

Total No. of Questions : 12]

SEAT No. :

P1906

[Total No. of Pages : 2

[5254]-1

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2008 Pattern)

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 Q 12 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 calculators is allowed.*

SECTION - I

Q1) a) Write short note on sewer material. **[8]**

b) Write procedure to determine BOD and its significance. **[8]**

OR

Q2) a) Write steps in design of sewer. **[8]**

b) Write significance of COD and total solids. **[8]**

Q3) a) Write short note stream purification process. **[8]**

b) Write working principle of screen chamber and write its classification. **[8]**

OR

Q4) a) Write short note on types of screen chamber. **[8]**

b) Write short note on oxygen sag curve. **[8]**

Q5) a) Differentiate between single stage and two stage trickling filter. **[9]**

b) Write short note on activated sludge process. **[9]**

P.T.O.

OR

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

SECTION - II

- Q7)** a) Write advantages and disadvantages for aerated lagoon. [8]
b) Write advantages and disadvantages for oxidation ditch. [8]

OR

- Q8)** a) Write advantages and disadvantages for facultative pond. [8]
b) Explain mechanism of removal of impurities in root zone. [8]

- Q9)** a) Write short note septic tank. [8]
b) Explain different methods of disposal of septic tank effluent. [8]

OR

- Q10)**a) Explain working principle of anaerobic digester and its stages. [8]
b) Write short note on USABR. [8]

- Q11)**a) Write short note on treatment of sugar industry wastewater. [9]
b) Write discharge standards for dairy and sugar industry. [9]

OR

- Q12)**a) Write short note neutralization process in industrial wastewater treatment plant. [9]
b) Enlist different secondary and tertiary treatment units in industrial wastewater treatment. Explain any one process. [9]



Total No. of Questions : 12]

SEAT No. :

P1907

[Total No. of Pages : 4

[5254]-2

B.E. (Civil)

DAMS AND HYDRAULIC STRUCTURES

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Define the term dam and state its purpose. [4]
b) Explain clearly various factor that affect the choice of particular type of dam for given site condition. [4]
c) Differentiate between Rigid dam and Non rigid dam. [4]
d) Explain clearly criteria for the selection of type of dam. [4]

OR

- Q2)** a) State clearly various methods of classification of dams. [4]
b) Distinguish between Arch dams & Buttress dam. [4]
c) Define meaning of Height of dam. [4]
d) State the procedure of fixing the appropriate Height of the dam to store water in the reservoir to its designed capacity. [4]

- Q3)** a) Discuss in brief various investigation required for reservoir planning. [6]
b) Derive an expression for limiting height of gravity dam. [6]
c) What is meant by elementary profile of gravity dam? Obtain an expression for base width of elementary profile for no tension condition. [6]

OR

- Q4)** a) Galleries in gravity dam. [5]
b) Various zones of storage in a reservoir. [5]

P.T.O.

- c) Determine the stability analysis of gravity dam with the following data. [8]
- i) Overturning moment at toe = 1×10^6 kN-m.
 - ii) Total resisting moment at toe = 2×10^6 kN-m.
 - iii) Total vertical force above base = 50×10^3 kN.
 - iv) Base width of dam = 50m
 - v) Slope of D/s surface = 0.8 H : IV.
 - vi) Calculate the maximum and minimum vertical stresses on foundation and also determine the maximum principle stress at toe of dam. Assume that there is no tail water and U/S face is vertical.

- Q5)** a) Briefly discuss causes of failure of earthen dam. [4]
- b) Explain with sketch syphon spillway. [4]
- c) Briefly discuss the checks that are required to be made to investigate the stability of an earthen dam. [8]

OR

- Q6)** a) Write short note on earth dam construction. [4]
- b) Write short note on radial gate. [4]
- c) Describe the method of plotting pheretic line for an earthen dam with horizontal filter at downstream side with sketch. [8]

SECTION - II

- Q7)** a) State various types of spillway gates and their specific applications. [5]
- b) Discuss various types of energy dissipation devices used below spillways in relation to the position at tail water depth & Jump Height curve. [5]
- c) A Ogee type spillway has 12 crest gate each having 10m clear span. Find the max flood that can be safely passed by lifting all the gates when the maximum resenon level is 105.00m and crest level is 101.00 m. [8]

Take coeff. $C = 2.16$.

Coeff of end contraction of piers = 0.05.

Coeff. of contraction for abutment = 0.1.

Neglecting the velocity of approach design the downstream profile of this spillway of gravity dam having downstream face slope 0.7 H : IV.

OR

- Q8)** a) Explain vertical lift gates or Rectangular gates. [5]
b) Write short note on maintenance of outlet structures. [5]
c) Explain creep theories by Bligh and Lane for the hydraulic design of weir on permeable foundation. State the advantages of Khosla's theory over creep theories. [8]

- Q9)** a) What is cross drainage works explain with sketch. [4]
b) Lacey's theory for design of alluvial canal. [4]
c) Design a channel using Kennedy's theory carrying a discharge $30\text{m}^3/\text{s}$ with critical velocity ratio and Manning's constant equal to 1.0 and 0.0225 respectively.

Assume that the bed slope is equal to 1 in 5000. Assume side slope $\frac{1}{2} H : IV$. [8]

OR

- Q10)** a) Explain the significance of bedforms in alluvial hydraulics. [4]
b) Define the following terms as applied to Lacey's theory. [4]
i) Regime channel
ii) Initial Regime
iii) Final regime
iv) SMT factor.
c) What are the various canal regulation works. [4]
d) What are canal escapes? What is its necessity. [4]

- Q11)** a) Write short notes on : [8]
i) Attracting spurs
ii) Submerged dikes
iii) Marginal Bunds
iv) Pitched island
b) Discuss the necessity of river training and enumerate the various works associated with it. [8]

OR

- Q12)**a) What is levee? Where it is used. [4]
- b) State the purpose and location of a surge tank and draft tube in hydro power scheme. [4]
- c) Explain the function of a pumped storage power plant. [4]
- d) What are the principle components of a hydro electric scheme? Discuss the utility if each components. [4]



Total No. of Questions : 8]

SEAT No. :

P1908

[Total No. of Pages : 4

[5254]-3

B.E. (Civil)

STRUCTURAL DESIGN - III

(2008 Pattern)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain loss due to creep and Shrinkage in detail. [5]
- b) A Post tensioned pre stressed Concrete beam section has top flange 475×225 mm, web 275×700 mm and bottom flange 400×300 mm is simply supported over an effective span of 15 meter . The beam is pre stressed with 5 no's of 12/7 Freyssinet parabolic cables ($F_y = 1650$ Mpa) with their C.G.100 mm from extreme bottom fiber, stressed one at a time from one end , Calculate total loss of prestress at the age of 100 days if $K= 0.0026/m$ length of cable, slip of anchorage = 2mm , $C_c = 1.8$, $E_s = 2 \times 10^5$ Mpa, Concrete grade M 40, Creep and relaxation = 2% of initial prestress. [20]

OR

- Q2)** a) Explain stress concept and load balancing concept of Analysis. [8]
- b) An unsymmetrical prestressed concrete section has top flange 500 × 250 mm, bottom flange 400 mm × 400 mm, and web 250mm × 1000 mm, it is supported over a span of 17 m carries super imposed load of 15 KN/m, the effective prestressing force is 1500 KN located at 100mm from soffit of the section at mid span, cable profile is parabolic and concentric at support. Calculate extreme fiber stresses in concrete at mid span at initial and final stage. Take loss ratio as 0.85 and unit weight of concrete as 25 KN/m³. [17]

P.T.O.

Q3) Design a Post tensioned Pre stressed concrete beam using I-section for flexure to carry a live load of 25 KN/m over a simply supported span of 20 m with M 60 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 5.5 m × 7.0 m with discontinuous edge to support imposed load of 4.5 KN/m² using S3 strands each having cross sectional area 100 mm² and $f_y = 1900$ Mpa check the safety of the slab at collapse and deflection at service load. Use M50 grade of concrete. [20]

SECTION - II

Q5) Fig (1) shows an intermediate frame of multistoried building the frames are spaced at 4 m centre to centre analyze the rigid jointed frame taking live load as 4 KN/m² and dead load as 5 KN/m² for panel AB and BC respectively. The self weight of beam AB is taken as 4 KN/m and for BC as 3.0 KN/m. The relative stiffness of all members is same. Use Portal method for horizontal load and Proper Substitute frame for vertical loading. Design the Beam ABC for combined effect of horizontal and vertical loading using 20 % redistribution of moments for vertical load moments. Use M25 and Fe500. [25]

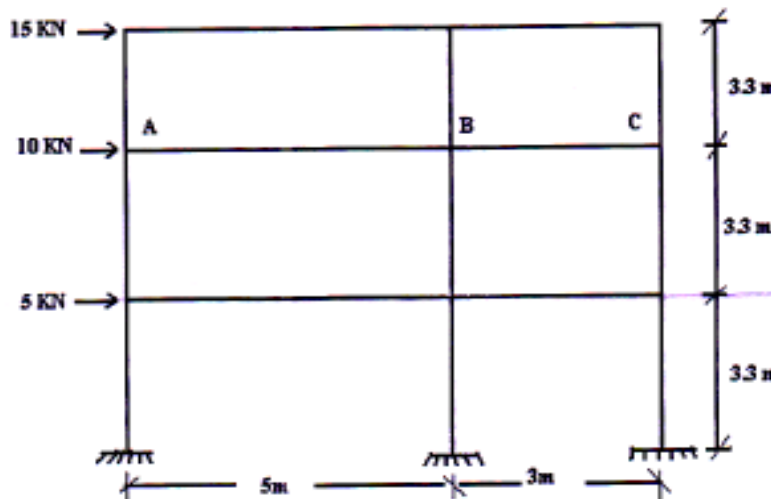


Fig. 1

OR

- Q6) a)** Explain in detail Portal Method of analysis. [7]
- b) Analyze the rigid jointed frame as shown in fig (2) by Cantilever Method for lateral loads. Flexural rigidity of all members is same. Analyze beam GHI using proper substitute frame method if it is subjected to vertical ultimate dead load and live load of intensities 12 KN/m and 16 KN/m on Span GH and 10 KN/m and 12 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 M20 and Fe 500. [18]

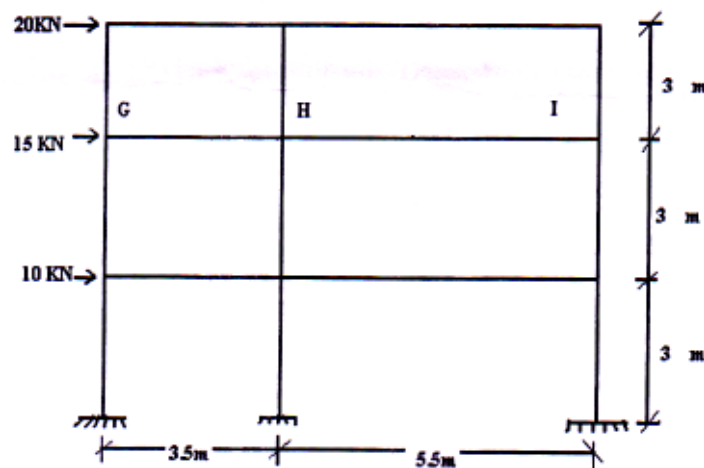


Fig 2

- Q7) a)** Explain with neat sketches various types of combined footing and state in what situations these are used. [5]
- b) Design a Rectangular water tank resting on ground of 2.1 lack Liter capacity, open at top, the joint between wall and base slab is rigid ,taking L/B ratio as 1.75 the safe bearing capacity of supporting strata is 200 KN/m², Design the wall and bottom slab of the tank .Draw details of reinforcement, use approximate method. [20]

OR

Q8) Design a L-Shape Cantilever retaining wall with following data

- a) Height of soil to be retained above base = 4.5 m
- b) Unit weight of Soil = 18 KN/m³
- c) Angle of repose = 30°
- d) SBC of Soil=190 KN/m²
- e) Coff .of friction between base & soil = 0.45
- f) Material - M25 & Fe-500
- g) Leveled Backfill

Show all necessary stability checks & details of reinforcement in stem, heel & toe. **[25]**



Total No. of Questions : 8]

SEAT No. :

P1909

[Total No. of Pages : 3

[5254]-4

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Ans Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q. 7 or Q.8.*
- 2) *Figures to the right indicate full marks.*
- 3) *IRC-6, 83,112 and IS 456-2000, IS1343 are allowed.*
- 4) *Assume suitable data wherever necessary.*
- 5) *Use of non programmable calculator is allowed.*

SECTION - I

- Q1)** a) Explain Courbon's theory for determining the load carried by longitudinal girders. **[10]**
- b) Explain economic span of a bridge. **[10]**
- c) Explain scour depth of a bridge? **[5]**

OR

- Q2)** a) Explain IRC loadings with suitable examples. **[10]**
- b) Explain the different types of bearing used in R.C. bridges. **[10]**
- c) Explain impact load. How it is calculated for R.C. bridges. **[5]**

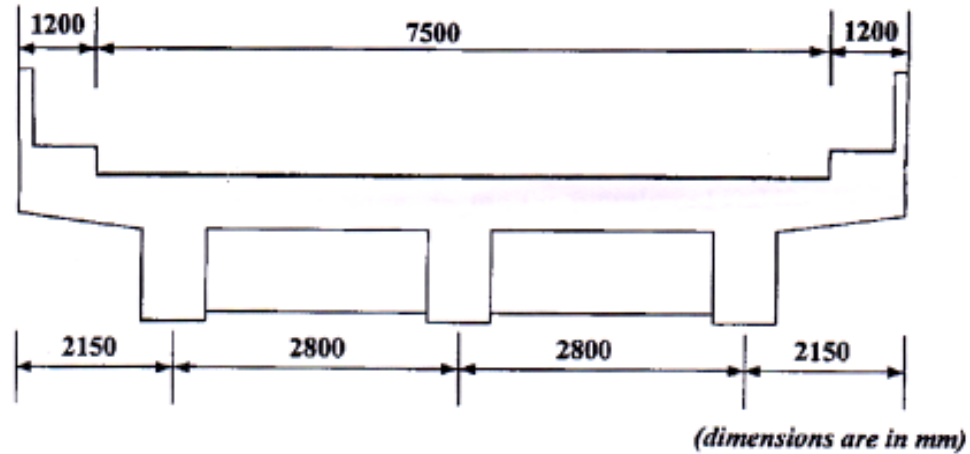
Q3) An R.C. T-Beam deck slab bridge shown in Fig. 3 has the following details. **[25]**

- a) Thickness of railings - 120 mm.
- b) Thickness of footpath - 180 mm.
- c) Thickness of wearing coat - 85 mm.
- d) Span of main girder - 18.0 m.
- e) Spacing of cross-beams - 3.0 m c/c.

P.T.O.

- f) Live load - IRC Class AA Tracked Vehicle.
- g) Materials - M30 grade of concrete and Fe 415 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/mm². 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 in brief the advantages of steel bridges. [12]
- b) Explain in brief with neat sketches the various types of railway steel bridges. [13]

OR

- Q6)** a) Design a rocker and roller bearing for the given data. [18]
- i) Reaction from the girder = 2500 kN.
 - ii) Allowable pressure on bearings 6 N/mm²
 - iii) Allowable pressure on bearing plate = 2500 N/mm²
 - iv) Allowable pressure on concrete bed = 7 N/mm² 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 U_2-U_3 , U_2-L_3 and U_3-L_3 for the railway steel truss bridge shown in Fig. 7. Also draw a neat sketch of the connection of members at U_3 [25]

- Weight of stock rail - 0.78 kN/m.
- Weight of check rail - 0.58 kN/m.
- Timber sleepers of size - $(0.25 \times 0.25 \times 2.5)$ m @ 0.45 m c/c.
- Unit weight of timber - 7.6 kN/m³
- Spacing of truss - 6.0 m c/c.
- The bridge supports a Eudl of 2950 kN.

Assume height of truss is 5.0m

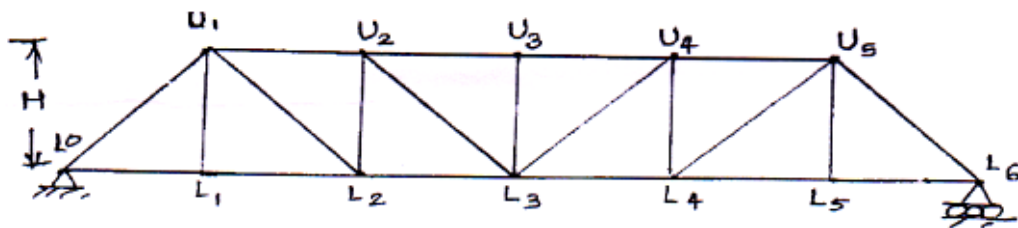


Fig.7 6panels @4m each

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. :

P1910

[Total No. of Pages : 4

[5254]-5

B.E. (Civil)

SYSTEMS APPROACH IN CIVIL ENGINEERING

(2008 Pattern) (Elective - I) (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, Q.6 or Q.7, Q.8 or Q.9, Q.10 or Q.11.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of Calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) What are the industrial applications of Linear Programming? **[4]**
- b) Describe various models of optimizations used in Systems Approach. **[6]**
- c) A firm produces three products. These products are processed on three different machines. The time required to manufacture one unit of each of the three products and the daily capacity of the three machines are given in the table below. **[6]**

Machine	Time per unit (minutes)			Machine capacity (min/day)
	Product 1	Product 2	Product 3	
M1	2	3	2	540
M2	4	2	1	570
M3	2	5	4	550

It is required to determine the daily number of units to be manufactures for each product. The profit per unit for product 1, 2 and 3 is Rs. 40, Rs. 30 and Rs. 50 respectively. Formulate the LP model that will maximize the daily profit.

OR

- Q2)** a) Explain the duality and sensitivity analysis as applicable in linear programming problems. **[6]**

P.T.O.

- b) Minimize $x_0 = x_1 - 3x_2 + 2x_3$ [10]
 Subject to
 $3x_1 - x_2 + 2x_3 \geq 7$
 $-2x_1 + 4x_2 \leq 12$
 $-4x_1 + 3x_2 + 8x_3 \leq 10$
 $x_1 \geq 0, x_2, x_3 \geq 0$

- Q3) a) How will you define transportation model? Explain its application. [6]
 b) Solve following transportation problem using least cost method and North-West corner 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

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

	J1	J2	J3	J4	J5
A1	10	5	9	18	11
A2	13	9	6	12	15
A3	3	2	4	14	10
A4	11	6	8	17	8

OR

- Q4) a) Give the steps in u-v method of optimization in transportation problem. [6]
 b) Optimize the transportation cost of following problem using row minima and column minima method. [6]

		D1	D2	D3	Available
Origins	O1	3	8	5	5
	O2	5	5	3	8
	O3	7	6	9	7
	O4	4	9	5	14
required		7	9	18	

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

	J1	J2	J3	J4
A1	5	8	4	9
A2	4	9	10	4
A3	8	9	7	8
A4	9	5	4	2

- Q5) a) What is Dynamic Programming? Write step by step procedure to solve a general problem by DP approach. [6]
- b) Find the shortest path from 1-12 through the network given below. [10]

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) What are global optima and local optima? Explain with the help of neat diagrams. [8]
- b) Explain the steps followed in Golden section method of one dimensional optimization problems. [8]

OR

- Q7) a) Differentiate between Fibonacci method and Dichotomous method. [8]
- b) Find the optima of the function. [8]

$$f(x) = x_1^2 + x_1x_2^2 - 16$$

- Q8)** a) Define a queue and explain the various queue disciplines. [6]
 b) There are seven jobs, each of which has to go through the machines A and B in the order AB. Processing times in hours are given as. [10]

job	1	2	3	4	5	6	7
A	12	9	3	15	10	11	15
B	10	3	8	10	12	2	13

Determine the sequence of these jobs that will minimize total elapsed time. Find the elapsed time and idle time of machines and jobs.

OR

- Q9)** a) Explain following in context of sequencing problems. [8]
 i) Total elapsed time and idle time
 ii) Processing order
 b) What is Simulation? What are the advantages and limitations of Simulation? [8]

- Q10)** a) Write a detailed note on Games theory. Include applications and limitations of Games theory. [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. [8]
 b) A fleet owner finds from his past records that the costs per year of running a truck whose purchase price is Rs. 6000 are as given below. [10]

Year	1	2	3	4	5	6	7
running cost	1000	1200	1400	1800	2300	2800	3400
resale value	3000	1500	750	375	200	200	200

Determine at what age is the replacement due.



Total No. of Questions : 12]

SEAT No. :

P1911

[Total No. of Pages : 3

[5254]-6

B.E. (Civil)

AIR POLLUTION AND CONTROL

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer-books.*
- 2) *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) Attempt the following

- a) Explain in detail about the Metrological Parameters. [6]
- b) How the Scales of Metrology is important. Give suitable example. [5]
- c) Explain with suitable sketches about Plume Behaviour. [6]

OR

Q2) Answer the following.

- a) How ground level concentration can be measured? Explain in brief. [9]
- b) Calculate effective stack height from following data. [8]
 - i) Physical stack is 203 m tall
 - ii) Inside Diameter 1.07 m
 - iii) Wind velocity is 3.56 m/s
 - iv) Air temperature is 13°C
 - v) Barometric pressure is 1000 millibars
 - vi) Stack gas velocity is 9.14 m/s
 - vii) Stack gas temperature is 149°C

P.T.O.

Q3) Answer the following.

- a) What is Air pollution survey? Discuss the process. [8]
- b) How sampling of gases carried out? Explain in detail. [8]

OR

Q4) Answer the following.

- a) What are the methods available in air sample analysis? Explain any one in detail. [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 m³/sec of air, and the appropriate filtering velocity has been determined to be 2.0 m/min. Determine the number of bags required for a continuously cleaned operation. [10]
- b) Discuss about Wet scrubber. [7]

Q9) Answer the following.

- a) What is land use planning? Discuss. [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 detail Environmental management plan. [8]



Total No. of Questions : 12]

SEAT No. :

P1912

[Total No. of Pages : 3

[5254]-7

B.E. (Civil)

ARCHITECTURE AND TOWN PLANNING

(2008 Pattern) (Elective - I)

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, Q 3 or Q4, Q5 or Q6 from Sec. - I and Q7 or Q8, Q 9 or Q10, Q11 or Q12 from Sec. - II.

SECTION - I

- Q1)** a) What is the impact of elements on architectural composition? [9]
- b) How and why water body conservation & creation is responsible for benefitting the users in an area? Explain with a suitable example. [8]

OR

- Q2)** a) Explain in detail difference between the vision for the development of a city by a town planner and a project by an architect. [9]
- b) Elaborate different garden styles. [8]

- Q3)** a) What is the necessity of the concept “Built Environment” to be promoted in megacities. [9]
- b) Enlist the parameters on which Quality of Life is based and establish the relation of the same with Urban Renewal proposal. [8]

OR

- Q4)** a) Explain the significance of the prevailing byelaws for enriching the spaces and hence to arrive at a beautiful “Built Environment”, within a town. [8]
- b) Mention clearly the differences between URBAN DESIGN & URBAN RENEWAL. [9]

P.T.O.

- Q5)** a) Enlist various sustainable technologies and explain the advantages and usage of the same. [8]
- b) Enlist and elaborate aspects contributing for designating a building as a “Green Building”? [8]

OR

- Q6)** a) Write a short note on : Advantages and usage of sustainable materials. [8]
- b) Write a short note on any one “Green build case study.” [8]

SECTION - II

- Q7)** a) Explain different theories of developments ; draw suitable sketches. [9]
- b) Explain the concept new towns : by giving suitable example. [8]

OR

- Q8)** a) Explain the contribution of three town planners for deciding different levels of development. [9]
- b) Write short notes on : town planning scheme and mention appropriate examples. [8]

- Q9)** a) Elaborate the types of surveys and the importance of the same while finalizing DP Proposal. [9]
- b) Explain in depth various urban road objectives and importance of traffic management. [8]

OR

- Q10)**a) Explain various levels of Planning and elaborate the common thread between them. [9]
- b) Explain various junctions in road network and elaborate importance of traffic management. [8]

Q11)a) Write short notes on : **[8]**

i) LA Act

ii) MHADA.

b) Elaborate applicability of modern tools for **[8]**

i) disaster management

ii) traffic regulation

OR

Q12)a) Write a short note on: SEZ, giving its status in our country. **[8]**

b) Elaborate applicability of modern tools for : **[8]**

i) Land Use Analysis

ii) Traffic management



Total No. of Questions : 12]

SEAT No. :

P1913

[Total No. of Pages : 2

[5254]-8

B.E. (Civil)

AD. GEOTECH. ENGG.

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Discuss different soil classifications. [16]

OR

Q2) a) Explain 'montmorillonite' & 'DDI'. [8]

b) Explain 'A-line chart', with sample graph. [8]

Q3) a) Explain 'modified culman's method. [10]

b) Derive equation for EP at rest. [7]

OR

Q4) a) Explain the steps for 'Anchored sheet pile design'. [10]

b) Derive equation for K_a , K_p & K_o . [7]

Q5) a) Explain 'Soil Nailing'. [5]

b) Discuss 'Geosynthetics'. [6]

c) Explain 'RE wall'. [6]

OR

Q6) a) Explain 'Prinquet & Lee theory'. [5]

b) Discuss functions of 'Geosynthetics'. [6]

c) Explain properties of Geogrid. [6]

P.T.O.

SECTION - II

Q7) a) Explain 'Barken's Method'. [8]

b) Explain 'Pauw's Analysis'. [8]

OR

Q8) Discuss diff. methods for determination of Amplitude & Frequency. [16]

Q9) a) Discuss 'Vibrofloatation'. [9]

b) Explain 'Double Undreamed pile construction'. [8]

OR

Q10) Discuss different soil improvement techniques. [17]

Q11) Discuss 'Rheology' & 'Rheological models'. [17]

OR

Q12) Explain the following :

a) Flookean models. [6]

b) Newtonian models. [6]

c) Geep. [5]



[5254]-9

B.E. (Civil)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) 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 note on : [16]

- a) Ill conditioned Matrix
- b) Gauss Elimination Method

OR

Q2) a) Solve the following equations by Gauss Elimination Method . [10]

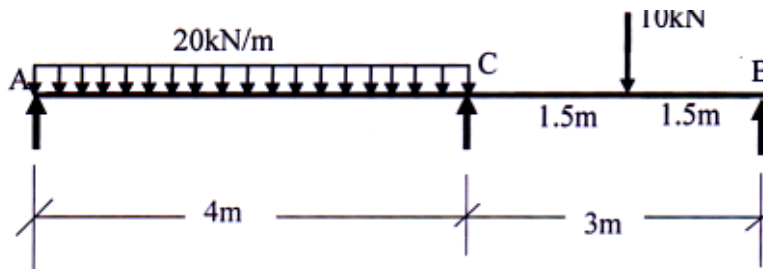
$$5X_1 - 2X_2 + 4X_3 = 5$$

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

$$4X_1 + X_2 = 6$$

- b) Write a note on "Importance of Matrix Algebra in Matrix Methods of Structural analysis". [6]

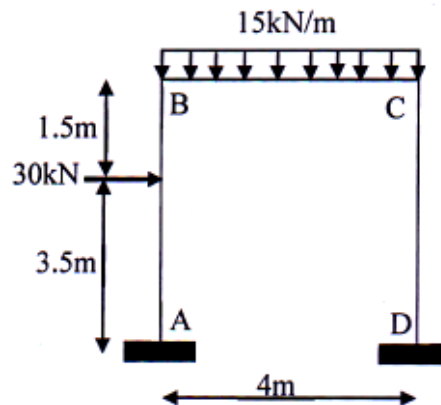
Q3) Analyze the beam shown below by flexibility method (EI constant). [18]



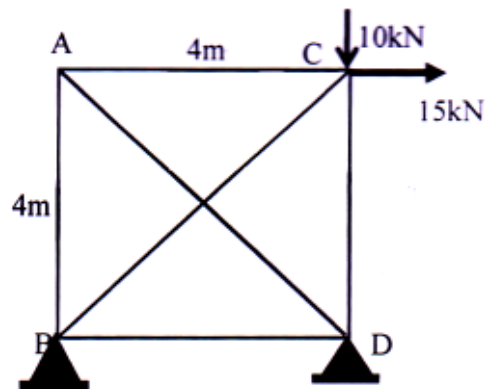
P.T.O.

OR

Q4) Analyze the portal frame using Flexibility Method (EI Constant). [18]



Q5) Analyze the truss by Flexibility Method (EI Constant) [16]



OR

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

SECTION - II

Q7) Write note on : [16]

- a) Displacement Method of structural analysis.
- b) Determinacy and Indeterminacy.

OR

Q8) a) Using proper DOF's, write stiffness matrix equation for a member of orthogonal grid structure. [10]

b) Explain role of transformation matrix in structural analysis. [6]

Q9) a) Explain properties and special characteristics of stiffness matrix of a structure. [8]

b) Show that stiffness matrix of a member of a structure in a structure co-ordinate system is obtained by transformation. [10]

OR

Q10) Stating clearly DOF, explain stiffness matrix for space truss member and space frame member. In which case you need transformation matrix. Explain reason. [18]

Q11) A single bay three storied frame is to be analyzed by computer programme of Stiffness matrix method [16]

a) Prepare the flow chart for the programme and state input required for the same

b) How will you input support conditions of the structure

OR

Q12) Explain in detail - Stiffness of a pin - joint for translation along coordinates i, j and k with example. [16]



Total No. of Questions : 12]

SEAT No. :

P3959

[Total No. of Pages : 3

[5254]-10

**B.E. (Civil Engineering)
HYDROINFORMATICS
(2008 Pattern) (Elective - II)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Compare numerical modeling and soft computing modeling in Hydroinformatics. [6]
- b) Explain the scope of internet and web based modeling in water resources engineering. [6]
- c) What are components of Hydroinformatics systems? Explain in detail different hardware and software components of Hydroinformatics systems. [6]

OR

- Q2)** a) Discuss any web based hydroinformatics system in India or abroad giving details about scope, purpose, underlying model, software used in front end and back end. [6]
- b) A commercial Hydroinformatics system is to be formed for managing reservoir operation with respect to release of water for an irrigation system and for domestic use for a small town what components you suggest, explain with justification. [6]
- c) Discuss the role of internet in rainfall forecasting system. [6]
- Q3)** a) Discuss design of multi - criteria decision support system for flood control giving details of information collection, analysis, prediction, estimation, decision- dissemination of the information. [8]

P.T.O.

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

OR

- Q4)** a) What is a decision support system in water resources engineering? What are its components? What is the role of public sector in decision support system? [8]
- b) A multi - criterion decision support systems is to be designed to collect information regarding availability of water resources viz, surface water, ground water, etc. in a district, frame various alternative schemes. [8]

- Q5)** a) Differentiate between physics based modeling and data driven modeling. Give examples of each [8]
- b) Discuss design of simulation model for household water distribution system giving details of objective, scope, basic formulae used, underlying solution procedure, simulation technique used. [8]

OR

- Q6)** a) Discuss any commercial simulation model for two dimensional flow modeling. [8]
- b) Discuss design of simulation model for household sewage collection system giving details of objective, scope, basic formulae used, underlying solution procedure, simulation technique used. [8]

SECTION - II

- Q7)** a) Enlist different algorithms of ANN. Which one is the fastest? Why? Explain in detail FFBP in detail. [6]
- b) Discuss the working of biological neuron and artificial neuron. Distinguish between them. [6]
- c) Explain in detail the step wise procedure for carrying out cross validation. [6]

OR

- Q8)** a) What is validation and testing? Why it is necessary? Can either of them suffice the each other's purpose while developing a model using any soft computing technique? [6]

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

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

OR

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

- Q11)** a) What are strengths and limitations of Artificial Neural Networks. [8]
- b) Define soft computing techniques. Is Genetic Algorithm a soft computing technique? Why? What is the difference between Genetic Algorithm and Genetic Programming? [8]

OR

- Q12)** a) Discuss a study about application of Artificial Neural Networks in Water Resources Engineering giving details about problem definition, objective, data, inputs, outputs, algorithm used and results. [8]
- b) 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. :

P1915

[Total No. of Pages : 3

[5254]-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 three questions from section - I and any three 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 Q 12 from Section - II.*
- 3) *Answers to the two sections should be written in separate books.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) State any three definitions of “Quality” with examples from construction sector. **[6]**
- b) State six reasons for poor quality in construction and its remedial measures. **[12]**

OR

- Q2)** a) 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 examples. **[10]**
- b) Explain short term and long term objectives of TQM in construction with practical examples. **[8]**
- Q3)** a) Differentiate between “Process Based Approach” and “Product Based Approach” with a proper example. **[8]**
- b) Prepare a checklist for avoiding honeycombing in concrete and for getting a very good finish. **[8]**

P.T.O.

OR

Q4) Explain eight ISO : 9001 principles with practical examples from construction sector. **[16]**

Q5) a) What is Benchmarking. Define internal and competitive Benchmarking. State four advantages of Benchmarking. **[2 + 2 + 4]**

b) What is Supply Chain Management (SCM)? State its advantages and limitations. **[2 + 6]**

OR

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

- a) Defects in construction.
- b) Six sigma as a tool in TQM
- c) Kaizen in TQM.
- d) Customer satisfaction.
- e) Conformities and non conformance.

SECTION - II

Q7) a) Define “MIS” and explain with examples how a MIS will benefit construction organizations in effective management of construction projects. **[2 + 6]**

b) Explain MIS structure consisting of Internet, Intranet, Extranet for managing e-business operations with help of a flow chart. **[10]**

OR

Q8) a) Discuss data and Information inputs needed to prepare a MIS for a Road Construction Firm. **[8]**

b) What are Decision Support System? Explain its advantages with an example from construction firm. **[10]**

Q9) Define “System”. Explain Various Subsystems of MIS with practical example from construction organizations. **[16]**

OR

Q10) Explain in detail.

[8 + 8]

- a) ERP software applications in construction.
- b) MIS in the strategic planning.

Q11)a) Explain the role of MIS in Tendering and Bidding Process.

[6]

- b) Explain integration of Hardware, Software, data communication and processing, information gathering and processing with examples from construction field.

[10]

OR

Q12) Discuss various limitations of presently existing MIS softwares used in construction Industry and suggest recommendations to overcome it. **[16]**



Total No. of Questions : 12]

SEAT No. :

P1916

[Total No. of Pages : 3

[5254]-12

B.E. (Civil)

EARTHQUAKE ENGINEERING

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is the difference between Intensity and Magnitude of an earthquake? Explain MMS measurement of earthquake in brief. **[8]**
- b) Explain the Plate Tectonic theory? Describe the difference between magnitude and intensity of an earthquake? **[8]**

OR

- Q2)** a) Classify and describe with suitable sketches different types of waves generated by an earthquake and their effects on structure? **[8]**
- b) What are the learning from past earthquakes? Explain design philosophy behind earthquake resistant design of structures? **[8]**
- Q3)** a) Obtain the response for a SDOF system subjected to forced but un-damped vibration. **[8]**
- b) A simply supported beam 4 m long supports mass of 1000kg at the center. Find the natural period and natural frequency. $E = 2.1 \times 10^6 \text{ kg/cm}^2$ & $EI = 10,000 \text{ kN.m}^2$. **[8]**

P.T.O.

OR

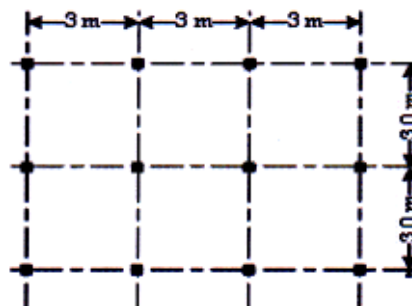
- Q4)** a) A simply supported beam 3 m long supports mass of 100kg at the center. Find the natural period and natural frequency. $E = 2.1 \times 10^6 \text{ kg/cm}^2$ & $EI = 10,000 \text{ kN.m}^2$. [6]
- b) Explain with examples, Over damped system, critically Damped system and Under damped system giving example of each for free but damped SDOF. [10]
- Q5)** a) Explain R.C.C. shear walls with neat sketches. [9]
- b) Explain the various factors used in seismic coefficient method. [9]

OR

- Q6)** A symmetrical three storey RC school building located in Zone V with following data- [18]
- a) Plan Dimensions = $7\text{m} \times 7\text{m}$
- b) Storey Height = 3.5m
- c) Total weight of beams/ storey = 130kN
- d) Total weight of columns/storey = 50kN
- e) Total weight of walls/storey = 530kN
- f) Live load = 130kN
- g) weight of terrace floor = 655kN . Assuming Hard Rock, determine total base shear for 5% damping using seismic coefficient method.

SECTION - II

- Q7)** A G+2 building is located in seismic zone III. The floor-to-floor height is 3.10 m. The building is supported on Type-II strata. The R.C. frames are in-filled with brick walls. The lumped weight due to dead loads is 5 kN/m^2 on floors and 2.5 kN/m^2 on the roof. The floor slabs are designed for a live load of 2.5 kN/m^2 and the roof is designed 1.5 kN/m^2 . [16]
- Calculate the base shear and distribute along the floors along X-direction.



OR

Q8) a) What is liquefaction of soil? Describe the remedial measures for reducing liquefaction of soils. [8]

b) Explain static analysis and dynamic analysis for structures. [8]

Q9) What is Seismic Isolation? Discuss in details with the sketches, the concept of Active and Passive control systems? [16]

OR

Q10) Explain the various techniques of retrofitting and rehabilitation of structures? [16]

Q11) A (350 × 550) mm column is reinforced with 8-16#. It is supported on an isolated footing. The load coming on the footing is 450 kN and a moment of 45 kNm. The SBC of the soil is 150 kN / m². Use M20 grade of concrete and steel of grade Fe 415 and design the footing. [18]

OR

Q12) Write notes on following with neat sketches (Any Three) : [18]

- a) Moment Resisting Frames
- b) Centrically Braced Frames
- c) Eccentrically Braced Frames
- d) Ductile Detailing of Slabs
- e) Tuned Mass Dampers



Total No. of Questions : 12]

SEAT No. :

P1917

[Total No. of Pages : 3

[5254]-13

B.E. (Civil Engineering)

ADVANCE CONCRETE TECHNOLOGY

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Enlist the basic Ingredients of cement and their Significance. [6]
b) Write a Brief note on Fly Ash. [6]
c) How is the workability requirement determined for a reinforced concrete construction? [6]

OR

- Q2)** a) Write a short note on grading of aggregate and their Importance. [6]
b) What are the various types of testing for cement? [6]
c) Explain in brief gel space ratio, maturity concept? [6]

- Q3)** a) Briefly discuss the difference in the compressive strength of concrete cubes and concrete cylinders. [8]
b) Write a Brief note on ultra light weight concrete. [8]

OR

- Q4)** a) Write a detailed note on “Design of No Fines concrete mixes”. [8]
b) Explain in brief how to carried out under water concreting? [8]

P.T.O.

- Q5)** a) Enlist the different methods of Non destructive Testing on RCC elements and explain any one method in details. [8]
- b) Write Detail note on Core Test. [8]

OR

- Q6)** Design a concrete mix of grade of M25 by IS Method [16]

Maximum size of aggregate (Crushed)- 20mm,

Compaction factor- 0.9,

Fine agg. Confirm to Zone II

Exposure condition moderate,

Specific gravity of both agg- 2.65,

Specific gravity of cement - 3.15,

Slump - 80mm

Assume suitable data if required

SECTION - II

- Q7)** a) Explain the historical development of fiber reinforced concrete. [6]
- b) Compare naturally and artificially occurring fibers. [6]
- c) Explain steel fiber and carbon fiber. [6]

OR

- Q8)** Explain fibre reinforced in respect of : [4+4+4+4+2=18]

- a) Definition
- b) Types of fibres
- c) Merits of fibres
- d) Demerits of fibres
- e) Mixing of fibres

- Q9)** a) Explain behaviour of SFRC in tension. [8]
b) What are the current developments in FRC. [8]

OR

- Q10)** a) Write a note on “SIFCON” with reference to definition, structure, properties and use. [8]
b) Explain stress strain property and compressive strength properties of FRC. [8]

- Q11)** a) Define ferro-cement? What are its applications? [8]
b) Enlist the casting techniques of ferrocement and explain any one. [8]

OR

- Q12)**a) Write a note on Fibre Reinforced Polymeric meshes (FRP) along with merits and demerits. [8]
b) Write a short note on precast construction technique. [8]



[5254]-14

B.E. (Civil Engineering)

QUANTITY SURVEYING, CONTRACTS & TENDERS

(2008 Pattern) (Semester - II)

Time : 4 Hours]

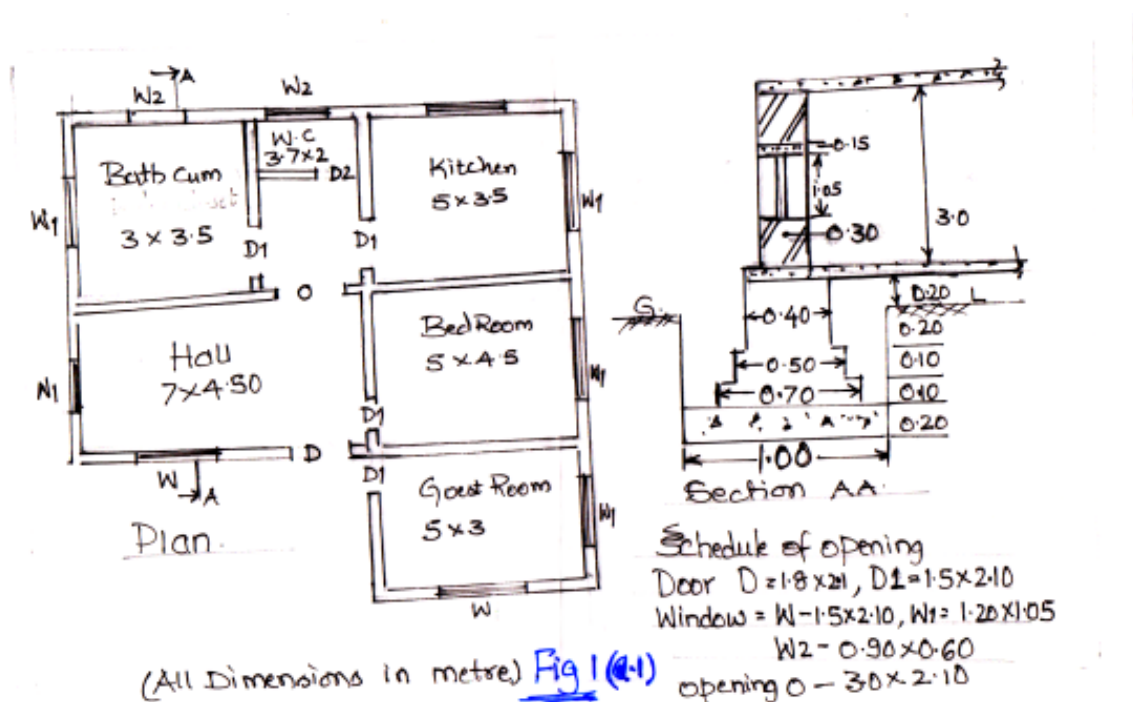
[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q.1 or 2, Q.3 or 4, Q.5 or 6 from section - I and Q.7 or 8, Q.9 or 10, Q.11 or 12 from section - II.
- 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 electronic pocket calculator is allowed.
- 6) Assume suitable data, if necessary.

SECTION - I

Q1) Estimate the quantity for the following item of work from fig. 1.



- i) Cement concrete in foundation. [3]
- ii) Brick masonry in footing and plinth [4]
- iii) Brick masonry in superstructure [4]
- iv) RCC in beams and lintel, also find quantity of steel assuming 1% cement concrete [4]
- v) Internal plastering in CM 1 : 6. [3]

OR

- Q2)** a) A college building is to be constructed requiring a total carpet area of 3500 sq-m, which includes all academic requirements. 10% of carpet area is to be occupied by walls, verandah, corridor, toilet etc. Find the approximate cost of construction by preliminary estimate. 7.5% of cost of building is to be used for water supply, 5% for electrification, 1.5% for architectural finishes. The plinth area cost may be taken as 1500 per sq-m. [6]
- b) Explain in detail the method of preparing approximate estimate for irrigation project. [4]
- c) Explain briefly the following : [8]
- i) Revised and supplementary estimate
 - ii) Abstract and detailed estimate
 - iii) Work charge estimate and contingencies
 - iv) Annual maintenance and repair estimate

- Q3)** a) Find out the quantity of earthwork for portion of road between chainage 00.00m to 300m. [8]

Chainage (m)	0	30	60	90	120	150	180	210	240	270	300
GL(m)	160	160.50	160.90	161.30	162	162.5	161.8	161.25	160.50	160	159.5

The formation level chainage 0.00 is 159.50 and has an rising gradient of 1 in 150. The formation width is 10m , & side slope are 2:1 in banking and 1.5: 1 in cutting.

- b) State the units of measurement as per IS 1200 for [8]
- i) Earthwork excavation for RCC column footing
 - ii) Pointing
 - iii) Doorframe
 - iv) Skirting
 - v) Internal plastering
 - vi) Bending, binding and steel reinforcement
 - vii) White washing, color washing
 - viii) Railing for staircase

OR

- Q4)** a) Explain the utility of DSR and what information is available in the DSR. Explain difference between Labor item and completed item. [4]
- b) State and explain the rules for deduction as per IS 1200 for : [6]
- i) Plastering both internal and external
 - ii) Brickwork in superstructure
- c) Explain the trapezoidal and prismoidal formula method for working out volume of earthwork for road construction and explain the application of load and lift in road construction. [6]
- Q5)** a) A building is to be provided with an RCC work in M25 grade. Draft detailed specification including formwork, steel reinforcement in slab and beams. [8]
- b) Explain the general specification for a first class building. [4]
- c) What are special specifications? Explain open specifications, its advantages and disadvantages. [4]

OR

- Q6)** a) Explain (i) Overheads (ii) Sundries (iii) Task work. [6]
- b) Explain the detailed procedure for preparing the rate per unit of a construction item. [4]
- c) Prepare the rate analysis for 1m³ of RCC work in beams, lintels and slabs considering centering and shuttering. Local rates for material & labour may be considered. [6]

SECTION - II

- Q7)** a) An equipment was purchased for Rs. 80000/- Assuming salvage value Rs. 10000/- at the end of 5 years, calculate depreciation & book value of the equipment for each year till the end of 5 years. Use constant percentage method. Give answer in tabular form. [8]
- b) State two differences between each of the following. [6]
- i) Building lease - Occupation lease
 - ii) Depreciation - Obsolescence
 - iii) Book value method of valuation - Rental method of valuation
- c) Explain with sketch the belting method for valuation of a plot (land). [4]

OR

- Q8)** a) A self occupied bungalow constructed on a plot of area 600 m² in 1985 has built up area of 300 m². Present day land and construction costs (in year 2015) are Rs. 1000/- and Rs.2000/- respectively. Assume 1st class specifications for the construction, future life 50 years and sinking fund accumulation is at the rate of 7%. Find the fair market value of the property in 2015. [8]
- b) Differentiate between 'straight-line' and 'constant percentage' methods of calculating depreciation including formulas. [6]
- c) State four types of value of a property and discuss any one of them. [4]
- Q9)** a) Distinguish clearly between prequalification & postqualification of contractors. [4]
- b) Enlist various types of repair works as per the PWD procedure and explain methods of executing (carrying out) them. [4]
- c) Discuss global tendering and BOT tendering with examples. [4]
- d) Explain clearly the terms: technical sanction and administrative approval. [4]

OR

- Q10)** a) Draft a tender notice for an English newspaper for construction of Government Guest House on behalf of executive engineer PWD. Estimated cost of this load bearing G +1 construction of 280 m² built up area including the works for paving, garden, porch, etc. is Rs. 27,40,000/- (At least 8 tender essentials must be included in the draft). [4]
- b) Write a detailed note on original PWD works. [4]
- c) Explain briefly the precautions to be taken for scrutiny of tenders. [4]
- d) Write a note on 'Daily Labour Work' by the PWD. [4]

- Q11)**a) What is meant by an 'arbitrator'? Explain the disabilities of an arbitrator. [4]
- b) Explain the process of arbitration with respect to the Arbitration Act, 1940. [4]
- c) What do you understand by termination of a contract? Briefly explain three ways in which a contract can be terminated. [4]
- d) Discuss the requirements to be fulfilled for a contract to be legal or valid. [4]

OR

- Q12)**a) Discuss the meaning and necessity of a 'valid' or 'legal (lawful)' contract. [4]
- b) State the advantages of 'Arbitration'. Briefly discuss the matters which cannot be referred to an Arbitrator as per the Arbitration Act of 1940. [4]
- c) Compare the item-rate contract and lump-sum contract. [4]
- d) State the expected qualities of an Arbitrator. Explain clearly meaning and necessity of 'sole' and 'joint' Arbitrators. [4]



Total No. of Questions : 12]

SEAT No. :

P1919

[Total No. of Pages : 3

[5254]-15

B.E. (Civil Engineering)

TRANSPORTATION ENGINEERING - II

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. 1 or Q. 2, Q. 3 or Q. 4, and Q. 5 or Q. 6 from Section-I Q.7 or Q8, 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, Mollies charts, electronics pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*
- 6) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

- Q1)** a) Explain the necessity of carrying out Fact Finding Surveys. [6]
b) Write a short note First Twenty Year Road Development Plan. [4]
c) Explain in brief the Following : [3 + 3 = 6]
i) Vehicular characteristics
ii) Parking Surveys

OR

- Q2)** a) State comparison between Nagpur road plan and Bombay road Plan. [1 × 6 = 6]
b) Define Alignment. State the requirements of an Ideal Alignment. [1 + 3 = 4]
c) Explain in brief the Following : [3 + 3 = 6]
i) Traffic signs
ii) Accident Studies

- Q3)** a) Define Stopping Sight Distance. Calculate SSD required by a car moving at a speed of 60 Kmph on a descending gradient of 1 in 20. Assume any other data suitably [1 + 5 = 6]
b) Draw a neat cross section of Urban road. [4]
c) Define Transition curve. Discuss in brief the necessity of providing Horizontal Transition Curves. [1 + 5 = 6]

P.T.O.

OR

- Q4)** a) What do you mean by Gradient? State various types of gradients. [1 + 2 + 3 = 6]

Also states the values of gradients recommended by IRC.

- b) Write a note on Highway Drainage? [4]
- c) Define Superelevation. Derive an equation $e + f = v^2/gR$. State clearly the meaning of each term used. [1 + 5 = 6]

- Q5)** a) Define specific gravity. Discuss in brief determination of Specific Gravity by Density Basket Method. [1 + 5 = 6]

- b) Explain in brief Ductility Test on Bitumen and its significance. [1 × 6 = 6]
- c) Write a note on Transverse Joints in Cement Concrete Pavement. [6]

OR

- Q6)** a) State the various recommendations of IRC for design of flexible pavement by CBR method. [1 × 6 = 6]

- b) State comparison between Flexible and Rigid pavement. [1 × 6 = 6]
- c) State comparison between Tar and Bitumen. [1 × 6 = 6]

SECTION - II

- Q7)** a) Explain in brief the following : [3 × 2 = 6]

- i) Turning Radius
- ii) Ruder and Aileron
- iii) Runway & Taxiway

- b) Discuss types of survey to be carried out for site selection of an Airport? [5]

- c) State the advantages and disadvantages of Air Transportation. [5]

OR

- Q8)** a) Give detail classification of Airports. [5]

- b) Explain with the help of a sketch, three controls for Rolling, Pitching and Yawing Movements of a Aeroplane. [2 × 3 = 6]

- c) How Runway orientation should be done? Discuss. [5]

- Q9) a)** A bridge needs to be constructed across an Alluvial stream having discharge of 500 Cumecs. Calculate the depth of maximum scour when the bridge consists of, Four spans of 40 m each [6]
Assume the value of silt factor = 1.1
- b) What is meant by economical span ? Derive the condition for an economic span, stating clearly the assumptions made in the derivation. [1 + 3 + 2 = 6]
- c) Write a short note on Afflux. [4]

OR

- Q10) a)** Define Bridge. State the various points to be considered while selecting an Ideal Bridge site location. [1 + 3 = 4]
- b) Calculate the height of Afflux for the following hydraulic data : [6]
The normal velocity of flow in the river = 1.5 m/sec.
The normal waterway under the bridge = 8000 m²
The artificial waterway under the bridge = 7000 m²
The enlarged area upstream of the bridge = 10000 m²
- c) Explain the following terms : [3 × 2 = 6]
- i) Vertical Lift Bridge
 - ii) Swing Bridge
 - iii) Suspension Bridges

- Q11) a)** Draw neat sketches of any three types of piers [2 × 3 = 6]
- b) Define scour depth. Discuss in brief practical method of determination of scour depth [2 + 4 = 6]
- c) Write a short note on : [3 + 3 = 6]
- i) Maintenance of Bridges
 - ii) Cutwaters and Ease Waters

OR

- Q12) a)** How will you account for the following in the design of Highway Bridge [3 × 2 = 6]
- i) Dead Load
 - ii) Temperature stresses
 - iii) Wind Load
- b) Write a note on types of Wing walls [6]
- c) What kind of maintenance is required for highway bridges? Also highlight the need of maintenance of old bridges [3 + 3 = 6]



Total No. of Questions : 12]

SEAT No. :

P1920

[Total No. of Pages : 2

[5254]-17

B.E. (Civil Engineering)

ADVANCED FOUNDATION ENGINEERING

(2008 Pattern) (Elective - III)

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 various stages involved in subsoil investigation studies for dam project. [6]
- b) Discuss a case study of failure of a deep foundation. [6]
- c) How will you plan for subsoil exploration programme for an offshore structure? [6]

OR

- Q2)** a) Discuss IS code provisions for soil exploration for tunnels. [6]
- b) State the field tests involved in deep investigation studies and explain any one. [6]
- c) Does increasing the number of bore holes cause an increase in revealing any additional information regarding the subsoil? Explain. [6]

- Q3)** a) Discuss the provisions for design and construction of raft foundations as per IS 2950-1965. [8]
- b) Explain the step by step procedure for design of combined trapezoidal footing along with the formulae involved. [8]

OR

- Q4)** a) State the various methods of raft design and explain any one. [8]
- b) Explain the considerations in the design of combined footings. [8]

P.T.O.

