. [8]

**SECTION-II**

- Q7) a)** Describe the concept of microGrid, and also its need and applications. [10]  
b) Write a note on Captive Power Plant. [8]

OR

- Q8) a)** Explain the protection and control strategy implemented in Smart Grid. [10]  
b) Write a note on Thin film solar cells. [8]

- Q9) a)** Highlight on web based Power Quality monitoring. [8]  
b) Explain EMC and its importance in Smart Grid. [8]

OR

- Q10) a)** Why Power Quality is considered to be an important issue especially in Smart Grid. [8]  
b) Write a note on Power Quality audit. [8]

- Q11) a)** Explain the concept WAN related to Smart Grid. [8]  
b) Write a note on Wi-Max based communication in Smart Grid. [8]

OR

- Q12) a)** Explain the importance of Bluetooth in Smart Grid. [8]  
b) Write a note on, Broadband over power line. [8]



Total No. of Questions : 12]

SEAT No. :

**P2759**

**[5154]-142**

[Total No. of Pages : 3

**B.E.(Electrical)**

**SWITCHGEAR & PROTECTION**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1) a)** Explain are interruption methods in case of circuit breakers. **[8]**
- b) For a 132 kV system, the reactance & capacitance upto the location of circuit breaker is  $3\Omega$  &  $0.015\mu\text{f}$  respectively. Calculate. **[8]**
- i) The frequency of transient oscillations.
  - ii) The maximum value of restriking voltage.
  - iii) Maximum value of RRRV.

OR

- Q2) a)** Explain current chopping phenomenon in case of circuit breaker. How it is prevented? **[8]**
- b) Write short note on 'Interruption of capacitive current in case of circuit breaker. **[8]**
- Q3) a)** With neat diagram explain construction & working of Air blast circuit breaker. **[8]**
- b) Explain different ratings of circuit breaker. **[8]**

OR

**P.T.O.**

**Q4)** a) With neat diagram explain construction & working of vacuum circuit breaker. [8]

b) Write short note on 'Auto.reclosing'. [8]

**Q5)** a) With neat diagram explain construction & working of Induction type Non-directional over current relay. [10]

b) What are the causes of faults in power system? What are different types of faults.Explain its effects on power system. [8]

OR

**Q6)** a) Explain the principle of simple or plain current differential relay. Explain in detail the problems associated with it. [10]

b) What are essential qualities of protective Relaying. Explain in detail. [8]

## SECTION-II

**Q7)** a) With neat block diagram, explain working of digital relay. State its advantages. [10]

b) Write short notes on: [8]

i) Sampling theorem

ii) Anti-aliasing filter

OR

**Q8)** a) With neat block diagram, explain working of static relay state its advantages over electro magnetic relays. [10]

b) Explain Least Square method for estimation of phasor. [8]

**Q9)** a) With neat diagram, explain operation of Buchholz relay. State its merits & limitations. [10]

b) With neat sketch explain protection of busbars using high impedance differential relay. [6]

OR



- Q10)a)** Explain protection of alternator against **[10]**
- i) Loss of excitation
  - ii) Loss of prime-mover
- b) A 3 phase 33/6.6kV, star/delta connected transforms is protected by differential protection. The CT's on LT side have ratio of 300/5. Determine the CT ratio on HT side. **[6]**

- Q11)a)** Explain the effect of **[8]**
- i) Arc resistance
  - ii) Power swing on the operation of distance relay.
- b) Explain time graded and current graded system of protection of three phase feeder using over current relays. **[8]**

OR

- Q12)a)** Compare impedance relay, reactance relay & mho relay with reference to its operation, characteristics & applications **[8]**
- b) Explain wide area measurement system. **[8]**



Total No. of Questions : 12]

SEAT No. :

P2760

[5154]-143

[Total No. of Pages : 3

**B.E. (Electrical)**  
**INDUSTRIAL DRIVES AND CONTROL**  
**(2008 Course) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) What are the factors of selection of a drive? Draw Block diagram of a drive and explain. [8]
- b) Explain the stability criterion of a motor-load combination with the help of Torque/speed characteristics. What is the condition for equilibrium speed? [8]

OR

- Q2)** a) What are the types of Mechanical Loads as function of speed? Explain using speed torque characteristics and suitable examples. [8]
- b) A drive has following parameters.  $J = 1 \text{ kgm}^2$ ,  $T = 15 - 0.01 N, Nm$  and passive load torque  $T_1 = 0.005 N, Nm$ , where  $N$  is speed in rpm. Calculate the steady state speed. Check the stability of this motor load combination using condition of stability. [8]

- Q3)** a) What are the electrical braking methods? Explain Dynamic braking method used for separately excited DC shunt motor. Draw braking Torque Speed characteristics. [8]
- b) A 230 V, 1000 rpm, 150 A dc separately excited motor has an armature resistance of 0.02 ohm. Motor is required to brake using plugging from 800 rpm. Calculate the value of external resistance to be connected in the armature to limit braking current to twice full load current and value of braking torque. [8]

OR

**P.T.O.**

- Q4)** a) Explain DC dynamic braking in Induction motor. Draw torque speed characteristics during motoring and braking. What precautions are required to be taken to use this method? [8]
- b) A 220 V dc shunt motor has an armature resistance of 0.062 ohm and with full field, has a of 215 V at a speed of 960 rpm. The motor is driving an overhauling load with a torque of 172 Nm. Calculate the minimum speed at which motor can hold the load by means of regenerative braking. [8]
- Q5)** a) Explain operation of a seperately excited dc motor fed from a three phase full controlled converter in armature circuit and one phase semiconrolled converter in field circuit for speed control comment on Quadrant operation. [9]
- b) Draw Closed loop speed control scheme for control below and above base speed for a seperately excited dc motor. Explain its operation. [9]

OR

- Q6)** a) Explain the operation of a dc seperately excited motor with armature fed from a single phase half controlled converter and with constant rated field supply. Explain the possible quadrant operations and range of control of motor. Comment on range for continuous conduction. [9]
- b) Explain closed loop control of seperately excited DC motor with the help of block diagram for constant torque mode of operation. [9]

### SECTION-II

- Q7)** a) Draw speed torque characteristics to explain Static Stator voltage speed control method in Induction motor drives. What is the range of speed control and what are the limitations. [8]
- b) Why V/f control is preferred in Induction motor control? What are advantages and limitations of this method? How V/f ratio is decided? [8]
- OR
- Q8)** a) Explain static rotor resistance control method used for IM speed control with the help of neat diagram and required relations. [8]
- b) What are the advantages of closed loop control? Explain scheme for closed loop control used in VSI fed IM drives. [8]

- Q9)** a) What are the selection criteria for motor used for intermittent loads? [8]  
b) Calculate the starting time of a drive with following parameters.  
 $J = 10 \text{ kg-m}^2$ ,  $T_m = 15 + 0.5 \text{ wm}$ ,  $T_l = 5 + 0.6 \text{ wm}$ . [8]

OR

- Q10)** a) What are Duties of motor? How motor rating is decided for periodic intermittent loads? [8]  
b) A motor operates on a periodic duty consisting of a loaded period of 20 min.s and no load period of 10 min.s. The maximum temp. rise is  $60^\circ\text{C}$  Heating and cooling time constants are 50 and 70 min.s resp.ly. When operating continuously on no load , the temp. rise is  $10^\circ\text{C}$ . Determine  
i) Mini temp. during duty cycle.  
ii) Temp. when motor is loaded continuously. [8]

- Q11)** a) Explain Drives used in Cement mills. [9]  
b) Explain AC servo drives with neat diagram and applications. [9]

OR

- Q12)** Write any two  
a) FOC in Induction Motor drives. [9]  
b) Drives used in Steel mills. [9]  
c) Drives used in Sugar mills. [9]



Total No. of Questions : 12]

SEAT No. :

**P2761**

**[5154]-144**

[Total No. of Pages : 2

**B.E. (Electrical)**

**VLSI DESIGN**

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

*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, Q.7 or Q.8, Q.9 or Q.10 & Q.11 or Q.12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume Suitable data, if necessary.*
- 6) *Each section should be solved on separate answer sheets.*

**SECTION-I**

**Q1)** Using only one 4:1 Multiplexer develop two input AND, OR, Ex-or, NAND gate. **[16]**

OR

**Q2)** Explain EDA tool design flow in detail along with flowcharts of different stages. **[16]**

**Q3)** a) Implement the following:

i)  $\Sigma m (0, 5, 6, 7, 9, 12, 15)$  Using 16 :1 Mux. **[6]**

ii) Implement 16 : 1 Mux using only 4 : 1 Mux. **[6]**

b) Compare high level language and VHDL language. **[6]**

OR

**Q4)** a) Compare Synchronous & Asynchronous counter. **[6]**

b) Draw and explain 4 bit PIPO shift register. **[6]**

c) Draw state table state diagram and Implement 101 detector. **[6]**

**Q5)** a) Define and explain in brief: **[9]**

i) sub program ii) Architecture iii) Component.

b) Draw ckt. of 4 bit adder and write its VHDL code. **[7]**

OR

**P.T.O.**

- Q6)** a) What is an architecture? What are its types? Explain any one of it with example. [8]  
b) Write VHDL code for MOD 5 counter also draw its timing diagram. [8]

**SECTION-II**

- Q7)** a) Explain w.r.t CMOS and give std. Values of [10]  
i) Fan in.  
ii) Fan out.  
iii) Power dissipation.  
iv) Figure of merit  
v) Noise margin  
b) Compare PMOS, NMOS & CMOS. [6]

OR

- Q8)** a) Explain data objects and data types used in VHDL. [8]  
b) Explain configuration with example in VHDL code. [8]

- Q9)** a) Explain sub-program overloading using VHDL code. [8]  
b) Explain the concept of package & Explain it with one Example in VHDL. [8]

OR

- Q10)**a) Implement following gates using CMOS:  
i) NOT. ii) AND. iii) OR. iv) EX-OR. [8]  
b) Explain the voltage transfer characteristics of CMOS inverter in detail. [8]

- Q11)**a) Draw the Architectural layout of CPLD. [8]  
b) Compare in detail ASIC, FPGA & CPLD. [10]

OR

- Q12)**a) Write VHDL code for Barrel Shifter. [8]  
b) Explain the process of place and route and simulation with its types in detail. [10]



Total No. of Questions : 12]

SEAT No. :

**P2762**

**[5154]-145**

[Total No. of Pages : 3

**B.E. (Electrical)**

**HIGH VOLTAGE ENGINEERING**

**(2008 Pattern) (Semester - II) (Elective - III) (403149 B)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1) a)** Derive the current growth equations according to Townsend's theory, in presence of primary and secondary process. Also define Townsend's first & second ionization coefficient. **[10]**
- b) A steady current of 500  $\mu\text{A}$  flows through the plane electrode separated by a distance of 0.4 cm when a voltage of 10 kv is applied. Determine the Townsend's first ionization coefficient if a current of 40  $\mu\text{A}$  flows when the distance of separation is reduced to 0.1 cm and the field is kept constant at the previous value. **[6]**

OR

- Q2) a)** Explain streamer theory of breakdown of gaseous dielectrics. Also state drawback of Townsend's theory. **[8]**
- b) What is Paschen's law? What is the significance of minimum breakdown voltage value under different P-d conditions? **[8]**

- Q3) a)** Explain following breakdown phenomenon of liquid dielectric materials. **[10]**

- i) Suspended particle theory
- ii) Cavitation an bubble theory
- iii) Stressed oil volume theory

- b) Explain treeing and tracking phenomenon in solid dielectrics. **[8]**

OR

**P.T.O.**

- Q4)** a) Explain following breakdown mechanism in solid insulating materials. [9]  
i) Intrinsic breakdown  
ii) Electromechanical breakdown  
b) Explain mechanism of breakdown in composite dielectric material. [9]

- Q5)** a) Explain in details Reynold's and Mason's Theory of charge formation in clouds. [8]  
b) What is lightning arrestor? State the desired characteristics of lightning arrestor & Write note on ZnO gapless type lightning arrestor. [8]

OR

- Q6)** a) State and explain the causes of overvoltages due to switching surges and system fault. [8]  
b) Explain "insulation co-ordination". How are protective devices chosen for the optimal insulation level in power system. [8]

### SECTION-II

- Q7)** a) Explain the Van-de-Graaf generator for generation of high DC voltage. [8]  
b) Explain the generation of high alternating voltages using cascaded connection of transformers. [10]

OR

- Q8)** a) A 12 stage impulse generator has 0.125 micro farad condenser and 1000 ohm and 5200 ohm are wave front and wave tail resistances. If the load condenser is 1200 pf, find the front and tail times of the impulse wave generated. [8]  
b) Write short note on trigatron gap. [7]  
c) Define impulse voltage, wave front and wave tail resistances. [3]

- Q9)** a) Write a short note on sphere gap voltmeter. State and explain factors affecting the reading and also explain how correction factors are applied for atmospheric condition charges. [10]  
b) A generating voltmeter has to be designed so that it can have a range from 50 to 210 kV DC. If the indicating meter reads a minimum current of 1.5 micro ampere, what will be the maximum current of the meter? Find the capacitance of the generating voltmeter as well. [6]

OR



**Q10)a)** Explain concept of hall effect and describe how it is used for measuring high current? [8]

b) Explain resistance, capacitance and mixed potential dividers with their advantages and disadvantages. [8]

**Q11)a)** Write a short note on testing of Bushings and isolators. [6]

b) Explain Schering bridge method for measurement of partial discharge with a neat diagram. List the features of high voltage Schering bridge. [10]

OR

**Q12)a)** Write a short note on testing of Surge diverter. [8]

b) Explain various tests conducted on cables. [8]



Total No. of Questions : 12]

SEAT No. :

**P2763**

**[5154]- 146**

[Total No. of Pages : 4

**B.E. (Electrical)**

**DIGITAL SIGNAL PROCESSING  
(2008 Pattern) (Semester - II) (Elective - III)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to candidates:*

- 1) *Answer any 3 questions from each section.*
- 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) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** State and Prove the sampling theorem in frequency domain. **[8]**
- b) Find the convolution between two discrete time signals  $x[n]$  &  $h[n]$ . **[10]**  
where  $x[n]=\{1\underset{\uparrow}{2}\underset{\uparrow}{3}\underset{\uparrow}{4}\}$ ,  $h[n]=\{1\underset{\uparrow}{-1}\underset{\uparrow}{1}\underset{\uparrow}{-1}\}$  and sketch the output.

OR

- Q2) a)** The analog signal given below is sampled by 600 samples per second. **[8]**  
 $x(t) = 2 \sin 480 \pi t + 3 \sin 720 \pi t$   
Calculate
- i) Nyquist sampling rate
  - ii) Maximum frequency of signal.
- b) Explain different types of system with mathematical example for each system. **[10]**
- Q3) a)** State and Prove the following properties of fourier transform. **[8]**
- i) Convolution Property
  - ii) Frequency shifting property.

**P.T.O.**

- b) Find the z transform for the following discrete time signals and find ROC for each [8]

i)  $x(n) = \left(\frac{-1}{5}\right)^n u(n) + 5\left(\frac{1}{2}\right)^n u(n-1)$

ii)  $x(n) = n^2 a^n u(n)$

OR

- Q4)** a) State and prove the following properties of z-transform. [8]

i) Convolution property

ii) Time shifting property

- b) Find the Fourier transform of following signals. [8]

i)  $e^{at} u(-t)$

ii)  $t e^{-at} u(t)$

iii)  $\frac{1}{2} \left[ \delta(t+1) + \delta(t+\frac{1}{2}) + \delta(t-\frac{1}{2}) + \delta(t-1) \right]$

- Q5)** a) Explain the following terms [8]

i) Magnitude & phase response

ii) Group delay

- b) Explain four types of GLPS systems. [8]

OR

- Q6)** a) Define LTI system. Prove the condition for a LTI system to be stable and causal. [8]

- b) Explain the concept of a system with Linear phase. What are advantages of system with linear phase. [8]

## SECTION - II

- Q7)** a) What is DFT? Explain any four properties of DFT. [8]  
b) Find the DFT of following signal [8]  
 $x[n], \{1, 0, 1, 0\}$ .

OR

- Q8)** a) Find N point DFT using Radix –2 FFT DIF algorithm for given sequence if  $N = 8$  [8]  
 $x[n] = \{1, 1, 1, 1, 0, 0, 0, 0\}$ . [8]  
b) Explain how to find Inverse DFT using FFT algorithm with butterfly diagram. [8]
- Q9)** a) Compare FIR and IIR filters. [6]  
b) Design a digital butterworth filter that satisfies the following condition using bilinear transformation

$$0.9 \leq |H(e^{j\omega})| \leq 1; 0 \leq \omega \leq \frac{\pi}{2}$$

$$|H(e^{j\omega})| \leq 0.2; 3\frac{\pi}{4} \leq \omega \leq \pi \quad [10]$$

OR

- Q10)** a) Compare butterworth and Chebyshev filters. [6]  
b) Design FIR filter with [10]

$$H_d(e^{j\omega}) = e^{-j3\omega}; -\frac{\pi}{4} \leq \omega \leq \frac{\pi}{4}$$

$$= 0; \frac{\pi}{4} \leq |\omega| \leq \pi$$

**Q11)a)** Obtain the direct form - II structures for the following systems

i)  $y(n) = 0.8y(n-1) - 0.5y(n-2) + 3x(n) + x(n-1) - x(n-2)$

ii)  $y(n) = -0.25y(n-1) + 0.05y(n-2) + x(n) - 2x(n-2)$

iii)  $y(n) = 0.5x(n) + 0.25x(n-1) + x(n-2) + 0.25x(n-3) + 0.5x(n-4)$  [12]

b) Explain DSP based vibration analysis system. [6]

OR

**Q12)a)** Write short note on any two: [12]

i) Spectrum Analysis

ii) Harmonic Analysis and measurement

iii) Power factor correction using DSP.

b) Obtain Linear phase realization of

$$H(z) = 1 + \frac{z^{-1}}{4} + \frac{z^{-2}}{4} + z^{-3} \quad [6]$$



Total No. of Questions : 12]

SEAT No. :

**P2764**

**[5154]- 147**

[Total No. of Pages : 2

**B.E. (Electrical)**

**ANN AND ITS APPLICATIONS IN ELECTRICAL ENGINEERING  
(2008 Pattern) (Semester - II) (Elective - III)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn 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 with neat sketch for neuron model and give its mathematical formulation. [9]

b) Explain various transfer function for ANN. [9]

OR

**Q2)** a) Explain Biological inspiration of ANN with neat sketch. [9]

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

**Q3)** a) Explain MLP with learning algorithm using weight update rule. [8]

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

OR

**Q4)** a) Explain delta rule in detail [8]

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

**Q5)** a) Explain Perceptron architecture with neat sketch and activation function. [8]

b) What is Least Mean Square algorithm used in ANN. [8]

OR

**P.T.O.**

- Q6)** a) What is Perceptron training algorithm? Explain with AND gate. [8]  
b) Explain linear rate  $\eta$ . [8]

**SECTION - II**

- Q7)** a) Explain hope - field Neural Network with neat sketch. [9]  
b) What is recurrent algorithm? Explain with neat sketch and mathematical activation function. [9]

OR

- Q8)** a) Explain Back-propagation method and its advantages and disadvantages. [9]  
b) Explain momentum coefficient needed in neural network. [9]

- Q9)** a) Explain Associative memory in detail. [8]  
b) Explain ART in detail with neat sketch. [8]

OR

- Q10)**a) Explain ART1 with neat sketch. [8]  
b) Explain various memory required in development of neural network. [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. :

**P2765**

**[5154]-148**

[Total No. of Pages : 2

**B.E. (Electrical)**

**MODELLING OF ELECTRICAL SYSTEMS  
(2008 Pattern) (Semester -II) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and Steam, tables is allowed.*

**SECTION -I**

**Q1)** Apply Park's transformation on a 3 $\phi$  Synchronous machine and obtain its voltage and torque equations. **[18]**

OR

**Q2)** Enlist the following used in modeling of synchronous machines. **[18]**  
a) Flux Linkages.  
b) Voltage and current equations.  
c) Electrical and mechanical equations

**Q3)** Draw the simplified model of synchronous machine. Derive the steady state equations and draw phasor diagram. **[16]**

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 constants.  
iii) time constants.

**Q5)** Explain in detail modeling of excitation system components. **[16]**

OR

**Q6)** Explain the classification of excitation systems. Explain in detail the various components of a block diagram representation of a general excitation system. **[16]**

**P.T.O.**



**SECTION -II**

- Q7)** a) Explain the circuit model of induction motor and its need. [9]  
b) Explain linear transformation and phase transformation used in modelling of induction motor. [9]

OR

- Q8)** a) Explain in detail the procedure in modelling of induction motor using transformation to a reference frame context [9]  
b) Explain two axis models for induction motor. [9]

- Q9)** Deduce the voltage equations of 3 phase induction motor in stationary reference frame as well as in rotor reference frame. [16]

OR

- Q10)** Deduce the equations needed in modelling of induction motor in synchronously rotating frame. Also write down torque equation. [16]

- Q11)** Write Short notes on: [16]

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

OR

- Q12)** Write Short notes on: [16]

- a) Transformer model.
- b) Three winding transformer model.
- c) Phase shifting transformer model.

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Total No. of Questions : 12]

SEAT No. :

**P2766**

**[5154]-149**

[Total No. of Pages : 2

**B.E. (Electrical Engineering)**  
**RENEWABLE ENERGY SYSTEM**  
**(2008 Course) (Elective - IV) (403150B) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Solve 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.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable additional data if necessary.*

**SECTION - I**

- Q1)** a) Describe concentrating solar power Technologies. [8]  
b) List various types of Fuel cells and explain any one. [8]

OR

- Q2)** a) Write a note on Micro-Hydropower systems. [8]  
b) Explain combined heat and power technology. [8]

- Q3)** a) Write a note on, Historical Development of wind power. [8]  
b) Give simple estimates of wind turbines energy. [10]

OR

- Q4)** a) List the methods and explain how maximum power can be achieved by controlling speed. [10]  
b) Explain the specific wind turbine performance calculations. [8]

- Q5)** a) Explain total clear Sky Insolation on a collecting surface with different types of radiations. [8]  
b) Write a note on, solar radiation Measurements. [8]

OR

- Q6)** a) Explain the solar position at any time of the day. [8]  
b) Explain with neat diagram, the Earth's orbit and also clearly explain the important dates. [8]

*P.T.O.*

**SECTION -II**

**Q7)** a) Explain the generic photovoltaic cell and the simplest equivalent circuit for a photovoltaic cell. [8]

b) Explain the impacts of Temperature and Insolation on I-V curves. [8]

OR

**Q8)** a) Explain the PV I-V curve under standard test conditions. [8]

b) Explain single - crystal czochralski silicon technology. [8]

**Q9)** a) Write a note on, major photovoltaic system types. [8]

b) Write a note on, Grid Autonomy. [10]

OR

**Q10)**a) Explain the grid-connected PV systems and its interfacing with the utility. [10]

b) Write a note on, Bi-direction metering. [8]

**Q11)**a) Explain, Nuclear energy power plant. [8]

b) Explain, Impact of Renewable Energy sources. [8]

OR

**Q12)**a) Explain Bio-chemical and photosynthesis techniques. [8]

b) Write a note on, Ozone depletion. [8]

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Total No. of Questions :12]

SEAT No. :

**P2767**

[Total No. of Pages :4

**[5154] - 150**

**B.E. (Electrical)**

**DIGITAL CONTROL SYSTEMS**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any one question from each pair of questions: Q.1 & Q.2, Q.3 & Q.4, Q.5 & Q.6, Q.7 & Q.8, Q.9 & Q.10, Q.11 & Q.12.*
- 2) *Answer 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) Compare Digital Control System with Analog 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)  $Y(n)=X(2n)$

2)  $Y(n)=X(-n+2)$

OR

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

**Q2) a)** Draw basic digital control system in block diagram form & explain the function of each block. [8]

b) What are different Sampling methods? Explain them. [8]

**Q3) a)** Derive the Z-transform of unit impulse signal and unit ramp signal with proper ROC. [6]

b) Find Initial and final values of given function:  $X(z) = \frac{1+Z^{-1}}{1-0.25Z^{-2}}$ . [12]

OR

**Q4) a)** Explain different methods of obtaining Inverse Z-transform. [6]

b) Evaluate the inverse Z-transform of : [12]

i) 
$$X(z) = \frac{1}{(z-1)(z-3)}$$

ii) 
$$X(z) = \frac{1 - \frac{1}{2}z^{-1}}{1 - \frac{1}{4}z^{-2}} ; Z > \frac{1}{2}$$
 by Partial fraction.

**Q5) a)** Show with proper diagrams mapping of Left half of S-plane into Z-plane. [8]

b) Examine the stability of system by Jury's test: [8]

$$F(z) = Z^4 - 0.6Z^3 - 0.81 Z^2 + 0.67 Z - 0.12 = 0$$

OR

**Q6) a)** Explain stability analysis of system using Bilinear transformation with Routh stability criterion. [8]

b) Write a short note on designing of Discrete time system based on Root locus method. [8]

## SECTION-II

**Q7) a)** Discuss the various methods used for STM from the given state difference equation  $X(k+1)=GX(k)+Hu(k)$ . [8]

b) Obtain STM of the following difference equation [8]

$$X(k+1)=GX(k)+Hu(k) \text{ where } G = \begin{bmatrix} 0 & 1 \\ -0.16 & -1 \end{bmatrix}; H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}.$$

OR

**Q8) a)** State and prove important properties of STM. [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)** Explain Kalman's and Gilbert's tests of Controllability and Observability. [8]

b) Determine Controllability and Observability of the system [8]

$$X(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -0.01 & 0.21 & 0.8 \end{bmatrix} X(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k); Y(k) = [0 \ 0 \ 1]X(k).$$

OR

**Q10) a)** Explain what do you mean by Full order observer? With the help of a block diagram explain it. [8]

b) For the system  $X(k+1) = G X(k) + H U(k)$ ;  $Y(k) = C X(k)$  where [8]

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

Design a full order state observer for the desired eigen values of observer matrix. As  $Z_1 = -1.8 + j2.4$  &  $Z_2 = -1.8 - j2.4$ .

**Q11)a)** Draw neat diagram of Digital Position control scheme and explain it. [8]

b) Construct state model for following transfer function. Also obtain different canonical form for system: [10]

$$\frac{Y(Z)}{R(Z)} = \frac{Z^3 + 8Z^2 + 17Z + 8}{(Z + 1)(Z + 2)(Z + 3)}$$

OR

**Q12)a)** Explain Stepper motor control with proper block diagram. [8]

b) Consider the system defined by [10]

$$\frac{Y(z)}{U(z)} = \frac{4z^2 - 3z + 0.5}{z^3 + z^2 - z - 0.75}$$

Determine State space representation in Controllable canonical form.

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2768**

[Total No. of Pages :3

**[5154] - 150-A**

**B.E. (Electrical)**

**INTRODUCTION TO ELECTRICAL TRANSPORTATION SYSTEM  
(2008 Course) (Semester-II) (Elective-IV) (403150 D)**

*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 answer - books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION-I**

- Q1)** a) What are the Drive systems used in Indian Railways? Explain how the Traction power is controlled and delivered for these Drive Systems. [8]
- b) Explain why Rail Transport is efficient and cheaper to run compared to Road Transport. [8]

OR

- Q2)** a) What are the major components for the control of electric vehicle explain with block diagram. [8]
- b) What are the different types of Electric Motors used in EV? Explain any one of them. [8]
- Q3)** a) What do you understand from the specification “Automotive Battery 12 Volt, 135 AH at 20 hour rate”. [8]
- b) What is continuous discharge current this battery can provide and for how many hours before getting fully discharged. [8]

OR

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



**Q4) a)** What are the precautions to be taken while Charging and Discharging a Lead acid Battery. [8]

b) What are the different types of lithium batteries and which battery is used electrical vehicle, also give their respective chemical reaction. [8]

**Q5) a)** Give two examples of application for each of the cases of Power conversion AC to DC, DC to DC and DC to AC. [10]

b) Explain why high frequency power conversion is advantageous. [8]

OR

**Q6) a)** What is the recent trends to used ultracapacitor in electrical vehicle. [10]

b) Explain three phase fully controlled rectifier for R load. [8]

### SECTION-II

**Q7) a)** Compare Advantages of Analog Controls to Digital Controls in a Electric Car instrumentation. [8]

b) What are CAN Bus controls and why this preferred control system in present day design. [8]

OR

**Q8) a)** Write short note on brushless motor drive. [8]

b) Compare mechanical steering with electric steering. [8]

**Q9) a)** Draw with Block diagram of a typical Drive Train of an Electric Car starting from Energy source to Drive and control at Wheels. [8]

b) What is the Power source for Electric Rail Traction. How this power is converted and controlled to provide starting Torque and high speeds. [8]

OR

- Q10)a)** Explain the various service conditions of electric drives. [8]
- b) What are different classes of duties of motor? Explain with one example each. [8]

- Q11)a)** While a Lift is descending with full load how is its speed controlled and what happens to the Potential energy. [10]
- b) What are the safety features in a Passenger Lift system and how to ensure that it is fail safe. [8]

OR

- Q12)a)** Explain regenerative braking used in elevator system. [10]
- b) What are the safety features to be considered while designing the elevator. [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2769**

**[5154]-151**

[Total No. of Pages : 2

**B.E. (Instrumentation & Control)  
PROCESS INSTRUMENTATION  
(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 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 suitable example analysis of thermal process. [8]  
b) Why Dead Time processes are difficult to control? Explain with suitable example. [8]

OR

- Q2)** a) Explain with suitable example self regulating and non self - regulating process. [8]  
b) Identify process variables in a stirred tank heater process. Define control objective and proper pairing of variables. [8]

- Q3)** a) Explain in brief features and functions of MLPC. [8]  
b) Elaborate analysis of liquid level control system. [10]

OR

- Q4)** a) What is the role of Scaling in process control? Explain the various steps involved for scaling in a Flow Ratio Control application. [10]  
b) Discuss in brief variable pressure drop and variable time constant. [8]

- Q5)** a) Discuss the quantitative control performance criteria for disturbance input changes. [8]  
b) Explain in brief input and output processing in feedback control. [8]

OR

**P.T.O.**

- Q6)** a) Write a brief note on correlations for tuning constants. [8]  
b) Discuss application issues such that, equipment specification and control algorithm in feedback control to provide accuracy and reliability. [8]

### SECTION-II

- Q7)** a) Explain with suitable example split range control. [8]  
b) Explain the working of a Feedforward control with suitable application. State its limitations. [8]

OR

- Q8)** a) Explain the use of Ratio Control with suitable example. [8]  
b) Explain in brief backlash and dead band. [8]

**Q9)** Write notes on:

- a) Multivariable processes and its control.  
b) RGA [18]

OR

- Q10)**a) Discuss in brief Interaction & Decoupling of process variables. [10]  
b) What is the need of Relative Gain Analysis? Elaborate the techniques used for reducing interaction. [8]

- Q11)**a) Write brief note on IMC. [8]  
b) Explain with example Fuzzy sets and Fuzzy relations. [8]

OR

- Q12)**a) Explain with suitable block schematic optimal controller. [8]  
b) Describe with suitable block diagram the working of a Model Reference Adaptive Controller. [8]



Total No. of Questions : 12]

SEAT No. :

P2770

[5154]-152

[Total No. of Pages : 3

**B.E. (Instrumentation and Control)**

**DIGITAL CONTROL**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Explain in detail the various blocks of Digital Time Control System. [8]  
b) Explain Impulse Sampling with the help of diagram. [8]

OR

- Q2)** a) Derive the Mathematical model of Zero Order Hold. [10]  
b) Compare Analog Control System and Digital Control System. [6]

- Q3)** a) Design a Deadbeat Controller for the system described by the following process transfer function, assume  $T = 1$  Sec and Input = Step. [10]

$$G_p(Z) = \frac{0.05(Z + 0.5)}{(Z - 0.9)(Z - 0.8)(Z - 0.35)}$$

- b) Compare Positional form and Velocity form of Digital PID Controller. [8]

OR

- Q4)** a) Derive an equation and show the block diagram representation of Positional form of Digital PID Controller. [10]  
b) List the advantages of Velocity form over the Positional form of Digital PID Controller. [8]

**P.T.O.**

**Q5) a)** Obtain State Transition Matrix for the following discrete time system [8]

$$X(K+1) = GX(K) + HU(K)$$

$$G = \begin{bmatrix} 0 & 1 \\ -3 & 4 \end{bmatrix}$$

b) Write a short note on Bilinear Transformation. [8]

OR

**Q6) a)** Explain the help of diagram the mapping of regions in S-Plane to Z-Plane and W-Plane. [8]

b) State and explain the necessary and sufficient conditions for Jury's Stability Test. [8]

### SECTION - II

**Q7) a)** Diagonalize the following matrix by Similarity Transformation. [8]

$$G = \begin{bmatrix} -4 & 1 & 0 \\ 0 & -3 & 1 \\ 0 & 0 & -2 \end{bmatrix}$$

b) Define the following terms: [8]

i) State Space

ii) State Trajectory

OR

**Q8) a)** Write a short note on Similarity Transformation. [8]

b) Obtain the various canonical forms of state Space representation. [8]

**Q9) a)** Write a short note on State Feedback Gain Matrix 'K' and explain how to calculate state feedback gain matrix. [8]

b) Define State Controllability and explain the various tests used to check the state controllability. [8]

OR

**Q10)a)** Explain various types of Observers in short. **[8]**

b) Define State Observability and state necessary and sufficient condition for the design of State Observer. **[8]**

**Q11)a)** Write a short note on Quadratic Performance Index. **[6]**

b) Write a short note on Optimal Control and discuss any one application of it. **[12]**

**Q12)** Consider the discrete time control system defined by the equation: **[18]**

$$X(K+1) = GX(K) + HU(K)$$

$$G = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}; \quad H = \begin{bmatrix} 1 \\ 0 \end{bmatrix}; \quad X(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

Determine the Optimal Control Law to minimize the following performance index also find  $J_{\text{MIN}}$ .

$$J = \frac{1}{2} X^*(4)SX(4) + \frac{1}{2} \sum_{K=0}^3 [X^*(K)QX(K) + U^*(K)RU(K)]$$

$$Q = S = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad R = 1$$

**x      x      x**

Total No. of Questions : 12]

SEAT No. :

**P2771**

**[5154]-153**

[Total No. of Pages : 2

**B.E. (Instrumentation and Control)**  
**PROJECT ENGINEERING AND MANAGEMENT**  
**(2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

**SECTION - I**

- Q1)** a) What is organizational structure? What are the types of organizational structures? Draw and explain line and staff organizational structure. [8]
- b) Write a short note on degree of automation. [8]

OR

- Q2)** a) Explain Interdepartmental, Interorganisational and Multi agency interaction involved in project and their co ordination in project statement. [8]
- b) What is project? What are various types of projects? [8]

- Q3)** a) What are the steps involved project planning and control process? [8]
- b) Explain the PERT method in detail with example. [8]

OR

- Q4)** a) Write a short note on project management software MS Project. [8]
- b) What are the various project life cycle phases. Explain one phase in detail. [8]

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



- Q5) a)** Prepare Technical specification sheet in s-20 format (any two): [10]  
i) Pressure instrument.  
ii) Turbine flow meter.  
iii) Thermo-well.  
b) What is P & I diagram? Explain with example. [8]

OR

- Q6) a)** What is material balance sheet? Explain with example. [9]  
b) Write short notes on S5.20, S5.5 and NFPA. [9]

**SECTION - II**

- Q7) a)** What is Plant layouts and General arrangement drawing. Write its importance. [8]  
b) Draw installation sketch of D/P cell. [8]

OR

- Q8) a)** List different types of cables and write their specifications. [8]  
b) What is loop writing diagram? Draw a loop wiring diagram of level control loop. [8]

- Q9) a)** Write the hazardous area classification and its effect on cable designing. [8]  
b) What is tendering? What are various types of tenders? Explain in detail. [8]

OR

- Q10) a)** What is final bid package? Explain in detail. [8]  
b) What are the procurement activities involved in project? Explain step by step. [8]

- Q11) a)** Write the various types of control panels. Write the differences among them. [10]  
b) What is cold commissioning and hot commissioning of control panels. [8]

OR

- Q12) a)** Design a control panel for a process three element drum level control. [8]  
b) Write FAT, SAT and CAT for control panels. [10]



Total No. of Questions : 12]

SEAT No. :

**P2772**

**[5154]- 154**

[Total No. of Pages : 3

**B.E. (Instrumentation & Control)**  
**BIOMEDICAL INSTRUMENTATION**  
**(2008 Pattern) (Elective - I) (Semester - I) (406264 A)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to candidates:*

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

**SECTION - I**

- Q1) a)** Explain Electrode offset Potential? How effect of Electrode Offset Potential can be overcome. Explain the various properties that the bioelectrode should possess. **[8]**
- b) Define the following terms: Evoked Potential, Resting Potential, Action Potential, Biosensors. **[8]**

OR

- Q2) a)** Explain Physiological parameters & suitable transducers for its measurements, operating principles (Any Two) **[8]**
- b) Explain the Ergonomic Considerations in medical equipment design for Dental Chair. **[8]**
- Q3) a)** Explain different chambers of heart. Explain an Electrical conduction system of heart. **[8]**
- b) Why Preamplifiers are needed for biosignal Processing Circuit? Enlist the various preamplifiers used in biosignal conditioning. Explain any one of them. **[8]**

OR

**P.T.O.**

- Q4)** a) Discuss the various Bipolar ECG leads configuration in detail. [8]  
 b) Why Transient Protection is necessary in designing the biomedical equipment? Explain the transient protection circuit. [8]
- Q5)** a) Explain the Plethysmography with the help of neat diagram. [8]  
 b) Explain the principle, working of Electromagnetic blood flow meter with neat diagram. [8]  
 c) List out the various methods for Cardiac Output Measurement. [2]

OR

- Q6)** a) What is Systolic & Diastolic Pressure? Enlist the two important techniques that plays important role in Sphymomamometric BP Measurements. Explain the same method of BP Measurement along with its advantage & disadvantage. [10]  
 b) Explain the dye dilution method with dilution curve. [8]

**SECTION - II**

- Q7)** a) What is EEG? Explain the 10-20 Electrode Placement. [10]  
 b) What is Electromyography? Explain the Electromyography in detail. [8]

OR

- Q8)** a) Draw & Explain the various parts of the brain. [8]  
 b) Define the following terms:- i) Efferent Nerve, ii) Afferent Nerve, iii) Biofeedback, iv) Evoked Potential. [8]  
 c) List out the various waveforms generated during the EEG measurement. [2]
- Q9)** a) Define a hearing Threshold. Explain the Bekesy Audiometer with neat diagram. [8]  
 b) Enlist the various Ophthalmic instruments & Explain Perimeter in details. [8]

OR

- Q10)** a) Draw & Explain the various parts of the Eye. [8]  
 b) Write short note on Sound Conduction system in ear. [8]

**Q11)a)** What is Spirogram? Draw & Explain the working of basic water sealed spirometer for Respiration measurements. [8]

b) Write short note on Electrical safety codes for Electromedical Equipment. [8]

OR

**Q12)a)** Define the Let go current, Macro shock, Micro shock, Leakage current. [8]

b) Explain the principle & working of Bubble type Oxygenator. [8]



Total No. of Questions : 12]

SEAT No. :

P2773

[5154]-155

[Total No. of Pages : 3

**B.E. (Instrumentation & Control)**  
**LASER BASED INSTRUMENTATION**  
**(2008 Course) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any three Questions from each section I and section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** What are the various processes due to which the small gain coefficients of laser get affected? Explain in detail. [8]
- b) Explain in detail how the axial modes and transverse modes of Laser output are formed. [8]

OR

- Q2) a)** Explain in detail the process of emission and absorption of radiation. [8]
- b) Calculate the value of population inversion required to give a gain coefficient of 1 per meter in a Nd:YAG laser with 1.06 micrometer for which the spontaneous life time is 230 microseconds, refractive index of 1.82 and line width of 3 THz. [8]

- Q3) a)** Estimate the threshold current density of a GaAs junction laser of 0.84 micrometer wavelength, 14.7 THz line width, loss coefficient 3500 per meter, refractive index 3.5, dimensions length = 310 micrometer, thickness= 2.2 micrometer and internal quantum efficiency = 1. [9]
- b) Estimate the efficiency of a GaAs laser operating well above threshold. The refractive index of material is 3.6 and laser cavity length is 0.4 mm. The loss coefficient is 900 per meter length and the internal quantum efficiency is 0.75. [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 He-Ne laser. [8]  
b) Calculate the efficiency of a He-Ne laser operating with a current of 10mA at a d.c. voltage of 2500 V and gives an optical power of 5 mW. [4]  
c) Calculate the threshold pumping power of a Nd: Glass laser for critical population inversion of  $8 \times 10^{21}/\text{m}^3$  and spontaneous life time 200  $\mu\text{s}$ . The upper level is at an energy of 1.5eV. [6]

- Q5)** a) What are the basic optical interferometers? Explain each in short. [8]  
b) What is mean by Speckle Pattern? Describe speckle properties in short. [8]

OR

- Q6)** a) Write short note on White light interferometer. [8]  
b) What are the properties of speckle pattern? Describe each in short. [8]

### SECTION - II

- Q7)** 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]

OR

- Q8)** a) What is the principle of operation of Laser velocimeter? Explain. [8]  
b) What are the two options for the electronic processing of the Doppler signal? Compare it. [8]

- Q9)** 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]

OR

**Q10)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]**

**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 1.6 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]**

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Total No. of Questions : 12]

SEAT No. :

P2774

[5154]-156

[Total No. of Pages : 3

**B.E. (Instrumentation and Control)**  
**ADVANCED CONTROL SYSTEM**  
**(2008 Pattern) (Semester - I) (Elective - I) (406264 C)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

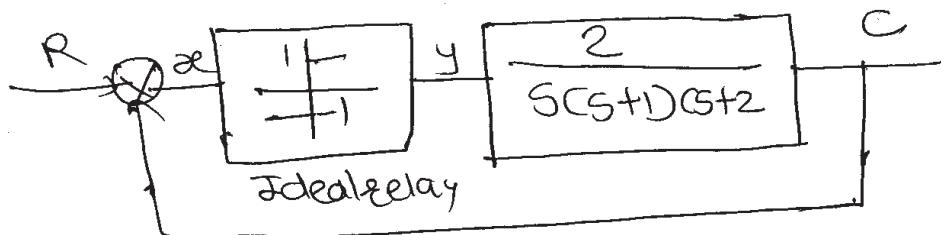
- 1) Answer any 3 questions from each section.
- 2) Answer to the sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.

**SECTION - I**

- Q1)** a) What are different characteristics of nonlinear system? Explain any one. [8]  
b) Derive the describing function of the combined. Deadzone and saturation nonlinearity. [8]

OR

- Q2)** a) What are characteristics of phase plane method. [8]  
b) Obtain the stability of a system shown in figure by describing function method. [8]



- Q3)** a) Determine the following quadratic form is positive definite [8]

$$U(x) = 10x_1^2 + 4x_2^2 + x_3^2 + 2x_1x_2 - 2x_2x_3 - 4x_1x_3$$

- b) Determine the stability of the equilibrium state of the following system

$$\dot{x}_1 = -x_1 - 2x_2$$

$$\dot{x}_2 = x_1 - 4x_2$$

OR

P.T.O.



**Q4) a)** A second order system represented by  $\dot{x} = AX$  where  $A = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix}$ .

Assuming matrix Q to be identity matrix. Solve for matrix P in the equation  $A^T P + PA = -Q$ . Use Liapunov theorem and determine stability of the system write. The Liapunov function  $u(x)$ . **[10]**

**b)** Explain positive definite and negative definite with example. **[6]**

**Q5) a)** Explain model reference Adaptive control using Lyapunov approach for stability analysis of continuous time system. **[9]**

**b)** Explain different elements of model reference adaptive control system with neat diagram. **[9]**

OR

**Q6) a)** Design of MRAC using Lyapunov theory for 1<sup>st</sup> order system. **[9]**

**b)** Briefly discuss the essential aspects of a adaptive control system. **[9]**

### SECTION - II

**Q7) a)** Derive least square as a real time parameter estimator. **[8]**

**b)** What are the different types of STR Explain any one in detail. **[8]**

OR

**Q8)** Write short notes on **[16]**

**a)** Indirect self tuning regulator.

**b)** Linear Quadratic STR.

**Q9)** Write short note on **[18]**

**a)** ABB Adaptive controller.

**b)** Fisher control DPR 900.

OR

**Q10)a)** Enlist the consideration in design of Robust control system. **[8]**

**b)** In STR following input and output has been obtained from real plant**[10]**

Time(t)	i/p u(t)	o/p y(t)
1	2.0	0.0
2	1.0	4.0
3	2.0	-2.0
4	1.5	4.0
5	1.0	2.0

Use any regression method to fit a model with structure.

$y(t) + ay(t-1) = bu(t-1) + e(t)$  where  $e(t)$  is error signal.

**Q11)a)** Obtain the control law which minimizes the performance index

$$J = \int_0^{\infty} [x^2 + u^2] dt \text{ for the system} \quad [8]$$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

The optimal control signal is given by  $u = -kx$  determine the optimal feed back gain matrix  $k$ .

b) 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 un stable & controllable

OR

**Q12)a)** Consider the system [10]

$$\begin{bmatrix} x_1(K+1) \\ x_2(K+1) \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} x(K) + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u(K)$$

$$x(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix} \quad Q = I, R = I \text{ and performance Index}$$

$J = \frac{1}{2} \sum_{k=0}^{\infty} [x^*(K)QH(K) + U^*(K)Ru(K)]$  minimize the perform index & find  $J_{min}$ .

b) Explain general purpose adaptive regulator. [6]

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Total No. of Questions : 12]

SEAT No. :

**P2775**

**[5154]-157**

[Total No. of Pages : 2

**B.E.**

**BUILDING AUTOMATION - I**

**(2008 Course) (Semester - I) (406264D) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) What is Fire, Classify fire based on the Substance that is fuel for the fire. [8]  
b) Explain different fire development stages. Which detectors are normally used to Detect fire in fire stage % why? [10]

OR

- Q2)** a) Explain Signaling line circuit with neat sketch. [8]  
b) Explain classification of fire detection systems. What are fire suppression systems. [10]

- Q3)** a) Explain Cause and effect phenomenon explains with suitable example. [6]  
b) What is IDC? Explain class A IDC with alarm open and trouble condition. [10]

OR

- Q4)** a) Explain rate of rise heat detector with neat sketch. [8]  
b) Explain following points. [8]  
i) Ionization type detector.  
ii) Main power supply.  
iii) Manual Call Points.  
iv) SLC interface card.

**P.T.O.**

- Q5) a)** Explain different guideline for installation of heat detector made by NFPA. [8]  
b) Discuss non alarm pull station. [8]

OR

- Q6) a)** Discuss manual initiating device. [8]  
b) Explain authentication with suitable example. [8]

### **SECTION - II**

- Q7) a)** Explain Access Control System using serial main & Sub Controller. [10]  
b) What is security system explain importance and application of security system. [8]

OR

- Q8) a)** Discuss false acceptance and false rejection in biometrics while installation of various access control system. [8]  
b) Explain various attacks on Biometric access control system. [10]

- Q9) a)** Define: [8]  
i) Fixed dome camera.  
ii) Body Camera.  
iii) PTZ Camera.  
b) Explain image capture phenomenon in camera. [8]

OR

- Q10) a)** What is CCTV Control room list various activities carried out in CCTV control room. [8]  
b) Explain selection criteria for lens selection in CCTV camera. [8]

- Q11) a)** List Various types of Intrusion detection system and explain any one application of intrusion system. [8]  
b) Explain different types of intrusion detectors. [8]

OR

- Q12) a)** Write a short notes on PIDS for Industrial Building. [8]  
b) Explain various wiring standered. [8]

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Total No. of Questions : 12]

SEAT No. :

**P2776**

**[5154]-158**

[Total No. of Pages :2

**B.E.(Instrumentation & Control)**  
**ENVIRONMENTAL INSTRUMENTATION**  
**(2008 Pattern) (Semester-I) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain the need of Instrumentation & control for environment. [8]  
b) Compare the portable & stationary analytical instruments. [10]

OR

- Q2)** a) Explain in short: [2\*5]  
i) Flame ionization detector  
ii) Ultraviolet analyzers  
b) Explain the role of Gas chromatography in environmental Analysis. [8]

- Q3)** a) Explain conductivity analyzers and their applications in water quality parameterization. [8]  
b) Discuss the need of water treatment facilities? [8]

OR

**P.T.O.**

- Q4)** a) Explain thermal conductivity detectors used in water treatments. Discuss their advantages and disadvantages. [8]  
b) Discuss water quality standards. [8]

- Q5)** a) What is flotation? Explain flotation in water treatment. [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. [10]  
b) Explain waste water measurement techniques. [8]

- Q9)** a) Discuss the analytical methods for air pollution. [8]  
b) What are the different air sampling methods? [8]

OR

- Q10)** a) What is energy environment relationship? [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) Discuss various devices used in air flow monitoring application. (Min2) [8]

OR

- Q12)** a) What is the need of rain water harvesting? Discuss any one method used for rain water harvesting. [8]  
b) Explain in detail about measurement of ambient air quality. [8]



Total No. of Questions : 12]

SEAT No. :

**P2777**

**[5154]-159**

[Total No. of Pages :3

**B.E.(Instrumentation & Control)**

**NANO INSTRUMENTATION**

**(2008 Pattern) (Semester-I) (Elective-II) (406265B)**

*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) *Figure to the right indicate full marks.*

**SECTION-I**

- Q1)** a) Explain electron transport in a two dimensional electron gas. [6]
- b) Describe the energy sub-bands and density of states in . [6]
- i) Quantum Dot and
  - ii) Quantum wire.
- c) Describe Self assembly technique for the synthesis of Nano material and its merits. [6]

OR

- Q2)** a) Explain CVD for the synthesis of Nano materials. [6]
- b) Describe Nanolithography technique in detail. [6]
- c) What is Top-down and Bottom-up approach for synthesis of Nano materials? Explain with suitable examples. [6]

- Q3)** a) Describe the principle and working of an AFM with diagram and its different modes of operation. [8]
- b) Write a note on Scanning near field optical microscopy. [8]

OR

**P.T.O.**

- Q4)** a) Explain magnetic and optical actuation of cantilevers. [8]  
b) Explain the principle, working of a STM in detail with suitable diagram and its modes of operation. [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) Write a note on CNT based FET. [8]

OR

- Q6)** a) Explain CNT based Resonant Tunneling Diode. [8]  
b) Explain why CNT as good microwave absorbing material? Based on CNT array explains RF Filter. [8]

### **SECTION-II**

- Q7)** a) Explain Spin relaxation mechanism, Spin injection and spin detection in spintronic devices. [8]  
b) Describe the GMR effect with a suitable diagram and spin valve device. [8]

OR

- Q8)** a) Explain the structure, working of a Spin Diode with a suitable diagram. Give its advantages over conventional one. [8]  
b) Write a note on Spin Filter. [8]

- Q9)** a) What is FET? Explain the MOSFET transistor's structure, working with a suitable diagram. Give the effect of downscaling its dimension. [8]  
b) Write a note on mesoscopic devices at room temperature. [8]

OR

- Q10)** a) Describe single electron transistor in detail. Explain the phenomenon of coulomb blockade. [8]  
b) Explain various resonant tunneling devices and circuits. [8]



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

- a) Nano mechanical Sensors. [6]
- b) Magnetic nanotransducers. [6]
- c) Describe CNT based Nano laser. [6]

OR

**Q12)** Write short notes on the following:

- a) Nano chemical sensors. [6]
- b) CNT based optical waveguide. [6]
- c) Explain Nano switches and molecular switches. [6]



Total No. of Questions : 12]

SEAT No. :

**P2778**

**[5154]-160**

[Total No. of Pages :2

**B.E.(Instrumentation & Control)**  
**ADVANCED DIGITAL SIGNAL PROCESSING**  
**(2008 Pattern) (Semester-I) (Elective-II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

**Q1)** a) What do you mean integer band positioning? Explain even and odd integer positioning. [12]

b) Explain noble identity in up sampling and down sampling systems. [6]

OR

**Q2)** a) Explain DFT analysis and synthesis filter bank in detail. [12]

b) Explain anyone application of multirate signal Processings. [6]

**Q3)** a) Explain forward linear prediction. [10]

b) Explain discrete time random signal and process. [6]

OR

**Q4)** a) Explain backward linear prediction. [10]

b) What do you mean the AR, MA, ARMA processes, explain in brief. [6]

**P.T.O.**

- Q5)** a) Discuss the direct and indirect methods of estimation of energy density spectrum. [8]  
b) Explain Bartlett method of power spectrum estimation with computational requirement. [8]

OR

- Q6)** a) Explain Yule-Walker method for AR Model parameters. [8]  
b) Explain the term power density spectrum. [8]

**SECTION-II**

- Q7)** a) Brief the different steps in RLS algorithm. [8]  
b) Explain application of adaptive filtering to adaptive channel equalization. [8]

OR

- Q8)** a) Explain different steps in LMS algorithm. [8]  
b) Explain adaptive noise cancelling system using adaptive filtering. [8]

- Q9)** a) Compare fixed and floating point dsp processors. [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) State different Interrupt Control Registers of TMS320C67XX, discuss in brief. [9]

- Q11)** a) Enlist different properties of CWT. [6]  
b) Explain Daubechies Four-Coefficient Wavelet. [10]

OR

- Q12)** a) Explain different features of STFT. [6]  
b) Write short note on Gabor Transform. [10]



Total No. of Questions : 12]

SEAT No. :

**P2779**

**[5154]-161**

[Total No. of Pages :2

**B.E.(Instrumentation & Control)**  
**AUTOMOBILE INSTRUMENTATION**  
**(2008 Pattern) (Semester-I) (406265D) (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 indicate full marks.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) Write a short note on “Current Trends in Modern Automobiles”. [8]  
b) Explain motivation behind applying Instrumentation concepts in the field of Automation. [8]

OR

- Q2)** a) Explain the concept of Electronic Control System in Automobiles. [8]  
b) Explain Instrumentation involved in Vehicle Motion Control System. [8]

- Q3)** a) Write a short note on Electronic Spark Timing Control System. [8]  
b) What is a carburetor? Explain Carburetor Control System. [8]

OR

- Q4)** a) Compare Single Port and Double Port Fuel Injection Systems. [8]  
b) Explain Ignition System in Automobile. [8]

- Q5)** a) Explain the following terms: [12]  
i) Engine Cranking and Warm up Control  
ii) Acceleration Enrichment-Deacceleration Leaning.  
b) Write a short note on Exhaust Emission Control System. [6]

OR

**P.T.O.**

- Q6)** a) Write a short note on Integrated Engine Control System. [8]  
b) State significance of Engine Performance Testing. Define: [10]  
i) Power  
ii) BSFC

**SECTION-II**

- Q7)** a) Explain the principle of Automatic Transmission Electronic Control Circuit. [6]  
b) Define and explain ABS, ASR and ESP. [10]

OR

- Q8)** a) Explain the Cruise Control System. [8]  
b) Explain the need and instrumentation involved in Electronic Steering Control System. [8]

- Q9)** a) Write a short note on Electronically Controlled doors and windows. [8]  
b) Explain the principle of control circuit components and its characteristics in an Automobile. [8]

OR

- Q10)** a) What is Air bag technology in Automobiles? Explain its significance. [6]  
b) Explain the Instrumentation involved in Central Locking and Anti Theft System. [10]

- Q11)** a) Write a short note on Ergonomics in Automobile. [8]  
b) Write short notes on: [10]  
i) Air Conditioning in Automobile  
ii) Emission Standards in Automobile.

OR

- Q12)** Explain: [18]  
a) Battery Monitoring and Control  
b) Automatic Gear Control System  
c) Steering Control Techniques.



Total No. of Questions : 12]

SEAT No. :

P2780

[5154]-162

[Total No. of Pages : 2

**B.E. (Instrumentation and Control)**  
**PROCESS DYNAMICS & CONTROL**  
**(2008 Course) (Semester - II) (406267)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

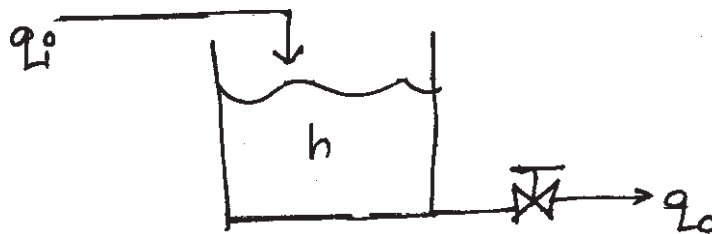
- 1) Answer any 3 questions from each section.
- 2) Answer to the sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.

**SECTION - I**

Q1) Attempt Any two:

[16]

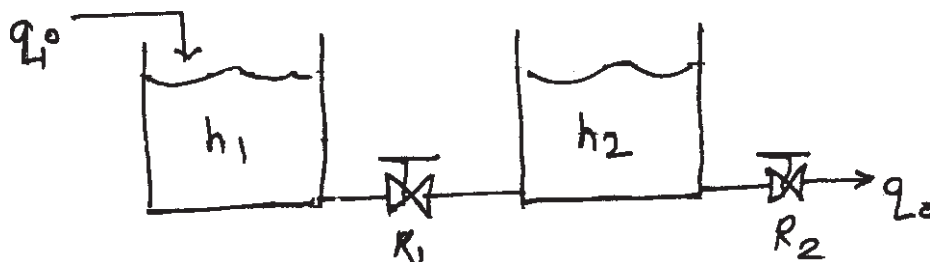
- a) Explain Dynamic Behaviour of first-order system.
- b) Explain Dynamic Behaviour of 2<sup>nd</sup> order system.
- c) Obtain Transfer function of following system.



OR

Q2) a) Develop mathematical model of following system.

[8]



- b) Comment on stability & linear & non-linear system.

[8]

P.T.O.