- Q5)** a) How is the testing of piles subjected to tensile loads carried out? explain. [8]
b) Explain the Reese and Matlock theory for laterally loaded piles. [8]

OR

- Q6)** a) Write short note on racer piles and discuss its design considerations. [8]
b) Explain cyclic pile load test with neat sketch. [8]

- Q7)** a) Under which conditions under reamed piles are suitable as foundations, explain. [8]
b) Explain the step by step procedure for construction on double under reamed pile foundation with sketches. [8]

OR

- Q8)** a) Discuss design aspects of 2 bulb under reamed pile foundation. [8]
b) State the methods for design of laterally loaded piles and explain any one. [8]

- Q9)** a) Write short note on Sand drains and its design aspects. [8]
b) Stone columns are to be provided for an industrial establishment site. [8]

OR

- Q10)** a) What are the changes required to be incorporated in design for providing under reamed pile to cater for tensile loading. [8]
b) Compare the design and suitability aspects of stone columns and sand drains. [8]

- Q11)** a) Discuss in detail any case study related to failure of well foundation. [9]
b) Describe in detail the design considerations in well foundation. [9]

OR

- Q12)** a) What are the IRC code provisions for well foundation, Explain. [9]
b) What are the measures to be taken to avoid failure of well foundation. [9]



Total No. of Questions : 6]

SEAT No. :

P1921

[Total No. of Pages : 2

[5254]-18

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

ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS
(2008 Pattern) (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) Explain the feasibility of older metamorphic rocks in Maharashtra State in Civil Engineering Construction with suitable examples. [8]
- b) Groups of Basaltic Flows. [6]
- c) Field characters of dykes in Maharashtra. [4]

OR

- a) Explain the feasibility of older secondary rocks in Maharashtra State in Civil Engineering Construction with suitable examples. [8]
- b) Nature of Tachylytes in Deccan Trap area. [6]
- c) Field Characters of fractures. [4]

Q2) Explain the suitability of deccan trap rocks dam foundation point of view in detail with suitable case histories. [16]

OR

- a) Types of spillway and one case history of tail channel erosion in Deccan Trap area. [8]
- b) Explain various theories of origin of Tachylytes. [8]

Q3) What are soils? How are they formed? Explain residual & transported soil of Maharashtra State. [16]

OR

- a) Water Bearing characters of Deccan trap basalts. [10]
- b) Scarcity of sand in Deccan Tap area. [6]

P.T.O.

SECTION - II

- Q4)** a) Explain any 3 physical properties of rocks masses in details. [9]
b) Discuss Barton's system of classification of rock masses. [9]

OR

- a) What are the different mechanical properties of rock masses? Explain them in details. [9]
b) Explain C-factor and Terzaghi's system of classifications of rock masses. [9]

- Q5)** a) Explain any 2 Case histories of bridges in Maharashtra State from geological point of view. [8]
b) The feasibility of Compact Basalt and Amygdaloidal Basalt from tunneling point of view with case histories. [8]

OR

- a) Buoyancy of rock masses. [6]
b) Discuss the influence divisional planes during tunneling. Give suitable case histories. [10]

- Q6)** a) Width of fault Zone. [4]
b) Artificial grounds. [4]
c) Compact Basalt as a construction material. [8]

OR

- a) Relationship Earthquake and Dam. [8]
b) Foundations of Monumental buildings. [4]
c) Active faults. [4]



[5254]-9

B.E. (Civil)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - IQ1) Write note on : [16]

- a) Ill conditioned Matrix
- b) Gauss Elimination Method

OR

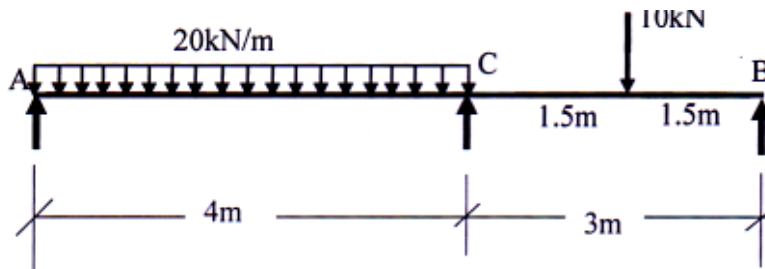
Q2) a) Solve the following equations by Gauss Elimination Method . [10]

$$5X_1 - 2X_2 + 4X_3 = 5$$

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

$$4X_1 + X_2 = 6$$

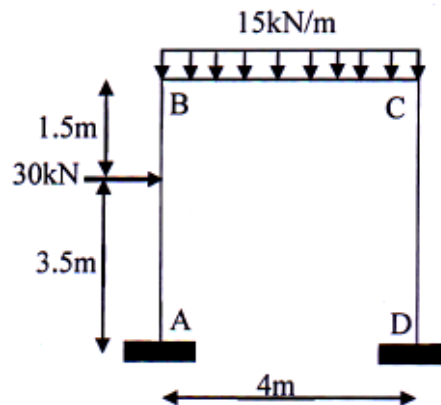
- b) Write a note on "Importance of Matrix Algebra in Matrix Methods of Structural analysis". [6]

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

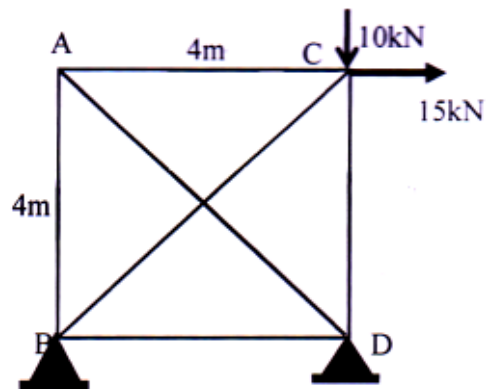
P.T.O.

OR

Q4) Analyze the portal frame using Flexibility Method (EI Constant). [18]



Q5) Analyze the truss by Flexibility Method (EI Constant) [16]



OR

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

SECTION - II

Q7) Write note on : [16]

- a) Displacement Method of structural analysis.
- b) Determinacy and Indeterminacy.

OR

Q8) a) Using proper DOF's, write stiffness matrix equation for a member of orthogonal grid structure. [10]

b) Explain role of transformation matrix in structural analysis. [6]

Q9) a) Explain properties and special characteristics of stiffness matrix of a structure. [8]

b) Show that stiffness matrix of a member of a structure in a structure co-ordinate system is obtained by transformation. [10]

OR

Q10) Stating clearly DOF, explain stiffness matrix for space truss member and space frame member. In which case you need transformation matrix. Explain reason. [18]

Q11) A single bay three storied frame is to be analyzed by computer programme of Stiffness matrix method [16]

a) Prepare the flow chart for the programme and state input required for the same

b) How will you input support conditions of the structure

OR

Q12) Explain in detail - Stiffness of a pin - joint for translation along coordinates i, j and k with example. [16]



Total No. of Questions : 12]

SEAT No. :

P1922

[Total No. of Pages : 3

[5254]-20

B.E. (Civil)

CONSTRUCTION MANAGEMENT

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Discuss the importance of communication and coordination between client, consultant and contractor for a construction site. Explain with suitable examples. [10]
- b) Explain the role of project management consultant in commercial housing project. [8]

OR

- Q2)** a) Explain in detail the role of various components of infrastructural sector of Indian construction Industry in Economics development. [10]
- b) Explain in detail project reporting system taking an example of commercial housing project. [8]

OR

- Q3)** a) What is the role of scheduling in any construction project and list out factors affecting the scheduling? [8]
- b) List-out an importance of Work Breakdown Structure (WBS). Draw and explain the different WBS levels for pre-stressed Bridge Project. [8]
- Q4)** a) Enlist type of annuity with appropriate application of each annuity. [8]
- b) Write a short note on 'Repetitive Scheduling Methods'. [8]

P.T.O.

- Q5) a)** Write a note on : **[8]**
- i) Interstate Migrant Worker Act.
 - ii) Child labor act.
- b) Write about project balance sheet with an example in construction project. **[8]**

OR

- Q6) a)** Write a note on working capital and explain the following term. **[8]**
- i) Term loan
 - ii) Debentures
 - iii) Deferred credit
- b) Foreign Direct Investment (FDI) is playing a major role in infrastructure development in India. State your views on the same. **[8]**

SECTION - II

- Q7) a)** Write about 'Break Even Analysis' give suitable example on township project of ten story, twenty towers. Each story contains four flats. **[10]**
- b) Explain the role of infrastructure in construction management. **[8]**

OR

- Q8) a)** Write short note on : **[8]**
- i) Risk Mitigation
 - ii) Quantitative Risk analysis
- b) Explain the concept of value and applicability of value analysis in construction industry with suitable example. **[10]**

- Q9) a)** Define Supply Chain Management (SCM). Explain SCM in context with construction material management. **[8]**
- b) What is a job plan? Explain in detail phases in the job plan. **[8]**

OR

Q10)a) Write a short note on : **[8]**

i) Inventory management.

ii) EOQ

b) Describe human resource management process with suitable example. **[8]**

Q11)a) Describe application of fuzzy logic in construction industry. **[8]**

b) Explain the analogy between Biological neuron & Artificial neuron. **[8]**

OR

Q12)a) What is an Expert system? How Artificial Intelligence is useful in the development of Expert system. Explain with suitable example. **[8]**

b) Describe importance of Genetic algorithm tool in construction industry. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1923

[Total No. of Pages : 3

[5254]-22

B.E. (Civil)

ADVANCED TRANSPORTATION ENGINEERING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Discuss in brief the stages in transport planning process. [12]
b) Explain in brief the factors affecting Trip Generation and Attraction rates. [6]

OR

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

- Q3)** a) Discuss in brief the importance of grade separated interchanges in traffic control. [6]
b) Explain in brief the merits and demerits of intelligent transportation systems. [10]

OR

- Q4)** a) Write a short note on Mass Rapid Transit systems. [6]
b) Explain in brief the following : [10]
(i) Flyovers (ii) Underpass (iii) Overpass (iv) Meeting at Grade
(v) Roundabout

P.T.O.

- Q5) a)** What do you mean by economic evaluation of transportation plan? Also state the objectives of carrying out economic evaluation. [10]
- b) Write a short note on benefit cost method. [6]

OR

- Q6) a)** 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 the Fundamental diagram of traffic flow. [8]
- b) Explain in brief the following terms : [10]
- (i) Parking Accumulation (ii) Parking Volume (iv) Parking Load
(iv) Parking Index.

OR

- Q8) a)** Explain in brief the factors affecting capacity and level of service. [2+2+4]
- b) Explain in brief the Cordon Line survey and Screen Line survey. [5+5=10]

- Q9) a)** A Two lane two way road is at present carrying a traffic of 1000 Commercial Vehicles Per Day(CVPD) It is to be strengthened for growing traffic needs. The VDF has been found to be 3.0. The rate of growth of traffic is 10 % per annum. The period of construction is 5.0 years. The pavement is to be designed for 15 years after construction. Calculate the cumulative standard axles to be used in design. [10]
- b) State comparison between highway pavement and airfield pavement. [6]

OR

- Q10)a)** Discuss the various types of failures in flexible pavement. [10]
- b) Define Unevenness Index. Explain in brief the working of Bump Integrator. [6]

Q11)a) Why joints are necessary in Rigid Pavements? Discuss in brief various types of joints in Rigid pavements. **[10]**

b) Write a short note on warping stresses and frictional stresses. **[6]**

OR

Q12)a) 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]**



Total No. of Questions : 12]

SEAT No. :

P1924

[Total No. of Pages : 4

[5254]-23

B.E. (Civil)

**STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS
IN CIVIL ENGINEERING
(2008 Pattern) (Elective - IV)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** Construct a histogram for the following data and determine mean, median, mode and standard deviation. **[12]**

Class Interval	< 20	20-30	30-40	40-50	50-60	> 60
Frequency	2	30	31	16	19	3

- b) Explain civil engineering applications of statistical methods. **[4]**

OR

- Q2) a)** Draw a histogram for the following data and determine mean, mode, median and standard deviation. **[12]**

Class Interval	0-100	100-200	200-300	300-400	400-500	500-600	600-700
Frequency	32	09	08	05	04	01	03

- b) Describe various methods of sampling. **[4]**

P.T.O.

- Q3) a)** Samples of three kinds of materials, subjected to extreme temperature changes, produced the following results. Check if the probability of crumbling is the same for the three kinds of materials at 0.05 level of significance. [8]

	Material A	Material B	Material C
Crumbled	41	27	22
Remained Intact	79	53	78

Use the following Chi square Table.

v	3	4	5	6	7
$\alpha = 0.05$	7.8147	9.4877	11.07	12.59	14.067

- b) Explain Binomial probability distribution. [8]

OR

- Q4) a)** A set of 5 identical coins is tossed 320 times and the number of heads appearing each time is recorded. The results are given below. Test at the 5% level of significance whether the sample is from a binomial population. [8]

No. of heads	0	1	2	3	4	5
Frequency	14	45	80	112	61	8

Use the chi square table given in Q. No. 3a.

- b) Explain Poisson Probability distribution. [8]

- Q5) a)** Explain the principle of least squares and derive the least square equations for fitting a straight line. [8]

- b) Fit an equation of the form $y = ab^x$ to the following data. [10]

x	2	3	4	5	6
y	144	172.8	207.4	248.8	298.5

OR

- Q6) a)** Explain linear and multiple regression. [8]

- b) Determine y at $x = 8.2$ for the following data. [10]

x	2	3	4	5	6	7	8	9
y	-14	4	40	100	190	316	484	700

Q7) a) Solve using Gauss Elimination method. **[8]**

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

$$3x_1 - x_2 + 2x_3 = 1$$

$$x_1 - x_2 + x_3 = -1$$

b) Solve using Gauss-Seidel method. **[8]**

$$83x + 11y - 4z = 95$$

$$7x + 52y + 13z = 104$$

$$3x + 8y + 29z = 71$$

OR

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

$$2x_1 + 2x_2 + 4x_3 = 18$$

$$x_1 + 3x_2 + 2x_3 = 13$$

$$3x_1 + x_2 + 3x_3 = 14$$

b) Solve using Gauss-Seidel method. **[8]**

$$2x + y + 4z = 12$$

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

Q9) a) Obtain the root of the following equation using bisection method.
 $\tan x + x = 0$. **[8]**

b) Explain Newton Raphson method. **[8]**

OR

Q10)a) Obtain the root of the following equation using False Position Method
 $xe^x - 3 = 0$. **[8]**

b) Explain Secant method. **[8]**

Q11)a) Derive the equation for Simpson's 1/3 rule. **[8]**

b) Solve using Gauss Quadrature 3 point formula. **[10]**

$$I = \int_1^2 (x^3 + 1) dx$$

OR

Q12)a) Derive the equation for Gauss Quadrature 3 point method. **[8]**

b) Solve using Simpson's 3/8 rule. **[10]**

$$I = \int_0^{\pi} x \sin x dx$$



Total No. of Questions : 12]

SEAT No. :

P1925

[Total No. of Pages : 3

[5254]-24

B.E. (Civil Engineering) (Semester - II)
FINITE ELEMENT METHOD IN CIVIL ENGINEERING
(2008 Pattern) (Open Elective)

Time : 3 Hours]

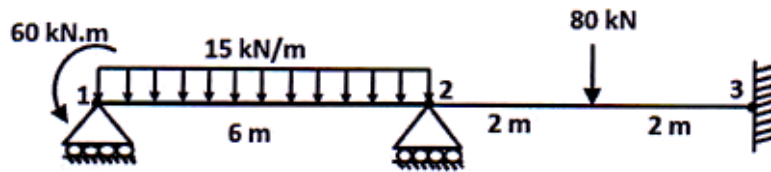
[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Determine the rotations of nodes 1 and 2 and bending moments for the beam as shown in figure using finite element method. Take $EI = 20 \times 10^3 \text{ kN.m}^2$ [18]



OR

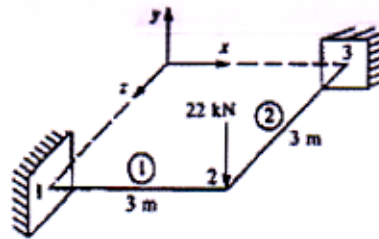
- Q2)** a) Derive 4×4 stiffness matrix for the truss member using finite element formulation. [12]
- b) Explain step by step procedure of FEM. [6]

Q3) Derive the stiffness matrix of two noded frame element with six degrees of freedom. Derive the transformation matrix for the two noded frame element. [16]

OR

P.T.O.

- Q4)** The grid consists of two elements fixed at nodes 1 and 3. Find displacement and rotations at node 2. Take $E = 210\text{GPa}$; $G = 84\text{GPa}$; $I = 16.6 \times 10^{-5} \text{ m}^4$ and $J = 4.6 \times 10^{-5} \text{ m}^4$. [16]



- Q5)** a) Explain in brief state of stress and strain at a point. [8]
 b) Derive the differential equations of equilibrium in case of three-dimensional stress system. [8]

OR

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

SECTION - II

- Q7)** a) Give two dimensional and three dimensional Pascal's triangle. Explain its use in FEM analysis. [9]
 b) What is aspect ratio of element? How it affect the FEM solution? Explain with suitable example. [9]

OR

- Q8)** a) State and explain the convergence criteria for the choice of the displacement function in FEM with examples. [9]
 b) Enlist the various 1D, 2D and 3D elements with diagrams used in finite element analysis. [9]

- Q9)** a) What are Serendipity elements explain with examples? Derive shape functions of four noded serendipity element. [8]
 b) Obtain strain displacement matrix for a CST element. [8]

OR

Q10)a) Derive shape functions for the nine noded rectangular elements in natural coordinate (ξ, η) system using Lagrange's interpolation function. [8]

b) Derive the relationship between the natural (area) and Cartesian coordinates of a triangular element. [8]

Q11)a) Explain Jacobian matrix in case of four noded isoperimetric quadrilateral element. Obtain strain displacement matrix. [12]

b) State and explain three basic laws on which isoparametric concept is developed. [4]

OR

Q12) Explain strain-displacement and stress-strain relationships for 3D problem. Hence, derive necessary matrices for formulation of stiffness matrix of 3D tetrahedron element. [16]



Total No. of Questions : 6]

SEAT No. :

P1926

[Total No. of Pages : 2

[5254]-25

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

GEOINFORMATICS

(2008 Pattern) (Open Elective)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Describe characteristics of LANDSAT. **[8]**
b) Discuss Visual Image Interpretation. Write the Elements of Visual Image Interpretation. **[8]**

OR

- a) Explain EMR. State the characterization for different frequencies on images. **[8]**
- b) Define resolution and explain any 4 types. **[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) Thermal & Infra Red Satellite

OR

- a) Explain any two satellite images and its application. **[8]**
- b) Write a note on : **[8]**
i) Supervised Classification.
ii) Unsupervised Classification.

P.T.O.

- Q3)** a) Describe Characteristics of IR Images. [10]
b) “Geometric” Corrections in Images under processing. [8]

OR

- a) What is Digital Image processing and briefly explain its application. [10]
b) Discuss the flow chart application of remote sensing in ground water assessment. [8]

SECTION - II

- Q4)** a) Define GIS? Explain in detail its components. [8]
b) Explain. [8]
i) Vector Model
ii) Map Resolution

OR

- a) What is ‘MAP’? Describe different types of maps in brief. What are its limitations? [8]
b) Write a note on : [8]
i) Hardware and Software for GIS
ii) Attributes.

- Q5)** a) What is GPS? Explain its importance in GIS tooling. [8]
b) What is RDBMS? Explain the Normal form with one example. [8]

OR

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

- Q6)** a) Explain application of Geo Informatics in following areas : [10]
i) Geotechnical Engineering.
ii) Water Resource management through canal irrigation.
b) Write in detail Digital Image Processing. [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 a brief note on “Role of GIS in Terrain Analysis” . [8]



Total No. of Questions : 12]

SEAT No. :

P1927

[Total No. of Pages : 3

[5254]-26

B.E. (Civil)

HYDROPOWER ENGINEERING

(2008 Pattern) (Open Elective)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer to the sections should be written in separate books.
- 2) Neat diagrama must be drawn wherever necessary.
- 3) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) Explain the process of Nuclear power generation. Why nuclear power is considered as positive power source of future. [8]
- a) State any eight constraints on Hydropower generation. [8]

OR

- Q2)** a) What are the different investigation required to be executed before initialing the hydropower project. [8]
- b) State any four constraints on development of tidal power and any four constraints on development of wind power. [8]

- Q3)** a) Based on the parameter (i) unit rating and (ii) Head, state the classification of small and micro Hydro Power. [8]
- b) What is storage power plant? Draw its layout and explain the components of storage power plant with its functioning. [8]

OR

- Q4)** a) State the different types of runoff river plants. Explain the components and their functions. [8]
- b) Differentiate between Base load and peak load plant. [8]

P.T.O.

- Q5) a)** What is load duration curve? With the help of graph explain its significance and application. [8]
- b) A load on hydel plant varies from minimum of 10000 kW to a maximum of 40000 kW. Two turbo generators of capacity 22000 kW each have been installed. Calculate. [10]
- i) Total installed capacity of plant.
 - ii) Plant factor
 - iii) Maximum demand
 - iv) Load factor
 - v) Utilisation factor

OR

- Q6) a)** Differentiate between base load plant and peak load plant. [8]
- b) The runoff river hydropower plant has inflow of 30 cumecs and it works on head of 40m with a provision for pondage to meet daily demand with load factor of 75%. Determine the power generation capacity of plant at 85% over all efficiency what amount of pondage is needed if the plant operates at the peak stations for six hours? [10]

SECTION - II

- Q7) a)** Explain any four equipments for power house. [8]
- b) Differentiate between surface power house and underground power house. [8]

OR

- Q8) a)** With a neat layout explain components, their function and working of dam toe power house. Which type of turbine is preferred in dam toe power house? Why? [8]
- b) What is meant by instrumentation of power house. [8]
- Q9) a)** Differentiate between reaction turbine and impulse turbine. [8]
- b) Determine number of turbines and diameter of the runner for a power plant having 30 cumecs inflow, 15m 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) What is significance of surge tank and state its advantages with neat sketch. [8]

b) Design a pelton wheel turbine to find (i) Q (ii) No. of jets. (iii) Dia of Jet (iv) Dia of wheel. [10]

Q11)a) Explain in detail different criteria for economic considerations of Hydroelectric power plant. [8]

b) What are the factor governing the pricing of electricity. [8]

OR

Q12)a) As per electricity act 2003, what are the duties of transmission Licencens. [8]

b) Explain the concept of carbon credits, justify Hydropower as green power. [8]



Total No. of Questions : 12]

SEAT No. :

P1928

[Total No. of Pages : 3

[5254]-27

B.E. (Civil)

INDUSTRIAL WASTE WATER MANAGEMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Give the note on following processes with suitable example. **[18]**

- a) Processes of Ultra filtration
- b) Processes of Reverse -osmosis
- c) Processes of Electro- Dialysis

OR

Q2) Attempt the followings :

- a) Explain about Physical unit processes commonly used in waste water treatment in details with suitable sketches. **[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 and 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 and colour in waste water? **[7]**

P.T.O.

OR

Q4) Attempt the followings :

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

Q5) Attempt the followings :

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

OR

Q6) Write in brief about : [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 water treatment plant to reuse the sewage in residential complex. [9]
- b) Describe the methods of three R principles to convert waste in to wealth? [9]

OR

Q8) Attempt the followings :

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

Q9) Attempt the followings :

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

OR

Q10) Attempt the followings :

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

Q11) Attempt the followings :

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

OR

Q12) Attempt the followings :

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



Total No. of Questions : 12]

SEAT No. :

P1929

[Total No. of Pages : 3

[5254]-28

B.E. (Civil)

MECHANICS OF WAVES

(2008 Pattern) (Open Elective)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from each section.
- 2) Answer any three question from section one and three questions from section two.
- 3) Answer to the two sections should be written in separate answer booklet.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Black figure to the right indicate full marks.
- 6) Your answer will be valued as a whole.
- 7) Use of electronic pocket calculator is allowed.
- 8) Assume suitable data if necessary.

SECTION - I

- Q1)** a) Discuss the phenomenon of wave growth considering the wave frequency and wave energy. [4]
- b) Define wave length, wave period, wave steepness. [6]
- c) For a wind of corrected speed 25 m/s remaining constant over a fetch of 40 km obtain H_s and T_s values using Hasselmann technique, if (i) water is very deep (ii) water depth is 5 m. [8]

OR

- Q2)** a) Discuss the process of wave decay. [4]
- b) Distinguish between Sea and Swell. [6]
- c) A slowly moving cyclone has a forward speed of 15 m/s passing over 30° latitude. The pressure at the hurricane centre is 700 mm of Hg. Maximum wind speed occurs at 60 km from the centre. What is the wave height and period at 300 km to the right of the centre. [10]

- Q3)** a) Prove that in deep water $C_0 = \frac{gT}{2\pi}$ and in shallow water $C_s = \sqrt{gd}$ with usual notations. Start with linear dispersion relationship. How to obtain C (wave velocity) and L (wave length) in intermediate water? [8]

P.T.O.

- b) A wave with a period 10 seconds is propagated shoreward over a uniformly sloping shelf from a depth of 300m to 3m. Find individual wave velocity (C) and wavelength (L) corresponding to 300 m and 3 m. [8]

OR

- Q4)** a) Write short note on choice of wave theories. [4]
b) Derive expression for water surface profile (η) starting with expression for velocity potential (ϕ). [4]
c) Derive expression for group wave velocity. Modify the formula for deep water and shallow conditions. [8]

- Q5)** a) Define wave energy spectra. What are the methods of deriving wave spectra? Explain in brief. [6]
b) The annual maximum wave heights observed at Pondecherry in m are as follows; 4, 5.23, 3.77, 5.88, 4.53, 4.59, 3.94, 3.12, 3.42, 6.96, 6.24, 4.43, 2.05, 5.23, 2.34, 1.25, 1.67, 3.45, 3.67, 2.35. Find wave height of 50 year return period. For $N = 20$, $y_n = 0.5236$, $S_n = 1.0628$. [10]

OR

- Q6)** a) Enlist various theoretical wave spectra. Explain any one of them in detail. [6]
b) What is difference between short term and long term wave statistics? Give details of Rayleigh distribution for short term statistics. [4]
c) Define probability density function, probability distribution function. [6]

SECTION - II

- Q7)** a) What is wave reflection? Give equation of resultant wave profile. State variation of reflection with structure characteristics and wave properties. [8]
b) A beach having a 1 on 20 slope, a wave with deep water height of 3 m and a period 8 seconds travels shoreward. Assume that a refraction analysis gives refraction coefficient as $K_r = (b_o/b)^{0.5} = 1.05$ at the point where breaking is expected to occur. Find breaker height and depth at which breaking occurs. [10]

OR

- Q8) a)** What is diffraction? Explain with neat sketch. What are the causes and effects of diffraction? Enlist the assumptions in the theory of diffraction. **[8]**
- b) A wave of 2.8 m height and 8 second period strikes over a beach with a slope of 1 in 35. (i) obtain the reflected wave height (ii) if the same wave strikes against the concrete wall having a slope of 1 in 8 what is reflected wave height? Reflection coefficient for surf similarity of 0.7, 0.75 and 0.8 is equal to 0.05, 0.055 and 0.06 respectively. **[8]**

- Q9) a)** Draw pressure distribution diagram for non-breaking waves acting on vertical walls for crest and trough of clapotis on wall. What is the limitation of Sainflou's method? **[8]**
- b) A wave of 1.5 m height attacks a smooth vertical wall of height 5.85 m. The depth at the structure of the toe is 3m. The net force and moment acting are 101.7 kN/m and 163.8 kNm/m respectively when wave is the crest and 17.1 kN/m and 11.8 kNm/m when wave at trough. The height of clapotis crest about bottom (y_c) is 5.5 m and height of clapotis trough (y_t) is 2.5 m. Calculate the reduced force and moment on the reduced wall of height 4.5 m. **[8]**

OR

- Q10) a)** Draw sketches for pressure distribution of broken wave on wall seaward of still water level and wall landward of still water level. **[8]**
- b) A vertical wall 4m high is sited in sea water with depth at tow (d_s) equal to 2.5 m. The wall is built on a bottom sloe of 1:20. The wave period is 8 sec. Find the maximum pressure, horizontal force and overturning moment about the toe of the wall for the given slope excluding the hydrostatic forces. The maximum breaker height (H_b) is 3m. **[8]**

- Q11) a)** Discuss variation of CD and Cm with Kc (Keulegan-Carpenter number) and Reynolds number Re. **[6]**
- b) Derive equation for wave force on entire member length. **[10]**

OR

- Q12) a)** Derive equation for Keulegan-Carpenter number. **[8]**
- b) Write short note on calculation of wave forces using Stokes' fifth order theory. **[4]**
- c) What are limitations of Morrison's equation. **[4]**



Total No. of Questions : 12]

SEAT No. :

P1930

[Total No. of Pages : 3

[5254]-29

B.E. (Civil Engineering)
FERROCEMENT TECHNOLOGY
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is ferrocement? Give the detailed classification of ferrocement and their typical characteristics along with their Applications. [8]
- b) Write a note on “Forming of Ferrocement structures. [5]
- c) Merits and Demerits of ferrocement over RCC. [5]

OR

- Q2)** a) Write a note on job requirements of required skills and also the tools & plants used for ferrocement technology. [5]
- b) What are different properties and specifications of raw materials used for Ferrocement Technology? [5]
- c) What are different properties and specifications of raw materials used for Ferrocement Technology? Also write a note on proportioning of cement mortar. [8]
- Q3)** a) Enlist the various construction methods of ferrocement. Explain the skeleton armature method with advantages and disadvantages. [8]
- b) Explain the effect of creep and shrinkage on ferrocement structures and also the protective surface treatment given to the same. [8]

P.T.O.

OR

- Q4)** a) Explain in detail process of constructing ferrocement structures in respect of : **[10]**
- i) planning the work.
 - ii) fabricating skeleton
 - iii) tying of wire meshes
 - iv) mortaring
 - v) curing
- b) Explain in detail specific surface method and crack control method. **[6]**

- Q5)** a) 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. **[10]**
- b) What are the special design considerations for ferrocement and typical features of ferrocement affecting design. **[6]**

OR

- Q6)** a) Draw the neat sketches of various structural forms like 'T', 'U', '+', 'L' & Also give the comparative study of behavior forms in respect of strength and design parameters with ferrocement technology. **[10]**
- b) Enlist and explain properties of ferrocement structures under static and dynamic loading conditions. **[6]**

SECTION - II

- Q7)** a) Explain the role of ferrocement in building construction of following building accessories: (i) foundations (ii) walls (iii) floors (iv) roofs. **[8]**
- b) Enlist and explain factors governing cost and value of ferrocement in building constructions. Also compare cost of ferrocement structures with conventional structures. **[8]**

OR

- Q8)** a) Explain in detail the ferrocement building component you seen with reference to following: material of construction, analysis and design principles, process of construction, quality control and maintenance. **[10]**
- b) Explain the special characteristics of ferrocement to resist shock affected during earthquakes. **[6]**

- Q9) a)** Compare all parameters of ferrocement counter forth retaining wall with reference to conventional counter forth retaining wall. [8]
- b) What is ferrocement? What are its different applications with hydraulic structures. Explain in detail any one. [8]

OR

- Q10)a)** Explain design & method of fabrication and casting of counter forth retaining wall. [8]
- b) Compare ferrocement container with conventional container for storage of granular materials. [8]

- Q11)a)** Write a note on:Ferrocement precast walling and flooring panels. [6]
- b) Explain in detail the industrial precast ferrocement concrete elements you seen with : [6]
- i) raw materials of construction
 - ii) analysis and design principles
 - iii) manufacturing process
- c) Give the testing methodology and quality control for ferrocement materials. [4]

OR

- Q12)a)** Explain role of ferrocement technology in construction of large size special purpose structures like shell and domes. [8]
- b) Why ferrocement is use for pre-casting? Give the different methods of ferrocement pre-casting and Explain any one in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P1931

[Total No. of Pages : 3

[5254]-30-A

B.E. (Civil)

GREEN BUILDING TECHNOLOGY

(2008 Pattern) (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 indicate full marks.*
- 3) *Your answers will be valued as a whole.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss in details the sustainable site selection criteria. [7]
b) Discuss the uses of following [4+3+2]
i) Building layout plan
ii) Solar Energy
iii) Fresnel Lens

OR

- Q2)** a) Differentiate with example 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) Differentiate with example the active and passive architecture. [6]
b) Explain the concept of Embodied Energy. [5]
c) What is 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]

P.T.O.

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

OR

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

SECTION - II

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

OR

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

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

OR

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

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

OR

- Q12)a)** Discuss the followings : [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. :

P1932

[Total No. of Pages : 4

[5254]-31
B.E. (Mechanical)
CAD/CAM & AUTOMATION
(2008 Pattern)

Time : 3 Hours]

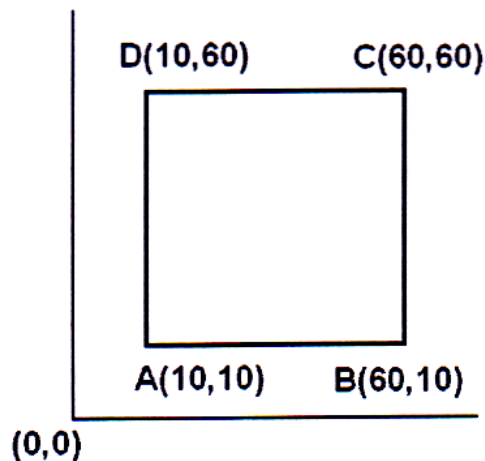
[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q. No.1 OR 2, No.3 OR 4, No.5 OR.6, No.7 OR 8, Q.No.9 OR 10, No.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) *Use of electronic non programmable pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Find the new position of position of square ABCD, if it is rotated about its own center point by 45° in counterclockwise direction. Also sketch the stepwise transformations to achieve this rotation. **[12]**



- b) Write a short notes on transformation matrix for isometric projection. **[4]**

OR

- Q2) a)** Draw 03 orthographic views of a triangle having vertices A (1, 2, 1), B (4, 3, 4) and C (5, 8, 2). **[12]**

- b) Write a short notes on mapping of geometric model. **[4]**

P.T.O.

Q3) a) Write parametric equation for circle having center point, C (3, 3, 0) and radius=3. If circle is divided into 8 parts, calculate coordinates on circle. [10]

b) What are different Solid Model Creation Schemes? Explain with neat sketch a Constructive Solid Geometry (CSG). State its advantages and limitations. [6]

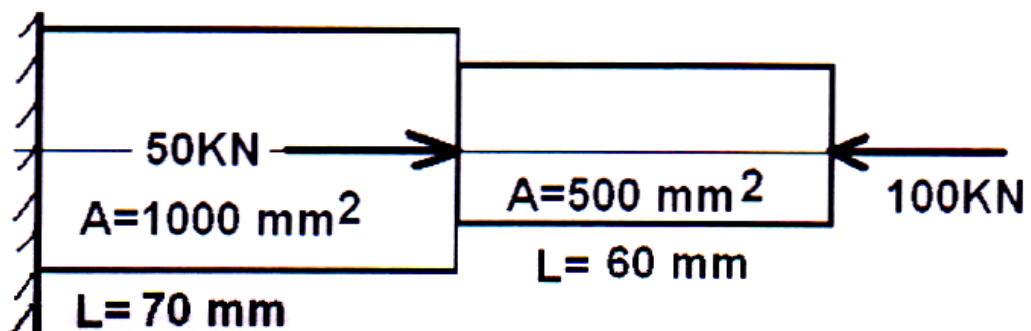
OR

Q4) a) Find the equation of 2D Hermite cubic spline having control points $P_0(2, 3)$ and $P_1(10, 1)$. The lines from point $P_2(8, 6)$ are tangent to curve at P_0 and P_1 . Take $u = 0.25$. [10]

b) Explain following with neat sketch : [6]

- Tabulated Surface
- Bezier Surface
- Offset Surface

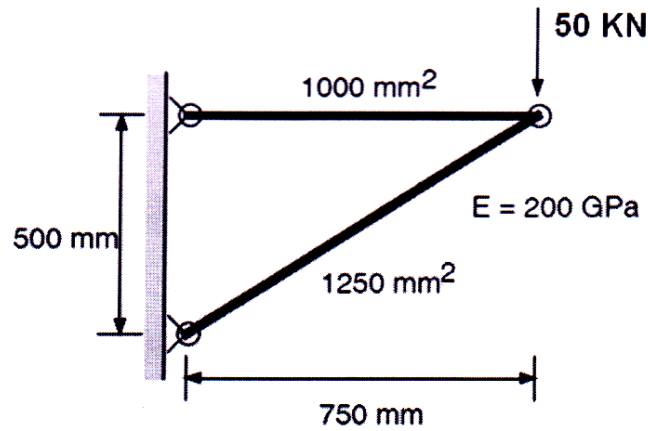
Q5) a) Consider the stepped bar shown in following figure. Assume modulus of elasticity $2 \times 10^5 \text{ N/mm}^2$. Determine nodal displacements, elemental stresses and support reactions. [12]



b) Write a short note on relationship between local and global coordinates in 1D element. [6]

OR

- Q6) a)** Consider the Truss as shown in figure given below. Determine nodal displacements, elemental stresses and support reactions. [12]



- b) What is CST element? How shape functions are computed using area method. [6]

SECTION - II

- Q7) a)** Explain NC words G81, G71, M06 and P001 with suitable example. [6]
- b) Write CNC part program to take a finishing cut to produce turning job as shown in figure 3. Assume suitable data. [10]

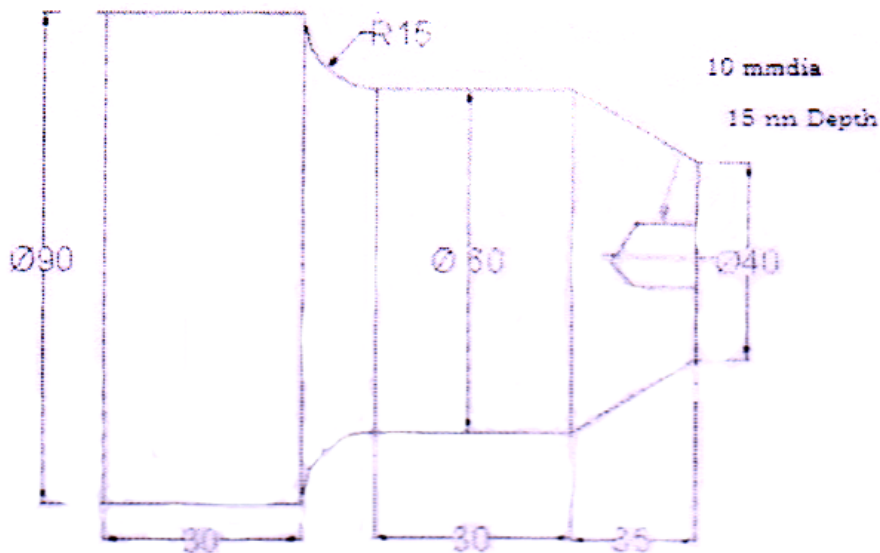


Figure 3 Q. No. 7 (b)

OR

- Q8) a)** Explain the components of DNC in detail. [6]

- b) Write complete CNC part program to generate end profile and drill the holes as shown in figure 4. Assume suitable machining data for speed and feed etc. [10]

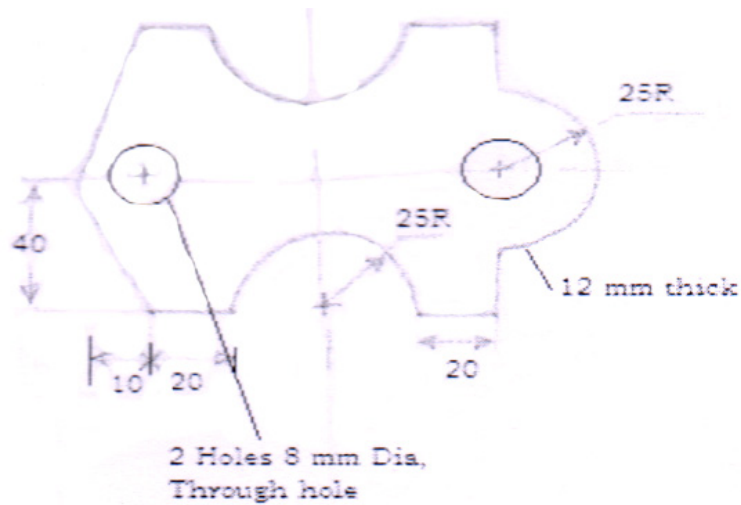


Figure 4 Q. No. 8 (b)

Q9) a) Differentiate between different types of automation. [8]

b) Classify machining center and explain any one in detail. [8]

OR

Q10)a) Explain in brief Classification of FMS. [8]

b) Explain various elements of computer Integrated Manufacturing. [8]

Q11)a) Explain SCARA robot with the help of neat Sketch. [6]

b) Explain WAIT, DELAY and MOVE commands. [6]

c) Explain pneumatic gripper arrangement used to handle thin sheets. [6]

OR

Q12)a) Write short notes on lead through programming method. [6]

b) Explain various types of joint notations schemes used in robots. [6]

c) Explain different types of actuators used in robots. [6]



Total No. of Questions : 12]

SEAT No. :

P1933

[Total No. of Pages : 4

[5254]-32

B.E. (Mechanical) (Common to Mechanical Sandwich)

DYNAMICS OF MACHINERY

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answer to the two sections should be written in the separate answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to right indicate full marks.*
- 5) *Use of Logarithmic Tables, Slide Rule, Mollier Charts, Electronic Pocket Calculator & Steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) What do you mean by Primary and Secondary Balancing in Reciprocating Engines? [6]
- b) Three masses A, B & C are mounted on a shaft. The planes of A and B are 100 cm apart whereas the planes of B and C are 75 cm apart. The masses A, B and C are of 30 kg, 40 kg and 32 kg and have their centre of gravity at a distance of 35 mm, 20 mm and 30 mm respectively from the shaft axis. Find the angular position of all the masses from positive x-direction so that static balance is achieved.

It is required to place weights at a radial distance of 25 cm so that complete balance is achieved. If the weights are to be placed in A and C, calculate the magnitude and angular positions of desired masses. [12]

OR

- Q2)** a) Differentiate between Static & Dynamic Balancing. Why there is need of accurate dynamic balancing of high speed machines? [6]
- b) An air compressor has four in - line cylinders at 90° intervals. The crank radius is 140 mm, while the connecting rod is 560 mm long for each cylinder. The mass of reciprocating parts is 20 kg for each cylinders and the speed of the rotation is 600 rpm. The cylinders are 300 mm apart. Show that there are no out of balance primary and secondary forces and determine the corresponding magnitudes of primary and secondary couples. [12]

P.T.O.

- Q3) a)** Define the following terms used in vibrations : **[4]**
- i) Amplitude of Vibrations
 - ii) Resonance
 - iii) Forced Vibrations
 - iv) Damped Vibrations
- b) What is Logarithmic Decrement? Derive the relations. **[6]**
- c) Determine the Natural frequency of a Simple pendulum by using FBD Method and Energy Method, neglecting the mass of the rod. **[6]**

OR

- Q4) a)** Define the following terms : **[4]**
- i) Damping Factor
 - ii) Coulomb Damping
 - iii) Damping Coefficient
 - iv) Critical Damping Coefficient
- b) Derive the relation for the Natural Frequency of Free Torsional Vibrations. **[6]**
- c) An under damped shock absorber is to be designed for a motor cycle of mass 200 kg such that during a road bump, the damped period of vibration is limited to 2 seconds and the amplitude of vibrations should reduce to one - sixteenth in one cycle.
- Find **[6]**
- i) Spring Stiffness
 - ii) Damping Coefficient of Shock Absorber
- Q5) a)** What are frequency response curves ? Mention the significance of these curves. **[6]**
- b) A machine part of mass 2 kg vibrates in a viscous medium. Determine the damping coefficient when a harmonic exciting force of 35 N results in resonant amplitude of 12.5 mm with a period of 0.2 sec. If the system is excited by a harmonic force of frequency 4 Hz, what will be the percentage increase in the amplitude of vibration when damper is removed as compared with that with damping? **[10]**

OR

- Q6)** a) Explain the following terms. [6]
- Force Transmissibility
 - Vibration Isolation
- b) A mass of 250 N is supported by a spring and dashpot. The spring is stretched by 150 mm due to weight and the dashpot has the coefficient of damping 1000 N per meter per sec. If the support oscillation is S.H.M. with amplitude 25 mm and frequency 6 rad/sec, find [10]
- The amplitude of the Load.
 - The relative amplitude between Load and Support.
 - The amplitude of the load when the frequency of disturbing force is equal to the natural frequency.
 - The amplitude of the load when the dashpot has been grounded frequency of the support is 6 rad/sec.

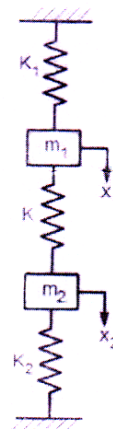
SECTION - II

- Q7)** a) Explain the Torsional Vibrations of a Geared system by [8]
- Neglecting inertia of gears
 - Considering inertia of gears
- b) A rotor of 10 kg mass is mounted midway on a 2 cm diameter, horizontal shaft supported at the ends by two bearings. The bearing span is 80 cm. Because of certain manufacturing defect, the C. G. of the rotor is 0.01 mm away from its geometric centre, If the system rotates at 3000 rpm, determine the amplitude of the steady state vibration and dynamic load transmitted to the bearings. [Take $E = 2 \times 9.81 \times 10^{10} \text{N/m}^2$] [10]

OR

- Q8)** a) Explain the concept of “Torsionally Equivalent Shaft”. [6]
- b) Determine the natural frequencies of the system shown in the figure. [12]

Given : $K_1 = K_2 = 40 \text{ N/m}$
 $K = 60 \text{ N/m}$
 $M_1 = m_2 = 10 \text{ kg}$.



- Q9) a)** Explain the following terms : **[4]**
- i) Sound Pressure level
 - ii) Sound Power Level
 - iii) Acoustic Intensity
 - iv) Sound Absorption Coefficient
- b) Derive an equation that gives relation between Sound Intensity Level and Sound Pressure Level. **[6]**
- c) A customer care containing six officers, individually makes noise level of 60, 56, 62, 53, 51 and 54 dB respectively. Add the noise levels when **[6]**
- i) All Officers are working.
 - ii) When first and second officers are not working.

OR

- Q10)a)** Write a short note on " Sound Level Meter". **[4]**
- b) What is Sound Enclosure ? Describe any one type of Sound Enclosure. **[6]**
- c) Explain radiation Fields of a Sound Source with a Neat Sketch. **[6]**
- Q11)a)** Write a short note on " Vibration Isolators". **[4]**
- b) Explain Frahm's Reed Tachometer with a neat sketch. **[6]**
- c) Explain with a neat sketch, the working principle of a Centrifugal Pendulum Absorber. **[6]**

OR

- Q12)a)** Explain Piezoelectric Accelerometer with a neat sketch. **[4]**
- b) A vibrometer has a period of free vibration of 2 sec. It is attached to a machine with a vertical harmonic frequency of 1 Hz. If the vibrometer mass has an amplitude of 2.5 mm relative to the vibrometer frame, what is the amplitude of vibration of the machine? **[6]**
- c) Explain the working principle of Frahm's Vibration Absorber. **[6]**



Total No. of Questions : 12]

SEAT No. :

P1934

[Total No. of Pages : 2

[5254]-33
B.E. (Mechanical)
INDUSTRIAL FLUID POWER
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answer to the two sections should be written in the 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 a simple hydraulic circuit showing all its essential components. State functions of each component. **[8]**
- b) Explain six important properties of a hydraulic fluid. **[6]**
- c) Compare static and dynamic seals. **[4]**

OR

- Q2)** a) What are the locations where filters are typically installed in hydraulic circuits? What are their advantages? **[6]**
- b) What are the effects of contaminants on different components of hydraulic systems? **[6]**
- c) Compare hose connections with pipe connections. **[6]**

OR

- Q3)** a) Draw a neat sketch and explain working of a fixed delivery axial piston pump. **[10]**
- b) What are the different accessories used in hydraulic systems? What are their functions? **[6]**
- Q4)** a) Explain with a sketch the different parts of a typical reservoir assembly. **[8]**
- b) Explain with sketch the operation of a balanced vane pump. **[8]**

P.T.O.

- Q5) a)** Draw a sketch and explain working of a sequence valve. [8]
b) What are the different centre positions used in DCV. Give advantages and disadvantages of each. [8]

OR

- Q6) a)** What is a accumulator? State different types of accumulators. Explain any one accumulator with a sketch. [8]
b) Explain with a sketch the working of a pressure and temperature compensated flow control valve. [8]

SECTION - II

- Q7) a)** Write a short note on “Hydraulic Motors”. [8]
b) Write a short note on “Types of cylinders”. [8]

OR

- Q8) a)** Explain with neat sketch “Bleed off circuit”. [8]
b) Explain with neat sketch “Motor Braking circuit”. [8]

- Q9) a)** Write a short note on “Pneumatic valves”. [8]
b) Write a short note on “Types of Lubricators” for Pneumatic systems. [8]

OR

- Q10) a)** Explain with Ckt working of a “Time Delay Valve”. [8]
b) Write a short note on “Types of Air dryers” for a Pneumatic system. [8]

- Q11) a)** What is the manufacture’s catalogue? How does the Designer select component from it? [9]
b) What are the factors considered, while Designing of a “Pneumatic System”. [9]

OR

- Q12) a)** What are factors considered, while Designing of a “Hydraulic System”. [9]
b) Write a short note on “Trouble shooting methods of” Hydraulic Systems. [9]



Total No. of Questions : 12]

SEAT No. :

P1935

[Total No. of Pages : 3

[5254]-34
B.E. (Mechanical)
ENERGY AUDIT AND MANAGEMENT
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain strategic measures for meeting the future energy requirements of India. **[8]**
- b) Differentiate between primary energy and secondary energy. Give two examples of each. **[8]**

OR

- Q2)** a) Write the responsibilities of energy auditor. **[8]**
- b) Explain energy security. **[4]**
- c) What is ABT? **[4]**

- Q3)** a) Explain stepwise procedure of detailed energy audit. **[8]**
- b) What are the energy conservation opportunities in Refrigeration and HVAC systems? **[8]**

OR

- Q4)** a) What is the need of energy audit? **[4]**
- b) What are the areas that need to be focused during pre-audit phase? **[6]**

P.T.O.

- c) Explain the following instruments used for energy audit with their application. [6]
- i) Pitot tube
 - ii) Ultrasonic flow meter.

- Q5)** a) Explain the concept of Time value of Money. [6]
- b) Explain the ROI financial analysis technique. What are the advantages and Limitations of ROI method? [6]
- c) A sum of Rs. 25,000/- is deposited in a bank at the beginning of a year. The bank pays 6% interest annually. How much money is in the bank account at the end of the fifth year, if no money is withdrawn? [6]

OR

- Q6)** a) Explain the Internal rate of return (IRR). What are the advantages and disadvantages of IRR? [6]
- b) Calculate Net present Value of a project at a discount rate of 15% with an Investment of Rs. 50,000 at the beginning of the first year, & saving of Rs. 23,000 & Rs. 36000 at the end of the first & second year respectively. [8]
- c) Explain simple payback period. What are the limitations of it? [4]

SECTION - II

- Q7)** a) What are advantages and disadvantages of direct method of efficiency calculation for Boiler? Explain indirect method of efficiency calculation. [10]
- b) Calculate the pump efficiency from the data given : pump flow is 0.40m^3 power absorbed : 325 kw, suction head + 1m, Delivery Head 55m, motor efficiency 88%, Type of drive direct coupled, Density of water $996\text{kg}/\text{m}^3$. [8]

OR

- Q8)** a) How furnace efficiency is calculated? Explain different heat losses in fuel fired furnaces. [10]
- b) Explain energy saving opportunities in pumping system. [8]

- Q9) a)** The lighting connected load for the small industry consisting of 150 Fluorescent tubes of 55W each with magnetic ballast. In first option, the magnetic ballast of Fluorescent tubes is replaced by electronic ballast and power consumption of same fluorescent tubes reduces to 40W. Calculate the Simple payback period of above replacement if cost of electronic ballast is Rs 105. In second option, fluorescent tubes are replaced by energy efficient fluorescent tubes of 20W and cost of Rs. 400 each. Calculate simple payback period. Which energy saving option is better and Why? Consider usage of 16 hours per day and an electrical tariff of Rs. 4 per KWh. [8]
- b) Explain energy efficient motors. How motor selection is done? [8]

OR

- Q10)a)** Explain the terms : [8]
- i) Copper losses
 - ii) Luminous efficiency
 - iii) Ballast
 - iv) Power factor
- b) Explain the different maximum demand (MD) control methods. [8]

- Q11)a)** What are the different waste heat sources? Explain in brief. [8]
- b) Explain the topping cycle and the bottoming cycle of cogeneration with two examples. [8]

OR

- Q12)Write Notes on :** [4 ×4 = 16]
- a) Heat wheel
 - b) Heat pipe
 - c) CDM projects
 - d) Carbon credit



Total No. of Questions : 12]

SEAT No. :

P1936

[Total No. of Pages : 2

[5254]-35

B.E. (Mechanical Engineering) (Semester - I)
PRODUCT DESIGN AND DEVELOPMENT
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain design by evolution and innovation? [10]
b) Explain different factors in product design? [8]

OR

- Q2)** a) What is product? Write standardization in product design? [10]
b) Write note on product development and product design? [8]

- Q3)** a) Write in detail about Technology Forecasting? [8]
b) Explain in detail about Mission statement? [8]

OR

- Q4)** a) Explain in detail steps involved in Technical Questioning? [8]
b) What is concept of customer wants? [8]

- Q5)** a) Explain in detail generating concepts? [8]
b) Write in detail FMEA? [8]

P.T.O.