- Q3)** a) Explain cascade control of heat exchanger system. [8]  
b) Explain heat exchanger response to changes in steam temperature. [8]

OR

- Q4)** a) Explain Measurement Logs in heat exchanger system. [8]  
b) Explain feed forward control of heat exchanger system. [8]

- Q5)** a) Explain 3-element boiler drum level control system with neat sketch. [8]  
b) Draw & explain Air-fuel ratio control strategy in case of boiler. [10]

OR

- Q6)** a) Explain Burner Management system in boiler. [8]  
b) Explain Boiler Interlocks. [10]

### **SECTION - II**

- Q7)** a) Explain time constants related to reactors. [8]  
b) Draw & explain end point detection strategy of batch reactor system. [8]

OR

- Q8)** a) Write short notes on logic control in batch process. [8]  
b) Explain batch production management in reactor system. [8]

- Q9)** a) Explain column pressure control strategy in distillation system. [8]  
b) Explain distillation system & write mass & energy balance equations. [8]

OR

- Q10)** a) Explain over head & bottom composition control in distillation system. [8]  
b) Comment on log in vapor & liquid flow in distillation system. [8]

- Q11)** a) Write short note on Design aspects for Waste-water treatment plant. [10]  
b) Explain centrifugal pump characteristics & various control strategies. [8]

OR

- Q12)** a) Explain pump characteristics such as - Q - H curve power curve & efficiency curve. [10]  
b) Explain characteristics & types of compressors. [8]

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Total No. of Questions : 12]

SEAT No :

**P2781**

**[5154]-163**

[Total No. of Pages :2

**B.E (Instrumentation & Control)**  
**INDUSTRIAL AUTOMATION**  
**(2008 Pattern) (Semester-II) (406268)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to candidates:*

- 1) *Answer any 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 to the right side indicate full marks.*
- 5) *Assume suitable data , if necessary.*

**SECTION-I**

- Q1) a)** Explain the role of each layer in “Automation pyramid” **[10]**  
b) Explain the role of automation in industries. **[8]**

OR

- Q2) a)** Explain various functional levels of automation used in process industry. **[10]**  
b) With a suitable example explain the role of SCADA in automation. **[8]**

- Q3) a)** Explain the role of LAS in foundation fieldbus network. **[8]**  
b) Write short note on Devicenet. **[8]**

OR

- Q4) a)** Explain OSI/ISO reference model in communication system. **[8]**  
b) Write short note on MODBUS protocol. **[8]**

- Q5) a)** Explain the stages involved in developing PLC based automation system. **[8]**  
b) With an example explain the “Instruction List” in PLC programming. **[8]**

OR

*P.T.O.*



- Q6) a)** Explain the procedure for interfacing a PLC with SCADA system using different communication protocols. [8]  
b) Explain basic principle and working of CNC machine. [8]

## **SECTION-II**

- Q7) a)** Explain the architecture of DCS in detail. [10]  
b) Explain performance criteria of DCS. [8]

OR

- Q8) a)** Explain the various function blocks in DCS. [10]  
b) List and explain the basic functions of DCS system. [8]

- Q9) a)** What is alarm? Explain the how the alarms are classified and prioritized also explain why classification and prioritization is required. [8]  
b) Explain on what basis display hierarchy is created. [8]

OR

- Q10)a)** Explain historical database management in DCS system. [8]  
b) Explain any four advanced control blocks in a DCS system. [8]

- Q11)a)** Write short note on “safety Instrumented systems”. [8]  
b) Explain standards for functional safety. [8]

OR

- Q12)a)** What is HaZOP? with the help of flow chart explain the HaZOP procedure. [8]  
b) Explain Safety Integrity Level (SIL). [8]



Total No. of Questions : 12]

SEAT No. :

**P2782**

**[5154]-164**

[Total No. of Pages : 3

**B.E. (Instrumentation and Control)**  
**ADVANCED BIOMEDICAL INSTRUMENTATION**  
**(2008 Pattern) (Semester - II) (Elective - III) (406269 A)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer Q.No.1 or 2, Q.No.3 or 4, Q.No.5 or 6, Q.No.7 or 8, Q.No.9 or 10, Q.No.11 or 12.*
- 2) *Figures to the right side indicate full marks.*

**SECTION-I**

- Q1)** a) Explain the working of atrial synchronous pacemaker with the help of diagram. **[8]**
- b) What is the need of Central monitoring unit in ICU. What are its requirements? **[4]**
- c) What are the two important blocks of Heart Lung machine? Explain any one of them in detail. **[6]**

OR

- Q2)** a) Design a 8 bed ICU giving the details of its layout, requirements, facilities to be provided. **[10]**
- b) Write a short note on Anasthesia Machine. **[8]**
- Q3)** a) Explain the working of generalised FM telemetry system. Suggest suitable blocks for transmitting ECG and respiration rate data. **[10]**
- b) Draw the block diagram of In Vitro oxymeter and explain the working. **[6]**

OR

**P.T.O.**

**Q4) a)** What are the factors driving the growth of tele medicine? [4]  
Explain the type of information that can be transmitted in a tele medicine system. [6]

b) Define

i) Mean cell volume

ii) Mean cell Haemoglobin

iii) Nomogram. [6]

**Q5) a)** What is Hounsfield No? Indicate the CT number for water, air and bone. [4]

What is the role of it in image reconstruction. [4]

b) Explain the working of an X ray image intensifier system with the help of a block diagram. [8]

OR

**Q6) a)** What are Xrays and what are their properties? [6]

b) Describe various scanning techniques used in CT. Explain how the progressive development in scanning techniques have helped reduce the scanning time. [10]

### **SECTION-II**

**Q7) a)** List and explain four factors affecting the interaction between ultra sound waves and biological tissues? [8]

b) Explain the principle of Single Photon Emission Computed Tomography. With the help of a diagram describe various building blocks of SPECT scanner. [10]

OR

**Q8) a)** Describe four transmission modes of Ultrasound transmitter. Specify the application of each mode. [10]

b) What are the advantages of Nuclear magnetic resonance technique over other imaging techniques? [4]  
Define Free Induction Decay. How does it help in identifying the problem. [4]

**Q9) a)** What is the principle of high frequency heat therapy? Explain the operation of short wave diathermy machine with the help of a block diagram. [8]

b) Describe laser applications in field of dermatology. [8]

OR

**Q10) a)** Describe how laser can be used for treating retinal detachment. [8]

b) Write shortnote on Ultrasound Diathermy. [8]

**Q11) a)** What are the three basic types of shock wave sources for lithotripsy? Explain them with the help of a diagram. Indicate the methods of focussing of the shock wave energy. [10]

b) Suggest suitable orthotic and prosthetic devices for Heart, Eye and Ear. [6]

OR

**Q12) a)** What measurements are essential during the process of haemodialysis. Explain how these are carried out with the help of a diagram. [10]

b) Describe different types of wheelchairs. [6]



Total No. of Questions : 12]

SEAT No. :

**P2783**

**[5154]-165**

[Total No. of Pages : 3

**B.E. (Instrumentation and Control)**  
**FIBER OPTIC INSTRUMENTATION**  
**(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 side indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data, if necessary.*

**SECTION-I**

- Q1) a)** Explain what is meant by a graded index optical fiber, giving an expression for the possible refractive index profile? Using simple ray theory concepts, discuss the transmission of light through the fiber. Indicate the major advantage of this type of fiber with regard to multimode propagation. **[10]**
- b) Briefly indicate with the aid of suitable diagrams the difference between meridional and skew ray paths in step index fibers. **[6]**

OR

- Q2) a)** An optical fiber has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Determine: **[8]**
- i) The acceptance angle for the fiber in water which has a refractive index of 1.33;
  - ii) The critical angle at the core - cladding interface.
- b) Describe with the aid of simple ray diagram: **[8]**
- i) Multimode step index fiber
  - ii) Single - mode step index fiber

Compare the advantages and disadvantages of these two types of fiber for use as an optical channel.

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

- Q3)** a) Discuss absorption losses in optical fibers, comparing and contrasting the intrinsic and extrinsic absorption mechanisms. [9]
- b) Briefly describe linear scattering losses in optical fibers with regard to:
- i) Rayleigh scattering
  - ii) Mie scattering. [8]

OR

- Q4)** a) Compare stimulated Brillouin and stimulated Raman scattering in optical fibers. [8]
- b) Explain Micro bending and Macro bending in optical fiber. Also explain what the critical bending radius for an optical fiber means. [9]
- Q5)** a) Briefly describe the processes by which light can be emitted from an atom . Discuss the requirements for population inversion in order that stimulated emission may dominate over spontaneous emission. Illustrate your answer with an energy level diagram of a common nonsemiconductor laser. [9]
- b) Compare P-I-N diode with avalanche photodiode. [8]

OR

- Q6)** a) Describe what is meant by the fusion splicing of optical fibers. Discuss the advantages and drawbacks of this jointing technique. [8]
- b) Discuss the principles of operation of the two major categories of demountable optical fiber connectors. Describe in detail a common technique for achieving a butt jointed fiber connector. [9]

### **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? [10]
- b) What are the advantages and drawbacks of Optical Fiber Sensors? [8]

- 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)**a) Explain working of Fiber Bragg Grating. Also explain the manufacturing technique of Fiber Bragg Grating. [8]
- b) Explain working of 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. :

**P2784**

**[5154]-166**

[Total No. of Pages : 3

**B.E. (Instrumentation)**

**PROCESS MODELLING AND OPTIMIZATION**

**(2008 Pattern) (Elective - III) (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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume Suitable data, if necessary.*

**SECTION-I**

**Q1) a)** How process model can be developed in time domain. **[8]**

b) Derive process model of gravity flow tank. **[8]**

OR

**Q2)** What is curve fitting? Why it is needed? Derive the equations to find the coefficients for linear relation  $Y = M X + C$ . **[16]**

**Q3) a)** Derive mathematical model of plug and flow reactor. **[9]**

b) Derive mathematical model of a CSTR in series. **[9]**

OR

**Q4) a)** Derive Mathematical model for binary distillation column. **[9]**

b) Develop a steady state mathematical model for multi-component flash drum. **[9]**

**Q5) a)** Explain sine wave testing for identification of process. **[8]**

b) Explain eyeball fitting method for identification of process. **[8]**

OR

**Q6) a)** What is identification? Compare different methods of identification. **[8]**

b) Explain ATV identification method. **[8]**

**P.T.O.**



## SECTION-II

- Q7) a)** Determine the stability of a  $2 \times 2$  process with a diagonal feedback controller given as: [9]

$$G_m = \begin{bmatrix} 5 & 0 \\ 1 & -4 \end{bmatrix} \text{ and } B_{-s} = \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$$

- b) Write short note on Loci plot [9]

OR

- Q8) a)** Explain Niederlinski index, Resiliency, Morari Resiliency Index. [9]

- b) For the system given Find NI for this comment on stability also find proper pairing of control and manipulated variables. [9]

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 9 \frac{e^{-2s}}{(2s+1)} & 10 \frac{e^{-s}}{(5s+1)} \\ 4 \frac{e^{-5s}}{(5s+1)} & 12.8 \frac{e^{-2s}}{(2s+1)} \end{bmatrix} \begin{bmatrix} P \\ Q \end{bmatrix}$$

- Q9) a)** Explain Continuity of functions with proper example and it's application in optimization. [8]

- b) Explain quadratic approximation. [8]

OR

- Q10) a)** Explain Convex and Concave functions with proper example and it's roll in optimization. [8]

- b) For the functions given below, analyze the concavity and convexity in each case. [8]

i)  $f(x_1, x_2) = (x_1 - x_2)^2 + x_2^2$

ii)  $f(x) = 2x_1^2 + x_1x_2 + x_2^2 + 8x_1 + 7x_2 + 36$

iii)  $f(x) = 7x + 24x^2 + 45x^3$

iv)  $f(x_1, x_2) = 2x_1^2 - 4x_1x_2 + 6x_2^2$

v)  $f(x) = x^4$

**Q11)a)** Determine the optimum values of  $x_1$  &  $x_2$  for the function. [8]

$$y = \frac{x_1^2}{4} + \frac{5}{x_1 x_2} + 8x_2$$

and state whether point is minimum or maximum.

b) Explain region elimination method. [8]

OR

**Q12)a)** Explain polynomial approximation method. [8]

b) Explain simplex method of optimization. [8]



Total No. of Questions : 12]

SEAT No. :

**P2785**

**[5154]-167**

[Total No. of Pages : 2

**B.E. (Instrumentation and Control)**

**BUILDING AUTOMATION - II**

**(2008 Pattern) (Semester - II) (Elective - III) (406269 D)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *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 different ways of heat transfer with suitable examples. [8]  
b) Explain Psychometric chart with diagram and its conditions. [10]

OR

- Q2)** a) Explain the attributes that influence Human comfort. Explain sensible and latent heat loss with suitable examples. [10]  
b) Explain the design factors for choosing an air-conditioning system. [8]

- Q3)** a) Describe various steam traps of steam system with application. [8]  
b) Explain dual duct VAV. [8]

OR

- Q4)** a) Explain Unitary equipments & its applications. [8]  
b) Generally what are the different HVAC equipments which you will control in a commercial building? Explain any 2. [8]

- Q5)** a) Explain benefits of DDC with respect to following point. [6]  
i) Improved effectiveness  
ii) Increased operating efficiency.  
iii) Increased energy efficiency  
b) Give example of Sensor/output device for each type of signal (AI, AO, DI, DO). Explain each device. [10]

OR

**P.T.O.**



Total No. of Questions : 12]

SEAT No. :

**P2786**

**[5154]-168**

[Total No. of Pages : 2

**B.E. (Instrumentation & Control)**  
**INSTRUMENTATION IN AGRICULTURE**  
**(2008 Pattern) (Semester -II) (Elective - IV)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION -I**

**Q1) a) Explain the Role of Instrumentation in Agriculture engineering. [8]**

**b) Explain the Mohr's circle of stress. [8]**

**OR**

**Q2) a) Write a note on sonic anemometer. [8]**

**b) Explain the types of fine wire thermocouples. [8]**

**Q3) a) Explain the instrumentation for Sugar plant. [9]**

**b) Explain the flow diagram of juice extraction process. [9]**

**OR**

**Q4) a) Explain the flow diagram of Fermenter process. [9]**

**b) Explain the instrumentation for Dairy industry. [9]**

**Q5) a) Compare overhead and Centre pivot irrigation method. [8]**

**b) Explain the necessity of Irrigation system in agriculture. [8]**

**OR**

**Q6) a) Explain concept of irrigation scheduling and Irrigation efficiencies. [8]**

**b) Define the design considerations in irrigation channels. [8]**

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

**SECTION -II**

- Q7)** a) Explain the SCADA for DAM parameters. [8]  
b) Explain irrigation control management of up stream & down stream control system. [8]

OR

- Q8)** a) List out the sensors for Green House and Explain the instrumentation 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]

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Total No. of Questions : 12]

SEAT No. :

**P2787**

**[5154]-169**

[Total No. of Pages : 2

**B.E. (Instrumentation & Control)**  
**MICRO ELECTRO MECHANICAL SYSTEMS**  
**(2008 Pattern) (Semester - II) (Elective - IV) (406270B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION -I**

- Q1)** a) Draw & explain one example of microsystem in detail. [8]  
b) Define MEMS. Give the significance of MEMS in engineering field. [8]

OR

- Q2)** a) Explain any two smart materials in detail. [8]  
b) Define smart system. Give requirements of smart system. [8]

- Q3)** a) Explain the magnetic micro relay with detail diagram. [8]  
b) Explain the piezo resistive pressure sensor with diagram. [8]

OR

- Q4)** a) Draw & explain the working of conductometric gas sensor. [8]  
b) Draw & explain the working of piezoelectric inkjet printer head. [8]

- Q5)** a) Draw & explain the CVD process for metal film deposition. [9]  
b) Give the step involved in the process of photolithography. Define positive and negative resist. [9]

OR

- Q6)** a) Draw & explain surface micro machining process for silicon. [9]  
b) Draw and explain any one advanced process for micro fabrication. [9]

**P.T.O.**

**SECTION -II**

- Q7)** a) Explain Hook's Law & Young's modulus of elasticity. [8]  
b) Explain the concept of stress in a for with diagram. [8]

OR

- Q8)** a) Draw & explain the Bimorph effect. [8]  
b) Define residual stress. Explain the effect of residual stress on a beam.[8]

- Q9)** a) State applications of Finite Element Method. Explain any one. [8]  
b) Explain the role of Finite Element Method to solve the structural problems. [8]

OR

- Q10)**a) Compare Finite Element Method and Finite Difference method. [8]  
b) Draw and explain the Finite Element Method with diagram. [8]

- Q11)**a) Explain the schottky & tunnel diode in detail. [9]  
b) Write short note on Phase-locked Loop (PLL). [9]

OR

- Q12)**a) Explain the importance of stability in a control system. Give methods to find stability. [9]  
b) Draw & explain the importance of integration of microsystem & microelectronics. [9]

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Total No. of Questions : 12]

SEAT No. :

**P2788**

**[5154]-170**

[Total No. of Pages : 2

**B.E. (Instrumentation & Control)**  
**DIGITAL IMAGE PROCESSING**  
**(2008 Course) (Elective - IV) (Semester -II) (406270C)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Write each section separately.*
- 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 hardware components of image processing system. **[18]**

OR

**Q2)** a) Explain image resolution with suitable example. **[10]**

b) List applications of Digital Image Processing. Explain any one with suitable diagram. **[8]**

**Q3)** a) Explain the structure of human eye with respect to digital image capturing phenomenon. **[8]**

b) Explain Histogram with suitable example. **[8]**

OR

**Q4)** Describe various mathematical operations on digital image. **[16]**

**Q5)** Explain 2D DFT and explain its properties. **[16]**

OR

**Q6)** Explain 2D DCT and explain its properties. **[16]**

**P.T.O.**

## SECTION -II

**Q7)** Explain image enhancement using average and weighted average filter with suitable example. [18]

OR

**Q8)** a) Explain image enhancement in frequency domain using Butterworth low pass filter. [10]

b) Compare time domain and frequency domain image enhancement. [8]

**Q9)** a) What is image restoration? Explain the process of image restoration. [8]

b) What is image restoration? Explain the process of image restoration.[8]

OR

**Q10)** Explain image restoration using inverse filter and its digital implementation.[16]

**Q11)a)** Define Pattern and pattern classification. [8]

b) List pattern classifiers. Explain any one pattern classifier with suitable example. [8]

OR

**Q12)a)** Define image segmentation. Explain need and applications of image segmentation. [8]

b) Explain Sobel operator for edge detection. [8]

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Total No. of Questions : 12]

SEAT No. :

**P2789**

**[5154]-171**

[Total No. of Pages : 3

**B.E. (Computer Engineering)**  
**DESIGN & ANALYSIS OF ALGORITHMS**  
**(2008 Pattern) (Semester-I)(410441)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Prove if  $f(n)=a_m n^m+\dots+a_1+a_0$  Then  $f(n) = O(n^m)$  [8]  
b) Write control abstraction for divide and conquer strategy. Explain quick sort algorithm. State its time complexity. [10]

OR

- Q2)** a) Define asymptotic notations. Explain their significance in analyzing algorithms. [6]  
b) Write and explain Dijkstra's algorithm for a directed graph. [6]  
c) What is Mathematical Induction? How it can be used to prove that an algorithm is correct? [6]

- Q3)** a) Solve the instance of 0/1 Knapsack problem using dynamic programming:  
 $n=4, m=25$   
 $(P_1, P_2, P_3, P_4)=(10, 12, 14, 16)$   
 $(W_1, W_2, W_3, W_4)=(9, 8, 12, 14)$  [8]

- b) What is the Flow Shop Scheduling problem? Explain how principle of optimality holds for this problem. Also explain how it is solved using dynamic programming. [8]

OR

**P.T.O.**

**Q4)** a) State and explain the principle of Dynamic Programming. Name the elements of Dynamic Programming and Compare Dynamic Programming with Greedy method. [8]

b) What is the optimal binary search tree problem? Explain how it is solved using dynamic programming. [8]

**Q5)** a) Explain backtracking strategy and write general recursive and iterative backtracking algorithms. [8]

b) Explain the solution to N-Queen's problem using branch and bound method. [8]

OR

**Q6)** a) Compare the Backtracking method with a depth first search technique. Explain backtracking algorithm for Hamiltonian Cycles problem. [8]

b) Explain the difference between FIFO and LC Branch and Bound solution to the 0/1 Knapsack problem. [8]

### SECTION - II

**Q7)** a) Prove that Satisfiability reduces to Chromatic Number Decision Problem (CNDP). [6]

b) Prove that vertex cover problem is NP-complete. [8]

c) Differentiate between NP-hard and NP-complete algorithms. [4]

OR

**Q8)** a) Show that the partition problem reduces to minimum finish time non-preemptive schedule. [6]

b) Explain NP hard code generation problem. [6]

c) State and Explain Cook's Theorem [6]

**Q9)** a) Explain with example parallel evaluation of expression. [8]

b) Prove that "the maximum of n keys can be found in  $O(\log \log n)$  time using n common CRCW PRAM processors". [8]

OR

- Q10)a)** Explain how graph problems can be solved on parallel processors. [8]  
b) Explain pointer doubling problem with algorithm. What is time complexity of the algorithm? [8]

- Q11)a)** What is Convex Hull? Explain Quick Hull and Graham's Scan algorithm. [8]  
b) Explain any two image edge detection algorithms. [8]

OR

- Q12)a)** What is meant by heuristic algorithms? Discuss any one heuristic search algorithm. [8]  
b) What is deadlock? Explain how resource allocation can be done to avoid deadlock. Write resource allocation algorithm. [8]



Total No. of Questions : 12]

SEAT No. :

**P2790**

**[5154]-172**

[Total No. of Pages : 2

**B.E. (Computer Engg.)**  
**PRINCIPLES OF COMPILER DESIGN**  
**(2008 Course) (Semester - I) (410442)**

*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 and digits in a given input text file. [8]
- b) Explain what is shift-reduce and reduce-reduce conflicts. [8]

OR

- Q2)** a) What is front end and back end of compiler? Explain in detail. [8]
- b) What are FIRST & FOLLOW sets, explain with suitable example calculation of these 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) Type Expression
  - ii) DAG

OR

- Q4)** a) What is mean by 'syntax directed definitions? Give syntax directed definition for any example of arithmetic expression. [8]
- b) Draw syntax tree, annotated parse tree, parse tree for  $a+b*c$ . [8]

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

- Q5) a)** Write a syntax-directed definition to translate 'switch' statement. With a suitable example show the translation of the source language 'switch' statement. [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)** Explain the mechanism for translating 'printf' function in C. [8]
- b) Explain in detail about Run Time Storage Allocation. [8]

OR

- Q8) a)** Explain with suitable example the mechanism used by compiler to handle procedure parameters. [8]
- b) What is an activation record? Explain each of its fields. [8]

- Q9) a)** Write short note on transformation on basic blocks. [8]
- b) Write short note on DAG. [8]

OR

- Q10)a)** Explain code generation algorithm. [8]
- b) Write short note on strength reduction and variable propagation. [8]

- Q11)a)** Write short note on Local Optimization. [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 meet over paths. [8]
- b) Explain Iterative data flow analysis. [10]

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Total No. of Questions : 12]

SEAT No. :

**P2791**

**[5154]-173**

[Total No. of Pages : 3

**B.E. (Computer Engineering)**  
**OBJECT ORIENTED MODELING AND DESIGN**  
**(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Give the Extensibility mechanisms in UML. **[8]**  
b) What are the different phases of RUP? **[8]**

OR

- Q2)** a) Explain and elaborate the building blocks of UML. **[8]**  
b) Write a short note on MDA. **[8]**

- Q3)** a) Draw use case diagram for Library management system with advanced use case notations. **[8]**  
b) Explain include and extend stereotype in use case diagram with an example. **[8]**

OR

- Q4)** a) Draw an activity diagram for the business process described below **[8]**  
A student applies for admission to a college. He can join one of the engineering branches. The student applications are sorted on merit. Top students are offered admission on merit order. The joining process involves student being shown available branches. Student selects branch, chooses optionally a hostel seat. In parallel makes payments, selects memberships to gym and select elective courses to attend. On successful admission he is enrolled, given an admit card and is given a copy of academic calendar. The students not admitted can register their interest in waitlist. Make additional assumptions about scope, use advanced activity diagram 2.0 features if relevant.  
b) What are functionalities & how are they depicted in use case diagram? **[8]**

**P.T.O.**



- Q5)** a) What is multiplicity, association class & association navigability. [6]  
b) Draw a class diagram for a banking system. Make and state suitable assumptions for the same. [6]  
c) What is the significance of package diagram? [6]

OR

- Q6)** a) What are interfaces & ports & where are they used? [6]  
b) Explain the concept of composition and Aggregation. [6]  
c) What is CRC. Compare it with class diagram. [6]

### **SECTION - II**

- Q7)** a) Explain the significance of communication diagram with example. [6]  
b) What are different interaction operators? Explain its use. [6]  
c) Give the state diagram for a printer for printing a document. [6]

OR

- Q8)** a) Identify the objects and messages for a student course registration sequence in a course management system and represent it using the sequence diagram. [6]  
b) Explain the components of Interaction Overview Diagram. [6]  
c) Explain the significance of timing diagram. [6]

- Q9)** a) What are the differences between component diagram and deployment diagram. [8]  
b) Explain Black Box view and White box view in Component diagram. [8]

OR

**Q10)a)** 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]**

b) Give notation and explanation for following concepts related to deployment diagram: **[8]**

Node, artifact, <<manifest>>, communication path.

**Q11)a)** Explain the concept and significance of forward engineering and reverse engineering in UML diagrams. **[8]**

b) Explain the proxy design pattern with an example. **[8]**

OR

**Q12)a)** How do you reverse engineer a class diagram? **[8]**

b) Explain the Iterator design pattern with an example. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P2792**

**[5154]-174**

[Total No. of Pages : 2

**B.E. (Computer Engineering)**

**IMAGE PROCESSING**

**(2008 Course) (Semester - I) (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)** Write a short note on Human Visual System. **[8]**

b) Explain the fundamental steps in Digital Image Processing. **[8]**

OR

**Q2) a)** What is digital image processing? Explain any two applications of image processing. **[8]**

b) Explain the representing digital images. **[8]**

**Q3) a)** What is image interpolation? How is useful in image processing? **[8]**

b) Explain the basic image pre-processing steps. **[8]**

OR

**Q4) a)** Explain image enhancement techniques in frequency domain. **[8]**

b) What is smoothing? Explain how Gaussian filter is used for smoothing. **[8]**

**Q5) a)** Explain Chain codes and B-Splines for boundary representation. **[9]**

b) Explain the region based segmentation and region growing with an example. **[9]**

OR

**P.T.O.**

- Q6)** a) With the help of appropriate mask explain the following: [9]  
i) Point detection  
ii) Corner detection  
b) What is region splitting and merging? [9]

**SECTION - II**

- Q7)** a) Discuss about the Wiener Filtering. [8]  
b) Explain Blind-deconvolution technique. [8]

OR

- Q8)** a) Explain image restoration technique to remove the blur? [8]  
b) Explain band-pass filter and Notch filters. [8]

- Q9)** a) What is need of data compression? Explain Run-length coding. [8]  
b) How an image is compressed using JPEG Image compression with a image matrix. [8]

OR

- Q10)** a) What is pattern? Explain any pattern matching technique. [8]  
b) Explain the dictionary - based compression with suitable example. [8]

- Q11)** a) What is Haar wavelet in image processing? [9]  
b) JPEG 2000: How it works? [9]

OR

- Q12)** Write short note: [18]  
a) Principal Component Analysis.  
b) Sub-band Coding.  
c) Image pyramids.



Total No. of Questions : 12]

SEAT No. :

**P2793**

**[5154]-175**

[Total No. of Pages : 3

**B.E. (Computer Engineering)**

**DESIGN AND ANALYSIS OF COMPUTER NETWORKS**

**(2008 Course) (Semester - I) (410444B) (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 diagram must be drawn whenever necessary.*
- 4) *Figures to the right indicates full marks.*

**SECTION - I**

- Q1)** a) Why distribution is required in network design? Explain exponential and geometric distribution? [9]
- b) Message arrive independently to a system at the rate of 10 pm. Their length is exponentially distributed with an average of 3600 characters. They are transmitted on a 9600 bps channel. A character is 8 bit long.[9]
- i) What is average service time, arrival rate, service rate?
  - ii) What are the average number of message in queues & number of message in queue?

OR

- Q2)** a) In a small convenience store there's room for only 4 customers. The owner himself deals with all the customers - he likes chatting a bit. On average it takes a customer 4 minutes to pay for his/her purchase. Customers arrive at an average of 1 per 5 minutes. If a customer finds the shop full, he/she will go away immediately. [9]
- i) What fraction of time will the owner be in the shop on his own?
  - ii) What is the mean number of customers in the store?
  - iii) What fraction of customers is turned away per hour?
  - iv) What is the average time a customer has to spend for check-out?
- b) Describe exponential random variable and memory less property of random variable? [9]

**P.T.O.**

- Q3)** a) Explain 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) What is switch fabrics? Why a third generation switch fabrics does provides more bandwidth than second generation switch. [8]  
b) Explain various optimization techniques like multiplexing parallelism, virtualization, soft state etc. used in system design? [8]

- Q5)** a) A Computer on 6 Mbps network is regulated by token bucket. The bucket is filled at the rate of 1 Mbps. It is initially filled to capacity with 8 megabits. How long can the computer transmit at the fill 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 (WF<sup>2</sup>Q) over WFQ? [8]

### **SECTION - II**

- Q7)** a) Explain different traffic model in details? [9]  
b) What is QOS? Explain different queue management algorithms. [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 how fragmentation is handled in IPV4 and IPV6. [8]

**Q11)a)** Discuss security issues at transport layer with suitable example and possible solutions? [8]

b) What are the functions of network Layer? Explain? [8]

OR

**Q12)a)** Explain bandwidth management. [8]

b) Explain which points are considered while planning and implementing network. [8]

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Total No. of Questions : 12]

SEAT No. :

**P2794**

**[5154]-176**

[Total No. of Pages : 3

**B.E. (Computer Engineering)  
ARTIFICIAL INTELLIGENCE**

**(2008 Course) (Semester - I) (410444C) (Elective - I)**

*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) Explain the Artificial Intelligence applications. [8]**

**b) Define the following terms with example. [10]**

State, Search tree, Successor function, Branching factor, completeness of algorithm.

OR

**Q2) a) What are the different types of agent? Explain the architecture and function of model based reflex agent and simple reflex agent. [8]**

**b) Explain the main factors for designing an intelligent agent and explain learning agent architecture and it's components. [10]**

**Q3) a) Write A\* Algorithm and explain in detail with example. [8]**

**b) Explain Minimax Search Algorithm for two players with example. [8]**

OR

**Q4) a) Solve given Crypt arithmetic problem using Constraint Satisfaction SEND + MORE = MONEY. [8]**

**b) How can we add alpha and beta cut-offs for better performance? [8]**

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



- Q5)** a) Explain Local beam search and Genetic algorithms with example. [8]  
b) Explain alpha-beta cut-offs as applicable to the basic minimax algorithm and Optimal decisions in multiplayer games. [8]

OR

- Q6)** a) Explain Alfa-beta pruning in CSP and Backtracking Search for CSPs.[8]  
b) Explain Local Search for CSPs. [8]

### **SECTION - II**

- Q7)** a) Explain classical planning with example and Non-Linear planning with example. [10]  
b) What are the various components of a typical planning system? [8]

OR

- Q8)** Explain the following terms as applicable to knowledge representation [18]  
a) Semantic - net.  
b) Script.  
c) Frames.  
d) Conceptual Dependency.

- Q9)** a) Explain Bayes' Rule and its uses. [8]  
b) What is a fuzzy set? Explain fuzzy logic concept with example. [8]

OR

- Q10)**a) What is 'learning by Parameter' adjustment? Explain with example. [8]  
b) Explain Decision trees and Implementation aspects of Decision tress.[8]

- Q11)a)** Draw and explain the Architecture of Ideal Expert System. **[8]**
- b) Elaborate the issues involved in natural language processing and the logical steps in Natural Language Processing. **[8]**

OR

- Q12)a)** Explain any four applications of neural network in Artificial Intelligence. **[8]**  
With Features, why NN and Goal.
- b) Explain unification algorithm with example. **[8]**

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Total No. of Questions : 12]

SEAT No. :

**P2795**

**[5154]-177**

[Total No. of Pages : 3

**B.E. (Computer Engineering)  
SOFTWARE ARCHITECTURE**

**(2008 Course) (Semester - I) (410444 D) (Elective - I(d))**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Describe software Architecture? Explain the importance of software Architecture in software development. **[9]**
- b) How software architecture are influenced by the following. **[9]**
- i) Stakeholders.
  - ii) Developing organizations.

OR

- Q2)** a) Explain the Architecture Business cycle. **[9]**
- b) Analyze the following concepts. **[9]**
- i) Connectors and Components.
  - ii) Architectural structure modules:(decompose, classes)

- Q3)** a) Interpret the following concepts of :- **[8]**
- i) 24/7 availability of a system.
  - ii) Transaction management.
- b) Explain quality attributes of web application. **[8]**

OR

**P.T.O.**

- Q4)** a) Explain testability tactics. [8]  
b) Explain the Template (Source, stimulus, response) for discussing Quality Attributes Scenarios, with and example for any Availability scenario of your choice. [8]

- Q5)** a) Describe Abstract factory pattern with respect to intent, application and solution. [8]  
b) Give the structure of object and class adapter pattern. [8]

OR

- Q6)** a) Explain when proxy pattern can be applied. Give the solution of proxy pattern using UML diagram. [8]  
b) How do you ensure about the single instance of a Maze game application. [8]

### **SECTION - II**

- Q7)** a) Differentiate Web Container and Web Server? [4]  
b) Explain following web server side concepts through simple examples [12]  
i) CGI.  
ii) Application Server.  
iii) Legacy applications.  
iv) Web Server.

OR

- Q8)** a) Describe JDBC? Write different steps to connect to database and execute query using JDBC with an example. [8]  
b) Explain with neat diagram J2EE Architecture. Discuss how it supports MVC Architecture. [8]

- Q9)** a) Discuss RPC? Assess the pro and cons of RPC as middleware? [8]  
b) Explain n-tier web architecture. [8]

OR

- Q10)** a) Compare XML and HTML. [4]  
b) Illustrate 3 tier architecture? What are the J2EE technologies supporting client tier. [6]  
c) Sketch and explain AJAX web application model. [6]

**Q11)** Explain brief: [18]

- a) ACTIVE X control.  
b) Middleware.  
c) JDBC.  
d) JSF.

OR

- Q12)** a) How does a web application manage sessions? [9]  
b) Explain Java web services. Relate SOA & Web services? [9]

ζ ζ ζ

Total No. of Questions :12]

SEAT No. :

**P2796**

[Total No. of Pages :3

**[5154] - 178**

**B.E. (Computer Engineering)**

**MULTIMEDIA SYSTEMS**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer 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) Differentiate between Multimedia file system and Conventional file system. **[8]**
- b) Explain with suitable examples multimedia building blocks and its role in development of web based multimedia applications. **[8]**

OR

- Q2)** a) What are the various devices used in multimedia systems? What are the different multimedia components present in Windows OS? **[8]**
- b) What is Multimedia Authoring? Explain any three Multimedia Authoring Tools in brief. **[8]**
- Q3)** a) Explain GIF & BMP file formats in brief. **[9]**
- b) Generate the Huffman encoding tree and codes for the example- Characters A, B, C, D and E have the following probability of occurrence: **[9]**

$p(A) = 0.16, p(B) = 0.51, p(C)=0.09, p(D)=0.13, p(E) = 0.11.$

OR

**P.T.O.**

- Q4)** a) Explain image enhancement using point processing. [9]  
b) Explain Shannon-Fano compression algorithm by taking a suitable example. [9]
- Q5)** a) Explain how audio is captured and stored in computers? [8]  
b) Explain in brief WAV & VOC file formats. [8]

OR

- Q6)** a) Compare: [8]  
i) PCM and DM  
ii) MPEG 4 and MPEG 7  
b) What are the fundamental characteristics of audio data? How do you define quality of audio data? [8]

### **SECTION-II**

- Q7)** a) Which are the different video broadcasting techniques? Explain various features of H.261 and H.263. [9]  
b) Explain any two audio file formats. [9]

OR

- Q8)** a) What are the features of MPEG in video compression? Define and explain I, P and B frames with reference to MPEG. [9]  
b) Explain various features of H.261 and H.263. [9]
- Q9)** a) Explain the use of animation in website development. [8]  
b) What is Open GL? How it supports animation? [8]

OR

- Q10)** a) Explain the architecture of OpenGL. [8]  
b) Explain major steps involved in 3D animation. [8]

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

**[16]**

- a) VoIP
- b) Quality of Service in Multimedia data transmission.
- c) Multimedia Applications.

OR

**Q12)**a) Explain Movie on Demand Concept in Multimedia.

**[8]**

b) Explain how multimedia is used in Web based applications.

**[8]**

*EEE*



Total No. of Questions : 12]

SEAT No. :

**P2797**

**[5154]-179**

[Total No. of Pages : 3

**B.E.(Computer)**

**MOBILE COMPUTING**

**(2008 Pattern) (Semester - I) (Elective-II) (410445)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain the primary objectives of Future Public Land Mobile Telecommunication Systems (FPLMTS). **[8]**
- b) Enlist and explain the applications of mobile computing. **[8]**

OR

- Q2)** a) Explain the cell layout and frequency planning in GSM.(Provide the appropriate diagrams) **[8]**
- b) Explain the functions of Home Location Register and Visitor Location Register. **[8]**

- Q3)** a) With the help of a diagram, explain frame, multiframe, superframe and Hyperframe for a GSM network. **[8]**
- b) Explain the structure of a TDMA slot with a frame for **[8]**
- i) Normal Burst
  - ii) Synchronization Burst.

OR

**P.T.O.**

- Q4)** a) Explain the structure of a TDMA slot with a frame for [8]  
i) Access Burst  
ii) Dummy Burst.  
b) Explain the time organization of Full and Half Rate Traffic Channels. [8]

- Q5)** a) Explain following two procedures, in detail, used in formation of a call: [10]  
i) Connection Request.  
ii) Paging procedure  
b) With the help of a signaling diagram, explain the call-clearing process for a Mobile-Terminated call. [8]

OR

- Q6)** a) With the help of a signaling diagram, explain IMSI Attach procedure. [8]  
b) With the help of a signaling diagram, explain the procedure for PSTN originating-MS terminating (PSTN-MS call) call establishment. [10]

## **SECTION-II**

- Q7)** a) Explain the four basic security services provided by GSM. [8]  
b) With the help of a signaling diagram, explain TMSI assignment process as a result of location update. [10]

OR

- Q8)** a) With the help of a block diagram, briefly explain the procedure for generation of  $K_c$ , SRES, and RAND at Authentication center. [10]  
b) Explain the characteristics of SIM. Also enlist the storage capabilities of SIM. [8]

- Q9)** a) Provide a simple layout of a typical FDMA/TDMA system. [8]  
b) Compare TDMA, FDMA and CDMA. [8]

OR

- Q10)a)** What is a mobile station? Explain functions of a mobile station. [8]
- b) Provide the codings used for [8]
- i) IMSI
  - ii) MSISDN

- Q11)a)** Explain format type A and format type B of LAPD<sub>m</sub>. [8]
- b) Write short notes on : [8]
- i) MM Specific Procedure.
  - ii) MM Common Procedure.

OR

- Q12)a)** Provide the simple structure of DTAP protocol and BSSMAP protocol. [8]
- b) Briefly explain following interfaces in GSM [8]
- i) V<sub>m</sub> interface
  - ii) A-bis interface
  - iii) A-interface



Total No. of Questions : 12]

SEAT No. :

**P2798**

**[5154]-180**

[Total No. of Pages : 3

**B.E.(Computer)**

**EMBEDDED SYSTEM**

**(2008 Pattern) (Semester - I) (Elective-II) (410445C)**

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

**SECTION-I**

- Q1)** a) What are the different categories of Embedded Systems depending on the area of applications? Give Examples. [8]
- b) Discuss various application areas of embedded system. [4]
- c) Draw layered architecture of Embedded System. Discuss various components in the Embedded System. [6]

OR

- Q2)** a) Differentiate between RISC and CISC architecture of the processors used in embedded systems. [6]
- b) What challenges are faced while designing an embedded system. [6]
- c) Explain how embedded processor and Application Specific System Processors are different than a general processor? [6]

OR

- Q4)** a) Discuss various read only memories used in an embedded system? [4]
- b) Describe different operating modes of ARM7 processor. [6]

**P.T.O.**

- c) It is required to design a real time robotic control system. For this application, select the appropriate processor based on [6]
- i) Instruction cycle time
  - ii) Bus width
  - iii) MIPS
  - iv) On chip cache
  - v) On chip RAM/ROM

- Q5)** a) Compare RS232 and RS485 standards. [4]  
b) Discuss I2C protocol w.r.t. following points [8]  
i) Data transfer speed  
ii) Arbitration  
iii) Data frame format  
c) Discuss optical devices commonly used in embedded systems along with applications? [4]

OR

- Q6)** a) Discuss different fields in the data frame of CAN bus protocol. What are the applications of CAN? [8]  
b) Discuss the topology used by devices to communicate through USB protocol. Mention different types of data transfer. [8]

## SECTION-II

- Q7)** a) What are the advantages and disadvantages of programming in C++ for Embedded System? [8]  
b) What is In-Circuit-Emulator? Give details. [6]  
c) How cross compilers are different than compilers? [4]

OR

- Q8)** a) With the help of neat diagram, explain software development cycle for embedded system. [8]  
b) Explain the usage of stacks and queues in embedded system programming. [10]

- Q9)** a) Explain the kernel services in an OS. [8]  
b) How RTOS performs the schedule management of multiple tasks. [8]

OR

- Q10)**a) Discuss different ways in which interrupts are handled in RTOS environment. [6]  
b) What are virtual device drivers? Explain. [6]  
c) Compare assembly language programming and high level language programming. [4]

- Q11)**a) Write short note on any two. [8]  
i) Embedded Linux  
ii) VxWorks  
iii) Special OS features for automotive systems  
b) Differentiate between soft real time operating system and hard real time operating system. [4]  
c) Identify the requirements of s/w mobile phone and show it with the help of class diagram. [4]

OR

- Q12)**a) Discuss different features of  $\mu$ COS-II. [4]  
b) Differentiate between RTOS and Desktop OS based on the following points. [4]  
i) Interrupt handling  
ii) Task scheduling  
c) Explain digital camera with respect to hardware and software components. [8]



Total No. of Questions : 12]

SEAT No. :

**P2799**

**[5154]-181**

[Total No. of Pages : 2

**B.E.(Computer Engineering)**  
**SOFTWARE TESTING AND QUALITY ASSURANCE**  
**(2008 Pattern) (Semester - I) (Elective-II) (410445D)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) What is verification and validation? Explain the testing lifecycle. [10]  
b) Explain the defect report with an example. [6]

OR

- Q2)** a) Explain the importance of testing with different types of testing. [8]  
b) Explain the different testing strategies. [8]

- Q3)** a) Explain the need of black box testing with positive and negative testing. [10]  
b) Explain boundary value analysis and domain testing. [8]

OR

- Q4)** a) Differentiate between black box and white box testing. Explain equivalence partitioning testing. [10]  
b) Explain the graph based testing methods. [8]

- Q5)** a) How do you derive test cases using loop testing? [8]  
b) Explain the testing of object oriented system with example. [8]

OR

**P.T.O.**

- Q6)** a) Explain mutation and data flow testing. [8]  
b) What is the need of white box testing? How it is applied in statement coverage? [8]

**SECTION-II**

- Q7)** a) Describe the types of testing metrics. [8]  
b) Explain the following in brief. [10]  
i) Goal question metric  
ii) Sanity testing  
iii) Smoke testing

OR

- Q8)** a) Explain the regression and validation testing. [10]  
b) Explain GUI testing with example. [8]

- Q9)** a) Explain quality assurance and quality control. [8]  
b) State and explain the quality factors. [8]

OR

- Q10)** Explain the following in brief [16]  
a) TQM  
b) SQA model  
c) Quality attributes  
d) Scenario testing

- Q11)** a) Explain the automated testing with an example. [8]  
b) How GUI testing is carried out with a testing tool? [8]

OR

- Q12)** a) Compare automated testing with manual testing. Give the design of test cases for an authentication system. [8]  
b) Explain how functional testing can be done with a tool. [8]





Total No. of Questions : 12]

SEAT No. :

**P2800**

**[5154]-182**

[Total No. of Pages : 3

**B.E.(Computer Engineering)**  
**DISTRIBUTED OPERATING SYSTEMS**  
**(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) *Figures to the right side indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) Differentiate between Network operating system and Distributed operating systems w.r.t. degree of transparency, basis of communication and resource management. **[10]**
- b) What is meant by transparency and give examples of different types of transparency. **[8]**

OR

- Q2)** a) Explain what is meant by absolute ordering, consistent ordering and causal ordering of messages in a distributed message passing system. Give a mechanism to implement each one of these. **[10]**
- b) What is IDL and how is it used? What is the role of the Interface Repository in CORBA. Where and how is it used? **[8]**

- Q3)** a) Explain Lamport's logical clock? What are the conditions satisfied by logical clocks? List the limitation of Lamport's clock how do overcome those. **[10]**
- b) What are the major issues in designing a distributed operating systems?[6]

OR

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

**Q4) a)** What is Process Migration? Explain desirable features of a good process migration Mechanism. [10]

b) Explain Election algorithms for selecting co-ordinator. [6]

**Q5) a)** Explain distributed algorithm for Mutual Exclusion. What are the advantages and disadvantages of it over centralized algorithm? [10]

b) Explain Token based & Non Token based Mutual Exclusion Algorithm. [6]

OR

**Q6) a)** Discuss the impact of message loss on following deadlock detection algorithms. [10]

i) A path pushing algorithms.

ii) Edge chasing algorithms.

b) Explain the following agreement problem [6]

i) Byzantine Agreement Problem

ii) Consensus Problem

iii) Interactive Consistency Problem

## SECTION-II

**Q7) a)** Explain distributed shared memory architecture. What is the main motivation behind implementing DSM. [10]

b) What is distributed scheduling? Why it is needed? What are the different issues in load distribution? Explain receiver initiated algorithm in detail. [8]

OR

**Q8) a)** What are the various design issues in implementation of distributed file systems? [10]

b) How does granularity affect DSM system performance? & What are the various advantages of DSM systems. [8]

- Q9)** a) How checkpointing is done in distributed database Systems? Write an algorithms for checkpointing in distributed database Systems. [10]
- b) Explain with suitable example Backward and forward error recovery.[6]

OR

- Q10)**a) How do we achieve the security in the distributed operating system? Explain it with access matrix model for security. [10]
- b) What are the features of capability based addressing? Also discuss advantages and disadvantages of capability based protection systems.[6]

- Q11)**a) Explain the following system. [10]
- i) Grid computing
- ii) Service Oriented Architecture
- b) What are web services? How do you compare it to components? And then Compare between service oriented architecture and component based architecture. [6]

OR

- Q12)**a) Explain in brief types/Classification of cluster. Compare cluster computing with Grid Computing. [10]
- b) What is Cloud computing? Explain types of cloud based on location and services. [6]



Total No. of Questions : 12]

SEAT No :

**P2801**

**[5154]-183**

[Total No. of Pages :3

**B.E. (Computer)**

**ADVANCED COMPUTER ARCHITECTURE**

**(2008 Course) (Semester-II) (410449)**

*Time : 3 Hours*

*Max. Marks : 100*

*Instructions to candidates:*

- 1) *Answer any three questions form each section.*
- 2) *Answer to these 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)** What are different classification approaches for parallel computer Architectures? Describe sample architectures representing each classification approach. **[10]**
- b)** How Branch prediction and speculative loading improves performance speedup of Itanium processor? **[08]**

OR

- Q2) a)** Define Amdahls law. Derive an expression for CPU clock as a function of instruction count, clocks per instruction and clock cycle time. **[10]**
- b)** Explain the following terminologies associated with SIMD computers. **[8]**
- i) Lock -step Operations.
  - ii) Associative Memory.
  - iii) Adjacency search.
  - iv) Bit serial Associative processor.

- Q3) a)** With suitable example, describe the major hurdles of pipelining. **[8]**
- b)** Find the set of distances and the collision vector for the reservation table shown below. **[8]**

	0	1	2	3	4	5	6	7
S1	1			1		1		
S2		1	1		1			
S3				1				1

**P.T.O.**

OR

- Q4)** a) What is significance of dynamic prediction? Draw the state transition diagram for 2 bit prediction scheme. [8]  
b) How to overcome the data hazards with dynamic scheduling? [8]

- Q5)** a) Discuss with example any three vectorizing functions designed for optimizing compilers. [8]  
b) How array processing is different than vector processing? Discuss the basic architecture of ILLIAC-IV Model 1 array processor. [8]

OR

- Q6)** a) State the concept of pipeline chaining. What is vector looping? With example explain vector looping with respect to Cray-1 architecture. [8]  
b) What is the use of data routing functions? With example discuss the necessity of data routing in array processors. [8]

### SECTION-II

- Q7)** a) With a neat diagram, explain the basic structure of a centralized shared memory and distributed memory multiprocessor. [10]  
b) Explain snooping with respect to a cache coherence protocols. [8]

OR

- Q8)** a) Explain the symmetric shared memory architecture, in detail. [10]  
b) Describe distributed shared memory and directory based cache coherence. [8]

- Q9)** a) What are multi-threaded architectures? Discuss the various performance parameters of multi-threaded processor architectures. [8]  
b) State the following terms w.r.t. multithreaded architectures:  
i) Interleaved Multithreading  
ii) Latency Hiding  
iii) Context Switching  
iv) Efficiency. [8]

OR

- Q10)** a) What is latency hiding? Explain any Two methods used for Latency Hiding in multi-threaded architectures. [8]  
b) With example explain message passing parallel programming. What is SPMD programming? [8]

**Q11)** Discuss the requirement of language features for parallel programming. Describe the various issues to be handled in parallelizing compiler with respect to flow analysis, optimization and code generation. **[16]**

OR

- Q12) a)** Explain in detail the steps usually followed for generating a multiprocessing application from a sequential application. **[8]**
- b) Explain the fork and join mechanism in any of the parallel languages. Where is this method most useful. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P2802**

**[5154]-184**

[Total No. of Pages : 3

**B.E. (Comp. Engg.)**

**PATTERN RECOGNITION**

**(2008 Pattern) (Semester - II) (Elective - III) (410450 A)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *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 feature, feature vector and classifiers. [6]  
b) Compare supervised and unsupervised pattern recognition. [4]  
c) State and explain the basic stages involved in the design of a classification system. [8]

OR

- Q2)** a) What is mean by pattern classifier? State and explain different approaches to pattern classifier. [10]  
b) What is the need of Pattern recognition? State and explain the applications of Pattern Recognition. [8]

- Q3)** a) Explain Bayes loss and risk function. Explain Bayes minimum error rate pattern classifier. [8]  
b) Define within-class scatter matrix & between-class scatter matrix. Discuss the discriminant analysis for 2-class problem. [8]

OR

- Q4)** a) Explain Bayes theorem for pattern classification? Explain Bayes classifier for Gaussian classes. [8]  
b) Explain Linear Discriminate Functions and Decision Hyper plane. [8]

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

- Q5)** a) Define and Explain following Criterion.  
 i) Bayes  
 ii) Maximum a Post priori  
 iii) Maximum-likelihood. [6]  
 b) Define Discriminant function. Give the discriminant function for following criterion-Bayes, Maximum a post priori, Maximum likelihood. [10]

OR

- Q6)** a) Explain Gaussian Mixture Models and Expectation-maximization method. [8]  
 b) Write a note on Bayesian estimation. [8]

**SECTION-II**

- Q7)** a) What is mean by Context-dependent classification? Explain Discrete Hidden Markov Model. [8]  
 b) Explain the need of Dimension reduction methods. State how principal component help for dimension reduction. [8]

OR

- Q8)** a) State dimension reduction methods. Explain Fisher discriminant analysis. [8]  
 b) Write a note on Continuous density hidden markov models. [8]

- Q9)** a) State and explain non-parametric techniques for density estimation. [8]  
 b) In order to select best candidates, school entrance exam on two subjects of English and Mathematics. Suppose that we know the marks and the classification results of 5 applicants as in the table below. If an applicant has been accepted this is denoted as class 1, otherwise class 2. Use the nearest neighbor rule and sum of square distance measure to determine if Ajay should be accepted if his marks of English and Mathematics are 70 and 70 respectively. Using the same example determine if Ajay should be accepted with k-nearest neighbor rule, with  $k=3$ . [10]

Candidate No.	English	Math	Class
1	80	85	1
2	70	60	2
3	50	70	2
4	90	70	1
5	85	75	1

OR



**Q10)a)** What is Non-parametric density estimation. Explain Parzon window density estimation. [8]

b) Write a note on : [10]

i) Perceptron Algorithm

ii) support vector machine.

**Q11)a)** What is nominal data? Explain the concept of Decision tree with example. [8]

b) What is clustering? Explain K-mean clustering algorithm. [8]

OR

**Q12)a)** Create by hand a dendrogram for the following six points in one dimension using hierarchical clustering - single linkage metrics based in Euclidian distance.

$D = \{662, 887, 255, 412, 996\}$  [8]

b) Write a note on Non-metric methods for pattern classification. [8]



Total No. of Questions : 12]

SEAT No. :

**P2803**

**[5154]-185**

[Total No. of Pages : 2

**B.E. (Computer Engineering)**  
**HIGH PERFORMANCE NETWORKS**  
**(2008 Pattern) (Semester - II) (Elective - III)**

*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) *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 side indicate full marks.*

**SECTION-I**

- Q1)** a) Explain 1000 BASE-X family with suitable applications. [8]  
b) Explain high level system architecture of Gigabit Ethernet. [10]

OR

- Q2)** a) Explain in short the need of flow control in gigabit Ethernet? How it is supported? [8]  
b) Differentiate between 10, 100,1000 Mbps n/w based on their MAC characteristics. [10]

- Q3)** a) Explain physical configurations for ISDN User-Network Interfaces with examples. [8]  
b) Explain in brief elementary functions for ISDN [8]

OR

- Q4)** a) Describe the SS7 protocol architecture. [8]  
b) Explain Frame-Mode Control Signaling with example. [8]

- Q5)** a) Explain in short the functional architecture of B-ISDN. [8]  
b) What is Quality of Service? Explain in detail the various ATM QoS parameters specifying their category of assessment. [8]

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. :

**P2804**

**[5154]-186**

[Total No. of Pages : 3

**B.E. (Computer)  
NEURAL NETWORKS**

**(2008 Pattern) (Semester - II) (Elective - III) (410450)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Attempt 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 basic architecture of a Biological Neural Net and compare it with Artificial Neural Net. [8]
- b) What is Linear Separability? Illustrate with example. Can single perceptron classify linear separable patterns? [8]

OR

- Q2)** a) Explain the McCulloch-Pitts (MP) model and its implementation for the realization of NOR gate. What is the importance of bias term? [8]
- b) Compare LMS, Perceptron and delta learning laws. [8]

- Q3)** a) Draw and explain the architecture of RBFN (Radial Basis function) Network? How it act as classifier? [10]
- b) What is the use of activation functions in ANN training? Discuss any 2 activation functions. [8]

OR

**P.T.O.**

**Q4)** a) What is linearly Non-separable classification problem? Can single Perceptron solve such problem? Discuss ADALINE computing model of a neuron. [10]

b) Discuss in brief the significance of learning constant, learning law and momentum term in back propagation training. [8]

**Q5)** a) How associative memory models classified? With diagram explain the working of Auto-associative Neural Network. [8]

b) What is meant by simulated annealing? What is annealing schedule? [8]

OR

**Q6)** a) With example illustrate the concept of stochastic update and thermal equilibrium. [8]

b) Explain the architecture of Boltzmann machine. [8]

### **SECTION-II**

**Q7)** a) How the self-organizing network is trained? Illustrate the Kohonen's learning with suitable example. [10]

b) Compare between competitive learning and vector quantization. Why it is called as unsupervised learning? [8]

OR

**Q8)** a) What is plasticity-stability dilemma problem? Explain the ART Training algorithm used for pattern clustering. [10]

b) Discuss the architecture of Recurrent Neural Network. [8]

**Q9)** a) How an optimization problem is formulated for a solution using a neural network model? Explain with example. [8]

b) Draw and explain the architecture of Bidirectional Associative Memory. [8]

OR

**Q10)a)** Explain with architecture and algorithms, the use of ANN in handwritten digit recognition. [8]

b) Discuss in brief auto-association and hetero-association process used for neural processing. [8]

**Q11)a)** How Fuzzy sets are different than traditional set? How Fuzzy logic can be used with Neural Networks for supervised or unsupervised learning? [8]

b) What do you understand by Soft Computing? Explain and compare its different components/ tools with features. [8]

OR

**Q12)a)** Compare Neuro Fuzzy systems with traditional Neural systems. State the advantages and disadvantages. [8]

b) Explain the Neuro-Fuzzy architecture of Fuzzy Back propagation training. How the architecture is different than traditional Feed Forward Network? [8]



Total No. of Questions : 12]

SEAT No. :

**P2805**

**[5154]-187**

[Total No. of Pages : 3

**B.E. (Computer Engineering)**

**ADVANCE DATABASES**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate 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 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

**P.T.O.**

**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]

**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 OLAP & 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) What is clustering? Explain the K-means clustering algorithms. [8]  
b) What is decision tree? Explain ID3 algorithm to create decision tree. [8]

OR

- Q10)**a) What is market basket analysis? How Apriori algorithm is useful in the market basket analysis? [8]  
b) Explain the following terms: [8]  
i) Frequent itemset.  
ii) Outlier analysis.

- Q11)**a) What 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 space model.



Total No. of Questions : 12]

SEAT No. :

**P2806**

**[5154]-188**

[Total No. of Pages : 2

**B.E. (Computer Engineering)**  
**VLSI & DIGITAL SYSTEM DESIGN**  
**(2008 Course) (Elective - IV) (Semester-II) (410451A)**

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

**SECTION -I**

- Q1)** a) Explain layout design rules for devices and interconnects. [9]  
b) Explain types of technology scaling. [8]

OR

- Q2)** a) Compare Speed-Power performance of available technologies. [9]  
b) Explain different tools for device simulation. [8]

- Q3)** a) Explain fabrication of Cu interconnects with suitable diagram. [8]  
b) Describe different limiting performance of CMOS. [9]

OR

- Q4)** a) Explain Shallow Trench Isolation (STI) with process flow. [8]  
b) Explain the different process options for device isolation. [9]

- Q5)** a) Explain wet etching and plasma etching. [8]  
b) Explain basic properties of Silicon Wafer. [4]  
c) Explain Czochralski and Float-Zone Crystal growth methods. [4]

OR

- Q6)** a) Write a short note on: [8]  
i) Nano imprint Lithography.  
ii) Electron-beam lithography.  
b) Explain Chemical vapor oxidation technique. [8]

**P.T.O.**

**SECTION -II**

- Q7)** a) Explain Island style and Row based FPGA architectures in detail. [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) Draw state diagram and write VHDL Code for Traffic Light controller.[8]

- Q9)** a) Explain the types of programmable logic devices n detail. [8]  
b) Explain Application Specific IC's Design flow. [4]  
c) Explain role of interconnect in VLSI design. [4]

OR

- Q10)** a) Explain static and dynamic behaviour of CMOS devices and circuits.[8]  
b) Explain role of software tools in digital design. Explain the types of software tools in VLSI design. [8]

- Q11)**a) List out different steps for designing clocked synchronous machine.[8]  
b) Explain different design parameters for digital circuit design. [5]  
c) Explain merits and demerits of FPGA. [4]

OR

- Q12)**a) Explain timing parameters for read and write operation in static RAM.[8]  
b) For clock circuitry explain the following: [9]  
i) Clock skew  
ii) Clock jitter  
iii) Slew

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Total No. of Questions : 12]

SEAT No. :

**P2807**

**[5154]-189**

[Total No. of Pages : 4

**B.E. (Computer)**

**OPERATIONS RESEARCH**

**(Elective - IV) (2008 Course) (Semester -II) (410451B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer any THREE questions from each Section.*
- 2) *Answers to these questions 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)** A plastic products manufacturer has 1,200 boxes of transparent wrap in stock at one factory and another 1,200 boxes at it's second factory. The manufacturer has orders for this product from three different retailers in quantities of 1000, 700 and 500 boxes, respectively. The unit shipping costs (in rupees per box) from factories to retailers are as follows.

	Retailer 1	Retailer 2	Retailer 3
Factory A	14	11	13
Factory B	13	13	12

Formulate this problem as LP model, Determine a minimum cost shipping schedule for all demands from current inventory. **[8]**

b) Write steps of the simplex algorithm for obtaining on optimal solution to a linear programming problem. **[8]**

OR

*P.T.O.*

**Q2) a)** Use Graphical method to solve Following LP problem.

Maximize  $Z = 2x_1 + x_2$  subject to constraints [8]

and

b) Draw flowchart for simplex algorithm for solving linear programming problem. [8]

**Q3) a)** Box 1 contains 2000 components of which 5% are defective. Box 2 contains 500 components of which 40% are defective. Box 3 and Box 4 contains 1000 components each with 10% defectiveness. A Box is selected randomly and a component is removed at random. [8]

- i) What is the probability that the selected component is defective?
- ii) If the selected component is defective what is the probability that it came from Box 2? [8]

b) What is Normal distribution? Explain central limit theorem and Standard Normal random variable. [8]

OR

**Q4) a)** State and explain steps of decision making process. [8]

b) For what value of  $\lambda$ , the Game with following pay-off matrix is strictly determinable? [8]

	Player B		
Player A	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>
A <sub>1</sub>	$\lambda$	6	2
A <sub>2</sub>	-1	$\lambda$	-7
A <sub>3</sub>	-2	4	$\lambda$

- Q5) a)** What is queuing system? Explain queuing systems transient state and steady state. [9]
- b)** A software tester finds that the time spent on debugging & fixing the error has an exponential distribution with mean 30 min per module. The arrival of modules is Poisson with an average of 10 modules per day of 8 hours. What is expected time per day? How many modules are there on average? [9]

OR

- Q6) a)** At what rate (average) a clerk at super market work in order to ensure a probability of 0.9 that the customer will not have to wait longer than 12 minutes? It is assumed that there is only one counter to which customer arrive in a Poisson fashion at an average rate of 15 per hour. The length of service by the clerk has an exponential distribution. [9]
- b)** State and prove the arrival distribution theorem (Pure birth Process).[9]

### SECTION -II

- Q7) a)** Describe Forward and Backward pass method of critical path Analysis. [9]
- b)** Find the sequence that minimizes the total elapsed time and processing time in hours required to complete the following Jobs. [9]

Job	1	2	3	4	5	6
Machine A	4	8	3	6	7	5
Machine B	6	33	7	2	8	4

OR

- Q8) a)** Write procedure for processing ‘n’ Jobs through three machines with respect to sequencing problem. [9]
- b)** What is float? What are different types of floats? Discuss in brief
- i) Total Float
- ii) Free Float
- Also explain their uses in network. [9]

- Q9)** a) Write a note on formulation of Geometric programming problem. [8]  
b) Describe linear fractional programming algorithm. [8]

OR

- Q10)** a) Explain how to obtain normality & orthogonality conditions? [8]  
b) Explain Lagrangian method. [8]

- Q11)**a) What is importance of Decision tree with respect to dynamic programming? State a sufficient condition for two stage optimization problem to be solved by dynamic programming. [8]  
b) Describe the recursive equation approach to solve the dynamic programming problem. [8]

OR

- Q12)**a) What is dynamic programming? Explain the Bellman's principle of optimality. [8]  
b) Explain Mathematical formulation of multistage Model. [8]

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Total No. of Questions : 12]

SEAT No. :

**P2808**

**[5154]-190**

[Total No. of Pages : 2

**B.E. (Computer Engineering)**

**CLOUD COMPUTING**

**(2008 Pattern) (Elective - IV) (410451C) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer THREE questions from each section.*
- 2) *Answers to the TWO sections should be written in 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) How cloud computing services uses various component? Describe in detail types of clouds. [8]
- b) Compare and contrast between SaaS, Paas, IaaS in accordance with economies of scale. [8]
- c) What is Multi Tennacy? [2]

OR

- Q2)** a) Incline and explain with examples types of cloud computing. [8]
- b) Explain the services provided by the Microsoft Azure. [8]
- c) Define utility Computing. [2]

- Q3)** a) What is difference between process virtual machines, host VMMs and native VMMs. [8]
- b) Compare and contrast between SOAP and REST. [8]

OR

- Q4)** a) What is role of web services? How asynchronous 'rich' interfaces applied for deployment of cloud services? [8]
- b) Describe with example Mashups. [8]

- Q5)** a) Explain in detail architecture of cloud file systems? [8]
- b) Explain how data organization in big tables are stored on distributed file systems such as GFS and HDFS. [8]

OR

*P.T.O.*



- Q6)** a) Explain scalable parallel implementation with suitable example of Mapreduce Model. [8]  
b) How amazon dynamo works for data storage in cloud file systems? [8]

**SECTION -II**

- Q7)** a) Describe security management levels with suitable diagram. [10]  
b) Write in brief access control in PaaS. [8]

OR

- Q8)** a) What are different key privacy in cloud environment. [8]  
b) Explain fundamental functions: identity management, access control for secure cloud computing. [10]

- Q9)** a) Explain in detail load computation across multiple implementation. Describe in brief virtual and horizontal load distribution [8]  
b) What are the temporal requirement for QOS? Describe in aggregation of work flow in load distribution. [8]

OR

- Q10)** a) Compare different issues in inter-cloud environments. [8]  
b) Explain in detail how QOS monitoring deployed in cloud computing?[8]

- Q11)**a) Explain in detail performance evaluation feature of Apache Virtual platform. [8]  
b) Explain conceptual representation of Eucalyptus Cloud with its components. [8]

OR

- Q12)**a) Write a short note on Xen cloud platform [8]  
b) Describe performance evaluation Features and functions of Enomaly Elastic Computing cloud platforms. [8]

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Total No. of Questions : 12]

SEAT No. :

**P2809**

**[5154]-190-A**

[Total No. of Pages : 2

**B.E. (Computer)**

**INFORMATION SECURITY**

**(2008 Course) (Semester -II) (410451 D)**

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

**SECTION -I**

- Q1) a)** Enlist and explain different types of cryptographies in detail. [10]  
b) Describe different standard or information security in detail. [8]

OR

- Q2) a)** What is transposition scheme of cryptography & Explain any one method of it with suitable example. [10]  
b) Apply any one algorithm to secure your confidential document. [8]

- Q3) a)** Describe DES algorithm with example. [8]  
b) What is ciphering? Explain any one with suitable example. [8]

OR

- Q4) a)** Write and explain RC5 algorithm in detail. [8]  
b) Enlist and explain any one cipher mode of operation. [8]

- Q5) a)** What is ECC? Explain with suitable example to encrypt a message. [8]  
b) What is RSA? Discuss it in short. [8]

OR

- Q6) a)** Explain number theory with its applications. [8]  
b) Write and explain DH algorithm in detail. [8]

*P.T.O.*

**SECTION -II**

- Q7)** a) What is MAC? Explain it's principles of working. [10]  
b) What is PKI? Discuss it with suitable example. [8]

OR

- Q8)** a) Discuss applications of DSA in detail with suitable example. [10]  
b) What is HMAC? Differentiate HMAC & MAC. [8]

- Q9)** a) What is SSL? Explain SSL in detail. [8]  
b) What is intrusion presentation system? Differential IDS and IPS. [8]

OR

- Q10)** a) Discuss different modules of IDS. [8]  
b) Explain firewall's. Design principles. [8]

- Q11)**a) Explain format of S/MIME in detail. [8]  
b) What is PEM? Discuss it in detail. [8]

OR

**Q12)** Write a short note on following: [16]

- a) X. 50g
- b) Electronic Commerce Security
- c) Security Mechanisms.
- d) PGP.