OR

- Q6)** a) Explain steps involved in product benchmarking? [8]
b) Explain in detail concept selection-design evaluation? [8]

SECTION - II

- Q7)** a) Write note on application of Product Teardown Process? [10]
b) Explain in detail about trend analysis? [8]

OR

- Q8)** a) Write in detail tear down method? [10]
b) Explain the form diagram? [8]

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

OR

- Q10)**a) Write note on DFX. [8]
b) Explain the weighed sum assessment method? [8]

- Q11)**a) Write short notes on : [8]
i) Benefits of Product life cycle
ii) Emergence of PLM
b) Write in detail different element of PLM. [8]

OR

- Q12)**a) Write note on Customer Involvement. [8]
b) What is importance of product workflow? [8]



Total No. of Questions : 12]

SEAT No. :

P1937

[Total No. of Pages : 3

[5254]-36

B.E. (Mechanical Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2008 Course) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Answer Three questions from section I and Three questions from section II.*
- 3) *Answer to the two sections should be written on separate.*
- 4) *Neat diagram must be drawn wherever necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Explain performance characteristics of pump. [8]

b) Write a note on stage velocity triangle. [8]

OR

Q2) a) What is specific speed? Explain its significance. [8]

b) Explain the difference between fan, blower & compressor [8]

Q3) a) Write short note on losses in pumps. [8]

b) Draw operating characteristics curves for reciprocating pump. [8]

OR

Q4) a) Write down steps involved in calculation of axial thrust methods to minimize axial thrust. [8]

b) Enlist different applications of rotary & reciprocating pumps. [8]

P.T.O.

- Q5) a)** Write down steps for design procedure and design optimization of Pumps. [10]
b) Explain various forms of corrosion occur in hydraulic machines. [8]

OR

- Q6) a)** Enlist steps for selection of impeller and casing dimension using industrial manuals for hydraulic design of pumps. [10]
b) Explain following terms : [8]
i) Static suction head
ii) Static discharge head
iii) Total suction head

SECTION - II

- Q7) a)** Explain design procedure & selection, optimization of blower. [8]
b) Write a short note on “Applications of Fans & Blowers”. [8]

OR

- Q8) a)** What are main cause for noise generation? What are methods for reducing the fan noise? [8]
b) How does dust erosion of centrifugal impeller occurs? What is its effect on the Performance? [8]

- Q9) a)** State design consideration and imperial relations used to determine various for design Parameters in fan & blowers? [8]
b) Explain the terms Surging and Stalling. [8]

OR

- Q10) a)** Write a short note on “Design procedure for selection and optimization of Blowers”. [8]
b) Write a short note on “Design of Impeller and casing dimensions in aerodynamic design. [8]

- Q11)a)** Explain the terms degree of reaction & Slip factor? **[8]**
- b)** An Axial compressor stage has the following data **[10]**
- | | |
|---|----------------|
| i) Temperature and Pressure at Entry | 300 K, 1.0 bar |
| ii) Degree of Reaction | 50 % |
| iii) Mean Blade ring diameter | 36 cm |
| iv) Rotational Speed | 18000 rpm |
| v) Blade Height at entry | 6 cm |
| vi) Air angles at rotor and stator exit | 25° |
| vii) Axial velocity | 180 m/s |
| viii) Work done factor | 0.88 |
| ix) Stage Efficiency | 85 % |
| x) Mechanical Efficiency | 96.7 % |

Determine :-

- A) Air angles at the stator and rotor entry
- B) The mass flow rate of air
- C) The power required to drive the compressor
- D) The loading coefficient
- E) The pressure ratio developed by the stage
- F) Mach number at the rotor entry

OR

- Q12)a)** Draw the velocity triangles at the entry and exit for the following axial compressor stage :- **[8]**
- i) $R = 1/2$
 - ii) $R < 1/2$
 - iii) $R > 1/2$
- b)** Air enters the inducer of centrifugal compressor at $P_{o1} = 1.02$ bar, $T_{o1} = 335$ K. **[10]**
- The hub and tip diameters of the impeller eye are 10 and 25 cm respectively. If the compressor runs at 7200 rpm and delivers 5.0 kg/s of air. Determine the air angle at the inducer blade entry and the relative Mach number. If IGVs are used to obtain a straight inducer section, determine the air angle at IGVs exit and the new value of the relative mach number.



Total No. of Questions : 12]

SEAT No. :

P1938

[Total No. of Pages : 4

[5254]-37
B.E. (Mechanical)
TRIBOLOGY
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate 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 & Steam tables is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) An oil of viscosity of 70 cp and relative density of 0.7 is used for lubrication. Convert the viscosity into centi-stoke. SUS. [4]
- b) Explain the following properties of lubricant in brief. [6]
- i) Viscosity
 - ii) Flash point & fire point
 - iii) Viscosity Index
- c) Using stribeck curve explain the range and types of lubrication modes. [6]

OR

- Q2)** a) Explain the process and methods of recycling of the used oil. [5]
- b) What do you mean by tribology? Explain the importance of tribology in industry. [6]
- c) Write a short note on the solid lubricants. [5]
- Q3)** a) Explain (1) Archard's wear theory (3) Factors affecting wear. [8]
- b) What do you mean by stiction ? Give examples. What are the methods to reduce stiction? [6]
- c) State different techniques used for wear debris analysis. [2]

P.T.O.

OR

- Q4) a)** Write notes on : **[8]**
- i) Adhesive wear
 - ii) Abrasive wear
 - iii) Fretting wear
 - iv) Corrosive wear
- b) Write a note on friction measurement by pin-on-disk apparatus. Also explain the causes of friction. **[8]**
-
- Q5) a)** Explain mechanism of pressure development in hydrodynamic lubrication with the help of two non-parallel surfaces separated by convergent film. **[6]**
- b) Derive the relation $\frac{h_0}{c} = 1$ - for hydrodynamic journal bearings. **[4]**
- c) Compare long and short journal bearings with the help of following points: **[8]**
- i) Fluid film pressure
 - ii) Pressure gradient
 - iii) Fluid flow
 - iv) Load carrying capacity

OR

- Q6) a)** The following data refers to a 360° hydrodynamic journal bearing. **[12]**
- | | |
|------------------------------------|---|
| Radial load = 10 kN | Journal Speed = 1450 rpm |
| L/D ratio = 1 | Bearing Length = 50 mm |
| Radial Clearance = 20 microns | Eccentricity = 15 microns |
| Specific gravity of the oil = 0.86 | Specific heat of the lubricant = 2.09 KJ/kg°C |
- Calculate :
- i) The minimum oil film thickness
 - ii) The coefficient of friction
 - iii) The power lost in friction
 - iv) The viscosity of the lubricant
 - v) The total flow rate of lubricant in lpm
 - vi) The side leakage

$\left(\frac{l}{d}\right)$	ϵ	$\left(\frac{h_0}{c}\right)$	S	ϕ	$\left(\frac{r}{c}\right)_f$	$\left(\frac{Q}{rcn_c l}\right)$	$\left(\frac{Q_s}{Q}\right)$	$\left(\frac{P}{P_{max}}\right)$
1	0	1.0	∞	(85)	∞	π	0	–
	0.1	0.9	1.33	79.5	26.4	3.37	0.150	0.540
	0.2	0.8	0.631	74.02	12.8	3.59	0.280	0.529
	0.4	0.6	0.264	63.10	5.79	3.99	0.497	0.484
	0.6	0.4	0.121	50.58	3.22	4.33	0.680	0.415
	0.8	0.2	0.0446	36.24	1.70	4.62	0.842	0.313
	0.9	0.1	0.0188	26.45	1.05	4.74	0.919	0.247
	0.97	0.03	0.00474	15.47	0.514	4.82	0.973	0.152
	1.0	0	0	0	0	0	1.0	–

Note : Assume linear interpolation for intermediate values.

- b) Name the types of Hydrodynamic thrust bearing. Dervie the equations for pressure distribution for flat plate thrust bearing. [6]

SECTION - II

- Q7)** a) Derive an expression for load carrying capacity and oil flow rate for hydrostatic bearing. State the assumptions made. [8]
 b) Explain thermal considerations in hydrostatic step bearings. [8]

OR

- Q8)** a) Explain the mechanism of piston-pin lubrication in IC engines. [8]
 b) Two circular plates of 400 mm diameter are seperated by an oil flim havig viscosity of 105cp. A load of 20 kN is transferred through the film. Calculate the time taken for reducing the flim thickness from 0.2 mm to 0.01mm.

Also estimate the time of approach, if plates were square in shape of side 400 mm, all other parameters are same. [8]

- Q9)** a) Explain the principle of Elastohydrodynamic Lubrication with applications. [8]
 b) Write short note on Ertel - Grubin Theory and Hertz theory. [8]

OR

Q10)a) Compare gas Lubricated bearings with oil-lubricated bearings for following parameters [8]

- i) Operating speed
- ii) Load Carrying capacity
- iii) Viscosity of Lubricant
- iv) Film thickness

b) Explain desirable properties of bearing materials. [8]

Q11)a) Why Lubrication is required in metal working? Explain the types of Lubrication in metal working. [8]

b) Discuss the development of concept and structure of superficial layers. [10]

OR

Q12) Write short note on any three of the following : [18]

- a) Lubrication in wire drawing
- b) Lubrication in rolling
- c) Metal spraying
- d) Cladded coatings



Total No. of Questions : 12]

SEAT No. :

P1939

[Total No. of Pages : 3

[5254]-38

B.E. (Mechanical Sandwich) (Semester - I)

AUTOMOBILE ENGINEERING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** Explain the following terms : **[9]**
- i) Air resistance
 - ii) Rolling resistance
 - iii) Grade resistance
- b) Explain with neat sketch the construction of a typical truck chassis frame. **[7]**

OR

- Q2) a)** Compare the merits and demerits of the frameless construction with the conventional frame construction. **[8]**
- b) Show by line diagram how the drive is taken from engine to driving wheel for the following arrangements and explain clearly the advantages and disadvantages of each arrangement. **[8]**
- i) Front engine front wheel drive
 - ii) Front engine rear wheel drive

- Q3) a)** Explain with neat sketch the working of a constant mesh gear box. **[8]**
- b) Describe with neat sketch function and working of multi-plate clutch. **[8]**

P.T.O.

OR

- Q4)** a) Explain with neat sketch the working of differential use in rear axle. [8]
b) Explain with neat sketch the operation of torque tube drive. [8]

- Q5)** a) Explain with neat sketch: Camber, King pin inclination and Scrub radius. [6]
b) Explain with neat sketch the working of shock absorber. [6]
c) Explain the advantages and disadvantages of independent suspension. [6]

OR

- Q6)** a) Sketch a recirculating ball type steering gear and explain its working. [6]
b) Explain with neat sketch the working of power steering. [6]
c) What are the different factors contributing load on A/C system. [6]

SECTION - II

- Q7)** a) What do you understand by servicing of brake system? Prepare the check point list for servicing of brake system. [8]
b) Explain the maintenance practices for : [10]
i) Suspension system
ii) Steering system

OR

- Q8)** Write short notes on any three : [18]
a) Tyre reconditioning
b) Wheel balancing
c) Antifreezing and Anticorrosive additives
d) Engine lubrication

- Q9)** a) Explain the term active and passive safety. List the instruments used in passive safety. [8]
b) Describe with neat sketch construction and working of seat used in automobile. Explain purpose of head restraint used in it. [8]

OR

Q10)a) Describe with neat sketch construction of vehicle structure and explain how it is made safety for crashworthiness. [8]

b) Explain in details the importance of ergonomics in automobile safety.[8]

Q11)a) List the various types of sensors used in electronic control system of vehicle. Explain any two sensors used in induction system. [8]

b) Explain with neat sketch construction and working of Anti-lock braking system used in automobile. [8]

OR

Q12)a) List the various types of actuators used in electronic control system of vehicle. Explain any two actuators. [8]

b) Explain with the help of block diagram the electronic engine control system used in automobiles. [8]



Total No. of Questions : 12]

SEAT No. :

P1940

[Total No. of Pages : 4

[5254]-40

B.E. (Mechanical Engineering)

QUANTITATIVE AND DECISION MAKING TECHNIQUES

(2008 Pattern) (Elective - II) (Theory)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Answer any three questions from each section.*
- 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) *Use of non-programmable calculator is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain steps in decision making. [5]
b) Explain decision tree with suitable example. [5]
c) Solve following problem by mixed strategy method. [6]

B's Strategy

		B1	B2
A's Strategy	A1	- 4	5
	A2	3	-7

OR

- Q2)** a) Explain [8]
i) Pure and Mixed Strategies
ii) Graphical method for solving Game Problem.
b) Solve following 4×4 Game Problem. [8]

	B1	B2	B3	B4
A1	5	- 4	- 4	6
A2	-3	- 2	- 3	- 6
A3	6	8	- 4	-1
A4	7	3	-9	-3

P.T.O.

Q3) a) Define OR and explain its scope. [6]

b) Solve following LPP Problem with Simplex Method. [10]

$$\begin{aligned} \text{Maximize } Z &= 4x_1 + 3x_2 + 6x_3 \\ \text{Subjected to } 2x_1 + 3x_2 + 2x_3 &\leq 440 \\ 4x_1 + 3x_3 &\leq 470 \\ 2x_1 + 5x_2 &\leq 430 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

OR

Q4) a) Sketch special cases in graphical solution of LPP. [4]

b) Solve following problem by Big M method. [12]

$$\begin{aligned} \text{Minimize } Z &= 5x_1 + 3x_2 \\ \text{Subjected to } 2x_1 + 4x_2 &\leq 12 \\ 2x_1 + 2x_2 &= 10 \\ 5x_1 + 2x_2 &\geq 10 \\ x_1, x_2 &\geq 0 \end{aligned}$$

Q5) a) Explain Hungarian method of solving assignment problem. [8]

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

Q6) a) Explain North West Corner method of allocation for transportation problem. [6]

b) A company has factories at F1, F2 and F3 that supply products to warehouses at W1, W2 and W3. The weekly production of factories is 200, 160 and 90 units respectively and the weekly demand of warehouses is 180, 120 and 150 units respectively. The unit shipping costs in rupees is below. [12]

1	W1	W2	W3
F1	16	20	12
F2	14	8	18
F3	26	24	16

Solve and optimize the solution by suitable method.

SECTION - II

Q7) a) Discuss various costs involved in inventory control. [6]

b) A company plans to consume 700 pieces annually of a particular component. Past record indicate that its purchasing department spent Rs. 12,500 for placing 15000 purchase orders. The average inventory was valued at Rs. 50000 and the total storage cost was Rs. 7500, which included wages, rent, taxes, insurance, etc. related to storage department. The company borrows capital at 10% a year. If the cost of the component is Rs 12 and lot size is Rs 10, determine the [10]

- i) Purchase price/year
- ii) Purchase expenses/year
- iii) Storage expenses/year
- iv) Capital Cost/year
- v) Total Cost/year

OR

Q8) a) Write a note on use of simulation techniques in queuing problems. [6]

b) A self service store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service time. find [10]

- i) Average number of customers in the system.
- ii) Average number of customers in the queue or average queue length.
- iii) Average time a customer spends in the system.
- iv) Average time a customer waits before being served.

- Q9) a)** Explain Average Accounting Rate of Return Method with its Merits and Demerits. [8]
b) A manufacturing company produces a single product whose selling price is Rs. 16/unit and the variable cost is Rs. 12/unit. If annual fixed cost of the firm are estimated as Rs. 1,20,000. Find the break even point in units, in rupees and as a percentage of capacity if the firm has an estimated capacity of 50,000 units of the product. What is margin of safety? [8]

OR

- Q10) a)** Discuss the replacement policy for the items that fail suddenly. [6]
b) A machine costs Rs 500. Operation and maintenance costs are zero for the first year and increases by Rs 100 every year. If money is worth 5% every year. determine the best age at which the machine should be replaced. The resale value of the machine is negligibly. What is the weighted average costs of owning and operating the machine? [10]

- Q11) a)** Discuss Floats. [6]
b) Information on the activities required for a project is as follows. Find critical path, TF, FF, IF. [12]

Activity	1-2	1-3	1-4	2-5	3-5	3-6	3-7	4-6	5-7	6-8	7-8
NT	2	7	8	3	6	10	4	6	2	5	6

OR

- Q12) a)** Write difference between PERT and CPM. [6]
b) A small project is composed of scrap activities whose time estimates are listed below. [12]

Activities		To	Tm	Tp
I	J			
1	2	3	6	15
1	6	2	5	14
2	3	6	12	30
2	4	2	5	8
3	5	5	11	17
4	6	3	6	15
6	7	3	9	27
5	8	1	4	7
7	8	4	19	28

- i) Draw network diagram
 ii) Calculate the length and variance of the critical path,
 iii) What is the approximate probability that the job on critical path will be completed in 41 days?



Total No. of Questions : 12]

SEAT No. :

P1941

[Total No. of Pages : 3

[5254]-41
B.E. (Mechanical)
POWER PLANT ENGINEERING
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q 1 or 2, Q 3 or 4, Q5 or 6 From Section - I
Solve Q 7 or 8, Q 9 or 10, Q 11 or 12 From Section - II.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

UNIT - I

- Q1)** a) Write a short note on present status of power generation in India. [8]
b) Discuss various tariff methods for electricity consumers in India. [8]

OR

- Q2)** a) Discuss points to be considered in choosing the type of electricity generation. [8]
b) A 30 MW plant has an overall efficiency of 25%. The calorific value of fuel used is 25,000 KJ/kg. Estimate cost of coal per 24 hour if load factor of the plant is 0.4. One ton of coal cost Rs 650. [8]

UNIT - II

- Q3)** a) Explain a concept of fluidized bed combustion with neat sketch. Quote merits of fluidized bed combustion over conventional methods of combustion. [8]
b) Explain the complete coal preparation process for pulverized coal power plant with a schematic sketch. [8]

P.T.O.

OR

- Q4)** a) The following readings were taken during a test on condenser [8]
Vacuum in condenser = 700 mm of Hg
Barometric reading = 762mm of Hg
Temperature of steam entering into condenser = 35°C
Inlet and outlet temperature of water = 16.7°C and 31°C.
Determine condenser efficiency and Vacuum efficiency.
- b) Explain reheat and regeneration cycle and represent it on P-V and T-S diagram. [8]

UNIT - III

- Q5)** a) Write the significance of hydro graph and flow duration curve. [6]
b) Write a detailed survey of site selection for hydro electric power plants. [6]
c) Explain methods to improve thermal efficiency of simple open cycle constant pressure gas turbine power plant. [6]

OR

- Q6)** a) Explain different arrangements of power components in gas turbine plant. [6]
b) Derive the expression for intermediate pressure for minimum work required in the compressor in gas turbine. [6]
c) Discuss the various parameters used for selection of turbine for hydro electric power plant. [6]

SECTION - II

UNIT - IV

- Q7)** a) Sketch and explain functional elements of nuclear power plant. [8]
b) Write a short note on : [8]
i) log sheet
ii) Selection of diesel engine size

OR

- Q8)** a) Explain diesel engine performance and operation curves. [8]
b) Explain PWR and SGR Nuclear reactors. [8]

UNIT - V

- Q9)** a) Explain recent developments in methods of power generation. [8]
b) Explain construction and working of simple air circuit breakers and oil circuit breakers. [8]

OR

- Q10)**a) Explain various functioning elements and instrumentations in power plants. [8]
b) Discuss solar power generation status in India. Sketch and explain solar power plant. [8]

UNIT - VI

- Q11)**a) Write a short note on water pollution by thermal power plants and its control. [6]
b) Write a short note on different pollutants and their effects on human health. [6]
c) Explain pre and post treatment for harmful pollutants emitted from power plant. [6]

OR

- Q12)** Write short note on any three of the following : [18]
a) Global warming and Green house effect
b) Acid rains
c) Thermal pollution by nuclear power plant
d) Carbon fixation method
e) Pollution sources in mega cities of India



Total No. of Questions : 12]

SEAT No. :

P1942

[Total No. of Pages : 6

[5254]-42
B.E. (Mechanical Engineering)
MECHANICAL SYSTEM DESIGN
(2008 Pattern)

Time : 4 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the different types of end closures for the pressure vessels? [6]
- b) A pressure vessel consist of a cylindrical shell with an inner diameter of 1500 mm, and thickness of 20 mm. It is provided with a nozzle with an inner diameter of 250 mm and thickness of 15 mm. The yield strength of the material for the shell and nozzle is 200 N/mm² and the design pressure is 2.5 MPa. The extension of the nozzle inside the vessel is 15 mm. The corrosion allowance is 2 mm, while the weld joint efficiency is 0.85. Neglecting the area of welds, determine whether or not a reinforcing pad is required for the opening. If so, determine the dimensions of pad mode from a plate of 15 mm thickness. [12]

OR

- Q2)** a) What are the methods of pre-stressing the cylinders. [6]
- b) A hydraulic cylinder, made of gray C.I. FG 300 is subjected to an internal pressure of 15 MPa. If the inner & outer diameter of the cylinder are 200mm & 240mm respectively. Determine the factor of safety. If the cylinder pressure is further increased by 30%, what will be the factor of safety. [12]

P.T.O.

- Q3) a)** What are the desirable properties of cylinder head material? [4]
- b) The bore of a cylinder of the four - stroke diesel engine is 150 mm. The maximum gas pressure inside the cylinder is limited to 3.5 MPa. The cylinder head is made of grey cast iron FG 200 ($S_{ut} = 200 \text{ N/mm}^2$) and the factor of safety is 5. Determine the thickness of the cylinder head.

Studs are used to fix the cylinder head to the cylinder and obtain a leakproof joint. They are made of steel FeE 250 ($S_{yt} = 250 \text{ N/mm}^2$) & the factor of safety is 5. Determine : [12]

- i) Number of studs
- ii) Nominal diameter of studs
- iii) Pitch of studs

OR

- Q4)** Design a connecting rod for a high speed I.C. engine using following data. [16]

Cylinder bore = 125 mm

Length of connecting rod = 300 mm

Maximum gas pressure = 3.5 MPa

Length of stroke = 125 mm

Mass of reciprocating parts = 1.6 kg

Engine speed = 2200 rpm

Assume suitable data & state the assumptions you make if any.

- Q5) a)** What are the types of optimum design? Differentiate between them. [4]
- b) A thin spherical pressure vessel is subjected to an internal pressure of 4 N/mm^2 . The mass of the empty vessel should not exceed 125 kg. If the factor of safety is 3. Design the pressure vessel with objective of maximizing the gas storage capacity out of following materials. [12]

Material	$S_{ut} \text{ (N/mm}^2\text{)}$	$\rho \text{ (kg/m}^3\text{)}$
Low alloy steel	500	7800
Aluminium alloy	250	2800
Copper alloy	420	8400

OR

Q6) A tensile bar of cross-sectional area atleast 85 mm^2 and length of 200 mm is subjected to a constant load of 5000 N. Design a bar for minimum cost of following materials. Assume factor of safety is 2. **[16]**

Material	Mass density ' ρ ' kg/m^3	Material cost 'C' (Rs/N)	Yield strength Syt (MPa)
Steel	7500	16	130
Alluminium alloy	3000	32	50
Magnesium alloy	2100	32	20

SECTION - II

Q7) a) It is observed from a sample of 400 bearings bushes that the internal diameters are normally distributed with mean of 30.015 mm and standard deviation of 0.008mm. Dimension of this diameter specified on drawing is $30.01 \pm 0.01 \text{ mm}$ Calculate the approximate number of rejected bushes from that sample. **[12]**

Refer Table No: 01 for the Areas under normal distribution curve from $Z=0$ to Z .

b) Justify that the Display and Control elements of a bike are designed based on the ergonomic considerations. **[4]**

OR

Q8) a) Transmission shafts are manufactured on a machining center. The designer has specified the dimension of OD as $30 \pm 0.04 \text{ mm}$. The natural tolerance is normally distributed with mean of 30mm but only 34% out of the manufactured shafts are found to be acceptable. So what is the standard deviation of this manufacturing process? **[10]**

Refer Table No: 01 above for the Areas under normal distribution curve from $Z=0$ to Z .

b) Explain the design considerations for Design of Castings. **[6]**

Q9) a) Justify the statement : '**All the structure formulae of the form $N=P_1(S_1).P_2(S_2).....P_n(S_n)$ can not be converted into structure diagrams and hence are not feasible**'. **[4]**

- b) Decide the number of teeth of all gears from a 9 speed gearbox with speeds starting from 100 rpm and based on R5, to transmit 10KW power from a motor running at 1440rpm. (Assume that the minimum number of teeth in all stages is 20 and that the design is based on symmetric structure diagram only). [10]

Draw the deviation diagram of designed gearbox. [4]

OR

- Q10)a)** With Figure, justify the statement : ‘**The gap between two fixed gears from a sliding mesh gear box must be greater than two times the face width of those gears**’. [6]
- b) Draw Symmetric Structure Diagrams for following structure formulae and find out optimum formula out of them along with the justification $3(1)2(3)2(6)$, $3(2)2(6)2(1)$, $3(2)2(1)2(6)$ [12]

Q11)a) Explain the following in connection with material handling systems : [6]

- i) Unit Load
 - ii) Containerization
 - iii) Objectives of material handling systems
- b) What are the guidelines for the selection of material handling systems. [4]
- c) A horizontal belt conveyor is to be used for transporting 400 tons of iron ore with mass density 1800kg/m^3 surcharge factor is 0.062. Determine belt width, if belt velocity is 1m/s. [6]

OR

Q12) Following data relate to a horizontal belt conveyor used for conveying coal in a thermal power station : [16]

Capacity of conveyor: 1200 ton/hr

Density of coal: 700 Kg/ m^3

Belt speed: 1.4 m/s

Surcharge factor: 0.1

Number of plies : 4

Material Factor K 1: 2

Belt tension and contact factor K2: 100

Material conveying length: 355m

Center distance between snub pulleys: 350m

Ratio of tail pulley to drive pulley dia.: 1.0

Ratio of snub pulley to drive pulley dia. : 0.5

Mass of each carrying run idler: 25 kg

Mass of each return run idler: 20 kg

Pitch of carrying run idlers: 1m

Pitch of return run idlers: 2.5m

Friction factor for idlers: 0.02

Snub Factor for snub pulleys: 0.03

Snub factor for Drive and tail pulleys: 0.06

Material velocity component along belt drive: 1 m/s

Angle of lap on drive pulley: 200°

Coefficient of friction between belt and pulley: 0.4

Drive efficiency: 93 %

Mass of belt / mm width / mm length = .015kg/mm/m

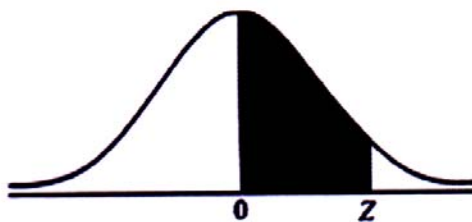
Motor speed 1440 RPM

Determine following parameters of the conveyor:

Standard belt with rounded off to nearest hundred mm.

Reduction ratio of the gear reducer

Power required to drive the conveyor.



Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

Table 01



[5254]-44
B.E. (Mechanical)
FINITE ELEMENT METHOD
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the difference between the Ritz method and the Finite Element Method. [8]

b) Describe the physical meaning of boundary conditions for a given DE. [8]

OR

Q2) a) Discuss the importance of idealization and mathematical modeling in finite element analysis. [8]

b) Explain the terms 'Plane stress' and 'Plane strain' problems. Give constitutive laws for these cases. [8]

Q3) a) Derive an expression for the element stiffness matrix of the two noded truss element. Also show the element stress calculations. [8]

b) For the plane truss as shown in figure 1, $P=1000\text{kN}$, $L=1\text{m}$, $E=210\text{ GPa}$, $A= 6.0 \times 10^{-4}\text{ m}^2$ for element 1 and 2, $A=6\sqrt{2} \times 10^{-4}\text{ m}^2$ for element 3. Determine displacement and reaction solutions. [10]

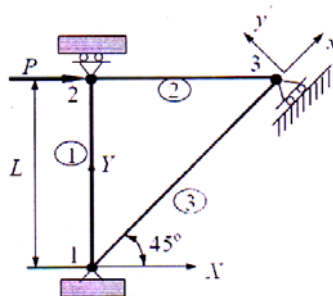


Figure 1

OR

- Q4) a)** Solve for the displacements and the reaction force at node 1 as shown in figure 2, if $k_1 = 4 \text{ N/mm}$, $k_2 = 6 \text{ N/mm}$, $k_3 = 3 \text{ N/mm}$, $F_2 = -30 \text{ N}$, $F_3 = 0$, $F_4 = 50 \text{ N}$ using minimum potential energy approach. [9]

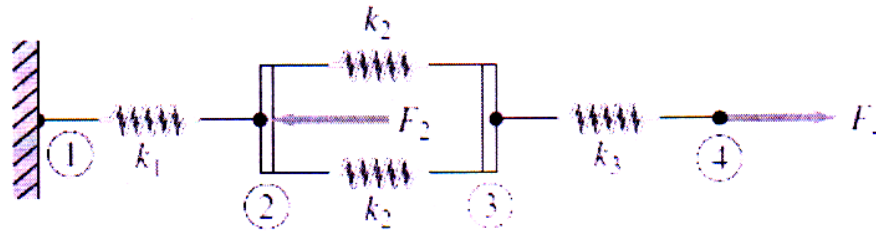


Figure 2

- b)** For the three - bar truss shown in Fig. 3, determine the nodal displacements and the stress in each member. Find the support reactions also. Take modulus of elasticity as 200 GPa. [9]

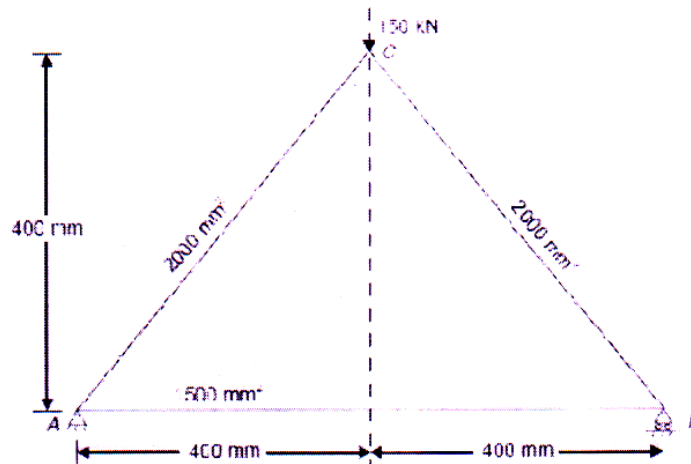


Figure 3

- Q5) a)** Explain two advantages of triangular elements over other elements. [6]
- b)** A CST element is defined by nodes at I (30, 40), J (140, 70) and K (80, 140) and the displacements at these nodes are (0.1, 0.5), (0.6, 0.5) and (0.4, 0.3) respectively. Determine the displacement the natural coordinates and the shape function at point P (77, 96) within the element. [10]

OR

- Q6) a)** What is mesh refinement? Explain h-refinement and p-refinement. [7]
- b)** Explain the concept of isoparametric, sub parametric and super parametric elements and their uses. [9]

SECTION - II

- Q7) a)** Explain plain stress and plain strain conditions in thermal analysis. [6]
- b) For a one dimensional composite bar shown in Fig. 4, determine the interface temperatures. For element 1, let $K_{xx} = 200 \text{ W/m}^\circ\text{C}$; for element 2, let $K_{xx} = 100 \text{ W/m}^\circ\text{C}$; and for element 3, let $K_{xx} = 50 \text{ W/m}^\circ\text{C}$; Let $A = 0.1 \text{ m}^2$. The left end has a constant temperature of 100°C and the right end has a constant temperature of 300°C . [12]

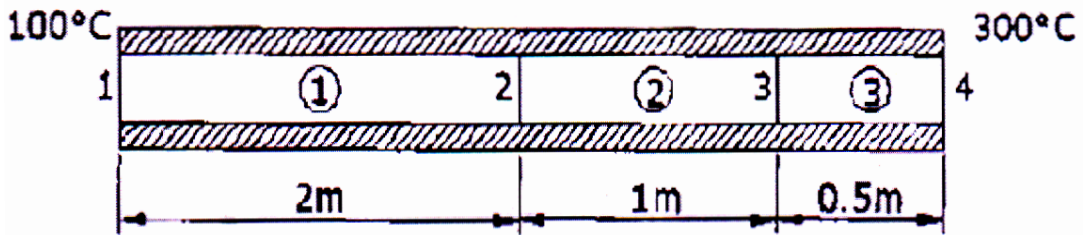


Fig. 4

OR

- Q8) a)** Explain the finite element modeling and shape functions for linear interpolation of temperature field of one dimensional heat transfer element. [9]
- b) In a triangular element with the nodes are having Cartesian coordinates (50, 60), (150, 90), (100,140) respectively. At the point P (100, 90) determine its natural coordinates, shape functions and temperature. [9]
- Q9) a)** Derive the lumped element mass matrix for 1-D bar element. [6]
- b) Find the natural frequencies of longitudinal vibration of the unconstrained stepped bar as shown in Figure 5. [10]

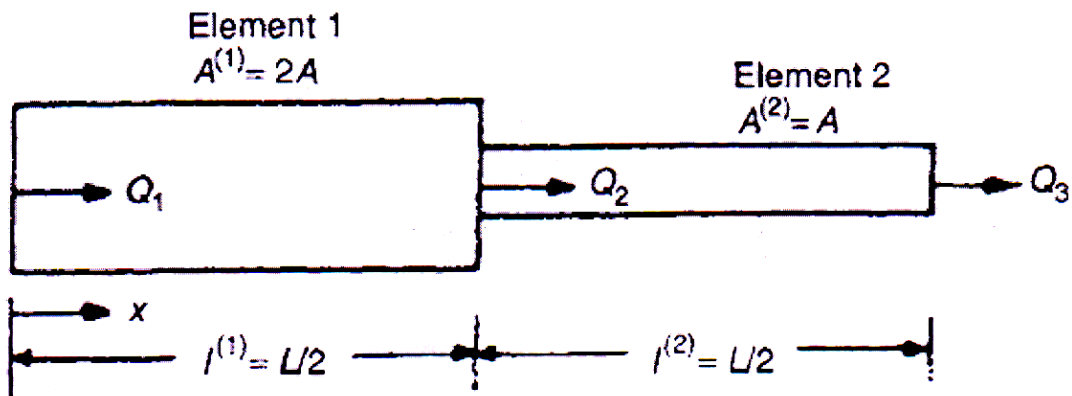


Fig. 5

OR

Q10)a) Derive the lumped element mass matrix for beam element. [6]

b) Explain the procedure involved in deriving the finite element equation of a dynamic problem. [10]

Q11)a) Explain the terms aspect ratio, warp angle and skew used for quality checks of element in FEM. [9]

b) Explain pre-processing in Finite element analysis. [7]

OR

Q12)a) Explain the terms distortion, stretch and taper used for quality checks of element in FEM. [9]

b) Explain post-processing in Finite element analysis. [7]



Total No. of Questions : 12]

SEAT No. :

P1944

[Total No. of Pages : 3

[5254]-45
B.E. (Mechanical)
ROBOTICS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the terms : **[6]**
- i) Repeatability
 - ii) Compliance
 - iii) Spatial resolution
- b) State three laws of Robotics & discuss the significance of any one of them. **[6]**
- c) Discuss various advantages of robotsation. **[6]**
- Q2)** a) Sketch & explain the working of Cartesian gantry type robot. State it's applications. **[6]**
- b) Sketch and explain the motions a 3 DOF wrist can perform. **[6]**
- c) Sketch and explain types of joints in robot. **[6]**
- Q3)** a) What are different factors to be considered in design of gripper? **[7]**
- b) Explain with neat sketch (any three) : **[9]**
- i) A rotary position sensor
 - ii) A microswitch
 - iii) A force sensor
 - iv) A proximity sensor

P.T.O.

- Q4)** a) Explain with neat sketch the working of stepper motor. State its advantages. [8]
 b) Compare close loop control with open loop control system. [8]
- Q5)** a) Compare Pneumatic & Hydraulic actuators w.r.t. their merits & demerits. [8]
 b) Explain briefly [8]
 i) Proportional Control
 ii) Proportional + Integral Control
- Q6)** a) What are the different types of actuators? Explain any two briefly. [6]
 b) Explain the control law of partitioning. [6]
 c) State the comparison of robot drive systems. [4]

SECTION - II

- Q7)** a) A planar 3R manipulator has link lengths $l_1 = 100$ mm, $l_2 = 80$ mm and $l_3 = 60$ mm. Determine its reachable workspace and state whether point (200, 100) is reached with $\theta_1 = 40^\circ$. If yes, what are the values of θ_2 and θ_3 ? If no, what should be the minimum value of θ_1 so that the point will be reached by the manipulator? [8]
 b) Explain Newton's - Eural's dynamics formulation. [8]
- Q8)** a) Explain the following terms (Any 2): [8]
 i) Fixed Angle Representation
 ii) Euler Angle Representation
 iii) Forward Kinematics
 b) Derive the dynamic model of a 2 DOF Planer RR Manipulator. [8]
- Q9)** a) Explain the image processing techniques. [6]

- b) Explain the following (Any 2) : [6]
- i) Image acquisition
 - ii) Sampling
 - iii) Edge detection
- c) Explain basic modes of robot language operating system. [6]
- Q10**a) Explain typical vision system for a robot. [6]
- b) Explain the various methods to enter programming command into the controller memory. [8]
- c) Discuss various motion interpolation schemes. [4]
- Q11**a) Describe various search techniques used with respect to Artificial Intelligence in robots. [8]
- b) Discuss tool and techniques of the simulation. [8]
- Q12**a) Explain maintenance and safety aspects of robots. [6]
- b) Explain the following : [10]
- i) Genetic algorithm
 - ii) Artificial neural network



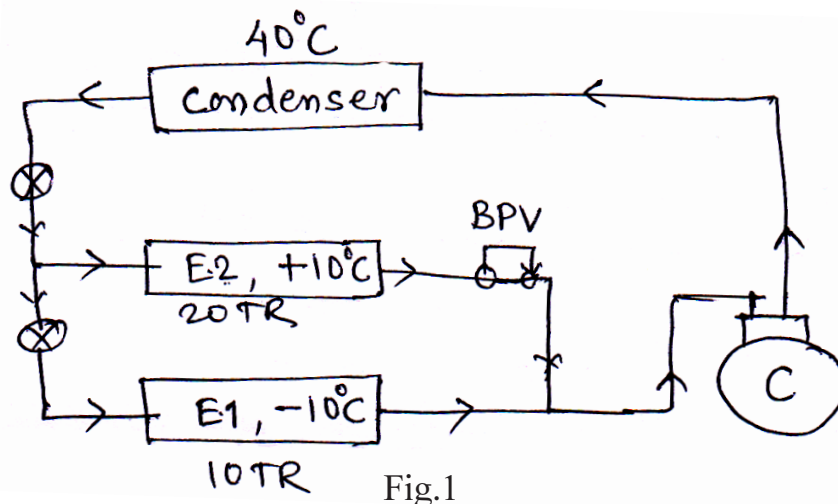
[5254]-46

B.E. (Mechanical)**ADVANCED AIR CONDITIONING & REFRIGERATION****(2008 Pattern) (Elective - III)***Time : 3 Hours]**[Max. Marks : 100**Instructions to the candidates:*

- 1) Answer any 3 questions from Section I and 3 questions from Section II.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagram must be drawn wherever necessary.
- 4) Figures to the right 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

- Q1)** a) Explain the working of Ammonia - CO₂ cascade cycle with its presentation on p-h & T-S diagram. [8]
- b) Find mass flow of refrigerant overall power input & COP of the refrigeration system as shown in Fig.1. [10]



Refrigerant used - R134a

condenser subcooling - 10°C

Use R134 a chart.

P.T.O.

OR

- Q2)** a) Explain the following defrosting methods : [8]
- i) Vapor defrosting
 - ii) Reverse cycle defrosting
- b) Draw the schematic of pumped circulation system. Explain the working of same. Give its applications. [10]
- Q3)** a) Explain compressor characteristics curves. Discuss the various capacity control method of compressors. [10]
- b) What is the selection criteria for cooling tower? Explain with suitable example. [6]

OR

- Q4)** a) With neat diagram, explain the working of low-side & high-side float valve as an expansion device. [8]
- b) Explain rating & selection of [8]
- i) Condenser &
 - ii) Evaporator
- Q5)** a) Compare variable frequency drive with constant speed drive. [6]
- b) Write a short note on : IAQ controls. [10]

OR

- Q6)** a) Discuss various safety controls used in Refrigeration plant for cold storage. [8]
- b) With neat diagrams explain : [8]
- i) Solenoid valve
 - ii) Regulating valve

SECTION - II

- Q7)** With appropriate assumptions explain CLTD/CLF method of cooling load calculation. [18]

OR

- Q8)** a) Explain the star rating of split air conditioners in India. [8]
b) Explain ASHRAE comfort chart. List factors affecting human comfort. [10]

- Q9)** a) Describe the design considerations for. Air conditioning plant for Hospitals. [8]
b) Write down the steps for performance evaluation of heat pump. [8]

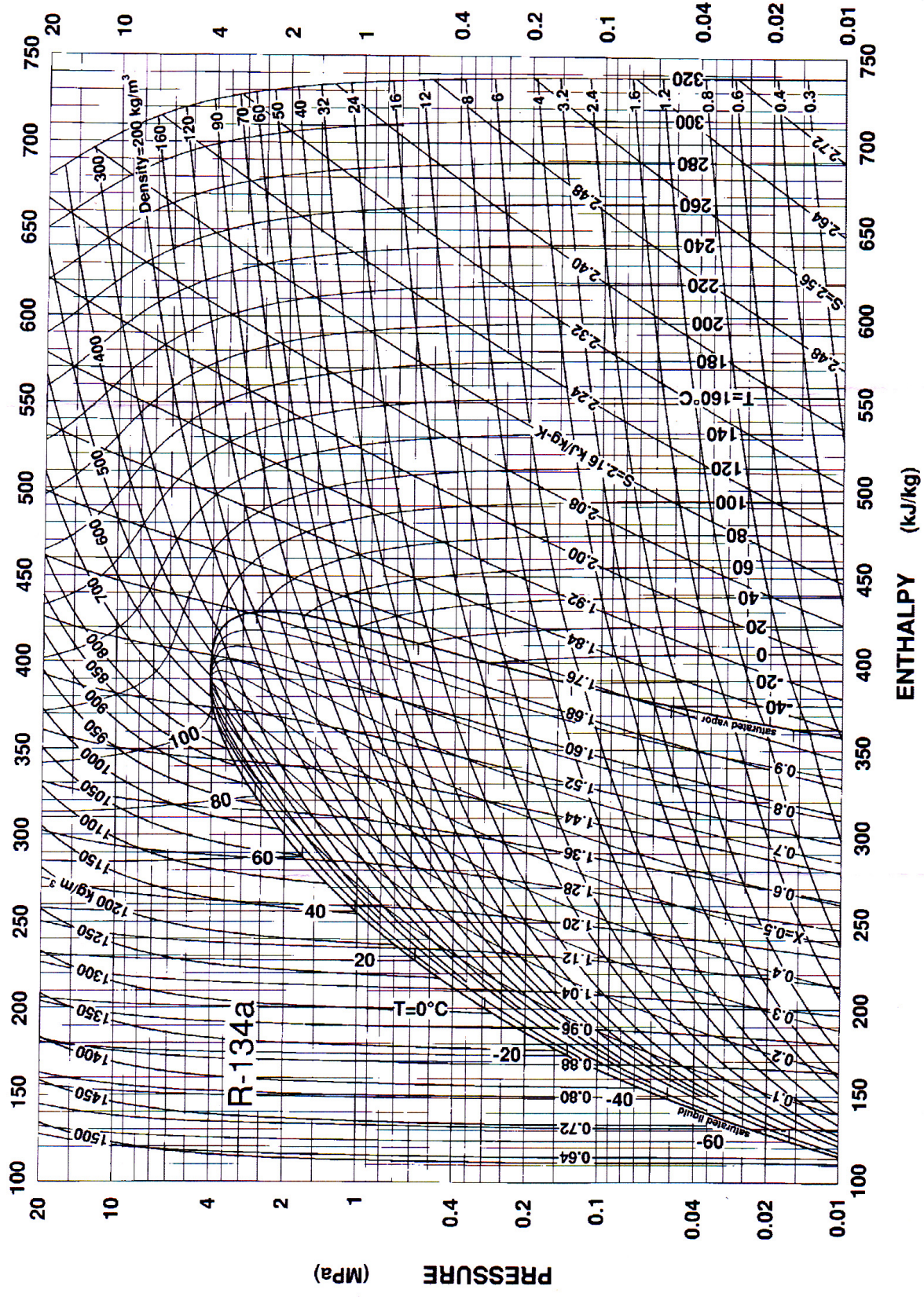
OR

- Q10)**a) Explain different types of heat pumps. Do thermodynamic analysis of heat pump. [8]
b) Describe the design considerations of AC plant for IT centres. [8]

- Q11)**a) With neat schematic explain simple Linde - Hampson cycle. Show cycle on T-S diagram. [8]
b) Explain the insulating materials for low temperature applications. [8]

OR

- Q12)**a) Define figure of merit. Explain the production of low temperature using Joule - Thomson effect. [8]
b) Explain properties of following cryogenics fluids. [8]
i) Hydrogen
ii) Helium



Total No. of Questions : 12]

SEAT No. :

P1946

[Total No. of Pages : 3

[5254]-47

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

INDUSTRIAL HEAT TRANSFER EQUIPMENTS

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) How heat exchanger classified according to construction features? [6]
b) State advantages and limitations of plate heat exchanger. [4]
c) Explain heat exchanger design methodology. [6]

OR

- Q2)** a) Explain fluidised bed heat exchanger? [5]
b) What are baffle plates how they classified? [5]
c) Explain methods to determine heat exchanger effectiveness. [6]

- Q3)** a) Explain Shell and tube heat exchanger basic design procedure. [5]
b) Printed-Circuit Heat Exchangers? [3]
c) In shell and tube feed water heater, cold water at 15°C flowing at the rate of 180kg/h is preheated to 90°C by flue gases from 150°C flowing at the rate of 900 kg/h. The water flows inside the copper tubes ($d_i = 25$ mm, $d_o = 32$ mm) having thermal conductivity $k_w = 381$ W/m.K. The heat transfer coefficients on gas and water sides are 120 and 1200 W/m².K, respectively. The fouling factor on gas and water sides is 0.002m²K/W. Determine the flue gas outlet temperature, the overall heat transfer coefficient based on the outside tube diameter, and the true mean

P.T.O.

temperature difference for heat transfer. Consider specific heats C_p for flue gases and water as 1.05 and 4.19 J/g.K respectively, and the total tube outside surface are as 5m^2 . There are no fin inside or outside the tubes, and there is no fouling on gas side. [8]

OR

- Q4)** a) What is TEMA standards? [5]
b) Explain Shell and tube heat exchanger in detail. [5]
c) Explain Kern Method. [6]

- Q5)** a) Explain plate fin heat exchanger. [9]
b) Air enters the core of finned-tube exchanger of the type shown in figure 1 at 1 atm and 30°C . The air flow at a rate of 1500kg/h perpendicular to the tube and exit with a mean temperature of 100°C . The core is 0.5m long with a 0.25 m^2 frontal area. Calculate the total pressure drop between the air inlet and outlet and the average heat transfer coefficient on the air side. [9]

OR

- Q6)** a) Explain tube fin heat exchanger. [9]
b) Air at 2 atm and 500K with a velocity of $u_\infty = 20\text{m/s}$ flows across a compact heat exchanger matrix having the configuration shown in figure 2 (surface 11.32- 0737-S-R). Calculate the heat transfer coefficient and the frictional pressure drop. The length of the matrix is 0.8m . [9]

SECTION - II

- Q7)** a) Explain horizontal shell type condensers with diagram. [8]
b) Which are the common heat exchanger types used in refrigeration and air conditioning industry. [8]

OR

- Q8)** a) Explain vertical tube side condensers with diagram. [8]
b) Explain :
i) Water cooling evaporator [4]
ii) Air cooling evaporator [4]

- Q9)** a) What is the principle of operation of cooling tower? [6]
b) State and explain different cooling tower material. [6]
c) What is hyperbolic cooling tower? [4]

OR

- Q10)**a) Explain Psychometric Analysis of Air Passing through cooling tower. [8]
b) Explain Combined Flow Coil Evaporative Cooling Tower. [4]
c) Factors to be considered for selecting cooling tower. [4]

- Q11)**a) What is liquid cooling? [6]
b) Why we need to cool electrical applications? [6]
c) Explain wick structure of heat pipe. [6]

OR

- Q12)**a) What is forced electronic cooling. [6]
b) Explain “cooling personal computers”. [6]
c) What is immersion cooling and explain in brief two closed loop System? [6]



Total No. of Questions : 12]

SEAT No. :

P1949

[Total No. of Pages : 3

[5254]-48
B.E. (Mechanical)
MANAGEMENT INFORMATION SYSTEM
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** What are the types of information system? Explain in detail : **[8]**
- i) Operation Support System
 - ii) Management Support System.
- b) Explain the role of MIS in the management. administration and operation of the organization. **[8]**

OR

- Q2) a)** Which are the Resources of an Information System? Explain in detail:**[8]**
- i) Hardware resources
 - ii) Software resources
- b) Define System. Describe Open and Closed System. **[8]**
- Q3) a)** Describe System Development Life Cycle (SDLC). **[8]**
- b) Differentiate between MIS & DSS. **[4]**
- c) Briefly Explain Phases of Decision Making. **[4]**

P.T.O.

OR

- Q4)** a) Explain in detail Behavioral Decision making. [8]
b) Which are the constraints on Decision Making? Explain. [4]
c) What are the steps in a Rational Decision Making Model? [4]
- Q5)** a) Draw the standard Data flow diagram symbols (Any Four) : [8]
i) centre to centre
ii) start state
iii) stop state 1
iv) stop state 2
v) Object call out
vi) Oval process
- b) What is the Database management System? Support your answer by giving suitable examples. [10]

OR

- Q6)** a) Explain briefly, System Requirements specification (SRS). [8]
b) One University designs various courses. Students register for these courses. These courses are conducted at various centers. Students select appropriate centre as per their choice, After register to the centre every centre may forms batches of students. Draw the ER diagram. [10]

SECTION - II

- Q7)** a) What do you understand by MIS software? Explain various types of it. [6]
b) Explain various software standards. [6]
c) Differentiate between system software and application software. [4]

OR

- Q8)** a) What are the different types of software models? Explain them in brief. [8]
b) What are the different levels of CMM? Explain any three of them. [8]
- Q9)** a) Explain necessity and role of software testing. [6]
b) Explain what you understand by software reliability. [6]
c) Write role of firewall and proxy servers in case of security measures. [4]

OR

Q10)a) Explain what measures can be taken to prevent loss of data and computer fraud from security point of view. **[8]**

b) Describe in brief : **[8]**

i) Software reliability

ii) Software testing approaches.

Q11)a) A Machine tool manufacturing company manufactures conventional machines and CNC machines. Design a following report formats using various information input. **[10]**

i) Statement of orders received, order dispatched and orders in process for last annual year

ii) Customer wise supply schedule for new orders in current Annual year

b) Explain concept of supply chain management. **[8]**

OR

Q12)a) An Automobile service station wants to improve on service to customers in following areas. **[10]**

i) Waiting time in the morning before customer left vehicle for servicing.

ii) Timely delivery at the end of the day with no waiting.

iii) Managing human recourse at service station.

Explain what information is needed to process and prepare format schedule based on it.

b) Explain role of MIS in financial management. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1947

[Total No. of Pages : 4

[5254]-49

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

RELIABILITY ENGINEERING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory i.e. Solve Q.1 or Q. 2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Neat diagrams must be drawn wherever necessary.*

SECTION - I

Q1) a) Define and explain the following terms in brief : **[8]**

- i) Reliability.
- ii) Hazard rate.
- iii) Mean time to failure
- iv) Probability density function of failure.

b) Following table shows the result of life tests carried out on 100 components simultaneously. **[8]**

Operating Time interval (Hours)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Numbers of failed Components	10	9	8	7	6	5	5	5	4	4

Evaluate hazard rate and failure density and represent it on graph against time interval.

OR

Q2) a) State and explain quality and reliability assurance rules in detail. **[8]**

P.T.O.

- b) Why is the reliability important? Give any four reasons and also state the areas of application of reliability. [8]

- Q3) a) Find the reliability of a system shown in the figure 1 by using conditional probability method. Assume that the components 1, 2, 3, 4 are identical and independent with the reliability value of 0.89 and component 5 has reliability of 0.8. [8]

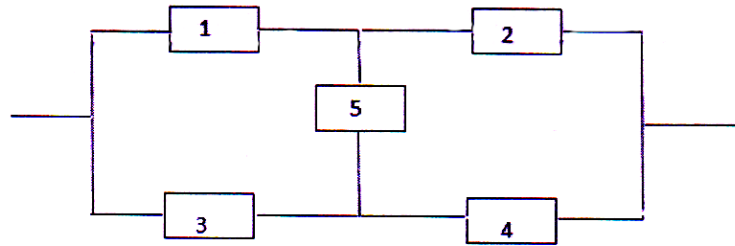


Fig. 1

- b) What is the concept of K out of n structure? Explain with the help of example and derive equation for reliability and MTTF for this structure. [8]

OR

- Q4) a) Find the reliability of the following structure shown in fig.2. [8]

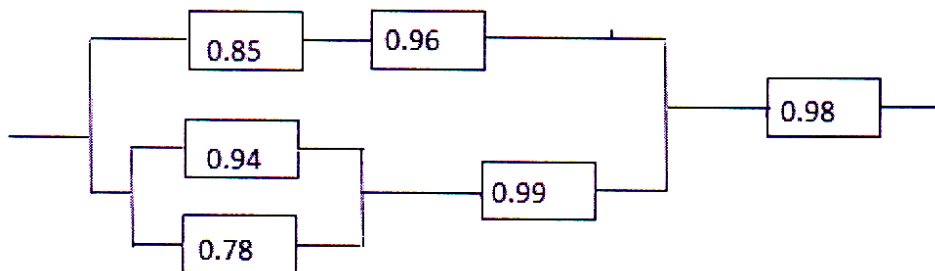


fig.2

- b) Explain in detail with the example and application : [8]
- i) Active redundancy
 - ii) Standby redundancy

- Q5) a) What is the importance of reliability allocation? Explain the dynamic programming apportionment in detail for reliability allocation. [8]

- b) A system consists of 6 sub-systems connected in series. The system reliability goal is 0.998 for a period of 20 hours operation. The necessary information for the sub-system is given below : [10]

Sub-system	Number of Modules (N_i)	Importance factor (W_i)	Operating time 't' Hours
1	30	1.00	20
2	75	0.98	18
3	40	1.00	20
4	50	0.95	16
5	60	0.93	14
6	70	1.00	20

Find the values of allocated reliabilities of subassemblies and their minimum acceptable failure rates using AGREE method. State any assumptions made.