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Total No. of Questions : 12]

SEAT No. :

**P2810**

**[5154]-191**

[Total No. of Pages : 2

**B.E. (Information Technology)**  
**INFORMATION ASSURANCE & SECURITY**  
**(2008 Pattern) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) What is attack? Explain different types of attacks? [10]  
b) Illustrate how to share and split the secret and its significance in some application. [8]

OR

- Q2)** a) What is Chinese remainder theorem? Explain with examples. [10]  
b) What are security goals? Explain various types of Authentication [8]

- Q3)** Describe the different modes of operation (ECB, CBC, CFB, OFB & CTR mode) with the help of block diagram. [16]

OR

- Q4)** a) Write working of AES algorithm in detail. [8]  
b) Describe the advantages and disadvantages of symmetric and asymmetric key cryptography. [8]

- Q5)** a) List and state the channels of key distribution in symmetric and asymmetric key systems. [8]  
b) Illustrate the Diffie Hellman Key exchange protocol. [8]

OR

- Q6)** a) What is PKI? Explain the different PKI architectures. [8]  
b) What problem was Kerberos designed to address. Describe Kerberos realm. [8]

**P.T.O.**

## SECTION-II

- Q7)** a) What is IPSEC? How does AH and ESP differ while working under Tunnel mode and Transport mode. [10]  
b) What do you mean by internet key exchange protocol? Explain its different phases? [8]

OR

- Q8)** a) What is SSL? Explain the SSL architecture in detail? [10]  
b) Explain different IDS methods with one example each. [8]

- Q9)** a) Write a short note on smart card and chip card transaction. [8]  
b) Explain domains of ISO 27001 security standard and state its purpose. [8]

OR

- Q10)** a) Explain and draw model for ISMS (Information Security Management system) of PDCA Cycle (Plan, Do, Check, Act phase). [8]  
b) Illustrate idea of Electronic Cash. [8]

**Q11)** Write a short note on following (any four) [16]

- a) Electronic evidence.
- b) Internet fraud
- c) Identity theft
- d) Computer Forensic
- e) Cyber tourism

OR

- Q12)** a) Illustrate Industrial Espionage in IT industry. [8]  
b) List some of the cyber crime and respective penalties. [8]



Total No. of Questions : 12]

SEAT No. :

**P2811**

**[5154]-192**

[Total No. of Pages : 2

**B.E. Information Technology**  
**OBJECT ORIENTED MODELING AND DESIGN**  
**(2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Solve 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) *Black 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) With suitable UML diagram explain composition and aggregation. [8]  
b) What is an association end? What are the properties of association end?[6]  
c) State the importance of modeling in UML [4]

OR

- Q2)** a) Explain the concept of Generalization and Inheritance with suitable example. [8]  
b) Describe the software development life cycle of UML. [6]  
c) How to apply constraints in Class Diagram. [4]

- Q3)** a) Describe the architectural meta model of UML. [8]  
b) Draw a class diagram for different dimensional figure on Window Screen. [8]

OR

- Q4)** a) Write a short note on UML versions. [8]  
b) Draw use case diagram for Student Admission System. [8]

- Q5)** a) Draw an object diagram for Hospital Management System. [8]  
b) Write a note on 4 + 1 view architecture. [8]

OR

**P.T.O.**

- Q6)** a) Write a note on Composite Structure Diagram. [4]  
 b) Draw a package diagram for “Online Shopping System” showing packages, package relationships. [4]  
 c) Explain in detail CRC method. [8]

**SECTION - II**

- Q7)** a) Illustrate with an example the relationship between use cases and sequence diagram. [8]  
 b) Explain with a diagram the basic UML syntax for state diagram. [6]  
 c) Compare Forward Engineering and Reverse Engineering. [4]

OR

- Q8)** a) Explain signals, partitions, exceptions and regions of Interaction overview diagram. [8]  
 b) Explain with a state diagram nested states for Telephone line. [6]  
 c) Explain the concept of ‘asynchronous message’ with a suitable example in the context of sequence Diagram. [4]

- Q9)** a) What do you mean by swim lane? Explain briefly the activity diagram with swim lane for servicing aero plane. [8]  
 b) Write a note on Component diagram. [8]

OR

- Q10)** a) Construct use case diagram for online air reservation system. [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 Activity diagram for issuing book from book library. [8]  
 b) Explain Sequence diagram with process transition scenario. [8]

OR

- Q12)** a) Write a note on Communication Diagram. [4]  
 b) What is a node represent in deployment diagram explain with diagram. [4]  
 c) Describe Branching and Forking in Activity diagram with suitable example. [8]

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Total No. of Questions : 12]

SEAT No. :

**P2812**

**[5154]-193**

[Total No. of Pages : 3

**B.E. (IT)**

**SOFTWARE TESTING AND QUALITY ASSURANCE**

**(2008 Course) (414442) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1) a)** Differentiate any two in detail: (4 Marks Each) **[8]**
- i) System Testing and Acceptance Testing
  - ii) Test Plan and Test Strategy
  - iii) Unit verification and Unit validation
- b) 'V & V diagram is basis for every type of testing?' Comment on this statement. What is the role of test plans in a V & V diagram? **[8]**

OR

- Q2) a)** Describe in brief System Level Testing. (Any 5 methods) **[8]**
- b) What are the different methods of White Box Testing? Differentiate between Black Box and White Box Testing. **[8]**

- Q3) a)** Define test Plan and its Contents. **[4]**
- b) Explain STLC phases. Differentiate between SDLC and STLC. **[12]**

OR

- Q4) a)** What is control flow graph? How is it used in white box testing? How is the cyclomatic complexity value useful to the tester? **[8]**
- b) What is a good test case? Write Test cases on Telephone. **[8]**

**P.T.O.**



- Q5)** a) Define measurement scale and explain the Nominal, Ordinal, Interval and Ratio scales of measurement. [8]
- b) What is test metrics? Explain In-Process and Product Quality Metrics in brief. [10]

OR

- Q6)** a) Explain the Metric Plan in brief. Explain Goal Question Metric (GQM) model of measurement. [10]
- b) What is the origin of defect? What are the different classes of defect?[8]

### **SECTION - II**

- Q7)** a) Define software quality and Software Quality Assurance. List the various objectives of Software Quality Assurance (SQA). [8]
- b) Illustrate with example the use of following techniques in improving quality: [8]
- i) Code inspection
  - ii) Project planning

OR

- Q8)** a) Classify software quality factors with respect to Product operation and Product revision. Explain correctness and maintainability quality attributes with proper examples. [8]
- b) Explain Ishikawa's Seven basic tools. [8]
- Q9)** a) Explain the benefits of using SQA standards. Also describe the contributions made by the use of standards in SQA. [6]
- b) What is SEI's Capability Maturity Model (CMM)? Explain briefly each level with their Key Process Area (KPA). [10]

OR

- Q10)** a) What is Six Sigma? Explain terms DMAIC & DMADV with reference to Six Sigma. [8]
- b) List the requirements of ISO 9000 and ISO 9001. [8]

**Q11)** Write short notes on any three (Each note for 6 Marks): [18]

- a) Six Sigma measure of software quality.
- b) Software Configuration Management (SCM).
- c) Goals and Activities performed in Organization Process Definition (OPD).
- d) Process Change Management (KPA for Level 5).

OR

- Q12)** a) Write in detail the actors and their roles in a typical software quality assurance Organizational framework. [6]
- b) What is Quality Assurance (QA)? How it is different from Quality Control (QC)? [4]
- c) Write a note on: (Each note for 4 Marks): [8]
- i) Pareto Chart.
- ii) Fishbone Diagram.



Total No. of Questions : 12]

SEAT No. :

**P2813**

**[5154]-194**

[Total No. of Pages : 3

**B.E. (Information Technology)**  
**ADVANCED DATABASE MANAGEMENT**  
**(2008 Course) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1) a)** Describe the PL/SQL transaction Commands. Write a PL/SQL transaction using the statements that first withdraw an amount of Rs. 1,000. The deposit Rs. 1,40,000. Update the current balance. Then check the total sum of all the accounts in the bank exceeds 2,00,000 then undo the deposit made. **[8]**

Tables: Trans\_Master(Trans\_No,Acc\_no,T\_Date,Amount, Trans\_Type, Balance)

Acc-Master(Acc\_no,cur\_balance) assume the proper data types.

b) Describe the working of cursor and types of cursors in PL/SQL. **[8]**

OR

**Q2) a)** Explain the need of packages and describe the package in detail with its advantages. **[8]**

b) Compare the Embedded SQL and dynamic SQL. **[8]**

**Q3) Write a short note on:** **[18]**

- a) Main Memory Database.
- b) Real Time Transaction system.
- c) Long Duration Transaction.

OR

**P.T.O.**

- Q4)** a) What is Transactional Workflow explain in detail with example. [9]  
b) Explain the different concurrency control protocol for Multidatabase System. [9]

- Q5)** a) What is object oriented databases? Explain the type Inheritance and table Inheritance in OODB. [8]  
b) Explain the need and structure of XML document. [8]  
c) Write short note on Timestamping concurrency control in Multidatabase System. [2]

OR

- Q6)** a) List and Explain the Query languages for XML. [8]  
b) What is Persistent object? Explain the approaches to make the Object Persistent. [8]  
c) Consider the following nested relational schema. [2]

Emp=(ename, childrenset setoff(children), skillset setoff(skill))

Children=(name,birthday), Birthday(day,Month,year)

Skills(type,Examset setoff(Exams)), Exams=(year,city))

Write DTD and XML file

## **SECTION - II**

- Q7)** a) Draw and Explain the three tier architecture for Data warehouse. [8]  
b) Explain the Data Warehouse Data flows in detail. [8]

OR

- Q8)** a) Discuss the features of Star, Snowflake and Fact Constellation schema of Data Warehouse, Compare the above three schema's [8]  
b) State and Explain the process of Data ware house Design. [8]

- Q9)** a) Write K means algorithm in details with example. [8]  
b) Explain Apriori Algorithm with example. [8]

OR

**Q10)** Write short notes on: [16]

- a) OLAP benchmarks and applications.  
b) Decision tree Classification and Bayesian classification.

**Q11)**a) Write a note on Database Security and the threats. [8]

- b) Explain the following in terms of providing security for a database: [8]  
i) Authorization.  
ii) Encryption.

OR

**Q12)**a) Explain the implicit and explicit locking? How does Oracle implement it? [8]

- b) Explain the use of Privileges and Role in Oracle with example. [8]



Total No. of Questions : 12]

SEAT No. :

**P2814**

**[5154]-195**

[Total No. of Pages : 3

**B.E. (Information Technology)  
ARTIFICIAL INTELLIGENCE**

**(2008 Course) (Semester - I) (Elective - I) (414443B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two Sections should be written in separate sheet.*
- 2) *Use of logarithmic tables, slide rules and electronic pocket calculator is allowed.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figures to the right indicates full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) Define the term artificial intelligence in your own words. Also define the role of intelligent agent in the problem solving. [8]
- b) What is an agent program? Describe a general model of learning agent. [8]

OR

- Q2)** a) Explain A\* search technique with suitable example. [8]
- b) Analyse the missionaries and Cannibals problem which is stated as follows. 3 missionaries and 3 cannibals are on one side of the river along with a boat that can hold one or two people. Find a way to get everyone to the other side, without leaving a group of missionaries in one place outnumbered by the cannibals in that place. [8]
- i) Formulate a problem precisely making only those distinctions necessary to ensure a valid solution. Draw a diagram of the complete state space.
  - ii) Design appropriate search algorithm for it.

- Q3)** a) What are the various parameters which are used to evaluate search methods? [8]
- b) Describe breadth first search technique. Show that is complete and optimal for unit costs. [8]

OR

**P.T.O.**

- Q4)** a) What is production system? Explain various problem characteristics. [8]  
b) What is state space search? How the problems are solved using space search. Explain with suitable example. [8]

- Q5)** a) Consider the following facts. [9]
- Team India
  - Team Australia
  - Final match between India and Australia
  - India scored 350 runs Australia score 350 runs India lost 5 wickets Australia lost 7 Wickets.
  - The team which scored the maximum runs wins
  - If the scores are same then the team which lost minimum wickets wins the match.

Represent the facts in predicate, convert to clause form and prove by resolution “India wins the match”.

- b) What are the logics used in reasoning with uncertain information? Explain. [9]

OR

- Q6)** a) Explain the properties of internal representation. [6]  
b) Describe the advantages of predicate logic over propositional logic. [6]  
c) Write a brief note on scripts. [6]

### **SECTION - II**

- Q7)** a) What are planning graphs? Explain the methods of planning and acting in the real world. [9]  
b) Explain the concept of planning with state space search. How is it different from partial order planning? [9]

OR

**Q8) a)** Define the problem domain of computer vision in the context of artificial intelligence. [9]

b) What is object detection in computer vision? List applications of object detection. [9]

**Q9) a)** Explain in detail statistical learning methods and reinforcement learning. [8]

b) Explain in detail learning from observation and explanation based learning. [8]

OR

**Q10) a)** Explain Hopfield Network. How is it used in learning a network? [8]

b) Explain the basic components of expert system. How can we make expert system knowledge base reusable? [8]

**Q11) a)** How the procedure for converting English to Prolog facts and Rules. Give suitable examples. [8]

b) Explain the applications of Genetic Algorithms in artificial intelligence domains. [8]

OR

**Q12) a)** What is distributed AI. Explain its applications. [8]

b) What is PROLOG? Explain how Prolog is used in Artificial Intelligence. [8]





Total No. of Questions : 12]

SEAT No. :

**P2815**

**[5154]-196**

[Total No. of Pages : 3

**B.E. (Information Technology)  
COMPILER DESIGN (Elective - I)  
(2008 Pattern) (Semester - I) (414443)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) With the help of the block diagram explain phases of the compiler. Also write down output of each phase of the compiler for expression  $X = Y - Z / 2$  where X and Z are of float type and Y is of integer type. **[10]**
- b) How lexical analyses detect the errors? Explain with suitable example. **[6]**

OR

- Q2)** a) Explain Lex specification with example. **[8]**
- b) Explain various compiler construction tools for the compiler design. **[4]**
- c) Explain difference between phase and pass. **[4]**

**Q3)** For the following grammar

$E \rightarrow E + T \mid T$

$T \rightarrow T * F \mid F$

$F \rightarrow (E) \mid id$

- a) Eliminate left recursion. **[3]**
- b) Compute First and Follow. **[6]**
- c) Construct Predictive parsing table. **[6]**
- d) Show sequence of parsing steps for the string  $id + id * id$ . **[3]**

OR

**P.T.O.**

**Q4)** Construct SLR parser for the grammar

[18]

$D' \rightarrow D$

$D \rightarrow \text{type tlist};$

$\text{tlist} \rightarrow \text{tlist, id} \mid \text{id}$

$\text{type} \rightarrow \text{int} \mid \text{float}$

Show the sequence of steps for the string float id, id;

**Q5) a)** What are SDD? Give SDD to translate expressions into syntax tree and draw syntax tree for  $a * b - 5 + c$ . [8]

b) Differentiate between L-attributed definitions and S-attributed definitions. [8]

OR

**Q6) a)** Explain Bottom up evaluation of inherited attributes. [8]

b) Translate following assignment statement into intermediate code [8]

$Z[i][j] := (X[i][j] * Y[i][j]) / 10$

### SECTION - II

**Q7) a)** Compare static scope with dynamic scope. Illustrate with suitable examples. [8]

b) Explain different source language issues. [8]

OR

**Q8) a)** Explain following parameter passing methods with suitable example. [8]

i) Call by value

ii) Call by reference

iii) Call restore

iv) Call by name

b) What are symbol tables? Explain in brief the different ways to organize symbol table. [8]

- Q9) a)** With proper examples explain following peephole optimization techniques: [8]
- i) Elimination of Redundant Instruction.
  - ii) Elimination Unreachable Code.
  - iii) Flow of Control Optimization.
  - iv) Algebraic Simplification.
- b) Discuss different issues in code generation phase. [10]

OR

- Q10)a)** With proper examples explain following optimizations: [10]
- i) Constant propagation.
  - ii) Variable propagation.
  - iii) Strength reduction.
  - iv) Dead code elimination.
  - v) Common subexpression.
- b) 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) How can overloading and overriding of functions in object oriented programming languages handle by Compiler? Explain in detail. [8]

OR

- Q12)a)** Explain different types of polymorphism with examples. [8]
- b) Explain different types of inheritance with example. [8]



Total No. of Questions : 12]

SEAT No. :

**P2816**

**[5154]-197**

[Total No. of Pages : 2

**B.E. (Information Technology)**  
**ADVANCED OPERATING SYSTEMS**  
**(2008 Course) (Elective - I) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, and Q5 or Q6 from Section - I and Q7 or Q8, Q9 or Q10, 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 UNIX commands with example: **[8]**  
Chgrp, wall, chown, ftp

b) Explain any four system calls with respect to process management. **[8]**

OR

**Q2) a)** Differentiate between a process and thread. Explain multithreading with example. **[8]**

b) Explain various primitives used for process synchronization. **[8]**

**Q3) a)** Draw and explain structure of PCB in KMOS. **[8]**

b) Explain the data structures used by KMOS. **[8]**

OR

**Q4) a)** What is process dispatch? Write functional specifications of process DISPATCH in KMOS. **[8]**

b) Give functional specifications of KMOSSTRART and KMOSCLOCK. **[8]**

**Q5) a)** Differentiate between multitasking O.S. and multiprocessing O.S. What are the advantages of using multiprocessor systems? **[8]**

b) Explain the types of multiprocessor operating system with eg. **[10]**

OR

**P.T.O.**

- Q6)** Write short notes on following [Any Three] [18]
- a) Monolithic kernel.
  - b) Multi tasking OS.
  - c) Design considerations of multiprocessing O.S.
  - d) Process Synchronization.

**SECTION - II**

- Q7)** a) Explain the concept of High memory mapping. [8]  
b) What is a slab? Explain different components of slab allocator. [10]

OR

- Q8)** a) Write pseudo C' code for kcalloc ( ), vmalloc and kfree ( ) functions and explain their use. [10]  
b) Explain the concept of statically allocating on the stack. [8]

- Q9)** a) Write a note on generalized device driver. [8]  
b) Explain the process of unification of files and I/O devices. [8]

OR

- Q10)**a) Explain various disk device driver access strategies. [8]  
b) Explain the concept of I/O scheduler with eg. [8]

- Q11)**a) Explain the following system calls related with file system management:[8]  
i) Mount  
ii) Unmount  
iii) Link  
iv) Lseek  
b) Explain the concept of file system abstraction. [8]

OR

- Q12)**a) Write a note on VFS. [8]  
b) Explain the process of mapping of file blocks with relevant system calls.[8]



Total No. of Questions :12]

SEAT No. :

**P2817**

[Total No. of Pages :3

**[5154] - 198**

**B.E. (Information Technology)**

**EMBEDDED SYSTEMS**

**(2008 Course) (Semester - I) (Elective - II) (414444 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) *In section I attempt: Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6.  
In section II attempt: Q.No.7 or Q.No.8, Q.No.9 or Q.No.10, Q.No.11 or Q.No.12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) What are the advantages of using ASIC & ASSP in embedded systems? Explain. [8]
- b) What are the criteria for selecting microprocessors or microcontrollers for an application? [8]

OR

- Q2)** a) What are the embedded systems? How they are different than general purpose systems? [6]
- b) What are the different components of an embedded system? [6]
- c) Differentiate between CISC and RISC. [4]
- Q3)** a) Describe the use of timers/counters and watchdog timers in Embedded system. [6]
- b) What are the techniques of power & energy management in a system?[6]
- c) What are the types of memory that can be integrated in a processor?[6]

OR

**P.T.O.**

- Q4)** a) How a designer selects EPROM, RAM and peripherals required for a robot arm control application? Explain. [8]
- b) What is the importance of clocking unit in embedded systems? How does it affect performance of an embedded system? [4]
- c) Explain the typical memory map for a small scale embedded application. [6]
- Q5)** a) What is the difference between serial & parallel I/O? Mention different standards used for both. [8]
- b) Describe SPI protocol in brief and the applications where it is preferred. [8]

OR

- Q6)** a) Explain different frames used for communication in CAN protocol. [8]
- b) How does host recognize the device insertion in USB protocol? Explain in detail. [8]

### **SECTION-II**

- Q7)** a) What are the different phases of software development cycle for a typical embedded system? [8]
- b) What are the different debugging tools available for embedded system programming? [6]
- c) When do you use high level language instead of assembly language for embedded system programming? [4]

OR

- Q8)** a) Compare Java and C++ programming and their suitability for embedded systems. [6]
- b) What is cross compiler? Name one. How it is different than generic compiler? [6]
- c) With an example explain how stacks and queues are used to implement application functionality in embedded system software. [6]

- Q9) a)** What are the different characteristics of real time operating system? Give two example of RTOS. [6]
- b) With the help of neat diagram, explain cyclic scheduling model for RTOS. What is interrupt latency time for this scheduling model. [10]

OR

- Q10)a)** With the help of neat diagram, explain preemptive scheduling for RTOS.[8]
- b) Define and explain interrupt latency period. What is its significance in RTOS? [4]
- c) What is a Pipes? Give details. [4]
- Q11)a)** Differentiate Micro C/OS-II and Vx Works based on features and their area of application. [6]
- b) With the help of neat system block diagram, explain the system requirements and tasks for chocolate vending machine. [10]

OR

- Q12)a)** How tasks are managed in Micro C/OS-II? Explain in detail. [8]
- b) With help of neat diagram, explain synchronization of tasks and IPCs for smartcard application. [8]

*EEE*



Total No. of Questions :12]

SEAT No. :

**P2818**

[Total No. of Pages :3

**[5154] - 199**

**B.E. (Information Technology)**

**MOBILE COMPUTING**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers 3 questions from section - I 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) Write a detail with neat diagram different Handoff mechanisms in GSM.[8]
- b) Explain in detail different Generations (1G, 2G, 3G) of Wireless Systems. [10]

OR

- Q2)** a) Explain in detail concept of frequency reuse channels, Cells Splitting in cellular system. [8]
- b) Explain the PCS Architecture with neat diagram. What are the elements in a SS#7 signaling Networks? Explain in detail architecture of SS#7 (Signaling System 7). [10]
- Q3)** a) Explain in detail with neat diagram how Security is maintained in GSM using Different Algorithms (A3, A5, A8 Algorithm). [8]
- b) Explain in detail GSM MAP with neat diagram. [8]

OR

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

- Q4)** a) Explain in detail Architecture of GSM with neat diagram. [8]  
b) Explain various databases used in GSM architecture. [8]
- Q5)** a) Explain in detail GSM MAP Service Framework, MAP Protocol Machine, MAP Dialogue. [8]  
b) Write short note on Operation, administration & maintenance for GSM. [8]

OR

- Q6)** a) Explain in detail SMS architecture with neat diagram. Also explain application of SMS technology. [8]  
b) Compare GSM and GPRS on the basis of working, advantages, application. [8]

### SECTION-II

- Q7)** a) Explain in detail GPRS Architecture with neat diagram. [8]  
b) Explain in detail CDMA Technology. [8]

OR

- Q8)** a) Explain Wireless Application Protocol (WAP) model in detail. [8]  
b) Short note on Billing and Charging mechanism in GPRS. [8]
- Q9)** a) Explain in detail Dynamic Host Configuration Protocol (DHCP). [8]  
b) Explain in detail for Mobile IP:Goals, assumptions and requirements, entities and terminologies. [8]

OR

- Q10)**a) Write detailed notes on: [8]  
i) MANET  
ii) Dynamic Source Routing (DSR).
- b) Explain in detail IP packet delivery, agent discovery. [8]

**Q11)a) Write short notes on (Any Two): [9]**

i) Wi - Max

ii) WLL

iii) W-LAN

b) What are the advantages & application to Spread Spectrum technology. Also explain in detail Spread Spectrum technology with neat diagram.[9]

OR

**Q12)a) Explain in detail Bluetooth technology with protocol stack. [10]**

b) Explain in detail RFID. [8]

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2819**

[Total No. of Pages :3

**[5154] - 200**

**B.E. (IT)**

**MULTIMEDIA SYSTEMS**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section - I*
- 2) *Answer Q7 or Q8, Q9 or Q10, Q11 or Q12 from section - II.*
- 3) *Answer to the section I and section II should be written in separate answer sheets.*
- 4) *Figures to the right indicate full marks.*
- 5) *Draw appropriate diagrams wherever necessary.*
- 6) *Use of non programmable electronic calculator is allowed.*

**SECTION-I**

- Q1)** a) What are the characteristics of multimedia presentation? [8]
- b) What is Huffman coding? Convert the following using Huffman coding? [8]

A	B	C	D	E	F	G
100	37	24	12	67	6	4

OR

- Q2)** a) What are the objectives and goals of multimedia? [8]
- b) What is LZW coding? Encode string 'rat bat mat' using LZW coding. [8]
- Q3)** a) Elaborate any two methods of point processing in the context of digital images. [8]
- b) Elaborate GIF and TIFF file format. [8]

OR

**P.T.O.**

- Q4)** a) Elaborate fractal image compression. [8]  
b) Elaborate BMP and JPEG file formats. [8]
- Q5)** a) Elaborate on digital audio and any one CD format. [10]  
b) Elaborate the MIDI and WAVE audio format. [8]

OR

- Q6)** a) Elaborate characteristics of sounds. [8]  
b) Elaborate the ADPCM with the help of a diagram. [10]

### **SECTION-II**

- Q7)** a) Why inter-frame correlation is important in video encoding? How I, P and B-frames technique help in the MPEG video compression technique. [8]  
b) Elaborate component, composite and S-video signal formats. Explain their applications. [10]

OR

- Q8)** a) What is digitization of video? Explain process of digitization of video. [8]  
b) What is a need of video file formats? Explain AVI and H.261 briefly. [10]
- Q9)** a) What is virtual reality? Elaborate CCD, VCR and 3D sound system. [8]  
b) Elaborate VR chair. [8]

OR

- Q10)** a) Elaborate basics of VRML. [8]  
b) Elaborate head mounted tracking system [8]

- Q11)a)** Elaborate anticipation and staging in the context of animation. [8]
- b) Elaborate straight ahead action and pose to pose in the context of animation. [8]

OR

- Q12)a)** Elaborate easy in and out, exaggeration in the context of animation. [8]
- b) Elaborate solid drawing and appeal in the context of animation. [8]

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2820**

[Total No. of Pages :3

**[5154] - 201**

**B.E. (Information Technology)**

**DISTRIBUTED SYSTEMS**

**(2008 Course) (Semester - II) (414448)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Answer Q1 or 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

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

**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

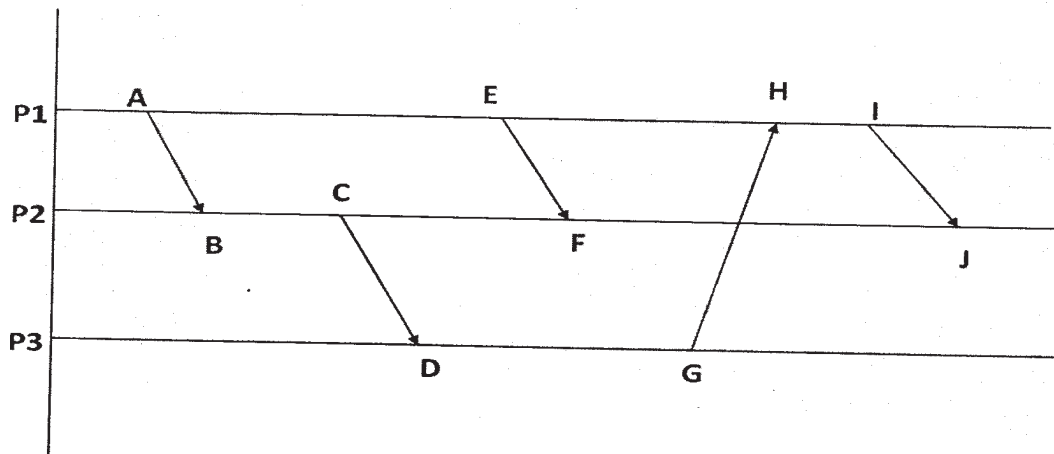
b) Discuss the techniques that makes LRPC more efficient than RPC. [8]

**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 systems. [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]

*EEE*

Total No. of Questions : 12]

SEAT No :

**P2821**

**[5154]-202**

[Total No. of Pages :2

**B.E.(I.T)**

**INFORMATION RETRIEVAL**

**(2008 Course) (Semester-II) (414449)**

*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) 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) 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]
- OR
- Q2)** a) Explain Luhn's Idea and conflation Algorithm in detail and explain in short steps to conflate the following words: Here, Hearby, Hereafter, Herein, Hereupon. [12]  
b) Explain the steps taken to form clusters using single pass Algorithm. [6]
- Q3)** 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]
- OR
- Q4)** 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]
- Q5)** a) Describe the various challenges for the effective deployment of Digital Libraries. [8]  
b) Explain E-measure and Harmonic Mean. [8]

OR

*P.T.O.*

- Q6)** 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 {d<sub>1</sub>, d<sub>3</sub>, d<sub>5</sub>, d<sub>2</sub>, d<sub>4</sub>, d<sub>6</sub>, d<sub>12</sub>, d<sub>24</sub>, d<sub>36</sub>, d<sub>48</sub>}. A new retrieval algorithm returns the following answer {d<sub>48</sub>, d<sub>41</sub>, d<sub>6</sub>, d<sub>61</sub>, d<sub>67</sub>, d<sub>511</sub>, d<sub>54</sub>, d<sub>57</sub>, d<sub>2</sub>, d<sub>28</sub>, d<sub>21</sub>, d<sub>250</sub>, d<sub>211</sub>, d<sub>1</sub>} Evaluate retrieval performance of the algorithm. [6]

## SECTION-II

- Q7)** a) Compare parallel and Distributed IR. [8]  
 b) Define ontology? Explain in detail reasons to develop Ontology. [8]

OR

- Q8)** a) Explain ontology Life cycle. [8]  
 b) Explain distributed IR with the help source selection and Query processing. [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 Method? State drawbacks of sequential scanning. [8]  
 b) How is image analysis and image access accomplished in MULTOS data model. [8]

- Q11)** a) What are different forms of searching the web. [4]  
 b) What are web Robots? What is its role in web search engines. [6]  
 c) Enlist the search Engines? On what parameters they can be compared. [8]

OR

- Q12)** a) State difference between search Engine and web Directories. [6]  
 b) Write short Notes on following. [12]  
     i) Web mining  
     ii) Economic Legal Issues with web Agents  
     iii) Collaborative Filtering



Total No. of Questions : 12]

SEAT No. :

**P2822**

**[5154]-203**

[Total No. of Pages : 3

**B.E. (Information Technology)**

**REAL TIME SYSTEMS**

**(2008 Pattern) (Semester - II) (Elective - III) (414450 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)** Describe the classification of real time system with suitable example. What are the issue in real time computing? **[8]**

b) What is performability? Explain with suitable example. In what way it is different than traditional measure of performance? **[8]**

OR

**Q2) a)** Draw and explain basic model of Digital Control Real Time System?**[8]**

b) Draw block diagram for real time computer. Explain various characteristics of Real Time system? **[8]**

**Q3) a)** Explain the classification of uniprocessor scheduling algorithm. With the help of suitable example explain the RM scheduling algorithm? **[10]**

b) Describe the priority inheritance protocol. What is the advantages of this protocol over the priority inheritance protocol? **[8]**

OR

**P.T.O.**

**Q4) a)** Consider: Task 1  $= (p_1, e_1) = (2, 0.9)$  [10]

Task 2  $= (p_2, e_2) = (5, 2.3)$

- i) Find total processor utilization
  - ii) find necessary and sufficient condition
- b) How does the ceiling priority protocol overcome the problem of deadlock that occurs due to priority inheritance? [8]

**Q5) a)** What are the various benefits of packages? [6]

- b) Explain use of POSIX programming API in Real Time system. With any eight API? [10]

OR

**Q6) a)** Explain how the two phase locking approach used in pessimistic concurrency control is disadvantages to real time system. How can it be modified to overcome the problem? [10]

- b) Describe the skeleton and optimistic algorithm under the two phase approach to improve predictability of a real time transaction? [6]

### SECTION-II

**Q7) a)** Describe the timed token protocol. Why this protocol is attractive for RTS? [8]

- b) Explain the VTCSMA protocol using a suitable example. Draw the VCRC trajectory for this example for  $n = 2$  and  $n = 4$ . Discuss the performance of this algorithm? [10]

OR

**Q8) a)** Discuss network architecture issues in real time systems? [10]

- b) What is Stop - and -Go Multihop protocol? [8]

- Q9)** a) With the help of block diagram explain the capability of RT Linux? [8]  
b) Describe the following capability of real time operating system [8]  
i) External-Internal Interrupt Handling  
ii) Memory management through virtual memory mapping and memory.

OR

- Q10)**a) List and explain the capabilities of RTOS? [10]  
b) State the commonly found features of commercial RTOS? [6]
- Q11)**a) How is hardware redundancy implemented through voting and consensus? Explain the working of formalized majority vote. [8]  
b) Discuss the causes of the failures and describe the types of faults in RTS? [8]

OR

- Q12)**a) Explain the procedure used to implementation of Time Redundancy for Backward Error Recovery. Why check pointing is expensive in memory and time. How it be modified to overcome the problem? [8]  
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. :

**P2823**

**[5154]-204**

[Total No. of Pages : 3

**B.E. (Information Technology)  
SOFTWARE ARCHITECTURE  
(2008 Pattern) (Semester - II) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three Que. from Section I and three Que. from Section II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Make suitable assumptions wherever relevant and appropriate.*

**SECTION-I**

**Q1) a)** Explain in details Software Structures. **[10]**

b) Explain with suitable example: **[8]**

- i) Architecture is high - level design.
- ii) Architecture is the overall structure of the system.
- iii) Behavior of each software element is part of the architecture.
- iv) Architecture has component & connectors.

OR

**Q2) a)** Explain Architecture Business Cycle activites in detail. **[10]**

b) How Architectures are influences by stakeholders? **[8]**

**Q3) a)** Write short note on follwoing: **[8]**

- i) Modifiability Tactics
- ii) Security Tactics

b) What is Quality Attributes? Explain quality attributes of web application?**[8]**

OR

**P.T.O.**

- Q4)** a) Following concern in context of modifiability: “when is a change made and who makes it”. [8]
- b) What is Availability? Discuss availability tactics for Fault detection. [8]

- Q5)** a) What can a Facade pattern do for us, Illustrate with an example. [8]
- b) Write a short note on model View Controller (MVC) and its application? [8]

OR

- Q6)** a) How observer pattern can be used to design a digital and an analog clock. Explain with the structure and behavior? [8]
- b) What are design patterns, why do we need them, give an example design pattern? [8]

### **SECTION-II**

- Q7)** a) Explain three -tier architecture with reference to presentation, business and persistence layers. [10]
- b) Write short note on following: [8]
- i) Coupling in XML.
- ii) Loose coupling.

OR

- Q8)** a) Compare Different architecture styles. [10]
- b) Explain concept of: [8]
- i) Structure of XML
- ii) Addressing quality attributes through multi tire architecture.



- Q9) a)** Write short note on following: [8]
- i) JSP
  - ii) JSF
- b) Explain with example and advantages of [8]
- i) Web Server
  - ii) Application Server.

OR

- Q10)a)** Compare and contrast EJB 2.0 and EJB 3.0 [8]
- b) Explain with example: [8]
- i) Entity Beans
  - ii) Session Beans

- Q11)a)** What kind of responsibilities does a web client have? How can one make web client more dynamic. [8]
- b) Write Short note on [8]
- i) Components and Interfaces
  - ii) Dynamic Link Library

OR

- Q12)a)** Explain DLL Servers in detail [8]
- b) Write short note on following: [8]
- i) NET web services
  - ii) Legacy Application



Total No. of Questions : 12]

SEAT No. :

**P2824**

**[5154]-205**

[Total No. of Pages : 3

**B.E. (Information Technology)**

**ADVANCED GRAPHICS**

**(2008 Pattern) (Semester - II) (Elective - III) (414450 C)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Compare and contrast parallel projection and perspective projection 3D display methods. [6]
- b) Explain following quadratic surfaces. [6]
- i) Ellipsoid. ii) Torus.
- c) What is Spline? What are the major differences between Bezier curve and B-Spline. [6]

OR

- Q2)** a) Explain Surface Rendering and polygon surfaces in detail. [6]
- b) Explain the issues related to three dimensional display methods. [6]
- c) Explain polygon table and geometric data representation with suitable example. [6]

- Q3)** a) Explain various animation techniques. [8]
- b) What is meant by key-framing, tweening and morphing with suitable example? [8]

OR

**P.T.O.**

- Q4)** a) Explain the basic rules of animation in brief. [8]  
b) Which are the different animation software's? Explain any one animation software in detail. [8]

- Q5)** a) Discuss in brief the construction of three-dimensional objects using sweep representations. [8]  
b) What is Constructive Solid Geometry (CSG)? Which operations are carried out in Constructive solid Geometry? [8]

OR

- Q6)** a) Explain in detail Quadrees and Octrees. [8]  
b) Explain desirable properties in solid representation. [8]

**SECTION-II**

- Q7)** a) What is the necessity of a color model? Explain the following color models with necessary equations and applications. [8]  
i) CMY                                  ii) HSV  
b) Explain CIE chromaticity diagram. How is RGB to CMY conversion done? Explain. [6]  
c) Explain any one color selection system with its application. [4]

OR

- Q8)** a) Explain YIQ color model. Also explain the following illumination models: Phong shading. [8]  
b) Explain HLV & HLS color cones. [6]  
c) What are the applications of color models. [4]

- Q9)** a) How ray tracing works? Draw and explain tracing rays from light source to eye. [8]  
b) What is surface rendering? Explain Gourads shading. [8]

OR

**Q10)a)** Define Illumination model. Discuss the basic components of illumination model. [8]

b) Explain Illumination W.R.T. ambience, Specular reflection and diffuse reflection. [8]

**Q11)a)** Explain the factors affecting the design of virtual reality system. [8]

b) What is meant by virtual reality system? Explain the applications of virtual reality system. [8]

OR

**Q12)a)** Explain in brief various issues with design and implementation of a VR system. [8]

b) What is VRML? Describe the basic structure of a VRML file. [8]



Total No. of Questions : 12]

SEAT No. :

**P2825**

**[5154]-206**

[Total No. of Pages : 2

**B.E. (Information Technology)**  
**ADVANCED COMPUTER NETWORK**  
**(2008 Pattern) (Semester - II) (Elective - III) (414450 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 answer books.*
- 3) *Neat Diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION-I**

**Q1) a)** Write brief description of ISO/OSI network model. **[10]**

b) What are principles of network design? **[8]**

OR

**Q2) a)** Enlist principles and services of Networking with Layered architecture? **[12]**

b) What is Internet and ATM? **[6]**

**Q3) a)** Explain the structure of ATM header. **[8]**

b) List mobility management issues in wireless networks. **[8]**

OR

**Q4) a)** Explain an architecture of Wireless communication. **[8]**

b) Explain WDM system with diagram. **[8]**

**Q5) a)** List QoS parameters. **[6]**

b) What is Congestion control and flow control mechanism of datagram network? Explain this w.r.t Open Loop and Closed Loop. **[10]**

OR

**P.T.O.**

- Q6)** a) How congestion is controlled in ATM network? [8]  
Explain it w.r.t.  
i) Internal congestion control  
ii) Global congestion control  
b) Explain M/M/1 queue and M/M/2 queue marcov Chain Models. [8]

**SECTION-II**

- Q7)** a) Explain in detail BGP and RIP. [10]  
b) Explain traffic engineering in MPLS. [8]

OR

- Q8)** a) Draw various formats of BGP messages. [8]  
b) Describe the significance of tunneling in VPNs. [10]

- Q9)** a) Explain characteristics of Mobile IP. [6]  
b) Describe various features of IPv6. [10]

OR

- Q10)**a) Describe RTP and RSVP. [8]  
b) What are different APIs for IPv6? [8]

- Q11)**a) Explain architecture of ad-hoc networks. [6]  
b) Define ad-hoc network? List limitations and applications of it. [10]

OR

- Q12)**a) State the process of implementation of firewall in the network? [8]  
b) Define overlay networks? State it's importance? [8]



Total No. of Questions :12]

SEAT No. :

**P2826**

[Total No. of Pages :3

[5154] - 207

**B.E. (I.T.)**

**BIOINFORMATICS**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section - I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section - II.*
- 2) *Answer three questions from section I and three questions 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) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1)** a) What are different Molecular and bioinformatics techniques. [8]
- b) What is Bio Informatics? Enlist Bioinformatics Applications. [8]

OR

- Q2)** a) Explain the working of Central dogma of molecular biology with neat diagram. [10]
- b) Discuss the bioinformatics databases which are accessible on the internet with appropriate examples. [6]
- Q3)** a) Explain in brief the data visualization techniques applicable to Bioinformatics. Discuss any two visualization tools with example. [8]
- b) List different computational methods of sequence alignment and discuss any two in detail in brief. [8]

OR

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

**Q4)** a) Differentiate between clustering and classification. Discuss in brief the K-means clustering Algorithm. [8]

b) Write short note on gene expression and microarrays. [8]

**Q5)** a) Write short notes on:

i) Pairwise Sequence Alignment (PSA) [5]

ii) Multiple Sequence Alignment (MSA) [5]

b) Explain the text mining with NLP Process. [8]

OR

**Q6)** Write a short note on: [18]

a) Substitution Matrix.

b) Dynamic Programming.

c) Word Method.

## **SECTION-II**

**Q7)** a) What is drug discovery? Explain various steps of drug discovery. [10]

b) Write about any one of protein secondary structure predictions methods. [8]

OR

**Q8)** a) What are the components involved in a modeling and simulation system? [8]

b) Draw and explain Collaboration-Communication model with appropriate examples. [10]



- Q9)** a) Explain BLAST algorithm in detail with neat diagrams. [8]  
b) Explain FASTA algorithm. What FASTA programs are available for sequence. [8]

OR

- Q10)**a) What are the heuristic methods employed for database searching. Explain Gapped Blast. What are the applications of such database searches. [8]  
b) Differentiate in the approach of BLAST and FASTA? [8]
- Q11)**a) Mention applications of genetic engineering. [8]  
b) What are the natural causes of degradation of ecosystem? [8]

OR

- Q12)**a) Write short notes on Genetic Engineering. [8]  
b) Define Biotechnology. What is the significance of environmental Biotechnology. [8]

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2827**

[Total No. of Pages :3

**[5154] - 208**

**B.E. (I.T.)**

**NEURAL NETWORK AND EXPERT SYSTEMS**

**(2008 Pattern) (Semester - II) (Elective - IV) (414451 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) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) Compare the biological neural network with computer in terms of speed of processing, size and complexity, storage, fault tolerance and control mechanism. **[9]**
- b) With the help of suitable diagram discuss functioning of a simple artificial neuron. Explain how the functionality is affected if two such neuron are connected in series. **[8]**

OR

- Q2)** a) With neat diagram explain topologies neural networks. **[8]**
- b) Draw and explain Rosenblatt's perception model of a neuron. Write the equation which describes the operation of the perception model of a neuron. **[9]**
- Q3)** a) What is conjugate gradient method? Comment on the performance of the conjugate- gradient method? **[9]**
- b) What do you understand by the following terminologies? **[8]**
- i) Nearest neighbor recall and interpolative recall.
  - ii) Stability and Convergence.
  - iii) Equilibrium state, Stable state and steady state.
  - iv) Fixed point stability, oscillatory stability and chaotic stability.

OR

**P.T.O.**

- Q4)** a) Demonstrate with algorithmic steps and formulations EBP algorithm on MLFFNN. [8]
- b) Comment on the following issues of EBP. [9]
- i) Advantages
- ii) Limitations
- Q5)** a) Explain how Support Vector machine is used for pattern classification and regression? [8]
- b) What is basic concept of Relevance Vector Machines? Explain how it is used in classification problems? [8]

OR

- Q6)** a) What is significance of “Regularization Theory”? Comment. [8]
- b) What do you understand by”Kernal” methods for Pattern Analysis? [8]

### **SECTION-II**

- Q7)** a) What are the salient features of Kohonen’s self-organizing learning algorithm. [9]
- b) Explain with diagram [8]
- i) Pattern Clustering and
- ii) Feature Mapping

OR

- Q8)** a) What do you understand by “Simulated Annealing”. [8]
- b) Explain with neat diagram “Recurrent Neural Networks”. [9]

- Q9)** a) What are the advantages in keeping knowledge base separate from control module in knowledge based system? [8]
- b) Describe the components of Expert 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 Expert system building tools. [9]
- b) Write a short note on E-MYCIN. [8]

OR

- Q12)**a) Explain various stages of knowledge acquisition in Knowledge based systems. [9]
- b) Write a short note on DENTRYL. [8]

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2828**

[Total No. of Pages :3

**[5154] - 209**

**B.E. (I.T.)**

**GEO INFORMATICS SYSTEMS**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain radiometric correction methods. What is the significance of applying various correction methods to remotely sensed images. [8]
- b) Explain in brief various applications of arial photo interpretation. [10]

OR

- Q2)** a) Explain image interpretation strategy. [4]
- b) 'Image interpretation keys provide valuable training aids for novice interpreters', justify. [6]
- c) Explain in detail image transformations in image processing of remotely sensed data. [8]
- Q3)** a) What is surface roughness? Explain the radar scattering mechanism due to different types of scattering. [8]
- b) Explain SLAR systems with suitable diagrams. [8]

OR

**P.T.O.**

- Q4)** a) Explain imaging sensor systems classification. [6]  
b) What are the orbital characteristics of satellites? Name them. [6]  
c) Explain the atmospheric properties significant in the remote sensing process. [4]
- Q5)** a) Write a note on geographic co-ordinate system. Give one example for geographic co-ordinates. [4]  
b) What is the importance of remote sensing, GIS, GPS and related technologies in your day-to-day life as an IT engineer? Explain. [6]  
c) List the data manipulation and analysis operations pertaining to GIS workflow. [6]

OR

- Q6)** a) Assume a general purpose technology for handling geographic data in digital form. What specific needs must be addressed? For such a system describe the information flow with suitable diagram. [8]  
b) Elaborate on the essential preprocessing procedures. What are the essential elements that a GIS must contain? [8]

### **SECTION-II**

- Q7)** a) What are the various ways and means to collect new data for a GIS application? Explain in brief. [8]  
b) Elaborate various sources of the data errors in GIS. [8]

OR

- Q8)** a) What is Data cleaning process in GIS? Explain in brief. [8]  
b) What are map to map and image to map transformations? Explain in brief. [8]

- Q9)** a) How will you model a hospital, a road and a national park in GIS? Justify your model with reason. [6]
- b) How will you model a mall using raster data representation in GIS? Explain in brief. [6]
- c) What is Binary model of GIS? Explain in brief. [6]

OR

- Q10)**a) How will you model a mall using vector data representation in GIS? Explain in brief. [6]
- b) What is spatial and attribute queries in GIS? Explain in brief. [6]
- c) What is Index model of GIS? Explain in brief. [6]
- Q11)**a) What is the role of GIS in urban management? Explain in brief. [8]
- b) How is GIS used in land use or land cover classification? [8]

OR

- Q12)**a) Describe any two applications of GIS in brief. [8]
- b) Take an application of enhancing railway line outreach and explain how GIS can be useful for that. [8]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2829**

**[5154]-210**

[Total No. of Pages :3

**B.E. (I.T)**

**BUSINESS INTELLIGENCE - II**

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

**(Open Elective) (414451DA)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION -I**

- Q1)** a) Discuss design and implementation aspects of Data warehouse. [8]  
b) What is Data Mart? Explain its significance in Business Intelligence. [8]

OR

- Q2)** a) Compare and contrast OLTP and DW with examples. [8]  
b) Explain following operations of OLAP with suitable example. [8]  
i) Drill-down  
ii) pivot  
iii) Dice  
iv) Slice

- Q3)** a) What are fact table and dimensional table? Explain design aspects of fact table in dimensional modeling. [8]  
b) Explain usage of data warehouse in retail sales system. [8]

OR

- Q4)** a) What is slowly changing dimensions (SCDs)? Explain three types of SCDs with example. [8]  
b) What are the different types of facts used in data warehouse design? Explain with example. [8]

**P.T.O.**



- Q5)** a) What are the common data anomalies encountered during ETL process? How are they handled? [9]  
b) Explain architecture of ETL in detail. [9]

OR

- Q6)** a) What is loading of data in data warehouse? Explain initial and incremental loading. [9]  
b) Explain Following terms W.r.t. ETL. [9]  
i) Data Profiling  
ii) Late arriving facts  
iii) Data Quality

**SECTION -II**

- Q7)** a) Explain ROLAP, MOLAP, HOLAP server architecture in detail and state their significance. [8]  
b) Explain reporting architecture with neat diagram. [8]

OR

- Q8)** a) Write short note on ( Any 2 ): [8]  
i) Query Rewrite  
ii) Dashboards as reporting tool  
iii) Ad-hoc Reporting.  
b) Explain ETL. scheduling. How is data-level security implemented? [8]

- Q9)** a) Explain the process of text-mining. What is the role of inverted index in text mining? [8]  
b) What is Materialized view? Explain with example. What are the advantages of it? [8]

OR

**Q10) a)** What is cluster analysis? How it is used for business intelligence, explain with example? [8]

b) Explain the application of decision tree in business analytics with the help of example. List its features in brief. [8]

**Q11)a)** What is PIG? How it is used to deal with BIG data? [9]

b) Discuss design challenges to implement real time BI system. Explain the necessity of real time BI. [9]

OR

**Q12)** Write Short notes (any Three): [18]

a) HIVE

b) Agile BI

c) Log based change data capture

d) Netezza

⊗ ⊗ ⊗

Total No. of Questions : 12]

SEAT No. :

**P2830**

**[5154]-211**

[Total No. of Pages : 3

**B.E. (Chemical)**

**PROCESS DYNAMICS AND CONTROL  
(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) *Assume Suitable data, if necessary.*
- 4) *Use of logarithmic tables slide rule, electronic pocket calculator is permitted*

**SECTION-I**

- Q1)** a) Discuss the importance of chemical process control. [8]  
b) Derive the Input-output model for stirred tank heater. [8]

OR

- Q2)** a) Derive the transfer function of pure capacitive process. Draw a suitable sketch. [8]  
b) A thermometer showing steady state temperature of 30°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 to read 80°C on Thermometer.  
iii) Time required for 80% response.

- Q3)** a) Define second order system and derive the transfer function for two non interacting liquid level system in series. Comment on type of dynamic response of the system. [10]  
b) A second order process with following transfer function is subjected to unit step change in input.

$$GP = \frac{5}{s^2 + s + 1}$$

Determine the damping factor  $\xi$  and the ultimate value of response. [6]

OR

**P.T.O.**

- Q4)** a) Define P, I & D controller and derive their transfer functions. Discuss their open loop response with neat diagrams. [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.  $G_f(s) = G_m(s) = 1$ ; [8]

The open loop process is  $GP(s) = \frac{1}{s+1}$

Determine the following;

- i) Closed loop transfer function
  - ii) Order of response
  - iii) Closed loop gain and time constant
  - iv) Offset.
- Q5)** a) Define stability of the process and discuss the Routh-Hurwitz criteria. [6]
- b) Draw the root locus diagram for the system with following transfer function; [12]

$$GP(s) = \frac{1}{(s+1)(s+2)(s+3)}$$

OR

- Q6)** Define controller tuning and discuss the following tuning methods; [18]
- a) Ziegler Nichols method
  - b) Cohen coon method
  - c) Time integral performance criteria.

### SECTION-II

- Q7)** a) Sketch the Bode diagram for PI controller. [9]
- b) Sketch the Nyquist diagram for PD controller. [9]
- OR
- Q8)** a) Sketch the Bode diagram for PD controller. [9]
- b) Discuss the following: [9]
- i) Bode stability criteria
  - ii) Nyquist stability criteria.
  - iii) Gain margin & phase margin.

**Q9)** Draw a neat sketch and write short notes on. **[16]**

- a) Cascade control
- b) Feed forward control & ratio control.

OR

**Q10)** Draw a neat sketch and discuss in detail about; **[16]**

- a) Adaptive control
- b) Split range control.

**Q11)** Draw the instrumentation diagram for Heat exchanger control and discuss in detail about its functioning. **[16]**

OR

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

- a) Role of digital computers in control.
- b) Supervisory control
- c) DCS
- d) PLC & SCADA systems



Total No. of Questions : 12]

SEAT No. :

**P2831**

**[5154]-212**

[Total No. of Pages : 3

**B.E. (Chemical Engineering)**  
**CHEMICAL REACTION ENGINEERING - II**  
**(2008 Course) (Semester - I) (409344)**

*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 table is allowed.*
- 6) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1) a)** Discuss in detail various models used in fluid particle reactions to determine the rate. What are the various factors responsible for selection of these models in specific case? **[10]**
- b) Derive an expression for unreacted core model with diffusion through ash layer controls for fluid particle reaction. **[8]**

OR

- Q2) a)** Derive an expression for fractional conversion of solids in case of mixed flow of particles of a single unchanging size with uniform gas composition for different resistance controls. **[8]**
- b) What are the various factors responsible for design of Fluid - solid reactors? Explain various types of reactors used for fluid - solid reactions in detail with suitable diagram. **[10]**

- Q3) a)** A fluid-fluid reaction of type **[8]**  
 $A \text{ (From Gas)} + bB \text{ (Liquid)} \rightarrow \text{Product (Liquid)}$   
takes place in reactor. A reaction is fast with  
i) moderate  $C_B$  and  
ii) High  $C_B$ .  
Derive the rate expression for both cases.

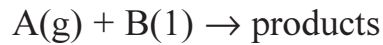
- b) Derive the rate expression for slurry reaction kinetics. What are the various resistances are viewed to act as series? **[8]**

OR

**P.T.O.**

- Q4) a)** The concentration of an undesirable impurity A in air is to be reduced from 0.1% to 0.02% by reactive liquid which contains a high concentration of reactant B, Find the height of the tower required for counter-current operation. [8]

Data Given: The reaction takes place in the liquid and is extremely rapid.



Assume that the diffusivities of A and B in reactive liquid are same, i.e.

$$k_{A1} = k_{B1} = k_1$$

$$k_{Ag} a = 32,000 \text{ mol/hr.m}^3 \cdot \text{atm} \quad k_{A1} a = 0.1/\text{hr}$$

$$H_A = 125 \times 10^{-6} \text{ atm.m}^3/\text{mol} \quad L \approx L' = 7 \times 10^5 \text{ mol/hr.m}^2$$

$$G \approx G' = 1 \times 10^5 \text{ mol/hr.m}^2 \quad \pi = 1 \text{ atm}$$

- b) Derive the expression for estimating height of tower in slow reaction. [8]

- Q5) a)** Discuss adsorption isotherms in detail. [8]

- b) Define void volume and pore density in case of solid catalyst. Explain both in detail. [8]

OR

- Q6) a)** What is catalyst Poisoning? Explain with various types of poisons. [8]

- b) The following data were obtained at 70°C for the equilibrium adsorption of n-hexane on silica gel particles. [8]

Partial pressure of C <sub>6</sub> H <sub>14</sub> in gas, atm	C <sub>6</sub> H <sub>14</sub> adsorbed, g mol/(g gel)
0.0020	10.5 × 10 <sup>-5</sup>
0.0040	16.0 × 10 <sup>-5</sup>
0.0080	27.2 × 10 <sup>-5</sup>
0.0113	34.6 × 10 <sup>-5</sup>
0.0156	43.0 × 10 <sup>-5</sup>
0.0206	47.3 × 10 <sup>-5</sup>

Determine the value of constants C<sub>m</sub> and K<sub>c</sub> for Langmuir isotherm by least-square-analysis.

## SECTION - II

- Q7)** a) Explain diffusion in porous catalysts with the help of suitable sketch. [8]  
b) Explain and derive an expression for experimental and calculated effectiveness factor. [8]

OR

- Q8)** a) Write a short note on mass transfer with reaction with the help of effectiveness factor in catalytic reactions. [8]  
b) Derive an expression for gaseous diffusion in single cylindrical pores of catalyst. [8]

- Q9)** a) What are the various controlling resistances in case of solid catalyzed reactions? [8]  
b) Explain in detail mixed reactor and recycle reactor. [8]

OR

- Q10)** Explain the experimental method for finding rates in case of differential and integral reactors. [16]

- Q11)** Write a short note on: [18]

- a) Fermentors.
- b) Staged adiabatic Reactor.
- c) Slurry Reactor.

- Q12)** a) Discuss in detail Michaelis-Menton Kinetics. [10]  
b) Explain the design procedure of fluidised bed reactor. [8]

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Total No. of Questions : 12]

SEAT No. :

P2832

[5154]-213

[Total No. of Pages : 4

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 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)** Design a jacketed vessel with plain jacket with the following specifications: **[12]**

Vessel internal diameter	2130 mm
Jacket internal Diameter	2260 mm
Jacket Length	2500 mm
Diameter of half coil or width of channel jacket	100 mm
Flanged and Dished head:	
Internal Diameter	2130 mm
Crown Radius	2130 mm
Knuckel Radius	128 mm
Straight Flange Length	60 mm
Internal Shell Pressure	0.55 N/mm <sup>2</sup>
Internal Pressure Jacket	0.35 N/mm <sup>2</sup>
Temperature	150°C
Material - Open Hearth Steel (15 - 200°C)	
Allowable stress	98 N/mm <sup>2</sup>
Modulus of Elasticity	190 × 10 <sup>3</sup> N/mm <sup>2</sup>
Poisson's Ratio	0.3

**b)** Explain the classification of reaction vessels. **[4]**

OR

**P.T.O.**

**Q2) 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 27700 kg-m.

Permissible shear stress = 400 kg/cm<sup>2</sup>, Permissible tensile stress = 600 kg/cm<sup>2</sup>. **[8]**

b) With neat sketches describe vortex and swirling and methods to avoid it. **[8]**

**Q3) 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 = 0.5m<sup>2</sup>, Volumetric flow rate of vapour = 1.13m<sup>3</sup>/s, Orifice coefficient = 0.84, Density of vapour = 0.70 kg/m<sup>3</sup>.