OR

- Q6)** a) Write assumptions made and explain the procedure in ARINC method of reliability Allocation. [8]
- b) A system having reliability goal of 0.645 consists of 4 subsystems having reliabilities of 0.795, 0.895, 0.845, 0.945. How should this be apportioned in four units? Use minimum effort method. [10]

SECTION - II

- Q7)** a) What are the objectives of maintenance process? Classify the maintenance techniques and explain each type in detail. [8]
- b) For the system from the following data collected at a plant : [8]

Mean time before failure : 65 hrs

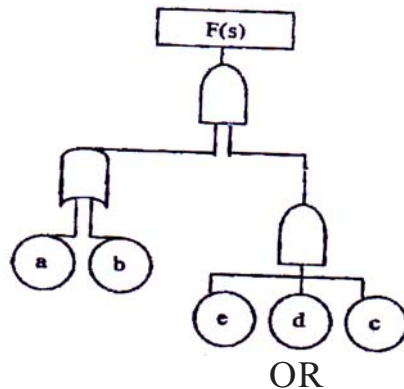
Mean time to repair : 20 hrs

Administrative logistics time : 125% of MTTR

Calculate operational availability & inherent availability of the plant.

OR

- Q8)** a) Write a note on reliability centered maintenance. [8]
b) For a pharmaceutical lab a suitable HVAC system has to be designed. It should have reliability value of 0.95 for an operation of 800 hrs. The availability value over the same period of time is required to be 0.98. Assume constant hazard rate for failure & repair. Estimate MTBF & MTTR. [8]
- Q9)** a) Write a note on FMECA. [8]
b) The failure probabilities of a, b, c, d and e are 0.01, 0.003, 0.005, 0.007 and 0.09 respectively. Find the reliability of the system. [8]



- Q10)** a) Write a note on minimal tie set & cut set method. [8]
b) Explain Ishikawa Diagram with an example. [8]
- Q11)** a) Write a note on Markov model. Write assumptions and give its applications. [8]
b) The following data refers to a short sample reliability test of engineering instruments : [10]

Failure No.	1	2	3	4	5	6	7	8
MTTF (Hrs.)	12	20	18	10	16	29	28	32

Calculate the reliability using mean and median ranking method. Also plot Reliability vs. Time curve.

OR

- Q12)** a) What is HALT? Explain the procedure to conduct it. [8]
b) The mean strength and the standard deviation of a bolted joint are 300 N/mm² and 30 N/mm² respectively. The joint is loaded such that stress induced has a mean value 250 N/mm² with standard deviation 5 N/mm². Assuming that the strength & induced stresses are normally distributed, find out the probability of survival of the bolted joint. [10]

Z	1.2	1.3	1.4	1.5	1.6	1.7	1.8
$\phi(Z)$	0.8849	0.9032	0.9192	0.9331	0.9452	0.9550	0.9640



Total No. of Questions : 12]

SEAT No. :

P1948

[Total No. of Pages : 3

[5254]-50
B.E. (Mechanical)
CRYOGENIC ENGINEERING
(2008 Pattern) (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) *Figures to the right indicate 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-Hampson system with the help of neat diagram and develop the expression for liquid yield. **[10]**
- b) Explain, briefly the variation of thermal properties of gases in cryogenic range of temperature. **[6]**

OR

- Q2)** Write Short Notes on : **[16]**
- a) Collins Heat Exchanger
 - b) Kapitza System
 - c) Meissner Effect
 - d) Vacuum shielded vessels

- 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]**

P.T.O.

OR

- Q4)** a) What are the system performance parameters in liquefaction systems- Explain. [8]
- b) Explain effect of Cryogenic temperature on thermal properties of solids in detail. [8]
- Q5)** a) Develop an expression for work requirement per unit mass for an ideal liquefaction system. [8]
- b) Determine the ideal work requirement for liquefaction of helium beginning at 1 atm. and 300 K. Also determine the heat rejected in the ideal isothermal compressor in KJ/kg. [10]

Properties of Helium			
Pressure (atm)	Temperature (K)	Enthalpy (KJ/kg)	Entropy (KJ/kg.K)
1.00	4.224 (Sat. Liq)	9.711	3.454
	4.224 (Sat. Vap.)	30.13	8.287
1.00	300	1573.0	31.41

OR

- Q6)** a) Explain the working of Gifford McMahon Cryorefrigerator with neat diagram. [8]
- 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? [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) Give classification of heat exchangers used in cryogenic Air Separation plants. Explain with the help of neat sketches the construction and working of aluminum brazed multi-channel plate-fin heat exchangers. [10]

b) Explain in detail, what is meant by J-T effect and Inversion Curve. [6]

Q9) Write short note on : [16]

- a) Applications of cryogenics
- b) Cryogenic insulations
- c) Space Simulation chamber
- d) Cryogenic Valves

OR

Q10)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]

Q11)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) Explain the different possible piping arrangements in Dewar vessel. Recommend the most desirable piping arrangement with explanation. Explain the method used for draining the Dewar Vessel. [10]

OR

Q12)a) Draw a schematic diagram of Heylandt cycle. Explain its operation using T-s diagram. Develop expressions for yield, work and efficiency. [12]

b) Discuss the effect of compressor and expander efficiency on system performance. [6]



Total No. of Questions : 12]

SEAT No. :

P1950

[Total No. of Pages : 3

[5254]-52

B.E. (Mechanical S/W)

INDUSTRIAL HYDRAULICS AND PNEUMATICS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any three questions from section - I and three questions from section - II.
- 2) Answers to the two sections should be written in separate answer books.
- 3) Draw neat diagrams wherever necessary.
- 4) Assume suitable data, wherever necessary.
- 5) Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.
- 6) Figures to the right indicate full marks.

SECTION - I

- Q1)** a) Differentiate between Hydraulic and Pneumatic Systems. [6]
- b) Draw simple hydraulic system showing all essential components and explain function of each. [6]
- c) A 500 cm³ sample of oil is to be compressed in cylinder until its pressure is increased from 1 to 50 atm. If the bulk modulus of oil equals to 1750 MPa. Find Percentage change in its volume. [6]

OR

- Q2)** a) Explain different types of seals used in hydraulic system. [6]
- b) Explain difference between flared fitting and compression fitting. [6]
- c) State and explain Pascal's law with its applications. [6]
- Q3)** a) Describe the construction and working of balanced vane pump. [6]
- b) Explain pump performance ratings. [5]
- c) Explain types of power units. [5]

P.T.O.

OR

- Q4)** a) What is the selection criteria of hydraulic power unit, hydraulic pump, filter motor, reservoir, necessary pipings, heat exchanges etc. [10]
- b) A vane pump has a rotor diameter of 63.5 mm, a cam ring diameter of 88.9 mm and a vane width of 50.8 mm. What must be electricity for it to have volumetric displacement of 115 cm³. [6]

- Q5)** a) What is the necessity of pressure control, directional control and flow control valve in fluid power system. [6]
- b) What is accumulator? How does it differ from a reservoir. [5]
- c) Explain cartridge valve with neat sketch. [5]

OR

- Q6)** a) Explain types and classification of fluid power control valves. [10]
- b) Draw any three symbols : [6]
- i) Pressure intensifier
- ii) Shuttle valve
- iii) Pressure relief valve
- iv) Fixed displacement bidirectional hydraulic motor

SECTION - II

- Q7)** a) Explain with neat sketch working of “vane motor”. [8]
- b) Write a short note on “Types of cylinder Mountings”. [8]

OR

- Q8)** a) Explain with neat sketch “Regenerative Circuit”. [8]
- b) Explain with neat sketch “Synchronization Circuit”. [8]

- Q9)** a) Write a short note on “selection of compressors for pneumatic systems”. [6]
- b) Write a short note on “Filters & Lubricators for Pneumatics”. [10]

OR

- Q10)**a) Explain with neat sketch “Pneumatic damping circuit”. [8]
b) Write a short note on “Applications of pneumatics for Low Cost Automation”. [8]

- Q11)**a) Write a short note on “Design Parameters for Hydraulic Systems.” [9]
b) Draw a “sequencing circuit” for Hydraulic application & Explain in details. [9]

OR

- Q12)**a) Write a short note on “Design Parameters for Pneumatic System.” [9]
b) Write a short note “Trouble shooting & maintenance of pneumatic systems.” [9]



Total No. of Questions : 12]

SEAT No. :

P1951

[Total No. of Pages : 5

[5254]-53

B.E. (Mechanical Sandwich) (Semester - I)
REFRIGERATION AND AIR CONDITIONING
(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

UNIT - I

- Q1)** a) Compare Vapour Compression Refrigeration with Air Refrigeration system. [5]
- b) Write short note on Magnetic Refrigeration. [5]
- c) Explain reverse Carnot cycle used for refrigeration with the help of p-V and T-s diagram. Also derive an expression for coefficient of performance. [6]

OR

- Q2)** a) What are the advantages and limitations of Air refrigeration systems? [5]
- b) Write a note on Thermoelectric Refrigeration. [5]
- c) The capacity of refrigerator is 200 TR when working between -6°C and 25°C . Determine the mass of ice produced per day from water at 25°C . Also find the power required to drive the unit. Assume that the cycle operates on reverse Carnot cycle and latent heat of ice is 335 kJ/kg . [6]

UNIT - II

- Q3)** a) What are the essential properties of good refrigerants? How are the refrigerants classified? [6]

P.T.O.

- b) Explain the terms : [6]
- i) ODP
 - ii) GWP
 - iii) TEWI
- c) Write a note on alternative refrigerants. [6]

OR

- Q4)** a) What is the difference between Primary and Secondary refrigerants? Why secondary refrigerants are used? List at least two secondary refrigerants. [6]
- b) Provide the list of alternative refrigerants for CFC's and HCFC's with proper justification. [6]
- c) What is the concept of green buildings. [6]

UNIT - III

- Q5)** a) What is the need of multi staging? Explain in detail about Cascade system with the help of sketch and P - h diagram. [8]
- b) A cascade system is designed to supply 10 tonnes of refrigeration at an evaporator temperature of -60°C and a condenser temperature of 25°C . The load at -60°C is absorbed by a unit using R22 as the refrigerant and is rejected to a cascade condenser at -20°C . The cascade condenser is cooled by a unit R12 as the refrigerant and operating between -30°C evaporating temperature and 25°C condenser temperature. The refrigerant leaving the R12 condenser is subcooled to 20°C , but there is no sub-cooling of R22 refrigerant. The gas leaving both the evaporators is dry and saturated and compressions are isentropic. Neglecting losses, determine : [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°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	$p_6 = 6.518 \text{ bar}$
Enthalpy at compressor outlet	$h_6 = 207 \text{ kJ/kg}$
Enthalpy at condenser outlet	$h_7 = 54.9 \text{ kJ/kg}$

Refrigerant

R22

At evaporator temperature (-60°C)

Pressure at compressor inlet	$p_1 = 0.3745 \text{ bar}$
Enthalpy at compressor inlet	$h_1 = 223.7 \text{ kJ/kg}$
Entropy at compressor inlet	$s_1 = 1.054 \text{ kJ/kg K}$

At condenser temperature (-20°C)

Pressure at compressor outlet	$p_2 = 2.458 \text{ bar}$
Enthalpy at compressor outlet	$h_2 = 275 \text{ kJ/kg}$
Enthalpy at condenser outlet	$h_3 = 22.2 \text{ kJ/kg}$

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]**



[5254]-55
B.E. (Mechanical Sandwich)
FINITE ELEMENT METHOD
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Discuss the advantages and disadvantages of finite element method over conventional methods. [6]
- b) Derive a system matrix equation for a Linear spring as a Finite element by direct method. [6]
- c) Differentiate between Finite Difference Method and Finite Element Method. [6]

OR

- Q2)** a) Name and explain in brief two main errors that come along with the Finite Element Method. [6]
- b) For a stepped bar subjected to an axial compressive loads as shown in Figure 1, find stresses in each bar. Assume young's modulus of material of bar as 200GPa. [12]

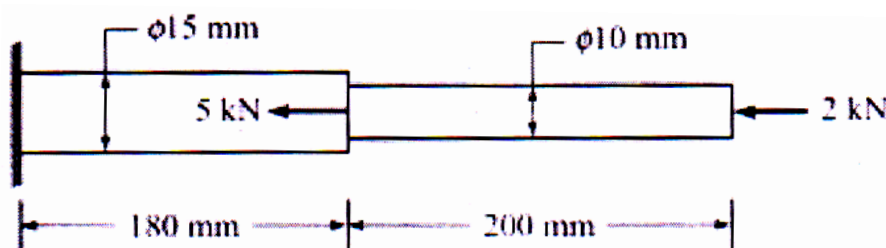


Figure 1 **Stepped bar.**

- Q3) a)** Derive an expression for the element stiffness matrix of the two noded truss element. Also show the element stress calculations. [8]
- b)** Given the truss structure shown in figure 2, calculate the stress and strain in truss element 1 if : $A_1 = 0.0004 \text{ m}^2$, $E_1 = 200 \times 10^9 \text{ Pa}$, $L_1 = 2 \text{ m}$. [8]

$$\mathbf{D} = \begin{Bmatrix} u_1 \\ v_1 \\ u_2 \\ v_2 \\ u_3 \\ v_3 \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ -1 \times 10^{-3} \\ -2 \times 10^{-3} \end{Bmatrix}$$

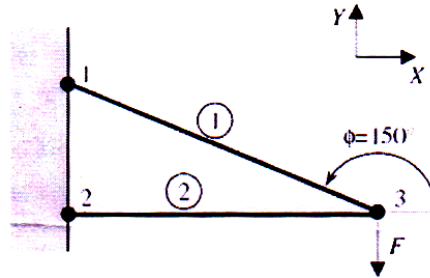
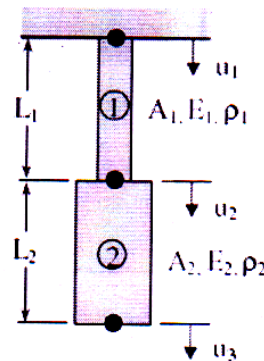


Figure 2

OR

- Q4) a)** Derive the expression for shape function for a two noded bar element taking natural coordinate 'ξ' as varying from -1 to 1. [6]
- b)** For the example as shown in figure 3 : [10]
- Compute the global applied force vector (R) considering only the gravitational force acting on the rod elements.
 - Solve for the reaction force(s) at the restraint(s).
 - Solve for the element strains.
 - Solve for the element stresses.



$$\begin{aligned} L_1 &= L_2 = 1 \text{ m} \\ A_1 &= 0.001 \text{ m}^2 \\ A_2 &= 0.004 \text{ m}^2 \\ E_1 &= E_2 = 70 \times 10^9 \text{ Pa} \\ \rho_1 &= \rho_2 = 2700 \text{ kg/m}^3 \end{aligned}$$

Figure 3

- Q5) a)** Explain the concept of Plane Stress and Plane Strain in Finite Element Method. [8]
- b)** Discuss the problem Modeling and Boundary Conditions for the following cases : [8]
- A cylinder of infinite length subjected to external pressure.
 - Belleville spring.

OR

- Q6)** a) Explain the term Quadratic Strain Triangles (QST). [6]
b) A CST element is defined by nodes at I (30, 40), J (140, 70), and K (80, 140) and the displacements at these nodes are (0.1, 0.5), (0.6, 0.5) and (0.4,0.3) respectively. Determine the displacement the natural coordinates and the shape function at point P (77, 96) within the element. [10]

SECTION - II

- Q7)** a) Derive stiffness matrix for beam element. [6]
b) A beam of length 10 m, fixed at one end and supported by a roller at the other end carries a 20kN concentrated load at the centre of the span. By taking the modulus of elasticity of material as 200 GPa and moment of inertia as $24 \times 10^{-6} \text{ m}^4$, determine : [10]
i) Deflection under load
ii) Shear force and bending moment at mid span
iii) Reactions at supports

OR

- Q8)** a) Derive an equation of potential energy for individual beam element. [6]
b) The beam of 4.5 m length is fixed at each end. A downward force of 12kN and moment of 10 kN - m (ccw) act at the center of the beam. Let $E = 200 \text{ GPa}$ and $I = 4 \times 10^{-4} \text{ m}^4$ throughout the beam. Determine the displacement and rotation under applied loads. [10]

- Q9)** a) Write a short note on elements used for heat transfer problem. [6]
b) The circular rod depicted in Figure 4 has an outside diameter of 60 mm, length of 1 m, and is perfectly insulated on its circumference. The left half of the cylinder is aluminum, for which $k_x = 200 \text{ W/m-}^\circ\text{C}$ and the right half is copper having $k_x = 389 \text{ W/m-}^\circ\text{C}$. The extreme right end of the cylinder is maintained at a temperature of 80°C , while the left end is subjected to a heat input rate 4000 W/m^2 . Using four equal-length elements, determine the steady-state temperature distribution in the cylinder. [10]

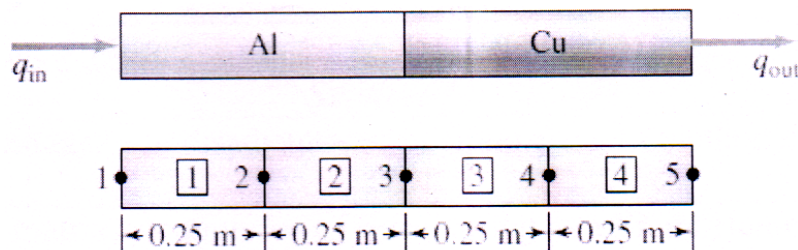


Figure 4

OR

Q10)a) Write short note on one dimensional heat conduction analysis. [6]

b) An insulated circular fin has cross sectional area $A = 0.15 \text{ m}^2$ and length $L = 0.5 \text{ m}$. The left end has a constant temperature of 120°C . A positive heat flux of $q=4500 \text{ W/mm}^2$ acts on the right end. Let $K_{xx}=7.5 \text{ W/(m}^\circ\text{C)}$. Determine the temperature at $L/4, L/2, 3L/4$ and L . [10]

Q11)a) Differentiate between static and dynamic analysis. [6]

b) Explain the necessity of crash analysis? what are its advantages and disadvantages. [6]

c) Write short note on pre and post processors. [6]

OR

Q12)a) Explain the different types of non linearities encountered in structural analysis. [6]

b) Explain the necessity of NVH analysis? what are its advantages and disadvantages. [6]

c) Enlist the desirable features in FEA packages. [6]



Total No. of Questions : 12]

SEAT No. :

P1953

[Total No. of Pages : 3

[5254]-56

B.E. (Mechanical Sandwich) (Semester - I)

AUTOMOBILE ENGINEERING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** Explain the following terms : **[9]**
- i) Air resistance
 - ii) Rolling resistance
 - iii) Grade resistance
- b) Explain various sections used for side members and cross members of chassis frame. **[7]**

OR

- Q2) a)** Explain the characteristics of following layouts : **[9]**
- i) Front engine front drive
 - ii) Front engine rear drive
 - iii) Rear engine rear drive
- b) Compare the merits and demerits of the frameless construction with the conventional frame construction. **[7]**

- Q3) a)** Explain with neat sketch the working of a constant mesh gear box. **[8]**
- b) Explain with neat sketch the working of differential use in rear axle. **[8]**

P.T.O.

OR

- Q4)** a) Describe with neat sketch function and working of multi-plate clutch. [8]
b) Explain with neat sketch semi-floating rear axle. [8]
- Q5)** a) Explain with neat sketch : Castor, Camber and King pin inclination. [6]
b) Explain with neat sketch the working of shock absorber. [6]
c) Explain with neat sketch the working of power steering. [6]

OR

- Q6)** a) Sketch a recirculating ball type steering gear and explain its working. [6]
b) Explain with neat sketch the working of disc brake. [6]
c) What are the requirements of automobile air conditioning system and how they are achieved? [6]

SECTION - II

- Q7)** a) Prepare maintenance schedule plan for three cylinder petrol engine of an automobile of your choice. [8]
b) Explain the maintenance practices for : [10]
i) Braking system
ii) Steering system

OR

- Q8)** Write short notes on any three : [18]
a) Tyre reconditioning
b) Wheel balancing
c) Antifreezing and Anticorrosive additives
d) Preventive maintenance of gear boxes and suspension system
- Q9)** a) Explain the term active and passive safety. List the instruments used in passive safety. Explain any one in short. [8]
b) Describe with neat sketch construction and working of seat used in automobile. Explain purpose of head restraint used in it. [8]

OR

Q10)a) Describe with neat sketch construction of vehicle structure and explain how it is made safety for crashworthiness. [8]

b) Explain in details the importance of ergonomics in automobile safety.[8]

Q11)a) List the various types of sensors used in electronic control system of vehicle. Explain any two sensors used in induction system. [8]

b) Explain with the help of block diagram the electronic engine control system used in automobiles. [8]

OR

Q12)a) Explain with neat sketch construction and working of Antilock braking system used in automobile. [8]

b) List the various types of actuators used in electronic control system of vehicle. Explain any two actuators. [8]



Total No. of Questions : 12]

SEAT No. :

P1954

[Total No. of Pages : 5

[5254]-57

**B.E. (Theory) (Mechanical Sandwich)
OPERATIONS RESEARCH
(2008 Pattern) (Elective - III)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *Answer any three questions from each section.*
- 3) *Answer to each section should be written in separate answer sheet.*
- 4) *Neat diagrams must be drawn whenever necessary.*
- 5) *Figures to right indicate full marks.*
- 6) *Use of non programmable calculator is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Write a note on Conversion of primal to dual. **[6]**

b) Maximize $Z = 6X_1 + 4X_2$ **[12]**

Subjected to $2X_1 + 3X_2 \geq 30$

$3X_1 + 2X_2 \leq 24$

$X_1 + X_2 \geq 3$

$X_1, X_2 \geq 0$

OR

Q2) a) Write a note on “Unbounded Solution”. **[4]**

b) Minimize $Z = 20X_1 + 10X_2$ **[14]**

Subjected to $X_1 + 2X_2 \leq 40$

$3X_1 + X_2 \geq 30$

$4X_1 + 3X_2 \geq 60$

$X_1, X_2 \geq 0$

P.T.O.

- Q3) a)** Explain with suitable example “Travelling Salesman Problem”. [8]
b) Solve following Assignment Problem to minimize cost. [8]

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	13

OR

- Q4) a)** Write steps to overcome “Degeneracy in transportation problem”. [6]
b) Solve following Problem by VAM to minimize transportation cost. Cell entries are transportation cost per unit. [10]

		Demand				
		D1	D2	D3	D4	Available
Source	S1	3	4	4	5	350
	S2	3	5	4	2	450
	S3	3	3	4	3	200
	Required	200	400	300	200	

- 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]
- i) Assumptions of Sequencing Model
 - ii) Graphical Method for solving sequencing problems.
 - iii) 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.

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. [8]

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) Assumes a single channel service system of a library in a school. On an average 10 students visit per hour and book issue rate is 14 students/hour, Determine **[10]**

- i) Probability of librarian being idle.
- ii) Probability that at least 4 students in the system.
- iii) Expected time that student is in queue.

b) Explain briefly Integer and dynamic Programming. **[6]**

OR

Q10)a) A company manufactures around 200 mopeds. Depending upon the availability of raw materials and other conditions, the daily production has been varying from 196 mopeds to 204 mopeds, whose probability distribution is as given below: **[12]**

Production/day	196	197	198	199	200	201	202	203	204
Probability	0.05	0.09	0.12	0.14	0.2	0.15	0.11	0.08	0.06

The finished mopeds are transported in a specially designed three lorry that can accommodate 200 mopeds only. Using the following 15 random numbers

82, 89, 78, 24, 53, 61, 18, 45, 04, 23, 50, 77, 27, 54 and 10 simulate the process and find out

- i) What will be average number of mopeds waiting in the factory?
- ii) What will be the number of empty spaces in the lorry?

b) Write a note on Goal Programming. **[4]**

Q11)a) Discuss Floats. **[4]**

b) Information on the activities required for a project is as follows. Find critical path, TF, FF, IF. **[12]**

Activity	1-2	1-3	1-4	2-5	3-5	3-6	3-7	4-6	5-7	6-8	7-8
NT	2	7	8	3	6	10	4	6	2	5	6

OR

Q12)a) Write difference between PERT and CPM. **[4]**

b) A small project is composed of scrap activities whose time estimates are listed below. **[12]**

Activities		To	Tm	Tp
I	J			
1	2	3	6	15
1	6	2	5	14
2	3	6	12	30
2	4	2	5	8
3	5	5	11	17
4	6	3	6	15
6	7	3	9	27
5	8	1	4	7
7	8	4	19	28

- i) Draw network diagram
- ii) Calculate the length and variance of the critical path,
- iii) What is the approximate probability that the job on critical path will be completed in 41 days?



Total No. of Questions : 12]

SEAT No. :

P1955

[Total No. of Pages : 3

[5254]-58

B.E. (Mechanical - Sandwich) (Semester - I)

ROBOTICS

(2008 Pattern) (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) Classify Robots and explain any one Robot configuration in detail. [8]
b) Define Robot & Explain components of Robot. [8]

OR

- Q2)** a) Explain various generations of robots in brief. Also state the generation to which today's industrial robot belongs. [8]
b) Explain maintenance and safety aspects of robots. [8]

- Q3)** a) Classify gripper & describe with neat sketch hydraulic gripper. [8]
b) A 10 kg rectangular block is gripped in the middle and lifted vertically at a velocity 1 m/s . If it accelerates at 27.5 m/s^2 and Coefficient of friction between gripping pads and block is 0.48. Calculate the minimum force that would prevent slippage. [8]

OR

- Q4)** a) Discuss broad classification of sensors based on working principle. [8]
b) Write a note on : [8]
i) Criteria of gripper design
ii) Rules for gripper design

P.T.O.

- Q5)** a) Discuss advantages, disadvantages and characteristics of stepper motor. [8]
b) The parameters m , b and k of spring mass system with friction have values as given $m = 1$, $b = 7$ and $k = 10$. Determine motion of the system if block is initially at rest and is released from position $x=1.5$. [10]

OR

- Q6)** a) Define Trajectory of a Robot. State advantages and disadvantages of defining trajectory using Cartesian co-ordinates and joint-space coordinates. [10]
b) Explain control law partitioning for second order system. [8]

SECTION - II

- Q7)** a) A moving frame is rotated about a fixed frame in the following manner [10]
i) Rotation of 90° about U
ii) Rotation of 180° about Z
iii) Rotation of 90° about Y
iv) Rotation of -90° about X
v) Rotation of 90° about V
vi) Rotation of -90° about U.

A point has co-ordinates $(25, -37, 48)$ with respect to the moving frame. Map the point in the fixed frame.

- b) Describe the four basic parameters used in DH notation algorithm and Explain the steps involved in DH notation process. [8]

OR

- Q8)** a) Explain geometric approach and algebraic approach for inverse kinematic solutions. [10]
b) Write a short note on : [8]
i) Singularities
ii) Velocity transformation

- Q9)** a) What is a vision system? How can vision system be classified? [8]
b) Explain in brief image edge detection and segmentation. [8]

OR

- Q10)a)** Explain in detail various image processing techniques. [8]
b) Explain different types of transmission systems for robotic system. [8]

- Q11)a)** Define Artificial intelligence. Explain the areas of particular importance of Artificial intelligence. [8]
b) State various robot languages and discuss them in brief. [8]

OR

- Q12)a)** Write a short note on : [8]
i) MEMS
ii) SWARM
b) Explain : [8]
i) Manual mode of programming
ii) Lead through mode of programming
iii) Off line programming



Total No. of Questions : 12]

SEAT No. :

P1956

[Total No. of Pages : 3

[5254]-59

**B.E. (Mechanical/Sandwich)
COSTING AND COST CONTROL
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each 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 and Cost Accounting. [8]
b) Explain in brief about Finance Accounting. [8]

OR

- Q2)** a) State and explain the limitation of Cost Accounting. [8]
b) Distinguish between Cost Allocation and Cost Absorption. [8]

- Q3)** a) Explain the types of various overheads (any 3 overheads) [10]
b) Explain the characteristic direct expenses. [6]

OR

- Q4)** a) Explain the detail various parameter used for classification of Costs.[8]
b) Explain the different methods of Costing in manufacturing Industries.[8]

- Q5)** a) Explain single and multiple overheads Rates. [10]
b) Distinguish between fixed overheads and variable overheads. [8]

P.T.O

OR

- Q6)** a) Explain the treatment of over and absorption of overheads in Cost Accounting. [8]
- b) Explain the Cost Accounting treatment of unsuccessful Research and Development Cost. [8]

SECTION -II

- Q7)** A contract is estimated to be 80% complete first year construction as certified. The contractee pays 75% of value of work certified as and when certified and makes the final payment on the completion of contract. following information is available for the first year: [16]

	Rs.
Cost of work in progress	8,000/-
Profit transferred to profit & loss A/C at end of the year 1 on in complete contract	60,000/-
Cost of work to date	88,000/-

Calculate the value of work-in-progress certified and amount of contract price.

OR

- Q8)** a) Discuss the distinguish feature of process cost system. [8]
- b) What are the methods of apportioning joint cost? Explain any one in brief. [8]

- Q9)** a) Product Z has a profit volume ratio of 28%. Fixed operating costs directly attributable to product Z during the quarter 11 of the financial year 2014-2015 will be Rs. 2,80,000.
- Calculate the sales revenue required to achieve a quarterly profit of Rs.70,000. [8]

- b) Explain following terms related to marginal costing (any four) [8]
- i) Marginal contribution
 - ii) Marginal cost
 - iii) Break even point
 - iv) Profit volume ratio
 - v) Margin of safety

OR

Q10)a) Explain the concept of contribution and contribution to sales ratio in marginal costing. [8]

b) Differentiate between Absorption costing and Marginal costing. [8]

Q11)a) State the basic of standard costing. [9]

b) State the need for the standard costing. [9]

OR

Q12) Write a short note on.

a) Types of standard costing [9]

b) Techniques of marginal costing [9]



Total No. of Questions : 12]

SEAT No. :

P1957

[Total No. of Pages : 3

[5254]-60 -A

B.E. (Mechanical Sandwich)

ENERGY MANAGEMENT AND INDUSTRIAL POLLUTION

(2008 Pattern) (Elective -IV)

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) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Discuss Indian energy scenario in context of natural gas, oil and coal. [9]
b) Discuss importance of energy strategy for the future of the nation. [9]

OR

- Q2)** a) What are the different losses in electric motors? How these losses can be minimized? [9]
b) Discuss different ways to improve power factor. [9]
- Q3)** a) Explain ten step methodology to carry out detailed energy audit. [8]
b) Write short note on "Bench marking". [8]

OR

- Q4)** a) Discuss the various financial analysis techniques for investments in energy efficiency projects. [8]

P.T.O

- b) A cogeneration system installation is expected to reduce an annual company's bill by Rs.20 Lacks. If the capital cost of the new cogeneration installation is Rs. 60 Lacks & Rs. 5 Lacks per year on an average required maintaining & operating plant. Calculate simple payback period & % return on Investment (%ROI). What is the future value of Rs.1000/- after 3 years if the interest rate is 10%. [8]

- Q5)** a) Explain the opportunities for improving energy efficiency in the boilers. [8]
- b) Enlist energy conservation opportunities in steam distribution system.[8]

OR

- Q6)** a) Enlist the methods to improve the performance of Pumping system. [8]
- b) Write the areas for improving the thermal efficiency of the HVAC systems. [8]

SECTION - II

- Q7)** a) Discuss effects of Industrial Pollution on environment. [9]
- b) Discuss the concept of Clean Development Mechanism. [9]

OR

- Q8)** a) Discuss environmental problem of global warming and efforts put at international level 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? [10]
b) Explain in short about different air quality control techniques? [6]

OR

- Q10)**a) Write short notes on [10]
i) Marine Pollution
ii) E-Waste
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. :

P1958

[Total No. of Pages : 6

[5254]-61

B.E. (Automobile)

AUTOMOTIVE REFRIGERATION & AIR CONDITIONING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

- Q1)** a) How does an actual vapour compression cycle differ from that of a theoretical cycle? [4]
- b) Describe the mechanism of a simple vapour compression refrigeration system? [6]
- c) During the test of refrigerant plant using F_{12} the following observations were made. [8]

Pressure range of working = 11.02 bar to 1.86 bar.

Temp. of refrigerant at entry & exit of condenser = 65°C & 32°C

Rate of flow of cooling water = 13 kg/min

Rise in temp. of cooling water = 8°C

M.E.P. in compressor = 3.4 bar.

Ice produced in 8 Hours = 360kg

Water temperature supplied for ice making = 27°C

Latent heat of ice = 336 kJ/kg

Bore of compressor = 90 cm

Stroke of compressor = 70 cm

R.P.M. of the compressor = 500

compressor is double acting

P.T.O

Find the following

- i) Theoretical C.O.P. of the system
- ii) Actual C.O.P. of the system
- iii) Mass flow of F_{12} per minute

The properties of F_{12} are given below.

Pressure (bar)	Saturation Temp °C	Enthalpy		Entropy
		liquid (kJ/kg)	Vapour (kJ/kg)	Vapour (kJ/kg-k)
11.02	45	465	593.5	4.75
1.86	-15	406	568.3	4.78

Assume average specific heat for liquid refrigerant is $0.97 \text{ kJ/kg } ^\circ\text{C}$ & for superheated vapour refrigerant is $0.65 \text{ kJ/kg-}^\circ\text{C}$.

OR

Q2) a) In an open cycle air refrigeration machine, air is drawn from a cold chamber at -2°C & 1 bar & compressed to 11bar. It is then cooled at this pressure to the cooler, temperature diagrams & cycle & for a refrigeration of 15- Tonnes find **[10]**

- i) Theoretical COP
 - ii) Rate of circulation of the air in kg/min
 - iii) Piston displacement per minute in the compressor & expander
 - iv) Theoretical power tonne of refrigeration
- b) Explain cannot cycle with P-h & T-s diagram. Derive an expression for its COP. **[8]**

- Q3)** a) Write down various components of Air conditioning system. [6]
b) Explain the properties of an ideal refrigerant? [4]
c) Classify the refrigerants. [6]

OR

- Q4)** a) Explain environmental concerns Legislation for automotive A/C systems. [6]
b) Give the classification of Evaporators. [4]
c) Explain Refrigeration charge capacity determination. [6]
- Q5)** a) Draw the neat sketch of comfort chart & explain it. [4]
b) Explain the different air distribution modes with sketch. [6]
c) Explain the manual temperature control system. [6]

OR

- Q6)** a) What are various ducts? Which is mostly used in A/C system? Why? [6]
b) Explain vehicle operation modes & cool-down performance. [4]
c) What are various components of air distribution system. [6]

SECTION -II

- Q7)** a) Discuss the any two psychrometric processes with the help of hand drawn psychrometric chart. [8]
i) Sensible cooling & sensible heating
ii) Evaporative cooling
iii) Adiabatic chemical dehumidification
iv) Adiabatic mixing of two air stream for fog formation

- b) Air at 10°C DBT & 90% RH is to be heated & humidified to 35°C DBT & 22.5°C WBT. The air is preheated sensibly before passing to the air washer in which water is recirculated. The RH of air coming out of the air washer is 90% this air is again reheated sensibly to obtain the final desired condition. [8]

Find:

- i) The temp. to which air should preheated
- ii) The total heating required
- iii) The make-up water required in the air washer
- iv) The humidifying efficiency of the air washer.

OR

- Q8)** a) Explain the following psychrometric relation [8]

- i) Humidity ratio
- ii) Relative humidity
- iii) Degree of saturation
- iv) Daltons law of partial pressure

- b) For a sample of air having 28°C DBT and relative humidity 40% at barometric pressure of 760 mm of Hg, Calculate: [8]

- i) Vapour pressure of air
- ii) Humidity Ratio
- iii) Vapour density or absolute humidity
- iv) Enthalpy

Verify your result by psychrometric chart.

Q9) a) Define following with neat sketch: [9]

- i) OASH
- ii) ERSHF
- iii) GSHP

b) The following data refer to summer air conditioning of building [9]

Outside design conditions = 43°C DBT, 27°C WBT

Inside design condition = 25°C DBT, 50% RH

Room sensible heat gain = 84000 kJ/h

Room Latent heat gain = 21000 kJ/h

By pass factor of the cooling used = 0.2

The return air from the room is mixed with outside air before entry to cooling coil in the ratio of 4:1 by mass. Determine.

- i) Apparatus Dew Point of cooling coil
- ii) Condition of the air entering & exit for cooling coil
- iii) Fresh air mass flow rate
- iv) Refrigerant load on cooling coil

OR

Q10)a) Explain the air conditioning electrical and electronic control with sketch. [9]

b) Explain the effect of air conditioning load on engine performance. [9]

Q11)a) Explain any 2 from the following [8]

- i) Initial vehicle inspection
- ii) Temperature measurement

- iii) Odour removal
- iv) Retrofitting
- b) Write a short note on refrigerant recovery, recycle and charging. [8]

OR

- Q12)**a) Explain the system oil giving at least 2 examples of oil. [8]
- b) Explain leak detection test. [8]



Total No. of Questions : 10]

SEAT No. :

P1959

[Total No. of Pages : 3

[5254]-62

**B.E. (Automobile Engineering)
MACHINES & VEHICLE DYNAMICS
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instruction: Every Section should be on separate answer paper.

SECTION - I

- Q1)** a) What is partial Balancing? Explain in brief. [6]
- b) Four cylinder engine, having piston mass of 2kg, crank radius is 200mm. connecting rod length 400mm, rotating with 1000 rpm. Each cylinder appear in order of 1-4-2-3 after 90° interval. if engine is complete primary balanced by means of force. Find out primary couple & secondary couple. [10]

OR

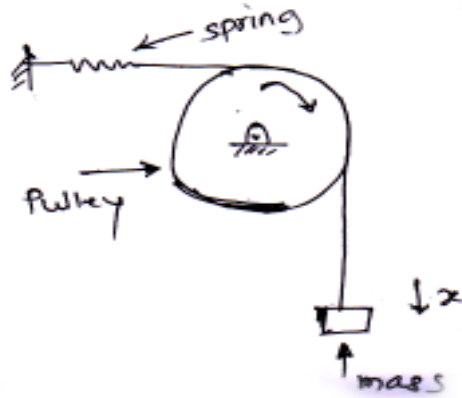
- Q2)** a) Explain Dynamic balancing machine in brief. [6]
- b) Derive expression for balancing of V engine for forces & couples. [10]
- Q3)** a) Derive expression for generalize equation of SHM. [6]
- b) Spring, mass, damper system have mass of 300kg, spring constant 15,000N/m, & damping coefficient 1500 N-s/m. If system is rotating with 2000 rpm find out, [10]
- i) Critical Damping coefficient
- ii) Damping factor
- iii) Roots of generalize equation of damped free vibration.

P.T.O

OR

Q4) a) Find out Natural frequency of following system.

[6]



- b) Derive the equation for damped free vibration for under damped, overdamped & critically damped system to find out root of governing equation of vibration. [10]

Q5) Solve any two.

[2 × 9 = 18]

- Derive expression of force transmissibility & impact of resonance on it.
- Find out generalize equation of motion & phase angle by graphical method for single degree damped forced vibration having harmonic excitation force on the system.
- A motor having weight of 50kg mounted on a spring of stiffness 10,000 N/m & Damper with constant of 1500 N-s/m. Motor carrying ecentric mass at 10mm from the axis of rotation & having weight of 2kg. If motor is rotating with 2500 rpm. find out
 - Displacement due to unbalance force
 - Phase angle

SECTION - II

- Q6)** a) Explain different co-ordinate systems for vehicle. [8]
b) Enlist forces acting on the vehicles & how to reduce them. [8]

OR

- Q7)** a) Define following terms in brief. [8]
i) Gradiability
ii) Acceleration
iii) Braking
iv) Comfort
b) What is the gyroscopic effect on vehicle at the time of turning? [8]

- Q8)** a) Derive generalize equation for fraction limited acceleration. [8]
b) Explain in brief about power source used in IC engine with its performance. [8]

OR

- Q9)** a) Derive generalize equation for power limited acceleration. [8]
b) Explain pitch & bounce motion of vehicle. [8]

- Q10)** Explain any three. [3 × 6 =18]
a) Tyre Nomenclature
b) Steady-state cornering
c) Lateral Acceleration gain
d) Yaw velocity & critical speed
e) Effect of braking an vehicle handling



Total No. of Questions : 12]

SEAT No. :

P1960

[Total No. of Pages : 4

[5254]-63

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

AUTOMOTIVE SYSTEM DESIGN

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Explain the following.

- a) Adequate and optimum design [6]
- b) Ergonomic considerations in design [6]
- c) Statistical considerations in design [6]

OR

Q2) Write short note on:

- a) Johnson's method of optimization [6]
- b) Design for natural tolerances [6]
- c) Aesthetic considerations in design [6]

Q3) a) Derive an expression for torque transmitting capacity of a single plate clutch by assuming uniform pressure. [8]

P.T.O

- b) A friction clutch is required to transmit 33.12 kW at 2000 rpm. It is to be of single plate disc type with both sides effective, the pressure being applied axially by means of springs and limited to 68700 Pa. If the outer diameter of the plate is to be 0.305m, find the inner diameter of the clutch ring and the total force exerted by the springs. Assume the uniform wear and coefficient of friction 0.3. [8]

OR

- Q4)** a) State and explain friction materials used in clutches. [4]
- b) What are the design requirements of a clutch? [4]
- c) 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, calculate the inner and outer diameters of the friction lining. [8]

- Q5)** a) Explain the gearboxes with different speed gears. [6]
- b) A four speed gearbox 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 73.12 mm and the smallest pinion is to have atleast 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 gearbox 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 3.25 mm. The top gear has got unity gear ratio. Find the exact gear ratio. [10]

SECTION - II

- Q7) a)** State and explain the types of live axles. [8]
- b) An Automobile engine develops 27.93 kW at 1500rpm and its bottom gear ratio is 3.06. If a propeller shaft of 40 mm outside diameter is to be used, determine the inside diameter of mild steel tube to be used, assuming a safe shear stress of 56.25 MPa for the mild steel. [8]

OR

- Q8) a)** Explain the construction of any one type universal joint with neat sketch. [8]
- b) A car has one of its rear wheels jacked up of the ground. With top gear engaged, the engine is turned by hand and it is found to make 11 turns while the jacked up wheel turns 4 times with first gear engaged, 19 turns of the engine correspond to 2 turns of the road wheel. Assuming direct drive through the gearbox in top drive, calculate the rear axle ratio and the first gear ratio of the gear box. [8]
- Q9) a)** Explain the theory of internal shoe brake with neat sketch. [8]
- b) Explain the hydraulic braking system with neat sketch. [8]

OR

- Q10)a)** Calculate the mean living pressure and heat generated during braking operation. [8]
- b) The disc brake pads operate at a mean radius of 0.14m. The force applied to each pad is 4450N and the coefficient of friction between each pad and disc is 0.35. When the disc rotates at 500 rpm, calculate. [8]
- i) The frictional torque acting on the disc.
 - ii) The work done per minute by this torque.
 - iii) The heat energy generated per second.

- Q11)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 280 MPa. 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]

OR

- Q12)a)** Explain the components of steering system. [12]
- b) State and explain any one steering gear mechanism. [6]



Total No. of Questions : 11]

SEAT No. :

P1961

[Total No. of Pages : 3

[5254]-64

**B.E. (Automobile Engineering)
AUTOMOTIVE AERODYNAMICS & STYLING
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each sections.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicates full marks.*
- 4) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Derive adiabatic steady state flow equation in brief. [8]
b) Explain any four type of flows in brief. [8]

OR

- Q2)** a) What is convective & local acceleration. [8]
b) Write a short note on continuity equation. [8]

- Q3)** a) Explain the term 'shock induced separation'. [8]
b) How High speed flow get affected by wings? [8]

OR

- Q4)** a) Write a note on flow around circular cylinder. [8]
b) What is transonic area rule? Write tip effect in brief. [8]

P.T.O

- Q5)** a) Explain flow phenomenon around car, when it is treated as bluff body? [10]
b) Enlist & explain resistive forces for any vehicle. [8]

OR

- Q6)** a) How car profile affect drag force? Explain aerodynamic drag coefficient for vehicles. [10]
b) Explain any 4 aesthetic features of car body. [8]

SECTION - II

- Q7)** a) Explain CFD methodology in brief. [10]
b) Write a short note on dirt accumulation on vehicle. [8]

OR

- Q8)** a) Explain Hatch back, square back, fast back dust flow pattern. [10]
b) Write a short note on boat faling & side forces. [8]

- Q9)** a) What is limitations of wind tunnel testing. [8]
b) Write a short note on closed type wind tunnel. [8]

OR

- Q10)**a) How road test is differ than the wind tunnel test? [8]
b) Write a short note on measuring equipments used in wind tunnel. [8]

Q11) Explain any four in brief.

[16]

- a) Front grill shapes
- b) Head light shapes
- c) Brand image
- d) Vehicle colour code
- e) Rear side shapes
- f) Vehicle body types



Total No. of Questions : 12]

SEAT No. :

P1962

[Total No. of Pages : 4

[5254]-65

**B.E. (Automobile Engg.) (Semester -I)
CAD-CAM & AUTOMATION (Elective -I (C))
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Black 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)** A triangle with vertices A(8,0) B(12,0) and C(12,3) has undergone reflection about line $y = x$. Find the concatenated matrix and then find new coordinates of ΔABC using the transformation matrix. **[10]**
- b) Explain the different types of coordinate system used in CAD system and how the coordinates are mapped from one coordinate system to another. **[6]**

OR

- Q2) a)** Write open GL syntax for the following commands **[6]**
- i) Rotation
 - ii) Translation
 - iii) Scaling
 - iv) Vertex
 - v) Color

P.T.O

- b) A triangle has coordinates A(1,2,3) B(4,3,4) and C(5,8,4) write the transformation matrix and determine the coordinates of orthographic view (Front view and Top view only) [10]

Q3) a) The coordinates of four data points P_0 , P_1 , P_2 and P_3 are (2,2,0), (2,3,0), (3,3,0) and (3,2,0) respectively. Find the equation of the Bezier curve and determine the coordinates of points on curve for $u = 0.0, 0.25, 0.5, 0.75, 1.0$. [9]

- b) Explain the different types of surface entities provided by the CAD/CAM system. [9]

OR

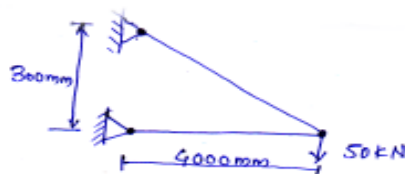
Q4) a) Compare the Hermite Bi cubic surface, Bezier surface & B-spline surface. [6]

- b) Write a parametric equation of circle having centre at (3,3,0) and a radius of 3 unit. calculate the coordinates of points on a circle if is divided in eight parts. [12]

Q5) a) Explain the terms (any two)

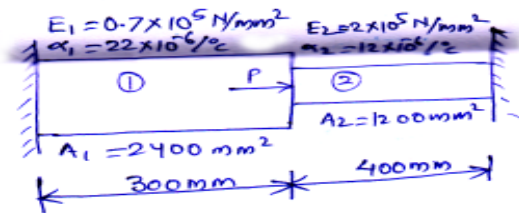
- i) Constant Strain Triangle (CST) [8]
- ii) Penalty Approach in FEA
- iii) Elimination Approach in FEA.

- b) A two member truss is as shown in fig the cross sectional area of each member is 150 mm^2 and modulus of elasticity is 210 GPa. Determine the deflection, reactions in each of the member's. [8]



OR

- Q6) a) What are the different steps involved in FEA? [6]
- b) An axial load $P = 500 \times 10^3$ N is applied at 25°C in the stepped bar as shown in fig the temperature of bar is raised to 45°C . Find the Nodal displacement and elements stresses. [10]

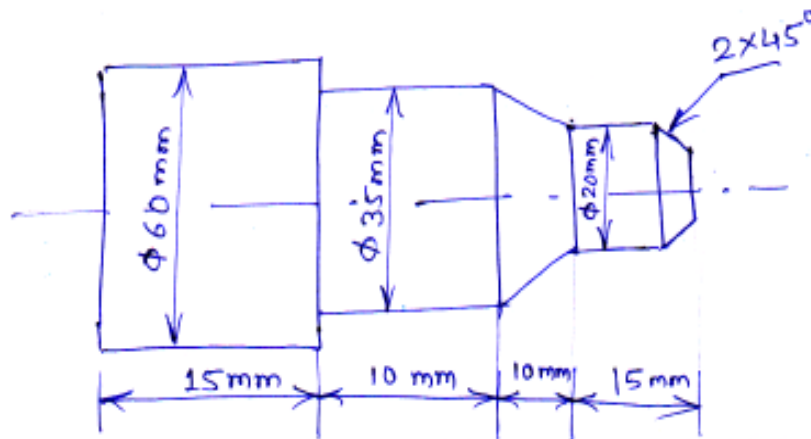


SECTION - II

- Q7) a) Explain tool length and cutter diameter compensation. [8]
- b) What is adaptive control? Explain in detail Adaptive control systems and its advantages. [10]

OR

- Q8) a) Explain in detail motion control modes used in CNC machines. [6]
- b) Write a CNC part program to turn a MS bar of size and shape as shown in following fig. use canned cycles only for both rough turning and finish cut. Assume feed rate (0.8mm/rev) and spindle speed 1000RPM. [12]



- Q9)** a) Enlist part classification & coding system used in GT and explain any one in detail. [10]
b) What are the limitations and advantages of flexible automation. [6]

OR

- Q10)** a) Explain the general configuration & functions of flexible manufacturing system. [8]
b) Explain Automatic storage & retrieval system with neat sketch. [8]

- Q11)** a) Explain different joints of robots with neat sketch. [8]
b) Name the different grippers used in material handling by robots with one application of each. Explain the working of magnetic gripper with neat sketch. [8]

OR

- Q12)** a) Explain application of robot in ARC Welding operation. [6]
b) Classify drives used for robot joint motions. [4]
c) Explain vacuum grippers. [6]



Total No. of Questions : 10]

SEAT No. :

P1963

[Total No. of Pages : 3

[5254]-66

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

AUTOMOTIVE NVH

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Q.No. 5 and Q.No. 10 is compulsory.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Write Section I and Section II on separate answer sheet.*

SECTION - I

- Q1) a)** What is of noise, vibration and harshness and role in vehicle design?[8]
- b) What are the causes of noise and vibration in vehicle? [8]

OR

- Q2) a)** What are the advantages and disadvantages of noise and vibration? [8]
- b) What are the different Physiological effect of NVH? Explain remedies for it. [8]
- Q3) a)** Explain damping treatment. [8]
- b) What are the types of vibration? Explain any two in details. [8]

OR

- Q4) a)** Explain mathematical model. Draw the mathematical model for car. [8]
- b) Derive the equation for two degree of freedom system to find out natural frequency with energy method. [8]

P.T.O

Q5) Write a short note: **[18]**

- a) Vibration Isolation
- b) Vibration absorber
- c) Coordinate Coupling

SECTION - II

Q6) a) What are the types of sound propagation? Effects of reflecting surfaces on sound propagation. **[10]**

b) Explain mechanism of hearing loudness in details. **[8]**

OR

Q7) a) Draw the Anatomy of Human Ear and explain Mechanism of hearing. **[8]**

b) Derive the equation that shows relation between sound power, sound intensity and sound pressure level. **[10]**

Q8) a) Explain pass by noise test with the help of neat sketch. **[8]**

b) Explain Fast Fourier Transform with sketch. **[8]**

OR

Q9) a) Explain Drive by noise test with the help of neat sketch. **[8]**

b) What are the different techniques use for vibration measurement? Explain any one. **[8]**

Q10) Write a short note:(any four)

[16]

- a) Transmission noise
- b) Aerodynamics noise
- c) Tyre noise
- d) Noise control methods
- e) Vibration control Techniques



Total No. of Questions : 10]

SEAT No. :

P1964

[Total No. of Pages : 3

[5254]-67

**B.E. (Automobile Engg.)
AUTOMOTIVE MATERIALS
(2008 Pattern) (Elective -II A)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Figures to the right indicate full marks.*
- 2) *Write both sections on different sheet.*

SECTION - I

- Q1)** a) Explain Deformation Mechanism in brief. [8]
b) Write a short note on failure modes of engineering materials. [8]

OR

- Q2)** a) What is strain hardening? Explain. [8]
b) Explain stress-strain variation in laminate. [8]
- Q3)** a) Write a short note on flame hardening. [8]
b) Explain in brief 'Phoshating'. [8]

OR

- Q4)** a) Explain 'Annealing' in brief. [8]
b) Write a short note on 'thermal spraying'. [8]

P.T.O

Q5) Write material selection process & criteria for any three. **[3 × 6 = 18]**

- a) Piston
- b) Cam
- c) Engine valve
- d) Bearing
- e) Clutch plate

SECTION - II

Q6) a) Write a short note on Lamina constitutive. **[8]**

b) Explain in brief 'Rule of mixtures'. **[8]**

OR

Q7) a) What is 'Filament Winding'? **[8]**

b) Explain & derive generalized hooks law. **[8]**

Q8) a) Explain method of production of fibres. **[8]**

b) Write a short note on ultrasonic NDT. **[8]**

OR

Q9) a) Explain fabrication process of thermosetting plastic or resin. **[8]**

b) Write a short note on pultrusion. **[8]**

Q10) Write a note on: (any three)

[3 × 6 = 18]

- a) Application of composite in Automobile
- b) Application of composite in defence
- c) Quasi-isotropic laminates
- d) Cross ply & angle-ply laminates
- e) Bucky papee



Total No. of Questions : 11]

SEAT No. :

P1965

[Total No. of Pages : 3

[5254]-68

B.E. (Automobile Engineering)

VEHICLE SAFETY (Elective -II)

(2008 Pattern)

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 indicate full marks.*
- 4) *Use of Logarithmic tables, slide rule, Electronic pocket calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) List down the different safety systems used in an vehicle. Explain any two systems in detail with neat sketch with their advantages. [12]
- b) Explain in brief ideal characteristics of vehicle structure. [4]

- Q2)** a) Discuss the optimization of vehicle structure in detail with an example.[9]
- b) Enlist the different types of vehicle impacts. Explain impact with Rebound in brief. [9]

OR

- Q3)** a) Write down the requirements of Crash Testing Also give the general requirements of vehicle body structure. [10]
- b) Explain in detail Movable Barrier Test. [8]

P.T.O

- Q4)** a) Discuss the necessity of ergonomics in Automotive Safety. [8]
b) Enlist the different types of dummies used for vehicle testing. Explain any one of them in detail. [8]

OR

- Q5)** a) Explain in detail Anthropometry to measure Human Impact Tolerances. [8]
b) Write a note on Location of controls with respect to vehicle safety. [8]

SECTION - II

- Q6)** a) List down the different passive safety systems used in an Vehicle. Explain any one in detail. [9]
b) Write a note on Road Safety. How you can improve the road safety. [9]

OR

- Q7)** a) Write a note on [10]
i) Air Bag
ii) Types of Seats
b) Explain in detail different types of mirrors and their location. [8]

- Q8)** a) Explain in detail High Intensity Discharge Lamp used in modern vehicles. [8]

- b) Enlist the different types of warning lights. Explain any one of them in detail. [8]

OR

Q9) a) Discuss the following with respect to Vehicle Safety.

- i) Direction Indicator [9]
ii) Reverse Lamp
iii) Stop Lamp

- b) What is the use of reflex indicator position lamp. Explain it in detail. [7]

Q10)a) What are the new important amendments made in new CMVR Bill for increasing the road safety. [8]

- b) What are the general requirements for emergency exit from the bus as per AIS-052. [8]

OR

Q11)a) Discuss the AIS-050 with regards to tyres general requirement for Two and Three Wheeler. [8]

- b) What are the performance requirements for front fog lamp by Adhesive Tape Adherence Test. [8]



Total No. of Questions : 12]

SEAT No. :

P1966

[Total No. of Pages : 3

[5254]-69
B.E. (Automobile)
OFF ROAD VEHICLE
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Which type of chassis used for off road vehicle and which section is selected normally to manufacture chassis? Justify. [8]
- b) Which type of Transmission system used in off road vehicle? Justify. [8]
- Q2)** a) What is off Road vehicle give classification and introduction. [6]
- b) Explain any one application of off road machine with construction layout and capacity of that. [10]
- Q3)** a) Explain different types of earth moving equipment with these application. [9]
- b) Explain with neat sketch hydraulic dozer. [9]
- Q4)** a) Give selection criteria of tractor and function of tractor with it's specification. [9]
- b) What is dozer and detailed out with neat sketch and attachment of dozer. [9]

P.T.O

- Q5)** a) Explain the construction and working of scrapper also write down the specification of any one scrapper. [8]
- b) Where is the application of elevation grader write down the function and specification of it. [8]

- Q6)** a) Give detail information about grader and various type of grader and working. [8]
- b) What are the shovels and various shovels use in recent trends? [8]

SECTION - II

- Q7)** a) Explain the special features of tanker and gun carrier. [8]
- b) Explain with neat sketch construction detail of tanker. [8]

- Q8)** a) Explain any one military vehicle with construction layout. [8]
- b) What is combat vehicles explain it in brief. [8]

- Q9)** a) Explain with sketch system and actuation of OCDB. [8]
- b) What is body hoist and bucket operational hydraulic. Explain in detail.[8]

- Q10)**a) Explain the factor affecting power steering system in detail working of it? [8]
- b) Recent to end in dumper with safety features. [8]

Q11)a) Explain in detail term the Mobility Index. [8]

b) Define traction performance and factor affecting traction performance. [8]

Q12)Write short note (any three) [18]

a) Normal ground pressure and maximum pressure

b) Dynamic behaviour and traction on wet soil

c) Vehicle cone index and rated core index

d) Earth moving machine



Total No. of Questions : 12]

SEAT No. :

P1967

[Total No. of Pages : 3

[5254]-71

B.E. Automobile

ALTERNATIVE FUELS & EMISSION CONTROL

(2008 Pattern) (Semester -II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** What is enthalpy of formation and enthalpy of combustion? [10]
- b) What are the fuel additives used for SI & CI engines. [8]

OR

- Q2) a)** How are SI and CI engine fuels rated? [8]
- b) What do you mean by alternative fuels? Explain its need, advantages and application in an automobile. [10]

- Q3) a)** Explain storage, handling and dispensing of Hydrogen fuel? [8]
- b) Explain engine modifications required while using bio-diesel as fuel for IC engine? [8]

OR

- Q4) a)** Compare LPG and CNG fuels for IC engines. [8]
- b) Explain Vegetable Oils as alternative fuel. [8]

P.T.O

- Q5)** a) Compare GTL and BTL. [8]
b) Explain Syngas in detail. [8]

OR

- Q6)** a) What are the different synthetic fuels used in vehicle? Explain its effect on engine performance. [8]
b) Explain any two synthetic fuels with its properties, advantages, disadvantages & handling. [8]

SECTION - II

Q7) Explain effect of design and operating parameters on SI engine emission. [16]

OR

- Q8)** a) Explain Charcoal Canister Control for Evaporative Emission Control. [8]
b) What is positive crankcase ventilation? Explain. [8]

- Q9)** Write short note (any 3) [18]
a) Chemical delay
b) Intermediate compound formation
c) Pollutant formation on incomplete combustion
d) Exhaust gas recirculation

OR

- Q10)** a) Explain Turbocharger in detail. [9]
b) Describe the sources and causes of soot and particulate formation? [9]

- Q11)**a) Explain Indian emission norms. [8]
b) Explain Ambient air quality monitoring. [8]

OR

- Q12)**a) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? [8]
b) Effect of NO_x emission on human as well as on environment. [8]



Total No. of Questions : 10]

SEAT No. :

P1968

[Total No. of Pages : 3

[5254]-72

**B.E. (Automobile Engineering)
VEHICLE PERFORMANCE & TESTING
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Write a short note on EGR. [8]
- b) Explain following performance parameters [8]
- i) Grad ability
 - ii) Top speed

OR

- Q2)** a) Write a short note on steering system. [8]
- b) Explain following performance parameters. [8]
- i) Acceleration
 - ii) Comfort

- Q3)** a) What will happen if truck clutch is replaced by multiplate clutch? [8]
- b) Write a short note on gear box test procedure. [8]

P.T.O

OR

Q4) a) Write a note on differential. [8]

b) What is enhancement in Epicyclic gear box with compare to sliding mesh? [8]

Q5) Write a short note on following (any 3): [18]

i) High speed track & pavement track

ii) Virtual testing

iii) Accelerated testing

iv) Coast down test

v) Steering pad, mud track

vi) Chassis dynamometer

SECTION - II

Q6) a) Write a note on seat belt. [8]

b) Explain particulate traps function and construction of it. [8]

OR

Q7) a) What is active and passive safety? [8]

b) Write a note on airbag. [8]

Q8) a) Write a note on human testing. [8]

b) What is enhancement in hybrid III family with compare to hybrid II. [8]

OR

Q9) a) Explain in brief about data acquisition system. [8]

b) Explain side impact test in brief. [8]

Q10) Write note on following. (any 3) [18]

a) Selection & mounting of sensors.

b) Engine noise

c) Wind noise

d) Road shocks

e) Battery testing



Total No. of Questions : 12]

SEAT No. :

P1969

[Total No. of Pages : 4

[5254]-75

**B.E. (Automobile) (Semester -II)
HYDRAULICS & PNEUMATICS (Elective -III)
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Compare various methods of power transmission. [8]
b) Discuss the service related fluid properties. [8]

OR

- Q2)** a) Describe any four types of hydraulic fluids. [8]
b) Describe different types of sealing materials. [8]

- Q3)** a) Explain the construction and working of internal gear pump with neat sketch. [8]
b) A gas charged accumulator supplies a hydraulic system with 20 litres of oil within the pressure range 150-200 bar gauge, if the accumulator has a pre-charge pressure of 100 bars gauge. Size the accumulator for [8]
i) Isothermal expansion
ii) Adiabatic expansion of gas

P.T.O

OR

- Q4)** a) Describe with neat sketch weight loaded accumulator. [8]
- b) A gear pump has 75 mm outside diameter, 50mm inside diameter, and a 25mm width. Calculate the volumetric efficiency, if the pump has an actual flow of 100 lpm at 1800 rpm and rated pressures. [8]
- Q5)** a) Describe the three position valve (4/3 DCV) with open centre position State and closed centre position State. [10]
- b) Describe with neat sketch meter-out circuit for speed control of cylinder. [8]

OR

- Q6)** a) Describe with neat sketch direct operating sequence valve and pilot operated sequence valve. [10]
- b) Explain direct operating pressure reducing valve. [8]

SECTION - II

- Q7)** a) Classify hydraulic cylinders. Describe double acting cylinders. [8]
- b) Describe with neat sketch working of vane motors. [8]

OR

- Q8)** a) Explain Regenerative circuit with neat sketch. [8]
- b) Draw a circuit for application of hydraulics for milling machine application. [8]

- Q9)** a) Compare hydraulic and pneumatic systems. [8]
b) Write a short note on [8]
i) Refrigerated dryers
ii) Absorption dryers

OR

- Q10)**a) Draw a neat sketch and explain working of a typical 5 way 2 position DC valve used in pneumatic circuit. [8]
b) Write a short note on [8]
i) Mechanical separators
ii) Filter separators

Q11) A 25 KN hydraulic press is used to keep a mould pressed for the specified time. The stroke of the press is 100mm. The speed during the approach is about 1m/min. The cylinder of the press exerts the force required for the operation. The return stroke is against a load of 15KN. Provision is required for the cylinder to be held at the top most position. Draw a simple hydraulic circuit which will fulfill these requirements. Select different components from the data given. Specify ratings of the components in case it is not available in the given data. [18]

OR

Q12) A machine is operated by a hydraulic system. The motion of the hydraulic cylinder is used to operate the machine. Total stroke of the cylinder is 600mm. First 500mm of the stroke is to be completed in about six seconds against a load of 20 KN. The load during remaining 100mm of the stroke is 40 KN. The speed during this part of the stroke is to be adjustable between 0.1 to 2.5 m/min. After the stroke is complete, the cylinder is to be returned against a load of 20KN within 6 seconds. A meter in circuit is used. Propose a hydraulic circuit which will fulfill these requirements. Select different components used in the circuit from the data given. Mention ratings of components, in case it is not available in the given data. [18]

DATA

DATA

1. Suction Strainer :

Model	Flow Capacity (lpm)
S ₁	38
S ₂	76
S ₃	152

2. Pressure Gauge :

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

3. Vane Pump :

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

4. Relief Valve :

Model	Flow capacity (lpm)	Max Working Pressure & bar
R ₁	11.4	70
R ₂	19	210
R ₃	30.4	70
R ₄	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (lpm)
F ₁	70	0-4.1
F ₂	105	0-4.9
F ₃	105	0-16.3
F ₄	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (lpm)
D ₁	350	19
D ₂	210	38
D ₃	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (lpm)
C ₁	210	15.2
C ₂	210	30.4
C ₃	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (lpm)
PO ₁	210	19
PO ₂	210	38
PO ₃	210	76

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

Model	Bore dia. (mm.)	Rod dia. (mm)
A ₁	25	12.5
A ₂	40	16
A ₃	50	35
A ₄	75	45
A ₅	100	50

10. Oil Reservoirs :

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



Total No. of Questions : 12]

SEAT No. :

P1970

[Total No. of Pages : 3

[5254]-76

B.E. (Automobile) (Semester -II)
PRODUCT DEVELOPMENT AND COSTING (Elective -III D)
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain with neat sketch the front end process. [8]
b) Explain AFM Development Process. [8]

OR

- Q2)** a) What is the aim of product development organization? Explain in brief. [8]
b) What do you mean by product planning? Explain the process in detail. [8]

- Q3)** a) How to identify the customer needs? Explain in detail. [8]
b) Write a short note on documentation process of interaction with customers. [8]

OR

- Q4)** a) Explain the importance of wants in the organization. [6]
b) How to establish the product specification and set the final specifications? [10]

P.T.O

- Q5)** a) Explain the five step method to clarify the problem. [10]
- b) Explain the following.
- i) Concept classification tree [4]
- ii) Concept combination table [4]

OR

- 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) How to manage the trade-off between differentiation and commonality? [8]
- b) Write a short note on product development & costing. [8]

OR

- Q8)** a) Describe the procedure of establishing the Architecture of the Chunk. [8]
- b) Explain the different types of modularity. [8]
- Q9)** a) How to assess the need & expenditure of industrial design? [10]
- b) Explain Ergonomic Needs and Aesthetic Needs in industrial design. [6]

OR

Q10)a) Write a short note on Design for Manufacturing (DFM). [8]

b) Explain the procedure of assessing the quality of industrial design. [8]

Q11)a) Explain the impact of DFM on development time & cost. [10]

b) How to estimate the manufacturing costs? Explain in brief. [8]

OR

Q12) Write short note on the following.

a) Economic Analysis Process [6]

b) Quantitative Analysis [6]

c) Qualitative Analysis [6]



Total No. of Questions : 12]

SEAT No. :

P1971

[Total No. of Pages : 3

[5254]-77

B.E. (Automobile)

TRANSPORT MANAGEMENT AND MOTOR INDUSTRIES

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) List out the document detail procedure for the licensing of Driver and Conductor. **[9]**

b) State particular that have to be collected for the purpose of preparing a accident report. **[9]**

OR

Q2) a) Detail out the responsibility of driver in case of accident. **[9]**

b) Define the terms. **[9]**

i) Good vehicle

ii) Public place

iii) Transport place

Q3) a) What are various taxes on motor vehicles. **[4]**

b) Describe the taxation and objective of taxation. **[6]**

P.T.O

- c) Short note- [6]
- i) One time tax on transport vehicle.
 - ii) One time tax on Non-transport vehicle.

OR

- Q4)** a) Explain the taxation structure for passenger and goods transport vehicles. [4]
- b) Under what circumstances the motor vehicle tax is refundable How do you get the refund. [6]
- c) Why road tax is laid on vehicle? [6]

- Q5)** 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 and disadvantages. [4]

OR

- Q6)** a) Give detail about Insurance and type of insurance. [6]
- b) Give detail difference between Insurance and assurance. [4]
- c) Detailed description about motor vehicle Insurance. [6]

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) What is the use of Computer in passenger transport operation? [6]
b) How do you select a vehicle for a particular operation. [6]
c) Give detail about theory of fares 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 organization. [4]

OR

- Q10)** Describe the following. [16]
a) Storage of transportation of petroleum product.
b) Management Information System.
- Q11)** Describe in brief. [16]
a) Global position system.
b) Traffic control in Towns.

OR

- Q12)** Write short note on (any two) [16]
a) Control of traffic
b) Advance techniques in traffic management
c) Alternative fuel for vehicle



Total No. of Questions : 12]

SEAT No. :

P1972

[Total No. of Pages : 4

[5254]-81

B.E. (Electronics)

ELECTRONICS SYSTEM DESIGN

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain Industrial product design with the help of case study in detail. [8]
- b) State the criteria for selection of frequency bands requirements of Voice and multimedia application. [6]
- c) Explain the bath tube curve indicating all its regions. [4]

OR

- Q2)** a) Explain the Pilot Production. Why it is necessary in Electronics Product design. [8]
- b) Define and explain the following terms in mathematical way. [6]
- i) MTBF
 - ii) MTTF
 - iii) Failure Rate
- c) Explain different reliable soldering practices. [4]

P.T.O

- Q3)** a) Explain error budget analysis with one example of an electronic product. [8]
- b) Explain different performance factor of DAC. [8]

OR

- Q4)** a) Explain Instrumentation amplifier with proper circuit diagram. 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) Determine the hardware design considerations for a load based weighing machine to display weight, rate and price information on digital display. [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) What are the different factors affecting on the choice between Assembly & High Level Language? **[10]**
- b) Write short notes on- **[8]**
- i) Structured Programming
 - ii) Real time software
- Q9)** a) 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) Explain various mechanisms which affect on signal integrity in high speed digital circuits. **[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. :

P1973

[Total No. of Pages : 3

[5254]-82

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

VLSI DESIGN

(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) *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 Body effect and Channel length modulation in detail. [8]
- b) What are advantages of CMOS and explain CMOS inverter circuit with Voltage transfer curve. [8]

OR

- Q2) a)** Explain Technology scaling with recent developments VLSI. [8]
- b) Explain Power consumption in CMOS? Derive the expression. [8]
- Q3) a)** Write a short note on 6T cell. [8]
- b) What is the role of memories in PLDs? Explain in detail. [8]

OR

- Q4) a)** Which are different refresh circuits are available for memories? Explain in detail. [8]
- b) Compare SRAM and DRAM. [8]

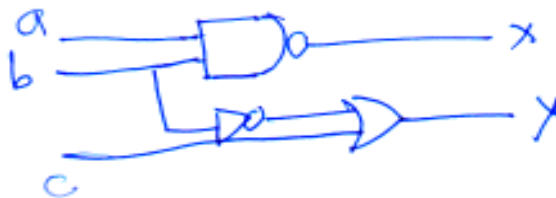
P.T.O

- Q5)** a) Differentiate between synchronous and asynchronous machines? [9]
b) What are function? Explain where it is needed and with how it is implemented in VHDL code with one example. [9]

OR

- Q6)** a) What are the data objects in VHDL programs. [9]
b) Write VHDL code for following circuit with structural modeling. [9]

Draw the following circuit with structural modeling.



SECTION - II

- Q7)** a) How logic is getting implemented in FPGA? Explain with half adder circuit. [9]
b) What is the role of Configurable Logic Block in FPGA? Explain in detail. [9]

OR

- Q8)** a) Draw and explain internal structure of CPLD and enlist important features. [9]
b) Compare CPLD with FPGA? [9]
- Q9)** a) Explain different types of faults? [8]
b) Explain controllability, predictability, testability in detail. [8]

OR

Q10)a) What is partial scan and full scan checks? [8]

b) Write short note on Built in self test (BIST) [8]

Q11)a) Give different power distribution techniques in detail. [8]

b) Explain I/O architecture in brief. [8]

OR

Q12)a) What is clock skew? Clock jitter? Explain its importance in chip design. [8]

b) Write short note on Power optimization. [8]



Total No. of Questions : 12]

SEAT No. :

P1974

[Total No. of Pages : 3

[5254]-83
B.E. (Electronics)
EMBEDDED SYSTEM
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** What is design metric? Explain the following design metrics. **[8]**
- i) Power
 - ii) Time to market
 - iii) Safety
 - iv) NRE cost
 - v) Size
 - vi) Performance
- b) Explain Blue tooth protocol. State it's features. Compare it with zig. bee. **[10]**

OR

- Q2) a)** What is IDE? Explain role & importance of tool chain in embedded system software development. **[10]**
- b) Define embedded system. Explain characteristics of embedded system. **[8]**

P.T.O

- Q3)** a) Explain memory organization in embedded interfacing techniques for embedded processor. [8]
- b) What are various types of processor? Explain internal architecture of a typical processor. [8]

OR

- Q4)** a) What is role of interrupt in embedded system? Explain how timings are controlled using interrupts. [8]
- b) Why RISC is preferred choice in embedded system? [8]
- Q5)** a) With the help of block diagram explain architecture of LPC 2148. [8]
- b) Compare and contrast ARM and THUMB mode of operation. How processor switches between these modes? [8]

OR

- Q6)** a) List different registers used in ARM7 processor with their function. What is register banking. [8]
- b) Write short note on ISP and IAP. [8]

SECTION - II

- Q7)** a) Write embedded C code for interfacing of LPC 2148 with LCD. Display "SPPU University" message on LCD. [10]
- b) List different scheduling algorithms and explain any one in detail. [8]

OR

Q8) a) How on chip multichannel ADC and DAC are configured? Explain with help of register. **[10]**

b) Explain any one on chip communication protocol on LPC 2148 in detail. **[8]**

Q9) a) What are features of μ cos-II? List any four services offered by μ cos-II. **[8]**

b) Draw and explain state diagram. **[8]**

OR

Q10)a) Explain management function calls for following kernel object of μ cos -II. **[8]**

i) Mailbox

ii) Message queue

b) Compare General Purpose OS and RTOS. **[8]**

Q11)a) With the help of block diagram, processor, memory, inter-task communication, & software architecture, explain digital camera. **[10]**

b) Explain priority Inversion problem with proper timing diagram in RTOS with suitable example. **[8]**

OR

Q12)a) Explain with neat block diagram adaptive cruise control system in automotive. **[10]**

b) Explain memory management and expansion techniques in embedded system. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1975

[Total No. of Pages : 4

[5254]-84

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

ADVANCED MEASUREMENT SYSTEMS (Elective -I)

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) State and explain Electrical Validation and debug with MSO series Oscilloscopes. [8]
- b) Explain in detail signal integrity design issues. [8]

OR

- Q2)** a) Explain Arbitrary Waveform generator and its typical applications. [8]
- b) Explain testing challenges and solutions for signal integrity issues. [8]

- Q3)** a) Describe working of Logic Analyzer with basic block diagram. [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

P.T.O

Q4) a) Draw and explain block diagram of network analyzer and state its applications. [8]

b) Explain with necessary diagram different DSO trigger methods. [8]

Q5) a) Explain the interfacing techniques for touch screen and thermal printer. [8]

b) Write a short note on: (any two) [10]

i) USB standard

ii) I2C standard

iii) PCI Express

OR

Q6) Write short notes on [18]

i) Role of CAN bus in embedded system

ii) GSM modem and AT command

iii) Role of RF modules in embedded system.

SECTION - II

Q7) a) What are microwave enclosures and electromagnetics compatibility? Explain EMI and EMC measurements. [8]

b) Write short notes on [8]

i) Operation of barraters

ii) Transmission cavity wave meter

OR

Q8) a) Explain different attenuation measurement techniques in microwave network. [8]

b) Explain single line cavity coupling system for wavelength measurement. [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) List and explain the features of LABVIEW. [8]

b) Explain modulation techniques FDM and ASK with their application in 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: [8]

i) Measurement errors in counter

ii) Data logger

OR

Q12) Write short note on any three.

[18]

- a) Automation in digital instruments
- b) V to F converter
- c) Sample and hold
- d) Analog Multiplexer



Total No. of Questions : 12]

SEAT No. :

P1976

[Total No. of Pages : 3

[5254]-85

B.E. (Electronics)

ADVANCED POWER ELECTRONICS (Elective -I)

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *All questions carry equal marks.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Define power quality. State various power line disturbances and their sources. **[10]**
- b) Explain the need of 12 pulse converter in industrial application. **[8]**

OR

- Q2)** a) State and explain various preventive and nullifying techniques for power line disturbances. **[10]**
- b) Explain double sided PWM converter system with its circuit diagram, simplified block diagram. **[8]**
- Q3)** a) Explain with block diagram any one method of vector control of induction motor. **[8]**
- b) Explain with a block diagram, the speed control of DC motor using microcontroller. **[8]**

P.T.O

OR

- Q4)** a) Explain with block diagram adaptive control of induction motor. [6]
- b) What are DC drives? Explain with circuit diagram, working of DC motor speed control technique by using microcontroller. Comment on P.F., Torque-Speed characteristics. [10]
- Q5)** a) What are multilevel inverters? Explain the circuit diagram, switching of multilevel inverter. State its advantages & disadvantages. [10]
- b) Explain the need of selective harmonic elimination technique in multilevel inverters. [6]

OR

- Q6)** Write a short note on any two: [16]
- a) Space vector modulation
- b) Bi directional converters
- c) Adaptive control technique
- d) Z-source inverter

SECTION - II

- Q7)** a) What is resonant converter? Explain with circuit diagram and waveform working of ZVS. Comment on P.F. State its advantages & disadvantages. [10]
- b) Explain bi-Directional power supplies. [4]
- c) Explain with diagram synchronous rectifier. [4]

OR

- Q8)** a) Explain with diagram SLR resonant converter. [10]
b) Explain low dropout regulator. [4]
c) Compare linear, switched mode and resonant converter. [4]

- Q9)** a) Explain in brief grid connected photovoltaic energy conversion system. [8]
b) Explain control of wind turbine generator. [8]

OR

- Q10)** a) Explain in detail about different configurations of grid connected PV systems. [8]
b) What is HVDC? Explain in detail. [8]

- Q11)** a) Explain the need of battery for photovoltaic systems. [8]
b) Explain FACTS in detail. [8]

OR

- Q12)** Write short note on: [16]
a) Energy Audit
b) Power quality problems
c) Traction Drives



Total No. of Questions : 12]

SEAT No. :

P1977

[Total No. of Pages : 3

[5254]-86
B.E. (Electronics)
BIOMEDICAL INSTRUMENTATION
(2008 Pattern)

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 help of two electrode equivalent circuit explain measurement of bio potential & half potential. **[8]**

OR

Q2) a) Discuss chemical sensor for measurement of PH, PO₂, Glucose & O₂. **[10]**

b) Describe temperature sensor used in medical application. **[8]**

Q3) a) Draw and explain 10-20 electrode system for EEG recording. **[8]**

b) What are the different components of central nervous system? Explain in detail. **[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) Explain various types of EEG electrodes. **[8]**

P.T.O

- Q5) a)** Amplitude of R wave in lead I = 12mm, Lead III = 6mm, Sensitivity = 10mm/mV. What is value of Lead II, a VR, a VL & a VF. [8]
- b) Explain the Cardio Vascular system with neat sketch. [8]

OR

- Q6) a)** Draw ECG amplifier to measure output at Lead II configuration & noise effect by using right leg drive. [8]
- b) Write short note on electro conduction system of heart. [8]

SECTION - II

- Q7) a)** Write short note on power sources for implantable pacemakers. [8]
- b) Explain techniques used in sphygmometric blood pressure measurement. Distinguish between direct & indirect B.P. measurement. [8]

OR

- Q8) a)** What are the objectives of patient monitoring system? With block diagram explain bed side monitoring system. [8]
- b) What is systolic & diastolic pressure? Explain non invasive blood pressure measurement system. [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) Explain the Doppler shift blood flow velocity meter. [8]
b) Explain Electronic stethoscope with advantages & disadvantages. [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 are used in vision correction. [8]



Total No. of Questions : 12]

SEAT No. :

P1978

[Total No. of Pages : 3

[5254]-87

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

MECHATRONICS

(2008 Pattern) (Elective -I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the division of functions between mechanics and electronics.[10]
b) Explain coupling and joints of mechanical components and systems.[8]

OR

- Q2)** a) State and explain modelling procedure of Mechatronics. [10]
b) What are the different Mechatronics Design approach. [8]

- Q3)** a) Explain the modelling of Electromechanical system. [8]
b) Draw and explain the structures of Beams and Springs in mechatronics. [8]

OR

- Q4)** a) Explain simple dynamic models in Mechatronics. [8]
b) Explain in detail proximity sensor. [8]

P.T.O

- Q5) a)** Discuss the selection criteria for force, pressure sensor in details. [8]
b) Explain different types of Electrical actuators with suitable example.[8]

OR

- Q6) a)** Explain in detail 4-quadrant servo drives. [8]
b) Draw and explain in detail flow and level sensor. [8]

SECTION - II

- Q7) a)** Discuss the role of controls in mechatronics. [8]
b) State and explain key element of controlled mechatronics systems. [10]

OR

- Q8) a)** Explain VART in detail. [8]
b) State and explain space analysis in mechatronics system. [10]

- Q9) a)** Draw and explain Block diagram of CNC machine. [8]
b) State the terminology and definitions of Serial Vs Parallel Transmission. [8]

OR

- Q10)a)** Explain in detail general purpose by standard. [8]
b) Explain architecture of PLC in detail. [8]

Q11)a) Draw and explain multichannel data logger. [8]

b) Write short note on signal conditioning & signal conversion. [8]

OR

Q12)a) Explain the logging & storage for data logging. [8]

b) Write a short note on Data sharing and publishing. [8]



Total No. of Questions : 12]

SEAT No. :

P1979

[Total No. of Pages : 3

[5254]-88

**B.E. (Electronics Engineering) (Semester -I)
ADVANCED COMPUTER ARCHITECTURE (Elective -II)
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain Handler's classification and Feng's classification for parallel computer architectures. [12]
- b) Explain instruction level parallelism. [6]

OR

- Q2)** a) Discuss any two applications of parallel processing in detail. [12]
- b) Explain the Von-Neuman computer architecture and its limitations. [6]
- Q3)** a) Explain the loop unrolling techniques & its use. [8]
- b) Compare superscalar and VLIW processor. [8]

OR

- Q4)** a) Explain the internal forwarding Techniques. [8]
- b) Explain with suitable examples, the various types of hazards in a pipeline processor. How these hazards can be resolved? [8]

P.T.O

- Q5)** a) What are vector processors? Discuss two different architectural configurations of vector processor. [12]
- b) Explain pipeline chaining. [4]

OR

- Q6)** a) State the characteristics of CRAY -I computer system. Draw and explain the computation section of CRAY -I vector processor. [12]
- b) Explain any two types of vector instructions. [4]

SECTION - II

- Q7)** a) Explain the algorithm to compute fast fourier transform for SIMD architecture. [10]
- b) Explain cube interconnection network and hyper cube interconnection network. [8]

OR

- Q8)** a) Explain matrix multiplication on SIMD architecture. [10]
- b) Describe the following system inter connection architectures: [8]
- i) Static interconnection
- ii) Dynamic interconnection

- Q9)** a) i) State features of IBM power 4 processor. [4]
- ii) Explain chip multiprocessing. [4]
- b) Explain cache coherency and bus snooping. [8]

OR

Q10)a) Explain in detail, the architecture of MPP. [8]

b) Write a note on interprocess communication and synchronization. [8]

Q11)a) What is multithreading? Explain following performance measuring parameters. [8]

i) Latency (L)

ii) Number of threads (N)

iii) Context switching overhead (C)

iv) Interval between switches (R)

b) Write a short note on latency hiding techniques. [8]

OR

Q12)a) Explain different context switching policies adopted by multithreaded architectures. [8]

b) Write short note on- [8]

i) Synchronous message passing

ii) Asynchronous message passing



Total No. of Questions : 12]

SEAT No. :

P1980

[Total No. of Pages : 3

[5254]-89

B. E. (Electronics) (Semester - I)
ENTREPRENEURSHIP AND BUSINESS PLANNING
(2008 Pattern) (Elective -II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Discuss the importance Entrepreneurship to Engineers in today's highly competitive technologically oriented corporate world. [7]
- b) Explain how growth of Entrepreneurs & Entrepreneurship affects the state of economy of the nation. [9]

OR

- Q2)** a) Explain the benefits of promoting entrepreneurship among the employees within the organization. [7]
- b) State and explain the parameters to be considered by entrepreneur while launching a new product or service. [9]
- Q3)** a) State and explain types of business ownership. Comment on types of ownership suitable for Engineer who wants to become an entrepreneur. [7]
- b) What is demand economy; how it affects the businesses, explain the strategies an entrepreneur need to formulate in order to tackle compelling issues with demand economy. [9]

P.T.O

OR

- Q4)** a) What is Break-even analysis? Explain how this tool can be used in business to maximize profits. [8]
- b) State legal forms of business; explain which legal form is more convenient to entrepreneurs to raise finances at minimum expense. [8]
- Q5)** a) What is business plan? Explain how the business plan helps entrepreneurs for raising funds for starting a new business. [9]
- b) Explain role of marketing in business. Explain the role of technology, in marketing, for today's highly competitive world. [9]

OR

- Q6)** a) Explain the importance of insurance. Explain how cost effectively you can take care of various risks involved in business. [7]
- b) How will you take care of direct and indirect of competition in your business? [5]
- c) Comment on selection of proper location and physical layout in a retail business. [6]

SECTION - II

- Q7)** a) Explain the importance of Human resource. Discuss the ways to hire the staff. [8]
- b) Discuss the importance of effective record keeping and accounting system in a business. [8]

OR

- Q8)** a) State and explain the methods used to track Inventory. [9]
- b) Comment on importance of correct evaluation of appraisal of employees. [7]

Q9) a) What is role of working capital? Explain how businesses get affected due to mismanagement of working capital. [8]

b) Explain how technology can help the business to improve operational efficiency. [8]

OR

Q10)a) Discuss the role of legal adviser. [7]

b) Explain in brief methods used to analyze financial performance of a business. [9]

Q11)a) State and explain legal requirements to be complied with while starting a new enterprise. [9]

b) State & explain the importance of consumer protection laws to an entrepreneur. [9]

OR

Q12)a) What are ethical business practices? Discuss how businesses have no alternative but to follow them, if they want to sustain today? [8]

b) What is PLM (Product life cycle Management)? Explain its importance in launching new products. [10]



Total No. of Questions : 12]

SEAT No. :

P1981

[Total No. of Pages : 2

[5254] - 90
B.E. (Electronics)
SYSTEM ON CHIP
(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Explain 4 transduction methods of mechanical transducers. [8]
b) Write a short note on material of MEMS. [8]

OR

- Q2)** a) Explain the principles & applications of MEMS. [8]
b) Explain the micromachining process in detail. [8]

- Q3)** a) Explain various substrate materials used for MEMS. [8]
b) What is the concept of sliding control. Explain in brief. [8]

OR

- Q4)** a) Explain various Digital controls in MEMS. [8]
b) Write short note on silicon piezo resistors. [8]

- Q5)** a) What are various mechanical transducers. [9]
b) Write short note on biosensors. [9]

OR

- Q6)** a) Explain the concept of electrophoresis. [9]
b) Explain various thermal transducers. [9]

P.T.O.

SECTION - II

- Q7)** a) Explain the SOC design flow. [8]
b) Explain the VLSI Design flow w.r. to FPGA. [8]

OR

- Q8)** a) Explain 4 compilation techniques of digital media. [8]
b) Explain the concept of automation w.r. to MEMS design. [8]

- Q9)** a) Explain the core architecture of digital media. [8]
b) What is the effect of the process of photolithography? Explain in detail. [8]

OR

- Q10)** a) What are the three basic steps of front end design in MEMS. [8]
b) Explain the process of FPGA synthesis. [8]

- Q11)** a) Explain TAP controller in detail. [9]
b) Explain BZLBO - in detail. [9]

OR

- Q12)** a) What is the advantage of mechanical packaging? How it is done. [9]
b) Explain h/w s/w co. design issues. [9]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1982

[Total No. of Pages : 2

[5254] - 92

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

COMPUTER NETWORK AND SECURITY

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) With diagram explain various types of networks? [8]
b) What is the relation between service, primitive and protocols? Explain with an example. [6]
c) With diagram and application explain the working of X.25. [4]

OR

- Q2)** a) Discuss the compatibility of layers in OSI and TCP/IP reference model. [8]
b) What are the various types of addressing? Explain. [8]
c) Justify horizontal and vertical communication in networks. [2]

- Q3)** a) With proper diagram and example explain the working of TELNET. [6]
b) Develop an advertisement using HTML tags. [6]
c) What is the significance of Ping and Traceroute? When is it used? [4]

OR

- Q4)** a) Explain the working of Email with proper diagrams. [6]
b) What is socket programming? Where and when is it used? [6]
c) How does www work? Elaborate. [4]

P.T.O.

- Q5)** a) How does process to process delivery happen? Explain with diagrams. [6]
 b) Describe in detail Path vector routing. [6]
 c) What is the significance of ICMP and IGMP? How does each work? [4]

OR

- Q6)** a) What are various Network layer issues? Discuss each in detail. [8]
 b) Explain with suitable diagram TCP connection Establishment, TCP data transfer and TCP connection Termination. [8]

SECTION - II

- Q7)** a) Explain protocols of noiseless channel. [6]
 b) What is bridged and switched Ethernet? Explain each. [6]
 c) How does a controlled access techniques work? Explain any one. [6]

OR

- Q8)** a) What are the basic functions of datalink layer? Elaborate each. [6]
 b) Explain the working of datalink layer of IEEE 802.11. [6]
 c) How does virtual LANs work? Explain with its application. [6]

- Q9)** a) Explain in detail the structure and working of any one guided media. [6]
 b) A channel has a B.W. of 5KHz and signal to noise ratio power ratio is 63. Determine the Bandwidth Needed if the S/N power ratio is reduced to 31. [4]
 c) What is a SONET? How does it work? What is its application? [6]

OR

- Q10)** a) Give the application of each type of switching technique? [4]
 b) With diagram explain the working of microwave communication. [6]
 c) How does physical layer of IEEE 802.15 WPAN work? Give diagram. [6]

- Q11)** a) Draw and explain Cryptography model. [6]
 b) Explain with steps UTP cabling PC to PC communication. [6]
 c) How is internet accessed through leased line? Draw diagram. [4]

OR

- Q12)** a) Draw and explain network security model. [6]
 b) How does cable tester work? Where is it used? [4]
 c) What is the use of Hash functions? How do they work? [6]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1983

[Total No. of Pages : 3

[5254] - 93

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

PROCESS AUTOMATION

(2008 Pattern)

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

SECTION - I

- Q1)** a) Explain with suitable example process control block diagram. [8]
- b) A sensor outputs a voltage ranging from -2.4V to -1.1V. For interface to analog to digital convertor, this need to be 0 to 2.5V. Develop the required signal conditioning. [8]

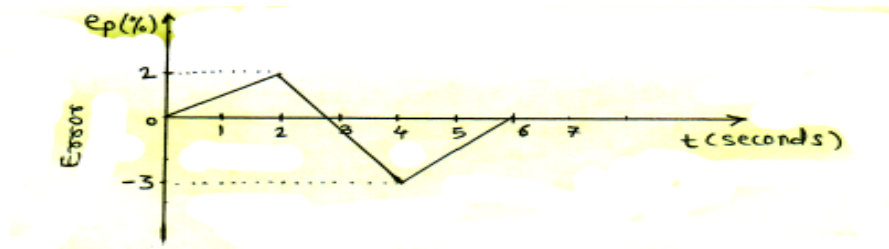
OR

- Q2)** a) Explain with suitable example following process characteristics : [8]
- i) Process Equation
 - ii) Process Load
 - iii) Process lag
 - iv) Self Regulation
- b) A pressure sensor outputs a voltage varying as 100mV/psi and has 2.5k Ω output impedance. Develop signal conditioning to provide 0 to 2.5V as pressure varies from 50 to 150psi. [8]

- Q3)** a) State the equation for a three mode PID controller. Explain with neat circuit diagram realization of this equation using operational amplifier. [8]

P.T.O.

- b) A PID controller has $K_p = 2$, $K_i = 2.2s^{-1}$, $K_d = 2s$ and $PI(0) = 40\%$. Solve the controller equations and plot the controller output for the error curve shown in figure. [10]



OR

- Q4)** a) Explain Ziegler Nichols method of process loop tuning. [8]
 b) A temperature control system inputs the controlled variable as a range from 0 to 4V. The output is a heater requiring 0 to 8V. A PID controller is to be used with $K_p = 2.4\% / \%$, $K_i = 9\% (\% - \text{min})$, $K_d = 0.7\% / (\% / \text{min})$. The period of the fastest expected change is estimated to be 8 seconds. Develop the PID circuit. [10]

- Q5)** a) Sketch the following control valves. [8]
 i) Globe Valve
 ii) Butterfly Valve
 iii) Diaphragm Valve
 iv) Plug Valve
 b) Find the proper valve size in inches for pumping a liquid flow rate of 600 ga/min with maximum pressure difference of 55psi. The liquid specific gravity is 1.3. Use the following control valve flow coefficient table. [8]

Valve Size inches	Cv
1/4	0.3
1/2	3
1	14
1 1/2	35
2	55
3	108
4	174
6	400
8	725

OR

- Q6)** a) Explain the terms flashing and cavitation with respect to control valves. [8]
b) An equal percentage valve has a maximum flow of 50 cm³/s and a minimum of 2cm³/s. If the full travel is 3cm, find the flow at a 1cm opening. [8]

SECTION - II

- Q7)** a) Explain feed forward control scheme for a steam heated heat exchanger. [8]
b) Explain with block diagram the concept of Model Reference Adaptive Controller (MRAC). [8]

OR

- Q8)** a) Explain with suitable example overriding control scheme to protect a process equipment. [8]
b) Explain with block diagram the concept of Model Based Controller (MBC). [8]

- Q9)** a) Draw and explain the P & I diagram for cascade control of a multiple effect evaporator. [10]
b) Draw and explain P & I diagram for three element control of drum level in a boiler. [8]

OR

- Q10)** a) Draw and explain P & I diagram for inferential control for top and bottoms product composition of a distillation column. [10]
b) Define a Robot. Explain how robots are classified. [8]

- Q11)** a) Explain with block diagram the architecture of a typical Distributed Control System (DCS). [8]
b) Write a short note on Square Root Extractor. [8]

OR

- Q12)** a) Explain with block diagram the architecture of a SCADA system. [8]
b) Explain with neat diagram a strip chart recorder. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1984

[Total No. of Pages : 3

[5254] - 94

B.E. (Electronics)

AUDIO & VIDEO ENGINEERING

(2008 Pattern) (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) 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 chromaticity diagram. [6]
b) Explain the mixing of colors used in color TV system. [6]
c) Draw a neat diagram of LED display & explain its working. [6]

OR

- Q2)** a) With respect to composite video signal explain the significance of forward scan, retrace, sync pulse, front & back porch and color burst. [6]
b) Define the terms :- [6]
i) horizontal & vertical resolution
ii) viewing angle
iii) kell factor
c) Explain the color circle diagram. [6]

- Q3)** a) Draw a neat block diagram of color TV receiver and explain function of each block. [8]
b) With the help of neat block diagram explain remote control used for color TV. [8]

OR

P.T.O.

- Q4)** a) Draw a neat block diagram of PAL encoder & decoder and explain function of each block. [8]
b) Compare PAL color system with NTSC & SECAM. [8]
- Q5)** a) Explain Digital TV transmitter using neat block diagram. [8]
b) Sketch & explain MAC & advanced MAC signals. [8]

OR

- Q6)** a) What is need of video compression? State the various schemes of video compression & explain any one of them in detail. [8]
b) State the objectives of MPEG-4 standard. Using abstract model explain the concept of audio/visual objects and their spatiotemporal relationships to generate encoded bit streams. [8]

SECTION - II

- Q7)** a) Explain the concept of video on demand. [6]
b) Explain conditional access system (CAS) using neat block diagram. [6]
c) Discuss the case study of live cricket match broadcasting. [6]

OR

- Q8)** a) State the features of CCTV. Explain its operation using neat block schematics. [6]
b) Discuss the various HDTV standards. [6]
d) Explain the concept of satellite TV. [6]

- Q9)** a) What are the advantages of digital sound recording? Explain any one technique of digital sound recording using neat diagram. [8]
b) Draw a neat block diagram of blue ray DVD player & explain function of each block. [8]

OR

- Q10)** a) State & explain the various audio compression standards. [8]
b) Write down important specifications of VCD & DVD player. [8]

Q11) Explain the following terms -

[16]

- a) Reverberation
- b) Acoustic feedback
- c) Acoustic chamber
- d) Dolby stereophonic system

OR

Q12) Write notes on -

[16]

- a) Graphic equalizer
- b) Chord less microphone system
- c) Satellite radio
- d) Special type speakers

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1985

[Total No. of Pages : 3

[5254] - 95

B.E. (Electronics)

IMAGE PROCESSING AND MACHINE VISION

(2008 Pattern)

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) *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) *Black figures to the right indicate full marks.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) With the help of neat diagram explain the various steps in Digital Image Processing. **[8]**
- b) Discuss Image formation model. Define illumination and reflectance. **[8]**

OR

- Q2)** a) What is an image model? Explain image sampling and Quantization in Detail. **[8]**
- b) Explain image formation in human visual system. **[8]**

- Q3)** a) Answer the following related to histogram of an image **[8]**
- i) If all pixels in an image are shuffled, will there be any change in the histogram? Justify your answer.
 - ii) Can two different images have different histogram? Justify your answer.
- b) Discuss in detail, image enhancement in frequency domain. **[8]**

OR

P.T.O.

Q4) a) Filter the given image $f(m, n)$ using 3×3 averaging using zero padding. **[8]**

$$F(m, n) = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 4 & 2 & 5 & 1 \\ 1 & 2 & 6 & 3 \\ 2 & 6 & 4 & 7 \end{bmatrix}$$

b) What is sharpening filter? Where it is required? **[8]**

Q5) a) Explain segmentation using thresholding. What is global threshold and local threshold? How we can select threshold value for optimum Segmentation. **[9]**

b) Write short note on **[9]**

i) Canny edge detector

ii) Chain code for boundary representations

OR

Q6) a) What are boundary descriptors? Explain Fourier descriptor in detail. **[9]**

b) With the help of suitable mask explain the following : **[9]**

i) Point detection

ii) Line detection

iii) Edge detection

SECTION - II

Q7) a) What is lossy and Lossless image compression? Give their performance parameters, applications, advantages and disadvantages. Whether JPEG standard is for lossy or lossless compression? **[10]**

b) With the help of neat block diagram explain Lossless Predictive Coding. **[8]**

OR

Q8) a) Write short note on, "Transform coding". **[9]**

b) Explain the Image Pyramid used for Multiresolution image Analysis. **[9]**

- Q9) a)** What is moments? Explain different statistical moments used for shape representation? [8]
- b) Explain the contour based shape representation and description of an image. [8]

OR

- Q10)a)** With the help examples describe shape number for shapes of order 4,6 and 8. [8]
- b) Explain the different algorithms of region identification. [8]

- Q11)a)** Compare Statistical and Syntactical approach for object recognition.[8]
- b) Explain the projective ambiguity and matching constraints with reference to scene reconstruction. [8]

OR

- Q12)a)** Explain the camera model of a single perceptive camera. [8]
- b) Explain Support Vector Machine approach for pattern recognition. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1986

[Total No. of Pages : 3

[5254] - 98

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) State and describe formula for mobile radio propagation between fixed stations. [8]
- b) Why to use 1-mi. intercept? [6]
- c) Write note on Cell sectorization [4]

OR

- Q2)** a) Discuss How Cell splitting and frequency reuse in mobile communication enhances spectral efficiency. [6]
- b) Describe in detail working of Cellular system. [8]
- c) Define Line of sight & Obstructive Path. [4]

OR

- Q3)** a) Describe Interference reducing directional antennas and Space diversity antenna. [8]
- b) Describe near end and far end interference with suitable example. [8]
- Q4)** a) Derive free space path loss formula for wireless communication. [8]
- b) Discuss fixed and non-fixed channel assignment in Mobile Communication. [8]

P.T.O.

- Q5) a)** Describe the architecture of HSCSD. [8]
b) Explain how dynamic splitting is superior than permanent splitting. [8]

OR

- Q6) a)** How security is achieved in Mobile network? Explain algorithms related to Security. [8]
b) With neat block diagram, describe GSM architecture in detail. [8]

SECTION - II

- Q7) a)** Define and explain the following terms with respect to the satellite communication. [8]
i) Poles
ii) Latitude
b) Draw the block diagram and explain Attitude and Orbit Control subsystem of a satellite. [8]

OR

- Q8) a)** Discuss TT & C System of Communication satellite. [8]
b) Compare LEO, MEO and GEO Satellites. [8]
- Q9) a)** Derive Bit rate and C/N ratio for QPSK System. [8]
b) Define and explain the following terms with reference to the FM techniques. SNR, Pre-emphasis & De-emphasis. [8]

OR

- Q10) a)** A satellite transponder has a bandwidth of 358.4 MHz. Earth stations use RRC filters with $\alpha = 0.4$. What is the maximum bit rate that can be sent through this transponder with BPSK and QPSK? [8]
b) Discuss Link Design Procedure in C band. [8]

- Q11)a)** Explain the terms with respect to VSAT **[10]**
- i) Free space path loss
 - ii) Edge of coverage loss
- b) Explain with a neat diagram the FDMA frame structure. **[8]**

OR

- Q12)a)** What is the necessity of Multiple Access Techniques? **[10]**
- b) Define and explain the meaning of VSAT? List the applications of VSAT with suitable example. **[8]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1987

[Total No. of Pages : 3

[5254] - 99

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Q1) a) How is spark pulse generated? What is the method of spark timing control in ignition system? **[10]**

b) What are the differences in SI & Diesel engine operation? **[8]**

OR

Q2) a) Explain with a neat diagram 4-stroke operation of SI engine? **[10]**

b) Explain different types of Hybrid vehicles. **[8]**

Q3) a) Explain the methods with principle of sensor operations for the following : **[8]**

i) MAP

ii) Exhaust Oxygen sensing

iii) Throttle plate sensing

iv) Engine speed

b) What are the different types of actuators used in automotive electronics? Explain working Principle of Solenoid & its role in fuel injection system. **[8]**

P.T.O.

OR

- Q4)** a) What are the various modes of operation of Hybrid Electric Vehicle (HEV)? [8]
- b) Explain with the help of working Principle, characteristics, limitations and usage for the following sensors in context with automotive system. [8]
- i) Temperature sensor
- ii) Vibration sensor
- Q5)** a) How steering control system (power/manual) works? Explain with proper diagram. [8]
- b) What are different strategies of 'Engine Management System' used in automotive systems? [8]

OR

- Q6)** a) Explain the importance of ABS. How is it implemented? [8]
- b) Write short notes on : [8]
- i) Wiper control
- ii) Remote keyless entry

SECTION - II

- Q7)** a) What is the selection criteria for processors of Automotive System. [10]
- b) State and explain hardware and software debugging techniques in context with Automotive application. [8]

OR

- Q8)** a) Explain the tool-chain for developing an Embedded 'C' program. [10]
- b) Compare 'soft real time' with 'hard real time' in context with automotive system. [8]
- Q9)** a) With the help of proper example, justify the relevance of Communication Protocols in automotive applications. [8]
- b) With an example, explain utility of GPS & GPRS in automotive environment. [8]

OR

Q10)a) Explain the features of CAN. How is it suitable for Data Communication in Automotive Electronics? [8]

b) Compare architectural features of ARM 9 and ARM cortex in automotive applications. [8]

Q11)a) What are the future trends for emission control? [8]

b) Explain the diagnostic coder for automotive. [8]

OR

Q12)a) What are the various safety norms and statements used in automotive system? [8]

b) Compare 'On-board' and 'off-board' diagnostics in automotive application. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1988

[Total No. of Pages : 2

[5254] - 100

B.E. (Electronics) (Elective - IV)

ARTIFICIAL INTELLIGENCE

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Discuss the various definitions of Artificial Intelligence. Explain the applications of AI. **[10]**
- b) Compare the different uninformed search techniques. **[8]**

OR

- Q2)** a) Explain the architecture of typical agent. What is a rational agent? **[10]**
- b) Explain "Simple Reflex based agents" with the help of schematic diagram. **[8]**

- Q3)** a) Explain different parameters on which performance of searching algorithm is measured. **[8]**
- b) Explain minmax search algorithm with suitable example. **[8]**

OR

- Q4)** a) Explain A* algorithm with suitable example. **[8]**
- b) Explain hill climbing algorithm with plateau, ridge. **[8]**

P.T.O.

- Q5) a)** Explain the different types of Neural Network architectures. [8]
b) Explain the unification algorithm in detail [8]

OR

- Q6) a)** Explain the different types of learning methods with suitable examples. [8]
b) State the rules and steps for converting given well predicate logic statements to clausal form. [8]

SECTION - II

- Q7) a)** Explain the decision tree algorithm with suitable example. [10]
b) Explain in detail the architecture of artificial neural network. [8]

OR

- Q8) a)** What are different learning methods? Explain in detail. [10]
b) How the performance of learning algorithm can be accessed explain with suitable example. [8]

- Q9) a)** Give the detailed Architecture of Expert system. [8]
b) Explain Waltz algorithm with example and comment on it's limitations. [8]

OR

- Q10) a)** Explain perception confined to vision and speech recognition system. [8]
b) What is the difference between expert system and traditional system? Comment on the advantages and disadvantages of expert system. [8]

- Q11) a)** What is NLP? Explain all phases of NLP. [8]
b) Explain the syntatic Analysis with suitable examples. [8]

OR

- Q12) a)** Parse each sentences using top-down and bottom-up approach. [8]
i) Mary wanted the plants.
ii) The Brown dog ate the bone.
b) Explain the steps in Natural language processing. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1989

[Total No. of Pages : 2

[5254] - 100 - A
B.E. (Electronics)
NANOTECHNOLOGY IN ELECTRONICS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Q1) a) Enlist the tools for measuring nanostructures. Explain any one tool in detail. **[8]**

b) Explain the fundamental science behind Nanotechnology. **[8]**

OR

Q2) a) Explain the tools to imagine nano-behaviours. **[8]**

b) Explain the tools to make nano-structures. **[8]**

Q3) a) Write short note on Novel dielectric materials for future transistors. **[8]**

b) Explain the silicon Nanocrystal non volatile memories. **[8]**

OR

Q4) a) Explain the nanoscale lithography. **[8]**

b) Explain the nano-CMOS devices. Also give its applications. **[8]**

P.T.O.

- Q5)** a) Explain the properties of nanotubes. [8]
b) Write short note on the following : [10]
i) Metal nanostructures.
ii) Semiconducting nano-particles.

OR

- Q6)** a) Explain any two applications of carbon nanotubes. [8]
b) Explain the following related to carbon nanostructure. [10]
i) Carbon molecules.
ii) Carbon clusters.