Density of liquid = 950 kg/m<sup>3</sup>, 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 are the different design methods for binary systems? Explain any one in detail. **[8]**

OR

**Q4) a)** What are the various types of areas used for design of plate column? How these areas are decided? **[6]**

b) Explain a sieve plate performance diagram. **[6]**

c) Draw neat sketches of the following: **[6]**

i) Liquid flow patterns on cross flow trays.

ii) Types of downcomers

**Q5) a)** 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]**

b) Explain random packings and structured packings. **[6]**

OR

- Q6)** a) Explain in detail Onda's method for prediction of HTU. Give the necessary equation. [8]
- b) Give advantages of plate column over packed column. [8]

### SECTION - II

- Q7)** a) Design a decanter to separate light oil from water. The oil is the dispersed phase. Oil - Flow rate = 1,000 kg/h, Density = 900 kg/m<sup>3</sup>. Viscosity = 3 mNs/m<sup>2</sup> Water - Flow rate = 5,000 kg/h, Density = 1,000 kg/m<sup>3</sup>, Viscosity = 1 mNs/m<sup>2</sup> Droplet diameter = 150 μm. [10]
- b) Write notes on: [8]
- i) Oil water separator
- ii) Gravity separator

OR

- Q8)** a) Make a preliminary design for a separator to separate a mixture of steam and water. Steam flow rate is 2500 kg/h and water flow is 1250 kg/h. operating pressure is 4.2 bar. Liquid density = 950 kg/m<sup>3</sup>, Vapour density = 2.5 kg/m<sup>3</sup>.  
Design the separator with demister pad. [10]
- b) Write about any two safety devices. [8]
- Q9)** a) Natural gas with a specific gravity 1.20 at 1,43,000 kPa and 46°C is being blown down to 1,02,000 kPa. The flow rate could be from 95 m<sup>3</sup>/day. The drop through pressure reducing regulator is 3,100 kPa leaving 1.000 Kpa for the pipe. The pipe length is 140 m upstream of the regulator and 8.7m downstream pipe diameters. Molecular weight of gas = 20,  $\psi = 0.6$ . [9]
- b) What are the desirable properties of piping material? [7]

OR

- Q10)**a) Explain the pipeline design for transportation of crude oil. [9]
- b) What are the various types of supports used for piping? [7]

**Q11)a)** Water flows through a pipeline at 1 kg/s, over a distance of 2 km. The impressed head of water = 9.8m. What is the diameter of pipeline if  $\rho = 1000 \text{ kg/m}^3$  &  $\mu = 1 \text{ mN.s/m}^2$ . **[8]**

b) Give the design considerations in condensate pipeline. **[8]**

OR

**Q12)a)** Water is to flow through a pipeline with 25mm I.D. for a distance of 2 km. The pressure drop = 10m of water. Density of water =  $1000\text{kg/m}^3$ , viscosity of water =  $1 \text{ m Ns/m}^2$ . Estimate the flow rate of water through the pipeline. **[8]**

b) Discuss the various factors considered while designing pipeline for natural gas. **[8]**



Total No. of Questions : 8]

SEAT No. :

**P2833**

**[5154]-214**

[Total No. of Pages : 2

**B.E. (Chemical)**

**ENVIRONMENTAL ENGINEERING**

**(2008 Course) (Elective - I) (Semester - I) (409341 A)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) What is standard for air? State its importance. [8]  
b) What are sources of entry of dust in air? [8]
- Q2)** a) Compare primary and secondary air pollutants. [8]  
b) Mention the effects of various air pollutants on plants. [8]
- Q3)** a) Describe construction and working of venture scrubber. [8]  
b) How adsorption can help in removal of air pollutants? [8]
- Q4)** Write short notes on (Any three):
- a) Impact of population on environment. [6]
  - b) Harmful effects of carbon monoxide on human health. [6]
  - c) Catalytic oxidation. [6]
  - d) Nuclear energy and environment. [6]

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

## SECTION - II

- Q5)** a) Describe the Winkler's experiment for determination of dissolved oxygen in a water sample. [8]  
b) How colour of wastewater sample can be measured? [8]
- Q6)** a) Comment on importance of food to micro-organism ratio in an activated sludge process. [8]  
b) How photocatalysis can be important for the treatment of waste water? [8]
- Q7)** a) Discuss the technique of composting in detail. State its merits and demerits. [8]  
b) Give a brief account on various disinfectants used for the treatment of water. [8]
- Q8)** Write short notes on : (Any three)
- a) Incineration. [6]  
b) Effect of total solid in water. [6]  
c) Working of upflow anaerobic sludge blanket reactor. [6]  
d) Micro-screening. [6]



Total No. of Questions : 12]

SEAT No. :

**P2834**

**[5154]-215**

[Total No. of Pages : 3

**B.E. (Chemical Engineering)**  
**MEMBRANE TECHNOLOGY**  
**(2008 Course) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right side indicate full marks.*

**SECTION - I**

- Q1)** a) Define membrane and classify membrane separation processes. [8]  
b) Explain the importance of separation operation in chemical manufacturing processes. [8]

OR

- Q2)** a) Discuss the materials used for preparation of membrane and explain characteristics of each. [8]  
b) Classify membranes based on homogeneity, transport mechanism, nature of material electric charge, morphology. [8]

- Q3)** a) Explain in detail characteristics of main chain elements & side group elements of polymer. [8]  
b) Explain the importance of glass transition temperature in determining state of polymer. [8]

OR

- Q4)** a) Explain the use of copolymer and cross linked type of polymeric materials used for membranes. [8]  
b) Define the glass transition temperature of polymer and explain the effect of polymer structure on it. [8]

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

**Q5)** Explain in detail phase inversion and immersion precipitation methods for preparation of synthetic membranes. [18]

OR

**Q6)** Explain any four methods of preparation of composite membranes. [18]

### **SECTION - II**

**Q7)** Describe in detail process for characterisation of MF membrane with short notes on following points: [16]

- a) SEM
- b) Bubble-Point method
- c) Mercury Intrusion porometry
- d) Permeability method

OR

**Q8)** Write a short notes on following methods of characterisation of UF membranes. [16]

- a) Thermoporometry
- b) Permporometry
- c) Gas-adsorption-desorption
- d) Liquid Displacement

**Q9)** Explain theory and applications of any four pressure-driven membrane separation processes. [16]

OR

**Q10)a)** Explain the following mechanism used to describe transport through porous membranes. [8]

- i) Depth Filtration
  - ii) Surface of screen filtration
- b) Distinguish between solution diffusion model and prove flow transport through Membrane. [8]



- Q11)**a) Explain boundary layer film model for concentration polarization. [9]
- b) Describe osmosis & Reverse Osmosis (RO) in detail and explain use of RO for desalination of water. [9]

OR

**Q12)** Explain the following applications of UF process. [18]

- a) Recovery of paint in automobile plants.
- b) Clarification of fruit juice.
- c) Oil-water emulsions.



Total No. of Questions : 12]

SEAT No. :

P2835

[5154]-216

[Total No. of Pages : 2

B.E. (Chemical)

BIOPROCESS ENGINEERING

(2008 Course) (Elective - I) (Semester - I) (409341 C)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers 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]

- a) Ammylase and
- b) Saccharides.

OR

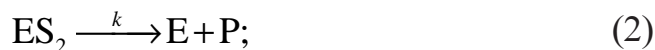
**Q2)** Explain immobilization of enzymes and its various methods. [16]

**Q3)** Explain manufacturing process for Vinegar. [18]

OR

**Q4)** Explain the treatment of waste water from dairy using Activated Sludge Process. [18]

**Q5)** Derive the kinetic expression for the following: [16]



Where  $K_m$  and  $K_p$  are the thermodynamic dissociation constant for reversible reactions 1 and 3 respectively. 'k' being the kinetic constant for reaction 2. Describe the kinetics represented by the above equations.

OR

**P.T.O.**

**Q6)** Derive mathematical expressions with the help of Michaelis-Menten competitive inhibition enzymatic kinetics. [16]

**SECTION - II**

**Q7)** Develop the mathematical model depicting noncompetitive inhibition enzymatic kinetics. [16]

OR

**Q8)** What is the relative activity and the degree of inhibition caused by a competitive inhibitor when  $[S] = K_m$  and  $[I] = K_i$ ? [16]

**Q9)** Ethanol is produced in a chemostat from glucose using *saccharomyces cerevisiae*. The outlet concentration of glucose is 50 g/lit. The feed rate of glucose is 1000 lit/hr. Calculate the specific [16]

- a) cell growth rate and
- b) volume of the fermenter.

Data:

- i) Maximum specific growth rate  $\mu_{max} = 0.33 \text{ hr}^{-1}$
- ii)  $I = 93 \text{ g/lit}$
- iii)  $K_i = 100 \text{ g/lit}$
- iv) Michaelis - Menten constant  $K_s = 1.7 \text{ g/lit}$ .

OR

**Q10)** A marine microorganism contains an enzyme that hydrolyzes glucose-6-sulphate (S). The assay is based on the rate of glucose formation. The enzyme in a cell-free extract has kinetic constants of  $K_m = 6.7 \times 10^{-4} \text{ M}$  and  $V_{max} = 300 \text{ nmoles. lit}^{-1}.\text{min}^{-1}$ . At  $10^{-5} \text{ M}$  galactose-6-sulphate as a competitive inhibitor (I) and  $2 \times 10^{-5} \text{ M}$  glucose-6-sulphate, 'v' was  $1.5 \text{ nmoles. lit}^{-1}.\text{min}^{-1}$ . Calculate  $K_i$  for galactose-6-sulphate. [16]

**Q11)** Write short notes on: [18]

- a) determination of oxygen transfer rates and measurement of  $K_L a'$  and
- b) Geometries of enzyme catalyzed CSTRs.

OR

**Q12)** Explain: [18]

- a) Reactor dynamics and
- b) Bubble column bioreactor.



Total No. of Questions : 12]

SEAT No. :

**P2836**

**[5154]-217**

[Total No. of Pages : 2

**B.E. (Chemical)**

**CORROSION ENGINEERING**

**(2008 Course) (Semester - I) (Elective - I) (409341)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** a) Enlist the chemicals causing pitting corrosion. Discuss about their effects. [8]

b) How does wet corrosion occurs? [8]

OR

**Q2)** a) Describe factors affecting corrosion in the atmospheric condition. [8]

b) Explain Stress corrosion. [8]

**Q3)** a) Explain the role of alloying in preventing corrosion. Support your answer with an example. [10]

b) Discuss the applications of thermophillic lining. [8]

OR

**Q4)** a) State the importance of Tafel equation. [8]

b) Discuss the corrosion of pipes in marine environment. [10]

**Q5)** a) Explain the concept of cell potential and polarization. [8]

b) Explain Evans diagram. [8]

OR

**P.T.O.**

- Q6)** a) Where does erosion corrosion occur? Why? [8]  
b) Explain the concept of sacrificial anode. [8]

**SECTION - II**

- Q7)** a) Explain the process of dezincification. [8]  
b) Comment on corrosion of iron and steel in aqueous media. [8]

OR

- Q8)** a) What are remedial measures to prevent inter-granular corrosion? [8]  
b) Explain how the modification of the materials is done by alloying. [8]

- Q9)** a) Compare the performance of weathering steel and hardened steel with reference to corrosion. [8]  
b) Discuss the use of inhibitors in corrosion control? [8]

OR

- Q10)**a) Corrosiveness of waters can be evaluated from chemical analysis. Justify the statement. [8]  
b) Explain the high temperature oxidation. [8]

- Q11)**a) Discuss cavitation corrosion and fretting corrosion and remedial measures for controlling the same. [12]  
b) What is passivation? [6]

OR

- Q12)**a) Discuss Galvanic corrosion and pitting corrosion and remedial measures for controlling the same. [12]  
b) Explain Glass lining. [6]



Total No. of Questions :12]

SEAT No. :

**P2837**

[Total No. of Pages :3

[5154] - 218

**B.E. (Chemical Engineering)**

**CHEMICAL PROCESS SYNTHESIS**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answer any 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 considerations for the development of a chemical process? [8]
- b) What do you mean by process synthesis? What are the different steps for complete engineering design and development of new process? [8]

OR

- Q2)** a) Mention different types of reaction systems and discuss any two with example. [8]
- b) Write a short note on idealized reactor models. [8]
- Q3)** a) Explain the different approaches to chemical process design with advantages and disadvantages. [8]
- b) Explain in short different parameters to be considered in choice of reactor. [8]

OR

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

**Q4) a)** What are the methods of separation of heterogeneous mixtures? Explain any one. [8]

b) Explain the role of catalyst and phase during the choice of reactor. [8]

**Q5) a)** What are the methods of separation of homogeneous mixtures? Explain any one. [10]

b) Write a short note on-reaction path. [8]

OR

**Q6) a)** What are the various parameters if distillation is choice of separator? [8]

b) Write note on any two: [10]

i) Choice and selection criteria for separators.

ii) Flow sheet structure.

iii) Overall Process design.

### SECTION-II

**Q7) a)** Explain the concept of distillation sequencing using simple column. [8]

b) Explain direct and indirect sequences of simple distillation columns. [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 composite curves with suitable example related to heat recovery problems. [10]

b) Discuss integration of heat pump schematically. [6]

OR

- Q10)**a) Explain graphically heat recovery pinch. [8]  
b) Write a short note on-overall heat exchanger network and utilities. [8]
- Q11)**a) Explain the intensification of hazardous materials. Discuss major hazards in process plants. [12]  
b) Write a short note on-Utilities selection during heat exchanger network.[6]

OR

- Q12)**a) What are safety and health considerations during the synthesis of chemical process? [10]  
b) Write a short note on - Explosion hazards. [4]  
c) What are the preventive measures taken to avoid toxic release? [4]

*EEE*



Total No. of Questions :12]

SEAT No. :

**P2838**

[Total No. of Pages :2

[5154] - 219

**B.E. (Chemical)**

**ADVANCED MATERIALS**

**(2008 Course) (Semester - I) (Elective - II) (409342)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Discuss the use Advanced Metallic Systems in industries. [8]
- b) Write down the different types of steels used in chemical industries.[10]

OR

- Q2)** a) Explain in detail Ductile Iron process. [9]
- b) Explain the use of alloyed steels in various industries with example. [9]
- Q3)** a) Describe the different properties of polymeric materials with example in detail. [8]
- b) Describe Fiber Technology with examples. [8]

OR

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

**Q4)** Explain in detail advanced polymeric materials with example and there industrial applications. [16]

**Q5)** Explain different advanced processing methods for Engineering Materials in detail. [16]

OR

**Q6)** a) Describe advanced powder synthesis techniques. [8]

b) Explain in detail Micro structural design and grain boundary Engineering. [8]

### **SECTION-II**

**Q7)** a) Write short note on Composite materials with example. [8]

b) Explain Reinforcing mechanisms in composite materials. [8]

OR

**Q8)** Explain in detail the Factors influencing the properties of composite materials like fibre Parameter, matrix, interface & molding methods. [16]

**Q9)** a) Explain Mechanical behaviour and properties of Metal Composites. [10]

b) Crack propagation and mechanical behaviour of composite materials. [8]

OR

**Q10)** Write down the different industrial applications of Ceramic materials and Describe fabrication methods of Ceramic Composites. [18]

**Q11)** Explain Carbon composites, their properties, fabrication methods and their applications. [16]

OR

**Q12)** Define Nanomaterials with example. Write down the synthesis of nonmaterial's and what are the different applications of nonmaterial in chemical industries. [16]

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2839**

[Total No. of Pages :3

**[5154] - 220**

**B.E. (Chemical Engineering)**

**POLYMER TECHNOLOGY**

**(2008 Course) (Semester - I) (Elective - II) (409342 C)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answer to the two sections should be written in separate books.*
- 2) Draw neat diagrams wherever necessary.*
- 3) Figures to the right side indicate full marks.*
- 4) Assume suitable data if necessary.*
- 5) Use of logarithmic table, electronic pocket calculators is allowed.*

**SECTION-I**

- Q1)** a) Explain the properties of polymers based on geometric isomerism and chemical composition. **[10]**
- b) Explain in detail different factors which need to be considered for determining mechanical properties of polymers. **[8]**

OR

- Q2)** a) Distinguished between Linear, Branch and Cross linked polymers with one example each. **[10]**
- b) Explain the properties of polymers based on Tacticity. **[8]**
- Q3)** a) Explain with one example in detail Emulsion Polymerization Technique. **[10]**
- b) Write a note on condensation Polymerization. **[6]**

OR

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

- Q4)** a) Explain in detail with examples Interfacial Polymerization Technique. [8]  
b) Write a note on “Bulk polymerization”. [8]
- Q5)** Explain in detail with one example each the effect of Molecular weight distribution 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 100 molecule of 10,000 monomer lengths and 1900 molecules of 20, 000 monomer lengths and 2500 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.

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2840**

[Total No. of Pages :3

**[5154] - 221**

**B.E. (Chemical Engineering)**

**PIPING DESIGN AND ENGINEERING (Elective - II)**

**(2008 Course) (Semester - I) (409342 D)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1) a)** Discuss the procedure in determining pipe diameter for specified height of pipe wall roughness and the discharge? **[10]**
- b) Discuss in detail about head balancing and quantity balancing methods?**[8]**

OR

- Q2) a)** Two pipes each 300mm long are available for connecting to a reservoir from which a flow  $0.095 \text{ m}^3/\text{s}$  is required. If the diameters of the two pipes are 0.030 m and 0.015 m respectively. Determine the ratio of the head of head loss when pipes are connected in series to the head loss when they are connected in parallel. Neglect minor losses. **[8]**
- b) Explain the two phase pressure drop calculations in piping? **[10]**
- Q3) a)** Discuss the various types of gasket according to ASME B16.5 and B16.47 for flanges? **[8]**
- 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) Explain the various types of pipe fittings in detail? [8]
- Q5)** a) Write down in brief the classification of safety valve along with working principle? [8]
- b) Discuss the working principle and applications of Rupture Disks? [8]

OR

- Q6)** a) Discuss in detail with working principle and types of Balance bellows PRV? [8]
- b) What are the steps followed during sizing of control valve? [8]

### **SECTION-II**

- Q7)** a) A steam piping system transports 20,000 lb/h of dry saturated steam at 150 psia. if the velocity is limited to 3000 ft/min, what size pipe is required? Calculate the pressure loss due to friction in 500 ft of pipe using the Unwin and Darcy equations, and compare the answers obtained? [8]
- b) Discuss the significance of Churchill and Swamee-Jain equation for calculation of friction factor in Compressed-Air Piping Systems? [10]

OR

- Q8)** a) Explain the Homogeneous and Heterogeneous Flow in slurry pipe lines?[8]
- b) How to calculate NPSHa and NPSHr? How to increase NPSHa? [10]
- Q9)** a) Which are the factors considered when the designer is locating equipment in the plot plan? [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.

b) Develop the typical layout considerations for pumps and storage tanks?[8]

**Q11)a)** Discuss the design criteria used in insulation system design for piping applications? [8]

b) Write down the different insulation material classification mostly used in the industrial and commercial piping industry? [8]

OR

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

a) Flare selection and sizing.

b) High alloy steel & its usage in piping.

c) Critical and Optimum thickness of insulation.

d) Line sizing of pneumatic conveying system.

*EEE*



Total No. of Questions :12]

SEAT No. :

**P2841**

[Total No. of Pages :3

[5154] - 222

**B.E. (Chemical)**

**ADVANCED SEPARATION PROCESSES**

**(2008 Course) (Semester - I) (Elective - II) (409342 E)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) What is cross flow filtration? What are its advantages over dead end filtration? [8]
- b) What is the principle and working of CF electro-filtration? Discuss its application? [8]

OR

- Q2)** 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]
- 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

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

**Q4)** a) Discuss the classification of membrane processes along with its applications. [8]

b) Explain the basic types of modules used in Reverse osmosis. [8]

**Q5)** a) Differentiate between electrophoresis and dielectrophoresis and discuss advantages of dielectrophoresis over electrophoresis techniques. [9]

b) Describe mechanism and applications of supercritical fluid extraction in chemical & biochemical industry? [9]

OR

**Q6)** a) Describe working principle of Ion chromatography techniques along with its applications? [9]

b) Enlist various factors considered for selection of an analytical method? Discuss advantages of HPTLC over TLC? [9]

## SECTION-II

**Q7)** Write short notes on:

a) Design and development of froth flotation equipment. [9]

b) Application of flotation technique. [9]

OR

**Q8)** a) Write down the flotation techniques classification on the basis of mechanism of separation and size of material separated. [9]

b) Explain 'collapse and drainage phenomena'. [9]

**Q9)** a) Explain the adsorption properties and applications of molecular sieve. [8]

b) Adductive Crystallization. [8]

OR

**Q10)** Write short notes on:

- a) Zone electrophoresis. [8]
- b) Differentiate between electrophoresis and dielectrophoresis and discuss advantages of dielectrophoresis over electrophoresis techniques? [8]

**Q11)** Explain the classification of unit operations based on the property difference. [16]

OR

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

- a) Exchange Reaction.
- b) Describe mechanism and applications of supercritical fluid extraction in chemical & biochemical industry?

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2842**

[Total No. of Pages :3

[5154] - 223

**B.E. (Chemical)**

**PETROLEUM REFINING**

**(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.*

**SECTION-I**

- Q1)** a) Describe in details about introduction to petroleum industries in India as well as world and its scenario. [8]
- b) Discuss the following terms? [8]
- i) Smoke Point
  - ii) Octane Number
  - iii) Viscosity Index
  - iv) Cetane Number

OR

- Q2)** a) What is the need of refining the crude oil? Describe with suitable examples? [8]
- b) What are the key issues and challenges for refineries in India? [8]
- Q3)** Describe Atmospheric distillation Unit with suitable Diagram and Distinguish between ADU and VDU with respect to various processing parameters? [16]

OR

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

**Q4)** What are different types of pipe still heaters? Describe Heating through exchangers and pipe still heaters with schematic diagram? [16]

**Q5) a)** What is cracking operation? Differentiate between thermal cracking and catalytic cracking? [2+6]

b) What would be the feed and final products of Fluid Catalytic Cracking units? Describe FCC with schematic diagram? [10]

OR

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

a) Hydro cracking operation.

b) Coking operation.

c) Thermal cracking.

### SECTION-II

**Q7)** Why desulphurization is necessary? Describe hydrosulphurization process with schematic diagram. [16]

OR

**Q8)** With neat schematic diagram describe HDA process. [16]

**Q9) a)** Why additives are added in the petroleum products? Discuss in brief about the additives for gasoline. [8]

b) With neat schematic diagram describe Hydro-refining? [8]

OR

**Q10)a)** Discuss various strategies of marketing of petroleum and petroleum products. [8]

b) Discuss various safety aspects in the refinery. [8]

**Q11)** Enlist various public and private sector refineries in India? And briefly discuss on “Indian Scenario of processing of petroleum fractions”. **[18]**

OR

**Q12)a)** Recent trends in petroleum with respect to distillation. **[9]**

b) Explain methodology for integration of refinery and petrochemical plants for power generation. **[9]**

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2843**

[Total No. of Pages :2

[5154] - 224

**B.E. (Chemical)**

**PROCESS MODELING AND SIMULATION**

**(2008 Course) (Semester - II) (409351)**

*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)** Describe typical modelling goals for a range of process engineering applications. **[16]**

OR

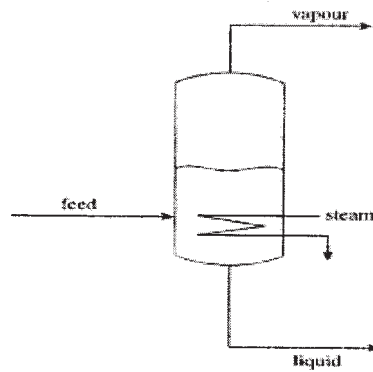
**Q2)** Discuss why modelling assumptions are important in the building of a model. **[16]**

**Q3)** Outline the systematic approach to model building. What are the key steps and their characteristics? **[16]**

OR

**Q4)** Consider a vessel, where a liquid feed is heated. Vapour and liquid are withdrawn. It is intended that a model of this process should be developed to investigate changes in the heat input  $Q$  from the steam coil as well as changes in feed conditions of temperature and composition. Develop a problem description for this situation discussing the necessary ingredients for the modeling. **[16]**

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



**Q5)** Develop a model for Double Pipe Heat Exchanger. [18]

OR

**Q6)** Develop a model for Shell & Tube Heat exchanger. [18]

### SECTION-II

**Q7)** Develop a mathematical model for Binary distillation column. State the assumptions completely. [16]

OR

**Q8)** Develop a mathematical model for Flash distillation column. State the assumptions completely. [16]

**Q9)** Develop a model for an energy equation in a CSTR where a consecutive reactions are occurring. State the assumptions completely. [18]

OR

**Q10)** Develop a model for Fluidized Bed Reactor. [18]

**Q11)** What is simulation? Explain with proper chemical engineering example. [16]

OR

**Q12)** Explain the following iterative convergence methods. [16]

- a) R-K method
- b) False Position method

*EEE*



Total No. of Questions :12]

SEAT No. :

[Total No. of Pages :4

**P2844**

**[5154] - 225**

**B.E. (Chemical)**

**PROCESS ENGINEERING COSTING AND 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 flow sheet preparation. [8]

OR

- Q2)** a) Explain factors affecting process selection. [8]  
b) Explain the factors that govern selection of plant location. [8]
- Q3)** a) Define depreciation and discuss its need and significance? [8]  
b) Discuss various methods of determine depreciation charges. [8]

OR

- Q4)** Write note on:
- a) Fixed capital. [4]
  - b) Working capital. [4]
  - c) 6/10 factor rule. [4]
  - d) Insurance. [4]

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

- Q5) a)** Explain in detail mathematical methods for profitability evaluation with neat diagram. [9]
- b) Explain cash flow analysis for an industrial operation. [9]

OR

- Q6) a)** Explain with neat sketch cumulative cash position showing effects of cash flow with time for an industrial operation neglecting time value of money. [9]
- b) A Company has three alternative investments which are being considered. Because all these investments are for the same type of unit and yields same service only one of the investments can be related. If a company In-charge expects 15% rate of return on original investment which one will be suitable? [9]

Item	Investment (I)	Investment (II)	Investment (III)
Initial Fixed Capital (Rs.)	1,00,000	1,70,000	2,10,000
Working Capital Investment (Rs.)	10,000	10,000	15,000
Annual Cash Flow (Rs.)	30,000	52,000	59,000
Annual Expenditure (Rs.)	15,000	28,000	21,000

**SECTION-II**

- Q7) a)** By using La-Grange multiplier method minimize the following objective function that is subject to single equality constraints: [6]

$$\text{minimize } f(x) = 4x_1^2 + 5x_2^2$$

$$\text{subject to } 2x_1 + 3x_2 = 6$$

- b) A plant produces water pumps at the rate of P units per day. The variable to costs per water pumps have been found to be Rs.  $47.73 + 0.1P^{1.2}$ . The total daily fixed charges are Rs. 1750, and all other expenses are constant at Rs.7325 per day. The profit is selling price per water pump minus total cost per water pump. Total cost per water pump is given as, [10]

$$C_T = 47.73 + 0.1P^{1.2} + (1750+7325)/P$$

If the selling price per water pump is Rs. 173, determine:

- i) The daily profit at production schedule giving the minimum cost per pump.
- ii) The daily profit at production schedule giving the maximum daily profit.
- iii) The production schedule at the break- even point.

OR

**Q8)** a) Explain graphical and analytical procedure for optimization with two or more variables. [10]

b) Write a note on optimum conditions in cyclic operations. [6]

**Q9)** a) Write a note on Pinch Technology. [8]

b) Derive the following equation for the optimum outside diameter of insulation on a wire for maximum heat loss: [8]

$$D_{opt} = \frac{2k_m}{(h_c + h_r)_c}$$

Where  $k_m$  the mean thermal conductivity of the insulation and  $(h_c + h_r)_c$  is the combined and constant surface heat transfer coefficient. The values of  $k_m$  and  $(h_c + h_r)_c$  can be considered as constants independent of temperature level and insulation thickness.

OR

**Q10)**a) Derive the equation for optimum cooling water flow rate in condenser. [8]

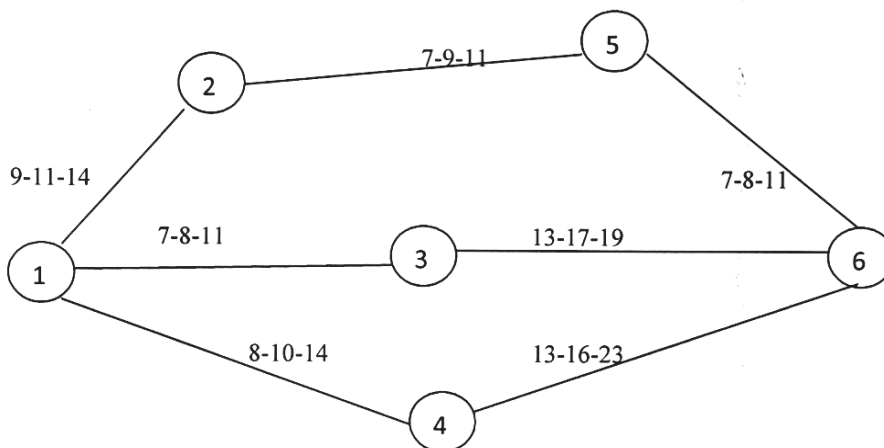
b) Explain preparation of Techno-economic feasibility report. [8]

**Q11)a)** What points should be considered while deciding plant location? Draw a plant layout and name the parts. [9]

b) Following network diagram shows the three time estimates for various activities and [9]

find the path considering:

- i) Optimistic time (a)
- ii) Pessimistic time (b)
- iii) Critical path using PERT.



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	Pre-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

EEE

Total No. of Questions : 12]

SEAT No. :

**P2845**

**[5154]-227**

[Total No. of Pages : 3

**B.E. (Chemical Engineering)**

**ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES  
(2008 Pattern) (Semester - II) (Elective - III) (409349 B)**

*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) 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. [6]
- Q3)** a) Explain the scenario of energy wastages in chemical process industries and explain the strategy of recovering it using advanced techniques. Take any one industry and explain. [6]
- b) Explain how following electrical utilities should be used to save the energy? [6]

**P.T.O.**

- i) Electrical motors
  - ii) Fans
  - iii) Drives
- c) Explain various ways of improving use of electrical distribution system in the plant for saving electrical energy. [4]

OR

**Q4)** Explain thermodynamic analysis in [16]

- a) Mixing
- b) Distillation
- c) Heat exchange

**Q5)** a) Explain how energy usage can be optimized through lost work analysis. [6]

b) Explain how waste heat in the process plant can be recovered to save heat energy. [6]

c) Define and explain Inevitable inefficiency. [4]

OR

**Q6)** a) What is energy audit? Also mention objectives of energy audit. [6]

b) Define energy manager. Explain his role. [6]

c) Explain the term energy management. [4]

### SECTION-II

**Q7)** a) What are various types Combined heat and power generation plants? Enlist and explain any one of them [6]

b) What do you mean by heat pump? Explain its operating principle in detail with neat diagram. [8]

c) Define and explain reversible heat pump. [4]

OR

**Q8) a)** Explain how systematic design methods are helpful in improving energy usage in chemical reaction. Explain it with suitable example. [9]

b) Explain how systematic design methods are helpful in improving energy usage in separation equipment. Explain it with suitable example. [9]

**Q9) a)** What are recommendations and guidelines to improve process conditions from energy saving point of view. [8]

b) Give the checklist of energy conservation items in chemical plants. [8]

OR

**Q10)a)** What do mean by combined heat and power generation? Explain how it optimizes energy supply to all types of consumers enlisting its benefits to both users and society at a large? [10]

b) Explain the advantages of Pinch Technology in a Chemical Process Industries. [6]

**Q11)a)** Explain the importance of automation in chemical industries and its effect on energy Conservation. [8]

b) Explain fouling factor. How it affects on performance in Heat exchangers? Explain with suitable example. [8]

OR

**Q12)a)** State briefly the methods of process synthesis. Explain importance of Heat Exchange Network (HEN) in a process industry. [8]

b) Enlist the ideas for improvement of a Boiler efficiency. [8]



Total No. of Questions : 12]

SEAT No. :

**P2846**

**[5154]-228**

[Total No. of Pages : 2

**B.E. (Chemical Engineering)  
CHEMICAL PROCESS SAFETY  
(2008 Pattern) (Semester - II) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section I and 3 questions from sections 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) Discuss in detail the safety aspects in the design of chemical process plants? [8]
- b) What are the ingredients of successful safety program. Draw a neat sketch and explain? [8]

OR

- Q2)** Define and explain Hazard, Toxicity, Flammability, Threshold limit value with appropriate examples? [16]

- Q3)** a) Discuss various legislations on safety control presently applicable in chemical process plants? [8]
- b) How will you evaluate exposure to volatile toxicants by Monitoring? [8]

OR

- Q4)** a) State typical projects involving industrial hygiene. Describe identification in industrial hygiene project? [8]
- b) What are the effects of noise on human being? List their legislative measures? [8]

- Q5)** a) Explain flammability characteristics of liquid and vapors? [9]
- b) Distinguish between fire and explosion. Explain Fire Triangle in detail?[9]

OR

**P.T.O.**



- Q6)** Explain the following: [18]
- a) Ignition and Auto-ignition temperature
  - b) Fire point, Flash point.
  - c) Types of explosion.

**SECTION-II**

- Q7)** a) Discuss how flammable and toxic chemicals are stored and handled?[8]
- b) What bonding & grounding procedures must be followed, to transfer a drum of flammable solvent into a storage tank? [8]

OR

- Q8)** Discuss in detail about the concept to prevent Fires and Explosions? [16]

- Q9)** a) Explain the procedure of Hazards and Operability studies? [8]
- b) Write a short note on Event Trees and Fault Trees? [8]

OR

- Q10)**a) Describe process hazard checklists in detail? [8]
- b) Explain the classification of Hazards and Hazard ratings. [8]

- Q11)**a) Explain Personal protective Equipments? [8]
- b) Explain Review of probability theory for Risk Assessment. [10]

OR

- Q12)** Explain briefly [18]
- a) Safety checklist for a chemical process plant
  - b) Disaster management
  - c) Role of computers in safety



Total No. of Questions : 12]

SEAT No. :

**P2847**

**[5154]-229**

[Total No. of Pages : 3

**B.E. (Chemical Engineering)**  
**FOOD TECHNOLOGY**  
**(2008 Pattern) (Semester - II) (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 answer books.*
- 3) *Neat Diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION-I**

- Q1)** a) Explain different types of fluids with example encountered in food processing. Give importance of heterogeneity in food technology. [8]
- b) Explain status of Indian food processing and compare with the world. [8]

OR

- Q2)** a) With neat diagram explain how taste can be defined for the particular food product. What are the conventional terms for each segments of taste. [8]
- b) How nutritional value of processed food is determined in the laboratory? [8]

- Q3)** a) Discuss post harvesting technologies food grains. [6]
- b) For which food wet cleaning is used? Explain advantages and disadvantages of wet cleaning? [6]
- c) What is water activity and how it is calculated? Give at least three examples of food with the range of water activity. [6]

OR

**P.T.O.**

- Q4)** a) With neat diagram explain size sorting machine and its applications. [6]  
b) Discuss applications of dry cleaning process with advantages and disadvantages. Name the food for which it is applicable. [6]  
c) What do you understand by water activity? List water activity of some. [6]

- Q5)** a) Explain UHT cycle for milk treatment and compare with conventional process. [8]  
b) With neat diagram explain oil extraction process from oil seeds. [8]

OR

- Q6)** a) Give neat flow sheet and explain ice-cream manufacturing process. [10]  
b) How chemical sterilization is done. Explain methods with example. [6]

### **SECTION-II**

- Q7)** a) With neat flow-sheet describe process of manufacture of jellies. [8]  
b) Explain importance of pectin in jam and jelly manufacture. [4]  
c) List the preservatives used for beverages and beverages storage. [4]

OR

- Q8)** a) What is canning? Explain process of tomato sauce manufacture. [10]  
b) How preservatives are classified. Give examples and explain the action of preservatives to prevent food spoilage. [6]

- Q9)** a) Explain wheat grain grinding and the effect on product and product quality. [8]  
b) Discuss with neat sketch industrial frying machines and name food products produced from such units. [8]

OR

**Q10)a)** Discuss effect of freeze drying and storage on sensory, nutritional characteristics of food. [8]

b) With neat sketch explain frozen food processing and storage. [8]

**Q11)a)** Explain importance of coating and coating materials used in chocolate industry. [6]

b) What is temper evident packaging? What is its importance in food and beverages industry. [6]

c) Explain various types of containers used in food industry stating advantages and disadvantages. [6]

OR

**Q12)a)** Explain enrobing process used in food industry with examples. [6]

b) Explain different container types and the applications. [6]

c) What information should be available on the packaging material of food? [6]



Total No. of Questions :12]

SEAT No. :

**P2848**

[Total No. of Pages :3

[5154] - 230

**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) State and explain the various objectives for standardization of equipment and materials. [9]
- b) Explain material consumption. Elaborate various policies to regulate material consumption. [9]

OR

- Q2)** a) Explain the objectives and importance of financial management. [9]
- b) For growth of a typical process industry how will you highlight the importance of [9]
- i) Qualitative standards.
  - ii) Quantitative standards.

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

- Q3)** a) Enlist the various industry standards. Elaborate two types of industry standards followed in chemical process industry. [8]
- b) Explain the formation and functions of BIS (Bureau of Indian Standards). [8]

OR

- Q4)** a) Explain the following standards. [8]
- i) ISO standard for food industries.
- ii) Agmark.
- b) Explain the role of Statistical Quality Control (SQC) for effective utilization of resources in industry. [8]

- Q5)** a) Elaborate on formation of Indian Standards. Enlist the objectives of product standards. [8]
- b) Write an explanatory note on Zero Defects. [8]

OR

- Q6)** a) State the various functions of equipment inspector. [8]
- b) Classify the control charts and explain with suitable example. [8]

### **SECTION-II**

- Q7)** a) Explain the objectives and importance of Total Quality Management (TQM). [9]
- b) Explain the formation, duties and advantages of Quality Circles (QC). [9]

OR

- Q8)** a) What is Quality Control? Explain Statistical quality control with suitable example. [9]
- b) Explain in detail the advantages and disadvantages of Quality Control. [9]

**Q9)** Explain with example the various standards followed in fabricating a distillation column for process industry. **[16]**

OR

**Q10)** Write notes on following concepts **[16]**

- a) Work sampling
- b) Zero defects

**Q11)** Write notes on: **[16]**

- a) Personal protective Equipment (PPE).
- b) ISO 9000 series.
- c) Six sigma.
- d) HSE management System.

OR

**Q12)a)** Explain in detail the role of automation in standardization. **[8]**

- b) Explain ISO. Elaborate on various ISO standards obtained by process industries. **[8]**

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2849**

[Total No. of Pages :3

**[5154] - 230-A**

**B.E. (Chemical Engineering)**

**CATALYSIS**

**(2008 Course) (Semester - II) (Elective - IV) (Theory) (409350)**

*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 mechanism of homogeneous catalysis with two applications. **[8]**

b) Write short note on shrinking core model with schematic and example. **[8]**

OR

**Q2) a)** Differentiate between the homogeneous and heterogeneous catalyst with respective industrial true and cons. **[8]**

b) Explain the qualitative nature and concept of catalysis and catalyst. **[8]**

**Q3) a)** For the reaction,  $A \rightarrow 4R$ , (gaseous reaction) run at 3.2 atm and 117°C. The rate at this temperature is measure as  $VA^1 = 96 C_A$ , mole /kg cat hr. Determine the amount of catalyst needed in a packed bed reactor with a very large recycle rate for 35% conversion of A to R for feed rate of 2000 mol/hr for pure A. **[10]**

b) Explain characterization techniques of homogeneous catalyst. **[6]**

OR

**P.T.O.**



- Q4)** a) State the adsorption isotherm and its application to heterogeneous catalyst. [8]  
b) Write short note on catalyst reforming. [8]
- Q5)** a) Derive the L-H model for diffusional kinetics. [8]  
b) Explain the diffusional effect on pores of catalyst particles. [10]

OR

- Q6)** Write short note on following: [18]  
a) Mechanism of liquid-liquid catalyst.  
b) Phase transfer catalyst.  
c) Mass transfer catalyst.

### SECTION-II

- Q7)** a) Write note on catalyst synthesis. [8]  
b) Explain the helium-mercury method for determining the void volume and so did density of the catalyst. [8]

OR

- Q8)** a) Derive mathematical equation for determining catalyst surface area by BET method. [8]  
b) Describe the general method of preparation of metal catalysts. [8]
- Q9)** Write note on: [18]  
a) Zeolites and  
b) ZSM - 5

OR

**Q10)a)** Estimate  $k$ , the first order rate constant, for an enzyme preparation with  $V_{\max}$  of  $4.8 \mu \text{ mole}/(\text{lit}.\text{min})$  under the given experimental conditions  $K_m = 2 \times 10^{-6} \text{ M}$ . [9]

b) An enzyme was assayed at an initial substrate concentration of  $2 \times 10^{-5} \text{ M}$ . In 6 min, half of the substrate has been used. The  $K_m$  for the substrate is  $5 \times 10^{-3} \text{ M}$ . Calculate [9]

i)  $k$ ,

ii)  $V_{\max}$  and

iii) the concentration of product produced after 15 min.

**Q11)a)** Explain the methods for evaluating the constants ( $k$  and  $C_m$ ) of the m-m equation. [8]

b) Give the kinetics of competitive inhibition. [8]

OR

**Q12)** Write note on following: [16]

a) Catalytic cracking with zeolite.

b) Selectivity of zeolite.

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2850**

[Total No. of Pages :3

**[5154] - 230-B**

**B.E. (Chemical Engineering)**

**NANOTECHNOLOGY**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

**Q1)** a) Explain the different routes used for chemical modification of carbon nanotubes? **[8]**

b) Discuss the different synthesis methods for fullerenes? **[8]**

OR

**Q2)** a) Why electro-deposition process is needed to grow nano-rods/wires through the alumina nano-pores? **[8]**

b) Write a short note on Diamonded nanostructures? **[8]**

**Q3)** a) Explain the difference between ALD and CVD? **[8]**

b) What is reactive sputtering? RF sputtering is preferred for insulating targets-Explain? **[10]**

OR

**P.T.O.**

**Q4) a)** What is meant by epitaxy? Explain molecular beam epitaxy with its schematic layout. List its characteristics. [8]

b) “Bottom-up technique is more convenient for nano fabrication” Explain. Also mention the merits and demerits and applications? [10]

**Q5) a)** Discuss in detail Bragg’s law of diffraction and Scherrer expression in X-ray diffraction? [8]

b) How do the cantilever deflections in AFM analysis affect the passage of laser beams from excitation source to the specimen to the detector. [8]

OR

**Q6) a)** Explain principle and operation of high resolution transmission electron microscope? [8]

b) Discuss the different characterization techniques based on electron microscopy? [8]

### **SECTION-II**

**Q7) a)** Derive Schrodinger’s equation? Also explain any two applications of Schrodinger’s equation? [10]

b) What are excitons? Why are excitonic effects more important in nanostructures than in bulk materials? [8]

OR

**Q8) a)** State De-Broglie hypothesis and derive the expression for De-Broglie wavelength? [8]

b) What is quantum dot, quantum well and wire? Explain in detail? [10]

**Q9) a)** Explain experimental procedure for finding out contact angles. Explain with neat sketch? [8]

b) Discuss different nanocoatings? Explain its applications and benefits? [8]

OR

**Q10)a)** What are the factors affecting contact angles and wetting? [8]

b) Discuss in detail about Self-assembly and Catalysis? [8]

**Q11)a)** How nanotechnology can be used for environmental pollution abatement? [8]

b) Explain Nano-biotechnology and explain how nanostructure mediated drug delivery helps for treatment of various diseases? [8]

OR

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

a) Nanoclays and its composites.

b) Applications of nanoparticles in waste water treatment.

c) Nanohydrogel.

d) Health hazards of nanomaterials.

EEE

Total No. of Questions :12]

SEAT No. :

**P2851**

[Total No. of Pages :4

[5154] - 230-C

**B.E. (Chemical)**

**FUEL CELL TECHNOLOGY**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Use two separate answer sheets for writing the answers to the two sections.*
- 2) *Draw schematics wherever necessary.*
- 3) *Assume suitable data wherever necessary.*
- 4) *Write the chemical reactions wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam table is allowed.*

**SECTION-I**

**Q1) a)** Describe Mobile Electrolyte Alkaline Fuel Cell and Static Electrolyte Alkaline Fuel Cell. **[12]**

b) Compare between Fuel Cell and battery. Discuss their working in Electric Vehicles. **[6]**

OR

**Q2) a)** What are the different types of fuel cell? Compare them and draw a neat figure in each case. **[12]**

b) Give advantages and disadvantages of Fuel Cell Technology. **[6]**

**Q3)** For a standard SOFC following data are available **[16]**

Average current density : 14 A/m<sup>2</sup>

Active anode surface area : 0.2 m<sup>2</sup>

Fuel Flow rate : 25 mol/h

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

Fuel Composition	: H <sub>2</sub> 85% and CO 15%
Air Flow rate	: 20 mol/h
Output Potential	: 230 V
Lower Heating Value of fuel	: 30000 kcal/Kg

Calculate:

- fuel utilization factor,
- air ratio,
- Power output and
- fuel efficiency

OR

- Q4)** a) In the typical SOFC, the Partial pressures of hydrogen, oxygen and water vapor are 0.8, 0.21 and 0.3 atm. Assume that activities of the components are proportional to their partial pressures. The cell is operated at 900 deg C. Gibbs free energy for the formation of water vapor is  $-54.635$  Cal/mole at STP condition. Faraday's constant is  $96487$  J/V. mol. [8]

Calcualte:

- Standard open circuit potential.
  - Open circuit potential at the operating conditions.
- b) A current density of  $12$  A/m<sup>2</sup> is obtained when pure hydrogen in fed to SOFC at the pressure of 1.7 atm. Total pressure of gases on anodic side is observed to be 2.4 atm. Air is supplied at 1.7 atm. The cell is operated at 1000°C. The diffusion factors for hydrogen, oxygen, water vapor are 95, 70 and 55 C/sm<sup>2</sup>. atm respectively. Calculate concentration over potential across cathode and anode. [8]

**Q5)** What is the importance of Nernst equation? Derive Nernst equation for calculating open circuit potential of SOFC using  $H_2$  as a fuel and  $O_2$  as an oxidizer. [16]

OR

**Q6) a)** What are the uses of hydrogen? Explain various ways of Hydrogen production. [8]

b) Explain schematically the working principle of SOFC and give advantages and drawbacks of SOFC. [8]

### SECTION-II

**Q7) a)** Explain the advantages and disadvantages of direct oxidation of hydrocarbons. [9]

b) What are factors affecting the performance of SOFC. [9]

OR

**Q8) a)** How oxidative reforming of methane is carried out. [9]

b) Explain different types defect structure in solids and Kroger Vink notations. [9]

**Q9) a)** Calculate mole fraction of defect at 200 and 1100°C. Defect energy is 75 KJ/mol. [8]

b) Design a planner SOFC to generate 250 KW power for ethanol as a fuel. [8]

OR

**Q10)a)** Design a tubular SOFC to generate 250 KW power from methane as a fuel. Single tube has a anodic diameter 20mm and active length of 1.8 m. [8]

b) What is steam reforming? What are the advantages of internal steam reforming. [8]



**Q11)** Explain the design of typical direct ethanol SOFC considering following aspects: **[16]**

- a) Catalyst,
- b) Structure,
- c) Reactions and
- d) Exit gas characteristics.

OR

**Q12)a)** Derive the correlation to calculate defect mole fraction for pure solid at thermal equilibrium. **[8]**

- b) What is three phase boundary (TPB)? Explain the mechanism of charge transfer in TPB. **[8]**

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2852**

[Total No. of Pages :2

**[5154] - 230-D**

**B.E. (Chemical)**

**PETROCHEMICAL ENGINEERING (Elective - IV)**

**(2008 Course) (Semester - II) (409350 E)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer book.*
- 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 are the main building blocks of petrochemical industry? Give the details of petrochemical products that are produced from benzene. [8]
- b) What is importance of petrochemicals and the discuss the status of petrochemical Industries in India. [8]

OR

- Q2)** What are basic principle sources of aromatics? Describe the BTX aromatic separation by suitable diagram. [16]
- Q3)** Draw a flow sheet for production of naphthene and explain the process with specification and process conditions. [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 alongwith its engineering problems. [8]

- b) Explain classification of different polymerization process and discuss its advantages and disadvantage. [8]

- Q11)**a) Explain the control of emission from steam crackers using Best Available Technique (BAT). [9]

- b) Discuss about recent advances in petrochemical plant & refineries in India. [9]

OR

- Q12)**a) What do you imply by safety in oil refining industry? [9]

- b) “Power on, India on”. Write views on power generation through petrochemical plants and justify the above statement. [9]

*EEE*

Total No. of Questions : 12]

SEAT No. :

P2853

[5154]-230-E

[Total No. of Pages : 3

B.E. (Chemical)

**COMPUTER - AIDED PROCESS CONTROL**  
**(2008 Course) (Semester - II) (Elective - IV) (409350F)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

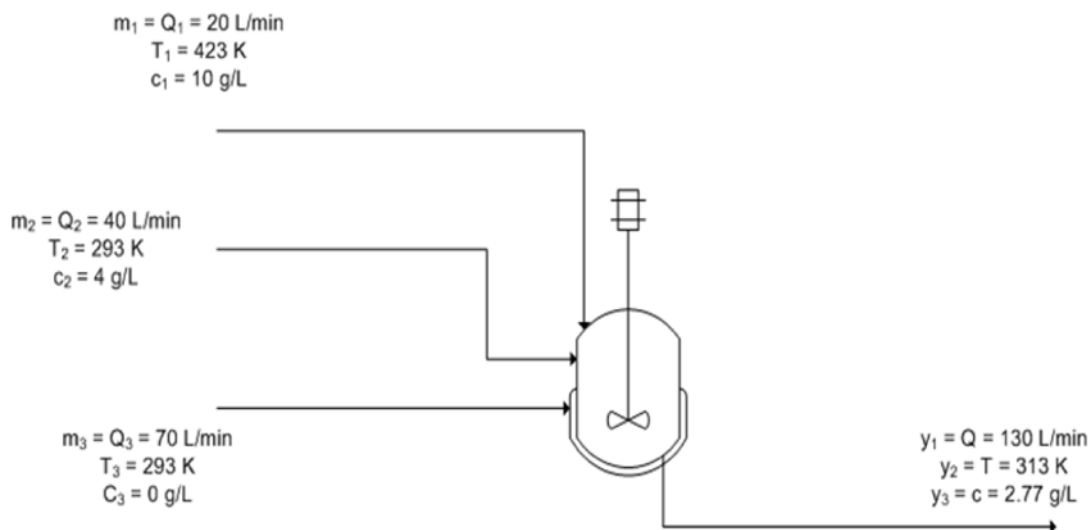
**SECTION - I**

**Q1)** 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)** What is DCS ? Explain in detail with applications and advantages. [18]

**Q3)** Compute RGA and suggest pairings between o/p variables and manipulated variable for following blending (MIMO) system. [16]



**P.T.O.**

the equation used to model the system are:

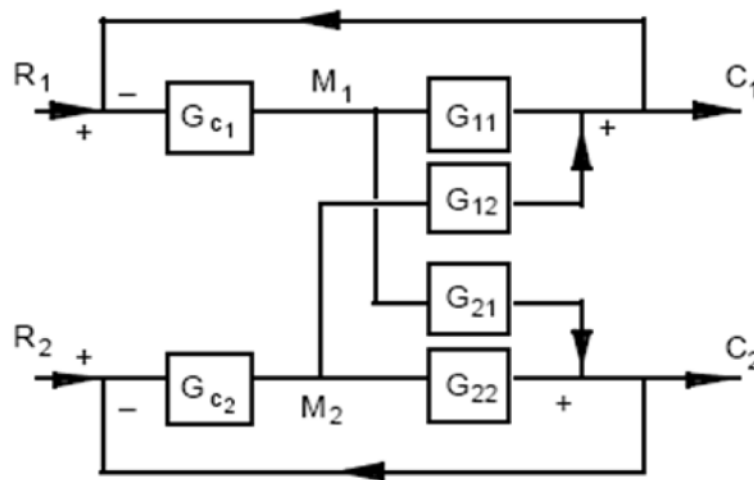
$$y_1 = m_1 + m_2 + m_3$$

$$y_2 = \frac{T_1 m_1 + T_2 m_2 + T_3 m_3}{y_1} = \frac{T_1 m_1 + T_2 m_2 + T_3 m_3}{m_1 + m_2 + m_3}$$

$$y_3 = \frac{c_1 m_1 + c_2 m_2 + c_3 m_3}{y_1} = \frac{c_1 m_1 + c_2 m_2 + c_3 m_3}{m_1 + m_2 + m_3}$$

OR

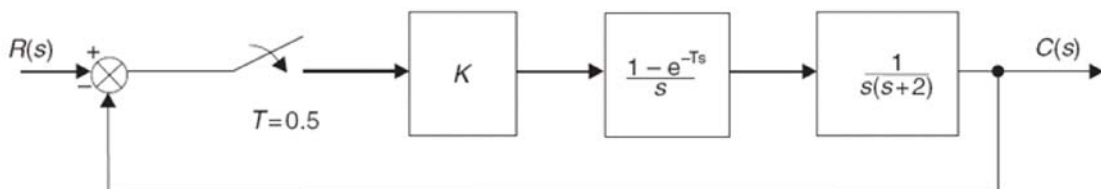
- Q4)** a) What is loop interaction? Design a decoupler for the following MIMO system. [10]



- b) Explain the methods for testing stability of MIMO systems [6]

- Q5)** Following figure shows digital control system. With  $K=1$  and sampling time 1 seconds. Determine [16]

- a) Open loop pulse transfer function  
b) Closed loop pulse transfer function.



OR

- Q6)** a) Explain the process of converting continuous signals into digital signal. [8]  
b) How the continuous signal is reconstructed from the discrete values? Explain with the help of diagram. [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)** Explain the use of software used to simulate process control modelling and simulation? [16]

- Q9)** Explain Singular Value Decomposition. How SVD analysis is used to recommend decoupling in MIMO Systems. [16]

OR

- Q10)** Explain hierarchical control systems with the help of block diagram. Mention advantages and disadvantages. [16]

- Q11)** Write Short notes on the following: [18]

- a) Basic structure of PLC
- b) MIMO Control system for evaporator
- c) Hold Devices

OR

- Q12)** Write Short notes on the following: [18]

- a) RGA and Pairing rules for I/O variables
- b) Control system for adiabatic reactor
- c) Signal conditioning



Total No. of Questions : 12]

SEAT No. :

**P2854**

**[5154]-231**

[Total No. of Pages : 2

**B.E. (Polymer)**

**POLYMER COMPOUNDING**

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

*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 11or12 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) *Assume Suitable data if required.*
- 6) *Use of calculator, graph paper is allowed.*

**SECTION - I**

- Q1)** a) Discuss the mechanism dispersive and distributive mixing in details. [8]  
b) Write a note on various mixing indices. [8]

OR

- Q2)** a) Explain the mixing action in a eccentrically rotating drum tumbler blender. [8]  
b) Write a note on rheology of filled polymers. [8]

- Q3)** a) Explain in detail the role of compatibilizer in polymer blending and explain any one method of compatibilization. [8]  
b) Discuss in details the mechanism and theory of surface modification of fillers. [8]

OR

- Q4)** a) Write a note on mechanism used for dispersion of nanofillers in polymer melt. [8]  
b) Discuss the terms polymer blends, polymer alloys, compatible blends, miscible blends immiscible blends with one example. [8]

**P.T.O.**

- Q5)** a) Write a note on carbon black and ZnO used as fillers in polymers. [9]  
b) Explain the action of plasticizers, softeners and flow promoters with suitable examples. [9]

OR

- Q6)** a) Indicate the mechanism of working 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 compounding of natural rubber and nitrile rubber. [9]  
b) Write a detailed note on compounding of unsaturated polyester resin. [9]

OR

- Q8)** a) Mention the advantages and disadvantages of reactive extrusion. [9]  
b) Write a detailed note on PVC compounds for pipes. [9]

- Q9)** a) Discuss construction and mixing action of cavity mixers and pin mixers. [8]  
b) Explain in details the requirements of a good mixing section. [8]

OR

- Q10)** a) Write a note on continuous compounders. [8]  
b) Explain EVK and SCCB mixing dispersive mixing sections. [8]

- Q11)** a) Explain the terms conjugated and non-conjugated 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 2 roll mill. [8]

OR

- Q12)** a) Explain with neat sketches, working principle of co-rotating Twin screw extruders. [8]  
b) Draw comparison between co-rotating and counter TSE with respect to propulsive action and mixing. [8]





Total No. of Questions : 12]

SEAT No. :

P2855

[5154]-232

[Total No. of Pages : 3

B.E. (Polymer)

**MOLD AND DIE DESIGN - I**  
**(2008 Course) (Semester - I)**

Time : 3 Hours]

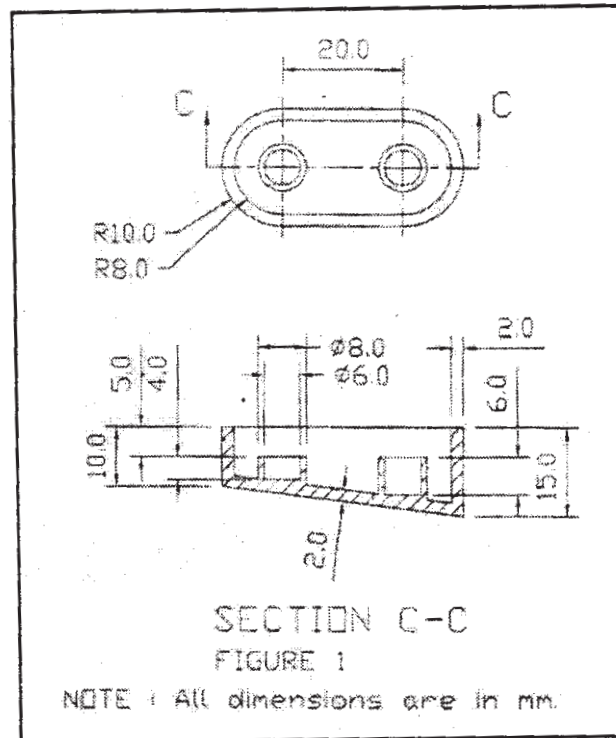
[Max. Marks : 100

Instructions to the candidates:

- 1) Answer to the two sections should be written in separate answer books.
- 2) 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**

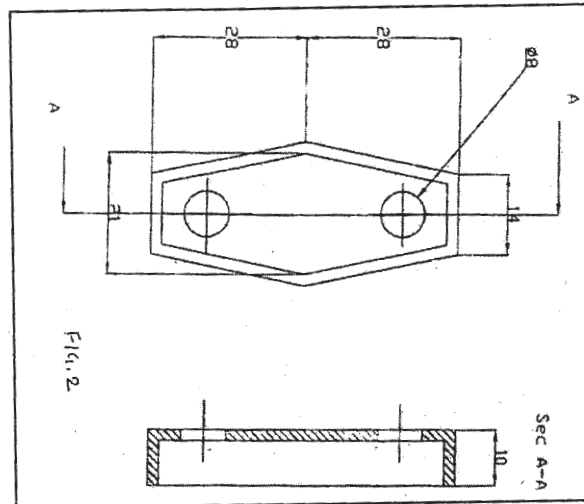
**Q1)** Design a 2 cavity 2 plate mold for the component shown in figure 1. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [35]



OR

P.T.O.