SECTION - II

- Q7)** a) Write a short note on molecular and super molecular switches. [8]
b) Explain the Micro Electro Mechanical Systems (MEMS). [8]

OR

- Q8)** a) Explain the lithography. [8]
b) Explain the Nano Electro Mechanical Systems. (NEMS). [8]

- Q9)** a) Explain the Atomic lithography. [8]
b) Explain the tools of manufacturing of micro and nano fabrication optical lithography. [8]

OR

- Q10)** a) Explain the nano Electronics for advanced computation and communication. [8]
b) Explain the Electron beam lithography. [8]

- Q11)** a) Explain the application of Nanotechnology to capture the light energy. [8]
b) Enlist the application of nanostructures in Electronics. Explain any one in detail. [10]

OR

- Q12)** a) Explain the application of nano structures in sensors and optics. [8]
b) Give the applications of Nanotechnology in Biomedical Electronics. Explain any one in detail. [10]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2051

[Total No. of Pages : 3

[5254]-101

**B. E. (Electronics & Tele-Communication)
ELECTRONICS PRODUCT DESIGN
(2008 Pattern) (Semester - I)**

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) *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) Enlist important specifications of any one electronic product. [6]
b) What is reliability? Discuss at least two schemes to improve the reliability of system. [6]
c) With the help of suitable example explain how techno-commercial feasibility is established. [6]

OR

- Q2)** a) With the help of neat block diagram explain the different stages of product design & development. [6]
b) Draw a neat diagram of regulated power supply & estimate the reliability of the same. Assume suitable values for failure rate of the used components. [6]
c) Explain the importance of various environmental tests carried out on the product. [6]
- Q3)** a) Discuss the different factors to be considered while selecting OP-AMP as signal conditioner. [8]

P.T.O.

- b) State & justify the performance selection parameters for ADC selection with suitable example. [8]

OR

- Q4)** a) State the important features of instrumentation amplifier. Discuss the case study of error budget analysis using IA. [8]
b) State the important specifications of DAC. Compare the different types of DAC. [8]

Q5) Explain in detail the microcontroller interface with - [16]

- a) LED
b) LCD
c) Keyboard
d) Touch Screen

OR

- Q6)** a) Discuss the different factors to be considered while selecting a microcontroller. [8]
b) Write note on - [8]
i) I²C
ii) SPI

SECTION - II

- Q7)** a) Explain the different approaches of software development using neat block diagram. [10]
b) Briefly explain the debuggers & simulators. [8]

OR

- Q8)** a) Discuss the various factors affecting choice between low-level & high-level language. [8]

- b) Write short notes on : [10]
- i) Hardware test programs
 - ii) Documentation for software

- Q9)** a) Discuss in detail the PCB design considerations for [8]
- i) Analog circuits
 - ii) Mixed signal circuits
- b) Define signal integrity. Discuss the variation factors on which signal integrity depends. [8]

OR

- Q10)**a) What is shielding? Discuss the different levels of shielding. [8]
- b) With suitable practical set-up explain how EMI test is conducted on an electronic product. [8]

- Q11)**a) Explain the following terms - [8]
- i) Radio link
 - ii) Path profile & profile loss
 - iii) SNR
 - iv) SINAD
- b) With the help of neat diagram explain the working & importance of equalizer. [8]

OR

- Q12)**a) Discuss the frequency selection criterion with suitable example. [8]
- b) Discuss the requirements of multimedia PC level 1 & level 2. [8]



Total No. of Questions : 12]

SEAT No. :

P2052

[Total No. of Pages : 3

[5254]-102

B. E. (Electronics & Tele Communication)

VLSI DESIGN & TECHNOLOGY

(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 book.*
- 3) *Figure to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Draw & Explain Pushpull CMOS inverter. Also draw small signal model of pushpull inverter. [8]
- b) With I-V Characteristics explain MOSFET as current source and Current sink. [8]

OR

- Q2)** a) What are the cascode amplifiers? Draw the diagram of cascode amplifier and explain its VTC. [8]
- b) Explain classical two stage CMOS OP-AMP with diagram. [8]
- Q3)** a) Explain following terms in brief. [8]
- i) Enhancement and Depletion mode MOSFET
 - ii) Hot electron effect and Body effect.
- b) Design CMOS logic for $Y = \overline{a + (b + c).d}$ [8]

P.T.O.

OR

Q4) a) Explain CMOS transmission gate in details. Draw 4:1 Mux using transmission gates. [8]

b) What is Technology scaling? What are the effects of technology scaling on chip level design? [8]

Q5) a) Draw state diagram and write VHDL code for traffic light controller.[9]

b) What is the necessity of test benches? State types of test benches and explain any one with suitable examples. [9]

OR

Q6) a) Compare 'Function' and 'Procedure' in detail with suitable examples.[5]

b) Explain 'Signals' and 'Variables' with suitable examples. [4]

c) Explain 'Moore' and 'Melay' Machines with suitable examples. [9]

SECTION - II

Q7) a) Draw and explain architecture of CPLD in detailed. [8]

b) Explore following terms w.r.t FPGA CLB, Versa Block, GRM, GCLK, DCM, GTS, DLL, Block RAM. [8]

OR

Q8) a) Compare ASIC, Memory, PAL, PLA, CPLD and FPGA. [8]

b) What is the difference between logic implemented in CPLD & logic implemented in FPGA. [8]

Q9) a) Explain different types of faults. Explain stuck open and stuck short fault in detail. [8]

b) What is JTAG? List different signals involved. [8]

OR

Q10)a) Explain in brief [8]

i) Controllability

ii) Observability

iii) Predictability

iv) Testability

b) What is need of 'Boundary scan'? Explain with the help of block diagram. [8]

Q11)a) Explain clock skew with an example. How to minimize the effect of clock skew. [8]

b) What is floor planning? Explain Global and switch box routing in detail. [10]

OR

Q12)a) Explain single phase and two phase clocked systems. [6]

b) What is power optimization? Explain the methods of power optimization of various levels. [6]

c) Explain i/p pad, o/p pad and three state pad design. [6]

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Total No. of Questions : 12]

SEAT No. :

P2053

[Total No. of Pages : 3

[5254]-103
B. E. (E & TC)
COMPUTER NETWORKS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Draw TCP/IP protocol suite. List with example addresses present at every layer. [8]
- b) Compare Co-axil cable, Twisted pair cable and fibre optic cable. [6]
- c) Explain client server network. [4]

OR

- Q2)** a) Draw ISO-OSI model and explain in brief function of each layer. [8]
- b) Draw and explain typical cable TV system. How cable video signal and internet data can be send over the same cable. [6]
- c) What is DSL? Explain any two types of DSL. [4]

- Q3)** a) Explain CSMA/CD. [6]
- b) What is framing concept in data link layer? Explain in details. [6]
- c) Explain token bus protocol. [4]

OR

P.T.O.

- Q4)** a) Explain Go back-N ARQ and selective repeat ARQ protocols. [6]
b) Draw HDLC frame format. Write function of each field. [6]
c) How does token ring LAN operate? [4]

- Q5)** a) What is frame Relay? Explain the different frame formats used in frame Relay. [10]
b) What is VLAN? How does it work? Explain with necessary diagram.[6]

OR

- Q6)** a) Explain the functions of different layers in Bluetooth. Also explain the different types of frame formats used in Baseband layers. [10]
b) What is IEEE 802.11? Explain wireless LAN in brief. [6]

SECTION - II

- Q7)** a) Show the format of typical IP datagram header and explain. [6]
b) What are different static routing algorithms? Explain any one in detail.[6]
c) Why is ARP request broadcast but ARP reply unicast? [4]

OR

- Q8)** a) List the various protocols giving their significance at network layer.[6]
b) Briefly define subnetting. How do the subnet mask differ from a default mask in classical addressing? [6]
c) What is DHCP? How does it work. [4]

- Q9)** a) Explain QOS at transport layer. Also write about transport service primitives. [8]
b) Explain connection establishment and connection releasing with respect to transport layer. [8]

OR

- Q10)a)** Draw the TCP header. Explain the function of each field. [8]
- b) How congestion affects network performance? Also explain the difference between flow control and congestion control. [8]

- Q11)a)** What is DNS? Explain the components of DNS system. [6]
- b) Explain Telnet and FTP in detail with respect to server and client communication. [8]
- c) What is URL & what are its Components. [4]

OR

- Q12)a)** What are the main responsibilities of application layers? Explain in brief. [6]
- b) Distinguish between public key and private key algorithm. State the advantages of RSA algorithm. [8]
- c) What is the function of SMTP and POP-3 Protocols in E-mail system?[4]



Total No. of Questions : 12]

SEAT No. :

P2054

[Total No. of Pages : 3

[5254]-104
B. E. (E & TC)
DIGITAL IMAGE PROCESSING
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q. 1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, 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 answersheet for each section.*
- 5) Use of electronic pocket calculator is allowed.*

SECTION - I

Q1) a) With the help of block diagram explain components of image processing system. **[8]**

b) Explain spatial resolution and gray level resolution in images. **[8]**

OR

Q2) a) List and explain any four statistical parameters and their significance with reference to image processing. **[8]**

b) Write a short note : **[8]**

i) Mach band effect

ii) Brightness adaption

Q3) a) Explain any two arithmetic and any two logical operations in image processing. Write application of each. **[10]**

b) Write the steps in frequency domain filtering. **[8]**

OR

P.T.O.

- Q4)** a) Explain the significance of color model. Describe RGB and CMY color models. Compare RGB color model with CMY color model. [10]
- b) Write the negative image matrix for following image matrix. Assume 8-bit length of each pixel. [8]

$$\begin{bmatrix} 100 & 25 & 100 \\ 150 & 25 & 100 \\ 150 & 25 & 25 \end{bmatrix}$$

Draw histograms and comment on histogram of input image matrix and histogram of output image matrix

- Q5)** a) Explain following transforms with its properties. [10]
- i) Haar transform
 - ii) DCT
- b) With reference to 2D transform, explain : [6]
- i) symmetry
 - ii) separability
 - iii) Basis Image

OR

- Q6)** a) Explain necessity of image transformation Explain DFT and its application in image processing. [10]
- b) Write a note on Walsh. Hadamard transform. [6]

SECTION - II

- Q7)** a) Explain the following with respect to compression. [8]
- i) Entropy coding methods.
 - ii) Fidelity criteria.
- b) Compare lossy and loss-less compression. Explain any one lossy compression method. [8]

OR

- Q8)** a) Explain arithmetic coding with example compare with Huffman coding. [8]
b) Explain Lossy Predictive coding technique with the help of block diagram. [8]

- Q9)** a) What is the need of boundary representation. State different methods of boundary representation. Obtain object shape represented by 8-directional chain code 466001225642. [10]
b) Explain image segmentation based on thresholding. Explain various types of thresholding techniques used in image segmentation. [8]

OR

- Q10)** a) What is edge detection? How edge detection algorithm can be used to detect the liquid level content of a transparent bottle. Propose the complete algorithm & state clearly all assumptions made. [10]
b) Explain Hough transform in detail. [8]

- Q11)** a) Explain the difference between image enhancement & restoration? Explain Inverse filtering used in image restoration. [8]
b) Explain with block diagram algorithm of character recognition in image processing. [8]

OR

- Q12)** a) Write short note on : [8]
i) Acoustic imaging
ii) Medical image processing.
b) Explain the image degradation model in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P2055

[Total No. of Pages : 3

[5254]-105

B.E. (E & TC)

EMBEDDED SYSTEMS & RTOS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Define Embedded systems. What are challenges faced in design of embedded system? What are categories of embedded system. [9]
- b) What is design metric? Explain following design metrics. [9]
- i) Power
 - ii) Time to market
 - iii) Safety

OR

- Q2)** a) What is CAN protocol? Explain in detail. [9]
- b) What is SPP (Single Purpose Processor), GPP (General Purpose Processor) and ASIP (Application Specific processor)? Compare between them. [9]
- Q3)** a) With the help of block diagram, explain architecture of LPC2148. [8]
- b) What is significance of following registers of LPC2148. [8]
- i) IODIR
 - ii) IOSET
 - iii) IOCLR
 - iv) IOPIN

OR

P.T.O.

- Q4)** a) Compare ARM7 ARM9 and ARM11 processor. [8]
b) Explain LCD interfacing to LPC 2148. Write embedded C program to display 'RTOS' on display. [8]

- Q5)** a) What is importance of os in embedded system? Compare traditional os and embedded os. [8]
b) With diagram, explain architecture of μ -cos-II Kernel. [8]

OR

- Q6)** a) What is task? Draw and explain task state diagram. [8]
b) What is significance of Scheduler in the Kernel? Explain any three scheduling algorithms in detail. [8]

SECTION - II

- Q7)** a) What is embedded Linux? What are different tools required to develop an application in ARM system using Linux? [8]
b) What is file system? Explain any two file systems used in embedded Linux. [8]

OR

- Q8)** a) What is device driver? Explain with simple application. [8]
b) What is Loadable Kernel Module? Explain following commands. [8]
i) insmod
ii) rmmod

- Q9)** a) Compare and contrast Android and Symbian os used in smart phone. [8]
b) What is Software Development Life Cycle (SDLC)? Explain any one model for it. [8]

OR

- Q10)**a) How symbian, vxworks and QNX are useful for embedded application. **[8]**
b) Compare spiral and waterfall model. **[8]**

- Q11)**a) With reference to following explain Adaptive cruise control system. **[9]**
i) Block diagram
ii) Control Algorithm
iii) Operation
b) What are hardware requirements of mobile phone? Explain os and other control operation in it. **[9]**

OR

- Q12)**a) With the help of block diagram, Hardware & Software component and sample algorithm, explain digital camera. **[9]**
b) Explain RF-ID authentication system. Explain with hardware and software components. **[9]**



Total No. of Questions : 12]

SEAT No. :

P2056

[Total No. of Pages : 3

[5254]-106

B.E. (Electronics & Telecommunication)

INDUSTRIAL DRIVES AND CONTROL (Elective - I)
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is dual converter. Explain with circuit diagram and wave form, the working of single phase dual converter with highly inductive load. Derive the equation for circulating current I_c . [10]
- b) The single phase dual converter is operated from $j20V$, $60Hz$ supply and load resistance $R = 10\Omega$. The circulating Inductance $L_c = 40mH$, Delay angles $\alpha_1 = 60^\circ$ and $\alpha_2 = 120^\circ$. Calculate peak circulating current and peak current of converters. [8]

OR

- Q2)** a) Explain source inductance effect on the operation of single phase converter. Derive equation of average output current (I_{dc}) and average load Voltage (V_{dc}). [8]
- b) Explain with circuit diagram and wave forms. Working of three phase full controlled converter using R-L load. Comment on Power factor. Derive the equation for DC load Voltage. [10]
- Q3)** a) What is DC-AC converter. Explain with circuit diagram and waveforms working of three phase voltage source inverter with 180° conduction mode with purely resistive load. [8]

P.T.O.

- b) The three phase voltage source Inverter is operating in 180° mode conduction mode has star connected resistive load $R=10\Omega$. The Inverter frequency is 50Hz and DC input voltage is 200V. Determine [8]
- i) RMS line voltage
 - ii) Total Power in the load

OR

- Q4)** a) Explain with neat circuit diagram and wave forms the working of 3 phase to 1 phase cyclo converter. [8]
- b) Explain with schematic the operation of 3 phase current source Inverter.[8]

- Q5)** a) What are the necessities of drive circuit in power controller applications. Explain with diagram and wave forms the working of micro controller based control of DC Drives. [8]
- b) Explain in detail, with block diagram, Closed loop speed control of DC Drive. [8]

OR

- Q6)** a) Sketch a single phase semi converter fed separately excited DC shunt motor as Drive. The field current is also controlled by semi converter. Explain how this circuit can be used for speed control of DC shunt motor below the rated speed with necessary wave forms. [8]
- b) Sketch the equivalent circuit of DC series motor and explain why it is not advisable to run series motor without load. [8]

SECTION - II

- Q7)** a) Sketch and explain torque - speed characteristics of A.C. motor drives.[8]
- b) Which are the different speed control methods of Induction motor. Explain the operation any one in detail. [8]

OR

- Q8)** a) Explain briefly the braking method of induction motor. [4]
b) Derive expression for maximum torque and maximum slip for an induction motor assuming $R_s = 0$. [6]
c) Explain slip power and methods to recover slip power. [6]
- Q9)** a) Explain with necessary diagram the operation of cylindrical rotor motor. [8]
b) Draw and explain frame speed characteristics of synchronous reluctance motor at constant voltage and frequency. [8]

OR

- Q10)** a) With the help of neat circuit diagram and wave forms, explain the operation of brushless DC motor. [8]
b) Describe construction and working of variable reluctance stepper motor. List down its advantages and disadvantages. [8]
- Q11)** a) Explain the operation of fuzzy logic based wind generation system. [9]
b) Explain traction drive with an application of Road Railway. [9]

OR

- Q12)** a) What is the necessity of power quality. Explain with different types of power line disturbances. [9]
b) What is Energy Audit. Explain required procedure for energy audit. [9]



Total No. of Questions : 12]

SEAT No. :

P2057

[Total No. of Pages : 3

[5254]-107

B.E. (E & TC)

MICROWAVE COMMUNICATION & RADAR

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) What is the waveguide? Explain the parameters of the rectangular waveguide. [9]

b) Discuss the power losses & Power transmitted in rectangular waveguide. [9]

OR

Q2) a) What are Microwave? Explain advantages & applications of Microwave. [9]

b) Differentiate between waveguide & coaxial cable. [9]

Q3) a) Describe the operation of Magic Tee. [8]

b) Explain construction & principle of operation of Microwave alternators. [8]

OR

Q4) a) Describe the operation of E-plane & H-plane tees. [8]

b) Describe the operation of circulators & Isolators. [8]

P.T.O.

- Q5)** a) Explain construction & principle of operation of TWT. [8]
b) Explain the operating modes of Magnetron. [8]

OR

- Q6)** a) What are slow-wave structures? Explain its advantages & application. [8]
b) Discuss the limitations of conventional tube at microwave frequencies & explain the remedy for these. [8]

SECTION - II

- Q7)** a) Explain construction, principle of operation & parameters of Microwave transistor. [9]
b) Compare IMPATT with TRAPATT diode. [9]

OR

- Q8)** a) Explain construction, principle of operation & parameters of Varactor diode. [9]
b) What are parametric amplifiers? Explain its construction & principle of operation. [9]

- Q9)** a) Draw & explain the block diagram of network analyzer. [8]
b) Explain the method of measuring impedance of terminating load in Microwave system. [8]

OR

Q10) Write a short note on : [16]

- a) VSWR measurement
- b) Power meter
- c) Noise factor
- d) Q-factor

- Q11)** a) Explain the principle & working of an MTI radar. [8]
- b) Explain A-scope & PPI displays with reference to radars. What are their limitations. [8]

OR

Q12) Write a short note on : [16]

- a) Doppler radar
- b) Planar array radars
- c) Pulsed radar
- d) CW radar



Total No. of Questions : 12]

SEAT No. :

P2058

[Total No. of Pages : 3

[5254]-109

B.E. (E & TC)

JOINT TIME FREQUENCY ANALYSIS

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from section I and 3 questions from section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *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) Consider the continuous time function $x(t)$ defined as,

$$\begin{aligned}x(t) &= 1 - |t| & -1 < t < 1 \\ &= 0 & \text{otherwise}\end{aligned}$$

Find the Time Bandwidth product for this function. Write all steps to calculate time variance and frequency variance. [14]

b) What are Hilbert & Banach Spaces? [4]

OR

Q2) a) Why a signal can not be time-limited & band-limited Simultaneously? Explain with suitable examples. [8]

b) Prove that in Haar 2-band filter bank, synthesis filters are power complementary. [8]

c) What are analytic functions? [2]

P.T.O.

Q3) Analyze the given $x(t)$ using 2 Band Haar filter bank structure : [16]

$$\begin{aligned}x(t) &= t & 0 \leq t \leq 3 \\ &= 0 & \text{otherwise.}\end{aligned}$$

OR

Q4) Explain : [16]

- Tiling diagram
- Uncertainty Principle
- Instantaneous frequency
- Nested subspaces

Q5) Signal $x(t)$ is defined as :

$$\begin{aligned}x(t) &= t/2 & 0 \leq t \leq 2 \\ &= \frac{-t}{2} + 1 & 2 \leq t \leq 4\end{aligned}$$

- Find projection of $x(t)$ so that it belongs to subspace V_0 . [8]
- Find projection of $x(t)$ so that it belongs to subspace V_1 . [6]
- Prove that $V_1 = V_0 \oplus W_0$. [2]

OR

- Q6)** a) Derive the alias cancellation condition for 2 Band Haar filter bank. Also give the transfer functions of LPF & HPF used in analysis & synthesis sections. [14]
- b) Explain the difference between $X(Z)$ & $X(-Z)$ [2]

SECTION - II

- Q7)** a) Compare Haar and Daub-4 filters. [2]
- b) Design the Daub - 4 filter bank. [8]
- c) Explain the effect of dilation & translation of a function $\phi(t)$ & $\psi(t)$ in frequency domain. [8]

OR

- Q8)** a) Discuss the concept of vanishing moments. [4]
- b) Given $x(t) = 3 - t, 0 < t < 3$
- i) Calculate $x_0(t) \in V_0, g_0(t) \in W_0, x_1(t) \in V_1$ [10]
- ii) Prove $x_0(t) + g_0(t) \in V_1$ [4]

Q9) Discuss : [16]

- a) Wavelet Packet Trees
- b) Biorthogonal 5/3 tap design

OR

Q10) Using Lifting Scheme, decompose the signal $x(n) = \{6, 5, 4, 3, 1, 2, 3, 4\}$ till V_0 subspace. The given signal belongs to subspace V_3 . Clearly show in-place computation. Show the reconstruction. [16]

Q11) Write short notes on : [16]

- a) Need for Joint Time Frequency Analysis.
- b) Audio compression using wavelets.

OR

Q12) Given $x(n) = \{5, 7, 20, 4, 13, 4, 10, 0\} \in V_3$. Perform MRA using Haar filters.

- a) Find projections in V_2, W_2, V_1, W_1, V_0 & W_0 spaces.
- b) Reconstruct after suppressing (making zero) coefficients in W_j subspaces and show denoising effect on reconstructed signal $x_d(n)$ when compared with $x(n)$.

[16]



Total No. of Questions : 12]

SEAT No. :

P2059

[Total No. of Pages : 3

[5254]-110

B.E. (Electronics & Telecommunication)

MEMS & SYSTEM ON CHIP

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Attempt 3 each questions from each section.*
- 2) *Attempt from Section-I : Q1 or Q2, Q3 or Q4, Q5 or Q6 and from Section-II: Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 3) *Draw neat diagrams.*
- 4) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain in detail necessary ingredients that will be involved in microsystem design. [8]
- b) What are performance parameters of Gyroscope? [8]

OR

- Q2)** a) Explain mechanical properties of materials used in MEMS sensor design. [8]
- b) Explain working principal, advantage and disadvantage of Piezoresistive micro-accelerometers ? [8]

- Q3)** a) Explain the concept of : [8]
- i) Mobility
 - ii) Resistivity in context to Piezo crystal.
- b) Explain in general optical and optical silicon properties. [8]

OR

- Q4)** a) Explain various technological aspects of sensors. [8]
- b) Explain in detail necessary ingredients that will be involved in microsystem design. [8]

P.T.O.

- Q5)** a) Explain working principal magnetic transducer. Discuss its advantages and disadvantages. [9]
- b) Explain in detail electrophoresis. What is its role in MEMS fabrication?[9]

OR

- Q6)** a) Which different properties of molecule-based biosensors are used in MEMS based sensor design. [9]
- b) Explain working principal of optical transducers. In which applications it is used? [9]

SECTION - II

- Q7)** a) Explain main characteristics of VLSI technology that are leading to overall organization of microprocessors. [8]
- b) Explain SoC architecture in detail. [8]

OR

- Q8)** a) Explain how code translation in a context to hardware and software. [8]
- b) Explain in detail new ways for speeding up execution of instructions.[8]

- Q9)** a) What reliability issues are crop up in packaging? Which factors leads failures in packaging? [8]
- b) What are the requirements of packaging? What are advantages of BGA?[8]

OR

- Q10)**a) Explain in detail different approaches in area routing. [8]
- b) Compare and contrast dataflow versus control flow. [8]

Q11) a) What are the issues in testing of core based systems on chip? Explain features of co-design tool. [9]

b) Explain in detail SoC test and how issues are demonstrated? [9]

OR

Q12) a) Explain in detail UBIST. [9]

b) Explain GDC algorithm with reference to behavioral VHDL and hybrid behavioral-RTL VHDL. [9]



Total No. of Questions : 7]

SEAT No. :

P2060

[Total No. of Pages : 2

[5254]-111

B.E. (E & TC)

MOBILE COMMUNICATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Define Grade of service and blocking probability for lost cell system and explain its significance. [6]
- b) With neat diagram explain the terms : [12]
- i) Cell splitting
 - ii) Cell sectoring
 - iii) Frequency Reuse
- Q2)** a) With neat diagram, explain the three basic propagation mechanisms of signal in mobile communication system. [8]
- b) Derive an expression for received power for free space propagation model. [8]
- Q3)** a) List out various modulation techniques. With neat diagram, explain the working of spread spectrum modulation techniques. [8]
- b) With the help of block diagram, explain the working operation of RAKE receiver. [8]

P.T.O.

Q4) Write short notes on : (Any two) **[18]**

- a) Multiple access techniques
- b) Small scale fading
- c) Evolution of wireless networks

SECTION - II

Q5) a) With the help of neat diagram, explain the working of frequency domain coding technique for speech. **[6]**

b) List out various selection criteria of speech coders in mobile communication. **[4]**

c) With neat block diagram, explain in detail GSM Codec. **[8]**

Q6) a) With step by step, explain GSM call connection to a PSTN subscriber. **[6]**

b) Draw and explain in detail, GSM frame structure. **[4]**

c) With neat block diagram, explain in detail GSM system architecture. **[6]**

Q7) a) With neat block diagram, explain in detail, IS-95 system architecture. **[8]**

b) Classify CDMA channels. Explain in detail forward and reverse channel modulation process with neat diagram. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3335

[Total No. of Pages : 2

[5254]-112

B.E. (Electronics & Telecommunication)

TELECOMMUNICATION & SWITCHING SYSTEM

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three questions from each section.*
- 2) *Answers to the two sections should be written in separate 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)** Explain the importance of switching? List the switching functions? [8]
b) Compare the Packet switching and Circuit switching? [8]

OR

- Q2) a)** Explain the space division switching and time division switching? [8]
b) Derive and calculate the Availability and unavailability for dual processor system with
MTBF=2200 HRS. and MTTR=4 HRS. in 20 years? [8]

- Q3) a)** Define and explain: [10]
i) Grade of Service. ii) Peak busy hour.
iii) Trunking. iv) Erlang and CCS.
v) Congestion.
- b)** On average, during the busy hour, a company makes 120 outgoing calls of average duration 2 minutes. It receives 200 incoming calls of average duration 3 minutes. Find, [6]
i) The outgoing traffic.
ii) The incoming traffic.
iii) The total traffic.

OR

P.T.O.

- Q4)** a) Derive and Explain the Erlang's lost-call formula? [8]
b) Explain the Loss system in Tandem? How the grade of Service is handling in the loss system? [8]

- Q5)** a) What is mean by grading? Draw and explain progressive grading in detail?[8]
b) Design a Three stage switching network for connecting 100 incoming trunks to 100 outgoing trunks? [10]

OR

- Q6)** a) Explain the concept of call packing, rearrangable networks and strict sense non-blocking networks? [10]
b) What is mean by common channel signaling? Explain the different signaling networks used in common channel signalling? [8]

SECTION - II

- Q7)** a) What is mean by pulse stuffing? How the Pulse stuffing help to synchronize the network? [8]
b) Explain in detail the phase locked loop clock recovery circuit? [8]

OR

- Q8)** a) Draw and explain the block diagram for connections between two autonomously timed digital switches? What are slips? How slips are controlled? [8]
b) How the master slave synchronization work in the network? [8]

- Q9)** a) Explain in detail the ISDN transmission channel? [8]
b) Draw and explain the user network interface configuration in detail? [8]

OR

- Q10)**a) Explain the protocol stack of ISDN? [8]
b) Write the short note on ISDN services? [8]

- Q11)**a) Explain in detail landline (PSTN) to mobile (cellular) telephone call procedure? [10]
b) Explain the adjacent channel interference and co-channel interference in cellular network? [8]

OR

- Q12)**a) What is mean by handoff? How the handoff is handle by network? [10]
b) Explain the terms, [8]
i) FHSS
ii) DSSS



Total No. of Questions : 12]

SEAT No. :

P2061

[Total No. of Pages : 4

[5254]-113

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) State and explain advantages of optical fiber communication system. [6]
- b) A graded index fiber has a core with a parabolic refractive index profile which has a diameter of 50 μ m. The fiber has a numerical aperture of 0.2. Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of 1 μ m. [6]
- c) Describe the two major stages of the fiber fabrication process. [6]

OR

- Q2)** a) Compare and Contrast [6]
- i) Multimode and Single mode fiber
 - ii) Step Index and Graded Index fiber
- b) A relative refractive index difference for an optical fiber is 1%. Estimate the numerical aperture and the solid acceptance angle in air for the fiber when the core index is 1.46. Calculate the critical angle at the core-cladding interface within the fiber. [6]
- c) State advantages and disadvantages of vapour phase decomposition in the preparation of glass for optical fiber. [6]

P.T.O.

- Q3) a)** Explain the various attenuation mechanisms in optical fiber. State various techniques deployed for the measurement of attenuation in optical fibers. [8]
- b) Calculate the pulse spreading caused by material dispersion for a graded index multimode fiber working at $\lambda = 850$ nm, if the fiber's length is 100km and the light source is an LED whose rms spectral width is 70nm. The given parameters are: Dispersion slope, $S_0 = 0.097$ ps/nm² km and $\lambda_0 = 1343$ nm. Is the dispersion value positive or negative? What is interpretation of negative sign? [8]

OR

- Q4) a)** Calculate the total pulse broadening due to material dispersion for graded index fiber of total length 80 km when LED is emitting at
- i) 850 nm and
- ii) 1300 nm is coupled to the fiber

In both cases assume $\Delta\lambda = 40$ nm. The material dispersion parameter of the fiber for the two wavelengths is -105.5 ps nm⁻¹km⁻¹ and -2.8 ps nm⁻¹ km⁻¹ respectively. Comment on the selection of wavelength. [8]

- b) Write a note on the losses in optical fibers : [8]
- i) Scattering and
- ii) Dispersion

- Q5) a)** State and explain the requirements of a good optical source for fiber optical communication link. [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 1.31 μ 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 the concept of intensity modulation of LED using I-P characteristics. **[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 μm depletion layer width and carrier velocity 3×10^4 m/s. Determine the maximum bandwidth and the corresponding response time for the device.
- b) Explain Dark Current Noise and Quantum Noise with reference to optical detectors. **[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) Explain the terms quantum efficiency and responsivity of a photo detector. How are these terms related to each other? **[8]**
- Q9) a)** State the key system requirements needed in analyzing point-to-point optical communication link. To fulfill these requirements; explain the choice of components and their associated characteristics. **[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 km^{-1}

Splice loss: 0.1 dB km^{-1}

Connector losses at the transmitter and receiver: 1 dB each

Mean power required at the APD receiver :

when operating at 35 Mbit s^{-1} (BER 10^{-9}): -55 dBm

when operating at 400 Mbit s^{-1} (BER 10^{-9}): -44 dBm

Required safety margin: 7 dB

Estimate :

- i) The maximum possible link length without repeaters when operating at 35 Mbit s^{-1} (BER 10^{-9}). It may be assumed that there is no dispersion-equalization penalty at this bit rate.
- ii) The maximum possible link length without repeaters when operating at 400 Mbit S^{-1} (BER 10^{-9}) and assuming no dispersion-equalization penalty.

OR

- Q10)a)** Draw the block diagram of an analog optical fiber link and state the major noise contributors. [8]
- b) Write a short note on WDM. [8]

- Q11)a)** Explain in detail the architecture of EDFA. [8]
- b) Draw block schematic of OTDR and explain its working. [8]

OR

- Q12)a)** Compare and contrast SOA and EDFA. [8]
- b) Explain usage of GRIN-rod lenses as expanded beam connectors. [8]



Total No. of Questions : 12]

SEAT No. :

P2062

[Total No. of Pages : 3

[5254]-114

B.E. (E & TC)

SOFT COMPUTING (Elective - III)

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any one Questions out of Q1 & Q2 and Q3 & Q4.*
- 2) *Answer any one Questions out of Q5 & Q6 and Q7 & Q8.*
- 3) *Answer any one Questions out of Q9 & Q10 and Q11 & Q12.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right side indicate full marks.*
- 6) *Use of Calculator is allowed.*
- 7) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) Explain in detail Artificial Neural Network (ANN). Compare ANN with BNN. [9]
- b) State the applications of Soft Computing along with its characteristics and advantages. [9]

OR

- Q2)** a) Given Fuzzy sets are p and q. Find Complement, Union, Intersection, Difference and apply the DeMorgan's laws : [9]

$$p = \left\{ \frac{0.1}{2}, \frac{0.6}{3}, \frac{0.4}{4}, \frac{0.3}{5}, \frac{0.8}{6} \right\}$$

$$q = \left\{ \frac{0.5}{2}, \frac{0.8}{3}, \frac{0.4}{4}, \frac{0.6}{5}, \frac{0.4}{6} \right\}$$

- b) Write short notes on (Any Two) : [9]
- i) Comparison between Hard and Soft Computing.
 - ii) History of Soft Computing
 - iii) Properties on fuzzy sets.

P.T.O.

- Q3)** a) What is Max-min Composition and max-product Composition? Explain with example. [8]
- b) Describe in detail the process of Fuzzification. What are the various methods of fuzzification? Explain any two in detail. [8]

OR

- Q4)** a) Define the term Membership function with neat figure along with its characteristics and explain it in detail. [8]
- b) Define the following terms with respect to Fuzzy Inference System. [8]
- i) Premise (Antecedant)
 - ii) Conclusion (Consequent)
 - iii) Rule-base

- Q5)** a) Enlist the Fuzzy Model. Explain any one in detail. [8]
- b) What is FLC? Explain the architecture with a neat block diagram. [8]

OR

- Q6)** a) Explain Primary Linguistic Variables and Composite Linguistic Variables. [8]
- b) Given a rule : IF x is A, THEN y is B, where

$$A = \left\{ \frac{0.2}{1}, \frac{0.5}{2}, \frac{0.7}{3} \right\} \text{ and } B = \left\{ \frac{0.6}{1}, \frac{0.8}{2}, \frac{0.4}{3} \right\} \text{ Infer } B' \text{ for another rule : IF x is}$$

A', THEN y is B', where $A' = \left\{ \frac{0.5}{1}, \frac{0.9}{2}, \frac{0.3}{3} \right\}$, using Mamdani implication rule. [8]

SECTION - II

- Q7)** a) What is training algorithm? Explain training algorithm for McCulloch Pitts model. [8]
- b) List and explain any two learning rules in detail. [8]

OR

- Q8)** a) What is Perceptron? Draw block diagram for it and explain in detail. [8]
b) Explain the role of Activation function and discuss any three activation function. [8]

Q9) List out the applications of Neural Network in different field. Explain any two in detail. [18]

OR

- Q10)**a) What is BPN? Explain it and write the training algorithm for this. [9]
b) Explain Self Organizing Feature Map in detail. [9]

Q11) Write notes on : (any two) [16]

- a) Hybrid learning algorithm
- b) Learning methods that cross-fertilize ANFIS
- c) Use of ANN for process control

OR

- Q12)**a) Draw and explain architecture of ANFIS. [8]
b) What are the advantages of ANFIS over FIS? Differentiate between ANFIS and FIS. [8]



Total No. of Questions : 12]

SEAT No. :

P2063

[Total No. of Pages : 3

[5254]-115

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

SPEECH PROCESSING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 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 book.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Explain human speech production system in detail. Describe LTI and LTV model of speech production. **[10]**
- b) Explain in brief the following classes of speech signal with suitable examples. **[8]**
- i) Affricates
 - ii) Fricative
 - iii) Vowels
 - iv) Diphthongs

OR

- Q2)** a) Explain pitch period estimation using AMDF. Compare it with Autocorrelation method. **[10]**
- b) Explain in detail the classification of voiced, unvoiced and silence speech segment based on energy and zero crossing rate. **[8]**
- Q3)** a) Explain the autocorrelation method for computing Linear Predictor Coefficients. **[8]**
- b) Explain the selection of order of linear prediction filter. Explain estimation of formants using LPC. **[8]**

OR

P.T.O.

Q4) a) Obtain the direct form I filter coefficients from the following reflection coefficients. [8]

$$K_1 = -0.5212 \quad K_2 = 0.2123 \quad K_3 = -0.412$$

b) What is LSF? Explain the algorithm for conversion of LPC to LSFs. [8]

Q5) a) With the help of neat block diagram, explain the computational procedure for calculation of Mel Frequency Cepstral Coefficients (MFCC). [8]

b) Explain homomorphic processing with reference to speech processing. [8]

OR

Q6) a) How pitch and formants are estimated using cepstral domain analysis? Elaborate with the help of Block diagram. [8]

b) Write short note on the following : [8]

i) Importance of short time speech analysis.

ii) Mel scale and Bark scale

SECTION - II

Q7) a) What is speech enhancement and explain different speech enhancement techniques in detail. [8]

b) Explain Wiener filter. How it is used for echo cancellation. [8]

OR

Q8) a) Explain spectral subtraction method used for speech enhancement. [8]

b) What is comb filter? Which type of the noise can be removed using this filter? How will you make the notches in the comb filter sharp? [8]

Q9) a) Explain the various conditions that are used for the optimization of dynamic time warping algorithm. [8]

- b) From the given transition matrix draw the state diagram. [8]

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

OR

Q10)a) State goals and limitation for DTW approach. Explain the equation to find cost function of DTW algorithm with suitable example. [8]

- b) State and explain Baye's rule. Explain with suitable example how it is used for speech classification? [8]

Q11)a) What is the difference between speaker identification and speaker verification. Explain various features are used for speaker identification and verification. [10]

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

OR

Q12)a) Explain Phoneme-based concatenative speech synthesis. What are the key issues in making the synthesized sound more natural? [10]

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



Total No. of Questions : 12]

SEAT No. :

P2064

[Total No. of Pages : 3

[5254]-116

B.E. (E & TC)

TELEVISION & VIDEO ENGINEERING

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the function of tuner section in TV. What are the basic 3 blocks in this section? Also elaborate on the need of RF amplifier section in TV. [10]
- b) What is additive mixing? In what way it is used in TV? What are (R-4) and (B-4) signals? [8]

OR

- Q2)** a) Draw the block diagram of colour TV camera. Also show (R-4), (B-4) & if signals are generated at the output. [10]
- b) Explain frequency interleaving. Why is it required in TV? [8]
- Q3)** a) With the help of a block diagram explain the working of a pattern generator. [8]
- b) What is a field strength meter? Explain with a block diagram its working. [8]

OR

P.T.O.

- Q4)** a) Compare NTSC, PAL and SECAM systems of TV. [8]
b) With the help of a block diagram explain the working of a remote control. [8]

- Q5)** a) Explain with a block diagram DTV receiver. [8]
b) Explain the jpeg image compression techniques in detail. [8]

OR

- Q6)** a) What is MAC? Explain its significance. [8]
b) List the advantages of Digital TV over analog TV. [8]

SECTION - II

- Q7)** a) With a block diagram explain the working of a set top box. Also explain its need in a DTH system. [8]
b) Explain the block diagram of DTH system. Compare it with cable TV received signal. [10]

OR

- Q8)** a) Write a short note on Voice on Demand. [8]
b) Explain CCTV with block diagram. Also compare it with CATV. [10]

- Q9)** a) Draw the block diagram of a video door phone system. Explain the function of every block. [8]
b) Write a short note on ipod. [8]

OR

- Q10)** a) What is Wi-Fi TV? Where is it used. Explain its significance. [8]
b) Write a short note on Mobile TV. [8]

- Q11*)a) Distinguish between LED, LCD and plasma display devices. [8]
- b) Explain camcorder with a block diagram. [8]

OR

- Q12*)a) List and explain different video recording formats. [8]
- b) Write a short note on Thin Film Technology (TFT). [8]



Total No. of Questions : 12]

SEAT No. :

P2065

[Total No. of Pages : 3

[5254]-117

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain functional block diagram of Swept Super Heterodyne Spectrum analyzer. [8]
- b) Explain the different types of CRO probes. What are the advantages of active probe. [10]

OR

- Q2)** a) Discuss on test setup for EMI measurement. [8]
- b) Explain working principles of Digital storage oscilloscope. [10]

- Q3)** a) Discuss in detail about digital data acquisition system. [8]
- b) Draw and Explain typical instrument block diagram. What are the standards of calibrations. [8]

OR

- Q4)** a) What is the need of RF vector voltmeter? With the help of block diagram explain its working. [8]
- b) Discuss in details about network connection model. [8]

P.T.O.

- Q5)** a) Discuss the method of True RMS measurement with the help of neat diagram. [8]
- b) Define the following terms with neat example.(Any two) [8]
- i) Settling time
 - ii) Resolution
 - iii) Sensitivity

OR

- Q6)** a) Write a short note on Software used in instrumentation. [8]
- b) Explain in details about the basic Q meter. [8]

SECTION - II

- Q7)** a) Explain with block diagram of harmonic distortion. [8]
- b) Explain the triggering controls used in analog and digital oscilloscope. What are the special trigger settings available only in digital oscilloscope. [8]

OR

- Q8)** a) Discuss Network analyzer and state its application. [8]
- b) Explain block diagram and working principle of Digital phosphor oscilloscope. [8]

- Q9)** a) What is the difference between dual beam and dual trace CRO. [10]
- b) Explain the detail structure of IEEE 488 instrumentation bus used to interface spectrum analyzer with computer. [8]

OR

- Q10)**a) Discuss with the help of neat block diagram automatic test system used for measuring different parameters in audio amplifier. [10]
- b) Discuss the different capabilities of MSO. [8]

- Q11*)a) Explain application of frequency synthesis. [8]
b) Write a note on FFT analyzer. [8]

OR

- Q12*)a) Discuss in details of heterodyne wave analyzer. [8]
b) Write a note on AWG. [8]



Total No. of Questions : 12]

SEAT No. :

P2066

[Total No. of Pages : 3

[5254]-118

B.E. (Electronics & Telecommunication)

ARTIFICIAL INTELLIGENCE

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Answer any 3 questions from section I and 3 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) Explain the architecture of a typical agent. What is a rational agent. [8]
b) What is Artificial Intelligence? Mention some applications that fall within the scope of A.I. [8]

OR

- Q2)** a) Compare depth first and breath first search methods. [8]
b) Write C pseudo code for depth limit search method. Explain its merits and demerits. [8]

- Q3)** a) Explain the importance and use of plateau, ridge, local maxima and global maxima with respect to hill climbing algorithm. [8]
b) Draw the search tree for tic-tac-toe. [8]

OR

- Q4)** a) Define heuristics. Explain the significance of heuristic function in the informed search with suitable example. [8]
b) Compare different search strategies with respect to time complexity, space complexity, optimality and completeness. [8]

P.T.O.

- Q5)** a) Explain the concept of forward chaining and backward chaining in the knowledge representation. [8]
- b) Represent the following sentences by first order logic calculus [10]
- i) Some dogs bark
 - ii) All dogs have four legs
 - iii) All barking dogs are irritating
 - iv) No dogs purr
 - v) Students are people who are enrolled in the courses.

OR

- Q6)** a) What are the drawbacks of predicate logic used in representation of facts? Give five examples where it becomes extremely difficult to use predicate logic for representations. [10]
- b) What is meant by non- monotonic reasoning? Differentiate between statistical reasoning and probabilistic reasoning. [8]

SECTION - II

- Q7)** a) What are the different learning methods? Explain them in short. [10]
- b) Explain in detail architecture of an artificial neural network. [8]

OR

- Q8)** a) Explain ADA-BOOST algorithm with pseudo code. [8]
- b) Write short notes on : [10]
- i) Passive reinforcement learning
 - ii) Active reinforcement learning

- Q9)** a) Explain in detail typical architecture of expert system. [8]
- b) What is perception? Discuss different techniques used in solving perceptual problems. [8]

OR

- Q10)**a) Design phases of an expert system to diagnose childhood disease. [8]
b) Explain waltz algorithm with example and comment on its limitations.[8]

Q11)What are the five phases of

- a) Natural Language Processing (NLP)? Explain in detail semantic analysis phase. [8]
b) Parse each of the sentences using top down & bottom-up approach.[8]
i) Mary watered the plants.
ii) The brown dog ate the bone.

OR

- Q12)**a) Explain the syntactic analysis with suitable example. [8]
b) What do you mean by grammar induction? Explain it in detail. [8]



Total No. of Questions : 12]

SEAT No. :

P2067

[Total No. of Pages : 3

[5254]-119

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

AUTOMOTIVE ELECTRONICS

(2008 Course) (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) *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) How is spark pulse generated? What is the method of spark timing control in ignition? System? [10]

b) What are the differences in SI & Diesel engine operation? [8]

OR

Q2) a) With neat diagram explain Four stroke operation of diesel Engine. [10]

b) Explain transmission system in automotive. [8]

Q3) a) Explain the methods with principle of sensor operations for the following: [8]

i) MAP

ii) Exhaust Oxygen sensing

iii) Throttle plate sensing

iv) Engine speed

b) What are the different types of actuators used in automotive electronics? Explain working Principle of Solenoid & its role in fuel injection system. [8]

P.T.O.

OR

Q4) a) Explain how below parameters are measured in automotive. [8]

i) Mass Air Flow.

ii) Engine Speed.

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

Q5) a) How steering control system (power/manual) works? Explain with proper diagram. [8]

b) What are different strategies of 'Engine Management System' used in automotive systems? [8]

OR

Q6) a) With the help of diagram Explain how electronics is use to control spark in ignition system. [8]

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

SECTION - II

Q7) a) What is the selection criteria for processors of Automotive System. [10]

b) State and explain hardware and software debugging techniques in context with Automotive application. [8]

OR

Q8) a) How timer/counters, PWM, WDT and interrupts of a general purpose microcontroller can be used in Automotive application? [10]

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

Q9) a) With the help of proper example, justify the relevance of Communication Protocols in a automotive applications. [8]

b) With an example, explain utility of GPS & GPRS in automotive environment. [8]

OR

Q10)a) Explain how FlexRay is it suitable for Data communication in Automotive Electronics? [8]

b) Compare MOST & LIN Protocol. [8]

Q11)a) What are the future trends for emission control? [8]

b) Explain the diagnostic coder for automotive. [8]

OR

Q12)a) Explain ON board diagnostic system in automotive. [8]

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



Total No. of Questions : 12]

SEAT No. :

P2068

[Total No. of Pages : 3

[5254]-120

B.E. (Electronics & Telecommunication)

NANOTECHNOLOGY

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What are Nano-particles? Explain the properties of individual nano particles. [8]
b) Explain the limitations of silicon material and consequently the significance of nano materials. List the applications of nanotechnology. [10]

OR

- Q2)** a) List out the various tools to make nano structures. Explain each of them in brief. [10]
b) Explain in brief various measuring tools for Nano-structures. [8]

- Q3)** a) Explain the basic principle of a single electron transistor device. [8]
b) Explain the silicon Nano crystal non volatile memories. [8]

OR

- Q4)** a) List and explain the novel dielectric materials for future transistors. [8]
b) Explain the nano scale lithography. What are the issues related to this process? [8]

P.T.O.

- Q5)** a) What are Carbon nano structures? Explain the structure of carbon nano structure. [8]
- b) Explain the electrical and mechanical properties of Carbon nano structures. [8]

OR

- Q6)** Write short notes on any two : [16]
- a) Metal nano structures
- b) Nano bricks and building blocks
- c) Microscopy

SECTION - II

- Q7)** a) Explain Nano Electro Mechanical systems (NEMS). [8]
- b) Explain the limitations of Electro Mechanical Systems and explain how NEMS comply with each of these limitations. [10]

OR

- Q8)** a) Explain the MEMS devices used in Automobile applications. List at least two applications. [10]
- b) What are molecular switches? Explain in brief their construction and application. [8]

- Q9)** a) Briefly explain different tools for fabrication of Micro and Nano optical systems. [8]
- b) Explain Optical Lithography. Draw the scheme of arrangement required. [8]

OR

- Q10)** a) Explain the physical fundamental of Nano-electronics. [8]
- b) Explain the limitations of interconnect wires in Integrated Circuits and how nano structures can help in this matter. [8]

Q11)a) What are natural nano scale sensors? Briefly explain two applications of nano scale sensors. **[8]**

b) Explain any one Bio-Medical application of Nano-electronics in detail. **[8]**

OR

Q12)a) Explain the application of Nanotechnology to capture the light energy. What phenomenon is used in capturing the light energy using nanotechnology? **[8]**

b) What are the various actuators that may employ nanotechnology? Explain any one in detail. **[8]**



Total No. of Questions : 12]

SEAT No. :

P2109

[Total No. of Pages : 3

[5254]-120-A

B.E. (E & TC) (Semester - II) (Elective - IV)

PLC & INDUSTRIAL PROCESS AUTOMATION

(2008 Pattern)

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) Draw and explain block diagram of process control system. Explain function of each element in brief. [8]
- b) Explain with example following types of control systems. [8]
- i) Self regulatory control
 - ii) Servomechanism

OR

- Q2)** a) Explain control system Evaluation criteria? [8]
- b) What is Field bus? Explain Foundation Field bus and Profibus in brief.[8]
- Q3)** a) A Sensor resistance changes linearly from 100 to 180 Ω as temperature changes from 20°C to 120°C. Find the linear equation relating resistance and temperature. [8]
- b) What are various temperature sensors used in process automation? Explain 3 wire RTD configuration used in temperature measurement?[8]

P.T.O.

OR

- Q4)** a) What is linearization? Explain different approaches for linearization. [8]
b) How DPT can be used for flow measurement and level measurement?[8]

- Q5)** a) Explain Ziegler - Nichols Method for controller tuning in detail? [8]
b) Draw and explain analog implementation of PID controller? [10]

OR

- Q6)** a) Explain analog and digital implementation of PI controller in detail? [10]
b) Explain proportional, Derivative & integral mode of continuous controller. [8]

SECTION - II

- Q7)** a) Define actuators? What are the types of actuators? Explain any one actuator? [8]
b) Draw & Explain working of flow control valve with forward and reverse action of pneumatic actuator? [8]

OR

- Q8)** a) What are the different principle used for flow measurement? Explain any one in detail? [8]
b) Explain different control valve types. [8]

- Q9)** a) Draw the ladder diagram for Bottle filling plant. [8]
b) Define PLC? Explain the following terms. [8]
i) PLC programming languages
ii) Elements of PLC

OR

- Q10)**a) What are the different types of PLC. Explain any one. [8]
b) Draw the ladder diagram for water pumping system? [8]

- Q11)a)** Write short notes on (any two) **[10]**
- i) PID algorithm for digital implementation.
 - ii) ANN based controllers
 - iii) Fuzzy logic systems
- b) Explain the statistical process control concern to fuzzy logic system in detail. **[8]**

OR

- Q12)a)** How Artificial Neural Network (ANN) based controllers are used in industrial applications? **[10]**
- b) Compare Fuzzy controller and ANN based controller? **[8]**



Total No. of Questions : 12]

SEAT No. :

P2069

[Total No. of Pages : 3

[5254]-120-D

B.E. (Electronics & Telecommunication) (Elective - IV)

PROGRAMMABLE SYSTEM ON CHIP

(Open Elective) (2008 Pattern)

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 the right indicate full marks.*
- 5) Use of electronics pocket calculator is allowed.*
- 6) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain detail programmable routing & interconnect of PSoC technology. [8]
b) Draw the architectural blocks of PSoC and conventional Microcontroller Unit. [8]

OR

- Q2)** a) Explain any one example of configuration of analog & digital blocks. [8]
b) What is features of PSoC3 family and explain additional features of PSoC5. [8]

- Q3)** a) Explain detail architecture of PSoC3. [8]
b) Explain memory organization of PSoC5. [8]

OR

- Q4)** a) Comparison of Analog and digital subsystems of PSoC5. [8]
b) Explain I/O interfaces and CPU system of PSoC3. [8]

P.T.O.

- Q5) a)** Explain difference between cypress PSoC and PSoC architecture and explain cypress PSoC? [10]
- b) Design any PSoC subsystem. [8]

OR

- Q6) a)** Explain PSoC memory management. [8]
- b) Explain detail structure of cypress semiconductor PSoC and explain some limitations. [10]

SECTION - II

- Q7) a)** Explain detail of PSoC hardware & software. [8]
- b) Explain hardware and software subsystem of mixed signal architecture. [8]

OR

- Q8) a)** Explain detail of PSoC interrupt subsystem. [8]
- b) Design system using PSoC express. [8]

- Q9) a)** Explain programmable gain amplifier. [8]
- b) Explain universal digital block and arrays and digital system interconnect. [10]

OR

- Q10)a)** Write short note on : [8]
- i) USB
- ii) SPI
- b) Explain flash temperature sensors and DTMF dialers. [10]

Q11)a) Explain ultra wide band RADAR. [8]

b) Explain data acquisition and control system with PSoC. [8]

OR

Q12)a) Explain hardware of Manchester decoder & DTMF decoder. [8]

b) Explain SPI and UART based task communications. [8]



Total No. of Questions : 12]

SEAT No. :

P2070

[Total No. of Pages : 3

[5254]-121

B.E. (Electrical) (Semester - I)
PLC AND SCADA APPLICATIONS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain input and output modules of programmable logic controller. [8]
b) What is central processing unit? Explain in detail. [9]

OR

- Q2)** a) State advantages and disadvantages of PLC. [9]
b) Draw and explain power supply diagram of PLC. [8]

- Q3)** a) Write a short note on programming equipments. [8]
b) Draw the ladder diagram for the following function table. [8]

Inputs - I1,I2

Outputs-Q1, Q2, Q3, Q4

I1	I2	Q1	Q2	Q3	Q4
0	0	1	0	1	0
0	1	0	1	0	1
1	0	0	1	0	1
1	1	1	0	1	0

OR

P.T.O.