**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 baffle cooling for core inserts with a neat figure. [6]

OR

**Q4)** Explain the stop bolt method for actuation of stripper plate in details with neat figures. [6]

**Q5)** With a neat labeled sketch, explain the constructional features of offset pipe die. [9]

OR

**Q6)** Write the down the step wise procedure to determine the pressure drop through the approach section and land section for a blown die. State the relevant formulae. [9]

### SECTION - II

- Q7)** a) Discuss any through hardening process in details. Why of the components in injection molds are through hardened and why? [9]  
 b) Describe the finishing operations in details. [9]

OR

- Q8) a)** Discuss the composition of tool steel in details. [9]  
b) Discuss in details any two methods of heat treatment. [9]

- Q9) a)** The included angle of an ISO metric coarse thread is 60° and pitch 2 mm. Calculate the best wire size for this thread. [8]  
b) Write a note on geometric characteristics and symbols. [8]

OR

- Q10) a)** Explain how flatness of surface is tested by using interferometer technique. [8]  
b) Write short note on interference fits and transition fits. [8]

- Q11) a)** Explain the constructional features of a ring gate and diaphragm gate with neat figures. [8]  
b) Explain the construction and function of locating ring. [8]

OR

- Q12) a)** Explain the design procedure for cavity and core inserts. [8]  
b) Explain the design calculations for guide pillar and guide bush. [8]

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2856**

**[5154]-233**

[Total No. of Pages : 2

**B.E. (Polymer)**

**POLYMER PROCESSING OPERATION - II**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Explain Extrusion Blow moulding process with its advantages and limitation. [9]
- b) Explain the terms: partition wall thickness, parisan swell, parisan inflation, cutting devices, process parameters and their effect on product quality. [9]

OR

- Q2)** a) Explain the faults during Extrusion Blow moulding and the remedies. [9]
- b) Explain injection stretch Blow moulding process with its advantages and limitation. [9]

- Q3)** a) Explain vacuum forming, drape forming and air-slip forming. [8]
- b) Give the significance of sheet heating, stretching and wall thickness distribution for thermoforming process. [8]

OR

- Q4)** a) Explain blister forming and plug-assist forming with applications. [8]
- b) Explain process of thermoforming with proper steps. [8]

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

- Q5) a)** Explain laminating and embossing lines with various parameters and their effect on quality. [8]  
b) Explain types of calenders, their construction and configurations. [8]

OR

- Q6) a)** Explain Calendering basic process with material used and products obtained. [8]  
b) Mention defects, causes and remedy during calendaring process. [8]

### **SECTION - II**

- Q7) a)** Explain effect of internal pressure in rotational molding along with multilayer rotational moulding. [9]  
b) Give the effect of temperature, speed, cooling time and rate on product quality. [9]

OR

- Q8) a)** Explain Microstructure development in slow crystallizing and fast crystallizing polymers. [9]  
b) Explain rotational moulding of liquid polymer. [9]

- Q9) a)** Explain Rotational moulding process with the kind of raw material required and the importance of major and minor axis. [8]  
b) Give the effect of molecular orientation on and crystallinity end product by injection molding. [8]

OR

- Q10) a)** Give the methods used for machining of polymers along with tool geometry and other machining parameters. [8]  
b) Explain water injection moulding with diagram. [8]

- Q11) a)** Explain Gas injection moulding process with its advantages and limitations. [8]  
b) Explain electroplating, vacuum metallizing, texturising, hot stamping, embossing. [8]

OR

- Q12) a)** Give types of inks used for printing techniques. [8]  
b) Explain LASER machining process and what are the advantages and disadvantages of this process. [8]



Total No. of Questions : 12]

SEAT No. :

**P2857**

**[5154]-234**

[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) Explain various terminologies and definitions like fiber, yarn, filament, denier, tenacity. [9]
- b) Give classification of fibers, advantages and disadvantages of synthetic fibers over natural fibers. [9]

OR

- Q2)** a) Give molecular requirements of fiber forming polymers. Also give properties and applications of synthetic and natural fibers. [9]
- b) Explain the source of natural fiber and its spinning technique. [9]

OR

- Q3)** a) Give melt 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 wet and dry spinning techniques used in fiber manufacture. [8]
- Q5)** a) Explain what is role of spin finish, its composition and function. [8]
- b) Give the steps for post spinning operations. [8]

***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 polyester Staple fiber production process with the steps involved. [9]  
b) Why identification is required for fibers and how is it done. [9]

OR

- Q8)** a) Why structural changes take place during spinning, drawing and heat setting. Explain in detail the changes for each process. [9]  
b) Explain fiber structure properties taking few examples. [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 Dyeing of synthetic fibers in loose fiber and yarn form. [8]  
b) Give types of dyes used for natural fibers and also given differences between dyes and pigments. [8]

- Q11)**a) What are Modified synthetic fibers and how is the modification achieved. [8]  
b) Explain nano-fibers and bi-component fibers. [8]

OR

- Q12)**a) Explain optical fibers and their advantages and applications. [8]  
b) Explain following terms: denier, tenacity and elongation, spin finish content, percent shrinkage. [8]



Total No. of Questions : 12]

SEAT No. :

**P2858**

**[5154]-235**

[Total No. of Pages : 4

**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 ( $6 \times 6$ ) for generally orthotropic material. **[4]**
- b) Find the transformed stiffness, reduced transformed stiffness, compliance and reduced compliance matrix for a unidirectional lamina whose engineering properties are: **[8]**
- $E_1 = 140 \text{ GPa}$   
 $E_2 = 10 \text{ GPa}$   
 $G_{12} = 5 \text{ GPa}$   
 $\nu_{12} = 0.3$
- c) Show that for orthotropic material,  $C_{ij} = C_{ji}$  where C represents stiffness matrix. **[6]**

OR

- Q2)** a) Write in short about Chentsov coefficients in details. **[6]**
- b) For an angle ply lamina with  $\theta=35^\circ$ , find **[6]**
- i) local strains
  - ii) global strains
  - iii) local stresses
  - iv) global stresses

**P.T.O.**



given reduced transformed stiffness matrix.

$$\begin{bmatrix} 0.236 & 0.324 & 0.2005 \\ 0.326 & 1.904 & 0.5419 \\ 0.2005 & 0.5419 & 0.3674 \end{bmatrix} \times 10^{11}$$

The applied stresses are  $\sigma_x = 5$  MPa,  $\sigma_y = -6$  MPa,  $\tau_{xy} = 8$  MPa.

- c) Give stress-strain relationship for isotropic materials for plane stress condition. [6]

- Q3)** a) State the conditions under which Hoffman's failure criteria reduces to Tsai-Hill failure criteria. [5]  
b) What are limitations of maximum strain theory. [5]  
c) Write a detailed note on Tsai-Wu failure criteria. [6]

OR

- Q4)** a) An off-axis load of 50 MPa is applied at 300 to an unidirectional lamina whose engineering properties are: [8]

Find failure by maximum stress and also by maximum strain theory.

The failure strengths in local co-ordinate system are given below where subscripts "t" represents tensile and "c" represents compressive. "S" represents shear strength in local co-ordinate system.

$$X_t = 1200 \text{ MPa}$$

$$Y_t = 100 \text{ MPa}$$

$$X_c = 700 \text{ MPa}$$

$$Y_c = 300 \text{ MPa}$$

$$S = 100 \text{ MPa}$$

- b) Write down Tsai-Hill failure criteria for all four quadrants. [8]

- Q5)** a) Derive an expression for prediction of transverse modulus  $E_2$  using mechanics of materials approach. [8]  
b) Prove the rule of mixtures for the major Poisson's ratio  $\nu_{12}$ . [8]

OR

- Q6)** a) Write a note on Halpin-Tsai equations. [6]
- b) A composite has the following properties. [6]
- $E_1 = 180 \text{ GPa}$ ,  $E_2 = 18 \text{ GPa}$ ,  $G_{12} = 6 \text{ GPa}$ ,  $\nu_{12} = 0.35$ . Determine the transformed reduced stiffness matrix for the lamina with ply angle  $45^\circ$ .
- c) Discuss in details about randomly oriented short fibre reinforced composites. [4]

### SECTION - II

- Q7)** a) Explain the thermography the non-destructive testing methods used for composites. [8]
- b) Explain Celanese compression test and Sandwich edgewise compression testing of composites. [8]

OR

- Q8)** a) Write in short about at two Fatigue test methods for fiber reinforced composite materials. [8]
- b) Explain test configuration for a two rail and three rail shear test and explain test strain gauge arrangement for determining the shear modulus. [8]

- Q9)** A unidirectional laminate has a stacking sequence  $[0/45]_s$ . Each ply is 0.2 mm thick. Determine the mid plane curvature if a force of 75N/m acts on the laminate. The individual ply properties are given below: [16]

$$E_1 = 140 \text{ GPa}, E_2 = 8 \text{ GPa}, G_{12} = 6 \text{ GPa}, \nu_{12} = 0.3.$$

OR

- Q10)**a) Determine the [A], [B] and [D] matrices for a laminate with stacking sequence  $[+35/-35]_s$ . The ply properties are: [12]
- $$E_1 = 145 \text{ GPa}, E_2 = 10 \text{ GPa}, G_{12} = 7 \text{ GPa}, \nu_{12} = 0.28.$$
- b) Write down the [A], [B] and [D] matrices for single layer specially orthotropic laminates. [4]

- Q11)a)** Derive equilibrium equations in terms of displacements for a transversely loaded specially orthotropic laminated plate. **[9]**
- b) Explain failure modes of mechanically fastened joints. **[9]**

OR

- Q12)a)** For a symmetric beam clamped at both the ends with a uniformly distributed load of 20N/m, determine the deflection. The beam is 100mm long, 15mm wide and depth is 9mm. The D matrix for the beam is **[10]**

$$\begin{bmatrix} 1050 & 45 & 0 \\ 45 & 250 & 0 \\ 0 & 0 & 50 \end{bmatrix}$$

- b) Discuss the different types of adhesive and bolted joints for composites. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P2859**

**[5154]-236**

[Total No. of Pages : 3

**B.E. (Polymer Engineering)**

**POLYMER REACTION ENGINEERING (Elective - I)  
(2008 Course) (Semester - I) (409364-C)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculator is allowed.*

**SECTION - I**

- Q1)** 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]

OR

- Q2)** a) Discuss in brief polymerization processes by using reactant preparation, polymerization and separation. [12]
- b) Explain the different parameters used for designing of polymerization reactor. [6]

- Q3)** 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]

OR

- Q4)** a) Derive the necessary equation for the total concentration of the free radicals under free radical polymerization. [6]
- b) Discuss the mechanism of Free radical polymerization and derive the necessary expression for Instantaneous Fractional Degree of Polymerization and Instantaneous weight Degree of Polymerization by using Ionic polymerization. [10]

**P.T.O.**

- Q5) a)** Write a Note on: Aqueous emulsifier solution. [8]
- b) Write a note on Auto Acceleration effect in free radical polymerization. [8]

OR

**Q6)** Styrene is polymerized in batch reactor at 60°C with the free radical initiator. The initial concentration of styrene is 8.35 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  $K_0 = 3 \times 10^{-6} \text{ sec}^{-1}$ ,  $k_p = 176 \text{ lit/gmole}\cdot\text{sec}$ ,  $k_c = 3.6 \times 10^7 \text{ lit/gmole}\cdot\text{sec}$ ,  $f = 0.6$  the volume of the reactor filled by the reacting system is 3760 lit.

For a reaction time of 180 min, compute the following:

The percentage of the styrene polymerized,

The number average molecular weight. [16]

### SECTION - II

- Q7)** Give technology overview for the following polymer: [18]
- a) SBR rubber
- b) Nylon 6
- c) Polystyrene

OR

**Q8)** Write a short note on reactor systems used for PET, PVC, High Density Polyethylene polymers. [18]

- Q9) a)** Describe the Three Stages of Emulsion Polymerization needed to understand the kinetics. [10]
- b) Write a note on types of Coordination Catalyst. [6]

OR

- Q10)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]

- Q11)a)** Write a note on Extruder Reactors. [8]
- b) Discuss the choice between batch and continuous reactor for polymerization process. [8]

OR

- Q12)** Write a short note on Reactor Selection for carrying out polymerization reaction and Role of control engineering in Polymerization reactor. [16]



Total No. of Questions :12]

SEAT No. :

**P2860**

[Total No. of Pages :3

**[5154] - 238**

**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 in separate answer book.*
- 2) *Solve 3 questions from section -I and 3 questions from section-II.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*
- 6) *Use of electronic pocket calculator is allowed.*

**SECTION-I**

- Q1)** a) 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

**P.T.O.**

- 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]
- 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 the 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]

EEE

Total No. of Questions : 12]

SEAT No. :

**P2861**

**[5154]-240**

[Total No. of Pages : 3

**B.E.(Polymer)**

**PRODUCT DESIGN AND POLYMER TESTING**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain concurrent engineering approach to plastic product design. [9]  
b) Write a note on life cycle assessment of plastic products. [9]

OR

- Q2)** a) Write a short note on creep curves and isochronous curves. [9]  
b) Write a detailed note on the various steps followed in plastic product design. [9]

- Q3)** a) Discuss in details the method for induction 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 various steps used in designing of snapfit assemblies [8]  
b) Write a note on hinges used in fastening of plastic components. [8]

**P.T.O.**

- Q5)** a) Write a detailed note on ASTM test methods used for determining of flexural strength using four point and four point bending method. [8]  
b) Discuss the ASTM test method used for determining shear properties.[8]

OR

- Q6)** a) Write a detailed note on ASTM test methods used for fatigue properties and abrasion resistance. [8]  
b) Write a detailed note on ASTM test methods determination of thermal conductivity and coefficient of thermal expansion. [8]

## **SECTION-II**

- Q7)** a) Discuss the procedure for determination of density by density gradient method. [8]  
b) Discuss the procedure for any two non-destructive testing methods.[8]

OR

- Q8)** a) Discuss the various tests used for testing of pipes and films. [8]  
b) Discuss the procedure for determination of acoustic properties. [8]

- Q9)** a) Write a detailed note on method for determination of refractive index, luminous transmittance. [8]  
b) Discuss the test methods for determining the properties of refraction of light by and birefringence. [8]

OR

- Q10)**a) Discuss the test methods used for determination of dielectric strength, dielectric constant and dissipation factor. [8]  
b) Discuss the procedure for determination of dynamic electric analysis (DEA). [8]

- Q11)**a) Discuss the procedure for determination limiting oxygen index test and UL 94 flammability tests. [9]
- b) Discuss the procedure for determination flammability tests for rigid and non-rigid plastics, flammability tests for cellular plastics. [9]

OR

- Q12)**a) Discuss the procedure for determination of outdoor weathering tests and accelerated weathering tests. [9]
- b) Discuss the procedure for determination environmental stress cracking. [9]



Total No. of Questions :12]

SEAT No. :

[Total No. of Pages :3

**P2862**

**[5154] - 241**

**B.E. (Polymer )**

**MOLD AND DIE DESIGN - II**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answers to two sections should be written in separate answer book.*
- 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 fixed rotating core method for ejection of internally threaded components. **[9]**
- b) Explain the rack and pinion method with neat sketch for ejection of threaded components. **[9]**

OR

- Q2) a)** Explain the sun and planet method with neat sketch for ejection of threaded components. **[9]**
- b) Discuss in details axially fixed rotating core methods for ejection of internally threaded components with neat figures. **[9]**
- Q3) a)** Explain the construction of rectangular manifold. **[8]**
- b) Explain the various heating techniques used for heating hot runner blocks with neat sketches. **[8]**

OR

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

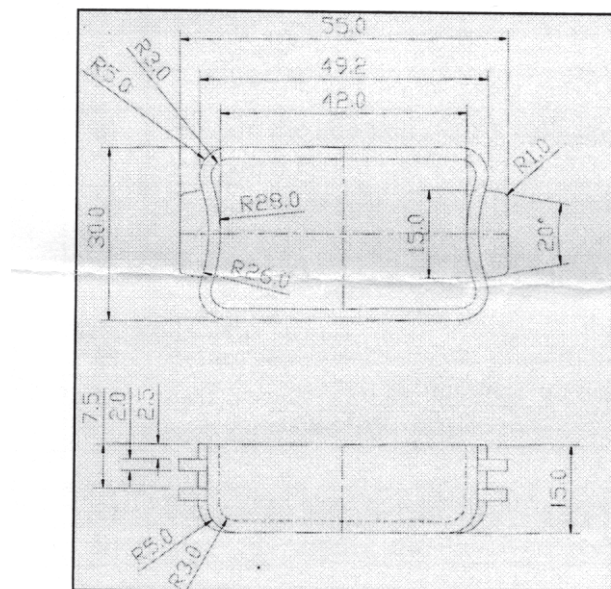
- Q4)** a) Explain in details with neat figures any 2 secondary nozzles. [8]  
 b) State advantages and disadvantages of hot runner molds. [8]
- Q5)** a) Explain in details constructional features of molds used for pressure forming. [10]  
 b) Discuss in details constructional features of rotational molds. [6]

OR

- Q6)** a) Explain in details flash and positive compression molds. [10]  
 b) Explain constructional features of molds used for injection stretch blow molding. [6]

**SECTION-II**

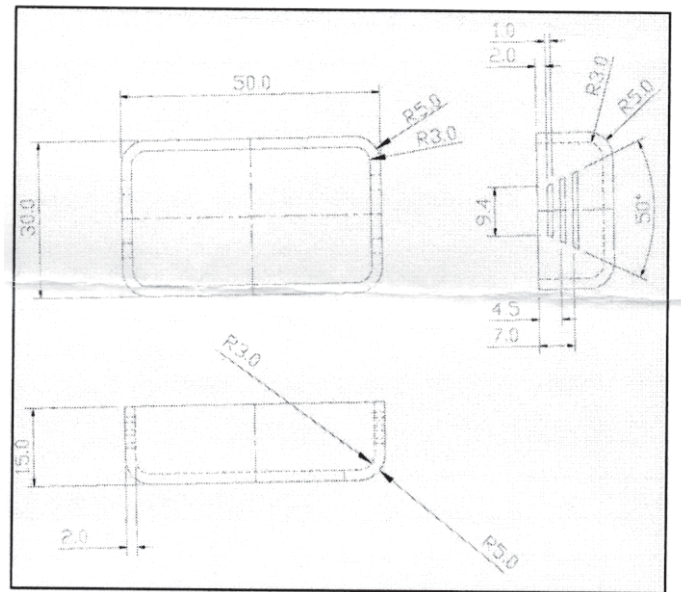
- Q7)** Design a 2 cavity mold for the component shown in figure 1. Draw at least 2 views with one sectional view to bring out the details of the feed, cooling and ejection system. Illustrate the relevant design calculations. [30]



**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)** Explain in details constructional features of a flat sheet die. **[10]**

OR

**Q10)** List the various design formulae used in design of coat hanger sheet die. Give the detailed design process. **[10]**

**Q11)a)** Write a note on filling analysis. **[5]**

b) Explain the term shrinkage. Give 2 reasons for shrinkage. **[5]**

OR

**Q12)** Discuss Cross and Carreau viscosity models in details. **[10]**

EEE

Total No. of Questions : 12]

SEAT No. :

**P2863**

**[5154]-242**

[Total No. of Pages : 3

**B.E. (Polymer)**

**POLYMER PHYSICS AND CHARACTERISATION**

**(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 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 working of FTIR using the chart method. **[9]**

b) Give the different types of vibrational mode. **[9]**

OR

**Q2) a)** Give the different methods of sample preparation. **[9]**

b) Explain ATR method and its advantages. **[9]**

**Q3) a)** Explain Nuclear Magnetic Resonance Spectroscopy (NMR) in short. **[8]**

b) Explain relaxation process, chemical shifts, spin-spin interaction for NMR. **[8]**

OR

**Q4) a)** Explain how characterization of polymers is done using NMR spectroscopy is done. **[8]**

b) Explain how qualitative and quantitative analysis of elements is done using NMR spectroscopy. **[8]**

**P.T.O.**



- Q5)** a) Explain GPC working with diagram. [8]  
b) Explain working of GPC. [8]

OR

- Q6)** a) Give significance of Bragg law of X-ray diffraction. Also explain lattice and powder diffraction methods. [8]  
b) Explain crystal geometry and structural determination of polymers using wide and small angle X-ray diffraction techniques. [8]

### **SECTION-II**

- Q7)** a) Give the Basic principal of electron microscopy and explain it working in short. [9]  
b) Why and how specimen preparation is done during electron microscopy. [9]

OR

- Q8)** a) Give working of transmission electron microscopy (TEM) with its advantages. [9]  
b) Explain Lamellar, fibrillar globular 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) Explain dynamic mechanical thermal analysis (DMTA). [8]

**Q11)a)** Describe Optical Properties along with interaction of light with polymers, reflection and refraction of light by polymers, birefringence, birefringence in isotropic. **[8]**

b) Give the concept of birefringence and explain birefringence in isotropic and anisotropic materials. **[8]**

OR

**Q12)a)** Explain dynamic electric analysis (DEA). **[8]**

b) Explain Electrical conduction in polymers, dielectric properties, electrical conductivity measurements in polymers and , static charge in polymers. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P2864**

**[5154]-243**

[Total No. of Pages : 2

**B.E. (Polymer Engineering)**  
**PROCESSING OF COMPOSITES**  
**(2008 Pattern) (Semester - II) (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 of natural fibers as a reinforcement material in composites. **[12]**

b) Explain various types and applications of natural fibers. **[6]**

OR

**Q2) a)** Explain in detail with any two examples of Thermoplastic based composite materials. **[12]**

b) Explain the properties and applications of polyamide fibers. **[6]**

**Q3) a)** Write a note on “Gel time Study for Thermoset”. **[8]**

b) Explain in detail Injection molding of Thermoset. **[8]**

OR

**Q4) a)** Write a short note on sheet Molding Compounds. **[8]**

b) Explain in detail Metal matrix composites. **[8]**

**Q5) a)** List the process parameters affecting Autoclave Processing. Explain the relation between Pressures, Temperature & Resin Viscosity with autoclaving time. Also discuss the flow sub-model as applied to autoclave processing. **[12]**

b) What is de-bulking operation? Explain the advantages of de-bulking operation. **[4]**

OR

**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)** With a neat sketch, explain the pre-preg lay up during autoclave processing. Discuss the significance of each component in the layup set-up. [8]

b) Discuss resin requirement for Pultrusion process and Explain with neat diagram in detail Pultrusion Process and its advantages and disadvantages. [8]

OR

**Q8) a)** What is the effect of pulling die resistance on Pultruded products. [8]

b) Discuss the applications of Thermoset and Thermoplastic Pultrusion process. [8]

**Q9)** Discuss in detail the process of Filament Winding and any one process model for the same. Discuss the effect of various process parameters on filament wound products. [16]

OR

**Q10)a)** Discuss advantage of adhesive joints and mechanicals joints. List and discuss surface preparation guidelines for adhesive bonding. [8]

b) Discuss any two method used for Machining of composites. [8]

**Q11)** Explain classification of nano-particles and with two case studies explain in detail Polymer nanocomposites. Give different possible morphologies of carbon nano fibers. [18]

OR

**Q12)a)** Write in short about functionalization of carbon nano tubes and nano clay. Discuss any one method for production of carbon nano tubes. [12]

b) Differentiate between Polymer Nano-composites with other normal composites. [6]



Total No. of Questions : 12]

SEAT No. :

**P2865**

**[5154]-245**

[Total No. of Pages : 3

**B.E. (Polymer)**

**ADVANCED POLYMER RHEOLOGY  
(2008 Course) (Elective - IV) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) 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 calendar rolls. [8]



Total No. of Questions :12]

SEAT No. :

**P2866**

[Total No. of Pages :3

[5154] - 247

**B.E. (Polymer Engineering)**

**POLYMER THERMODYNAMICS AND BLENDS**

**(2008 Pattern) (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 second 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) State the importance of entropy in the explanation of free energy change in process. Explain the isothermal process. [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 molecular weight on the Phase stability. [9]

b) Explain the importance of temperature with necessary diagram on the miscibility of polymer blend systems. [9]

OR

**P.T.O.**



- Q4)** a) Explain the term Phase Equilibria. [10]  
b) Write a short note on Criterion of Phase stability. [8]
- 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 alloys and 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. [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)** a) Explain Miscible and Immiscible Polymer Blends by using appropriate Rheological Models. **[8]**
- b) Write a note on any one Commercial polymer blend involving PP polymer. **[8]**

*EEE*

Total No. of Questions :8]

SEAT No. :

**P2867**

[Total No. of Pages :4

**[5154] - 251**

**B.E. (Petroleum Engineering)  
RESERVOIR ENGINEERING - II  
(2008 Course) (Semester - I) (412381)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Questions No.2 (two) and 8(eight) are compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Answer 3 questions from section I and 3 questions from section II.*
- 5) *Neat diagrams should be drawn wherever necessary.*
- 6) *Use of a non-programmable calculator, log-log, and semi-log paper is allowed.*
- 7) *Assume suitable data if necessary.*

**SECTION-I**

- Q1) a)** Show the various regions of an isochronal test vs. a modified isochronal test. **[6]**
- b) Derive the diffusivity equation in Cartesian coordinates. How many conditions are required to solve the diffusivity equation? Explain in detail. **[10]**

**Q2)** Following data is given:

$$q = 30 \text{ stb/d}$$

$$h = 140 \text{ ft}$$

$$B = 1.47 \text{ RB / STB}$$

$$k = 0.2 \text{ md}$$

$$c_t = 1.4 \times 10^{-5} \text{ psi}^{-1}$$

$$\mu = 0.72 \text{ cp}$$

$$r_w = 0.5 \text{ ft}$$

$$P_i = 3100 \text{ psi}$$

$$\text{porosity} = 20\%$$

$$r_e = 2800 \text{ ft}$$

Calculate the reservoir pressure at the radius of 1 ft, 5ft, 10 ft, and 50 ft after 3 hours of oil production. **[18]**

**P.T.O.**

- Q3)** a) What is the significance of ETR, MTR and LTR in well test interpretation? Explain with figures. [4]
- b) What do you mean by transient, PSS and SS in well testing? Explain their significance. [4]
- c) Derive the continuity equation for a single phase fluid flowing through a one dimensional porous media, in Cartesian coordinates. [8]
- Q4)** a) How can superposition of space and time be combined? Explain, with appropriate diagrams representing flow-rates and pressures. [6]
- b) What are the objectives of a gas well test? How is a gas well test different from an oil well test? What parameters in a gas well test differ from an oil well test? [10]

### SECTION-II

- Q5)** What are the various geometries that can be encountered while testing a horizontal well? Explain in detail. How can method of images be used to solve such scenarios. [16]
- Q6)** Explain the various flow regimes in a DST, with appropriate figures. How is a typical analysis done, for procured DST data, and what all are the methods for analyzing DST data? [16]
- Q7)** Write a detailed note on Horner's approximation, its significance, and why is it used. How is it different from a derivative based analysis? [16]
- Q8)** Explain in detail: [18]
- a) Write down Arp's equation, and show how the empirical decline curves are derived from the equation.
- b) What are the assumptions used for Arp's equation?
- c) Show graphs which are used for estimating decline parameters for all three types of decline curves -  $q$  vs.  $t$ ,  $N_p$  vs.  $t$ ,  $q$  vs.  $N_p$  all on Cartesian, semi-log and log-log plots.

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	0.148	0.146	0.144	0.142	0.140	0.138
1.3	0.135	0.133	0.131	0.129	0.127	0.125	0.124	0.122	0.120	0.118
1.4	0.116	0.114	0.113	0.111	0.109	0.108	0.106	0.105	0.103	0.102
1.5	0.100	0.0985	0.0971	0.0957	0.0943	0.0929	0.0915	0.0902	0.0889	0.0876
1.6	0.0863	0.0851	0.0838	0.0826	0.0814	0.0802	0.0791	0.0780	0.0768	0.0757
1.7	0.0747	0.0736	0.0725	0.0715	0.0705	0.0695	0.0685	0.0675	0.0666	0.0656
1.8	0.0647	0.0638	0.0629	0.0620	0.0612	0.0603	0.0595	0.0586	0.0578	0.0570
1.9	0.0562	0.0554	0.0546	0.0539	0.0531	0.0524	0.0517	0.0510	0.0503	0.0496
2.0	0.0489	0.0482	0.0476	0.0469	0.0463	0.0456	0.0450	0.0444	0.0438	0.0432
$-Ei(-x), 2.0 < x < 10.9, \text{interval} = 0.1$										
x	0	1	2	3	4	5	6	7	8	9
2	$4.89 \times 10^{-2}$	$4.26 \times 10^{-2}$	$3.72 \times 10^{-2}$	$3.25 \times 10^{-2}$	$2.84 \times 10^{-2}$	$2.49 \times 10^{-2}$	$2.19 \times 10^{-2}$	$1.92 \times 10^{-2}$	$1.69 \times 10^{-2}$	$1.48 \times 10^{-2}$
3	$1.30 \times 10^{-2}$	$1.15 \times 10^{-2}$	$1.01 \times 10^{-2}$	$8.94 \times 10^{-3}$	$7.89 \times 10^{-3}$	$6.87 \times 10^{-3}$	$6.16 \times 10^{-3}$	$5.45 \times 10^{-3}$	$4.82 \times 10^{-3}$	$4.27 \times 10^{-3}$
4	$3.78 \times 10^{-3}$	$3.35 \times 10^{-3}$	$2.97 \times 10^{-3}$	$2.64 \times 10^{-3}$	$2.34 \times 10^{-3}$	$2.07 \times 10^{-3}$	$1.84 \times 10^{-3}$	$1.64 \times 10^{-3}$	$1.45 \times 10^{-3}$	$1.29 \times 10^{-3}$
5	$1.15 \times 10^{-3}$	$1.02 \times 10^{-3}$	$9.08 \times 10^{-4}$	$8.09 \times 10^{-4}$	$7.19 \times 10^{-4}$	$6.41 \times 10^{-4}$	$5.71 \times 10^{-4}$	$5.09 \times 10^{-4}$	$4.53 \times 10^{-4}$	$4.04 \times 10^{-4}$
6	$3.60 \times 10^{-4}$	$3.21 \times 10^{-4}$	$2.86 \times 10^{-4}$	$2.55 \times 10^{-4}$	$2.28 \times 10^{-4}$	$2.03 \times 10^{-4}$	$1.82 \times 10^{-4}$	$1.62 \times 10^{-4}$	$1.45 \times 10^{-4}$	$1.29 \times 10^{-4}$
7	$1.15 \times 10^{-4}$	$1.03 \times 10^{-4}$	$9.22 \times 10^{-5}$	$8.24 \times 10^{-5}$	$7.36 \times 10^{-5}$	$6.58 \times 10^{-5}$	$5.89 \times 10^{-5}$	$5.26 \times 10^{-5}$	$4.71 \times 10^{-5}$	$4.21 \times 10^{-5}$
8	$3.77 \times 10^{-5}$	$3.37 \times 10^{-5}$	$3.02 \times 10^{-5}$	$2.70 \times 10^{-5}$	$2.42 \times 10^{-5}$	$2.16 \times 10^{-5}$	$1.94 \times 10^{-5}$	$1.73 \times 10^{-5}$	$1.55 \times 10^{-5}$	$1.39 \times 10^{-5}$
9	$1.24 \times 10^{-5}$	$1.11 \times 10^{-5}$	$9.99 \times 10^{-6}$	$8.95 \times 10^{-6}$	$8.02 \times 10^{-6}$	$7.18 \times 10^{-6}$	$6.44 \times 10^{-6}$	$5.77 \times 10^{-6}$	$5.17 \times 10^{-6}$	$4.64 \times 10^{-6}$
10	$4.15 \times 10^{-6}$	$3.73 \times 10^{-6}$	$3.34 \times 10^{-6}$	$3.00 \times 10^{-6}$	$2.68 \times 10^{-6}$	$2.41 \times 10^{-6}$	$2.16 \times 10^{-6}$	$1.94 \times 10^{-6}$	$1.74 \times 10^{-6}$	$1.56 \times 10^{-6}$

EEE

Total No. of Questions : 8]

SEAT No. :

**P2868**

**[5154]-252**

[Total No. of Pages : 2

**B.E. (Petroleum Engineering)**  
**PETROLEUM FORMATION EVALUATION**  
**(2008 Course) (412382) (Semester - I)**

*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)** Describe borehole environment with the help of a neat sketch. Explain the empirical relationship between different zones and fluids. **[15]**

**Q2)** Describe different types of sources used in neutron logging. Explain the principle of any one type of neutron logging tool with the help of a sketch. **[15]**

**Q3)** Explain important resistivity logging methods with the help of neat sketches. **[15]**

**Q4)** Write notes on any four of the following: **[20]**

- a) Logs used to measure geometry of borehole,
- b) Cement Bond Log,
- c) Downhole fluid sampling as a part of formation evaluation,
- d) Parameters measured in mud logging,
- e) MWD,
- f) Logs used to measure geometry of borehole.

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



**SECTION - II**

**Q5)** Outline the procedure for determination of water saturation using logs. [15]

**Q6) a)** Answer any two of the following: [10]

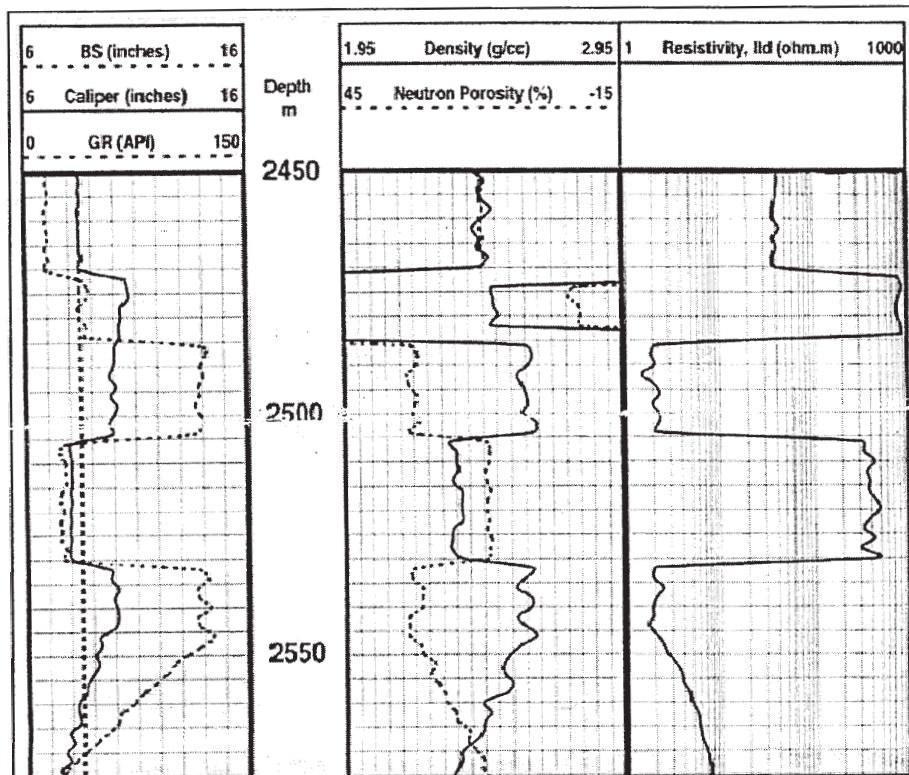
- i) Applications of dipmeter logging
- ii) Waxman and Smit Model
- iii) Origin of abnormal pressure
- iv) Recognition of fracture reservoir

b) How to recognize movable hydrocarbons from logs. [5]

**Q7)** What is production logging? Explain important production logging methods. [15]

**Q8) a)** A record of logs is given from 2450 m 2475 m by GR, Caliper (first track), Density and Neutron porosity (second track), and resistivity (third track). [10]

Carefully observe the log signatures and their relationships



Interpret the lithology and cross relations shown by different signatures. Do you find any clean formation in this log? Justify your answer with suitable comments.

b) Write a detailed note on ‘Mud logging’. [10]

**X X X**



Total No. of Questions : 6]

SEAT No. :

**P2869**

**[5154]-253**

[Total No. of Pages : 1

**B.E. (Petroleum Engineering)  
WELL ENGINEERING AND DESIGN  
(2008 Course) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *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 types of casings? Discuss different load cases while casing design. [10]  
b) Discuss Leak Off Test in detail. [8]
- Q2)** a) Derive trajectory design for type II profile [8]  
b) Write short note on LWD Tool. [8]
- Q3)** a) Discuss driller's method of well control. [8]  
b) Explain open well and close well gas migration in detail. [8]

**SECTION - II**

- Q4)** Discuss Liner setting and cementation in horizontal well in detail. [18]
- Q5)** a) Discuss different components and functions of drill string. [8]  
b) Write short note on: [8]  
i) Stuck up,  
ii) MOP.
- Q6)** a) Discuss Bingham plastic model of fluid flow. [8]  
b) Explain effect of BHHP and Impact force on hole cleaning. [8]



Total No. of Questions : 8]

SEAT No. :

**P2870**

**[5154]-254**

[Total No. of Pages : 3

**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) *Question 4 and 8 from Section 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 full marks.*

**SECTION - I**

- Q1)** a) Explain with the help of suitable diagrams characteristic curves for gravity anomaly of a thin horizontal slab and a cylinder. **[10]**
- b) Draw and describe in brief Schlumberger array method for vertical electrical resistivity sounding survey. **[5]**
- Q2)** a) What is the principle of radioactive survey? Explain with suitable diagram the working principle of Geiger Muller Counter used in radioactivity survey. **[10]**
- b) What are the different modes of transport of microseepages of petroleum from reservoir to surface? **[5]**
- Q3)** a) Give important characteristics of seismic waveforms: velocity, amplitude, resolution and display. **[10]**
- b) What is Normal Moveout (NMO)? How is normal move out correction applied to a horizontal and a dipping reflector? **[5]**

**P.T.O.**

**Q4)** Answer any five from the following: **[20]**

- a) Seismic impedance.
- b) Time Lapse Seismic.
- c) AVO.
- d) Corrections in magnetic surveying.
- e) Wenner Configuration in electric surveys.
- f) Direct Indications of Hydrocarbons.
- g) Elastic properties of rocks.

### **SECTION - II**

**Q5)** a) Explain Seismic facies analysis based on the external shapes of seismic bodies, and the internal texture of rock bodies with the help of suitable examples. **[10]**

b) Describe the steps involved in the exploration of a new basin leading to the drilling of a wildcat well. What basic questions about subsurface need answers? **[5]**

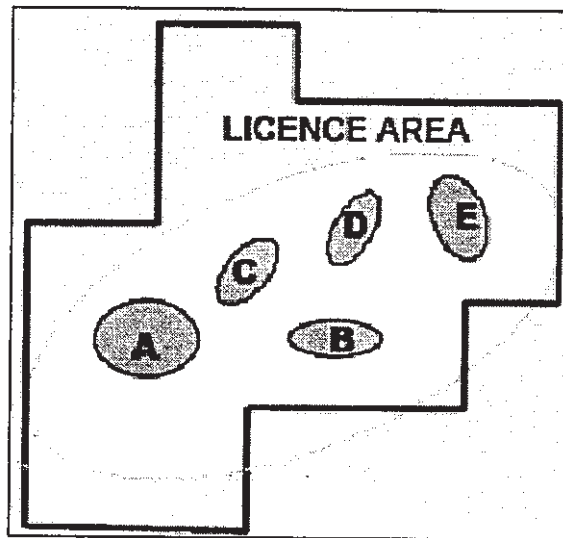
**Q6)** a) What are petroleum seepages? What are direct and indirect methods of their detection? **[10]**

b) What are the basic tools in the recognition of a structural play? **[5]**

**Q7)** Figure given below shows presence of many plays in a licence area controlled by dependent and independent parameters to decide the value of reservoir. **[15]**

Design a template for the creation of a 3D Reservoir model taking into consideration the foresaid dependent and independent parameters.

Also list out information on attributes to be included in the Data Base Management System (DBMS), which would allow a means to review the reservoir model and update the same.



How this database is useful in the creation of different maps?

- Q8)** a) Discuss in detail volumetric and material balance methods of reserves estimation giving advantages of each. [15]
- b) What are Static and dynamic maps. [5]



Total No. of Questions : 8]

SEAT No. :

**P2871**

**[5154]-255**

[Total No. of Pages : 2

**B.E. (Petroleum)**

**ADVANCED INSTRUMENTATION & PROCESS CONTROL IN  
PETROLEUM INDUSTRY**

**(2008 Course) (Semester - I) (Elective - IC) (412384-B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Describe essential features of analog control systems. [6]  
b) State various temperature measuring instruments and explain any one in detail. [6]  
c) Explain dynamics of first-order system. [6]
- Q2)** a) Explain digital communication systems used in petroleum industry. [8]  
b) State classification of hazardous areas and guidelines for electrical installations in hazardous areas. [8]
- Q3)** a) State various pressure measuring instruments and explain working of Bourdon-type pressure gauge. [8]  
b) Explain construction and working of viscometer. [8]
- Q4)** a) Explain working of feedback control loop. [8]  
b) Explain characteristics of PID - control. [8]

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

## SECTION - II

- Q5)** a) Explain heat exchanger control system. [8]  
b) Explain control systems used for pumps and compressors. [8]
- Q6)** a) Explain automatic control system used in top drive oil well drilling operations. [8]  
b) Explain SCADA system used in production operations. [8]
- Q7)** a) Explain various types of subsea valves. [8]  
b) Explain subsea sand monitoring system. [8]
- Q8)** Write short notes on following: [18]  
a) Control systems for oil & gas separators.  
b) PID control in dynamic positioning of floating vessels in deep sea operations.  
c) Electro-hydraulic multiplex control systems.



Total No. of Questions :12]

SEAT No. :

**P2872**

[Total No. of Pages :2

**[5154] - 258**

**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)** What are the reasons for failure of inorganic theory of formation of crude oil? **[8]**

b) Explain: RON, MON, Aniline point, Diesel Index. **[8]**

OR

**Q2) a)** Write a note on TBP distillation. **[8]**

b) Describe in brief the overall refinery flow. **[8]**

**Q3) a)** What are the factors affecting the desalting process? **[8]**

b) Write a note on the operating conditions of the vacuum distillation unit. **[8]**

OR

**Q4) a)** Write a note on the ATU. **[8]**

b) What do you mean by the preheating train? Explain. **[8]**

**P.T.O.**

- Q5) a)** Write a note on the regenerator of FCC. [9]  
b) Write a note on the expanded bed hydrocracking. [9]

OR

- Q6) a)** Give the properties desired for good quality bitumen. Discuss the air blowing process. [9]  
b) Write a note on the Flexi coking unit. [9]

### **SECTION-II**

- Q7) a)** Describe alkylation process using hydrochloric acid. [8]  
b) Explain the semiregenerative process for catalytic reforming. [8]

OR

- Q8) a)** Explain few commercially important reforming processes. [8]  
b) What are the factors affecting isomerization process. [8]  
**Q9) a)** What do you mean by lube oil base stock? Explain the steps to obtain the same. [8]  
b) Explain propane deasphalting. [8]

OR

- Q10) a)** Write a note on DILCHILL dewaxing. [8]  
b) Write a note on solvent extraction using NMP. [8]  
**Q11) a)** What are the various ways of hydrogen recovery in refineries? Discuss any one. [9]  
b) Write a note on pollution in refineries. How is it controlled? [9]

OR

- Q12) a)** With the help of neat diagrams, explain batch blending and line blending process. [9]  
b) How is sulphur recovered in the refineries? Explain the Claus process. [9]

EEE



Total No. of Questions :10]

SEAT No. :

**P2873**

[Total No. of Pages :4

[5154] - 260

**B.E. (Petroleum Engineering)**

**NON-CONVENTIONAL HYDROCARBON RESOURCES**

**(2008 Pattern) (Semester - I) (Elective - II) (412385 C)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) Answers to the two sections should be written in separate books.*
- 2) Question no. 5 of section I and question no. 10 of section II is compulsory.*
- 3) Figures to the right indicate full marks.*
- 4) Draw neat diagrams wherever necessary.*

**SECTION-I**

**Q1)** Answer in brief on any two of the following:

**[16]**

- a) Continuous Accumulation System.
- b) Physical and Chemical Properties of heavy oil.
- c) Organic richness and thermal maturity.
- d) Classification of heavy oil.

OR

**Q2)** a) Draw a schematic diagram of methane flow dynamics in a coal seam system. **[8]**

- b) Describe the risk and planning associated with drilling horizontal wells drilled in tight reservoirs. **[8]**

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

**Q3) a)** Following mineralogical variation is observed during detailed petrophysical studies of the potential shale horizon. **[8]**

No.	Depth in meters	Mineralogy percent			
		Quartz	Carbonate	Clay minerals	Others
1	2800 m	20	28	45	07
2	2810	14	27	49	10
3	2820	20	14	62	06
4	2830	44	10	41	05
5	2840	54	12	27	07
6	2850	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? **[8]**

OR

**Q4)** Write in brief on any two of the following: **[16]**

- Experimental Techniques used to Measure Gasification Rates.
- Reservoir modeling in shale gas reservoir.
- Underground coal gasification using a controlled, retractable injection point.
- Qualitative description of phenomena at the underground coal gasification cavity wall.

**Q5) a)** The following sorption isotherm data is given for a coal sample. **[10]**

P(psi)	76	122	205	221	305	504	507	756	1001	1008
V(scft/ton)	77	113.2	159.8	175	206.4	265.3	267.2	311.9	339.5	340

Calculate the Langmuir isotherm constant  $V_m$  and the Langmuir pressure constant  $b$  for the coal sample.

b) Write in brief on simplified Process Schematic for Fischer-Tropsch Coal-to-Liquids Systems. **[8]**

## SECTION-II

**Q6) a)** A gas reservoir has the following characteristics: **[10]**

$A = 3000$  acres,  $h = 30$  ft,  $\phi = 0.15$ ,  $S_{wi} = 20\%$ ,  $T = 150^\circ\text{F}$ ,  $p_i = 2600$  psi,  
 $Z_i = 0.82$

$p$	$Z$
2600	0.82
1000	0.88
400	0.92

Calculate the cumulative gas production and recovery factor at 1000 and 400 psi.

b) Write a note on radioactivity in shale. **[6]**

OR

**Q7) 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  $0.2 \times 10^6$  mm<sup>2</sup> has Young's modulus  $5 \times 10^{10}$  Pa and Poisson's ratio of 0.25. The plate is subjected to compressive force of 500N at the faces of its lateral end. Find out change in volume during loading. **[6]**

**Q8) a)** Write in brief any two of the following: **[10]**

i) Environmental problems related to drilling and production operations.

ii) Design of a typical openhole disposal well for protection of useful aquifers.

iii) Prevention and control methods in gas hydrate formation.

b) An undersaturated coal system has the following reservoir parameters: Drainage area = 160 acres, thickness = 15 ft, porosity = 3%, Initial pressure = 650 psia, desorption pressure = 450 psia, total compressibility =  $16 \times 10^{-5}$  psi<sup>-1</sup>

Estimate the total volume of water that must be produced for the reservoir pressure to decline from initial pressure to desorption pressure. **[6]**

OR

**Q9)** 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? [6]

**Q10)** Write notes on any four of the following: [18]

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.

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2874**

[Total No. of Pages :2

[5154] - 261

**B.E. (Petroleum)**

**CARBON MANAGEMENT IN PETROLEUM INDUSTRY**

**(2008 Course) (Semester - I) (412385, D) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

**Q1)** Which are the components of greenhouse effect? How does greenhouse effect work? Describe in detail, harmful effect of green house gases on the earth. **[18]**

OR

**Q2)** What is carbon credit? Discuss how carbon credit is important for the economical development of a country and industry. **[18]**

**Q3)** Discuss in detail the arrangement under Kyoto Protocol to allow industrialized countries with a green house gas reduction commitment for investment in developing countries as an alternative. **[16]**

OR

**Q4)** Discuss various activities with examples that can contribute to earn carbon credit. Explain, how these will be useful to improve quality of bio-physical environment on earth. **[16]**

**P.T.O.**

**Q5)** Which is the first commitment period of Kyoto protocol? What is Kyoto target? How a country can achieve its target? Explain in detail. [16]

OR

**Q6)** What is UNFCCC? Write three categories of parties and discuss in detail, parties commitment and role in the convention. [16]

### **SECTION-II**

**Q7)** Describe in detail design considerations and working of solar and wind energy system to generate the electric power. [18]

OR

**Q8)** List various resources of renewable energy generation that are available today on commercial basis. Discuss the challenges and opportunities in detail for renewable energy system. [18]

**Q9)** What is sustainable development? What are the challenges of sustainable development in developing countries? Discuss in detail effective ways to overcome these challenges. [16]

OR

**Q10)** Discuss in detail biological approach in carbon sequestration. [16]

**Q11)** What is clean development mechanism? Describe any four processes that have been developed and are used widely under clean development mechanism to minimize the impact of carbon footprint. [16]

OR

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

- a) Energy management.
- b) Evolution of smart cities.
- c) Afforestation and reforestation.
- d) Challenges of global climate change.

*EEE*

Total No. of Questions :8]

SEAT No. :

**P2875**

[Total No. of Pages :4

[5154] - 262

**B.E. (Petroleum Engineering)**

**IMPROVED OIL RECOVERY AND RESERVOIR SIMULATION**

**(2008 Course) (Semester - II) (412387)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Questions No. 3(three) and 8 (eight) are compulsory.*
- 3) *Figures to the right indicate full marks.*
- 4) *Answer 3 questions from section I and 3 questions from section II.*
- 5) *Neat diagrams must be drawn wherever necessary.*
- 6) *Use of a non-programmable calculator, log-log, and semi-log paper is allowed.*
- 7) *Assume suitable data if necessary.*

**SECTION-I**

- Q1)** a) Write down the detailed steps of reservoir simulation, along with the required data, from an accuracy perspective. [6]
- b) What is the difference between a PDE and ODE? Why can't we solve a PDE in reservoir simulations? [10]
- Q2)** a) Discretize the 2-D heat equation given below, using 3 explicit and 3 implicit techniques. [10]
- b) Write a detailed note on consistency, stability and convergence. [8]
- Q3)** a) How is a crank-nicholson solving technique different from a completely implicit technique? Explain using an example equation. [6]

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

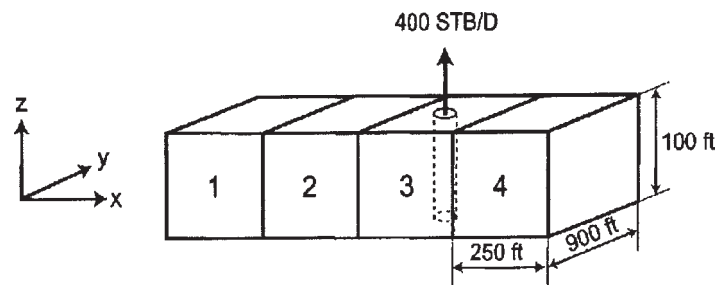
- b) Using any of the finite difference schemes, solve the following differential equation. Consider a 3 element system with four nodes,  $u_1$  to  $u_4$ , with both these being boundary nodes. Boundary conditions are provided for these nodes: [10]

$$\frac{\partial^2 u}{\partial x^2} - 2u = 0 \text{ where } 0 < x < 1 \text{ and } f(x) = 4x^2 - 2x - 4$$

Boundary conditions are:

$$u_1 = 0 \text{ @ } x = 0 \text{ and } u_4 = -1 \text{ @ } x = 1$$

- Q4)** a) A well produces @ 400 STB/D. Dimensions of the block are -  $\Delta x = 300$  ft;  $w = 700$  ft;  $h = 200$  ft;  $kx = 370$  md.  $Fvf = 1.0$  rb/stb; viscosity = 5 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 WAG in detail with the screening criteria. Why does such a screening criteria exist. [16]
- Q6)** Explain ASP flooding in detail with an appropriate figure. [16]
- Q7)** What are the advantages and disadvantages of in-situ combustion techniques available? Explain in detail. [16]
- Q8)** Write short notes on (any three): [18]
- Microbial EOR.
  - Well site layout for Polymer EOR.
  - Welges Methods
  - Miscible and Immiscible Flooding.



Formulas / Equations for the exam

$$\int_{t^n}^{t^{n+1}} \{T_{x_{i-1/2}} [(p_{i-1} - p_i) - \gamma_{i-1/2} (Z_{i-1} - Z_i)]\} dt + \int_{t^n}^{t^{n+1}} \{T_{x_{i+1/2}} [(p_{i+1} - p_i) - \gamma_{i+1/2} (Z_{i+1} - Z_i)]\} dt$$

$$+ \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \frac{d}{dp} \left(\frac{\phi}{B}\right)_i [p_i^{n+1} - p_i^n],$$


---

$$\int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{m_i} dt = m_{a_i}$$


---

$$T_{z_{i,j,k-1/2}}^m [(p_{i,j,k-1}^m - p_{i,j,k}^m) - \gamma_{i,j,k-1/2}^m (Z_{i,j,k-1} - Z_{i,j,k})]$$

$$+ T_{y_{i,j-1/2,k}}^m [(p_{i,j-1,k}^m - p_{i,j,k}^m) - \gamma_{i,j-1/2,k}^m (Z_{i,j-1,k} - Z_{i,j,k})]$$

$$+ T_{x_{i-1/2,j,k}}^m [(p_{i-1,j,k}^m - p_{i,j,k}^m) - \gamma_{i-1/2,j,k}^m (Z_{i-1,j,k} - Z_{i,j,k})]$$

$$+ T_{x_{i+1/2,j,k}}^m [(p_{i+1,j,k}^m - p_{i,j,k}^m) - \gamma_{i+1/2,j,k}^m (Z_{i+1,j,k} - Z_{i,j,k})]$$

$$+ T_{y_{i,j+1/2,k}}^m [(p_{i,j+1,k}^m - p_{i,j,k}^m) - \gamma_{i,j+1/2,k}^m (Z_{i,j+1,k} - Z_{i,j,k})]$$

$$+ T_{z_{i,j,k+1/2}}^m [(p_{i,j,k+1}^m - p_{i,j,k}^m) - \gamma_{i,j,k+1/2}^m (Z_{i,j,k+1} - Z_{i,j,k})]$$

$$+ q_{sc_{i,j,k}}^m = \frac{V_{b_{i,j,k}}}{\alpha_c \Delta t} \left[ \left(\frac{\phi}{B}\right)_{i,j,k}^{n+1} - \left(\frac{\phi}{B}\right)_{i,j,k}^n \right],$$


---

$$T_{y_{i,j-1/2}}^m [(p_{i,j-1}^m - p_{i,j}^m) - \gamma_{i,j-1/2}^m (Z_{i,j-1} - Z_{i,j})]$$

$$+ T_{x_{i-1/2,j}}^m [(p_{i-1,j}^m - p_{i,j}^m) - \gamma_{i-1/2,j}^m (Z_{i-1,j} - Z_{i,j})]$$

$$+ T_{x_{i+1/2,j}}^m [(p_{i+1,j}^m - p_{i,j}^m) - \gamma_{i+1/2,j}^m (Z_{i+1,j} - Z_{i,j})]$$

$$+ T_{y_{i,j+1/2}}^m [(p_{i,j+1}^m - p_{i,j}^m) - \gamma_{i,j+1/2}^m (Z_{i,j+1} - Z_{i,j})] + q_{sc_{i,j}}^m = \frac{V_{b_{i,j}}}{\alpha_c \Delta t} \left[ \left(\frac{\phi}{B}\right)_{i,j}^{n+1} - \left(\frac{\phi}{B}\right)_{i,j}^n \right]$$


---

$$\int_{t^n}^{t^{n+1}} \left( \frac{u_x A_x}{B} \right) \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} \left( \frac{u_x A_x}{B} \right) \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \left[ \left( \frac{\phi}{B} \right)_i^{n+1} - \left( \frac{\phi}{B} \right)_i^n \right].$$


---

$$T_{x_{i-1/2}}^m [(p_{i-1}^m - p_i^m) - \gamma_{i-1/2}^m (Z_{i-1} - Z_i)] + T_{x_{i+1/2}}^m [(p_{i+1}^m - p_i^m) - \gamma_{i+1/2}^m (Z_{i+1} - Z_i)] + q_{sc_i}^m = \frac{V_{b_i}}{\alpha_c \Delta t} \left[ \left( \frac{\phi}{B} \right)_i^{n+1} - \left( \frac{\phi}{B} \right)_i^n \right].$$

$$T_{x_{i-1/2},k} = \left( \beta_c \frac{k_x A_x}{\mu B \Delta x} \right) \Big|_{x_{i-1/2},k} = \left( \beta_c \frac{k_x A_x}{\Delta x} \right)_{x_{i-1/2},k} \left( \frac{1}{\mu B} \right)_{x_{i-1/2},k} = G_{x_{i-1/2},k} \left( \frac{1}{\mu B} \right)_{x_{i-1/2},k}$$

$$T_{y_{i,j+1/2},k} = \left( \beta_c \frac{k_y A_y}{\mu B \Delta y} \right) \Big|_{y_{i,j+1/2},k} = \left( \beta_c \frac{k_y A_y}{\Delta y} \right)_{y_{i,j+1/2},k} \left( \frac{1}{\mu B} \right)_{y_{i,j+1/2},k} = G_{y_{i,j+1/2},k} \left( \frac{1}{\mu B} \right)_{y_{i,j+1/2},k}$$

$$T_{z_{i,j,k+1/2}} = \left( \beta_c \frac{k_z A_z}{\mu B \Delta z} \right) \Big|_{z_{i,j,k+1/2}} = \left( \beta_c \frac{k_z A_z}{\Delta z} \right)_{z_{i,j,k+1/2}} \left( \frac{1}{\mu B} \right)_{z_{i,j,k+1/2}} = G_{z_{i,j,k+1/2}} \left( \frac{1}{\mu B} \right)_{z_{i,j,k+1/2}}$$

EEE

Total No. of Questions : 12]

SEAT No. :

**P2876**

**[5154]-263**

[Total No. of Pages : 3

**B.E.(Petroleum)**

**PETROLEUM PRODUCTION ENGINEERING–II**

**(2008 Pattern) (Semester-II) (412388)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

**Q1)** Classify various types of separators and write their applications in detail.[18]

OR

**Q2)** Discuss working and design of a three phase vertical and horizontal separator in detail. [18]

**Q3) a)** Explain working of a skimmer tank and write skimmer sizing equations.[8]

b) Draw neat schematic sketch and explain working of a vertical heater treater. [8]

OR

**Q4)** Write short note on: [16]

- a) Produced water treating system
- b) Crude stabilization system
- c) GGS
- d) CPF and CTF

**P.T.O.**

**Q5)** Write in detail, various causes of corrosion and factors that prevent corrosion process. **[16]**

OR

**Q6) a)** How will you identify potential sources of corrosion? Write the role of following factors that contribute to corrosion process. **[10]**

- i) presence of air
- ii) dissimilar metal in physical contact
- iii) fluid velocity and turbulence
- iv) different types of water
- v) presence of acidic gases

**b)** Describe the process of corrosion in brief. **[6]**

### **SECTION-II**

**Q7)** Explain in detail one method for each to solve the problem of sand, scale and wax deposition in oil field equipments or tubulars. **[18]**

OR

**Q8)** What are the various ways and methods to know decline in well productivity? Write the solution to improve the well productivity in detail. **[18]**

**Q9) a)** Draw typical DST curves to show following condition, **[8]**

- i) High pressure and high permeability reservoir without formation damage
- ii) High pressure, low productivity and low permeability reservoir with formation damage

**b)** Draw typical RFT profile and explain its application in wellbore or formation analysis in brief. **[8]**

OR

**Q10)** Draw neat schematic sketch and explain formation damage mechanism. Explain causes and solution for it in detail. Also write a note on skin factor and pressure drop due to formation damage. **[16]**

**Q11)a)** Discuss various methods of subsurface separation. **[8]**

b) Explain subsea production, separation and processing of oil gas and water. **[8]**

OR

**Q12)** Write a note on: **[16]**

a) Horizontal well completion.

b) Intelligent well completion.

c) Reservoir aspect of horizontal well technology.

d) Types of multilateral wells.



Total No. of Questions : 6]

SEAT No. :

**P2877**

**[5154]-264**

[Total No. of Pages :1

**B. E. (Petroleum Engineering)**  
**ADVANCE DRILLING ENGINEERING (Elective-III)**  
**(2008 Course) (Semester-II) (412389 A)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer all questions.*
- 2) *Answer Section I and Section II on separate answer sheet..*
- 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 derrick design criteria in detail. [8]  
b) Write note on ton mile and cut off practices of drilling line. [8]
- Q2)** a) What is Von Mises stress? Effect on casing design. [9]  
b) Write note on casing wear. [9]
- Q3)** a) Discuss CBL, VDL logs of cementing. [8]  
b) Discuss DST in detail. [8]

**SECTION-II**

- Q4)** a) Explain Chemo-Poro-Thermo-Plastic behavior of rock. [9]  
b) Write short note on failure of inclined well bore. [9]
- Q5)** Write short note on [16]  
a) MPD  
b) UBD
- Q6)** a) Explain horizontal well completion design in brief. [8]  
b) Discuss different types of well completions in brief. [8]



Total No. of Questions : 6]

SEAT No. :

**P2878**

**[5154]-265**

[Total No. of Pages :1

**B. E. (Petroleum Engineering)**  
**DEEP WATER TECHNOLOGY**  
**(2008 Course) (Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *All question are compulsory.*
- 2) *Write section I and section II on separate answer books.*
- 3) *Neat diagram 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 environmental forces acting on floaters. [9]  
b) Explain DP system of station keeping in detail. [9]
- Q2)** a) Discuss casing policy for deep water wells. [8]  
b) Discuss different riser components in detail. [8]
- Q3)** a) Explain well bore stability in directional wells. [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 deep water well EOR techniques in detail. [8]  
b) Explain Pipe line design for offshore. [8]
- Q6)** Write short note on [16]  
a) FPSO  
b) Gas Hydrates



Total No. of Questions : 8]

SEAT No. :

**P2879**

**[5154]-266**

[Total No. of Pages :3

**B. E. (Petroleum)**

**TRANSPORT OF OIL AND GAS**

**(2008 Course) (Semester-II) (412389C) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

**Q1)** 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 1000 psig. An engine-driven separable compressor is available from surplus. The engine is rated for 1,600 hp at 900rpm. 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]**

- 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 = 7000 ft, inlet pressure = 900 psi, temperature = 80 F.  $E = 0.004$ ,  $C = 120$ ,  $f = 0.032$  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

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



- d) Piping hookup
- e) Equivalent Stress Criterion for pipelines
- f) Hydrostatic Collapse

**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 the help of process diagram Gas to Gas monetization. [8]

## SECTION-II

**Q5) a)** Explain with the help of process diagram Gas to liquids. [8]

b) Explain Intelligent pigs for Purposes other than Metal Loss Detection.[8]

**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]

**Q7) a)** What is the HP required in compressing 1MMSCFD 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]

Explain friction factor for various flow types.