- Q4)** a) Draw and explain different types of relays. [8]
b) Explain output devices and their types with examples. [8]

- Q5)** a) Explain PID process for a closed Loop control. [9]
b) What is 'Adjust and observe' method of PID tuning. [8]

OR

- Q6)** a) Write a short note on AC motor starter. [9]
b) Explain any one DC motor controller. [8]

SECTION - II

- Q7)** a) Explain in detail SCADA architecture. [9]
b) What are the desirable SCADA properties? [8]

OR

- Q8)** a) Write a short note on SCADA server. [9]
b) Explain important SCADA functions. [8]

- Q9)** a) Explain three generations of SCADA systems. [8]
b) Write a short note of Automatic Substation Control. [9]

OR

- Q10)** a) Explain SCADA implementation in water purification systems. [9]
b) Explain system operating states. [8]

Q11) a) Explain TCP/IP protocol. **[8]**

b) Explain profibus protocol in detail. **[8]**

OR

Q12) a) Write a short note on OSI protocol. **[8]**

b) Explain DNP3 protocol in detail. **[8]**



Total No. of Questions : 12]

SEAT No. :

P2071

[Total No. of Pages : 3

[5254]-122

B.E. (Electrical)

POWER SYSTEM OPERATION & CONTROL

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What do you mean by steady state stability? Obtain the steady state stability criterions. Draw necessary power- δ curve. **[8]**
- b) A synchronous generator of 4 - pole, 50 Hz, 11 kV, 200MVA has inertia constant of 5 MJ/MVA. **[10]**
- i) Find energy stored in the rotor at syn. speed.
 - ii) The machine is operating at 100 MW and load is suddenly increased to 150 MW. Find rotor retardation.
 - iii) If the retardation is maintained for 10 cycles, find change in rotor torques angle and rotor speed at the end of this period.

OR

- Q2)** a) Obtain the equation for critical clearing angle when L-G fault takes place at the middle point of one of the parallel lines feeding the loads. Draw the P- δ curves. **[8]**
- b) A 50 Hz synchronous generator has reactance of 0.25 Pu and $E = 1.2$ Pu, $V_t = 1.0$ Pu is connected to infinite bus $|V| = 1.0$ Pu through transformer with reactance 0.05 Pu and two parallel transmission lines.

P.T.O.

Each line has reactance of 0.40 Pu. L-G fault takes place at one end of one of the line. Calculate

- i) Prefault power
- ii) Power during fault
- iii) Postfault power
- iv) Critical clearing angle
- v) Draw $p-\delta$ curves [10]

- Q3)** a) State sources of reactive power. Explain, advantages and disadvantages of synchronous condenser. [8]
- b) Explain, loading capability curves of synchronous generator. [8]

OR

- Q4)** a) What is series compensation used in EHV lines? Obtain the equation for degree of compensation. State the locations of capacitor used. [8]
- b) Explain, the problems associated with series compensation. [8]
- Q5)** a) What is SVC? Explain the functions of SVC. [8]
- b) Explain with neat connection diagram the TCR & FC compensation. [8]

OR

- Q6)** a) Explain with neat circuit diagram TCSC system. [8]
- b) Write short note on UPFC. [8]

SECTION - II

- Q7)** Write short note on following : [16]
- a) Necessity of Automatic Generation Control (AGC).
 - b) Working of speed governing model.
 - c) Generator load model.
 - d) Steady state frequency droop characteristic of speed governing system.

OR

Q8) a) Explain two area load frequency control, with block diagram and frequency response. [10]

b) Explain operational benefits of proportional plus integral controller over proportional load frequency control of single area case. [6]

Q9) a) Compare unit commitment and economic load dispatch tasks. Write objective function of Unit commitment and Economic load dispatch. Explain the constraints on Unit commitment and Economic load dispatch. [10]

b) State various methods of unit commitment. Explain priority list method with suitable example. [8]

OR

Q10) a) Explain with mathematical formulation, the economic load dispatch with transmission loss and including equality constraint of meeting load. [12]

b) Explain the cost curve of thermal generator. Write mathematical equation relating power and cost. Draw the cost curve of thermal unit. [6]

Q11) a) Explain the advantages and operational complexities of interchange of power. [6]

b) What is Capacity interchange? [5]

c) What is Inadvertent power exchange? [5]

OR

Q12) a) Explain, under which situation the mode of emergency-power interchange is applied. [5]

b) What is the concept of energy banking? Explain the operational rules. [5]

c) What is the concept of power pool? Explain how it operates. [6]



Total No. of Questions : 12]

SEAT No. :

P2072

[Total No. of Pages : 3

[5254]-123

B.E. (Electrical)

CONTROL SYSTEM - II

(2008 Pattern) (Semester - I)

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) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Explain the steps to design Lag network by Bode plot approach. [8]

b) A unity feedback system has an open loop transfer function,

$G(s) = \frac{4}{s(s+2)}$ Design a suitable Lead compensator so that phase margin is 50° 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° and $K_v = 8/\text{sec}$. [10]

Q3) a) Describe : [8]

i) Diagonalisation of system matrices with distinct and repeated eigen values.

ii) Vander Monde Matrix.

P.T.O.

- b) Determine the STM for the system is given by : [8]

$$X^0(t) = \begin{bmatrix} -2 & 3 \\ 0 & -3 \end{bmatrix} X(t)$$

by Inverse transform method

OR

- Q4)** a) Explain state diagram representation of standard state model. [8]
b) Obtain the solution of non-homogeneous state equation using Laplace transform method. [8]

- Q5)** a) Define Controllability & Observability. Explain any one method to determine it. [8]
b) Evaluate the controllability and observability of the following system. [8]

$$A = \begin{bmatrix} -2 & 1 \\ 1 & -2 \end{bmatrix}; B = \begin{bmatrix} 1 \\ 0 \end{bmatrix}; C = [1 \quad -1]$$

OR

- Q6)** a) Explain various methods of evaluation of state observer gain matrix K_e . [8]
b) For a given system

$$A = \begin{bmatrix} 0 & 20.6 \\ 1 & 0 \end{bmatrix}; B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}; C = [0 \quad 1]$$

Determine observer gain matrix K_e such that $S_1 = -10$ and $S_2 = -10$ are Eigen values of observer gain matrix. [8]

SECTION - II

- Q7)** a) Write short note on design specifications in time domain and frequency domain. [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) Describe zigler-Nichol method for PID controller. [8]
- Q9)** a) Explain Jump resonance and limit cycle for non-linear system. [8]
 b) Derive the Describing function for Ideal Relay. [8]

OR

Q10)a) Describe 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 ∓ 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. [6]

$$V(X) = 8X_1^2 + X_2^2 + 4X_3^2 + 2X_1X_2 - 4X_1X_3 - 2X_2X_3$$

- c) Explain the procedure to calculate time from phase plane trajectory. [6]



Total No. of Questions : 6]

SEAT No. :

P2073

[Total No. of Pages : 2

[5254]-124

B.E. (Electrical)

ROBOTICS AND AUTOMATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Solve any two :

[18]

- a) Explain DOF with neat sketch. Also Explain work envelope
- b) Write in detail about Historical information of Robot science.
- c) Explain Growth of Robot science and define as per ISO,BRA and JIRA

Q2) Solve any two :

[16]

- a) Explain Yaw, pitch and roll.
- b) Explain Arm prosthesis Automation.
- c) Explain classification of robots

Q3) Solve any two :

[16]

- a) Explain underwater Welding application in robot science
- b) Write a short note on Robot intelligence based on robot programming.
- c) Explain parts sorting application of robot with selection criteria.

P.T.O.

SECTION - II

Q4) Solve any two : **[18]**

- a) Explain with neat sketch about Homogeneous coordinate. Explain transformational translation and rotational transformation in detail.
- b) Explain co-ordinate reference frame with neat sketch.
- c) Explain Kinematic Chain with neat sketch.

Q5) Solve any two : **[16]**

- a) Explain Euler-Lagrange method to control robot motions and hence comment on Euler angle.
- b) Explain inverse kinematic problem using fixed frame rotation.
- c) How many parameters are required for specifying position and orientation of rigid body? Explain.

Q6) Solve any two : **[16]**

- a) Explain resolved motion rate control.
- b) Explain various linear control schemes.
- c) Explain resolved motion position control.



Total No. of Questions : 12]

SEAT No. :

P2074

[Total No. of Pages : 3

[5254]-125

B.E. (Electrical)

POWER QUALITY (Elective - I)

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Define and explain the following terms as per IEEE Std. 1159, such as : **[10]**
- i) Impulsive transient
 - ii) Oscillatory transient
 - iii) Voltage variations
 - iv) Voltage sags and
 - v) Voltage swell
- b) What are objectives of grounding? Explain, problems due to poor grounding? **[8]**

OR

- Q2)** a) Explain relation between Equipment compatibility, immunity, planning and emission levels. **[10]**
- b) Explain various grounding practices as per IEEE standard. **[8]**

P.T.O.

- Q3)** a) Explain various devices used for voltage regulation. [8]
b) Explain the following terms related with voltage flicker [8]
i) Short term(P_{st}) and
ii) Long term(P_{lt}) voltage flicker.

OR

- Q4)** a) Explain various causes, effects of overvoltage. Suggest various mitigation measures. [8]
b) Explain various factors responsible for RMS voltage variation. What is complex power? [8]
- Q5)** a) Explain in detail economic impact of voltage sags. [8]
b) Explain step by step procedure for assessment of equipments sensitivity to voltage sags. [8]

OR

- Q6)** a) What are the mitigation measures for voltage sags? Explain any two measures in detail. [8]
b) Explain voltage sag characteristics such as magnitude, duration, phase angle jump and missing voltage. [8]

SECTION - II

- Q7)** a) Explain in brief impacts of harmonics on following power system equipments [8]
i) Transformers ii) Energy and Demand metering
b) Explain various harmonics mitigation methods. [10]

OR

- Q8)** a) What is harmonic filtering? Explain passive filters. [8]
b) What are causes of harmonic resonances? Explain consequences of harmonic resonances. [10]

- Q9)** a) Define and explain oscillatory transients with their sources. [8]
b) Explain switching transient problems with loads. [8]

OR

- Q10)** a) Explain transients, their sources and its effects on power system operation. [10]
b) Explain various computer tools used for transient's analysis. [6]

- Q11)** a) Explain the role of intelligent systems 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]

OR

- Q12)** a) What are the different approaches to be followed in power quality monitoring? [8]
b) Why analysis of data is required? Explain various data collection techniques. [8]



Total No. of Questions : 12]

SEAT No. :

P2075

[Total No. of Pages : 3

[5254]-126

B.E. (Electrical)

ILLUMINATION ENGINEERING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What are the various methods of controlling natural light? [8]
b) Explain the important parts of the eye with the help of neat diagram. [10]

OR

- Q2)** a) Explain plane angle and solid angle. Derive the relation between them. [6]
b) What is good and bad effects of lighting. Explain perfect level of illumination. [6]
c) Write a note on quantification and measurement of light. [6]

- Q3)** a) Write the construction and working of [8]
i) High pressure mercury vapor lamp
ii) Metal halide lamp
b) Explain features and applications of [8]
i) LASERS ii) LEDs

OR

P.T.O.

- Q4)** a) What is induction lamp? Explain in detail about the same. [8]
b) Explain : [8]
i) Fluorescent lamp
ii) Low pressure sodium vapor lamp

- Q5)** a) What are reflectors and ignitors? Explain. [8]
b) What is ballast? State different design considerations of ballasts for HID lamps. [8]

OR

- Q6)** a) List the primary functions of control gear and different accessories under control gear circuit for gaseous discharge lamps. [8]
b) Explain process of dimming. [8]

SECTION - II

- Q7)** a) Explain zonal cavity method for general lighting design. [8]
b) Explain design procedure for indoor illumination scheme design. [8]

OR

- Q8)** a) State the factors to be considered while designing illumination scheme for hospital. [8]
b) A hall of 30m × 15m with ceiling height of 5m is to be illuminated using fluorescent tubes rated 80 watt and 40 humensper watt. Take coefficient of utilization of 0.5 and depreciation factor of 1.4. Determine the number of fluorescent tubes required. Show the placement of tubes in the plan.[8]

- Q9)** a) Compare fluorescent lamp with incandescent lamp. [8]
b) Explain payback calculation in case of energy efficient lighting. [8]

OR

- Q10)**a) Explain point by point method of illumination scheme design. [8]
b) Write short note on isolux diagram. [8]
- Q11)**a) Explain photovoltaic lighting with suitable diagram. [10]
b) Explain standalone systems in case of emergency lighting. [8]
- OR
- Q12)**a) With suitable diagram explain day lighting. [10]
b) Write a short note on retrofits. [8]



Total No. of Questions : 12]

SEAT No. :

P2076

[Total No. of Pages : 4

[5254]-127

B.E. (Electrical)

PROJECT MANAGEMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

UNIT - I

- Q1)** a) Define Project Management. Explain its importance. **[8]**
b) State the categories and characteristics of Project Management. **[9]**

OR

- Q2)** a) Explain Project Appraisal. State the need for Project Appraisal? **[8]**
b) Explain various characteristics of Project Management. How is Project Appraisal carried out? **[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	40	-	20	30	35	40
Project B	45	20	25	30	40	50

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]

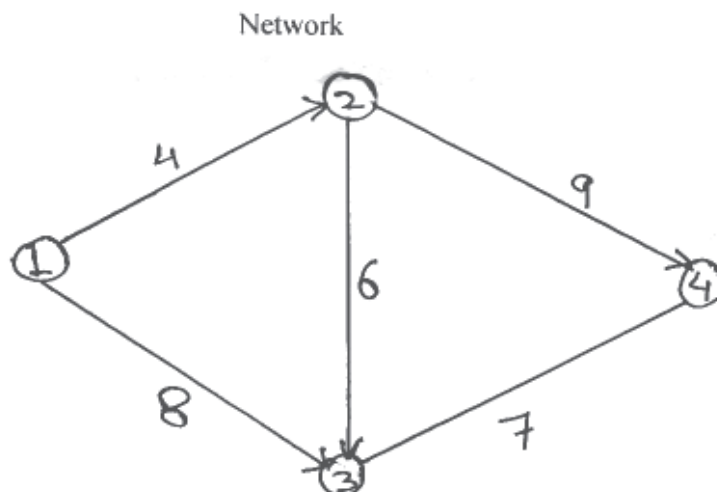
UNIT - III

- 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	4	2	400
1-3	8	6	150
2-3	6	5	100
2-4	9	7	200
3-4	7	3	200



UNIT - IV

- Q7)** a) State the factors for cost escalation. How to take care of them during planning? [8]
b) Why Project Cost Estimation is required? State all its steps. Describe the Cost estimating process. [9]

OR

- Q8)** a) Define direct cost, indirect cost & prime cost. What are different cost factors? [9]
b) Write short notes on : [8]
i) Cost scheduling
ii) Budgeting

UNIT - V

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

OR

- Q10)**a) Explain short notes on : [9]
i) International Project Management
ii) Quality of procured items
b) 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
40,000	0.50
50,000	0.60
60,000	0.30
30,000	0.40

The cash inflow acceptable for the project sponsor is Rs. 40,000. 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. 5, 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) Adjusted discount rate method
- ii) Correlation coefficient



Total No. of Questions : 12]

SEAT No. :

P2077

[Total No. of Pages : 3

[5254]-128

B.E. (Electrical)

RESTRUCTURING & DEREGULATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 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) *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 key objectives of “Electricity Act 2003” with reference to generation, transmission and distribution sector? [8]
- b) Explain the institutional structures of Indian power sector before and after restructuring. [8]

OR

- Q2)** a) Discuss the working of Indian Energy Exchange for day ahead market. [8]
- b) What are the challenges before Indian power sector. [8]

- Q3)** a) What are the tariff setting principles? [8]
- b) Explain following economic terms of power sector [8]
- i) Fixed cost and variable cost
 - ii) Capital cost
 - iii) Depreciation
 - iv) Profitability indices

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)** Explain following methods of regulations : [18]
a) Incentive regulation.
b) Rate of return regulation
c) Benchmarking Regulation

OR

- Q6)** Write short note on : [18]
a) CERC
b) Structure of regulatory process in India
c) Role of State Electricity regulatory Commission.

SECTION - II

- Q7)** Explain following models based on industry structure and contractual arrangements: [16]
a) Wholesale Competition
b) Retail Competition
c) Pool and Bilateral trade.

OR

- Q8)** a) Compare between ‘Competition for the market’ and ‘Competition in the market’. [8]
b) Discuss “The California Crisis”. [8]
- Q9)** a) What are the various methods of transmission pricing. [9]
b) Elaborate power exchange in India. [9]

OR

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

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

Q11) a) Discuss the working of ISO. **[8]**

- b) What are the three parts of availability based tariff? How they are implemented. **[8]**

OR

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

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



Total No. of Questions : 12]

SEAT No. :

P2078

[Total No. of Pages : 4

[5254]-130

B.E. (Electrical)

EHV TRANSMISSION (Elective - II)
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

UNIT - I

- Q1)** a) Explain why are transmission lines required. State the advantages of selection of higher values of line voltages for transmission. Derive equations for power handling capacity, line current and % power loss in terms of voltage, line length and line parameters. [12]
- b) Write note on different types of winds causing vibrations/oscillations of conductors of transmission lines. [6]

OR

- Q2)** a) Derive travelling wave equations and their solution caused due to disturbance on transmission line. Also prove that it consists of two waves travelling in opposite direction. [12]
- b) A power of 11000 MW is required to be transmitted over a distance of 1000km. At voltage level of 400KV determine power handling capacity and number of circuits required. Also find percentage power loss. The reactance and resistance of this 3 phase line is 0.327 ohm/km and 0.031ohm/Km respectively. Assume phase difference of 30° between sending end and receiving end voltages. [6]

P.T.O.

UNIT - II

- Q3) a)** State the advantages of bundle conductors over ACSR of composite conductors, when used for high voltage transmission. Also state the difficulties with use of bundled conductors. Derive the expression for GMR of bundled conductor in terms of number of subconductors "n" each of radius "r" and bundle radius "R". [12]
- b) A bundle conductor has two sub conductors each of radius 1.59 cm and bundle spacing 45.72cm. Calculate GMR of bundle conductors. [4]

OR

- Q4) a)** For 3 phase ehv transmission line with horizontal configuration derive the expression for flux linkage matrix and hence inductance matrix. [8]
- b) For 3 phase ehv transmission line L_s is self inductance, L_m is mutual inductance. Line is transposed. Derive expression for positive sequence component of inductance in terms of L_s and L_m for each line. [8]

UNIT - III

- Q5) a)** For a bundle conductor of two sub^{R²} conductors derive expression for maximum and minimum surface voltage gradient, neglecting the effect of charges of image conductors and charges of sub conductors of other phases. [8]
- b) Derive Mangolt Formula for maximum voltage gradient on outer phases and on central phase. [8]

OR

- Q6) a)** Given a positive charge Q_1 and sphere of radius R with Q_1 located external to sphere whose center is at distance S_1 from Q_1 , the sphere can be made to have zero potential on its surface if a charge of opposite polarity and magnitude $Q_2 = Q_1 \frac{R}{S_1}$ is placed at distance from center of sphere towards Q_1 . Prove this. [10]
- b) Compare line charge with point charge. [6]

SECTION - II

UNIT - IV

- Q7)** a) Write note on primary and secondary shock currents and their effects on human being. Also explain "threshold current" and "let go current". [10]
- b) Write note on biological effects of electrostatic field on human, animals and plants. [8]

OR

- Q8)** a) Explain procedure to find electrostatically induced voltage on unenergised circuit of double circuit line. [10]
- b) Write note on harmful effects of magnetic field on human health. [8]

UNIT - V

- Q9)** a) Draw the neat sketch of bipolar HVDC system showing the main components. State function of each component. [10]
- b) For three phase full wave bridge rectifier derive the expression for output dc voltage at ignition delay angle α . [6]

OR

- Q10)** a) With neat sketch explain operation of converter as inverter in HVDC system. Explain ignition advance angle and extinction advance angle. [10]
- b) It is required to obtain dc voltage of 110KV from a bridge connected rectifier operating with α (ignition delay angle) = 30° and overlap angle $\mu = 15^\circ$. Calculate the necessary line secondary voltage of rectifier transformer. [6]

UNIT - VI

- Q11)** a) Write note on ideal and actual VI characteristics of converter of HVDC. [10]
- b) State and explain important requirement for satisfactory operation of HVDC link, for selection of control characteristic. [6]

OR

- Q12)** a) Write note on converter firing control system. [8]
- b) Discuss problems associated with weak ac system in operation of dc system. [8]



Total No. of Questions : 12]

SEAT No. :

P2079

[Total No. of Pages : 2

[5254]-131

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

SMART GRID

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) High light on evolution of electric grid and the concept of Smart Grid. [10]
b) Give CDM opportunities in Smart Grid. Also explain Carbon Credits. [8]

OR

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

- Q3)** a) Explain Smart Meters and give its functions when deployed in domestic sector. [8]
b) Write a note on PHEV. [8]

OR

- Q4)** a) Explain how Smart Appliances can be the part of Smart Grid. [8]
b) Explain the concept Vehicle to Grid. [8]

P.T.O.

- Q5) a)** Write a note on “IED”. [8]
b) Explain WAMS and give its advantages. [8]

OR

- Q6) a)** Write a note on Substation Automation. [8]
b) Write a note on Phase Measurement Unit. [8]

SECTION - II

- Q7) a)** Describe the concept and formation of Micro Grid. [10]
b) Write a note on, Microturbine. [8]

OR

- Q8) a)** Discuss different issues of micro grid when interconnected. [10]
b) Write a note on, Fuel cells. [8]

- Q9) a)** Write a note on, Power quality management in smart grid. [8]
b) Describe the concept, power quality conditioners related to smart grid. [8]

OR

- Q10) a)** Describe the EMC and how it is role in smart grid. [8]
b) Explain how power quality can be improved in smart grid by monitoring with the help of Web based technology. [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)** Write short note on, NAN. [8]
b) Why cyber security is most important in smart grid. [8]



Total No. of Questions : 12]

SEAT No. :

P2080

[Total No. of Pages : 3

[5254]-132

B.E. (Electrical)

SWITCH GEAR AND PROTECTION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer three questions from 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) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain arc interruption theories in case of circuit breaker. [8]
- b) Explain resistance switching in circuit breaker. [8]

OR

- Q2)** a) What is current chopping? With neat diagram explain this phenomenon? In which circuit breaker it is observed? [8]
- b) A 3 Phase 13.8 kN, 50 Hz alternator is connected to a circuit breaker. The inductive reactance upto circuit breaker is $6\Omega/\text{ph}$ & capacitance to earth upto circuit breaker is $0.002 \mu\text{f}$ per phase. [8]

Determine -

- i) Frequency of restriking voltage transients.
- ii) Peak restriking voltage across circuit breaker contacts.
- iii) Maximum value of RRRV
- iv) Time for peak restriking voltage

P.T.O.

- Q3)** a) With neat diagram explain construction & working of puffer type SF₆ circuit breaker. [8]
- b) Explain autorecksing in circuit breaker. [8]

OR

- Q4)** a) Explain following rating in circuit breaker. [8]
- i) Rated making capacity
- ii) Rated breaking capacity
- iii) Short time current rating
- b) With neat diagram explain construction & working of vacuum circuit breaker. [8]

- Q5)** a) With neat diagram explain principle of operation of [10]
- i) Biased current differential relay.
- ii) Reactance relay
- b) With neat diagram explain protective zones in power system. [8]

OR

- Q6)** a) What is protective relaying? Explain its need. What are different causes of faults. Explain its effects on power system. [10]
- b) Explain following terms in induction relay. [8]
- i) Pick up current
- ii) Time setting
- iii) Current setting

SECTION - II

- Q7)** a) Write a short note on numerical relay. [10]
- b) Discuss the concept of Discrete Fourier transform to estimate the phasor. [8]

OR

- Q8) a)** Write short note on **[10]**
- i) Sampling theorem
 - ii) anti aliasing filter
- b) Draw and explain block diagram of Phasor Measurement Unit(PMU).**[8]**

- Q9) a)** Explain the effect of inrush magnetizing current on the protective system of transformer. Explain the principle of harmonic restraint with the help of necessary schematic diagram. **[8]**
- b) Explain abnormal operating conditions like unbalance loading, loss of prime mover. **[8]**

OR

- Q10)a)** For a 10 MVA, 132 kV/6.6 kV power transformer with delta-star connections. Design differential protection for three phase 50 Hz transformer. **[8]**
- b) Explain in detail loss of excitation of generator with protection against it. **[8]**

- Q11)a)** Explain the current graded and time graded system of protection of three phase feeder using over current relay. **[8]**
- b) What is distance relay? Compare impedance reactance and Mho relay.**[8]**

OR

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



Total No. of Questions : 12]

SEAT No. :

P2081

[Total No. of Pages : 3

[5254]-133

B.E. (Electrical)

INDUSTRIAL DRIVES AND CONTROL

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is a drive? Draw block diagram showing parts of a drive system. State the selection factors of a drive? [8]
- b) A drive has the following parameters $T = 100 - 0.1N$, N-m where N is the speed in rpm. Load torque $T_l = 50$, N-m. Initially the drive is operating in steady-state. The characteristic of the torque are changed to $-100 - 0.1N$, N-m. Calculate initial and final equilibrium speeds. For given drive also calculate the time from initial speed to final speed, If $J = 10 \text{ kgm}^2$. [8]

OR

- Q2)** a) Explain the types of Mechanical Loads using speed torque characteristics and suitable examples. [8]
- b) A drive has following parameters. $J = 10\text{kgm}^2$, $T=15-0.01N$, Nm and passive load torque $T_l = 0.005N$, Nm, where N is speed in rpm. Initially the drive is operating in steady state. Calculate time required for starting. [8]

P.T.O.

- 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

- Q4)** a) Explain plugging in Induction motor. Draw torque speed characteristics during motoring and braking. What precautions are required to be taken to use this method? [8]
- b) Explain closed loop control of a drive with torque and speed control. [8]
- Q5)** a) Explain operation of a separately excited dc motor fed from a single phase full converter in armature circuit and from single phase semi bridge converter in field circuit for speed control below rated speed. Explain the quadrants in which it will operate. [9]
- b) Draw speed control scheme for control below and above base speed for a separately excited dc motor. Explain its operation. [9]

OR

- Q6)** a) Explain the operation of a dc separately excited motor with armature fed from a class A chopper and with constant rated field supply. Explain the possible quadrant operations and range of control of motor. [9]
- b) Explain closed loop control of separately excited DC motor with the help of block diagram for constant Power mode of operation. [9]

SECTION - II

- Q7)** a) Draw speed torque characteristics to explain Static Stator voltage speed control method used in Induction motor drives. What is the range of speed control and what are the limitations. [8]
- b) Why V/f control is preferred in Induction motor control? What are advantages and limitations of this method? How V/f ratio is decided? [8]

OR

- Q8)** a) Explain regenerative braking of VSI fed induction motor drives. [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? How rating of motor is obtained? [8]
b) How time and energy required for the starting of a motor is calculated? Explain with equations. [8]

OR

- Q10)**a) What are duties of motor as per NEMA std? Explain with diagrams. [8]
b) A motor operates on a periodic duty consisting of a loaded period of 20 min.s and no load period of 10 min.s. The maximum temp rise is 60°C Heating and cooling time constants are 50 and 70 min. respectively. When operating continuously on no load ,the temp. rise is 10°C . Determine i) Mini temp during duty cycle ii) Temp when motor is loaded continuously. [8]

- Q11)**a) Explain AC servo drives with neat diagram and applications. [9]
b) Explain FOC in Induction Motor drives. [9]

OR

Q12) Write Short notes (Any Two)

- a) Drives used in Rolling mills [9]
b) Drives used in Textile mills [9]
c) Drives used in Cement mills [9]



Total No. of Questions : 12]

SEAT No. :

P2082

[Total No. of Pages : 3

[5254]-134

B.E. (Electrical)

VLSI DESIGN

(2008 Pattern) (Elective-III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Draw circuit diagram of 8×1 multiplexer and also draw its truth table. [8]
b) Draw circuit and truth table of 4 bit ring counter. Also draw its timing diagram & Explain. [8]

OR

- Q2)** a) Differentiate between mealy and moore machine of FSM. [8]
b) Design and develop 4 bit asynchronous up counter along with its timing diagram. [8]

- Q3)** a) With reference to EDA tool, Explain complete VLSI Design flow. [10]
b) Develop 4 bit shift register using structural modelling of VHDL. [8]

OR

- Q4)** a) Explain different modelling types of architectures in VHDL. [10]
b) Develop three bit MOD 5 counter using VHDL code. [8]

P.T.O.

- Q5)** a) Explain with example the concept of concurrent & sequential statements used in VHDL. [8]
b) Explain any four data types & four data objects along with one example. [8]

OR

- Q6)** a) Differentiate between synthesizable & non-synthesizable statements in VHDL. [8]
b) Explain with example concurrent and sequential statements in VHDL. [8]

SECTION - II

- Q7)** a) Define & Explain : [8]
i) Noise margin
ii) FOM
iii) Propagation Delay
iv) FAN-OUT
b) Explain voltage transfer characteristics of CMOS inverter. [8]

OR

- Q8)** a) Compare CMOS & NMOS. [8]
b) Implement NAND, NOR, EX-OR, NOT gate using CMOS. [8]

- Q9)** a) Draw architecture of CPLD & Explain the same. [10]
b) Explain Boundary scan w.r.t FPGA & also explain its configuration. [8]

OR

- Q10)** a) Explain architecture of FPGA. [10]
b) Compare PAL & PLA [8]

Q11)a) Design barrel shifter using VHDL. [8]

b) Design triangular wave generator using VHDL. [8]

OR

Q12)a) Develop sign & unsigned comparator using VHDL. [8]

b) Design vending machine controller using VHDL. [8]



Total No. of Questions : 12]

SEAT No. :

P2083

[Total No. of Pages : 3

[5254]-135

B.E. (Electrical)

HIGH VOLTAGE ENGINEERING

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Discuss time lags for breakdown. Define statistical time lag and formative time lag. [8]
- b) Describe breakdown in non uniform fields and corona discharge. [8]

OR

- Q2)** a) Explain the Streamer theory of breakdown in air at atmospheric pressure. [8]
- b) What is Paschan law? How do you account for the minimum voltage for breakdown under given Pxd conditions. [8]

- Q3)** a) Explain any two theories of breakdown in liquids. [10]
- b) What is composite dielectrics? What are its properties? [8]

OR

P.T.O.

- Q4) a)** What are the different mechanism by which the breakdown occurs in solid dielectrics in practice? State any three mechanisms in details. [10]
- b) In an experiments for determining the breakdown strength of transformer oil ,the following observations were made. Determine the power law dependence between the gap spacing and applied voltage of the oil. [8]

Gap spacing (mm)	4	6	10	12
Breakdown voltage (KV)	90	140	210	255

- Q5) a)** Explain the different theories of charge formation in clouds. [8]
- b) What are the causes for switching and power frequency over voltages?How they are controlled in power system.. [8]

OR

- Q6) a)** What are the mechanism by which lightening stroke develop and induce overvoltages on overhead power lines? [8]
- b) Differentiate between Gap and Gapless type of arrester. [8]

SECTION - II

- Q7) a)** What is Tesla coil? Explain with neat diagram its principle of operation with construction and use. [8]
- b) Explain one method of controlled tripping of impulse generator. Why control tripping is necessary. [8]

OR

- Q8) a)** Draw the neat sketch of Marx circuit arrangement for multistage impulse generator. Discuss basic principle of operation of Marxs circuit. [8]
- b) A 12- stage impulse generator has 0.126 μF capacitors .The wave front and wave tail resistances connected are 800 ohms and 5000 ohms respectively If the load capacitor is 1000 pF, find the front and tail times of the impulse wave produced. [8]

- Q9) a)** What is capacitance voltage transformer? Explain with phasor diagram how a tuned capacitance voltage transformer can be used for voltage measurement in power system. [10]
- b) Explain the principle and construction of electrostatic voltmeter for very high voltages. [8]

OR

- Q10)a)** Draw vertical arrangement of sphere gap used for peak value of voltage. Clearly show insulator support, sphere shanks, operating gear and motor for changing gap distance, HV connection and sparking point. Discuss various factors that affect the sparkover voltage of sphere gap. [10]
- b) Explain principle of operation, working and construction of Generating voltmeter used for measurement. [8]

- Q11)a)** Explain power frequency test and impulse test on insulator. [8]
- b) Explain impulse testing on transformer. [8]

OR

- Q12)a)** Write note on earthing and layout of high voltage laboratory. [8]
- b) Explain how radio interference voltage of high voltage apparatus is measured. [8]



Total No. of Questions : 12]

SEAT No. :

P2084

[Total No. of Pages : 4

[5254]-136

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any 3 questions from each section.*
- 2) *Answers to the two sections should be written in separate 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 in allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) State the basic discrete - time sequences (signals). Represent those graphically & mathematically. **[8]**
- b) Find the convolution sum of the following two sequences using Matrix method. **[10]**

$$x(n) = \delta(n - 1) + 2\delta(n) - 3\delta(n + 1) - \delta(n + 2)$$

$$h(n) = 2\delta(n + 1) + 3\delta(n + 2) + 2\delta(n + 3)$$

OR

- Q2)** a) Explain with example the following basic operations on discrete time signals - **[8]**
- i) Time Shifting
 - ii) Time Reversal
 - iii) Time Scaling
 - iv) Amplitude Scaling

P.T.O.

- b) Determine the output response $y(n)$ if [10]
 $x(n) = \{2, 1, 2, 3\}$; $h(n) = \{2, 2, 1\}$
 Use Graphical Method.

- Q3)** a) Define Fourier transform. State the condition for its existence. [6]
 b) Determine the Fourier transform of the following signals - [10]
 i) $x(t) = t \cdot \cos t$
 ii) $x(t) = e^{at}u(t)$

OR

- Q4)** a) Define Z-transform. State the condition for its existence. [6]
 b) Determine the Inverse Z-transform of [10]
 i) $X(Z) = \frac{z}{3z^2 - 6z + 9}$ using Partial Fraction Expansion Method for
 ROC $|Z| > 1$
 ii) $X(Z) = \frac{z+2}{z^2 - 5z + 7}$ For casual sequence using Long Division Method

- Q5)** a) Explain ideal low pass and high pass frequency filters with phase distortion and delay. [8]
 b) Explain frequency response of single pole or zero system. [8]

OR

- Q6)** a) Explain concept of stability and causality with inverse system for first order and system with a zero in ROC. [8]
 b) Explain generalized phase system (GLPS) with linear phase. [8]

SECTION - II

Q7) a) Obtain circular convolution using graphical method. Given that

$$x_1(n) = \{1, \underset{\uparrow}{3}, 5\}, x_2(n) = \{2, 1, 1\} \quad [8]$$

b) Explain 8 - point Radix - 2 DIF FFT algorithm. [8]

OR

Q8) a) Obtain 4 - point DFT, given that [8]

$$x(n) = \{1, 1, 0, 3\}$$

b) Obtain $x(n)$ if $x(k) = \{1, 0, 1, 0\}$ [8]

Q9) a) Explain Bilinear Transformation Technique with respect to IIR filter design. [8]

b) Find the magnitude & phase response function of 7th order low pass linear phase FIR filter with cut-off frequency 1 rad/sec. Using Wanning window. [10]

OR

Q10)a) Explain in detail various types of window functions used in FIR filter design. [8]

b) Design a digital high pass filter for cut off frequency of 30Hz & sampling frequency of 150 Hz using BLT. Take $N = 1$. [10]

Q11)a) Explain with neat diagram Direct form I realization of IIR filters. [8]

b) The transfer function of the discrete time causal system is given by - [8]

$$H(Z) = \frac{1 - Z^{-1}}{1 - 0.2Z^{-1} - 0.15Z^{-2}} \text{ Obtain parallel realization.}$$

OR

Q12)a) Develop direct form II realization of the transfer function - **[8]**

$$H(z) = \frac{3 + 3.6z^{-1} + 0.6z^{-2}}{1 + 0.1z^{-1} - 0.2z^{-2}}$$

b) Write a short note on any ONE of the following - **[8]**

- i) DSP based vibration analysis system
- ii) Harmonic Analysis & Measurement using DSP



Total No. of Questions : 12]

SEAT No. :

P2085

[Total No. of Pages : 2

[5254]-137

B.E. (Electrical Engineering)

ANN AND ITS APPLICATION IN ELECTRICAL ENGG.

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Explain Biological inspiration with neat sketch. Explain historical development of artificial neural network. What is need of intelligent tool required to solve complex engineering problem? [18]

OR

Q2) Explain various tools of intelligence system. Explain advantages and disadvantages of neural network and fuzzy logic. Explain basic single neuron model with neat sketch and mathematical representation. [18]

Q3) What are different learning processes? Explain in short Competitive learning in neural network? Draw and explain sketch of hebbian learning model? [16]

OR

Q4) Explain Hebbian learning with an example also explain Boltzmann learning in detail. [16]

Q5) Explain Least - Mean square algorithm required in ANN also explain perceptron architecture in neat sketch. [16]

OR

P.T.O.

Q6) Solve OR function using perceptron rule hence also explain perceptron training algorithm. [16]

SECTION - II

Q7) What is Back propagation algorithm used in neural network also explain momentum coefficient of Neural Network in detail. [18]

OR

Q8) Explain Back-propagation algorithm using three layer network also explain concept of learning rate needed in neural network. [18]

Q9) Explain in short adaptive resonance theory and its type also explain Kohonen network used in neural network. [16]

OR

Q10) What is Radial Basis functions. Explain Hopfield Networks in neural network. [16]

Q11) Apply neural network to generation scheduling problem with example. [16]

OR

Q12) Apply neural network to solve the restoration of power supply after failure in any electrical network (consider at least 4 bus system). [16]



Total No. of Questions : 12]

SEAT No. :

P2086

[Total No. of Pages : 2

[5254]-138

B.E. (Electrical)

MODELLING OF ELECTRICAL SYSTEMS

(2008 Pattern)

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.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

Q1) Apply Park's transformation on a 3ϕ synchronous machine and obtain its voltage and torque equations. **[18]**

OR

Q2) Explain the following as applied to modelling of synchronous machine. **[18]**

- a) Electrical equations
- b) Mechanical equations
- c) Per unit system

Q3) Draw the simplified model of synchronous machine. Derive the steady state equations and draw phasor diagram. **[16]**

OR

Q4) Explain formulation of state space equations and equivalent circuit, subtransient and transient inductances in modelling of synchronous machine. **[16]**

P.T.O.

Q5) Explain the classification of excitation systems. Explain in detail the various components of a block diagram representation of a general excitation system. [16]

OR

Q6) Explain in detail the modelling of complete excitation system. [16]

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) Discuss the two axis models of induction motor. [9]

b) Elaborate the procedure of transformation to a reference frame as used in modelling of IM. [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 a synchronously rotating frame. Also write down the torque equation. [16]

Q11) Write short notes on : [16]

a) Load Modelling

b) Transformer model

OR

Q12) Write short notes on : [16]

a) Three winding transformer models

b) Static load modelling for load flow studies



Total No. of Questions : 12]

SEAT No. :

P2087

[Total No. of Pages : 3

[5254]-139

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

RENEWABLE ENERGY SYSTEM

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain with neat sketch Solar Dish/Sterling power systems. [8]

b) List different types of Fuel Cells and explain any one. [8]

OR

Q2) a) Explain with neat sketch Biomass for Electricity generation. [8]

b) Write a note on, "Demand side Management". [8]

Q3) a) Draw and explain wind farm layout showing the dimensions. [8]

b) Derive the formula for rotor maximum efficiency of wind generator. Also explain the impact of tower height on generation of power. [10]

OR

P.T.O.

- Q4)** a) Explain environmental impacts of wind turbine. [8]
b) List various methods and explain how maximum power can be achieved by controlling speed of wind turbine. [10]

- Q5)** a) Write a note on solar position at any time of day. [8]
b) Explain with the help of sketch altitude angle of the sun at solar noon. [8]

OR

- Q6)** a) How the sun path diagrams can be used for shading analysis. [8]
b) Write a note on direct and diffused radiation and its effect on power generation. [8]

SECTION - II

- Q7)** a) Explain the basic semiconductor physics used in photovoltaic to convert sunlight into electricity. [8]
b) List different types of Crystalline Silicon Technologies and explain any one. [8]

OR

- Q8)** a) Explain from cells to a module and from module to arrays. [8]
b) Explain single-crystal Czochralski silicon technology. [8]

- Q9)** a) Write a note on Major photovoltaic system types. [10]
b) Explain the stand alone PV systems with example. [8]

OR

- Q10)** a) Explain the maximum power point trackers and hourly I-V curves. [10]
b) Explain Bi-directional metering and list its advantages. [8]

- Q11)**a) Explain Nuclear energy power plant. [8]
b) Write a note on Carbon trading and concept of carbon credits. [8]

OR

- Q12)**a) Explain Bio-chemical and photosynthesis techniques. [8]
b) Write a note on Kyoto Protocol. [8]



Total No. of Questions : 12]

SEAT No. :

P2088

[Total No. of Pages : 3

[5254]-140

B.E. (Electrical)

DIGITAL CONTROL SYSTEM

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer any one question from each pair of questions : Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.
- 2) Answers to the two sections must be written in separate answer books.

SECTION - I

Q1) a) What is importance of Digital Control system? [8]

b) Explain sampling theorem and reconstruction process. [8]

OR

Q2) a) State advantages and limitations of Digital Control System. [8]

b) Explain standard test signals with mathematical expressions. [8]

Q3) a) State and prove important properties of Z-transform. [6]

b) Find the Z-transform of the sequence : [12]

i) $X(t) = e^{-at}\sin\omega t$

ii) $F(k) = (1/2)^k$, for $k = 0, 1, 2, \dots$

OR

Q4) a) State and prove Final value theorem in Discrete Time Systems. [6]

b) Evaluate the inverse Z-transform of : [12]

i) $X(Z) = \frac{1}{(z-1)(z-3)}$

ii) $X(z) = \frac{1 - \frac{1}{2}z^{-1}}{1 - \frac{1}{4}z^{-2}}$; $Z > \frac{1}{2}$ by Partial fraction.

P.T.O.

- Q5)** a) Show with proper diagrams mapping of Left half of S-plane into Z-plane. [8]
- b) Describe stability analysis by use of Bilinear transformation and Routh Stability Criterion. [8]

OR

- Q6)** a) Explain the effect of sampling period on the transient response and on the stability of discrete time system. [8]
- b) Write a short note on designing of Discrete time system based on Root locus method. [8]

SECTION - II

- Q7)** a) Discuss Z-transform method used for STM from the given state difference equation $X(k + 1) = GX(k) + Hu(k)$ [8]

- b) Evaluate the pulse transfer function $\frac{Y(z)}{U(z)}$ from the state variable model

of a discrete time system with usual notation. $x(k+1) = \begin{bmatrix} 0.8 & 1 \\ 0 & 0.5 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 0.5 \end{bmatrix} u(k)$

$$Y(k) = [1 \quad 0] x(k) H = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \quad [8]$$

OR

- Q8)** a) Describe conversion of pulse transfer function to state space model and vice versa. [8]

- b) By using any one method, determine the discrete time state space model

for a system having pulse transfer function $\frac{Y(z)}{R(z)} = \frac{z+0.1}{(z-1)(z-0.8)}$. [8]

- Q9)** a) Write short note on Principal of Duality and effect of pole zero cancellation. [8]

- b) Describe relationship between controllability, observability and stability. [8]

OR

- Q10)a)** Explain Full Order Observer with proper block diagram. [8]
b) Design full order observer for the system having [8]

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

So that desired eigen values of observer matrix are $Z = 0.5 + j0.5, Z = 0.5 - j0.5$.

- Q11)a)** Draw neat diagram of Digital temperature control scheme and explain it. [8]
b) Construct state model for following transfer function. Also obtain different canonical form for system: [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 with proper block diagram. [8]
b) Draw a neat block diagram of digital position control scheme and explain the function of each block. [10]



Total No. of Questions : 12]

SEAT No. :

P2089

[Total No. of Pages : 3

[5254]-140-A

B.E. (Electrical)

**INTRODUCTION TO ELECTRICAL TRANSPORTATION
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) 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)** State different types of electrical vehicle? Compare them with the help of following points. **[8]**
- i) propulsion
 - ii) energy system used
 - iii) characteristics
 - iv) challenges
- b) What are the Drive systems used in Trams? Explain how the Traction power is controlled and delivered for these Drive Systems. **[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]**

P.T.O.

Q3) a) What do you understand from the specification “Automotive Battery 12 Volt, 135 AH at 20 hour rate”. [8]

b) What is continuous discharge current this battery can provide and for how many hours before getting fully discharged. [8]

OR

Q4) a) State various types of batteries used in electrical vehicle. Explain any one of them. [8]

b) How hydrogen fuel cell developed explain with help of diagram n. [8]

Q5) a) Give two examples of application for each of the cases of Power conversion AC 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 used in electrical vehicle. [10]

b) Explain three phase fully controlled rectifier for RL load. [8]

SECTION - II

Q7) a) Compare Advantages of Analog Controls to Digital Controls in a Electric bus instrumentation. [8]

b) What are CAN Bus controls and why this is preferred control system in present day design. [8]

OR

Q8) a) Write short note on brushless dc motor drive. [8]

b) Compare mechanical steering with electric steering. [8]

Q9) a) Explain with Block Diagram typical Drive Train of an Electric Bus starting from Energy source to Drive and control at Wheels. [8]

b) Explain the Power source for Electric Rail Traction. [8]

OR

Q10)a) Explain the various maintenance techniques used to maintain 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) Draw the controller diagram for electric vehicle controller with DSP. [8]



Total No. of Questions : 12]

SEAT No. :

P2090

[Total No. of Pages : 3

[5254]-141

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) Discuss on (any four) :

[16]

- a) Non-self regulation
- b) Interacting processes
- c) Nonlinear Dynamics
- d) Degrees of Freedom

OR

Q2) a) Explain in brief Dead time or transport delay processes. Also discuss the effect of P action on Dead time dominant processes. **[8]**

b) Define Self-regulating process. Derive the first order differential equation for self-regulating process. **[8]**

Q3) a) What is the need of analyzing process control loops? With the help of necessary diagrams and equations explain the procedure to test a typical temperature control loop. **[10]**

b) Compare major aspects of SLPC and MLPC. **[8]**

OR

P.T.O.

Q4) a) Apply Scaling & find out normalized (Scaled) equation for Heat Exchanger, as per following data: [12]

- i) Steam flow rate $W_s = 0$ to 3000 pounds per hour
- ii) Latent heat of steam $H_s = 1010$ Btu per pound.
- iii) Process fluid flow rate $W_p = 0$ to 24990 pounds per hour.
- iv) Specific heat of Process fluid $C_p = 1$ Btu per pound.
- v) Outlet Temperature $T_2 = 50$ to 250 °F
- vi) Outlet Temperature $T_1 = 0$ to 100°F

Energy balance equation of heat exchanger is

$$H_s W_s = C_p W_p (T_2 - T_1)$$

b) Draw the Faceplate of SLPC. Enlist specifications of SLPC. [6]

Q5) a) Discuss application issues such that, input and output processing in feedback control to provide accuracy and reliability. [8]

b) Explain in brief various performance measures for disturbance input changes. [8]

OR

Q6) a) Comment on “Tuning of Feedback Controller”. Explain with suitable example fine tuning. [8]

b) Discuss in brief effect of tuning parameters on performance of closed loop system. [8]

SECTION - II

Q7) a) What are different ways to improve nonlinear process performance? Explain in brief any one non linear element. [8]

b) Explain with suitable example Feedback-Feedforward control scheme. [8]

OR

Q8) a) Describe with neat sketch configurations of ratio controller. [8]

b) What is cascade control system? Illustrate with neat sketch a cascade control system. [8]

- Q9)** a) Explain necessity of decoupling control with the help of suitable example. [10]
- b) Discuss in brief Interaction and its effect on process performance. [8]

OR

Q10) In-line blending of two streams outlet flow F_3 and composition x are to be controlled. The available manipulated variables are the inlet flows F_1 & F_2 . Composition is defined as the fraction of component F_1 . The process is linear and instantaneous. [18]

- a) Draw the process flow diagram
- b) Calculate the RGA
- c) How would you pair the input-output variables for this process? Why?
- d) Draw the control instrumentation on process flow diagram.
- e) Suggest suitable technique to eliminate interaction and also draw revised control instrumentation on process flow diagram.

- Q11)** a) Describe step analysis or % incompletion method for finding time constants of a two time constant system. [8]
- b) Explain with neat block diagram the working of Fuzzy Logic Controller. [8]

OR

- Q12)** a) Explain with suitable block schematic Smith Predictor. [8]
- b) What is Model Predictive Controller? Explain with suitable block diagram. [8]



Total No. of Questions : 12]

SEAT No. :

P2091

[Total No. of Pages : 3

[5254]-142

B.E. (Instrumentation & Control)

DIGITAL CONTROL

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain in detail the various blocks of Digital Time Control System. [8]
b) State Sampling Theorem and explain in short Phenomenon of aliasing and Folding. [8]

OR

- Q2)** a) Compare Analog Control System and Digital Control System. [10]
b) Define Zero Order Hold and First Order Hold. [6]

- Q3)** a) Compare Positional form and Velocity form of Digital PID Controller. [8]
b) Derive an equation and show the block diagram representation of Velocity form of Digital PID Controller. [10]

OR

- Q4)** a) List the advantages of Velocity form over the Positional form of Digital PID Controller. [8]
b) Design a Deadbeat Controller for the system described by the following process transfer function, assume $T = 1$ Sec and Input=Step. [10]

$$Gp(Z) = \frac{(Z+1)}{(Z-0.5)(Z-0.8)}$$

P.T.O.

- Q5) a)** Compare the Jury's Stability and Bilinear Transformation. [8]
b) Check the stability of the system as shown below by using Bilinear Transformation. [8]

$$P(Z) = Z^3 - 4Z^2 + 5Z - 2$$

OR

- Q6) a)** State and explain the necessary and sufficient conditions for Jury's Stability Test. [8]
b) Write a short note on Bilinear Transformation. [8]

SECTION - II

- Q7) a)** Define the following terms : [8]
i) State Space
ii) State Vector
iii) State Variable
iv) State Trajectory
b) Write a short note on Similarity Transformation. [8]

OR

- Q8) a)** Obtain the State Model for the following P.T.F. by using direct form. [8]

$$\frac{Y(Z)}{U(Z)} = \frac{Z^2 + 5Z + 2}{Z^3 + 6Z^2 + 4Z + 1}$$

- b) Diagonalise the following matrix by Similarity Transformation. [8]

$$G = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 6 & -11 & 6 \end{bmatrix}$$

Q9) a) Consider the discrete time control system defined by the equation. [12]

$$X(K + 1) = GX(K) + H U (K)$$

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

Determine the suitable State Feedback Gain Matrix 'K' such that the system will have the close loop poles at $Z = 0.5 + j0.5$ and $Z = 0.5 - j0.5$.

b) Define State Observability. [4]

OR

Q10)a) Write a short note on State Observer and Its types. [8]

b) Write a short note on Pole Placement and its need. [8]

Q11) Consider the discrete time control system defined by the equation [18]

$$X(K + 1) = GX(K) + H U (K)$$

$$G = 0.3679; \quad H = 0.6321; \quad X(0) = 1$$

Determine the Optimal Control Law to minimize the following performance index also find J_{MIN} ,

$$J = \frac{1}{2} [X(7)]^2 + \frac{1}{2} \sum_{K=0}^6 [X^2(K) + U^2(K)]$$

OR

Q12)a) Write a short note on Optimal Control and discuss any one application of it. [12]

b) Write a short note on Quadratic Performance Index. [6]



Total No. of Questions : 12]

SEAT No. :

P2092

[Total No. of Pages : 3

[5254]-143

B.E. (Instrumentation & Control) (Semester - I)
PROJECT ENGINEERING AND MANAGEMENT
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, 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 are various types of organizational structure? Explain matrix organizational structure in detail. **[8]**
- b) Write a short note on the interdepartmental interaction involved in instrumentation type of projects and their interaction involved in Project statement. **[8]**

OR

- Q2)** a) Explain Interdepartmental, Interorganisational and Multi agency interaction involved in Project and their co ordination Project statement. **[10]**
- b) What is project management? **[6]**

- Q3)** a) What are the types of estimates? Explain in detail. **[8]**
- b) Write short notes on (1) SOW (2) Milestone scheduling. **[8]**

OR

- Q4)** a) Write a short note on project management software Primavera. **[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 [10]
- i) Thermo well
 - ii) Turbine flow meter
- b) Explain what is P & I diagram. Draw the P & I diagram pressure control loop. [8]

OR

- Q6) a)** Write short note on i) P & T Diagram ii) Material balance sheet. [8]
- b) What are the various standards used in instrumentation project. Explain in detail. [10]

SECTION - II

- Q7) a)** What is Plant layouts and General arrangement drawing? Write its importance. [8]
- b) Draw installation sketch of thermo well. [8]

OR

- Q8) a)** What are the types of cables used in plant automation? Suggest cables for carrying transmission signal. Justify your answer. [8]
- b) What is loop wiring diagram? Draw a loop wiring diagram of level control loop. [8]

- Q9) a)** What are installation and commissioning activities. [6]
- b) What is cold and hot commissioning? Explain in detail. [10]
- c) What is tending? [2]

OR

- Q10) a)** Explain bidding process in detail. [9]
- b) What are the construction activities involved in project? Explain step by step. [9]

Q11)a) What are the various types of control panels. [8]

b) Write a short note on breakfront control panel. [8]

OR

Q12)a) Explain the FAT and SAT for control panel in detail. [8]

b) Write a short note on consoles. [8]



Total No. of Questions : 12]

SEAT No. :

P2093

[Total No. of Pages : 3

[5254]-144

B.E. (Instrumentation & Control)

BIOMEDICAL INSTRUMENTATION (Elective - I)

(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

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

SECTION - I

Q1) a) Define Bioelectrode .Name the various types of bioelectrodes used for bioelectric potential measurements. Explain the necessity of microelectrode, micropipette electrode. [8]

b) Define the following : [4 × 2]
half cell potential, offset potential, action potential. Resting potential, Evoked Potential,

OR

Q2) a) Define Biosensor. With the help of neat diagram, explain the working of Biosensor (Glucose Sensor). [8]

b) Explain the Ergonomics Considerations in Medical Equipment design for Dental Chair. [8]

Q3) a) Explain in detail the pumping action of heart and the genesis of ECG Waveform. [8]

b) With the help of neat diagram, Explain the working of Carrier Amplifier. [8]

OR

P.T.O.