- 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 = 3cp, Length = 7,000 ft, inlet pressure = 700 psi, temperature = 80F.  $E = 0.004$ ,  $C = 120$ ,  $f = 0.032$  and  $0.034$  for 2" and 4" respectively. **[12]**
- b)** Explain Friction Factor for various Flow types. **[6]**



Total No. of Questions : 10]

SEAT No. :

**P2880**

**[5154]-267**

[Total No. of Pages : 3

**B.E. (Petroleum Engineering)**  
**ENVIRONMENT TECHNOLOGY AND SAFETY IN**  
**PETROLEUM INDUSTRY**  
**(2008 Pattern) (Semester - II) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from each section.*
- 2) *Que 5 & Que 10 are compulsory.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right side indicate full marks.*
- 6) *Use of non programmable electronic pocket calculator is allowed.*
- 7) *Assume Suitable data if necessary.*

**SECTION-I**

- Q1)** a) What are the types of solids contained in waste water? Give detailed classification. [6]
- b) Discuss the impact of natural gas flaring on Environment in details. What are the majors taken to reduce the impact? [6]
- c) What are characteristics of produced waters in Petroleum industry? How are these harmful to environment? [6]

OR

- Q2)** a) What is HAZOP Analysis? What are merits and demerits of HAZOP? [6]
- b) Discuss classification of Air Pollutants in details. [6]
- c) Discuss hazardous materials used in petroleum industry. [6]
- Q3)** a) Draw a simple flow sheet showing all aspects of produced water treatment. [8]
- b) What are Indian and International produced water discharge standard with reference to petroleum industry. [8]

OR

**P.T.O.**

- Q4)** a) Write note on Accidental discharges of petroleum fields to environment. [6]
- b) Explain any four important parameters used internationally to assess quality of produced wastewater. [6]
- c) What are physical principles used in following equipment Plate condensers, Gas /Air filtration units, hydro cyclones, skim pipes. [4]
- Q5)** a) What are methods to curb noise pollution from [8]
- i) Seismic operations ii) Compressions
- b) What are equipment used for treatment of produced water. What are demerits of DGF equipment? [8]

### **SECTION-II**

- Q6)** a) Write short notes on [6]
- i) Work Permit system
- ii) Root cause analysis
- iii) Job safety analysis.
- b) What are objectives of well abandonment and plugging? [4]
- c) Write merits and demerits of FMEA, JSA, what -if analysis. [6]

OR

- Q7)** a) Discuss in details on OHSAS 18001. [9]
- b) What are Safety audits? What are benefits of safety audits? [3]
- c) What are the procedures for onshore/ offshore well abandonment? [4]
- Q8)** a) What are environmental aspects of oil field operations with respect to
- i) Seismic
- ii) Drilling
- iii) Production
- iv) Offshore [6]

- b) What are the different types of primary & Secondary treatment available for wastewater treatment? Write in details about any two treatments. [6]
- c) What are effects of emulsification on the oil spills? [6]

OR

- Q9)**
- a) Discuss “ Biochemical Oxygen demand and Chemical Oxygen demand in details. [6]
  - b) What do you mean “ Sludge volume index” and give formula to calculate the same. Also, give values for good as well as poor sludge. [6]
  - c) What are effects of oil spills on aquatic life? [6]
- Q10)**
- a) What are common Legislation applicable to oil field operations. [6]
  - b) What are reactive/proactive system models of HSE management? [6]
  - c) Discuss factors affecting oil spill movements. [4]



Total No. of Questions : 6]

SEAT No. :

**P2881**

**[5154]-268**

[Total No. of Pages : 3

**B.E. (Petroleum)**

**PETROLEUM ECONOMICS**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Solve any two questions each from section I and II.*
- 3) *Use of graph paper is allowed.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume additional data if necessary.*

**SECTION - I**

**Q1) a) Answer the following in brief (any five):** **[15]**

- i) Hyperbolic Decline Curves.
- ii) Proven and Probable reserves.
- iii) Crude oil benchmarks blends.
- iv) Oil Price cycles and Geopolitics.
- v) Reserves Auditing.
- vi) Natural Gas major trade movements.
- vii) Gas Pricing in India.
- viii) Reserves to Production Ratio.

b) Explain in brief on effects of oil price on import bill in India. **[10]**

**Q2) a) Assume following data:** **[10]**

Current oil price of brand oil in international market is \$43.20. It is anticipated that the price will increase at a rate of 4.25% per year for first four years and then drop to an annual rate of 3.55% thereafter for next four years.

The producible oil has lower API than that brand oil along with higher Sulphur and TAN content, thus leading to a price differential of 9.25% with respect to the oil price quoted above.

Develop a forecast for oil price each for brand oil and the oil under consideration for a span of eight years.

b) Define and explain in brief the following, Incremental analysis, sensitivity analysis, and replacement analysis. **[15]**

**P.T.O.**

**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) An oil and gas company is considering one of the three available marginal fields for acquisition with project tenure of five years.

Property A will cost \$12 MM and will generate revenue of \$ 5.0 MM each for next five years. B will cost \$15MM and will generate revenue of \$ 6.2 MM in the first year which will decrease by \$ 1.0 MM every year. C will require \$ 18 MM with revenue of \$7.25 MM in the first year and a decrease of \$0.5 every year thereafter.

Rank the projects based on NPV. Consider the hurdle rate as 8%. [15]

## SECTION - II

**Q4) a)** Initial cost of the completely installed reactor is \$50,000 and its salvage value towards the completion of useful life is \$5000. Service life of the reactor is 6 years. Calculate its depreciation using Straight Line Depreciation (SLD) and Double Declining Balance (DDB) methods.

Prepare a plot of book value against number of years and compare the results obtained with different methods in your own words. [15]

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)** Explain **any three** of the following: [15]

i) Depreciation and Depletion

ii) Risk and uncertainty in project management

iii) Meaning and interpretation of EMV

iv) Reserves accretion and discovery of field size scenario in past 20 years.

v) Profitability in projects and equivalence of field size in different countries within the framework of Production sharing contract.

- 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  $1/4^{\text{th}}$  of its royalty to B and  $1/8^{\text{th}}$  of its royalty to C. D, the original lessee, then conveys the lease to E, retaining  $1/16^{\text{th}}$  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. [10]

- Q6)** a) What are the components of Production sharing contract in India? Explain the procedure for distribution of one barrel of oil between government and operator. Draw necessary diagrams. [15]
- b) An oil 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 : 10]

SEAT No. :

**P2882**

**[5154]-269**

[Total No. of Pages : 3

**B.E. (Petroleum Engineering)**

**PETROLEUM PRODUCTION ENHANCEMENT AND OPTIMIZATION  
(2008 Pattern) (Semester - II) (Elective - IV) (412390B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Answer 3 questions from Section I and 3 questions from Section II.*
- 3) *Figures to the right indicate full marks.*
- 4) *Q2 (two) in Section I is compulsory.*
- 5) *Either of Q 5 (five) or Q 6 (six) in Section II are compulsory.*
- 6) *Neat diagrams should be drawn wherever necessary.*
- 7) *Use of a non-programmable calculator, log-log, and semi-log paper is allowed.*
- 8) *Assume suitable data if necessary.*

**SECTION - I**

- Q1)** a) Write 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: 9,810 ft  
iii) 3 1/2" tubing 6.5 lb/ft  
iv) YF 130 with  $SG = 1$   
v) Rate = 40 bpm  
vi) Frictional pressure gradient = 400 psi / 1000 ft  
vii) Number of Perforations = 4 perfs/ft; Diameter of Perforations = 0.4"  
viii) Perforation friction = 12.7 psi  
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 DataFrac 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: [10]  
i) Casing 7", #29 to 3,500 ft  
ii) M.D. top perf 3,250 ft  
iii) M.D. bottom perf 3,348 ft  
iv) Fluid being pumped - OIL API gravity 35°  
v) ISIP = 1,400 psi  
b) What are the types of fracture models and how are they different from each other? Explain with appropriate diagrams. [6]

### SECTION - II

- Q5)** What do you mean by optimization? In general why it is necessary to go for optimization in Petroleum Production related processes or equipments? List, at least six general situations in which you may need to go for production optimization. [18]

OR

- Q6)** a) Draw the generic nature of following graphs and explain their role in optimization in brief: [12]  
i) Choke performance curves  
ii) Production rate Vs Flowing Bottom Hole Pressure  
iii) Pressure drop in tubing Vs Production rate at optimum GLR and for various GLR values  
b) How is a choke different from SSSV? List the reasons for which it is often necessary to control the flow through chokes. [6]

- Q7)** What are the various flow regimes that are encountered while flowing a two-phase liquid in the wellbore? [16]

OR

- Q8)** a) Write a various techniques or tools that are available to improve the production performance of a field. Explain any one of them along with application. [8]
- b) What is real time monitoring? Write the benefits of real time monitoring of surface and subsurface production system in oil and gas field. How it is useful in the diagnosis of system performance? Explain in brief. [8]
- Q9)** Discuss in brief, how long term planning and optimization techniques of well completion or well design for a high pressure, high permeability reservoir will help you to minimize following problems along with better production management and minimum water and gas coning. [16]
- a) Well stimulation.
- b) Re-perforation with reference to OWC and GOC.
- c) Water and gas shut off jobs.

OR

- Q10)** Discuss any one case study, in detail to explain the application and scope of production optimization that was applied either for a well bore or a field to improve the productivity. [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. :

**P2883**

**[5154]-270**

[Total No. of Pages : 1

**B.E. (Petroleum Engineering)**  
**WELL CONTROL METHODS**  
**(2008 Course) (Semester - II) (Elective - IV)**

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

**SECTION - I**

- Q1)** a) Discuss causes of abnormal pressure. [8]  
b) What are causes of kick and early warning signs? [8]
- Q2)** a) Explain Gas influx behavior in open hole with suitable sketch. [8]  
b) Write short note on: [8]  
i) ECD  
ii) MAASP
- Q3)** a) Explain use of Diverters in details. [9]  
b) Explain choke manifold with suitable sketch. [9]

**SECTION - II**

- Q4)** a) Discuss weight and wait method in brief. [9]  
b) Describe unusual problems of well control in brief. [9]
- Q5)** a) Draw Subsea BOP Stack. [8]  
b) Describe function test of surface BOP. [8]
- Q6)** Write short note on: [16]  
a) Stripping operation  
b) Underground blow out.



Total No. of Questions : 8]

SEAT No. :

**P2884**

**[5154]-271**

[Total No. of Pages : 2

**B.E. (Petrochemical)  
REACTION ENGINEERING - II  
(2008 Pattern) (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 where ever necessary.*
- 5) *Use of steam tables and electronic calculator is allowed.*

**SECTION-I**

**Q1)** A chemical R, is produced by liquid phase hydration of P over a catalyst. Derive a rate law based on Langmuir-Hinshelwood theory assuming.

- a) Surface reaction is rate limiting
- b) Adsorption of P is rate-limiting. [16]

**Q2)** Discuss laboratory reactors and methods used to establish kinetics of gas solid catalytic reactions. [18]

**Q3)** Derive an expression for effectiveness factor for a porous catalyst that is valid for any shape and arbitrary kinetics. [16]

**Q4)** Discuss in brief: [16]

- a) Choice of catalyst pellet diameter
- b) Effects of pore diffusion on reactor design
- c) Merits of trickle bed reactor
- d) Catalyst deactivation

**P.T.O.**

## SECTION-II

- Q5)** Discuss and draw typical concentration profiles for gas and liquid films for various regimes obtained in gas-liquid reactions. Derive relationship giving enhancement factor for any one of them. **[16]**
- Q6)** An acidic impurity A in a gaseous feed is to be removed so as to reduce its partial pressure from 3500 Pa to 100 Pa (total pressure is 250 KPa) by reacting it with a base B dissolved in water in a tower having regular packings. Overall gas side mass transfer coefficient is  $0.0065 \text{ mol/hr.m}^3\text{.Pa}$ . Gas side resistance to mass transport in absence of the reaction is 20% whereas the liquid film contributes the remaining resistance. Henry's constant is  $155 \text{ Pa.m}^3\text{/mol}$ . L/G ratio is 4 mol/mol. Calculate minimum height of the tower required. **[18]**
- Q7)** Derive time-conversion relationship for a spherical particle reacting in a constant gas environment assuming that reaction at the shrinking core controls the overall rate. **[16]**
- Q8)** a) Give merits and demerits of fixed bed and fluidized bed reactors. **[8]**  
b) Discuss non-ideal flow patterns obtained in reactors. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P2885**

**[5154]-273**

[Total No. of Pages : 3

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Describe aquatic eco system with neat diagram. [5]
- b) Discuss in detailed about separation, handling and transportation of Biomedical waste. [6]
- c) Discuss the mechanism of formation of ozone layer? What are the harmful effects of Ozone layer depletion? [5]

OR

- Q2)** a) What is Kyoto Protocol & CDM? How and when CDM can be applicable? How it can be helpful for developing countries? [4]
- b) Discuss the role of Environmental Engineer for pollution control. [7]
- c) Enlist various types of hazardous waste. [5]

- Q3)** a) With the help of flow diagram, explain 'Ethyl Amine Process' for removal of acidic pollutants from gaseous emissions from petroleum industries. [6]
- b) Discuss the important laws and standard for control of air pollution. [4]
- c) Write a note on factors on which choice of Air pollution Control equipment depends. [6]

OR

**P.T.O.**

- Q4)** a) Discuss at least three basic mechanisms with principle, working, advantages and disadvantages for removing particulate matter from gas streams. [8]
- b) Discuss the sources and ill effects of any four gaseous pollutants in details. [8]
- Q5)** a) Write short note on Objectives of using air pollution Control Equipment. [4]
- b) Discuss the Meteorology factors influencing air pollution. [8]
- c) A conventional cyclone with diameter 2 m handles 6 m<sup>3</sup>/s of standard air carrying particles with a density of 2000 kg/m<sup>3</sup>. 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 ( $\mu$  g) as  $1.81 \times 10^{-5}$  kg/ (m.s.). Neglect the density of the gas. [6]

OR

- Q6)** Write a short note on following: (Any 4) [18]
- a) Source Correction method for air pollution.
- b) Effect of gas flaring.
- c) Control of NO<sub>x</sub> in a complex fertilizer plant.
- d) Solid waste disposal by incineration.
- e) Green House effect.
- f) Ventury Scrubber.

### **SECTION - II**

- Q7)** a) Write in short importance of BOD test. Give the limitations of BOD test. What is ultimate BOD? [8]
- b) Discuss various physical and chemical characteristics of wastewater. [4]
- c) What is Chemical Oxygen demand? Can we determine tentative BOD of wastewater if its COD is known? How? [4]

OR

- Q8)** a) Write the detailed classification of solids found in waste water. [6]
- b) Discuss general standards for quality of water for different purposes. [6]
- c) Discuss the different water pollution laws and standards which protect water from pollution. [4]



- Q9)** a) Compare between the Trickling filter and Activated sludge systems (Minimum 5 points). [4]
- b) Discuss various methods of recovery of materials from process effluents. [6]
- c) Discuss principle, construction, working, advantages and disadvantages of trickling filter with neat sketch. [6]

OR

- Q10)**a) Explain activated sludge process for waste water treatment and give design criteria for the design of its reactor. Draw the flow chart for conventional activated sludge process. [8]
- b) Differentiate between suspended culture growth process and attached culture growth process. Give one example, of each, of treatment method which works on above principle. [8]

- Q11)**a) Discuss the sources and method of treatment for Refinery liquid waste with neat sketch. [9]
- b) Discuss the sources and treatment method for dairy industry waste water with neat sketch. [9]

OR

- Q12)** Write a short note on (Any four): [18]
- a) Role of MPCB & CPCB.
- b) OSHA.
- c) ISO 14000.
- d) Importance of regulations for hazardous waste.
- e) Paper & pulp mill waste treatment.
- f) Sanitary land filling operations.



Total No. of Questions : 8]

SEAT No. :

**P2886**

**[5154]-275**

[Total No. of Pages : 3

**B.E. (Petrochemical Engineering)**  
**NOVEL SEPARATION PROCESSES**  
**(2008 Course)(Semester - I) (Elective - I) (412404 B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Draw concentration profiles for membrane processes for following cases:[8]
- i) two gas films and a solid
  - ii) two liquid films and a solid
- b) Explain the process principles involved in Surfactant based separation processes. Indicate its Industrial applications. [8]
- Q2)** a) Classify membrane separation processes by giving examples and its industrial applications. [8]
- b) Discuss with suitable examples the selection criteria for chemical engineering separation processes. [8]
- Q3)** Classify the models for gas separation by membranes. Develop the counter current model for membrane separation processes. State the assumption made. State also solution strategy for solution of model equations. [18]
- Q4)** Discuss in detail various membrane modules with neat sketches for membrane separation processes. State also merits and demerits of each module. [16]

**P.T.O.**

## SECTION - II

**Q5) a)** In a given run using a flow rate of 0.25 m<sup>3</sup>/hr in an ion-exchange tower with a column height of 0.4 m, the break point occurred at 10 min. The ratio of usable capacity to total capacity is 0.65. What is the height of similar operating for 14 min. to the break point at the same flow rate?[10]

b) Write a brief note on: “Adsorption Hysteresis”. [6]

**Q6)** From Darcy’s Law, the velocity through a packed bed for a given pressure drop (P) is given by: [16]

$$u = \frac{\phi P d_p^2}{1\eta}$$

where,

$\phi$  = Darcy’s constant

P = Pressure drop

$d_p$  = Particle diameter

1 = Length of column

$\eta$  = Viscosity of the mobile phase

Also, from the analysis of the Van Deemter equation, for a well packed column and for a highly retained solute, it is found that:

$$H_{\min} = 2.48d_p$$

and the velocity at  $H_{\min}$  is equal to  $\frac{1.62 D_m}{d_p}$

where  $D_m$  is the diffusivity of the solute in the mobile phase.

From the above information, derive an analytical expression for the maximum efficiency obtainable for a column in terms of these parameters, if the maximum allowable pressure drop is P.

**Q7)** Emmett (1954) studied the adsorption of argon on 0.60 gm of silica gel at  $-185^{\circ}\text{C}$ . Using the BET equation and data given below, calculate the surface area of the adsorbent. **[18]**

P, [mm Hg]	78.46	176.92	224.62	378.46	432.31	515.38	584.62
Volume adsorbed [(cm <sup>3</sup> (STP))]	55.03	72.73	80.00	106.67	117.58	138.18	166.06

The surface area of adsorbent can be related to the volume of gas adsorbed in the mono layer by expression:

$$S_g = 4.45 \times 10^4 V_m$$

**Q8)** Write notes on **[16]**

- a) Iso electric Focusing.
- b) Zone Melting.
- c) PSA and TSA.
- d) Bioseparations.

**x      x      x**

Total No. of Questions : 12]

SEAT No. :

**P2887**

**[5154]-276**

[Total No. of Pages : 2

**B.E. (Petrochemical Engineering)**  
**ELEMENTS OF FLUIDIZATION ENGINEERING**  
**(2008 Course) (412404 C) (Semester - I) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *Answer 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) Draw the various contacting schemes of solid and gas. [9]  
b) Write a note on hydrodynamics of fluidization. [9]

OR

- Q2)** a) Write a note on the industrial gas distributors. [9]  
b) Give the advantages and disadvantages of fluidization. [9]

- Q3)** a) Draw the Geldart chart for classification of particles. Hence explain Geldart B particles. [8]  
b) Derive the formula for minimum fluidization velocity. [8]

OR

- Q4)** a) Write a note on fluidization with carryover of particles. [8]  
b) Write a note on the terminal velocity of particles. [8]

- Q5)** a) What is the need for different measurements in fluidization? Hence classify the measurement techniques in fluidization. [8]  
b) Write a note on the simple two phase model. [8]

OR

**P.T.O.**

- Q6)** a) Discuss bubble dynamics in a fluidized bed. [8]  
b) A feed consisting of two sizes of solids is to be treated in a pilot-plant fluidized bed reactor. The solids remain unchanged in size and density and elutriation occurs. Find the composition and flow rates of the entrained and overflow streams.

Data

*Feed:*  $F_0 = 2.7$ ,  $F_0$ , fines = 0.9,  $F_0$  coarse = 1.8 kg/min

*Bed weight:*  $W = 17$  kg,

*Elutriation:*  $K_{\text{fines}} = 0.8$ ,  $K_{\text{coarse}} = 0.0125/\text{min}$  [8]

**SECTION - II**

- Q7)** a) Discuss the single particle theory for fluid to particle heat transfer in a fluidized bed. [8]  
b) Discuss the various factors affecting the mass transfer rate in a fluidized bed. [8]

OR

- Q8)** a) Write a note on immersed horizontal cylinder to bed heat transfer. [8]  
b) Discuss the wall to fluid heat transfer in a fluidized bed. [8]

- Q9)** a) Give the effect of pressure on fluidized bed. [8]  
b) Write a note on cloudless and clouded bubbles. [8]

OR

- Q10)** a) Discuss Coalescence and splitting of bubbles in a dense bed. [8]  
b) What is slug flow? Give the importance of slug flow in fluidized beds. [8]

- Q11)** a) Discuss the design of a fluidized bed dryer for Geldart D particles. [9]  
b) Give the factors affecting the design of catalytic reactors. [9]

OR

- Q12)** a) Discuss the operational features of fluidized bed boilers. [9]  
b) Discuss the shrinking core model for solids of unchanging size in non-catalytic reactors. [9]

**x x x**

Total No. of Questions : 8]

SEAT No. :

**P2888**

**[5154]-277**

[Total No. of Pages : 2

**B.E. (Petrochemical Engineering)  
GREEN CHEMISTRY  
(2008 Pattern) (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 concepts of environmental management systems and ecolevels and how they can be applied to medium sector in Indian context. **[16]**
- Q2)** Explain in detail the concept of biorefinery. **[16]**
- Q3)** State and discuss in detail any six principles of green chemistry with appropriate real life examples. **[16]**
- Q4)** Explain in detail the principles behind. **[18]**
- a) Photochemical synthesis.
  - b) Phase Transfer Catalysis.

**SECTION - II**

- Q5)** a) Discuss any example in which green process has replaced a conventional process.
- b) Give an industrial example of electro-organic synthesis. **[16]**

**P.T.O.**

**Q6)** Discuss the scope for using process intensification strategies in chemical manufacture. **[16]**

**Q7)** Discuss how green chemistry approach takes care of environmental conservation. **[16]**

**Q8)** Write notes : **[18]**

- a) Alternative Energy Potential for India.
- b) Carbon footprint of a process.





Total No. of Questions : 12]

SEAT No. :

P3621

[Total No. of Pages : 2

[5154]-278

B.E. (Petrochemical Engineering)

OPTIMIZATION TECHNIQUES FOR PROCESS INDUSTRIES

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

**SECTION - I**

Q1) What are Isoperimetric Objects? Explain the concept in details with diagram. [16]

OR

Q2) Enlist and explain in details any two types of Optimization problems. [16]

Q3) Note the steps involved in simplex method as a numerical optimization method. [16]

OR

Q4) Solve the following optimization problem by using Linear Programming method: [16]

Minimize  $Z = 4x_1 - x_2$

$x_1, x_2$

Subject to  $2x_1 + x_2 \leq 8$  Storage Constraint

$x_2 \leq 5$  Availability Constraint

P.T.O.

**Q5)** What is Unbounded solution? With representative diagram, explain the feasibility of solution. **[18]**

OR

**Q6)** With design diagrams, explain the Golden search method for multivariable optimization. **[18]**

### **SECTION - II**

**Q7)** With neat diagram, explain the Constrained NLP minimization with equalities and inequalities. **[16]**

OR

**Q8)** Show that, BFGS updating guarantees a “direction matrix” that is positive, definite and symmetric, which can be numerically “better” than a poorly behaved Hessian. **[16]**

**Q9)** Draw and explain the generalized Bender’s decomposition (GBD) and outer-approximation (OA) algorithms. **[16]**

OR

**Q10)** With schematic diagram of a GA, note the different strategies for developing the next generation using crossover, mutation, and immigration techniques. **[16]**

**Q11)** A biomass pellet fired furnace has to be optimized for heat recovery. With schematic diagram, explain optimization strategy. **[18]**

OR

**Q12)** In a refinery, supply network of crude oil from different exploration location is to be developed. Note the steps involved in developing the network. **[18]**



Total No. of Questions : 12]

SEAT No. :

**P2889**

**[5154]-280**

[Total No. of Pages : 4

**B.E. (Petrochemical Engineering)**  
**NATURAL GAS TECHNOLOGY**  
**(2008 Course) (412405 C) (Semester - I) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *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) Elaborate on different types of natural gas composition and regional disparities. [8]
- b) Describe origin of natural gas. [8]

OR

- Q2)** a) Explain in detail bacterial gas reservoir. [8]
- b) Discuss the out look for world gas production. [8]

- Q3)** a) Explain in detail sampling methods of natural gas. [8]
- b) Discuss sour gas and sweet gas. [6]
- c) Discuss measurements taken during sampling. [4]

OR

**P.T.O.**

- Q4)** a) Discuss the components present in the natural gas. [8]  
 b) Find the viscosity for a gas with composition in mole % of  $C_1 = 90.5$ ,  $C_2 = 2.3$ ,  $C_3 = 2.3$  at 3000 psia and 540°R. [6]  
 Data:

Mi	Pci	Tci	$\mu_{gi}$
16.043	667.8	343.1	0.0110
30.070	707.8	549.8	0.0092
44.097	616.3	665.7	0.0082

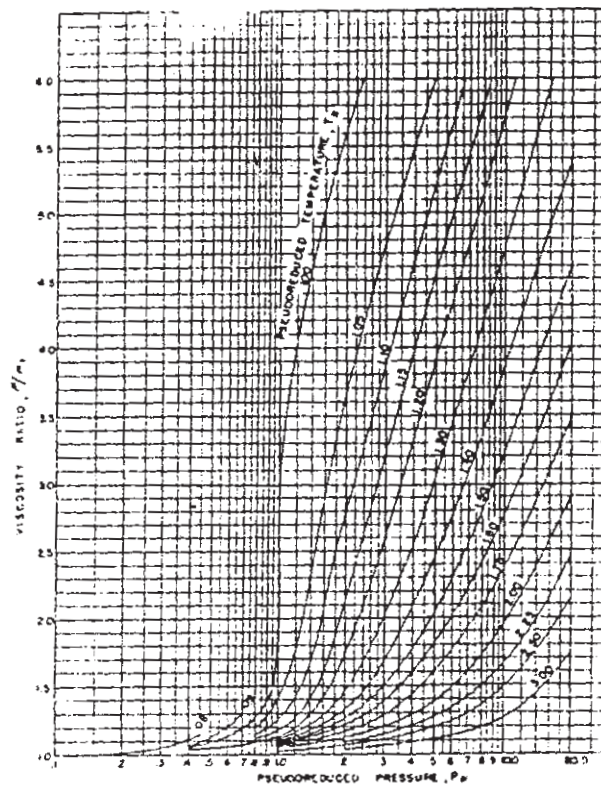


Figure 4-1. Viscosity ratio versus pseudoreduced pressure.

- c) Draw phase diagrams of a dry gas and a wet gas showing conditions in the reservoir as well as at the surface and describe same in brief. [4]

- Q5)** a) Elaborate on measurement of water content of natural gas. [6]  
 b) Explain in detail phase diagram for hydrate formation. [6]  
 c) Write a short note on hydrate formation during drilling. [4]

OR

- Q6)** a) Describe in detail nucleation step in hydrate formation. [6]  
b) Elaborate on hydrate structures. [6]  
c) Write a short note on hydrate inhibitors. [4]

**SECTION - II**

- Q7)** a) Explain in detail dehydration of natural gas by absorption. [8]  
b) Describe with flow sheet compression refrigeration cycle for natural gas. [8]

OR

- Q8)** a) A separator to be operated at 1000 psia, is required to handle a well stream with gas flow rate 7 mmscfd at GLR 40 bbl/mmscf. Determine the separator size required for [8]  
i) vertical separator  
ii) horizontal single-tube separator  
iii) spherical separator  
Assume a liquid (oil + water) density of 52 lbm/ft<sup>3</sup>, ideal gas with gravity 0.8, operating temperature equal to 110°F, a retention time 3 min and ½ full of liquid conditions.
- b) Describe with flow sheet acid gas removal by potassium carbonate process. [8]

- Q9)** a) Explain with flow sheet natural gas liquefaction using TEALARC process with one pressure level. [6]  
b) Explain in detail construction and working of centrifugal compressor. [6]  
c) Discuss LNG carriers with Technigaz integrated tank. [6]

OR

- Q10)** a) Discuss safety precautions for natural gas pipeline. [6]  
b) Elaborate on existing LNG terminal in India. [6]  
c) Write a short note on LNG carriers. [6]

- Q11)a)** Describe in detail production of higher alcohols and ethers from methane. [8]
- b) Describe with flow sheet Fisher-Tropsch synthesis process in moving bed reactors. [8]

OR

- Q12)a)** Explain in detail methanol production using ICI process. [8]
- b) Write a short note on [8]
- i) Production of synthesis gas by indirect conversion process.
  - ii) Oxidative coupling process.

**x x x**

Total No. of Questions :8]

SEAT No. :

[Total No. of Pages :5

**P2890**

**[5154] - 282**

**B.E. (Petrochemical)**

**REFINERY PROCESS DESIGN**

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

*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 if necessary.*

**SECTION-I**

**Q1)** Vapor leaving the topmost tray in a multicomponent distillation column consists of 30 Mol% n-butane, 40 Mol% n-pentane, and 30 Mol% n-hexane. Column pressure is 6 bar. Vapor is fed to a total condenser from which reflux is returned to the column. If reflux ratio is 3, calculate vapor and liquid compositions for 2 theoretical plates below the top plate. **[18]**

**Q2)** Feed to a C2 splitter is 20% vaporized liquid having 50% ethylene and 50% ethane (Mol%). The column operates at 14 bar pressure. Purities of both top and bottom products are expected to be 99.9%. Calculate minimum reflux ratio and the number of theoretical stages needed for the separation. Use FUG method. **[16]**

**Q3) a)** Discuss rating and design problems in refinery context. **[8]**

b) Explain how coil outlet temperature (COT) for VDU feed can be determined. **[8]**

**P.T.O.**

- Q4)** a) Discuss hydraulic problems in distillation column. [8]  
b) Explain feed-forward control scheme used in distillation operation. [8]

### 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 heavy oils.  
ii) Tube side heat transfer coefficient.  
iii) Correction factor  $F_T$ .  
iv) Shell side pressure drop.  
v) Baffle spacing.  
b) State the approximate heat transfer coefficients you will assume in the following situations: [2]  
i) Organic vapor condensing on shell side.  
ii) Hydrocarbon liquid boiling on tube side.
- Q6)** a) Discuss in brief a method for box furnace design. [10]  
b) Draw constructional features of fired heater used in reforming unit. [6]
- Q7)** With reference to centrifugal pump operation and design, discuss: [18]  
a) NPSHR  
b) Energy Optimization  
c) Operating Point
- Q8)** Discuss  
a) Importance of Anti-surge control in Centrifugal Compressor. [5]  
b) Centrifugal Vs Reciprocating Pump. [5]  
c) Choice of a process pump. [6]



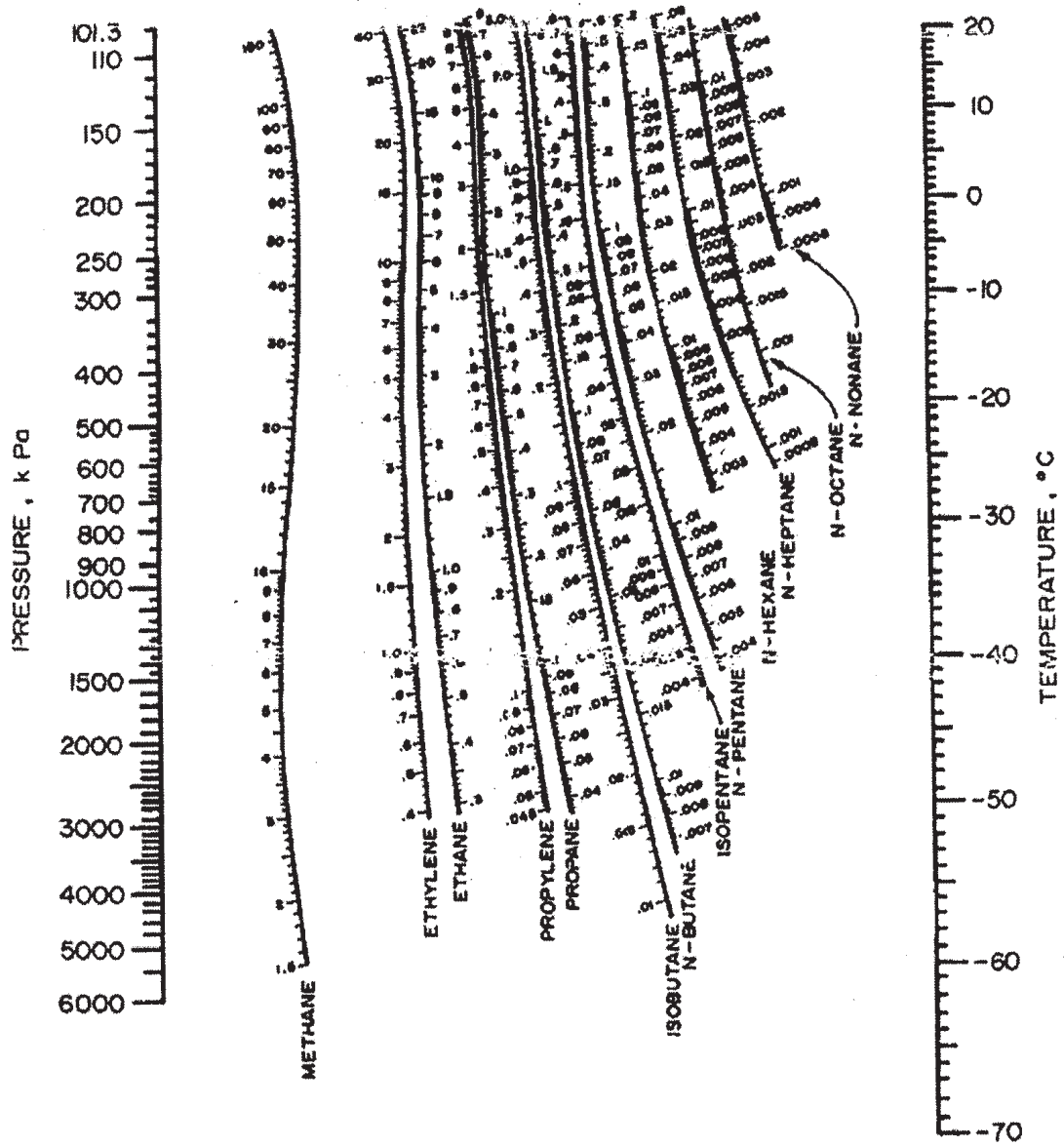


FIG 1: K-Chart for low temperature range

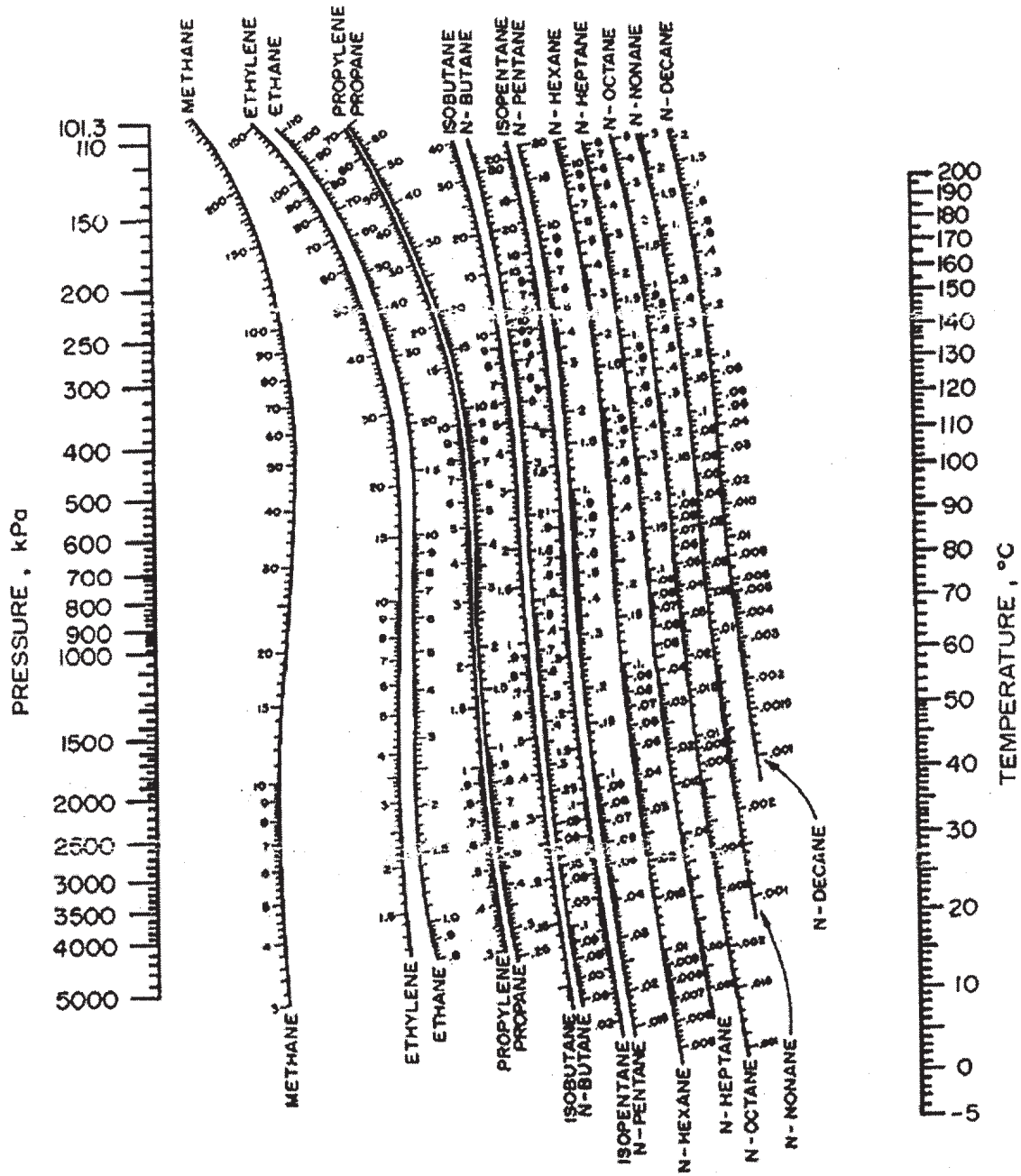
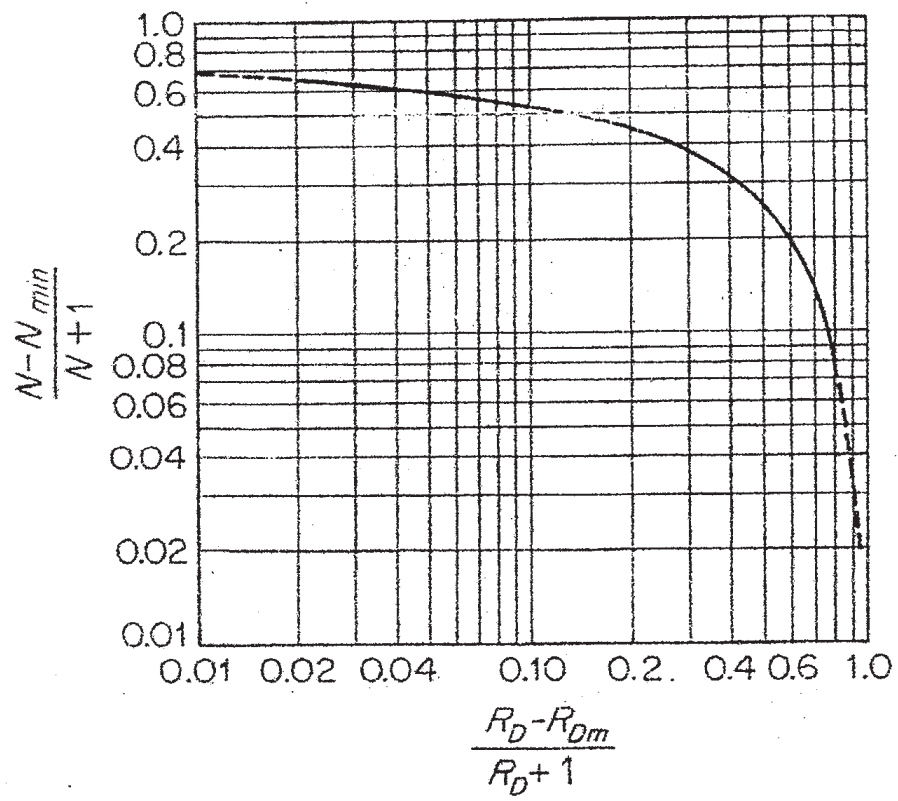


FIG 2: K-Chart for high temperature range



**FIG 3: Gilliland Curve**

*EEE*

Total No. of Questions : 8]

SEAT No. :

**P2891**

**[5154]-283**

[Total No. of Pages : 2

**B.E.(Petrochemical)**

**PLANT DESIGN & PROCESS ECONOMICS**

**(2008 Pattern) (Semester - II) (412409)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain anatomy of chemical engineering project. [6]  
b) Describe importance of trip and interlock systems in petrochemical plants. [6]  
c) Describe the off site facilities required for chemical engineering project. [6]
- Q2)** With suitable example explain steps involved in process development and commercialization. [16]
- Q3)** a) Describe guidelines used for preparing P&ID diagram for given plant. [8]  
b) Explain fire protection systems used in chemical plants. [8]
- Q4)** a) Describe the guidelines used while preparing good site layout and plant layout. [8]  
b) Explain PERT & CPM techniques used for project monitoring and control. [8]

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

## SECTION-II

**Q5) a)** Explain different types and methods of cost estimation. [8]

b) Explain the components of total cost of the project. [8]

**Q6) a)** A factory is producing 1000 samples per hour on a machine. The material cost is Rs.300, direct labour cost of Rs.200, and direct expense is Rs.100. The factory overheads are 150% of total labour cost and administrative cost is 30% of manufacturing cost. If the selling price of each sample is Rs.2, calculate whether management is going in loss or gain and by what amount? [8]

b) Define various cost indices and state William's sixth tenth rule. [8]

**Q7)** Company has 4 alternative designs given below. Select best among them so that minimum 10% ROR on investment is obtained. [16]

Item	Design-I	II	III	IV
Operating cost/yr	100	100	100	100
Fixed charges (% of initial cost)	20	20	20	20
Cash flow/yr.	4000	6000	6900	8850
Initial cost	10,000	16,000	20,000	26,000

**Q8)** Write short notes on the following: [18]

a) Direct/Indirect manufacturing cost.

b) Present worth and discount annuities.

c) Break-even analysis.



Total No. of Questions : 12]

SEAT No. :

P2892

[5154]-284

[Total No. of Pages :2

**B. E. (Petrochemical Engineering)**  
**PROCESS MODELING AND SIMULATION**  
**(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 answer books.
- 2) Answer any three questions from each section.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Figures to the right side indicate full marks.
- 5) Use of Calculator is allowed.
- 6) Assume Suitable data if necessary.

**SECTION-I**

**Q1)** With schematic, explain the process design principles and factors applied in modeling of petrochemical process plants. [16]

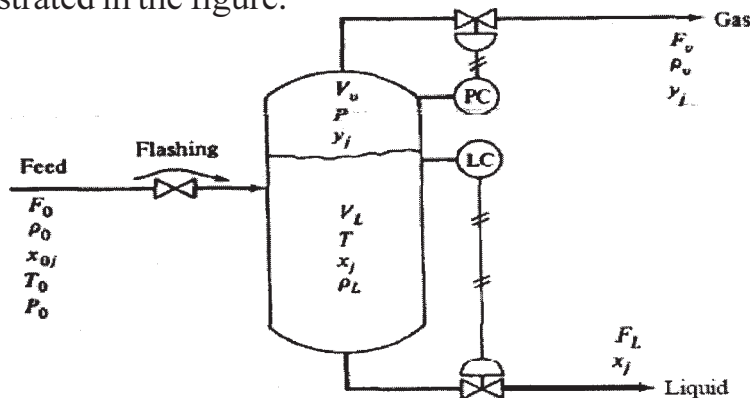
OR

**Q2)** Two liquid feeds are pumped into a reactor in which they react to form products. The reaction is exothermic, and therefore heat must be removed from the reactor. This is accomplished by adding cooling water to a jacket surrounding the reactor. Reactor effluent is pumped through a preheater into a distillation column that splits it into two product streams. With neat flow diagram, explain the steady state design procedure specifying the various pieces of equipment in the plant. [16]

**Q3)** A consultant company SR is developing process models for a divided wall column. Being the lead engineer, describe various steps with proper assumptions for developing model equations and process design. [18]

OR

**Q4)** Develop steady state mathematical model for a multi component flash drum as illustrated in the figure. [18]



**P.T.O.**

**Q5)** 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  $y'(0) = -2$

OR

**Q6)** Solve the following equation by using fourth order Rungee-Kutta method to find  $y$  at  $x = 0.1$  using  $h = 0.1$ : [16]

$$\frac{dy}{dx} = x + y + xy \quad [x_0 = 0, y_0 = 1]$$

### **SECTION-II**

**Q7)** Applications of supercomputing facilities have helped in online optimization of refinery operations. Ease of doing is induced by such efforts. Justify this statement with architecture of DCS system for refinery automization. [18]

OR

**Q8)** Carberry reactors are used for enhanced yields of multiphase reactions. With example, draw the sketch and show various components of the reactor. Also describe in details the functioning of the reactor. [18]

**Q9)** Explain Inventory Control Model applied to state space models in Isomerization unit for better gasoline fuel quality. [16]

OR

**Q10)** Design a model involving time constraint to describe Fluidized Catalytic Cracking unit. [16]

**Q11)** With neat labeled diagram, describe Interaction and Non-interacting models for processes in a tank farm. [16]

OR

**Q12)** Enlist and briefly describe any four major applications of imperical models in downstream processing. [16]



Total No. of Questions : 8]

SEAT No. :

**P2893**

**[5154]-285**

[Total No. of Pages : 2

**B.E. (Petrochemical Engineering)  
FINE CHEMICAL INDUSTRIES  
(2008 Course) (Semester - II) (Elective -III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Compare fine chemicals with bulk chemicals. Give pertinent examples of fine and bulk chemicals. [10]  
b) Discuss green synthesis. [8]
- Q2)** a) Explain role of catalyst in fine chemical processes with examples. [8]  
b) Discuss market trends in global fine chemicals sector. [8]
- Q3)** a) Discuss novel separation technologies crucial to fine chemicals manufacture. [10]  
b) Discuss markets for fine chemicals at national level. [6]
- Q4)** a) Explain the concept of mixed plants with reference to fine chemicals. [10]  
b) Discuss how waste generation is minimized in fine chemicals manufacture. [6]

*P.T.O.*



## SECTION - II

- Q5)** a) Compare batch operation with continuous one. [9]  
b) Discuss scale down methodologies. [9]
- Q6)** a) Discuss in detail manufacturing process for any dye intermediate. [10]  
b) Explain the effect of scale of operation on economy of a process plant with reference to fine chemical sector. [6]
- Q7)** a) Write a note on ion exchange resins as catalysts. [10]  
b) Discuss alternative feed-stocks for manufacturing fine chemicals. [6]
- Q8)** Write notes: [16]  
a) Supercritical Extraction.  
b) Homogeneous catalysis.

⊗ ⊗ ⊗

Total No. of Questions : 9]

SEAT No. :

**P2894**

**[5154]-288**

[Total No. of Pages : 2

**B.E. (Petrochemical Engineering)**

**PETROLEUM EXPLORATION AND PRODUCTION OPERATIONS**

**(2008 Pattern) (Semester - II) (412411 A) (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) *All questions are compulsory.*
- 3) *Figures to the right indicate marks.*
- 4) *Draw suitable diagram wherever necessary.*

**SECTION - I**

**Q1)** Describe important physical and chemical properties of crude oil and natural gas. **[15]**

**Q2)** Describe a typical petroleum system with respect to source rock, reservoir rock, cap rock, trap at timing. **[15]**

OR

**Q3)** Write short notes on **any three** of the following: **[15]**

- a) Reservoir drive mechanisms.
- b) Reserves estimation.
- c) Types and uses of oil well logging surveys and
- d) Geological risk analysis.

**Q4)** a) Explain the geochemical aspects of transformation of organic matter into hydrocarbon in a sedimentary basin. **[10]**

- b) Write in brief use of different logs in the understanding of porosity of formations. **[10]**

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

## SECTION - II

**Q5)** a) Explain with the help of neat sketches any two well completion methods. [10]

b) What are commonly encountered problems during drilling? [5]

OR

**Q6)** a) What are the components of well control system? [5]

b) Why is it necessary to use different logs for evaluation of formation? [10]

**Q7)** Write in brief on chemical EOR methods. [15]

OR

**Q8)** a) What are the surface and subsurface components of Electrical Submersible Pumps? [5]

b) Explain in brief probable reasons for production decline in case of oil and gas wells. [10]

**Q9)** Write short notes on any four of the following: [20]

a) Factors that balance demand and supply of petroleum.

b) India's hydrocarbon potential.

c) Importance of natural gas for Indian industry.

d) Environmental impact of oil spills in offshore area.

e) Applications of microbiology in oil industry, and

f) Refineries in India.



Total No. of Questions : 8]

SEAT No. :

**P2895**

**[5154]-289**

[Total No. of Pages : 3

**B.E. (Petrochemical Engineering)**  
**CATALYST SCIENCE AND TECHNOLOGY**  
**(2008 Course) (Semester - II) (Elective - IV) (412411 B)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *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 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) With the help of neat sketch explain how catalyst changes reaction pathways. **[10]**
- b) Define the following terms: **[8]**
- i) Selectivity
  - ii) Activity
  - iii) Functionality
  - iv) Turnover Number
- Q2)** a) Differentiate between Langmuir-Hinshelwood and Rideal model for catalytic reactions. **[8]**
- b) Write a note on: Regenerability of Spent Catalysts. **[8]**

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

**Q3)** The adsorption of ethane as Linde molecular sieve 5A°, was studied by Glessner and Myers (1969) at 35°C. [16]

P, [mm Hg]	U take, V[cm <sup>3</sup> (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

- Using the data given above determine if the Langmuir equation can be used to model the data.
- Calculate the total surface solid, if density of ethane = 0.3549 gm/cc.

**Q4)** a) Explain the BET method to determine the surface area of catalysts. [8]

b) What is catalyst poisoning? Explain various types of poisons. [8]

## SECTION - II

**Q5)** a) Explain diffusion in porous catalysts with suitable sketch. [6]

b) Explain various methods for catalyst synthesis. Explain any one method in detail. [8]

c) Write a brief note on: Catalyst Inhibitors and Promoters. [4]

**Q6)** a) Discuss the method of acid strength. Explain various sources of acidity in catalyst surface. [8]

b) With the help of neat diagram discuss FCC with emphasis on catalyst used, operating condition, reaction time and regeneration of catalysts. [8]

**Q7)** a) Discuss the manufacture process of phthalic anhydride. Give schematic diagram of reactor configuration, catalyst used, operating conditions and hot spot formation. **[10]**

b) Write a brief note on: Multitubular Catalytic Reactor. **[6]**

**Q8)** Write notes on: **[16]**

a) Catalytic Reformer.

b) Methanol Synthesis Reactor.

c) Multiphase catalysis for processing of Hydrocarbons.



Total No. of Questions : 8]

SEAT No. :

**P2896**

**[5154]-290**

[Total No. of Pages : 2

**B.E. (Petrochemical Engineering)**  
**POLYMER REACTION ENGINEERING**  
**(2008 Course) (Semester - II) (Elective - IV) (412411 - C)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Solve any three questions from each section.*
- 3) *Numbers to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

**SECTION - I**

- Q1)** a) Explain in detail the design considerations in Polymerization Reactors. **[8]**  
b) Give industrial examples of addition polymerization and condensation polymerization. **[8]**

- Q2)** a) Discuss Free radical polymerization mechanism. **[9]**  
b) In case of free radical polymerization, derive the necessary equation of the rate of Initiation in terms of Initiator concentration. **[9]**

- Q3)** Styrene is polymerized in batch reactor at 60°C with the free radical initiator. The initial concentration of styrene is 5 mole/lit, and the concentration of initiator is kept constant at 0.06 mole/lit. Assume termination takes place only by combination. The constants are: **[16]**

$$K_0 = 7 \times 10^{-6} \text{ sec}^{-1}, k_p = 160 \text{ lit/gmole}\cdot\text{sec}, k_c = 1.0 \times 10^7 \text{ lit/gmole}\cdot\text{sec}, f = 0.8.$$

The volume of the reactor occupied by the reacting mixture is 3200 lit.

For a reaction time of 40 min, compute the following:

- a) The percentage of the styrene converted,
- b) The average molecular weight of the product.

**P.T.O.**

- Q4)** Give definitions: **[16]**
- a) Weight Fraction.
  - b) First moment of  $P_j$ 's.
  - c) Number Average Degree of Polymerization.
  - d) Weight Average Degree of Polymerization.
  - e) Number Average Molecular Weight.
  - f) Weight Average Molecular Weight.

**SECTION - II**

- Q5)** a) Discuss industrially important copolymers. **[8]**  
b) Discuss copolymer behavior based on monomer reactivity ratio. **[8]**
- Q6)** a) Write a note on Aqueous Emulsifier Solutions. **[6]**  
b) Derive the necessary equation for the steady state population balance for the particles having 'n' radicals in Emulsion polymerization. **[10]**
- Q7)** a) Explain the factors taken into consideration while choosing a reactor type for polymerization reaction. **[9]**  
b) Explain process control strategies employed in polymerization process. **[9]**
- Q8)** Draw and discuss process flow diagram for the manufacture of **[16]**
- a) Nylon 6
  - b) Polyvinyl Chloride.





Total No. of Questions : 6]

SEAT No. :

**P2897**

**[5154]-291**

[Total No. of Pages : 1

**B.E.(Printing)**

**TECHNOLOGY OF GRAVURE**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** Explain in detail making of laser etching of a Gravure cylinder. [18]

OR

Explain Gravure cylinder making by engraving process. [18]

**Q2)** Explain the role of Copper, Nickel and Chrome in cylinder making. [16]

OR

Explain voltage effect, efficiency factor, chemistry of electrolyte and Current density for plating a gravure cylinder . [16]

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

OR

Explain various resins used in inks used for gravure process. [16]

**SECTION - II**

**Q4)** Explain in detail closed loop inking system for a gravure press. [18]

OR

Explain in detail doctor blade loading system of gravure press. [18]

**Q5)** Explain in detail preparation of an impression roller for a gravure press. [16]

OR

Explain the impact of pressure and hardness on gravure print quality. [16]

**Q6)** Explain in detail shaft-less technology for a gravure press. [16]

OR

Explain in detail Register Control on a gravure press. [16]



Total No. of Questions : 6]

SEAT No. :

**P2898**

**[5154]-293**

[Total No. of Pages : 2

**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 sheets.*

**SECTION - I**

**Q1)** What is significance of following in designing of print advertisement. **[18]**

- a) White space.
- b) Colour.
- c) Image of product.

OR

“Marketing Research is an excellent tool for decision maker to decide on product launch” - Justify. **[18]**

**Q2)** What are different ways of budgeting the advertisement expenditure. Explain in details. **[16]**

OR

Write down those features of print media which makes it the “Preferred One” over the other media. Justify with suitable case / example. **[16]**

**Q3)** Explain any case study of campaign planning along with its period, USP, theme, target audience, brand positioning, market share and other details if any. **[16]**

OR

**P.T.O.**

Explain following types of advertising with suitable examples. [16]

- a) Public Service Advertising.
- b) Service advertising.

**SECTION - II**

**Q4)** Write short notes on: [16]

- a) Public relations advertising.
- b) Marketing and advertising communication process.

OR

Explain AIDA model with any suitable example. [16]

**Q5)** Write in details about types of appeals used in advertising. Justify with suitable example. [18]

OR

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]

**Q6)** Compare and contrast between [16]

Print Media Vs TV Media

OR

Describe those features of print media which makes it the “Preferred One” over the other media. Justify with suitable case / example. [16]



Total No. of Questions : 6]

SEAT No. :

**P2899**

**[5154]-294**

[Total No. of Pages : 2

**B.E. (Printing)**

**QUALITY CONTROL TECHNIQUES IN PRINTING**

**(2008 Course) (Semester - I) (Elective - I) (408281 A)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** List out Quality Characteristic and explain them in detail. **[16]**

OR

Explain Cost of Quality with suitable example of each type. **[16]**

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

Sample No.	1	2	3	4	5	6	7	8
Sample Size	120	135	70	90	150	130	70	70
No of Defectives	4	3	0	2	4	1	2	3

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

OR

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

$N = 9000, n = 55, c = 2$

Sr. No.	1	2	3	4	5	6
Percentage Defective	0.4%	0.8%	2%	4%	6%	12%

**P.T.O.**

- Q3)** a) Explain in detail Job Production & Mass Production. [8]  
b) Describe Lean manufacturing system in detail. [8]

OR

Explain in detail world class manufacturing. [16]

**SECTION - II**

- Q4)** Explain any two optical & physical properties of paper. [18]

OR

Explain following properties related to Ink [18]

- a) Flow
- b) Color
- c) Opacity
- d) Adhesion

- Q5)** Explain need of monitor profile with respect to obtained quality printing. [16]

OR

Explain Offset Lithography process control with help of profile creation. [16]

- Q6)** Explain the process of press standardization & characterization for Digital printing. [16]

OR

Describe factors to be considered for press finger printing of Offset Printing. [16]

**x x x**

Total No. of Questions : 6]

SEAT No. :

**P2900**

**[5154]-297**

[Total No. of Pages : 1

**B.E.(Printing Engineering)  
SECURITY PRINTING (Elective - II)  
(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1) a)** Compare digital & printed document. Explain with examples. **[18]**

OR

b) Describe Optical security printing in detail. **[18]**

**Q2) a)** Explain digital printing for Security Printing. **[16]**

OR

b) Explain design and structure in bank note printing. **[16]**

**Q3) a)** Explain plastic money in security printing. **[16]**

OR

b) Explain UV printing, properties & security applications. **[16]**

**SECTION - II**

**Q4) a)** Explain CTS system and application. **[18]**

OR

b) Describe MICR system in details. **[18]**

**Q5) a)** Explain invisible ink applications in Security Printing. **[16]**

OR

b) Explain Types of inks used for Security Printing with examples. **[16]**

**Q6) a)** State and explain bond security systems and applications. **[16]**

OR

b) Explain flexography in security printing features. **[16]**



Total No. of Questions : 6]

SEAT No. :

**P2901**

**[5154]-301**

[Total No. of Pages :5

**B.E.(Printing)**

**PRINT PRODUCTION PLANNING AND CONTROL**

**(2008 Pattern) (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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

**Q1)** Explain the classification of Production Systems in detail with suitable examples. **[16]**

OR

Explain the functions of Production Planning and Control in detail with suitable examples. **[16]**

**Q2)** Consider a project consisting of 12 activities with following precedence relationship and durations. **[16]**

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Immediate Predecessor	-	-	A	A	A	D	C	D	E,F	B,I	G,H	J,K
Duration(Weeks)	4	8	2	4	9	1	7	3	2	2	5	4

- a) Draw network diagram & find the critical path
- b) List the total float, free float and independent float for all activities.

OR

**P.T.O.**

The time estimates (in weeks) for the activities of a PERT network are given below.

Activity	$T_0$	$T_m$	$T_p$
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

- Draw the project network and determine expected project length.
- Calculate the Std. Dev. And variance of the project.
- What is the probability that project will be complete no more than 4 weeks earlier than expected time.
- If the project due date is 19 weeks, what is the probability of not meeting the due date.

Given data:  $Z = 1.33, P = 0.9082$

$Z = 0.67, P = 0.7486$

$Z = 1.28, P = 0.9$

[16]

**Q3)** There are seven jobs, each of which has to go through the machines A & B in the order AB. Processing time in hours are given as, [18]

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine the sequence of these jobs that will minimize the total elapsed time T. Also find T and idle time for machines A and B.

OR

2



There are five jobs, each of which is to be processed through three machines A, B and C in the order ABC. Processing times in hours are,

Job	1	2	3	4	5
Machine A	3	8	7	5	4
Machine B	4	5	1	2	3
Machine C	7	9	5	6	10

Determine the optimum sequence for the five jobs and the minimum elapsed time. Also find the idle time for the three machines and waiting time for the jobs. [18]

### SECTION-II

**Q4)** A job production unit has four jobs A, B, C and D, which can be manufactured on each of the four machines. The processing cost of each job for each machine is given. How should the jobs be assigned so as to minimize the processing cost. [16]

	P	Q	R	S
A	31	25	33	25
B	25	24	23	21
C	19	21	23	24
D	38	36	34	40

OR

Solve the following Assignment problem for minimization. The costs are given below. Find all the alternate solutions, if any. [16]

	X1	X2	X3	X4	X5
A	15	29	35	20	38
B	21	27	33	17	36
C	17	25	37	15	42
D	14	31	39	21	40
E	19	30	40	19	18

**Q5)** Find the initial feasible solution for the following problem. The supply, demand and unit cost figures are given. **[16]**

	W1	W2	W3	W4		
P1	190	300	500	100	70	
P2	700	300	400	600	90	↑
P3	400	100	400	200	180	Supply
	50	80	70	140		Demand →

OR

Solve the following Transportation problem with NWCM and LCM. **[16]**

	D1	D2	D3	D4		
S1	10	20	5	7	10	
S2	13	9	12	8	20	
S3	4	15	7	9	30	↑
S4	14	7	1	0	40	Supply
S5	3	12	5	19	50	
	60	60	20	10		Demand →

**Q6)** A company makes three products X, Y and Z which go through three departments-Drill, Lathe and Assembly. The hours of department time required by each of the products, the hours available in each of the departments and the profit contribution of each of the products are given in the following table.

Products	Time required per unit (Hours)			Profit Contribution (Rs.Per Unit)
	Drill	Lathe	Assembly	
X	3	3	8	9
Y	6	5	10	15
Z	7	4	12	20
Hrs. Available	210	240	260	

The marketing department of the company indicates that the sales potential for the products X and Y is unlimited, but for Z it is not more than 30 units. Determine optimum production schedule. **[18]**

OR

A company machines and drills two castings X and Y. The time required to machine and drill one casting including machine set up time is as follows,

Casting	Machine Hours	Drilling Hours
X	4	2
Y	2	5

There are two lathe and three drilling machines. The working week is of 40 hours; there is no overtime and lost time. Variable costs for both the castings are Rs. 120 per unit while the total fixed costs amount to Rs. 1000 per week. The selling price of casting X is Rs. 300 per unit and that of Y is Rs. 360 per unit. There are no limitations on the number of X and Y castings that can be sold. The company wishes to maximize profits. Formulate the linear programming model for the same. **[18]**



Total No. of Questions : 6]

SEAT No. :

**P2902**

**[5154]-303**

[Total No. of Pages :2

**B. E. (Printing)**

**PRINTING MACHINE MAINTENANCE  
(2008 Course) (Semester-II) (Elective-III)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) State working of spur gears in inking train in offset. [8]  
b) What is the drive system used in offset press. [8]

OR

- a) Draw the diagram of bevel gears. Compare spur, helical and bevel gears. [8]  
b) A chain drive has been used in the feeder table of sheet fed offset machine. What are the advantages of this drive over other drives? State different methods of lubricating the chain drive. [8]

- Q2)** What is the difference between preventive maintenance and breakdown maintenance. Give a suitable example. [16]

OR

Prepare a maintenance checklist for IR dryer of a sheetfed press stating daily, weekly, monthly and annual requirements for smooth working. [16]

- Q3)** Explain the 7 elements of preventive maintenance explain how it will applicable to Feeders in sheetfed offset. [18]

OR

What is the importance of lubricato. [18]

**SECTION-II**

- Q4)** a) State basics steps in condition monitoring. [9]  
b) Explain leakage monitoring (pneumatics), corrosion monitoring, temperature monitoring. [9]

OR

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

- a) The diagnostic pressrun test described here is a three-step test process. The first step involves checking for mechanical ink ghosting. The next step tests the registration of each print unit using register grid films and plates. The final step is to run a test form to determine the register and printing capabilities of the press. Explain each step in detail. [10]
- b) The probability that printability testing equipment used in an ink lab will need a number of recalibrations per year is given in the following table. A service firm is willing to provide any number of necessary calibrations for a fixed fee of Rs. 2000 per month. Without this plan, recalibration costs Rs. 1500 per occurrence. Which approach would be most economical, recalibration as needed or the fixed fee service contract?[8]

Number of recalibrations	0	1	2	3	4
Probability of occurrence	.15	.25	.30	.20	.10

**Q5)** Write short notes on the following that require special maintenance needs[16]

- Antifriction bearings
- Friction clutches
- Brakes
- Gear box

OR

- Define what is hazard. State any two physical and chemical hazards in gravure printing plant. [8]
- State steps to eliminate these hazards. [8]

**Q6)** Explain working/ construction of former folder used in web machine. Explain maintenance of former folder. [16]

OR

Explain working and construction of dryer in web press. Explain maintenance of the same. [16]



Total No. of Questions : 6]

SEAT No. :

**P2903**

**[5154]-305**

[Total No. of Pages : 2

**B.E. (Ptg)**

**FLEXIBLE PACKAGING**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1)** Explain the role of polyolefins in packaging. **[18]**

OR

Explain the considerations of Packaging. **[18]**

**Q2)** Explain in detail rotary letterpress process for flexible packaging. **[16]**

OR

Explain in detail Flexography for flexible packaging. **[16]**

**Q3)** Explain along with diagram Co-extrusion techniques. **[16]**

OR

Explain along with diagram Cast Film Extrusion process. **[16]**

**SECTION - II**

**Q4)** Explain in detail the stages in tubing process. **[16]**

OR

Explain in detail Bag-in-Box concept for tea product. **[16]**

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

**Q5)** Explain the types of closures for various applications. [16]

OR

Describe shrink packaging technique for a given product. [16]

**Q6)** Explain the packaging methods for beverages. [18]

OR

Mention deterioration factors for the following: [18]

- a) Cheese
- b) Horticulture Products
- c) Beer



Total No. of Questions : 12]

SEAT No. :

**P2904**

**[5154]-311**

[Total No. of Pages : 3

**B.E. (Production)**  
**MACHINE TOOL DESIGN**  
**(2008 Pattern) (Semester - I) (411081)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

**UNIT - I**

- Q1)** a) What do you understand by kinematic structures in machine tools? [6]
- b) Design a gearbox for a drilling machine with following details:
- i) Input shaft runs at 300 rpm (constant speed)
  - ii) Speed ranges between 100 rpm to 250 rpm in six steps
  - iii) Power requirement of drill machine is 7.5 KW
  - iv) Drive motor runs at 960rpm

Plot the speed chart. Determine the no.of teeth for each gear and show the layout of gearbox and connection to the motor. [12]

OR

- Q2)** a) Show that for geometric progression the useful value of speed ratio ' $\phi$ ' lies between 1 & 2. Also prove that maximum loss of economic speed is constant in geometric progression. [8]
- b) Deduce the expression for power in horizontal milling machine and show diagrammatically the forces acting on milling cutter during machining.[10]

**P.T.O.**



## UNIT - II

- Q3)** a) What are the important elements of machine tools? Explain their functioning and importance in the working of machine tools. [8]
- b) Explain the concept of static and dynamic rigidity of machine tool and state the procedure for estimating them. [8]

OR

- Q4)** a) Give the comparative evaluation of machine tool structures on the basis of:
- i) Materials for machine tool structures.
  - ii) Frictional behaviour under dry & lubricated condition
  - iii) Profiles of machine tool structures. [10]
- b) Would it be possible to design and build machining and turning centers without the use of computer controls? Explain. [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) What are the basic consideration in designing the spindle unit supports and spindle ends in a high speed machine tools? Sketch unit supports and spindle ends in a high speed machine tools [10]
- b) Why it is essential to preload the bearings of spindle mountage? [8]

OR

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

#### UNIT - V

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

OR

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

#### UNIT - VI

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

OR

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



Total No. of Questions : 12]

SEAT No. :

**P2905**

**[5154]-312**

[Total No. of Pages :3

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

OR

- Q2) a)** A hydraulic system is operating at 150 bar with pump flow 15 lpm. The input power to the pump drive is 10 kW. The pump is loaded for 65% of the operating time. The overall efficiency when it is on load is 72%. If the ambient temperature is 20°C and maximum permissible fluid temperature in the reservoir is 80°C. Calculate the suitable size of the reservoir if it is of square section of size 'a' with length '1.5a'. **[8]**
- b) For a 4×3 direction control valve:
- Draw its symbol.
  - Draw neat sketch showing constructional features.
  - Explain principle of working.
  - Applications. **[8]**

**P.T.O.**

- Q3)** a) A certain operation requires a flow of 80 lpm for 1.4 seconds. Determine the volume change in accumulator during discharging if the total cycle time is 5 seconds. [4]
- b) Explain with neat sketch working of pressure intensifier. [4]
- c) Draw neat sketch of regenerative circuit and show that in regenerative circuit  $v = \frac{Q}{a}$ . Where,  $v$  is extension speed of piston,  $Q$  is Flow rate and  $a$  is piston rod area. [8]

OR

- Q4)** a) Explain the terms related to filter: [4]
- beta rating
  - absolute ratings
- b) A cylinder has to exert a forward thrust of 80 KN and reverse thrust 20 KN. The cylinder extend speed is 0.5 m/min and retract speed is 7 m/min. Full pump flow is utilized during retraction of cylinder. The maximum pump pressure is 100 bar and pressure drop across various element is as follows: Filter–2.5 bar, Direction control valve (Each flow path)–3.5 bar, Flow control valve (controlled flow - 12 bar, flow control valve (check valve)–2.5 bar. Compare the efficiencies of meter in and meter out circuit. Assume 2:1 ratio piston area to piston rod. [10]
- c) Draw and explain meter out circuit. [4]

- Q5)** a) Draw the suitable pneumatic circuit using cascade system to actuate cylinder 'A', cylinder 'B', and cylinder 'C' as per following sequence: [12]
- Cylinder A and B extends simultaneously
  - Cylinder B retracts and Cylinder C extends simultaneously
  - Cylinder C retracts
  - Cylinder A retracts
- b) Explain with neat sketch the function of lubricator in pneumatic system. [6]

OR

- Q6)** a) Explain Electro-pneumatic system. [6]
- 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. [12]

## SECTION-II

- Q7)** a) What is sign flag? What is its significance? Explain with suitable example. [8]  
b) Explain clearly the difference between microprocessor and microcontroller. [8]

OR

- Q8)** a) Draw in diagram of 8085 $\mu$ P. [8]  
b) Write the 8085  $\mu$ P program to perform following functions: [8]  
i) Load the number 4DH in register C  
ii) Load the number 6EH in register B  
iii) Increment the content of register B by one  
Subtract the content of register C from B and display the sum at port 1.

- Q9)** a) Define and compare the characteristics %overshoot, settling time, rise,time,and deviation in steady state for P, PI, and PID controller. [8]  
b) Explain with suitable example use of timers in PLC. [8]

OR

- Q10)**a) For a certain process transfer function is  $\frac{3}{s + 4}$ . Obtain the response of proportional controller for step response of 5 if feedback transfer function is the gain of 0.15 and proportional gain  $K=1.5$ . [8]  
b) Draw the ladder diagram to drill a hole in work piece upto a specified depth. The process is: start the drill, move it down to specified depth, retract the drill, drill stops. The system stops(with red lamp ON) in case of thermal overload. [8]

- Q11)**a) Explain with neat sketch rotary disc feeder. [9]  
b) Explain design aspects of AS/RS systems. [9]

OR

- Q12)**Write a short note on: [18]  
a) Indexing mechanisms  
b) Automated warehouses  
c) Low cost automation



Total No. of Questions : 12]

SEAT No. :

P2906

[5154]-313

[Total No. of Pages : 6

**B.E. (Production)**  
**OPERATIONS RESEARCH**  
**(2008 Course) (Semester - I) (411083)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1) a)** A retail store stocks two types of shirts A and B. These are packed in attractive cardboard boxes. During a week the store can sell a maximum of 400 shirts of type A and a maximum of 300 shirts of type B. The storage capacity, however, is limited to a maximum of 600 of both types combined. Type A shirt fetches a profit of ₹2/- per unit and type B a profit of ₹5/- per unit. How many of each type the store should stock per week to maximize the total profit? Formulate a mathematical model of the problem. **[8]**

b) Solve by simplex method **[10]**

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

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

$$y_1 + 2y_2 \geq 6$$

$$y_1, y_2 \geq 0$$

OR

**Q2) a)** What are the various phases of solving OR problem? **[8]**

b) Solve by dual simplex **[10]**

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

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

$$x_1 + 2x_2 \geq 10$$

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

**P.T.O.**

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

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

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

OR

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

	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	W <sub>5</sub>	available
F <sub>1</sub>	7	6	4	5	9	40
F <sub>2</sub>	8	5	6	7	8	30
F <sub>3</sub>	6	8	9	6	5	20
F <sub>4</sub>	5	7	7	8	6	10
Required	30	30	15	20	5	100 (total)

b) Explain MODI method. **[6]**

- Q5) a)** What is Goal programming? Distinguish it from linear programming. [6]
- b)** A company has 8 salesmen, who have to be allocated to four marketing zones. The return of profit from each zone depends upon the number of salesmen working that zone. The expected returns for different number of salesmen in different zones, as estimated from the past records, are given below. Determine the optimal allocation policy. [10]

Sales marketing in zones ₹. X 000

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

OR

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

**SECTION - II**

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

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

When should the machine be replace?

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

OR



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

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

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

OR

**Q10)a)** A particular item has a demand of 9000 units per year. The cost of one procurement is ₹.100 and the holding cost per unit is ₹.2.40 per year. The replacement is instantaneous and no shortages are allowed. Determine: **[10]**

- i) The economic lot size,
- ii) The number of orders per year,
- iii) The time between orders,
- iv) The total cost per year if the cost one unit is ₹.1.

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

**Q11)a)** Explain the following terms in networks: **[8]**

- i) Earliest time
- ii) Latest time
- iii) Event slack
- iv) Critical path

b) The following table gives data on normal time and cost and crash time and cost for a project. **[10]**

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

The indirect cost per day is ₹. 10.

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

OR

**Q12)a)** A project has the following activities and their characteristics: **[10]**

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

- i) Draw the PERT network.
  - ii) Identify the critical path.
  - iii) Determine mean project completion time.
  - iv) Find the probability that the project is completed in 36 weeks.
- b) Explain the following terms in Networks: **[8]**
- i) Difference between PERT and CPM.
  - ii) Resource smoothing.
  - iii) Dummy in network analysis.
  - iv) Difference between activity and event.



Total No. of Questions : 12]

SEAT No. :

**P2907**

**[5154]-314**

[Total No. of Pages : 2

**B.E. (Production)**

**PLASTIC ENGINEERING**

**(2008 Course) (Semester - I) (Elective - I) (411084 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) Discuss additives used in the plastic. [8]  
b) Explain various types of plastics. [10]

OR

- Q2)** a) Explain concept of addition. [8]  
b) Describe concept of polymerization. [10]

- Q3)** a) Explain any four types of gates with suitable sketches. [8]  
b) Explain functions of register ring sprue bush, cavity and core inserts. [8]

OR

- Q4)** a) Explain how to specify moulding machine. [8]  
b) Discuss various design considerations in injection mould design. [8]

- Q5)** a) Explain working principle of vented barrel extruder. [8]  
b) Discuss various problems observed in extrusion. [8]

OR

- Q6)** a) Explain extrusion coating and lamination with suitable sketches. [8]  
b) Discuss various problems observed in extrusion. [8]

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

**SECTION - II**

- Q7)** a) Compare injection blow & extrusion blow molding processes. [10]  
b) Explain stretch blow molding with suitable sketches. [8]

OR

- Q8)** a) Explain twin station blow moulding with suitable sketches. [8]  
b) Discuss design considerations in blow molding. [10]

- Q9)** a) Explain twin sheet thermoforming with suitable sketches. [8]  
b) Discuss problems in thermoforming. [8]

OR

- Q10)** a) Discuss twin sheet vacuum thermoforming with suitable sketch. [8]  
b) Discuss process factors in thermoforming. [8]

- Q11)** a) Explain reaming and tapping in machining of plastics. [10]  
b) Explain [6]  
i) Trimming  
ii) Polishing

OR

- Q12)** a) Discuss finishing of Plastics. [10]  
b) Explain buffing and sawing in plastic. [6]

**x x x**

Total No. of Questions : 12]

SEAT No. :

P2908

[5154]-315

[Total No. of Pages : 4

B.E. (Production)

INDUSTRIAL ROBOTICS

(2008 Course) (Semester - I) (Elective - I) (411084 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 answer books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data, if necessary.

**SECTION - I**

- Q1)** a) Define Automation. compare hard automation with soft automation. [8]  
b) The population of robots worldwide is increasing. What are the factors contributing to this growth? [8]

OR

- Q2)** a) A robot has one dof and one sliding joint with full range of 1m. The robot's control memory has a 12-bit storage capacity. Determine the control resolution for the axis of motion. [8]  
b) Classify robots. State various motions given to wrist. [8]
- Q3)** a) List the steps involved in DH convention. [8]  
b) For a pick and place type of robot, the link parameters table is given below. [8]

i	$\alpha_{i-1}$	$a_{i-1}$	$d_i$	$\theta_i$
1	0	2	0	10°
2	-60	0	-3	0°
3	0	0	0	90°

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

OR

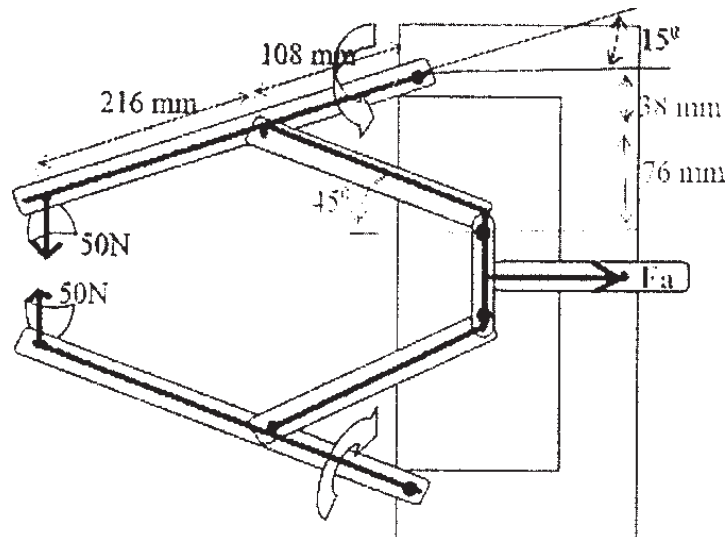
P.T.O.

- Q4) a)** Explain the Inverse kinematics associated with planar 3R manipulator. **[8]**
- b) For a pick and place type of robot, the link parameters table is given below: **[8]**

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

Determine the location of the end point of the link 3 w.r.t the base.

- Q5) a)** What is Robot Gripper? With neat sketch explain in detail any two types of gripper mechanisms. **[9]**
- b) For the given data in the mechanical gripper design of following figure, Calculate the required actuating force if the gripper force is to be 50 N. **[9]**



OR

- Q6) a) Describe [9]**
- i) Vacuum gripper
  - ii) Ultrasonic gripper
- b) Explain magnetic grippers with its advantages and disadvantages. [9]

**SECTION - II**

- Q7) a) What is Robot sensor? Explain why there is a need of Sensor in Robot? [8]**
- b) Explain the concept of Machine vision associated with the robot vision system. [8]

OR

- Q8) a) With neat sketch explain Proximity and Range Sensors used in robot.[8]**
- b) The given data represents  $8 \times 8$  arrays of pixels. Each element in the array indicates the gray level value of the pixels. [8]
- i) Construct histogram for the array and obtain appropriate threshold value.
  - ii) Convert the picture into a black and white image. The data is as:

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



- Q9) a) Explain: [8]**
- i) Textual robot language.
  - ii) Off-line programming mode
- b) Explain the generations of Robot programming Language. [8]

OR

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

OR

- Q12)a) Describe the concept of safety in robotics. [9]**
- b) Write a note on: [9]
- i) Walking Robot
  - ii) Robot used in mines

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2909**

**[5154]-316**

[Total No. of Pages : 3

**B.E. (Production Engg.)  
POWDER METALLURGY**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Explain the centrifugal atomization process of powder production. [6]  
b) Explain Hoganas process with a neat diagram. [6]  
c) Describe the configurations of a rotating ball mill which is loaded. [6]

OR

- Q2)** a) Explain the Pyron process of powder production. [6]  
b) Explain the influence of Apparent density, compression ratio and flow rate on the behaviour of powders. [6]  
c) What is the principle of Elutriation method of particle size measurement? How do we apply Stoke's law for particle size measurement? [6]

- Q3)** a) What are the means to avoid rejection due to fracturing of green compacts. [8]  
b) Write a note on effective tooling design? State the various materials used for dies and punches. [8]

OR

- Q4)** a) Explain the stages of compaction with a suitable diagram and How can we avoid the large variation of green density of compact? [8]  
b) Compare hydraulic press with mechanical press. What are the essential compacting tools and state the steel from which they are made. [8]

**P.T.O.**

- Q5)** a) Explain the several mechanisms of material transport in Sintering with the help of a diagram. [8]
- b) How does particle size, particle shape, particle structure and green density affect Solid state sintering. [8]

OR

- Q6)** a) Write short notes on Liquid phase sintering and Activated Sintering. [8]
- b) Explain the importance of the different atmospheres used in sintering furnaces. [8]

### **SECTION - II**

- Q7)** a) Write shortnotes on: [8]
- i) Explosive compaction
- ii) Powder forging
- b) Explain with a neat diagram the Injection moulding process. [8]

OR

- Q8)** a) Explain in details Hot Isostatic Pressing (HIP) with a neat diagram. [8]
- b) Write shortnote on the “HERF” process. [8]

- Q9)** a) What are nanosize particles? What are the problems associated with handling such particles? [8]
- b) State the advantages and limitations of powder metallurgy process over the conventional manufacturing processes. [8]

OR

- Q10)**a) How do you inspect the quality of powder metallurgical parts? Explain sizing and coining. [8]
- b) Write short notes on: [8]
- i) Steam treatment
- ii) Impregnation

**Q11)** With the help of a neat flow chart explain production details of the following:[18]

- a) Brakes and clutch lining material
- b) Diamond Impregnated cutting tools
- c) Electrical Contact Materials

OR

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

- a) Self lubricated bearings
- b) Cemented Carbide tools
- c) Refractory metal components.

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2910**

**[5154]-317**

[Total No. of Pages : 3

**B.E. (Production)**

**MICROPROCESSORS APPLICATIONS**

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

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

**SECTION - I**

**Q1) a) Compare RISC & CISC MICROCONTROLLER. [8]**

b) Discuss Harvard and Von Neumann architecture in detail with block diagram. [8]

OR

**Q2) a) Draw Block diagram of Microprocessor & explain each block in detail. [8]**

b) Describe in brief application areas of microcontrollers. [8]

**Q3) a) What is the advantage of interrupts over polling? Explain Hardware and software interrupts. [8]**

b) Explain addressing modes of 8085 in detail with the help of example. [8]

OR

**Q4) a) How will the instruction get executed in 8085? Explain with the help of example. [8]**

b) Which are the buses are available in 8085. Explain the bus structure in detail. [8]

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

- Q5)** a) Draw internal memory organization of 8051 & explain with the help memory map. [10]  
b) Explain program counter & stack pointer of 8051 in detail. [8]

OR

- Q6)** a) Draw the block diagram of 8051 & explain its architecture in detail.[10]  
b) With the help Diagram explains the program Status Word 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) PUSH  
ii) ACALL  
iii) RLC A  
iv) JNZ

OR

- Q8)** a) Write a program to multiply two 8 bit numbers stored in internal RAM locations 40H onwards & store the result in location 50H. [8]  
b) Explain the format of TMOD register of 8051 in detail. [8]
- Q9)** a) Define CNC and state features of CNC. Explain the application of CNC.[8]  
b) Interface DAC to 8051. Draw interfacing diagram.

Write assembly program to display its output on LCD. [8]

OR

- Q10)**a) Draw the ladder diagram for boiler system and explain it. [8]  
b) Interface ADC 0808 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 liquid level measurement. Draw circuit diagram with suitable sensor and signal conditioning. Display the liquid level On LCD. Write the Flowchart and algorithm. **[10]**

b) Explain RS 485 serial communication protocol with diagram. How to interface the RS 485 with 8051 explain with Diagram. **[8]**

OR

**Q12) a)** Design pressure measurement system for 0-10 bar. Suggest suitable sensors, signal conditioning and microcontroller. Draw the flowchart for the system. **[10]**

b) Explain features of I<sup>2</sup>C protocol. Also operation with timing diagram for communication between microcontroller and devices. **[8]**

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2911**

**[5154]-318**

[Total No. of Pages : 2

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

**ERGONOMICS AND HUMAN FACTORS IN ENGINEERING**

**(2008 Pattern) (Semester - I) (Elective - II) (410085)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

**UNIT - I**

- Q1)** a) How is the speed of movements and accuracy of movements a performance criterion. [9]
- b) Describe designing of MMH task with a good example. [9]

OR

- Q2)** Write short note on following ergonomic concepts. [18]
- a) Measures of Physiological Functions.
  - b) Strength and Endurance.
  - c) Human Physical Activities.

**UNIT - II**

- Q3)** a) Write a note on work space envelope for seated personnel. [8]
- b) Explain the principles of seat design. Discuss with a good example. [8]

OR

- Q4)** a) Describe any three principles of arrangements of components with example. [8]
- b) Compare between work surface height and working height. [8]

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



### UNIT - III

- Q5)** a) Discuss any one special control device with a neat sketch. [8]  
b) Write a note on concept of visibility. [8]

OR

- Q6)** a) Write a note on general location of displays and controls with in workspace. [8]  
b) Explain any four important functions of controls. Discuss with suitable examples. [8]

### SECTION-II

### UNIT - IV

- Q7)** a) Discuss the effect of illumination on performance from a Human Factors perspective. [9]  
b) Discuss the physiological effect of heat on performance. [9]

OR

- Q8)** a) How is Color system defined in Human Factors Engineering? Describe with a neat sketch. [9]  
b) Discuss noise exposure limits. [9]

### UNIT - V

- Q9)** a) Write a note on work and rest cycles. [8]  
b) Effect of environmental conditions on energy expenditure, Discuss. [8]

OR

- Q10)** a) Describe the process of muscle mechanism with a suitable diagram. [8]  
b) Differentiate between aerobic and anaerobic glycolysis. [8]

### UNIT - VI

- Q11)** a) What is safety? Discuss basis for defining safety considerations. [8]  
b) Discuss any one case of ergonomically designed product in your opinion. [8]

OR

- Q12)** a) Human Factors in system design: discuss the concept. [8]  
b) Describe the importance of HFE data in interface design. [8]



Total No. of Questions : 12]

SEAT No. :

**P2912**

**[5154]-319**

[Total No. of Pages : 2

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

**MATERIALS AND LOGISTICS MANAGEMENT**

**(2008 Pattern) (Elective - II)(411085 B) (Semester - I) (Revised)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

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

OR

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

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

OR

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

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

OR

**P.T.O.**

- Q6)** a) Explain various causes of surplus and obsolete stock. [8]  
b) Justify the role of store keeper is important in any manufacturing industry. [8]

**SECTION-II**

- Q7)** a) Explain various modes of transportation. What are the factors on which best transportation mode is selected? [8]  
b) Explain in-bound logistics and out-bound logistics with example. [8]

OR

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

- Q9)** a) Explain risks of supply chain management in any one driver in brief. [8]  
b) List logistical drivers of supply chain management and explain any one in brief. [8]

OR

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

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

OR

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



Total No. of Questions : 12]

SEAT No. :

**P2913**

**[5154]-320**

[Total No. of Pages : 2

**B.E. (Production Engineering)**  
**SIMULATION AND MODELING**  
**(2008 Pattern) (Semester - I) (Elective - II) (411085)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Solve Q-1 or Q-2, Q-3 or Q-4, Q-5 or Q-6, Q-7 or Q-8, Q-9 or Q-10, Q-11 or Q-12.*
- 2) *Neat diagrams must be drawn wherever 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) Discuss various terminology used in simulation. [8]  
b) Discuss role of statistics in simulation modeling. [8]

OR

- Q2)** a) Explain with suitable example the events and activities associated with part manufactured on shop floor. [8]  
b) Discuss simulation concept by considering queue formed discretely banking service. [8]

**UNIT - II**

- Q3)** a) Define different type of simulation models. [8]  
b) Explain concept of simulation with suitable example in queuing model. [8]

OR

- Q4)** a) Discuss the simulation applications in production management. [8]  
b) What is system and system environment? List the components of a system with example. [8]

**UNIT - III**

- Q5)** a) Explain different methods for data collection for analysis. [10]  
b) Explain methods of Generation of pseudo random numbers. [8]

OR

**P.T.O.**

- Q6)** a) Discuss the methods for selecting families of input distributions when input data available. [10]  
b) Discuss use of random numbers in simulation with example. [8]

**SECTION-II**

**UNIT - IV**

- Q7)** a) Explain any two distribution and its properties used in simulation. [8]  
b) Describe termination and non terminating simulation. [8]

OR

- Q8)** a) Explain F-test to accept or reject a candidate distribution. [8]  
b) With illustrative example describe the output analysis for dynamic state simulations [8]

**UNIT - V**

- Q9)** a) State the need of simulation in manufacturing and material handling system. [9]  
b) Discuss about a simulation of a job manufacturing shop. [9]

OR

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

**UNIT - VI**

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

OR

- Q12)**a) Write comparison of simulation software with programming languages. [8]  
b) Discuss the steps for development of simulation software with suitable example. [8]



Total No. of Questions :12]

SEAT No. :

**P2914**

[Total No. of Pages :5

**[5154] - 322**

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

**COMPUTER INTEGRATED DESIGN AND MANUFACTURING**

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

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Attempt 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 logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam table is allowed.*
- 6) *Assume suitable data if necessary.*

**SECTION-I**

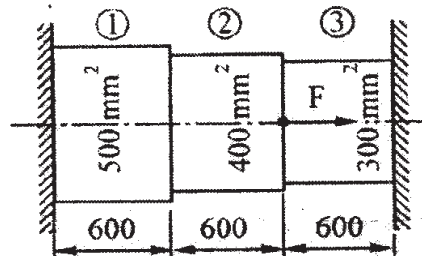
- Q1)** a) Explain the different network topology in CAD/CAM system. [6]
- b) Find the concatenated homogeneous matrix ( $4 \times 4$  transformation) for the following operations, performed in the following sequence, [10]
- i) Rotation through  $60^\circ$  about Z axis.
  - ii) Translation through 15 and -25 units along X and Y direction respectively.
  - iii) Rotation about  $40^\circ$  about X axis.

OR

- Q2)** a) What is inverse transformation? Show the inverse transformation for translation and scaling. [6]
- b) A triangle PQR has its vertices at P (0, 0), Q (6, 0) and R (3, 4). It is to be translated by 3 units in X direction and 2 units in Y direction and then it is to be rotated in anticlockwise direction about the new position of point R through  $60^\circ$ . Find the new position of the triangle. [10]

**P.T.O.**

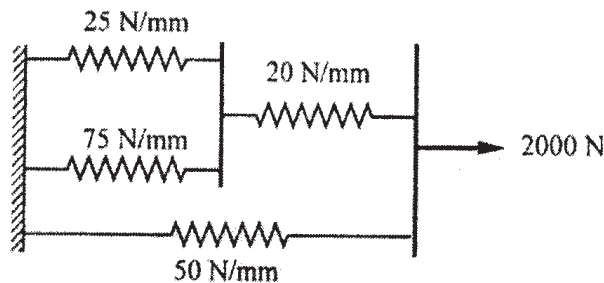
- Q3)** a) Briefly explain the steps to be followed in manually carrying out the finite element solution to a physical problem. [6]
- b) A stepped bar is as shown in the Fig.1 Determine the stresses and deflections in each of the sections. Assume uniform material having  $E = 90 \text{ GPa}$  and axial force  $F$  as  $50 \text{ kN}$ . [12]



**Fig. 1**

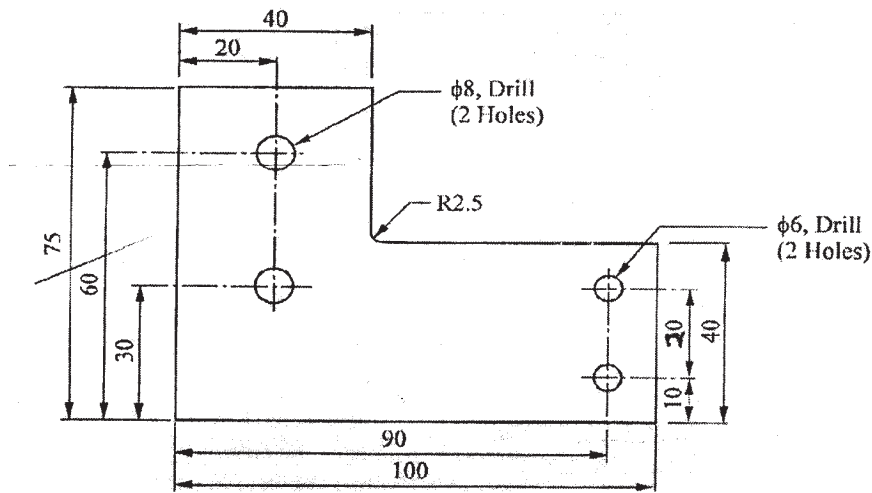
OR

- Q4)** a) Explain following with sketch related to FEA [6]
- Local axis
  - Global axis
  - Degree of freedom
- b) Fig.2 shows the cluster of four springs. Calculate deflection of each spring when a force of  $2000 \text{ N}$  is applied. Model the spring as 1D spar element. [12]



**Fig. 2**

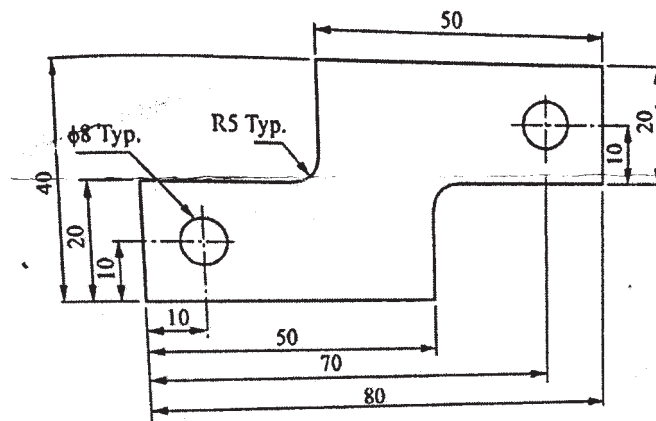
- Q5) a)** Write short note on word address format. [8]
- b)** Write a CNC program in G and M codes for milling the sides of the part as shown in the Fig.3 also write remark for each block. [8]



**Fig. 3**

OR

- Q6) a)** What is canned cycle? Explain with neat sketch canned cycles on lathe. [8]
- b)** Write a CNC program for drilling the part as shown in Fig. 4 and the tool path is shown in Fig. 4. [8]



**Fig. 4**

## SECTION-II

- Q7) a)** Explain the various phases of ERP implementation. [6]
- b)** Write short note on computer aided inspection and quality control. [10]

OR



- Q8)** a) Discuss MRPI & MRP II in modern manufacturing system with sketch. **[8]**
- b) Write short note on methods of programming the robot. **[8]**
- Q9)** a) What is cellular manufacturing system (CMS)? Explain the different methods of cell formation in group technology. **[12]**
- b) Write a note on Petrinets. **[6]**

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

		Parts						
Machines		A	B	C	D	E	F	G
	↓							
1		0	1	0	1	1	1	0
2		1	0	1	0	0	0	0
3		1	0	1	0	0	1	1
4		0	1	0	1	0	1	0
5		1	0	0	0	1	0	1

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

b) Explain with neat sketch Laminated Object Manufacturing (LOM). [8]

OR

**Q12)a)** Explain with neat sketch Fused Deposition Method (FDM) with its highlights. [8]

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

*EEE*

Total No. of Questions :12]

SEAT No. :

[Total No. of Pages :4

**P2915**

**[5154] - 323**

**B.E. (Production)**

**PROCESS PLANNING AND TOOL SELECTION**

**(2008 Pattern) (Semester - II) (411088)**

*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 two separate books.*
- 3) *Neat diagrams must be drawn whenever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION-I**

- Q1) a)** List several functions performed by the Process engineer. **[8]**
- b) Discuss the principles of DFM which are useful for designing a product. **[8]**

OR

- Q2) a)** Process engineering is the hub of the organization explain. **[8]**
- b) List several functions performed by the Product engineer. **[8]**
- Q3) a)** Define the following term: **[8]**
- i) Part Print
  - ii) Specifications
  - iii) Routing
  - iv) Process picture
  - v) Equipment
  - vi) Assembly Chart
- b) What do you mean by geometry of the form? How is it measured? **[8]**

OR

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

**Q4) a)** How size of the work piece is important for determining the process planning? [8]

b) How functional surfaces are determined? Determine areas used for processing? [8]

**Q5) a)** What do you mean by tolerance stack? How is it accumulated? [9]

b) What is Tolerance chart? How is it made? [9]

OR

**Q6) a)** What are the causes of work piece variation? How to achieve work piece control. [9]

b) Discuss theories for equilibrium. [9]

### **SECTION-II**

**Q7) a)** Differentiate SPM and GPM. [8]

b) What different type of machine selection problem exist? [8]

OR

**Q8) a)** Enumerate different GPM and explain any one. [8]

b) Enumerate different sources of tooling and discuss. [8]

**Q9) a)** Define the following term: [8]

i) Part Print

ii) Specifications

iii) Routing

iv) Process picture

v) Equipment

vi) Assembly Chart

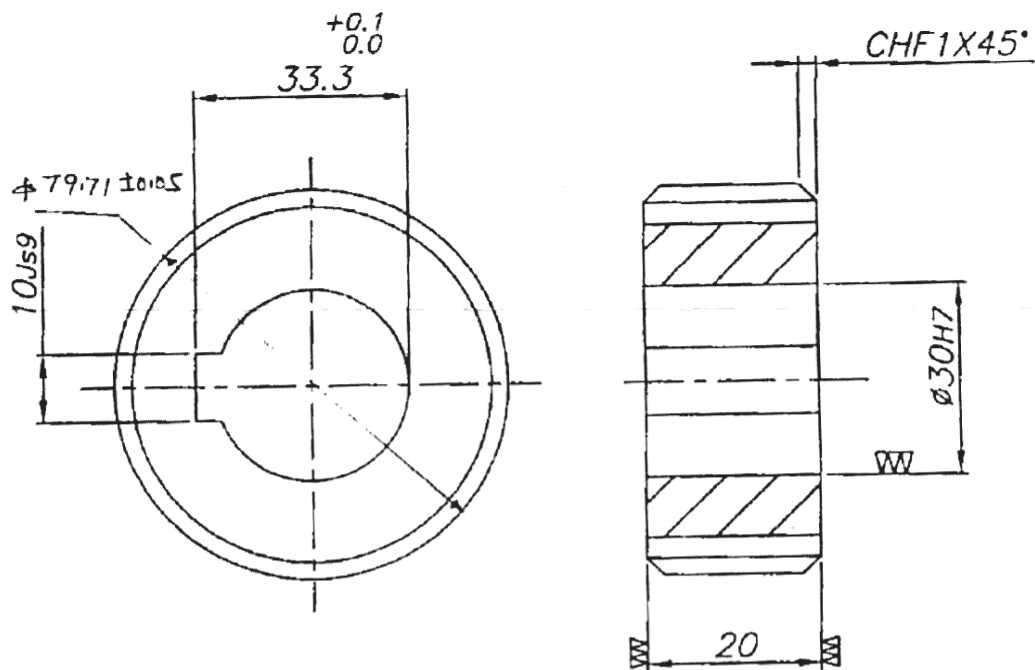
b) What do you mean by geometry of the form? How is it measured? [8]

OR

Q10)a) State classification of operations. [8]

b) Discuss CAPP with flow chart. [8]

Q11) Prepare a process sheet for the component as shown in fig.1. The required quantity: 1000/month. Write detailed manufacturing plan, operation sequence, proper tooling and equipment selection, process parameters with sample calculations. [18]



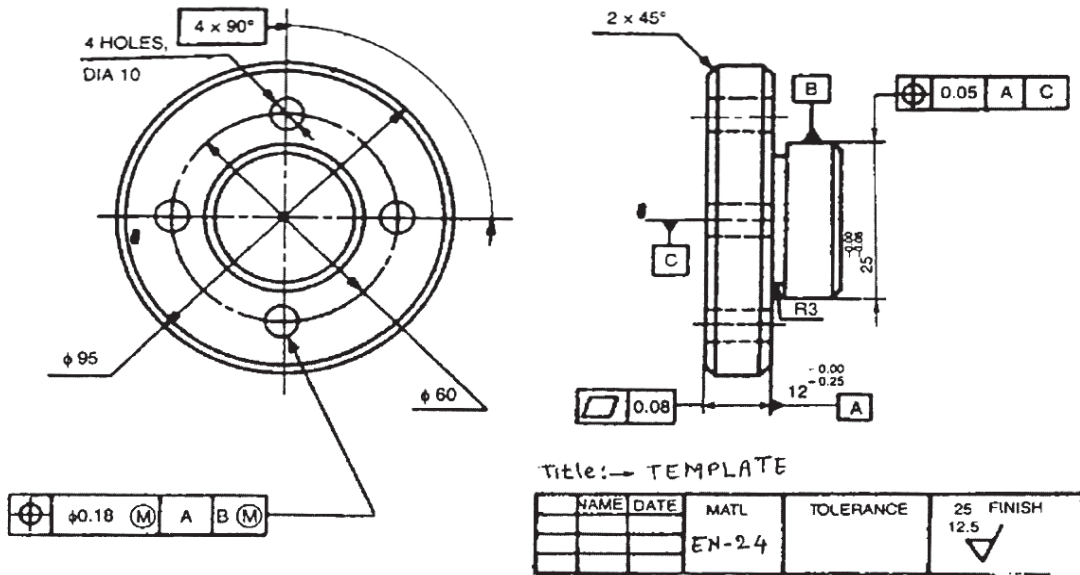
ALL DIMENSIONS ARE IN MM

OD	$79.71 \pm 0.05$
PCD	75.71
MODULE	2.00
NO. OF TEETH	36
ROOT DIA	70.71
HELIX ANGLE	$18^\circ$
PRESSURE ANGLE	$20^\circ$

Title	Material	Qty	Scale	Heat Treatment
MAIN GEAR	EN-24	1000/month	1:1	TOUGHNED 40 RC

OR

**Q12)** Prepare a process sheet for a component as shown in figure 2. which is to be manufactured in batches of size 600. Analyse the part print carefully and prepare the process sheet containing manufacturing plan with operation sequence, equipments, tooling, fixtures, process parameters and sample calculation of operation time. [18]



EEE

Total No. of Questions : 12]

SEAT No. :

**P2916**

**[5154]-324**

[Total No. of Pages :2

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagram 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

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

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

## 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 mean by double declutching? Explain? [6]

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

OR

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

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

OR

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





Total No. of Questions : 12]

SEAT No. :

**P2917**

**[5154]-325**

[Total No. of Pages :3

**B. E. (Production)**

**MECHATRONICS**

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

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

**SECTION-I**

- Q1)** a) Explain in detail the advantages and disadvantages of PLC's. [8]  
b) Compare PLC's with other types of controllers. [8]

OR

- Q2)** a) What are the PLC ladder construction limitations? [8]  
b) Describe with neat sketch Overall PLC system. [8]

- Q3)** a) Bypass/control stations increases flexibility of PLC. Explain with neat sketch. [8]  
b) Explain with neat sketch register /BCD inputs? What are advantages of it? [8]

OR

- Q4)** a) Explain in detail types of racks in discrete I/O system. [8]  
b) What is I/O rack and table mapping? Explain the process with neat sketches. [8]

- Q5)** a) What is the necessity of Analog system in PLC's? How to give instructions for analog input modules. [8]  
b) Explain with neat sketch transformation of an analog signal into a binary or BCD value. [10]

OR

- Q6)** a) Explain with neat sketch transformation of binary data into an analog signal. [8]

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

- 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 (100°C to 600°C), it provides, via a transmitter, a +1 to +5 VDC signal compatible with the analog input module.
- i) Find the equivalent voltage change for each count change (the voltage change per degree Celsius change) and the equivalent number of counts per degree Celsius, assuming that the input module transforms the data into a linear 0 to 4095 counts, and
- ii) Find the same values for a module with a 10-bit resolution. [10]

### SECTION-II

- Q7)** a) What is the necessity of special type of I/O modules? Explain in detail its types. [8]
- b) Explain with neat sketches Fast-Input/Pulse stretcher module and Wire input fault module. [8]

OR

- Q8)** a) What are positioning interfaces? Explain with neat sketch PLC system using stepper modules to control three axes. [8]
- b) Fuzzy logic modules work with other modules to input and output process information according to fuzzy control algorithms. Explain with neat sketch. [8]

- Q9)** a) Write any four ladder relay instructions with associated symbol and functions. [8]
- b) What are types of PLC programming languages? Explain in short. [8]

OR

- Q10)** a) With a suitable illustration explain the Boolean language used in PLC to program a controller. [8]
- b) Write in short about any two arithmetic instructions used in PLC programming. [8]

- Q11)** a) Define arithmetic mean, median, mode and standard deviation. [9]
- b) What is RTD? Explain its principle of operation and working in bridge circuit. [9]

OR

- Q12)a)** Explain the types of measurement errors with respect to the possible causes and methods of prevention/reduction. **[9]**
- b) With a neat diagram, explain the working principle of linear variable differential transformer(LVDT). **[9]**



Total No. of Questions : 12]

SEAT No. :

**P2918**

**[5154]-326**

[Total No. of Pages :2

**B. E. (Production)**

**METAL WORKING TRIBOLOGY**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from section II.*
- 2) *Figures to the right indicate full marks.*

**SECTION-I**

**Q1) a)** What are the different techniques of surface contact examination? Explain in detail. **[6]**

b) Evaluate contact stiffness of any joint. Explain how? **[10]**

OR

**Q2) a)** Explain concept of Ergodicity. **[6]**

b) State different factors required for Abbot's bearing area curve. Explain in detail. **[10]**

**Q3) a)** What are the causes of friction? Explain adhesion theory? **[8]**

b) Explain different Methods of measuring dynamic coefficient of friction. **[10]**

OR

**Q4) a)** Explain Stick slip motion. **[8]**

b) What are the technological properties of surface friction? Discuss in detail. **[10]**

**Q5) a)** What are the quantitative laws of wear? Discuss abrasive wear in detail. **[6]**

b) What are the sources and causes of wear and effect of wear on properties of metals. **[10]**

OR

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

- Q6)** a) Discuss in detail the abrasive wear. How the abrasive wear can be prevented? Discuss abrasive wear resistant materials? [6]  
b) Write Short Note On following (any two) [10]  
i) Fretting wear  
ii) Stick regime  
iii) Mechanism of wear  
iv) Corrosion wear

### SECTION-II

- Q7)** a) Explain hydrodynamic lubrication with the help of neat sketches? [8]  
b) Explain various important properties and applications of lubricants? [8]

OR

- Q8)** a) What is boundary lubrication? Explain with the help of sketches in details. [8]  
b) What are the functions of lubricants? Discuss various types of lubricants. [8]

- Q9)** a) Discuss and explain the hydro-static bearing with neat sketches? [10]  
b) State and prove the pressure equation of a journal bearing? [8]

OR

- Q10)** a) Derive Petroff equation involving concentric bearing. [10]  
b) Explain significance of "Bearing power". [8]

- Q11)** a) Derive an equation for two circular plates approaching each other involving squeeze film operation. [10]  
b) Differentiate between Circular and rectangular plates squeeze film Lubrication. [6]

OR

- Q12)** a) Derive squeeze film equation for circular plate approaching a rigid surface. [10]  
b) Write short notes on: [6]  
i) Metal working case tribology.  
ii) Rail-Wheel tribology.



Total No. of Questions : 12]

SEAT No. :

P2919

[5154]-327

[Total No. of Pages :4

B. E. (Production)

FINITE ELEMENT ANALYSIS

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

Time : 3 Hours]

[Max. Marks : 100

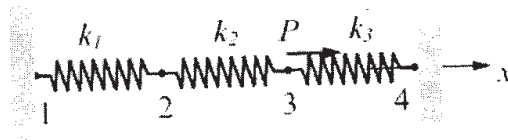
Instructions to the candidates:

- 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) Discuss the significance of Finite Element Analysis in different engineering field. [6]

b) [10]



Given : For the spring system shown above.

$$k_1 = 100 \text{ N/mm}, k_2 = 200 \text{ N/mm}, k_3 = 100 \text{ N/mm}$$

$$P = 500 \text{ N}, u_1 = u_4 = 0$$

- Find:
- a) the global stiffness matrix
  - b) displacements of nodes 2 and 3
  - c) the reaction forces at nodes 1 and 4
  - d) the force in the spring 2

OR

**Q2)** a) Derive stiffness matrix and load vector using any one of the approach. [6]

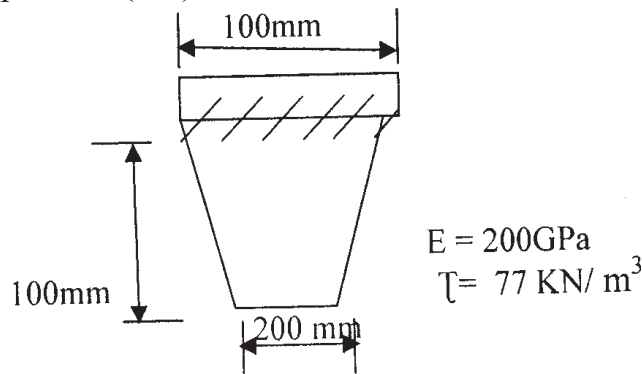
b) A beam of length 20m, fixed at one end and supported by a roller at the other end carries a 20kN concentrated load at the centre of the span. By taking the modulus of elasticity of material as 250 GPa and moment of inertia as  $20 \times 10^{-6} \text{ m}^4$ . Determine:

- i) Deflection under load.
- ii) Shear force and bending moment at mid span.
- iii) Reactions at supports.

[10]

P.T.O.

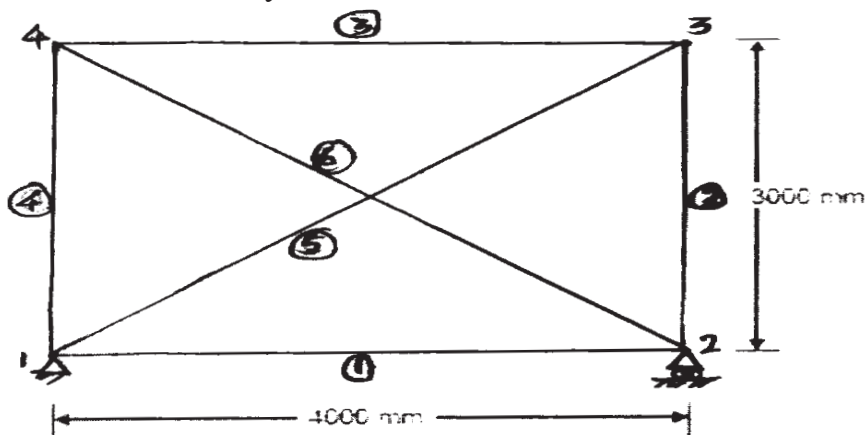
- Q3)** a) State and explain generalized Hook's law [6]  
 b) Find the deflection at free end under its own weight using 1,2,3 elements for taper Bolt(bar). [10]



OR

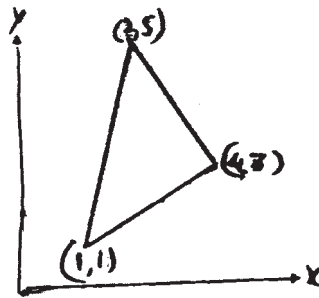
- Q4)** a) Discuss the concept of Local and Global co-ordinate system with respect to frame element. [8]  
 b) Write short notes on.(Any two) [8]  
 i) Geometric isotropy / Geometric Invariance  
 ii) Galerkin's method  
 iii) Mesh generation  
 iv) Boundary conditions

- Q5)** Fig.5. shows an indeterminate pin connected plane stress with cross sectional area of diagonal members equal to  $2000\text{ mm}^2$  and all other members with cross sectional area of  $1000\text{ mm}^2$ . If Young's modulus  $E = 200\text{kN/mm}^2$
- a) Assemble global stiffness matrix  
 b) Determine load vector if temperature of member 1-3 increases by  $25^\circ\text{C}$ . Given  $\alpha = 12 \times 10^{-6}/^\circ\text{C}$   
 c) Determine load vector if member 1-3 is longer by  $0.2\text{ mm}$ .  
 d) Introduce Boundary Conditions [16]



OR

- Q6) a)** Explain two dimensional problem using constant strain triangle. [8]  
**b)** For a CST element shown in Fig. 6.4. Obtain the strain-displacement matrix. Assume Poisson's ratio is zero and Young's modulus is constant. [10]



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

**SECTION-II**

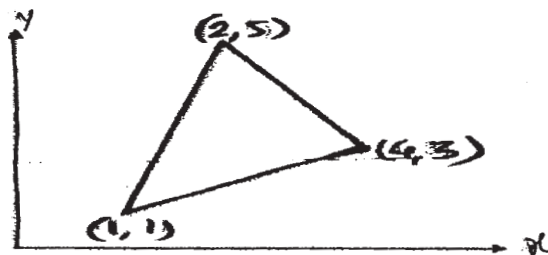
- Q7) a)** Solve the Differential equation by following methods. [12]

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

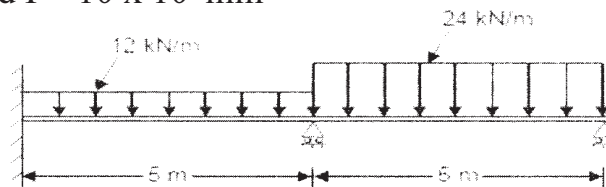
- i) Finite Difference Method  
 ii) Petro Galerkin method  
**b)** Derive stiffness equation for a spar element oriented arbitrarily in a 2-dimensional plane. [6]

OR

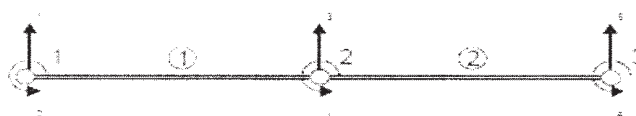
- Q8) a)** For a CST element shown in Fig. 6.4. Obtain the strain-displacement matrix. Assume Poisson's ratio is zero and Young's modulus is constant [6]



- b)** Analyze the beam shown by finite element method and determine the end reactions. Also determine the deflections at mid spans given  $E = 3 \times 10^5 \text{ N/mm}^2$  and  $I = 10 \times 10^6 \text{ mm}^4$  [12]



(a)



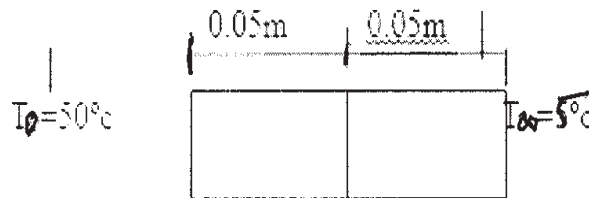
(b)



- 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  $1 \text{ cm}^2$  is  $20 \text{ W/m}^\circ\text{C}$ . The rate of heat generation in the rod is  $10^5 \text{ W/m}^3$ . One end of the rod is kept at  $0^\circ\text{C}$  and the other end at  $100^\circ\text{C}$ . 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)** a) Discuss briefly thermal effects in 2D elements [4]
- b) Determine the temperature distribution in the wall and the heat input at left surface of the wall  $L = 0.2 \text{ m}$ ,  $k = 0.01 \text{ w/m}^\circ\text{c}$ ,  $\beta = 25 \text{ w/m}^2 \text{ }^\circ\text{c}$ . Solve for nodal temperatures. [12]



- Q11)** Write short note on [16]
- a) Mesh generation
- b) Functions and phases in FEA software

OR

- Q12)** Write short notes on [16]
- a) Mesh generation techniques
- b) Solving a design problem using a FEA Package



Total No. of Questions : 12]

SEAT No. :

**P2920**

**[5154]-328**

[Total No. of Pages : 2

**B.E. (Production)**

**WORLD CLASS MANUFACTURING**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1) a)** What is business excellence? **[8]**

b) Explain Hall's frame work WCM. **[8]**

OR

**Q2) a)** Discuss merits & demerits of Maskell's WCM model. **[8]**

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

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

b) What is value stream mapping. **[8]**

OR

**Q4) a)** What is bench marking system? **[8]**

b) Discuss Toyota Production System? **[8]**

**Q5) a)** Discuss procurement and store practices of WCM **[8]**

b) Explain in detail. Flexible Manufacturing System. **[10]**

OR

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

- Q6)** Write short notes on following: [18]
- a) Just in Time (JIT)
  - b) Total Productive Maintenance.
  - c) 3M

**SECTION - II**

- Q7)** a) Explain function of HR department leading world class organization. [8]  
b) Discuss “people are used as problem solver in WCM” [8]

OR

- Q8)** a) Explain role of training in WCM organization. [8]  
b) Discuss various rewards techniques WCM organization. [8]

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

OR

- Q10)** a) Explain TOPP tool of performance measurement. [8]  
b) What is a AMBIT system of WCM performance? [8]

- Q11)** a) Discuss role of cleanness in manufacturing system. [8]  
b) Explain agile manufacturing. [10]

OR

- Q12)** a) What is green manufacturing? Explain its significance. [8]  
b) Explain any one case study of MNC related to WCM. [10]



Total No. of Questions : 12]

SEAT No. :

**P2921**

**[5154]-330**

[Total No. of Pages : 2

**B.E. (Production Engineering)  
TOTAL QUALITY MANAGEMENT  
(2008 Course) (Semester - II) (Elective - IV) (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)** What is the meaning of quality? Discuss various dimensions of Quality. **[10]**

b) Explain different barriers in TQM implementation. **[8]**

OR

**Q2) a)** Explain relation of quality and price, quality and market share with suitable examples. **[10]**

b) Who are the members in quality council? Explain importance of quality council. **[8]**

**Q3) a)** Discuss various steps to deal with customer complaints in organization. **[8]**

b) Explain how employee involvement is important in TQM. **[8]**

OR

**Q4) a)** Explain concept of PDCA Cycle TQM. **[8]**

b) Discuss importance of Juran Quality Trilogy. **[8]**

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

- Q5)** a) What is the meaning of bench marking? How it is important to organization. [8]  
b) Discuss Stages of FMEA. [8]

OR

- Q6)** a) Explain concept of Poka-Yoke. [8]  
b) List Ishikawa's Seven Quality Tools and explain any four in detail. [8]

### **SECTION - II**

- Q7)** a) Explain how design simplification, overdesign and redundancy improves system reliability. [10]  
b) Explain use of FEMA in reliability study. [8]

OR

- Q8)** a) Discuss concept of maintainability and availability. [10]  
b) Explain Bath Tub curve with suitable sketch. [8]

- Q9)** a) How supplier partnership is important to organization? [8]  
b) Which qualities are required for leadership in organization? [8]

OR

- Q10)** a) Explain the concept of six sigma. [8]  
b) Discuss types of control charts used for study of variables. [8]

- Q11)** a) Explain various objectives of CMMI. [8]  
b) Discuss ISO/TS 16949:2002 for Automobile Industry. [8]

OR

- Q12)** Write short notes on the following: [16]  
a) ISO 27001:2005 Information Security Management System.  
b) Benefits of ISO 14001:2004.



Total No. of Questions : 12]

SEAT No. :

P2922

[5154]-331

[Total No. of Pages : 6

**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 3 questions from each section.*
- 2) *Answer 3 questions from Section I and 3 questions from Section II.*
- 3) *Answer to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Your answers will be valued as a whole.*
- 7) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 8) *Assume suitable data, if necessary.*

**SECTION - I**

**Q1) a)** Explain the graphical method of solving Linear Programming. **[6]**

b) Maximize  $Z = 4x_1 + 4x_2$  **[10]**  
Subjected to

$$\begin{aligned}x_1 + 2x_2 &\leq 10 \\6x_1 + 6x_2 &\leq 36 \\x_1 &\geq 6 \\x_1, x_2 &\geq 0\end{aligned}$$

Solve the problem by graphical method.

OR

**Q2) a)** A furniture manufacturer produces two products: chairs & tables. Processing of these products is done on two machines A & B. A chair requires 2 hrs on machine A and no time on machine B. there are 16 hrs per day available on machine A 30 hrs per day on machine B. profit gain by manufacturer from chair and table is Rs. 2 and Rs. 10 respectively. What should be the daily production of each of the two products?

Formulate this problem as a LP model to maximize the profits. **[6]**

b) Use Big M method to solve the following LP problem. **[10]**

Minimize  $Z = 600x_1 + 500x_2$   
Subjected to

$$\begin{aligned}2x_1 + x_2 &\geq 80 \\x_1 + 2x_2 &\geq 60 \\x_1, x_2 &\geq 0\end{aligned}$$

**P.T.O.**

- Q3)** a) Explain difference between assignment and transportation problem. [6]  
 b) Five men are available to do five different jobs. From past data, the time in hours that each man can take to complete job is as given below. Find the assignment of men to jobs that will minimize the total time taken. [10]

		Jobs				
		1	2	3	4	5
Men	A	2	9	2	7	1
	B	6	8	7	6	1
	C	4	6	5	3	1
	D	4	2	7	3	1
	E	5	3	9	5	1

OR

- Q4)** a) Explain the procedure for solving transportation problem with Vogl's Approximation method (VAM). [6]  
 b) Find the optimal transportation routes [10]

		Warehouse			
		1	2	3	4
Customer	A	8	9	6	3
	B	6	11	5	10
	C	3	8	7	9

- Q5)** a) Explain different reasons for carrying inventory? [6]  
 b) Define following terms [4]  
 i) Lead time  
 ii) Order cycle  
 c) A manufacturer has to supply a customer with 500 units per year. Shortages are not allowed and the storage costs amount to Rs. 1.50 per unit per year. The set up cost per run is Rs. 120. Determine total variable cost and optimum run size. [8]

OR

- Q6) a)** Explain Jhonsons' procedure for processing n jobs two machines. [6]
- b) A product requires to be processed on two machines i.e. turning and milling, The times required to perform the turning and milling operation of each product are shown below: [12]

Product	1	2	3	4	5	6	7	8	9
Turning time Hours	7	9	8	5	4	10	4	9	12
Milling time Hours	3	6	5	10	7	9	8	6	5

Determine the order in which the product should be processes, so that the total time required processing all products is minimized.

### SECTION - II

- Q7) a)** In a bank with single server, there are two chairs for waiting customers. On an average one customer arrives every 10 minutes and each customer takes 5 minutes to get served. [10]

Determine

- i) Time for which server is idle, if it works 8 hrs a day.
  - ii) Average waiting time for the customer in the bank.
  - iii) Probability that a customer will get a chair to sit down.
  - iv) Probability that a customer will have to stand.
  - v) Probability that there would be two customers in queue.
- b) Solve the following game: [8]

		B		
		8	-3	7
A	6	-4	5	
	-2	2	-3	

OR



- Q8) a)** Solve, by using the dominance rule, and find optimal strategies and value of game: **[10]**

		Player B					
		B1	B2	B3	B4	B5	B6
Player A	A1	4	2	0	2	1	1
	A2	4	3	1	3	2	2
	A3	4	3	7	-5	1	2
	A4	4	3	4	-1	2	2
	A5	4	3	3	-2	2	2

- b) A automobile company distributes its products from its only loading station. It was found that average every 5 minutes one truck arrives and average loading time is 3 minutes. **[8]**

Determine

- i) Probability that the truck has to wait?
- ii) Waiting time of the truck that waits?
- iii) Average time of trucks in queue?

- Q9) a)** Draw a flow chart showing steps of simulation process. **[6]**

- b) At a service station the survey made for number of vehicles being brought in service is as **[10]**

below:

No of vehicles arriving per day	0	1	2	3	4	5
Frequency of arrivals	2	4	10	5	3	1

Consider the following sequence of random numbers:

09, 54, 42, 01, 80, 06, 06, 26, 57 and 79

- i) Using the above sequence, simulate the demand for the next 10 days.
- ii) Also estimate the daily average arrivals for the vehicles on the basis of the simulated data.

OR

**Q10)a)** Explain application of simulation. **[6]**

b) Simulate the number of machine breakdowns for the next six shifts on the basis of following data: **[10]**

No of breakdowns per shift	0	1	2	3
Probability	0.9	0.085	0.012	0.003

If due to operational constraints, only one machine can be repaired in a shift, find the

- i) Average number of machines repaired in shift?
- ii) Average number of machines lying unrepaired at the end of shift?
- iii) Proportion of time for which the repair facility is idle?

Use following random nos. 998,371,701,589,093,959

**Q11)a)** Explain difference between CPM & PERT. **[6]**

b) The activities involved in a PERT project are detailed in the following table: **[10]**

Job	Duration (weeks)		
	a	m	b
I-J	a	m	b
1-2	4	8	12
2-3	1	4	7
2-4	8	12	16
3-5	3	5	7
4-5	2	2	2
4-6	3	6	9
5-7	3	6	9
5-8	4	6	8
7-9	4	8	12
8-9	2	5	8
9-10	4	10	16
6-10	4	6	8

- i) Draw a PERT diagram & find project duration.
- ii) Find the critical path and time estimates.
- iii) Find the probability of completing the project before 52 weeks.

OR

**Q12)a)** Explain advantages & Disadvantages of CPM & PERT. **[8]**

b) A project has following activities and relevant data is as below **[8]**

Task	Preceding Activity	Duration (hours)
A	-	4
B	A	7
C	-	6
D	C	5
E	B	7
F	D,E	6
G	F	5

- i) Draw an arrow diagram (network) representing above assembly work.
- ii) Tabulate earliest start, earliest finish, latest start and latest finish time for all duration.
- iii) Tabulate total float.

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2923**

**[5154]-332**

[Total No. of Pages : 2

**B.E.(Production) S/W  
MECHATRONICS AND ROBOTICS  
(2008 Pattern) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**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 Various Registered used microprocessors. [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]

- 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]

**P.T.O.**

## 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) Velocity  
iii) Displacement  
iv) 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. :

**P2924**

**[5154]-333**

[Total No. of Pages : 3

**B.E. (Production Sandwich Engg.)  
ADVANCED PRODUCTION TECHNOLOGY  
(2008 Pattern) (Semester - I) (411123)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1) a)** Discuss the physical aspects of high speed machining and hard-part machining. **[8]**

b) State in detail the Near Dry Machine tools and their Machining Operations. **[10]**

OR

**Q2)** Explain the following in detail: **[18]**

- a) High Speed Machining Technology.
- b) Dry machine tool and requisite equipments.
- c) Hard Part Machining.

**Q3)** Discuss the following: **[16]**

- a) Nano-Scale Machining.
- b) Magnetic Abrasive Finishing.
- c) Magnetic Float Polishing.

OR

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

- Q4)** Discuss the following: [16]
- a) Nano Metrology.
  - b) Ultra-precision machines.
  - c) Abrasive Flow Machining.

- Q5)** Discuss the following: [16]
- a) Computer Aided Inspection.
  - b) Enterprise Resource Planning.
  - c) Cellular Manufacturing Systems.
  - d) Rapid Prototyping.

OR

- Q6)** a) What is Computer Integrated Production Management? [6]
- b) Explain the Manufacturing Resource Planning and Enterprise Resource Planning. What is the objective of their implementation? [10]

### **SECTION - II**

- Q7)** Explain the following: [18]
- a) Industrial Robots.
  - b) Analytical Model of FMS.
  - c) Petrinets.
  - d) Automated Workpiece Handling.

OR

- Q8)** Explain the following: [18]
- a) Centrifugal and Revolving Feeder.
  - b) Design for Automated Assembly.
  - c) Automated Factory.
  - d) Features of Toyota Production System.

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

- a) Hydraulic Valves.
- b) Hydraulic Servo Mechanism.
- c) Standard Components for Pneumatic Mechanisms.
- d) Applications of Pneumatic Mechanisms.

OR

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

- a) Hydraulic Actuators.
- b) Hydraulic Proportional Valves.
- c) Air Motors.
- d) Advantages of Pneumatic Mechanisms.

**Q11)a)** What is F-R-L and what is the function of a lubricator? **[2]**

- b) Explain with neat diagrams closed loop electro hydraulic control system and open loop hydraulic system. **[8]**
- c) Describe the types and construction details of Piston Pumps and Gear Pumps. **[6]**

OR

**Q12)a)** Draw and explain constructional features of a 5/3-direction control valve of linear type along with its graphical symbol. **[8]**

- b) Describe the principles and procedures for Pneumatic Circuit Design. **[8]**





Total No. of Questions : 12]

SEAT No. :

**P2925**

**[5154]-335**

[Total No. of Pages : 3

**B.E. (Production Sandwich Engineering)  
AUTOMOBILE ENGINEERING  
(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 form each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*

**SECTION - I**

**UNIT - 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]

**UNIT - II**

- 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 Pump circulation system? Explain. [8]

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

### UNIT - III

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

OR

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

### SECTION - II

#### UNIT - IV

- 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]

#### UNIT - V

- 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]

**UNIT - VI**

**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.

**x      x      x**

Total No. of Questions : 12]

SEAT No. :

**P2926**

**[5154]-336**

[Total No. of Pages : 3

**B.E. (Production Sandwich)**  
**COMPUTER INTEGRATED MANUFACTURING AND**  
**INDUSTRIAL ROBOTICS**  
**(2008 Course) (Semester - I) (411124 C) (Elective - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

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

b) Explain need of Models in CIM. **[4]**

OR

**Q2) a)** List out the different methods of Rapid Prototyping. Explain any one Method in detail. **[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 Structure of Robotics. **[8]**

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

OR

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

b) Explain the Concept of Spatial mechanism. **[4]**

**P.T.O.**

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

OR

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

### **SECTION - II**

- Q7)** a) Classify the various types Grippers used in Robotics. [8]  
b) A 5 kg rectangular block is gripped in the middle and lifted vertically at velocity 1 m/s. If it accelerates to this velocity at  $27.5 \text{ m/s}^2$  and the coefficient of friction between the gripping pad and block is 0.48 calculate minimum force that would prevent slippage. [8]

OR

- Q8)** a) Explain concept finite element analysis in grippers designs for pressure Foragile. [8]  
b) Write a short note on design consideration for gripper design. [8]

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

OR

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

**Q11)a)** Explain along with sketch the application Robot in the following Area.[12]

- i) Spray Painting
- ii) Spot Welding
- iii) In medical field.

b) Explain the application of CLIMBING Robot in detail. [6]

OR

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

- a) Interfacing of robotics with PC.
- b) Obstacles avoidance technique in robotics.
- c) Languages used for programming in robot.

**x x x**

Total No. of Questions : 12]

SEAT No. :

**P2927**

**[5154]-337**

[Total No. of Pages : 2

**B.E. (Production - Sandwich)**

**PLASTIC ENGINEERING**

**(2008 Course) (Semester - I) (Elective - I) (411124 D)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

- Q1)** a) Discuss concept of condensation in plastic. [8]  
b) Explain coloring of plastic. [10]

OR

- Q2)** a) Discuss the classification of plastic. [8]  
b) Explain concept of addition. [10]

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

OR

- Q4)** a) Explain types of nozzles with suitable sketches. [8]  
b) Explain 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) Explain twin screw extruder with suitable sketch. [8]  
b) Discuss various problems observed in extrusion. [8]

**P.T.O.**

**SECTION - II**

- Q7)** a) Discuss different materials used in blow molding. [10]  
b) Explain bottle manufacturing in blow moulding with suitable sketches. [8]

OR

- Q8)** a) Explain rotary blow molding system with suitable sketches. [8]  
b) Compare injection blow & extrusion blow molding processes. [10]

- Q9)** a) Explain thermoforming by skeleton tooling with suitable sketch. [8]  
b) Explain matched metal moulding thermoforming with suitable sketches. [8]

OR

- Q10)** a) Discuss various problems observed in thermoforming. [8]  
b) Explain vacuum forming male moulding with suitable sketches. [8]

- Q11)** a) Explain buffing and polishing operations in plastic. [10]  
b) Explain guidelines for tool geometry in plastic machining. [6]

OR

- Q12)** a) Explain important considerations in tapping and turning operations in plastic. [10]  
b) Explain milling and sawing operations in plastics. [6]

**x x x**



Total No. of Questions : 12]

SEAT No. :

**P2928**

**[5154]-338**

[Total No. of Pages : 2

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

**ERGONOMICS AND HUMAN FACTORS IN ENGINEERING**

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

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer 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**

**UNIT - I**

- Q1)** a) Describe designing of MMH task with a good example. [9]  
b) How is the speed of movements and accuracy of movements a performance criterion. [9]

OR

- Q2)** Write short note on following ergonomic concepts. [18]  
a) Human Physical Activities  
b) Measures of Physiological Functions  
c) Strength and Endurance

**UNIT - II**

- Q3)** a) Compare between work surface height and working height. [8]  
b) Explain the principles of seat design. Discuss with a good example. [8]

OR

- Q4)** a) Explain the principles of use of anthropometric data in design. Explain any two with examples. [8]  
b) Write a note on mirror image arrangements. [8]

**UNIT - III**

- Q5)** a) Write a note on concept of visibility. [8]  
b) Write a note on general location of displays and controls within workspace. [8]

OR

**P.T.O.**

- Q6)** a) Explain any four important functions of controls. Discuss with suitable examples. [8]  
b) Discuss any one special control device with a neat sketch. [8]

**SECTION - II**

**UNIT - IV**

- Q7)** a) How is Color System defined in Human Factors Engineering? Describe with a neat sketch. [9]  
b) Write a note on Foot Controls. How are they comparable with Hand Controls. Discuss? [9]

OR

- Q8)** a) Discuss the effect of illumination on performance from a Human Factors perspective. [9]  
b) Discuss the physiological effect of heat on performance. [9]

**UNIT - V**

- Q9)** a) Differentiate between Heat Index and Wind Chill Index. [8]  
b) Describe various noise exposure limits. How are threshold limits determined? [8]

OR

- Q10)** a) Human Factors in system design: discuss the concept. [8]  
b) Describe the importance of HFE data in interface design. [8]

**UNIT - VI**

- Q11)** a) What is PMTS? How is it significant for an ergonomist? [8]  
b) Explain the application of MOST for construction and civil work. [8]

OR

- Q12)** a) Differentiate between conventional systems versus method time measurement system. [8]  
b) Write a note on evolution of MTM systems. [8]



Total No. of Questions : 12]

SEAT No. :

**P2929**

**[5154]-339**

[Total No. of Pages : 3

**B.E. (Production Engineering S/W)**  
**MATERIALS MANAGEMENT AND LOGISTICS**  
**(2008 Pattern) (Semester - I) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right side indicate full marks.*
- 3) *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 Engineering? Explain steps in Value Engineering with suitable example. **[9]**

b) Materials management is an integral part of shop floor management. Explain with example **[9]**

OR

**Q2) a)** What is bill of material? Explain how explosion chart helps in material requirement planning. **[9]**

b) Write note on Make or Buy decision. **[9]**

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

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

- i) Letter of credit                      ii) Bill of Lading

OR

**Q4) a)** Explain any three of the '5 rights of procurement' including how each might be achieved. **[8]**

b) What is Vendor Rating and vendor development? Explain categorical plan method in detail. **[8]**

**P.T.O.**

- Q5)** a) What is store identification? Explain KODAK system of codification briefly. [8]
- b) How study of waste management techniques helps to manage surplus and obsolete material? [8]

OR

- Q6)** a) Material issuing policies plays important role in managing the cost of material. Explain in detail. [8]
- b) What is stock verification? Explain types of Stock Verification with its advantages and disadvantages. [8]

### **SECTION-II**

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

OR

- Q8)** a) Explain the economic and service benefits of warehouse. [8]
- b) List economic factors of transportation. Explain any four in brief. [8]

- Q9)** a) What are the types of selective control of inventory? Explain ABC analysis in detail. [8]
- b) Alfa industry estimates that it will sell 26000 units of its product for the forthcoming year. The ordering cost is Rs. 180 per order and the carrying cost per unit per year is 15% of the purchase price per unit which is Rs. 55. Find [8]
- i) Economic order size
- ii) No.of orders per year.
- iii) Time between successive orders.

OR

- Q10)**a) Derive expression for Economic Order Quantity (EOQ) assuming instantaneous replenishment system. [8]
- b) John Industry needs 5600 units/year of a bought out components which will be used in its main product. The ordering cost is Rs. 270 per order

and the carrying cost per unit is Rs. 35. Find [8]

- i) Economic Order Quantity
- ii) No. of orders per year.
- iii) Time between successive orders.

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

b) The annual demand of a product is 36,000 units. The average lead time is 3 weeks. The standard deviation of demand during the average lead time is 150 units/week. The cost of ordering is Rs 500 per order. The cost of purchase of the product per unit is Rs.15. The cost of carrying per unit per year is 19% of the purchase price. The maximum delay in lead time is 1 week and probability of this delay is 0.3. Assume a service level of 0.95. [9]

- i) What is the reorder level if Q system is followed?
- ii) If P system is followed, what is the maximum inventory level?

OR

**Q12)a)** A firm has demand distribution of demand during a constant lead time with a standard deviation of 400 units. The firm wants to provide 95% service. [9]

- i) How much safety stock should be carried for them?
  - ii) If the demand during lead time averages 1500 units, what is the appropriate reorder level?
- b) What is safety stock? How lead time affects safety stock in finished goods inventory? [9]



Total No. of Questions : 12]

SEAT No. :

P3622

[Total No. of Pages : 6

[5154]-340

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

FINANCIAL MANAGEMENT AND COST CONTROL

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right side indicate full marks.
- 3) 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) Define working capital. Why it is required? Explain various sources of finance. [8]
- b) What is importance of Ratio Analysis? Explain the importance of following ratios. [8]
- i) Quick Ratio
  - ii) Inventory Turnover Ratio
  - iii) Debt – Equity Ratio.

OR

- Q2)** a) Distinguish between 'Profit maximization' and 'Wealth maximization' objectives of the firm. [8]
- b) Explain functions of finance management. Explain the difference between finance and accounting relating to the treatment of funds and decision making. [8]

**P.T.O.**

- Q3) a)** There are two mutually exclusive projects under active consideration of a company. Both the projects have a life of 5 years and have initial cash outlays of Rs. 1,00,000 each. The company pays tax at 50% rate and the maximum required rate of the company has been given as 10%. The straight line method of depreciation will be charged on the projects. The projects are expected to generate a net cash inflow before taxes as follows: **[10]**

Year	Project X (Rs.)	Project Y (Rs.)
1	40,000	60,000
2	40,000	30,000
3	40,000	20,000
4	40,000	50,000
5	40,000	50,000

With the help of the above given information you are required to calculate:

- i) The Pay-back Period of each project
  - ii) The Net Present Value and Profitability Index for each project
- b) Discuss in brief importance of capital expenditure. **[6]**

OR

- Q4) a)** Explain essential features for effective operating of control of capital expenditure. **[10]**
- b) From the following information you are required to calculate pay-back period: A project requires initial investment of Rs. 40,000 and generate cash inflows of Rs. 16,000, Rs. 14,000, Rs. 8,000 and Rs. 6,000 in the first, second, third, and fourth year respectively. **[6]**
- Q5) a)** Write a short note on Sources of working capital. **[9]**
- b) Jhon C. Ltd. sells goods on a gross profit of 25%. Depreciation is considered as a part of cost of production. The following are the annual figures given to you :Sales (2 months credit) Rs. 18,00,000 Materials consumed (1 months credit) 4,50,000 Wages paid (1 month lag in payment)

3,60,000 Cash manufacturing expenses (1 month lag in payment) 4,80,000  
 Administrative expenses (1 month lag in payment) 1,20,000 Sales  
 promotion expenses (paid quarterly in advance) 60,000 The company  
 keeps one month's stock each of raw materials and finished goods. It  
 also keeps Rs. 1, 00,000 in cash. You are required to estimate the working  
 capital requirements of the company on cash cost basis, assuming 15%  
 safety margin. [9]

OR

**Q6) a)** Write note on concept of working capital. [9]

b) Hi-tech Ltd. plans to sell 30,000 units next year. The expected cost of  
 goods sold is as follows: [9]

Rs.	(Per Unit)
Raw material	100
Manufacturing expenses	30
Selling, administration and financial expenses	20
Selling price	200

The duration at various stages of the operating cycle is expected to be as  
 follows:

Raw material stage	2 months
Work-in-progress stage	1 month
Finished stage	1/2 month
Debtors stage	1 month

Assuming the monthly sales level of 2,500 units, estimate the gross  
 working capital requirement. Desired cash balance is 5% of the gross  
 working capital requirement, and working -progress in 25% complete  
 with respect to manufacturing expenses.

### SECTION - II

**Q7) a)** What is labour turnover? Explain various methods to measure labour  
 turnover. What are the causes and costs associated with labour turnover?  
 [8]



- b) From the following information you are required to calculate depreciation rate under WDV Method. [8]

Cost of the Machine	Rs. 10,000
Estimated Useful Life.	3 years
Estimated Scrap or Salvage Value	Rs. 1,000

OR

- Q8) a)** What are the requirements of good wage payment system? State to what extent Halsey and Rowan plans fulfil the above requirements. [8]

- b) Draw a stores ledger card recording the following transaction that took place in a FIFO & LIFO methods : [8]

2015

1st January	Opening stock	190 pieces @ Rs.2 each
5th January	Purchase	100 pieces @ Rs.2.20 each
10th January	Purchase	150 pieces @ Rs.2.40 each
20th January	Purchase	180 pieces @ Rs.2.50 each
2nd January	Issues	150 pieces
7th January	Issues	100 pieces
12th January	Issues	100 pieces
28th January	Issues	200 pieces

- Q9) a)** Define and explain briefly the following types of variances [8]

- i) material price variance
- ii) material usage variance
- iii) material mixture variance
- iv) material yield variance

- b) From the following data, calculate labour variances: The budgeted labour force for producing product A is: [8]

20 Semi-Skilled workers @ Re. 0.75 per hour for 50 hours

10 Skilled workers @ Rs. 1.25 per hour for 50 hours

The actual labour force employed for producing A is

22 Semi-Skilled workers @ Re. 0.80 per hour for 50 hours

8 Skilled workers @ Rs. 1.20 per hour for 50 hours

OR

**Q10)a)** Define budget control .What are the pre-requisites for the implementation of budget control. **[8]**

b) From the following information, calculate: **[8]**

i) Material Cost Variance

ii) Material Price Variance

iii) Material Usage Variance

Quantity of materials purchased 3,000 units

Value of material purchased Rs. 9,000

Standard quantity of material required per ton of finished product = 25 units

Standard rate of materials Rs. 2 per unit

Opening stock of materials Nil

Closing stock of materials 500 units

Finished production during the year 800 tons

**Q11)a)** Define Marginal Costing. State the applications and limitations of Marginal Costing. **[6]**

b) From the following particulars, calculate: **[12]**

i) P / V Ratio Solution:

ii) Profit when sales are Rs. 40,000, and

iii) New break-even point if selling price is reduced by 10%

Fixed cost = Rs. 8,000

Break-even point = Rs. 20,000

Variable cost = Rs. 60 per unit

OR

**Q12)a)** Define and explain the concept of standard cost and standard costing.[9]

b) The following are the cost information in relation to the manufacture of a product: [9]

Selling price -Rs. 10 per unit

Trade discount -5% of selling price

Material cost -Rs. 3 per unit

Labour -Rs. 2 per unit

Overheads:

Fixed Rs. 10,000

Variable 100% of labour cost

Calculate:

i) BEP.

ii) Profit if sales are 15% above break-even volume.



Total No. of Questions : 12]

SEAT No. :

**P2930**

**[5154]-341**

[Total No. of Pages : 3

**B.E. (Production S/W)  
PRODUCT DEVELOPMENT  
(2008 Pattern) (Semester - I) (Elective - II)**

*Time : 3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer Que. No.1 or Que. No.2, Que. No.3 or Que. No.4, Que. No.5 or Que. No.6 from Section-I and Que. No.7 or Que.No.8, Que. No.9 or Q. 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 rules, Mollier charts, electronic pocket calculator and steam tables is allowed.*

**SECTION-I**

**UNIT - I**

- Q1)** a) What is modern product development process? Explain the role of product development team in product development planning with reference to ISO standard. **[10]**
- b) Explain standardization, Simplification and Specialization in product design. **[8]**

OR

- Q2)** a) Distinguish between **[8]**
- i) Product development Vs Product Design
  - ii) Product verification and Production validation
- b) Explain in detail seven phases of Product design **[10]**

**UNIT - II**

- Q3)** a) Explain the following terms: **[8]**
- i) Customer Needs
  - ii) Customer population
- b) What is Technology Forecasting? Explain in detail Technology S-Curve. **[8]**

OR

**P.T.O.**

- Q4)** a) Explain in short the Economic Analysis of product? How it is useful to company? [8]  
b) What is Mission Statement and Technical Questioning? Explain the Economic analysis of Product. [8]

**UNIT - III**

- Q5)** a) What is functional modeling? Explain decomposition in detail. [8]  
b) Write short notes on: [8]  
i) Pugh's Concept ii) System modelling

OR

- Q6)** a) Explain the different steps of product development based on product function? [8]  
b) Write short notes on: [8]  
i) FMEA ii) Concept selection process

**SECTION-II**

**UNIT - IV**

- Q7)** Write short notes on: [16]  
a) Benchmarking approach  
b) FMEA  
c) Tear down methods

OR

- Q8)** a) What is intended assembly cost analysis and explain function form diagrams. [8]  
b) What is reverse engineering? Explain the advantages & disadvantages of reverse engineering. [8]

**UNIT - V**

- Q9)** Explain the following terms: [16]  
a) Design for manufacture  
b) Design for piece part production  
c) Product testing  
d) Product validation

OR

- Q10)a)** Explain the phases of product life cycle with its corresponding technologies. [8]
- b) Explain the following terms: [8]
- i) Product Testing                      ii) Virtual Trials

**UNIT - VI**

- Q11)a)** What is product life cycle? Why it is necessary? Explain its components in detail. [8]
- b) Explain in short reliability concept in product development. [10]

OR

- Q12)a)** Explain in short Emergence of PLM & significance of PLM. [10]
- b) Write short notes on: [8]
- i) Reliability in product design
- ii) Importance of customer involvement



Total No. of Questions :12]

SEAT No. :

**P2931**

[Total No. of Pages :3

[5154] - 342

**B.E. (Production Sandwich)**

**SUPPLY CHAIN MANAGEMENT**

**(2008 Course) (Semester - II) (Elective - III) (411130 A)**

*Time : 3Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer three questions from each section.*
- 2) *Your answers will be valued as a whole.*
- 3) *Assume suitable data, if necessary.*

**SECTION -I**

**Unit -I**

- Q1)** a) What is Supply Chain. Explain the stages in a supply chain with a good example. [9]
- b) What are the obstacles to achieving a strategic fit? [9]

OR

- Q2)** a) Explain how to achieve strategic fit through understanding the customer and supply chain uncertainty? [9]
- b) Explain the components of pricing decisions. [9]

**Unit -II**

- Q3)** a) Explain the economies of scale to exploit quantity discounts. [8]
- b) What is the roles of aggregate planning in supply chain management?[8]

OR

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

- Q4)** a) Discuss the role of transportation in supply chain? Mention the various modes of transportation with their strengths and weaknesses? [11]
- b) Discuss any two factors influencing SCM network design. [5]

**Unit-III**

- Q5)** a) Identify cycles & push-pull boundary in supply chain when you are Purchasing Samsung Galaxy Note Phone from a shop in your city. [12]
- b) Explain and two measures of forecast errors? [4]

OR

- Q6)** a) Explain the role of cycle inventory in supply chain? [8]
- b) What are the economies of scale to exploit quantity discounts? [8]

**SECTION -II**

**Unit-IV**

- Q7)** Write note on following. Explain with suitable example: [18]
- a) Direct Shipment Network.
- b) Tailored Network.
- c) SCM Network Design.

OR

- Q8)** a) Explain the concept of tradeoffs in transportation design of SC. [10]
- b) Discuss the concept of Milk Runs in shipment network in SCM. [8]

**Unit-V**

- Q9)** a) What are the different effects seen because of Bullwhip Characteristics in demand fluctuations in SC? [8]
- b) Discuss the impact of E Business on customer service in book industry.[8]

OR



- Q10)a)** Revenue management is a key to improving SC efficiency. How? [8]  
b) Pricing and Revenue management is influenced by which factors in SCM. [8]

**Unit -VI**

- Q11)a)** Explain the role of pricing and revenue management in supply chain management. [8]  
b) Explain the role of IT pricing and revenue management. [8]

OR

- Q12)a)** How to evaluate network design decisions using decision trees? [10]  
b) Explain the process of risk management in network design. [6]

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2932**

[Total No. of Pages :2

**[5154] - 343**

**B.E. (Production Sandwich)**

**PLANT ENGINEERING & MAINTENANCE**

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

*Time : 3Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION -I**

- Q1)** a) What is necessity of measurement of productivity of plant? Explain. [8]  
b) Discuss principles of plant management. [8]

OR

- Q2)** a) What is Parato chart? Explain in detail. [8]  
b) Explain classification of maintenance. [8]
- Q3)** a) Discuss significance of plant facility. [8]  
b) Explain Group Technology. [8]

OR

- Q4)** a) Explain how the Information Technology is useful for optimization of layout. [8]  
b) What is REL chart? [8]

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

- Q5)** a) Explain types of software's for classification and coding. [8]  
b) Discuss maintenance management in detail. [10]

OR

- Q6)** Write short notes on following: [18]  
a) MICLASS software for classification and coding.  
b) Inventory planning.  
c) Brake down maintenance.

**SECTION -II**

- Q7)** a) What is reliability? Discuss in detail. [8]  
b) Explain mathematical model for life cycle costing model. [8]

OR

- Q8)** a) Discuss various preventive maintenance with life cycle costing. [8]  
b) Explain meaning of schedule of preventive management. [8]

- Q9)** a) Discuss material handling equipments. [8]  
b) Write the issues related to recycling and wastages. [8]

OR

- Q10)**a) Explain the importance of energy audit. [8]  
b) Discuss safety measures of chemical plants. [8]

- Q11)**a) Explain ferrography & hot ferrography. [8]  
b) What is condition based maintenance. [10]

OR

- Q12)**a) What are the advantages of Overall effectiveness of equipments? [10]  
b) Explain RAM analysis. [8]

EEE

Total No. of Questions :12]

SEAT No. :

**P2933**

[Total No. of Pages :3

[5154] - 344

**B.E. (Production Sandwich)**

**INDUSTRIAL RELATIONS & HUMAN RESOURCE MANAGEMENT**

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

*Time : 3Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION -I**

**Unit -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]

**Unit -II**

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

OR

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

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

**Unit-III**

- 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**

**Unit-IV**

- 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]

**Unit-V**

- 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]

**Unit - VI**

- 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.

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2934**

[Total No. of Pages :2

**[5154] - 345**

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

**MARKETING MANAGEMENT**

**(2008 Course) (Semester - II) (Elective - III) (411130 D)**

*Time : 3Hours]*

*[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 Philosophy of Business with a suitable example. **[16]**

OR

**Q2)** a) Explain an Industrial Marketing Perspective. **[8]**

b) Explain the installation of monitoring the environment for developing marketing philosophy. **[8]**

**Q3)** a) Explain the importance of understanding Customer Behaviour for Marketing. **[8]**

b) Explain the procedure for understanding consumer's decision processes. **[8]**

OR

**Q4)** For organizing a commodity market, explain the study of perspectives of organizational buyers in industrial markets with suitable example. **[16]**

**Q5)** What is Market Segmentation? How the products are positioned as per it. **[18]**

OR

**P.T.O.**

**Q6)** Write a note on: **[18]**

- a) Marketing Strategies.
- b) Managing Industrial Products.

**SECTION -II**

**Q7)** Explain: **[16]**

- a) Intermediates in Marketing.
- b) Organizations for developing new products.

OR

**Q8)** What is price theories ? Enumerate different procedures for product promotions. **[16]**

**Q9)** With suitable example, write different views for managing sales force and sales territories along with formulation of services marketing. **[16]**

OR

**Q10)** Explain marketing and technological innovations? How Non profit and social marketing are supplementary to each other. **[16]**

**Q11)** Explain marketing research and importance for marketing management. **[18]**

OR

**Q12)** Explain role of quantitative techniques and tools in marketing research. **[18]**

*EEE*



Total No. of Questions : 12]

SEAT No. :

**P2935**

**[5154]-351**

[Total No. of Pages : 2

**B.E.(Biotechnology)  
Bioseparation-II  
(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

**Q1)** What is downstream Processing? Discuss the major concepts of downstream processing with reference to protein purification. **[16]**

OR

**Q2)** What are the different characteristics of proteins important for the development of purification protocol. **[16]**

**Q3)** What is basic principle of Infrared Spectroscopy? Describe quantitative analysis using this technique with its instrumentation and applications. **[16]**

OR

**Q4)** Describe in details: **[16]**

- a) NMR
- b) Spectrofluometry

**Q5)** Explain the concepts of Reverse phase chromatography with the detailed procedure. **[18]**

OR

**Q6)** Explain the concept of Hydrophobic interaction Chromatography with the detailed procedure. **[18]**

**P.T.O.**

## SECTION-II

**Q7)** Write short notes on: **[16]**

- a) Gas-liquid Chromatography
- b) LC-MS

OR

**Q8)** Explain theory of Mass Spectrometry in details. **[16]**

**Q9)** What are 'Hyphenated Techniques', explain it with case study. **[16]**

OR

**Q10)** What do you mean by SFE? Explain in detail technique with case study. **[16]**

**Q11)** Write and explain flow sheet of separation of following bioproducts **[18]**

- a) Butanol
- b) Beer

OR

**Q12)** Write a flow sheet of Penicillin separation process. Elaborate each step with detailed explanation. **[18]**



Total No. of Questions : 12]

SEAT No. :

**P2936**

[5154]-352

[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 wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary.*

**SECTION-I**

- Q1)** a) Describe in brief principle, construction and working of electromagnetic flow meter. [8]
- b) With the help of neat sketch, explain the principle and working of Radiation Pyrometer. [8]

OR

- Q2)** Explain in brief working principle of following instruments. [16]
- a) McLeod pressure gauge.
  - b) Optical Pyrometer.
  - c) Bimetallic Thermometer.
  - d) Thermocouple.
- Q3)** a) Derive the transfer function for a liquid level system with constant flow output. [6]
- b) Consider a CSTR in which a reaction is occurring  $A \rightarrow B$  and it proceeds at a rate  $r=kC_0$ . Derive the transfer function for this system. [6]
- c) A thermometer having a time constant of 2 min is at a steady state temperature of 28°C. At time  $t=0$ , the thermometer is placed in a temperature bath maintained at 120°C. [4]

OR

*P.T.O.*

- Q4)** a) Derive the response of a typical first order system to a step input of magnitude A. Also explain the characteristics of the response obtained. [6]
- b) Derive the transfer function of a single tank liquid level system having a linear resistance. [6]
- c) What are the characteristics of a first order system? Enlist few examples of first order system. Describe the significance of time constant with respect to these systems. [4]
- Q5)** a) A step change of magnitude 5 is introduced in to a system having the transfer function. [10]

$$\frac{Y(S)}{X(S)} = \frac{10}{(S^2 + 2.5S + 5)}$$

Determine

- i) Percent Overshoot.
  - ii) Maximum value of Y (t)
  - iii) Rise Time
  - iv) Ultimate Value of Y (t)
- b) Derive the response of a second order system for a step change in input. Based on the value of the damping coefficient, explain the different cases with the help of a graph. [8]

OR

- Q6)** a) With the help of a neat sketch, compare the responses obtained for a second order system to step and impulse forcing functions. [8]
- b) Derive the transfer function for a damped vibrator system and state the significance of the constants appearing in the transfer function. [10]

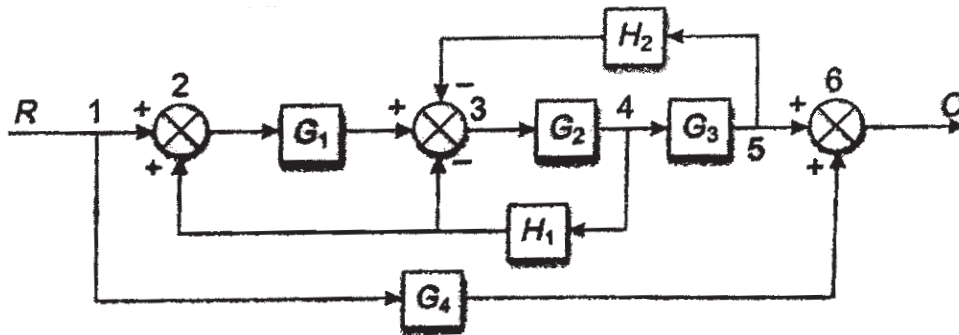
**SECTION-II**

**Q7) a)** Differentiate between. [6]

- i) Positive and Negative feedback.
  - ii) Servo and Regulator Problem
- b) What is proportional Integral derivative control? Derive its transfer function and state the characteristics of the response generated by a PID controller. [12]

OR

**Q8) a)** Obtain the transfer function  $C(s)/R(s)$  for the block diagram shown below. [12]



b) With the help of a neat sketch, explain the control actions of different types of controllers. [6]

**Q9) a)** Draw the Bode Plot for the following system. [8]

$$G(s) = \frac{20}{(2S + 1)(0.5S + 2)}$$

b) Write a note on C-C tuning method [8]

OR

**Q10) a)** The open loop transfer function of a control system is given as [12]

$$G(s) = \frac{Kc(S + 2)}{S(S + 3)(S + 4)}$$

Determine the stability of the system using Routh's criteria.

- b) With respect to frequency response analysis define the following terms. [4]
- i) High frequency asymptote.
  - ii) Low frequency asymptote.
  - iii) Corner frequency.
  - iv) Amplitude Ratio.

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

- a) Override control system.
- b) Foam Controller.
- c) Artificial Neural Networks.
- d) Cascade Controller.

OR

**Q12)** Write short note on. [16]

- a) Auctioneering control system.
- b) Ratio control System.
- c) Fuzzy Logic.
- d) Split Range Control.



Total No. of Questions : 12]

SEAT No. :

**P2937**

**[5154]-353**

[Total No. of Pages : 3

**B.E (Biotechnology)**  
**BIOPROCESS EQUIPMENT DESIGN**  
**(2008 Pattern) (Semester - I) (415465)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *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) Define and explain Polar Moment of Inertia with example. [8]  
b) Describe the general design procedure for process equipment. [8]

OR

- Q2)** a) Discuss in detail design procedure for cylindrical shell. [8]  
b) Explain Maximum distortion energy theory with example. [8]

- Q3)** a) Explain the design procedure of torispherical head. [8]  
b) Why it is necessary to consider the corrosion allowance while specifying the final thickness of vessel? [8]

OR

- Q4)** a) A high pressure vessel is to be operated at 90 MN/m<sup>2</sup>. The inside diameter of vessel is 20.5 cm. Steel having yield stress 500 MN/m<sup>2</sup> is selected for fabrication. Estimate the wall thickness required by maximum shear stress theory with a factor of safety 1. [8]  
b) Explain about auto frottage construction. [8]

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

- Q5) a)** Calculate the power required for mixing 6000L with specific gravity 0.9 and viscosity 90 cp in an agitated tank. Pitched blade turbine impeller at 90 rpm is used. Diameter of tank is 20 m and the ratio of tank diameter to agitator diameter is 0.45. The power number and Reynolds number relationship data is: [9]

$N_{Re}$	1000	2000	3000	4000
$N_p$	1.1	1.2	1.3	1.4

- b) Explain various flow pattern in agitated vessel and power curves in agitation. [9]

OR

- Q6) a)** A toluene is continuously nitrated to mononitrotoluene in a cast iron vessel, 1 meter in diameter, fitted with propeller agitator 0.3m diameter, rotating at 2.5 Hz. The temperature is maintained at 310 K by circulating 0.5 kg/sec cooling water through a stainless steel coil 25 mm outer diameter and 22 mm inner diameter in the form helix 0.8m in diameter. The conditions are such that the reacting material may be considered to have some physical properties as 75%  $H_2SO_4$ . If the mean water temperature is 290 K, what is the overall heat transfer co-efficient for desired heat transfer co-efficient. [10]

**Properties of water**

$$K = 0.59 \text{ W/mk}$$

$$C_p = 4180 \text{ J/kg. K}$$

$$\mu = 1.08 \times 10^{-3} \text{ NS/m}^2$$

$$\rho = 998 \text{ kg/m}^3$$

**Properties of 75%  $H_2SO_4$**

$$K = 0.40 \text{ W/mk}$$

$$C_p = 1880 \text{ J/kg.K}$$

$$\mu = 6.5 \times 10^{-3} \text{ NS/m}^2 \text{ at } 310\text{K}$$

$$\rho = 1666 \text{ kg/m}^3$$

$$\mu_s = 8.6 \times 10^{-3} \text{ NS/m}^2$$

Thermal conductivity of stainless steel is 15.9W/mk. Dirt resistance at inside and outside surface are 0.0003 & 0.0005  $\text{m}^2\text{K/w}$ .

- b) Discuss the design consideration for various types of jackets with neat sketch. [8]



## SECTION - II

- Q7)** a) Explain the thermal design procedure for shell and tube heat exchanger. [8]  
b) Discuss about Codes and Standards and various types of heat exchanger. [8]

OR

- Q8)** a) Explain various types of evaporators used in process industry. [8]  
b) Explain the procedure with equations to calculate the tube side heat transfer coefficient. [8]

- Q9)** a) Discuss about percent flooding and weep point. [8]  
b) Define Murphree plate, Overall plate (column) efficiency. [8]

OR

- Q10)** a) Explain typical performance diagram for a sieve plate. [8]  
b) Compare the different types of plates in distillation. [8]

**Q11)** Write short note on: [18]

- a) Tangential Flow Filtration (TFF) and  
b) Need of downstream processing in the biological process.

OR

**Q12)** Discuss on: [18]

- a) Continuous sterilization.  
b) High performance thin layer chromatography.



Total No. of Questions : 12]

SEAT No. :

**P2938**

**[5154]-354**

[Total No. of Pages : 2

**B.E. (Biotechnology)**

**ENVIRONMENTAL BIOTECHNOLOGY**

**(2008 Pattern) (Semester - I) (Elective - I) (415461 A)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION - I**

**Q1) Answer the following [18]**

- a) Define BOD and derive the equation for BOD. Illustrate the limitations of BOD.
- b) Sample was prepared by 5% dilution of waste water and following observations were made ( $K = 0.2$ )
  - i) D.O. of original sample is = 0.6 mg/lit
  - ii) D.O. of aerated water used for dilution = 6.0 mg/lit
  - iii) D.O. of diluted sample after 5 days incubation = 1 mg/lit

OR

**Q2) Explain in detail about the following parameters which are been used for the analysis of waste water [18]**

- a) Suspended solids
- b) Colour and odour

**Q3) Answer the following: [16]**

- a) With the help of neat labeled diagram explain the benzoic acid degradation by using photo catalytic reactor.
- b) Explain the construction and working of packed bed reactor.

OR

**Q4) A trickling filter 80-ft in diameter is operated with a primary effluent of 0.380 MGD and a recirculated effluent flow rate of 0.560 MGD. Calculate the hydraulic loading rate on the filter in units gallons per day per square foot.[16]**

**P.T.O.**

**Q5)** What does industrial effluent mean? What is the impact of industrial effluents on human life? How industrial effluents influence pollution? How does effluent treatment plant work? [16]

OR

**Q6)** Differentiate between [16]

- a) Chemical coagulation and chemical precipitation.
- b) Sedimentation and flocculation.

**SECTION - II**

**Q7)** Explain the principle of Upflow anaerobic sludge blanket digester with the help of neat diagram. Discuss the limitations and advantages of the same. [18]

OR

**Q8)** Write short note on [18]

- a) Basic design and operation of cyclone separator.
- b) Sampling and analysis of air pollutants.

**Q9)** Explain the various methods involved in the disposal of radioactive wastes. [16]

OR

**Q10)** Write a note on [16]

- a) Biological detoxification.
- b) Role of methanogens in xenobiotic degradation.

**Q11)** What are Xenobiotic compound? Explain the biodegradation of herbicides and pesticides. [16]

OR

**Q12)** Describe in detail about [16]

- a) Land farming.
- b) Biosparging.

**x x x**

Total No. of Questions : 11]

SEAT No. :

**P2939**

**[5154]-356**

[Total No. of Pages : 2

**B.E (Biotechnology)**

**Biotherapeutics Technology**

**(2008 Course) (Semester - I) (Elective - I) (415461 C)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Both sections compulsory.*
- 2) *Draw diagrams wherever necessary.*
- 3) *Maximum marks for each question is given in brackets.*

**SECTION - I**

**Q1)** Describe in detail Phase I and II clinical trials and role of FDA in conducting clinical trials. **[18]**

OR

**Q2)** Give an overview of Biopharmaceutical industry. **[18]**

**Q3)** Giving examples describe process of cloning Biotherapeutic protein in mammalian cell line. **[16]**

OR

**Q4)** Write notes on **[16]**

- a) transfection
- b) expression vectors

**Q5)** Describe in detail transgenic plants as sources of recombinant biopharmaceuticals. **[16]**

OR

**Q6)** With the help of flow chart describe the production and characterization of recombinant proteins. **[16]**

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

**SECTION - II**

**Q7)** Write notes on: **[18]**

- a) Cell banking.
- b) Clean room design.

OR

**Q8)** Give an account of types of water and flow chart of generation of water for biopharmaceutical processing. **[18]**

**Q9)** Giving examples describe various methods of drug delivery. **[16]**

OR

**Q10)** Write notes on

- a) real time stability
- b) drug delivery routs **[16]**

**Q11)** Write notes on any 2 (8 marks each) **[16]**

- a) ICH guidelines
- b) Biogenerics
- c) Drug and cosmetics act
- d) Patents and trademarks

**x      x      x**



**Q6)** Enumerate the different main applications of solar energy? What is the principle of solar photovoltaic power generation? What are the advantages and disadvantages of photovoltaic solar energy conversion? [16]

**Q7) a)** Explain a biodiesel production cases with a neat sketch. [14]

**b)** Explain the advantages of microalgae as feed stock for biofuels. [4]

OR

**Q8)** What is biodiesel? What are the advantages of biodiesel? Enlist the various steps involved in the preparation of biodiesel from jatropha and describe any one in detail. [18]

**Q9) a)** What are the challenges in butanol fermentation? Explain any two approaches to overcome them. [10]

**b)** Write a note on [6]

i) Role of detoxification

ii) Concept of Bio refinery

OR

**Q10)**What is aim of pretreatment? Explain dilute acid hydrolysis and alkali pretreatment. Enlist the drawbacks of both the methods [16]

**Q11)a)** Write a note on “Continuous and batch type” biogas plant. [8]

**b)** What are the methods of mixing in biogas? Explain any three methods with neat schematic sketch. [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. :

**P2941**

**[5154]- 358**

[Total No. of Pages : 3

**B.E. (Biotechnology)**

**BIOMATERIALS**

**(2008 Pattern) (Elective - II) (415462 B) (Semester - I)**

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to candidates:*

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

**SECTION - I**

- Q1)** a) What is shape memory polymer? Explain shape memory cycle in detail.[6]  
b) Explain general properties of materials used in biology. Discuss briefly different classes of materials used in biology. [10]

OR

- Q2)** List out three important types and properties of metals which are being used during implants. Discuss processing steps involved for typical metallic implant device with one example. [16]

- Q3)** Explain in detail along with properties and functions- [16]
- a) Porous materials
  - b) Chitin and chitosan
  - c) Dental implants
  - d) Biodegradable plastics

OR

- Q4)** A titanium dental implant was manufactured by the Biomatter company for the past 8 years. It performed clinically well. For economical reasons, manufacturing of the titanium device was outsourced to Metalsmed Inc. Early clinical results on this Metalsmed implant, supposedly identical to the Biomatter implant, suggested increased inflammation. How would you compare the surface chemistry and structure of these two devices to see if a difference that might account for the difference in clinical performance could be identified? Discuss all possibilities in detail. [16]

**P.T.O.**



**Q5)** Explain structure with physical and chemical properties of polylactic acid. How method of synthesis differs from other common polymerization processes with a neat sketch detail out the synthesis procedure for the same. [18]

OR

**Q6) a)** Explain mass spectrometry and atomic force microscopy for analysis of polymer structure. [9]

b) Draw a chemical structure and write a note on “Biomedical applications of pullulan”. [9]

### SECTION - II

**Q7)** Write a short note on- [16]

a) Membrane Bioreactors

b) Application of biocatalyst in biotransformation process.

c) Ceramics

d) Nanobiomaterials.

OR

**Q8)** What is ‘Biocatalyst’? How it works for production of polymer, aromatic precursors. Explain any one industrial application of biocatalyst with suitable example. [16]

**Q9) a)** Explain structure and properties of polyglycolide and polycaprolactone. [8]

b) What is PHA? Explain in detail fermentative production of polyhydroxyalkanoates along with its applications. [10]

OR

**Q10)** List out different medical fibers and biotextiles. Describe in detail manufacturing methods of medical fibers. Give types of fibers and selection criteria required for medical fibers. [18]

**Q11)** List the type of materials used in each of the following medical applications along with feasibility of materials for said applications. **[16]**

- a) Contact lenses.
- b) Tissue engineering scaffold
- c) Skin repair
- d) Bone plates.

OR

**Q12)a)** Explain hydrogel applications in medicine considering importance of swelling property. **[8]**

- b) How can we use stress-strain diagrams in selecting the most appropriate materials for orthopedic biomaterials. **[8]**



Total No. of Questions : 12]

SEAT No. :

**P2942**

**[5154]- 359**

[Total No. of Pages : 2

**B.E. (Biotechnology)**

**STEM CELL BIOLOGY AND REGENERATIVE MEDICINE  
(2008 Pattern) (Semester - I) (End Sem.) (415462 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.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume Suitable data if necessary.*

**SECTION - I**

**Q1)** What is a niche? Why is the study of a niche important in case of stem cell biology? **[18]**

OR

**Q2)** Explain how stem cells are important in a living organisms life. **[18]**

**Q3)** Lineage tracing is a very important technique in stem cell research. **[16]**

OR

**Q4)** Write a note on (8 marks each): **[16]**

- a) Chromatin Immunoprecipitation
- b) Fluorescent Activated Cell Sorting

**Q5)** Describe the entire procedure for getting iPSC's. Why is iPSC's significant step in stem cell research? **[16]**

OR

**Q6)** How are pancreatic stem cells isolated and cultured? Any specific requirements for the growth and propogation of pancreatic stem cells? **[16]**

**P.T.O.**

## SECTION - II

**Q7)** How is the categorization of the stem cell research in India? What are the guidelines laid down for the research and patentability issues in human stem cell research? **[18]**

OR

**Q8)** Enlist the guidelines laid down by the Government of India for stem cell banking and distribution of Human Embryonic stem Cells? **[18]**

**Q9)** What are degenerative diseases? What is the main cause of degenerative diseases? Explain the strategy of using stem cells in treating degenerative diseases. **[16]**

OR

**Q10)** How are stem cells used in: **[16]**

- a) Cardiomyopathies
- b) Retinal replacement therapy

**Q11)** Explain how stem cells and its properties are put to use for tissue engineering. Comment on the use of stem cells in giving fully functional organs in petridish. **[16]**

OR

**Q12)** Explain the use of cultured epithelial autografts (CEA) for epidermal regeneration in patients suffering from massive burns. **[16]**



Total No. of Questions : 12]

SEAT No. :

**P2943**

**[5154]- 360**

[Total No. of Pages : 2

**B.E. (Biotechnology)**

**BIOPROCESS MODELING AND SIMULATION**

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

*Time :3 Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, 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)** Discuss in detail Segregated and Unsegregated models with suitable examples. **[16]**

OR

**Q2)** Give detailed notes on problem definition and formulation in Model Building. **[16]**

**Q3)** Model a PFR with the following first order reactions taking place inside it. **[18]**

- a) Consecutive
- b) Parallel
- c) Reversible

OR

**Q4)** Model three CSTR's in series with variable hold up with proper assumptions and nomenclature accompanied by a neat sketch. Prove that the system is critically defined. **[18]**

**Q5)** Write short notes on various variables and parameters used in the modeling of Fermenter and Bioreactor. **[16]**

OR

**P.T.O.**

**Q6)** Briefly explain with suitable examples the classification of mathematical models based on [16]

- a) State of the process
- b) Variation of independent variables.

### SECTION - II

**Q7)** Define Chemostat? How recycle stream affects the yield of bio product in Chemostat? Model a Chemostat with proper assumptions and neat sketch?[18]

OR

**Q8)** In a Chemostat with cell recycle, the feed flow rate and culture volumes are  $F=100\text{ml/hr}$  and  $V=1000\text{ml}$  respectively. The system is operated under glucose limitation, and the yield coefficient,  $Y_{x/s}^M$ , is  $0.5\text{gdw cells/g substrate}$ . Glucose concentration in the feed is  $S_0=10\text{g glucose/l}$ . The kinetic constants of the organisms are  $\mu_m=0.2\text{h}^{-1}$ ,  $K_s=1\text{g glucose/l}$ . The value of  $C$  is  $1.5$ , and the recycle ratio is  $\alpha=0.7$ . The system is at steady state. [18]

- a) Find the substrate concentration in the recycle stream ( $S$ ).
- b) Find the specific growth rate ( $\mu_{net}$ ) of the organisms.
- c) Find the cell (biomass) concentration in the recycle stream.
- d) Find the cell concentration in the centrifuge effluent ( $X_2$ )

**Q9)** Write short notes on Activated Sludge systems. Model activated sludge systems with proper diagram and assumptions. [16]

OR

**Q10)** Model Suspended growth systems with proper diagram and assumptions. [16]

**Q11)** Model a binary distillation column and prove that the system is mathematically consistent. [16]

OR

**Q12)** Model a reactor with mass transfer and prove that the system is critically specified. Also discuss the rate limiting steps involved in the process. [16]



Total No. of Questions : 12]

SEAT No. :

**P2944**

**[5154]-361**

[Total No. of Pages : 3

**B.E.(Biotechnology)**

**PLANT ENGINEERING AND PROJECT COSTING**

**(2008 Pattern) (Semester-II) (415470)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain the importance of pilot plant in plant design. [8]  
b) Describe the different types of process design aspects. [8]

OR

- Q2)** a) Discuss the scale up factors considered for design of bioreactor. [8]  
b) Explain the various factors consider in techno economic feasibility study in process design. [8]

- Q3)** a) A process engineer would like to choose a plant location for peniciline manufacturing unit. Please help him during selection different equipment by giving justification. [8]  
b) Discuss various types of project design for any biodiesel plant. [8]

OR

**P.T.O.**

- Q4)** a) Explain plant safety operation and maintenance. [8]  
b) Discuss about the check list for safe plant design. [8]

- Q5)** a) Explain the colour code of pipeline carrying utilities. [9]  
b) Explain the procedure of ethanol production plant to prepare a bill of material. [9]

OR

- Q6)** a) Discuss about the different utilities required in bioethanol production plant. [9]  
b) Comments on primary and secondary utility. [9]

## **SECTION-II**

- Q7)** a) Discuss about CPM and PERT technique. [12]  
b) Explain the purpose of taxes. [6]

OR

- Q8)** a) Discuss in detail about project planning. [9]  
b) Discuss in detail about working capital required for any plant design. [9]

- Q9)** a) Explain in brief various methods for raising finance. [8]  
b) Explain in brief about Sinking fund. [8]

OR

- Q10)** a) Discuss in detail about capital recovery factor. [8]  
b) Explain the concept of Discounted cash flow with diagram. [8]



**Q11)a)** Explain various methods of charging depreciation. [8]

b) Define and explain in detail replacement value. [8]

OR

**Q12)a)** Discuss about salvage value, Junk value. [8]

b) Comments on alternative-investment. [8]



Total No. of Questions :12]

SEAT No. :

**P2945**

[Total No. of Pages :2

[5154] - 362

**B.E. (Biotechnology)**

**FOOD BIOTECHNOLOGY**

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

*Time : 3Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION -I**

**Q1)** What is spoilage of food? Explain different mechanisms and types of spoilage. **[16]**

OR

**Q2)** Which are the different classes of industrially important food? Explain with examples. **[16]**

**Q3)** Explain in brief following preliminary processing methods-cleaning, sorting, grading, peeling. **[18]**

OR

**Q4)** Explain the design, principle and applications of Freezing. **[18]**

**Q5)** Explain the design, principle and applications of dryer. **[16]**

OR

**Q6)** How is pasterurization time calculated? Explain the terms-D value, F value, Z value. **[16]**

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

## SECTION -II

**Q7)** Explain in brief the technologies used for microbial production of food ingredients. **[16]**

OR

**Q8)** Explain microbial biotechnology of food flavor production. **[16]**

**Q9)** Explain the role of enzymes in bakery industry. **[18]**

OR

**Q10)** How are enzymes used in meat processing? Explain in brief. **[18]**

**Q11)** Explain the terms- solid, liquid and hazardous wastes. **[16]**

OR

**Q12)** Write a note on activated sludge and anaerobic processes for treatment of food processing wastes. **[16]**

*EEE*

Total No. of Questions :12]

SEAT No. :

**P2946**

[Total No. of Pages :2

**[5154] - 364**

**B.E. (Biotechnology)**

**INTRODUCTION TO SYSTEMS BIOLOGY**

**(2008 Pattern) (Semester - II) (Elective - III) (415467)**

*Time : 3Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION -I**

**Q1)** What are the components of systems biology? Give an overview of systems biology and give its relevance to biotechnology research. **[18]**

OR

**Q2)** Write a note on (9 marks each): **[18]**

- a) Network analysis and mathematical modeling in systems biology.
- b) Human Genome Project.

**Q3)** What are the various strategies of whole genome sequencing? Describe in detail any two. **[16]**

OR

**Q4)** What is structural genomics? How is it enhancing the research in biotechnology? **[16]**

**Q5)** What is a microarray? How it functions and what are its applications? **[16]**

OR

**Q6)** Explain in detail RNA interference (RNAi) technology and its applications. **[16]**

**P.T.O.**

## SECTION -II

**Q7)** What are the different types of epigenetic modifications which occur in organisms? How do they affect the various functions of the organism? [18]

OR

**Q8)** Which are the different techniques used for detecting epigenetic modifications? Explain CHIP assay in detail. [18]

**Q9)** Write a note on Pharmacogenomics and its significance in the modern medicine. [16]

OR

**Q10)** Explain in detail the genes and enzymes involved in drug metabolism. Is there a difference between slow and fast metabolizers, explain. [16]

**Q11)** Answer the following: [16]

- a) Describe MALDI-TOF with a diagram.
- b) What is the application of Mass spectrometry?

OR

**Q12)** What is a metabolome? What are the applications of metabolomics in drug and pharmaceutical research? [16]

*EEE*

Total No. of Questions : 12]

SEAT No. :

**P2947**

**[5154]-366**

[Total No. of Pages : 4

**B.E. (Biotechnology)**  
**IPR, BIOETHICS AND REGULATIONS**  
**(2008 Pattern) (Semester - II) (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, Q-7 OR Q-8, Q-9 OR Q-10, Q-11 OR Q-12.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume Suitable data, if necessary.*
- 5) *Answers to the two sections should be written in separate answer books.*

**SECTION-I**

**Q1)** Answer the following: **[18]**

What is informed consent? Why to make informed consent? What is the Significance of informed consent.

OR

**Q2)** Write in short about: **[18]**

- a) Principles of essentiality
- b) Principles of voluntariness, informed consent, and community agreement.
- c) Principles of non-exploitation

**Q3)** Read the following case study and answer the questions: **[16]**

Red Rice is a serious weed in rice production fields in North and South America. Red rice is extremely difficult to control because rice and red rice are different cultivars of the same genus and species, (*Oryza sativa* L), and will therefore interbreed. The outcrossing frequency is approximately 2% which is considered high by plant breeding standards. This means that in rice fields infested with red rice, traits of rice can be rapidly transferred to the red rice.

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

Rice has been genetically engineered to have a herbicide resistant gene. Because of outcrossing, it is apparent that if herbicide resistant rice were grown in red rice infested fields, the red rice would acquire herbicide resistance. An international donor agency funded the research that engineered rice herbicide resistance, but after examining the potential consequences to U.S. rice production, refused to allow the rice to be released for U.S. production.

A scientist at the international research agency learned of the herbicide resistant rice and requested and received from the donor agency herbicide resistant rice seed for commercial production. The scientist wanted the seed because using the seed would eliminate the chemical load on the environment, and reduce production costs.

In Colombia, typical rice culture consists of tilling the soil, irrigating to germinate all seeds, and chemically killing the emerged seedlings. This process is repeated three times before the seedbed is ready to plant.

Questions:

- a) What are the potential harms that could occur from using herbicide resistant rice?
- b) What are the potential benefits that could occur from using herbicide resistant rice?
- c) Who would be harmed, and who would be benefited by using the herbicide resistant rice?
- d) If you were the international research agency executive who decided to ban its use in the U.S., how would you defend your position on moral grounds?
- e) Suppose you are a member of the Sierra Club, which opposes using herbicide resistant crops. What arguments would you use to oppose its use?
- f) Assume that the herbicide resistant rice can be effectively grown for a long time, but the herbicide resistance is transferred to another native plant in the community. What are the moral implications of allowing this changes in the native species to occur?

OR

**Q4)** What are the ethical issues raised to use the transgenic plants and animals for the manufacture of vaccines? Which safety issues are considered such manufacture process? **[16]**

**Q5)** Answer the following: **[16]**

- a) What does it mean to “license a patent” and why is it done?
- b) What practical steps need to be taken to obtain patent protection? Can anyone obtain a patent for a software -related invention?

OR

**Q6)** Answer the following: **[16]**

- a) Write in detail about patent prosecution flow chart in India.
- b) What are the benefits of federal trademark registration?

### **SECTION-II**

**Q7)** Answer the following: **[18]**

- a) What is a trademark? What is the Difference Between a “Trademark” and a “Service Mark”?
- b) Differentiate between Trademark and domain name.

OR

**Q8)** How Do You Create a Trademark? What Cannot Be Protected by a Trade mark? What are the guidelines regarding registration of a work under the Copyright Act? **[18]**

**Q9)** Draw a structure depicting administrative hierarchy for biotechnology in India and describe it in detail. **[16]**

OR



**Q10)** Why we need good manufacturing practices? What are the fundamentals of cGMP's? What happens if cGMP's are not followed? [16]

**Q11)** Answer the following [16]

- a) What is the difference between a general license and specific license? What export /imports are allowed under a general license?
- b) Which organizations support clinical trials? Differentiate between phase I and phase II clinical trials.

OR

**Q12)** Answer the following: [16]

- a) How are people recruited to a clinical trial? What are the risks and benefits of trials?
- b) What is meant by quality assurance? What are the factors which influence the quality?



Total No. of Questions : 12]

SEAT No. :

**P2948**

**[5154]- 367**

[Total No. of Pages : 3

**B.E. (Biotechnology)**

**INDUSTRIAL ORGANISATION AND MANAGEMENT  
(2008 Pattern) (Semester - II) (Elective - IV) (415468 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 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)** Explain in details partnership deeds and scientific management system. [16]

OR

**Q2)** a) State and explain advantages of sole enterprise. [8]

b) Discuss in details about joint stock company. [8]

**Q3)** a) Define manpower planning. Enlist various objectives and requirements of manpower planning. [8]

b) How motivation is important for industry prospective explain? [8]

OR

**Q4)** a) Explain the selection process in detail. [8]

b) What is merit rating? Explain in detail various methods of merit rating.[8]

**P.T.O.**

- Q5) a)** Enlist and explain various functions of purchase department. [10]  
b) State and explain steps for reducing materials handling cost. [8]

OR

- Q6) a)** Write notes on: [6]  
i) BinCards and  
ii) Stores Ledger  
b) For an inventory control model to find Economic Order Quantity, Show that  $Q = \sqrt{\frac{2PD}{HC}}$  [12]

Where, Q = Economic Ordering Quantity, C = unit cost of production,

D = Annual production, P = Set up cost for quantity Q,

H = Inventory carrying cost / handling cost.

### **SECTION - II**

- Q7) a)** Enlist and explain various functions of sales department. [9]  
b) Explain various price fixation factors. [9]

OR

- Q8) a)** Give one case study showing the importance of marketing management for growth of industrial organization. [9]  
b) What are the different methods of market research? Explain. [9]  
**Q9) a)** Explain in detail the procedure to import equipment from foreign source. [8]  
b) Write an explanatory note on ISO 9000 family. [8]

OR

- Q10)a)** Discuss about patent and patent rights. [8]  
b) Explain necessity and advantages of total quality management. [8]

- Q11)a)** Explain in detail on the payment of gratuity Act 1972. [8]  
b) State and explain the various employee benefits under Employees state Insurance Act. [8]

OR

- Q12)a)** Write note on Factories Act. [8]  
b) Write note on FERA and FEMA. [8]