Q4) a) Why Transient Protection is necessary in designing the biomedical equipment? Explain the Transient Protection Circuit. [8]

b) Explain Einthoven Triangle that connected with defining Bipolar Leads of ECG. [8]

Q5) a) What is important of Blood Pressure Measurement in Cardiac Performance? With the help of neat circuit diagram, explain the working for measurement of Systolic & Diastolic blood pressure. [10]

b) Explain the principle working of Ultrasonic Blood Flow meter with a neat diagram. [8]

OR

Q6) a) List out the various methods for the Cardiac Output Measurement. [2]

b) Explain Dye dilution Method with Dilution Curve. [8]

c) Explain Plethysmography with the help of neat diagram. [8]

SECTION - II

Q7) a) Explain the EEG Amplifier with the help of neat diagram. [8]

b) Draw & Explain the structure of Neuron. [8]

c) What is Biofeedback. [2]

OR

Q8) a) What is EEG? State the EEG Recording modes? List out the various waveforms generated during the EEG along with the frequency range, amplitude. State the significance of each waveform. [10]

b) What is Electromyography? Explain the Electromyography in detail. [8]

- Q9)** a) Draw & Explain three main sections of Human Auditory System? Explain the middle ear Functioning. [8]
- b) With the help of neat diagram, Explain the working of Ophthalmoscope type Instrument. [8]

OR

- Q10)**a) Describe the working of Evoked response type Auditory system with a neat diagram. [8]
- b) State the various errors in Vision & their method of correction with neat sketch. State the functioning of three layers of eyes. [8]

- Q11)**a) Explain the Following terms with respect to Respiratory Measurements:- [4 × 2]

- i) TV,
- ii) ERV,
- iii) VC,
- iv) IRV

- b) Methods of Accident Prevention in medical equipments:- Low power supplies like Batteries, Appropriate grounding and shielding, Isolation, Use of Circuit breakers [8]

Diagram

Explanation.

OR

- Q12)**a) Let go Current, Macro Shock, Micro shock, Leakage Current. [4 × 2]

- b) A medical apparatus for oxygenating the blood. [1]

Diagram [3]

Explanation [4]



Total No. of Questions : 12]

SEAT No. :

P2094

[Total No. of Pages : 3

[5254]-145

B.E. (Instrumentation & Control)

LASER BASED INSTRUMENTATION

(2008 Pattern) (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 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 table 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, 14.5 THz line width, loss coefficient 3500 per meter, refractive index 3.6, dimensions length = 300 micrometer, thickness = 2 micrometer and internal quantum efficiency = 1. [9]

P.T.O.

- 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

- 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 2500V and gives an optical power of 5mW. [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 of 200 μs . 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 1.5 per unit length in x-direction and the fringe spacing is found to be 1 mm. Hence find the strain. [8]
- b) List out the applications of holographic interferometer that you know. Explain any one in detail. [10]



Total No. of Questions : 12]

SEAT No. :

P2095

[Total No. of Pages : 3

[5254]-146

B.E. (Instrumentation & Control)
ADVANCED CONTROL SYSTEM
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain in brief with neat diagram of limitcycle. [8]
b) Define describing function determine describing function of the relay with dead zone. [10]

OR

- Q2)** a) Explain the nonlinearities backlash and hysteresis with example. [10]
b) Explain in brief phase plane method. [8]

- Q3)** a) Explain model reference adaptive control using Lyapunov approach for stability analysis of continuous time system. [8]
b) Explain with neat diagram of model reference adaptive control system.[8]

OR

- Q4)** a) Explain in detail stability and convergence studies of model reference adaptive control system. [8]
b) Explain in detail discrete time MRAC system. [8]

P.T.O.

- Q5) a)** Determine whether following quadratic form is positive definite or not [8]
 $Q(x) = 10x_1^2 + 4x_2^2 + x_3^2 + 2x_1x_2 - 2x_2x_3 - 4x_1x_3$
- b)** Explain in brief frequency domain stability criteria. [8]

OR

- Q6) 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 the stability of the system. Write the Liapunov function $V(x)$. [10]
- b)** Explain stability analysis by describing function method. [6]

SECTION - II

- Q7) a)** Explain self tuning regulator using block diagram. [8]
- b)** Explain indirect self tuning regulator using least squares estimator for $Ay(t) = Bu(t) + v(t)$ where y is the output, u is the input of the process and v is a disturbance also give the algorithm for obtaining it. [10]

OR

- Q8) a)** Explain in detail LQG self tuning regulators. [8]
- b)** Explain implicit and explicit self tuning regulators. [10]
- Q9) a)** Explain in detail robustness studies multi variable system. [8]
- b)** Explain in detail general purpose adaptive regulator. [8]

OR

- Q10) a)** Explain the requirements for the formulation of an optimal control problem. [8]
- b)** Explain the necessary conditions of optimality. [8]

Q11)a) Obtain the control law which minimizes the performance index

$$J = \int_0^{\infty} (x^2 + u^2) dt \text{ for the system.}$$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \quad [8]$$

b) Discuss performance measures for optimal control problems. [8]

OR

Q12) Write short note on. [16]

- a) Indirect self tuning regulator
- b) ABB adaptive controller



Total No. of Questions : 12]

SEAT No. :

P2096

[Total No. of Pages : 3

[5254]-147

B.E. (Instrumentation & Control)

BUILDING AUTOMATION - I

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Draw the block diagram of building life safety system & explain each block. [8]

b) Explain fire stages and detector analogy with neat sketch. [10]

OR

Q2) a) Explain notification appliances and notification appliances circuit. [8]

b) Write a short notes on : [10]

i) Fire Triangle

ii) Fire Signature

Q3) a) List various automatic Fire Detector, Explain any one automatic fire detector with neat sketch. [6]

b) Explain addressable pull station with neat sketch. [10]

OR

P.T.O.

- Q4)** a) Give classification FAS loops. Explain any one. [8]
b) Explain Air Sampling Detector with neat sketch. [8]

- Q5)** a) Explain Types of smoke detector. Elaborate photoelectric type. [8]
b) Explain relays and contacts used in FAS. [8]

OR

- Q6)** a) Explain cause and effect matrix. [8]
b) Explain different guideline for placing smoke detector as per NFPA slandered. [8]

SECTION - II

- Q7)** a) Draw and Explain the architecture of intelligent access control systems. [10]
b) Write a short notes on [8]
i) 2 wire smoke detector
ii) Authentication

OR

- Q8)** a) Explain Standalone access control system with neat sketch. [8]
b) Discuss communication between card and card reader technology with the help of weigand card. [10]

- Q9)** a) Explain the Term Camera resolution in detail. [8]
b) Explain various components of CCTV System. [8]

OR

- Q10)**a) List and explain types of data compression in video processing. [8]
b) Explain DVM with neat sketch. [8]

- Q11)**a) Explain PIDS with neat sketch. [8]
- b) List various types of Intrusion detection system explain any one with neat sketch. [8]

OR

- Q12)**a) Explain any one application of Perimeter Intrusion Detection system. [8]
- b) Explain CCTV control room. [8]



Total No. of Questions : 12]

SEAT No. :

P2097

[Total No. of Pages : 3

[5254]-149

B.E. (Instrumentation & Control)

NANO INSTRUMENTATION

(2008 Pattern) (Elective - II) (Theory)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Describe the energy sub-bands and density of states in - [6]
i) Quantum Dot and ii) Quantum wire
b) What is ballistic transport of electrons in a medium? Give parameters on which the electron transport depends at the Nanosale. [6]
c) Describe Self assembly technique for the synthesis of Nano material and its merits. [6]

OR

- Q2)** a) Describe Nanolithography technique in detail. [6]
b) Illustrate various properties and applications of Nano materials. [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) Give the principles, working of an SNOM with suitable diagram and its advantages. [8]

P.T.O.

OR

- Q4)** a) In an AFM, describe different types of inter atomic forces involved and its modes of operations with diagram. [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) Describe CNT based Field emission device and metallic electron emitting tip. [8]

OR

- Q6)** a) Describe CNT based transistor in detail. [8]
- b) Explain why CNT as good microwave absorbing material? Based on CNT array explains RF Filter. [8]

SECTION - II

- Q7)** a) Define the terms viz, spin polarization, magnetic moment, spin injection, spin relaxation and spin detection involved in the spintronic devices. [8]
- b) Describe the GMR effect with a suitable diagram and spin valve device. [8]

OR

- Q8)** a) Explain the structure, working of a spin Diode with a suitable diagram. Give its advantages over conventional one. [8]
- b) Write a note on spin filter in detail. [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) Describe the Resonant Tunneling Diode and Transistor with its structure and operation. [8]

OR

- Q10)** a) Describe single electron transistor in detail. Explain the phenomenon of coulomb blockade. [8]
- b) Describe in detail about any mesoscopic device working at room temperature along with a suitable diagram. [8]

Q11) Write short notes on the following.

- a) Nano mechanical Sensors. [6]
- b) Magnetic nanotransducers. [6]
- c) CNT based optical antenna. [6]

OR

Q12) Write short notes on the following.

- a) Nano chemical sensors. [6]
- b) CNT based optical waveguide. [6]
- c) UV Nano wire photo detector. [6]



Total No. of Questions : 12]

SEAT No. :

P2098

[Total No. of Pages : 2

[5254]-150

B.E. (Instrumentation & Control)

ADVANCED DIGITAL SIGNAL PROCESSING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain polyphase decomposition in multirate signal processing. [12]
b) Explain term Interpolation. [6]

OR

- Q2)** a) Explain any one application of multirate digital signal Processings in details. [12]
b) Explain term Decimation. [6]

- Q3)** a) Explain forward linear prediction. [10]
b) Explain discrete time random signal and process. [6]

OR

- Q4)** a) Explain backward linear prediction. [8]
b) Derive the Yule Walker equations or normal equations for AR process. [8]

P.T.O.

- Q5)** a) Discuss the direct and indirect methods of estimation of energy density spectrum. [8]
b) Explain Welch method of power spectrum estimation with computational requirement. [8]

OR

- Q6)** a) Explain Burg method for AR Model parameters for spectrum estimation. [8]
b) Explain the term power density spectrum. [8]

SECTION - II

- Q7)** a) Brief the different steps in LMS algorithm. [8]
b) Explain application of adaptive filtering for system modelling. [8]

OR

- Q8)** a) Explain different properties of RLS algorithm. [8]
b) Explain adaptive noise cancelling system using adaptive filtering. [8]

- Q9)** a) Explain the different features of TMS 320c67xxDSP processor. [9]
b) Discuss the linear and circular addressing modes in TMS320C67XX. [9]

OR

- Q10)** a) Draw the functional block diagram of TMS320C67XX. Show all details. [9]
b) Explain different types of instructions of TMS320C67XX. [9]

- Q11)** a) Enlist different properties of CWT. [6]
b) Explain Daubechies Four-Coefficient Wavelet. [10]

OR

- Q12)** State the equations and properties of FT, STFT and CWT. Compare it. [16]



Total No. of Questions : 12]

SEAT No. :

P2099

[Total No. of Pages : 3

[5254]-151

B.E. (Instrumentation & Control)
AUTOMOBILE INSTRUMENTATION
(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.*
- 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) Write a short note on “Current Trends in Modern Automobiles”. [8]
b) Explain Instrumentation involved in Vehicle Motion Control System. [8]

OR

- Q2)** a) Explain the concept of Electronic Control System in Automobiles. [8]
b) Explain various open loop and closed loop components of an Engine Management System. [8]

- Q3)** a) Compare Single Port and Double Port Fuel Injection Systems. [8]
b) What is a carburetor? Explain Carburetor Control System. [8]

OR

- Q4)** a) Write a short note on Electronic Spark Timing Control System. [8]
b) Explain Ignition System in Automobile. [8]

P.T.O.

- Q5) a)** Explain the following terms : [12]
- i) Engine Cranking and Warm up Control
 - ii) Acceleration Enrichment - Deacceleration Leaning
- b) What is Engine Mapping. [6]

OR

- 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 Electronic Braking. [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 Instrumentation involved in Central Locking and Anti Theft System. [8]

OR

- Q10) a)** What is Air bag technology in Automobiles? Explain its significance. [6]
- b) Explain the principle of control circuit components and its characteristics in an Automobile. [10]

- Q11)** a) Explain “Ergonomics and Safety” in Automobile. [8]
- b) Writes 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



[5254]-152

B.E. (Instrumentation & Control)
PROCESS DYNAMICS & CONTROL
(2008 Pattern) (Semester - II)

Time : 3 Hours]

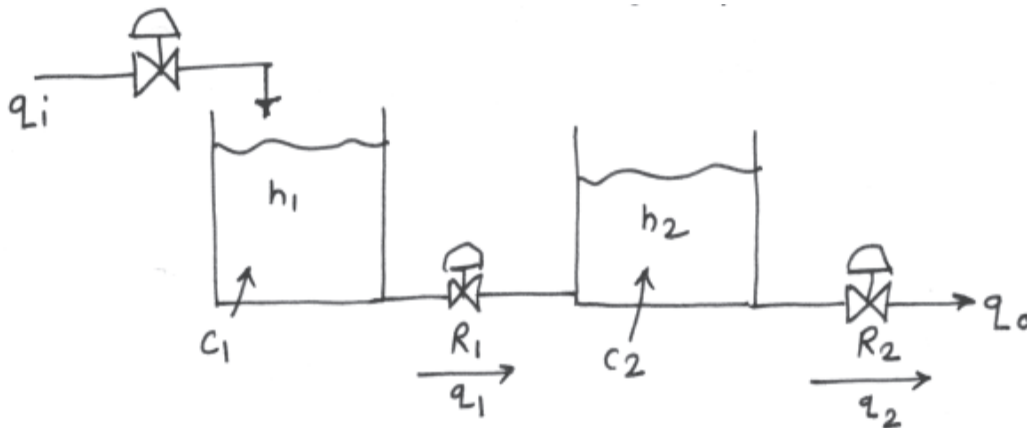
[Max. Marks : 100

Instructions to the candidates:

- 1) Write three questions from each section.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.

SECTION - I

- Q1)** a) Explain dynamic behavior of non linear 1st order system. [6]
 b) Obtain the mathematical model for following tank system. [10]



OR

- Q2)** a) Explain why we need mathematical modeling. Compare basic modeling methods. [6]
 b) Discuss how second-order plus dead time processes can be reduced to first-order plus dead time models (SOPDT to FOPDT) with an example. [10]

P.T.O.

- Q3)** a) Explain heat exchanger response to constant steam temperature. [8]
b) Explain resonance effect in heat exchanger. [8]

OR

- Q4)** a) Explain cascade control of heat exchanger. [8]
b) Explain following control schemes for heat exchanger with neat sketch.[8]
i) Throttle condensate
ii) Bypass method

- Q5)** a) Explain 3-element boiler drum level control system. [8]
b) Explain fuel-air ratio control schemes with neat sketch. Explain in brief burner management system. [10]

OR

- Q6)** a) Compare feed water control strategies in boilers. [8]
b) Explain fuel savings through optimization & water side optimization.[10]

SECTION - II

- Q7)** a) Explain end-point detection & pH control in continuous CSTRs. [10]
b) Draw & label interacting time constants. Explain effect of lags. [8]

OR

- Q8)** a) With neat sketch explain temperature control schemes in CSTRs. [10]
b) Explain end-point detection of batch reactors. [8]

- Q9)** a) Explain overhead composition control & bottom product control schemes in distillation column. [8]
b) Derive & explain modeling equations of distillation column under steady state condition. [8]

OR

- Q10)a)** Explain in detail lag in liquid & vapor flow in distillation column. [8]
b) Write short notes on: Frequency response w.r.t. distillation column. [8]

- Q11)a)** Explain any two controls required in compressor. [8]
b) Explain centrifugal pump & it's characteristics in detail. [8]

OR

- Q12)a)** Explain & Compare rotary pumps and metering pumps. [8]
b) Explain compressor throttling. [8]



Total No. of Questions : 12]

SEAT No. :

P2101

[Total No. of Pages : 3

[5254]-153

B.E. (Instrumentation & Control)

INDUSTRIAL AUTOMATION

(2008 Pattern) (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 answer books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Assume Suitable data if necessary.*

SECTION - I

- Q1)** a) What are the User Requirement Specifications for any automation project? Explain with suitable example. **[10]**
- b) Compare the PLC and SCADA on the basis of performance criteria. **[8]**

OR

- Q2)** a) Explain the role of each layer in “Automation Pyramid”. **[10]**
- b) Explain the general objectives of Plant Automation. **[8]**

- Q3)** a) Write Short note on ControlNet and DeviceNet. **[8]**
- b) Explain MODBUS Protocol. **[8]**

OR

- Q4)** a) Explain HART Communication. layers with respect to OSI/ISO reference model. **[8]**
- b) Explain OSI/ISO reference model in communication system. **[8]**

P.T.O.

- Q5)** a) Write short note on CNC Machine. [8]
b) Explain with example Function block diagram and Sequential Function Chart in PLC Programming. [8]

OR

- Q6)** a) With an example explain "What is SCADA?" [8]
b) Explain basic principle and working of CNC Machine. [8]

SECTION - II

- Q7)** a) Explain the various function blocks in DCS. [8]
b) Write a program in DCS system (Any make) using FBD programming method for any flow control loop. Write the different steps involved in the configuration of function blocks. [10]

OR

- Q8)** a) List and explain the basic functions of DCS System. [8]
b) Explain the architecture of DCS in detail. [10]

- Q9)** a) Explain the Security and User access management system in any DCS system. [8]
b) Explain different logical function blocks available in any DCS System. [8]

OR

- Q10)** Explain in brief related to DCS System. [16]
a) Alarm Management System.
b) Data Communication Links.

- Q11)**a) What are the different safety architectures? [8]
b) Explain IEC61511 standard for functional safety. [8]

OR

- Q12)**a) Explain the importance of Hazard and Operability study (HaZOP). [8]
b) Explain Safety Integrity Level (SIL) [8]



Total No. of Questions : 12]

SEAT No. :

P2102

[Total No. of Pages : 3

[5254]-154

B.E. (Instrumentation & Control)

ADVANCED BIOMEDICAL 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 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 working principle of ESU. Draw and explain the electrode configuration used in ESU. [8]
- b) Compare Internal and External pacemaker. [4]
- c) Draw the schematic diagram of dc defibrillator and explain the function of each component. [6]

OR

- Q2)** a) What is a programmable pacemaker? Explain with the help of a neat block diagram. [8]
- b) What are the front panel controls provided on an Infusion pump? Explain their function. [4]
- c) Explain the generalised block diagram of a typical Bedside Monitor. [6]
- Q3)** a) Explain the working principle of Pulse Oximeter. What signal processing arrangement is used in pulse oximeter. [8]
- b) What is telemedicine and what are its applications? [8]

P.T.O.

OR

Q4) a) What are the common methods used for modulation in biotelemetry system? Explain the pulse width modulator system. [8]

b) Draw the block diagram of a Coulter counter and explain its working. What are the errors generally encountered in it? [8]

Q5) a) How Xrays are produced? Explain the working of Xray tube. [8]

b) What are limitations of conventional radiology? How it is overcome in Computed Tomography? [8]

OR

Q6) a) What is the function of a collimator and grid in an Xray machine? Explain with the help of a diagram. [8]

b) What is Computed Tomography? Explain the technique with the help of a diagram. [8]

SECTION - II

Q7) a) What is the significance of relaxation process in NMR imaging. Distinguish between T1 and T2 relaxation times. [8]

b) Draw the block diagram of pulse height analyser and explain it's working. [8]

OR

Q8) a) Explain the principle of Positron Emission Tomography scanner. Describe with the help of a diagram the various building blocks of PET scanner. [8]

b) How ultrasound is generated? Explain the role of focussing, frequency and active element diameter with reference to ultra sound transducers? [8]

Q9) a) What does laser stand for. Explain the principle of operation of laser? [8]

b) What is diathermy? Explain the principle of ultra sound diathermy. [8]

OR

Q10)a) List different types of endoscopes and explain any one of them in detail. [8]

b) Write shortnote on Microwave Diathermy. [8]

Q11)a) Explain the working of Lithotripter machine with the help of a block diagram. Draw the shape of acoustics shock wave pulse. [10]

b) What are Orthrotic & Prosthetic devices? Give suitable examples. [8]

OR

Q12)a) Explain the function of kidneys. What changes take place in body in case of renal disease? What is the remedy for it? [10]

b) Describe different types of joysticks used in Wheelchair. [8]



Total No. of Questions : 12]

SEAT No. :

P2103

[Total No. of Pages : 3

[5254]-155

B.E. (Instrumentation & Control)

FIBER OPTIC INSTRUMENTATION

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *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) What are the advantages of optical fibers? Describe the total internal reflection in optical fiber with the help of simple ray diagram. [10]
- b) Compute the acceptance angle and Brewster's angle of an optical fiber with numerical aperture of 0.30 and a cladding refractive index of 1.50. [8]

OR

- Q2)** a) Consider an optical fiber with core refractive index of 1.50 and cladding refractive index of 1.45. Determine: (i) the critical angle at the core and cladding interface; (ii) the NA for the fiber; (iii) the acceptance angle in air for the fiber. [9]
- b) Explain the Step-index fiber and Graded-index fiber in detail with neat ray diagrams. [9]
- Q3)** a) Explain the various measurement of losses in optical fibers in detail. [8]
- b) Explain the Rayleigh scattering and Mie scattering with neat diagrams. [8]

OR

P.T.O.

- Q4)** a) Explain bending losses in an optical fiber in detail. [8]
b) Explain in detail the dispersion losses in an optical fiber. [8]

- Q5)** a) Explain the mechanical and fusion fiber splicing techniques. [8]
b) Explain the structures of P-I-N diode and Avalanche photodiode. [8]

OR

- Q6)** a) Compare the LED and Laser as light sources in optical fibers. [8]
b) Explain different configurations of optical couplers. [8]

SECTION - II

- Q7)** Classify the optical fiber sensor based on sensing mechanism. Describe the sensing techniques based on intensity modulation. Also, enlist different applications and advantages of intensity modulated optical fiber sensors. [18]

OR

- Q8)** a) Describe the intrinsic and extrinsic optical fiber sensors with the help of suitable diagrams. [9]
b) Explain the advantages and disadvantages of optical fiber sensors? [9]

- Q9)** a) Explain the application of Optical Time Domain Reflectometer (OTDR) in Distributed Optical Fiber Sensing. [8]
b) Explain the use of Fiber Bragg Grating in optical fiber sensors. [8]

OR

Q10) Write short notes on :

- a) Fiber Bragg Grating. [8]
b) Distributed Optical Fiber Sensing. [8]

Q11)a) What are the types of fiber amplifiers? Explain the operation of silicon laser amplifier (SLA) with neat sketch. [8]

b) Explain various components of Integrated Optics. [8]

OR

Q12) Write short notes on :

a) Optical amplifier [8]

b) Integrated optical devices [8]



Total No. of Questions : 12]

SEAT No. :

P2104

[Total No. of Pages : 3

[5254]-156

B.E. (Instrumentation & Control)

PROCESS MODELLING AND OPTIMIZATION

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Answers to the two sections should be written in separate 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.*
- 6) *Pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Derive second order model of any Mechanical system. [8]
b) What is data fitting? Explain any one data fitting method. [8]

OR

- Q2)** For a experimentation following data is obtain. [16]

X	0	5	10	15	20	25	30	35	40	45	50
Y	8	18	25	32	41	47	56	63	72	81	89

Identify the curve fitting equation will give best fit. Obtain the values coefficient of equation

- Q3)** a) Obtain mathematical representation of two isothermal tanks having constant hold- ups series converting reactant A and B into two product C with reaction rate k and reaction is exothermic. [9]
b) Obtain mathematical representation gas phase pressurized CSTR. [9]

P.T.O.

OR

- Q4)** a) Obtain mathematical representation of non-isothermal CSTR. [9]
b) Obtain mathematical representation plug flow cooling jacket. [9]

- Q5)** a) Explain pulse testing method. [8]
b) Explain merits and demerits of step and sine wave testing. [8]

OR

- Q6)** a) Explain relationships among time, Laplace and frequency domain. [8]
b) Explain sin wave testing method. [8]

SECTION - II

- Q7)** a) Determine the stability of a 2×2 process with a diagonal feedback controller given as: [9]

$$G_m = \begin{bmatrix} 3 & 10 \\ 1 & 5 \end{bmatrix} \quad \text{and} \quad B_{-s} = \begin{bmatrix} 2 & 0 \\ 0.5 & 1 \end{bmatrix}$$

- b) Write short note on robust nests doylt stein criterion. [9]

OR

- Q8)** a) How interaction between loops can be determine? Explain limitation of method. [9]
b) For the system given Find NI for this comment on stability also find proper pairing of control and manipulated variables. [9]

$$\begin{bmatrix} X \\ Y \end{bmatrix} = \begin{bmatrix} 10 \frac{e^{-3s}}{(5s+1)} & \frac{e^{-2s}}{(s+1)} \\ 2 \frac{e^{-5s}}{s+1} & 7 \frac{e^{-2s}}{(5s+1)} \end{bmatrix} \begin{bmatrix} P \\ Q \end{bmatrix}$$

Q9) For the functions given below, analyze the concavity and convexity in each case. **[16]**

a) $f(x_1, x_2) = x_1^2 + x_2^2 + x_2^2$

b) $f(x) = x_1^2 + 5x_1x_2 + 4x_2^2 + 2x_1 + 6x_2 + 2$

c) $f(x) = x + 3x^2 + 6x^3$

d) $f(x_1, x_2) = 2x_1^2 - 5x_1x_2 + 3x_2^2$

OR

Q10)a) How to find extremum of the objective functions and also explain it's importance. **[8]**

b) Explain quadratic approximation. **[8]**

Q11)a) Explain polynomial approximation method. **[8]**

b) Explain scanning and bracketing procedure for optimization of unconstrained problem. **[8]**

OR

Q12)a) Explain unidirectional search method for optimization. **[8]**

b) What is optimization? Explain the need of optimization with suitable example. **[8]**



Total No. of Questions : 12]

SEAT No. :

P2105

[Total No. of Pages : 3

[5254]-157

B.E. (Instrumentation & Control)

BUILDING AUTOMATION - II

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Describe different ways of heat transfer with suitable examples. [8]
b) On a measurable wet day, the outside air temperature is 5°C at 80% relative humidity. Bring that air into your building and heat it to 22°C. Draw Psychometric chart and find out relative humidity. Comment on the situation. [10]

OR

- Q2)** a) Explain the attributes that influence Human comfort. Explain sensible and latent heat loss with suitable examples. [10]
b) Explain the working of air-conditioning system with neat sketch. [8]

- Q3)** a) Describe various steam traps of steam system with application. [8]
b) Explain dual duct VAV. [8]

OR

P.T.O.

- 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

- a) What is BMS? Explain its components. [6]
b) Describe along with the application of different switches used in monitoring various signals and status of the equipments used in building automation. [10]

SECTION - II

- Q7)** a) Explain pros and cons of LON protocol. [8]
b) Explain serial transmission modes of Modbus protocol. [8]

OR

- Q8)** a) Describe motor control center with block diagram. [8]
b) Explain system integration using BACnet and its challenges. [8]

- Q9)** a) Define ASHRAE. Draw ASHRAE symbols for the following : [8]
i) Chiller
ii) Cooling tower
iii) Unit heater
iv) Damper- opposed blade
v) Roof ventilator intake
vi) Humidifier
b) Explain the elements of green building. [8]

OR

Q10)a) What are the different energy management /conservation strategies?
Explain. [8]

b) Explain lighting control. [8]

Q11)a) Explain features and benefits of IBMS. [10]

b) Explain project life cycle. [8]

OR

Q12)a) Name different verticals where Building Management System can be used.
Explain any two. [10]

b) What are the different building management systems which can be
integrated and also list few of the advantages of integration? [8]



Total No. of Questions : 12]

SEAT No. :

P2106

[Total No. of Pages : 3

[5254]-158

B.E. (Instrumentation & Control)
AGRICULTURE IN INSTRUMENTATION
(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 concept of fine wire thermocouple. [8]

OR

Q2) a) Explain the various bio sensors. [8]

b) Explain the concept of Mohr's circle of stress. [8]

Q3) a) Explain the instrumentation for Dairy plant. [9]

b) Explain the instrumentation for Batch process. [9]

OR

Q4) a) Explain the flow diagram of juice extraction process. [9]

b) Explain the flow diagram of Batch process. [9]

P.T.O.

- Q5) a)** Explain in short irrigation methods : **[2 × 5]**
- i) Over head
 - ii) Centre Pivot
- b) Explain the design considerations in irrigation channels. **[6]**

OR

- Q6) a)** Compare different Irrigation systems. **[8]**
- b) Explain soil moisture measurement methods. **[4 × 2]**
- i) Gypsum block soil moisture sensor
 - ii) Voltage based method

SECTION - II

- Q7) a)** Explain irrigation control management of up stream & down stream control system. **[8]**
- b) Explain the role of SCADA for DAM parameters. **[8]**

OR

- Q8) a)** Explain instrumentation for green house control. **[8]**
- b) Explain humidity and temperature system for green house. List out the sensors for the same. **[8]**

- Q9) a)** Explain implementation of hydraulic control circuit use in harvesters cotton pickers. **[8]**
- b) Explain implementation of pneumatic control circuit use in harvesters cotton pickers. **[8]**

OR

- Q10)a)** Explain automation in Farm equipments. **[8]**
- b) Explain selection criteria for pump in detail. Explain installation of pump. **[8]**

Q11) Write short notes on :

a) Explain the infrared & UV bio sensor methods in agriculture. [9]

b) Agrometrological instrumentation weather stations. [9]

OR

Q12)a) Explain what is Leaf area length evapotranspiration? [9]

b) Explain Soil water content measurement using TDR. [9]



Total No. of Questions : 12]

SEAT No. :

P2107

[Total No. of Pages : 2

[5254]-159

B.E. (Instrumentation & Control)

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

SECTION - I

Q1) a) Explain the significance of smart materials in smart systems. [8]

b) Explain any two MEMS with diagram. [8]

OR

Q2) a) Define microsystem. Explain any one micro system with diagram. [8]

b) Explain the significance of smart systems in solving engineering problems. [8]

Q3) a) Draw & explain electrostatic comb drive in MEMS. [8]

b) Draw & explain silicon capacitive accelerometer in MEMS. [8]

OR

Q4) a) Draw & explain micromirror array for video projection in MEMS. [8]

b) Draw & explain magnetic microrelay in MEMS. [8]

P.T.O.

- Q5) a)** Draw & explain the PVD process for metal film deposition. [9]
b) Draw & explain the process of etching in micro fabrication technique. [9]

OR

- Q6) a)** Explain the significance of silicon as a material for micromachining. [9]
b) Draw & explain bulk micromachining process for silicon. [9]

SECTION - II

- Q7) a)** Compare a bar and a beam in microsystems. [8]
b) Write a note on energy methods for elastic bodies. [8]

OR

- Q8) a)** Explain the concept of torsion of beams in microsystems. [8]
b) Explain the concept of anticlastic curvature of beams in micro systems. [8]

- Q9) a)** Explain the need for numerical methods for finding solution of equation. [8]
b) Explain finite element model for structures with piezoelectric sensors and actuators. [8]

OR

- Q10) a)** Explain the squeezed film effects in electromechanics. [8]
b) Explain the applications of Finite Element Method. [8]

- Q11) a)** Draw & explain electronic differential amplifier for microsystems. [9]
b) Draw & explain tunnel diode & its characteristics. [9]

OR

- Q12) a)** Explain the signal conditioning circuits for micro systems. [9]
b) Write a short note on micro system packaging. [9]



Total No. of Questions : 12]

SEAT No. :

P2108

[Total No. of Pages : 2

[5254]-160

B.E. (Instrumentation & Control)

DIGITAL IMAGE PROCESSING

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, from Section - I Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12 from Section - II.*
- 2) *Answers to the two sections should be written in separate 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) Explain the steps in digital image processing. [16]

OR

Q2) Discuss characteristics of image digitizing components with suitable examples. [16]

Q3) Explain brightness adoption and discrimination with suitable examples. [16]

OR

Q4) Explain the basic image transformations with suitable examples. [16]

Q5) Obtain the 2D DFT of the following image : [18]

10	20	30
40	50	60
70	80	90

P.T.O.

OR

Q6) Explain DCT. Discuss its properties and applications. [18]

SECTION - II

Q7) Explain median spatial filter for image enhancement with suitable example. [18]

OR

Q8) Explain image enhancement in frequency domain. [18]

Q9) Explain image degradation model. [16]

OR

Q10) Explain inverse filtering. [16]

Q11) Explain sobel edge detecting operator with suitable example. [16]

OR

Q12) Discuss edge detection in image with suitable application. [16]



Total No. of Questions : 12]

SEAT No. :

P1990

[Total No. of Pages : 3

[5254] - 161

B.E. (Computer Engg.)

DESIGN AND ANALYSIS OF ALGORITHMS

(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) Black figures to the right indicate full marks.
- 5) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) Write Greedy Prim's minimum spanning tree algorithm. Also explain it with suitable example. [10]
b) Prove by contradiction: There exist two irrational numbers x & y such that x^y is rational. [8]

OR

- Q2)** a) Let the number of jobs be 4, and the associated profits with these jobs be $P_1 = 100$, $P_2 = 10$, $P_3 = 15$, $P_4 = 27$ respectively. The deadline for completion of these jobs $d_1 = 2$, $d_2 = 1$, $d_3 = 2$ and $d_4 = 1$ respectively for the four jobs. Find the feasible solutions and an optimal solution for these Job sequencing using Greedy approach. [7]
b) Write an algorithm to solve Optimal Merge Patterns problem. [5]
c) Write an algorithm for Quick Sort. State its time complexity. [6]

- Q3)** a) Solve the instance of 0/1 knapsack problem using dynamic programming : [8]
 $n = 4$, $m = 25$
 $(P_1, P_2, P_3, P_4) = (10, 12, 14, 16)$
 $(W_1, W_2, W_3, W_4) = (9, 8, 12, 14)$
b) What is Travelling Salesperson problem? Explain how it is solved using dynamic programming. [8]

P.T.O.

OR

Q4) a) State multistage graphs problem and explain how it can be solved using forward approach. [8]

b) Write an algorithm for finding optimal binary search tree using dynamic programming strategy. What is its computing time? [8]

Q5) a) Explain the algorithm for 0/1 knapsack problem using backtracking. [8]

b) Write the control abstraction for LC- search. [6]

c) Differentiate between “backtracking” and “branch and bound” strategies. [2]

OR

Q6) a) Write backtracking algorithm form coloring of the graph. Determine the time complexity of the same. [8]

b) Explain branch and bound algorithm for Hamiltonian Cycles problem.[8]

SECTION - II

Q7) a) Explain how Directed Hamiltonian Cycle (DHC) reduces to Travelling Salesperson decision Problem (TSP). [7]

b) Prove that the sum of subsets problem is NP-Hard, given that exact cover problem is NP-Hard. [7]

c) Explain non deterministic algorithms. [4]

OR

Q8) a) Prove that CNF- satisfiability reduces to clique decision problem. [6]

b) Explain any two NP-Hard graph problems. [6]

c) Explain Cook’s Theorem. Explain P and NP. [6]

Q9) a) Write an algorithm for prefix computation. Determine its time complexity. [8]

b) Explain in detail logarithmic time merging algorithm with example. [8]

OR

Q10)a) Explain all pairs shortest paths. Also give parallel shortest paths algorithm. [8]

b) Write the odd-even merge sort algorithm and explain it with an example. [8]

Q11)a) Explain how Huffman's technique is used for data coding. [8]

b) Explain Convex Hull, Quick Hull and techniques to solve them. [8]

OR

Q12)a) Explain any two heuristic search algorithms. [8]

b) Explain any two image edge detection algorithms. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1991

[Total No. of Pages : 2

[5254] - 162
B.E. (Computer Engg.)
PRINCIPLES OF COMPILER DESIGN
(2008 Pattern)

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 whenever necessary.*
- 3) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Write the use of yytext, yyleng, yyin, yyout, yylex, yymore, yyless, yywrap. For following grammar - **[8]**

$S \rightarrow AB$

b) $A \rightarrow a \mid b \mid \epsilon$ **[10]**

$B \rightarrow b \mid c$

- i) Compute First and Follow sets
- ii) Construct Predictive Parser

OR

Q2) a) Explain the role of lexical analyzer. Explain interaction between lexical analyzer and parser. Define lexeme, token, and pattern with suitable example. Construct Predictive Parser for following grammar – **[8]**

b) $S \rightarrow iEtSS' \mid a$

$S' \rightarrow eS \mid \epsilon$ **[10]**

$E \rightarrow b$

Q3) a) Construct syntax tree for $a - 4 + c$. **[8]**

b) Explain type checking and type conversion. **[8]**

OR

Q4) a) Explain syntax directed translation and need of semantic analysis. **[8]**

b) Explain L-attributed and S-attributed definitions. **[8]**

P.T.O.

- Q5) a)** What is backpatching? Explain in detail. [8]
b) Write and explain intermediate code for procedure calls. [8]

OR

- Q6) a)** Write SDT for declarative statement and explain the same. [8]
b) Write and explain intermediate code for arrays. [8]

SECTION - II

- Q7) a)** What is an activation record? Explain with the help of diagram. [8]
b) List and explain static allocation strategies. [8]

OR

- Q8) a)** Explain storage allocation strategies for block structured and non-block structured languages. [8]
b) Explain source language issues in run time storage organization. [8]

- Q9) a)** What are the code issues in code generation? [8]
b) Write and explain the algorithm to generate code form DAG. [10]

OR

- Q10) a)** Explain code generator-generator concept. [8]
b) What is dynamic programming? Explain in detail. [10]

- Q11) a)** Explain principle sources of optimization. [8]
b) List and explain optimizing transformations. [8]

OR

- Q12) a)** Explain data flow equations. [8]
b) Explain iterative data flow analysis. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1992

[Total No. of Pages : 2

[5254] - 163

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 whenever necessary.*

SECTION - I

Q1) a) What is the need of modeling software system? What are OO concepts used in software modeling and how? [8]

b) What do you mean by OMG? Explain the CORBA architecture. [8]

OR

Q2) a) Draw and explain 4 + 1 view architecture of the system models all the view of the system? [8]

b) Explain the behavioral things in UML2.0 [8]

Q3) a) How UML2.0 supports requirements modeling? [8]

b) Give the activity diagram for 'Book a Ticket' in Railway Reservation System using swim lanes. State your assumptions. [8]

OR

Q4) a) Draw detailed use case diagram for online Internet Banking System using all advanced notations for use case diagram.. [8]

b) What are boundary classes? Identify' and model in UML the boundary classes in a ATM system. [8]

Q5) a) Explain the element of a class diagram with an example. [8]

b) Explain the application of composite structure diagram. [6]

c) What do you mean by an active class. [4]

OR

P.T.O.

- Q6)** a) Draw the class diagram for online Airline traffic management system. [8]
b) Explain the concept of Realization and Aggregation. [6]
c) How to draw object diagrams? [4]

SECTION - II

- Q7)** a) Explain the communication diagram with example. [6]
b) How timing diagram can be used in real time systems? [6]
c) Enlist and elaborate the significance of messages used in sequence diagram. [6]

OR

- Q8)** a) Explain the sequence diagram elements with a sequence diagram for “withdraw money” from ATM system. [8]
b) Explain following : [6]
i) Composite State
ii) Self transition
iii) Sub State
c) How interaction overview diagram is related to activity diagram? [4]

- Q9)** a) Explain the purpose of a component diagram with a diagram and example. [8]
b) How do you model the deployment view in UML? [8]

OR

- Q10)** a) What are types of interfaces of a component? How it is modeled in UML? [8]
b) Draw the deployment diagram for client server 3 tier for your college website. [8]

- Q11)** a) Explain the forward engineering and reverse engineering with example. [8]
b) Give the solution for structural design pattern. [8]

OR

- Q12)** a) How do you forward engineer a class diagram? [8]
b) Explain the facade design pattern with an example. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1993

[Total No. of Pages : 2

[5254] - 164
B.E. (Computer Engineering)
IMAGE PROCESSING (Elective - I)
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Explain the software and hardware required for digital imaging. [8]
b) Justify the various steps required in image processing. [8]

OR

- Q2)** a) What is digital image processing? Explain any two applications of image processing. [8]
b) How the colour image is stored? [8]

- Q3)** a) Compare linear and non-linear transformation. [8]
b) Explain the basic image pre-processing steps. [8]

OR

- Q4)** a) What is sampling? Explain N-Quest sampling method. [8]
b) What is histogram? Explain the use of it in image processing? [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

- Q6)** a) What is texture? Explain statistical and spectral descriptor. [9]
b) What is region splitting and merging? [9]

P.T.O.

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 the methods used for lossless image compression. [8]

- Q9)** a) What is need of data compression? Explain Run-length coding. [8]
b) How the object is detected in image processing? [8]

OR

- Q10)**a) Write short note on Vector quantization. [8]
b) Explain the methods used for lossless image compression. [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) Dimension Reduction
b) Character Recognition Application
c) WAVELET with properties

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1994

[Total No. of Pages : 3

[5254] - 165

B.E. (Computer Engineering)

DESIGN AND ANALYSIS OF COMPUTER NETWORKS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

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 (WF²Q) 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]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1995

[Total No. of Pages : 2

[5254] - 166

B.E. (Computer Engineering)
ARTIFICIAL INTELLIGENCE
(2008 Pattern) (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) Define Artificial Intelligence and agent. Explain where AI is impossible and why? [8]
- b) Write Hill Climbing Algorithm? Explain in detail the problems of Local Maxima, Plateau and Ridge in hill climbing and solution to this. [10]

OR

- Q2)** a) Suppose you design a machine to pass the Turing test. What are the capabilities such a machine must have? Explain each in detail. [8]
- b) Write Uniform cost search algorithm and explain in detail with example.[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
TWO + TWO = FOUR [8]
- b) How can we add alpha and beta cut-offs for better performance? [8]

P.T.O.

- Q5) a)** Explain Cutting off search and Search versus lookup. [10]
b) Explain alpha-beta cut-offs as applicable to the basic minimax algorithm. [8]

OR

- Q6) a)** Explain Alfa-beta pruning in CSP and Move ordering. [10]
b) Explain Simulated annealing with example. [8]

SECTION - II

- Q7) a)** Explain classical planning and Non-Linear planning with example. [8]
b) What are the various components of a typical planning system? [8]

OR

- Q8) a)** Explain the following terms as applicable to knowledge Representation. [16]

- i) Semantic - net
- ii) Script
- iii) Frames
- iv) Conceptual Dependency

- Q9) a)** Explain Bayes' Rule and its uses. [8]
b) Explain Rule based methods for uncertain reasoning. [8]

OR

- Q10) a)** What is 'learning by Parameter' adjustment? Explain with example. [8]
b) Explain Fuzzy sets and Fuzzy logic in detail. [8]

- Q11) a)** Draw and explain the Architecture of Ideal Expert System. [8]
b) Why does PROLOG qualify to be an AI language? Discuss. [8]

OR

- Q12) a)** Explain with suitable examples the application of neural network in Artificial Intelligence. [8]
b) Explain Discourse and pragmatic processing. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1996

[Total No. of Pages : 3

[5254] - 167
B.E. (Computer Engineering)
SOFTWARE ARCHITECTURE
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Compare and contrast and also give relationship between requirements and design. Illustrate with examples. **[6]**
- b) Write short notes on **[12]**
- i) Architecture VIEWS
 - ii) Module Structures

OR

- Q2)** a) Write short note on Layered architecture. **[8]**
- b) Write short note on Opportunities and Advances in software architectures. **[10]**

- Q3)** Explain the given terms in context of QUALITY. **[16]**
- a) Importance of achieving 'performance' for any system.
 - b) Quality attributes
 - c) Testability
 - d) Relationship between design and quality

OR

P.T.O.

Q4) Explain and illustrate the following concepts (in context of quality attribute/tactics) with examples, in brief : **[16]**

- a) USABILITY
- b) Interfaces and ease of modifiability
- c) Authentication as a security tactic
- d) Performance, response time, throughput

Q5) a) Give code for factory method design pattern in C++. **[8]**

b) Write short note on design pattern. **[8]**

OR

Q6) a) Explain behavioral pattern. **[8]**

b) Write short note on MEDIATOR and adaptor pattern. **[8]**

SECTION - II

Q7) a) Write short note on application servers. **[8]**

b) What is the role of JAVA SE, JAVA EE technologies? **[8]**

OR

Q8) a) Explain working of RPC. **[8]**

b) What is the need of J2ME and Java APIs? **[8]**

Q9) In brief explain the concept and give good examples to illustrate. **[18]**

- a) URL, domain names
- b) XML DOM
- c) REST
- d) Need for JSF

OR

Q10) Explain following concepts through simple examples. **[18]**

- a) Custom controls through VB
- b) Use of active X controls
- c) XHTML
- d) Java applets

Q11)a) Explain distributed application. **[8]**

b) Explain use of .NET for web applications. **[8]**

OR

Q12)a) Explain interfaces and DLL servers in context of COM/.NET. **[8]**

b) Compare COM and .NET. **[8]**



Total No. of Questions : 12]

SEAT No. :

P1997

[Total No. of Pages : 2

[5254] - 168

B.E. (Computer Engineering)

MULTIMEDIA SYSTEMS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Explain in brief Multimedia Architecture. How Windows supports multimedia? [8]
- b) What is MMDBMS? Explain the characteristics of Multimedia database. [8]

OR

- Q2)** a) What is streaming? Explain SIP and RSVP protocols for streaming. [8]
- b) What is multimedia? Explain building blocks of multimedia. [8]

- Q3)** a) Classify Image Compression techniques. Discuss RLE stating example. [8]
- b) What is image enhancement? Explain how it is achieved using the contrast stretching and histogram equalization. [8]

OR

- Q4)** a) Explain bitmap file format? Explain special features of .bmp files. [8]
- b) What is histogram of an image? Write algorithm for computing histogram of 8 bit gray scale image? [8]

P.T.O.

- Q5) a)** Explain CD and DVD formats. [10]
b) What is MIDI? Explain in brief MIDI file format. [8]

OR

- Q6) a)** What are different audio devices used in multimedia systems? Explain any four. [8]
b) Discuss the factors that determine size of file and quality of sound for audio capture and playback. What are various chunks present in a sound file stored as WAV format? [10]

SECTION - II

- Q7) a)** Which are the different video broadcasting techniques? Compare them. [8]
b) Write Short note on Text file formats. [8]

OR

- Q8) a)** Which are the different layers in MPEG? Define and explain I, P and B frames with reference to MPEG. [8]
b) Name different techniques used for text compression. Explain with suitable example Arithmetic coding applied to text data. [8]

- Q9) a)** Differentiate between 2D and 3D animation, Explain different techniques of animation. [10]
b) Explain Client Pull & Server Push animation. [8]

OR

- Q10) a)** Write a small program in OpenGL to create any 2D/3D animation. [10]
b) Explain basic principles of 2D animation. [8]

- Q11) a)** Explain various networking components required for a reliable Multimedia data transmission. [8]
b) Write short note Multimedia over IP. [8]

OR

- Q12) a)** State and explain any four applications of Multimedia over internet. [8]
b) State and explain the requirements of Multimedia applications on the network. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P1998

[Total No. of Pages : 3

[5254] - 169
B.E. (Computer Engineering)
MOBILE COMPUTING
(2008 Pattern) (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) *Black figures to the right indicate full marks.*
- 5) *Assume Suitable data, if necessary.*

SECTION - I

- Q1)** a) State reasons behind the design of GSM systems. Justify why phased implementation has been adopted for GSM. **[8]**
- b) Name and explain the following standardised interfaces : **[10]**
- i) air interface
 - ii) between BSS and MSC
 - iii) between MSCS
 - iv) between MSC and PSTN/ISDN

OR

- Q2)** a) Explain the specifications for a GSM system. **[8]**
- b) Explain the services provided by GSM, classified into three groups. **[10]**
- Q3)** a) With the help of a diagram explain the use of echo canceller on PSTN MSC interface. **[8]**
- b) Explain the functions of MS, BTS and BSC. **[8]**

OR

P.T.O.

- Q4)** a) Explain the functions of MSC, HLR and VLR. [8]
b) List different logical channels and their associated functions. [8]
- Q5)** a) Name different types of burst signals used in GSM. Justify the utility of including the training sequence in the middle of the normal burst. State reasons for using dummy burst over air. [8]
b) What is frequency hopping? Explain cyclic and Pseudorandom algorithms for frequency hopping in detail. [8]

OR

- Q6)** a) In a speech frame there are 24 frames in one multiframe lasting 120ms carrying data. The number of data bits/frame is 114. What is the data rate for full and half rate channels. [8]
b) Explain the functions performed within the IMSI detach procedure. [8]

SECTION - II

- Q7)** a) Explain with the help of signaling diagram MS location updating procedure. [8]
b) What are the steps in the establishment of MS-PSTN call? Explain the call set-up with suitable signal and response diagram. [10]

OR

- Q8)** a) What are the two different SIM implementation? Explain characteristics of SIM. List important items stored on SIM. [10]
b) What are the four basic security services provided by GSM? Explain each of it. [8]

- Q9)** a) Derive multiple access efficiency of TDMA. [8]
b) Compare TDMA, CDMA and FDMA. [8]

OR

- Q10)** a) Explain functioning of CDMA. [8]
b) Explain the encryption procedure adopted in GSM system. [8]

- Q11)a)** With the help of schematic representation, explain different formats of LAPDm protocol. **[8]**
- b) Explain the procedures provided by RR layer during 'Connection Establishment phase'. **[8]**

OR

- Q12)a)** Explain MAP protocol for basic support. **[8]**
- b) Briefly explain mobility management specific procedure and connection management procedure. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1999

[Total No. of Pages : 3

[5254] - 170

B.E. (Computer Engineering)

EMBEDDED SYSTEMS

(2008 Pattern) (Elective - II)

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 Media Processor are different than a general processor? [6]

- Q3)** a) Discuss various actions taken to reduce the power consumption in an embedded system. [8]
- b) Discuss different structural units in a processor in an embedded system. Mention few advanced units. [8]

OR

P.T.O.

- Q4)** a) Discuss various read only memories used in an embedded system? [4]
b) Discuss different operating modes of ARM7 processor. [6]
c) It is required to design a real time robotic control system. For this application, select the appropriate processor based on [6]
i) Instruction cycle time
ii) Bus width
iii) MIPS
iv) On chip cache
v) On chip RAM/ROM

- Q5)** a) Differentiate between parallel and serial ports in a system. [4]
b) Discuss 12C 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 the use of an emulator in embedded system design? Explain with the help of diagram. [10]

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)** What are the subsystems of an I/O system? Explain. [8]
b) How RTOS performs the schedule management of multiple tasks. [8]

OR

- Q10)a)** Compare the following scheduling models of RTOS, based on worst case latency : [6]
i) Cooperative Round Robin
ii) Cooperative ordered list
iii) Cooperative Time slicing (rate monotonic)
b) What 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 μ 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]

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Total No. of Questions : 12]

SEAT No. :

P2000

[Total No. of Pages : 2

[5254] - 171

B.E. (Computer Engineering)

SOFTWARE TESTING AND QUALITY ASSURANCE

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *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 software testing? Explain the importance of software testing in software development life cycle. [8]

b) Explain the significance of Test Plan with its format. [8]

OR

Q2) a) Explain the phases of software testing with activities. [8]

b) What is defect lifecycle? Explain with activities. [8]

Q3) a) Explain any two black box testing methods with test case design. [10]

b) Explain domain and documentation testing. [8]

OR

Q4) a) What is black box testing? Compare with white box testing and explain how you derive test cases in equivalence testing. [10]

b) Explain the need of positive and negative testing with example. [8]

Q5) a) How do you derive test cases using basis path testing? [8]

b) Explain the design of test cases with loop testing and data flow testing. [8]

OR

P.T.O.

- Q6)** a) Explain the purpose and importance of white box testing with testing types. [8]
b) Explain the graph based testing methods. [8]

SECTION - II

- Q7)** a) Describe the testing metrics and measurement tools. [8]
b) Explain the following in brief. [10]
i) Validation testing
ii) Scenario testing
iii) Adhoc testing

OR

- Q8)** a) Explain the regression testing and sanity testing methods. [10]
b) Explain the Goal Question Metric model. [8]

- Q9)** a) What is software quality assurance and control? Explain. [8]
b) Explain any four quality factors. [8]

OR

- Q10)** Explain the following in brief: [16]
a) Six Sigma
b) TQM
c) ISO
d) Smoke testing

- Q11)** a) Explain the GUI testing with an example. [8]
b) Explain the features of a functional testing tool. [8]

OR

- Q12)** a) What are the advantages of automated testing? Compare automated testing with manual testing. [8]
b) How web based application testing can be done with a tool? [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2001

[Total No. of Pages : 3

[5254] - 172

B.E. (Computer Engineering)

DISTRIBUTED OPERATING SYSTEMS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Define Distributed operating systems, Distributed System and Distributed Computing. What are the issues to design distributed systems? [10]
- b) What is meant by transparency and give examples in details migration transparency? [8]

OR

- Q2)** a) How would you incorporate persistent asynchronous communication into a model of communication based on RMI's to remote objects? [10]
- b) Explain the parameter passing semantics in CORBA. When is call-by-reference used and when is call-by-value used? Explain the difference between the two. [8]

- Q3)** a) Describe the two key issues how the clock is adjusted in Cristian's algorithm. [10]
- b) Explain Lamport's logical clock? What are the conditions satisfied by logical clocks? List the limitation of Lamport's clock how do overcome those. [6]

OR

- Q4)** a) What is Process Migration? Explain desirable features of a good process migration Mechanism. [10]
- b) Explain Ring algorithms for selecting co-ordinator. [6]

P.T.O.

- 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)** Write short note on following Hierarchical Deadlock Algorithms [10]
- i) The Menasce-Muntz Algorithm.
- ii) The Ho-Ramamoorthy Algorithm
- 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) How checkpointing is done in distributed database systems? Write an algorithms for checkpointing in distributed database systems. [8]

OR

- Q8) a)** Write short note on : [10]
- i) Log structured file systems
- ii) Google file systems
- b) How does granularity affect DSM system performance? & What are the various advantages of DSM systems. [8]

- Q9) a)** What is distributed scheduling? Why it is needed? What are the different issues in load distribution? Explain receiver initiated algorithm in detail.[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 in brief types/classification of cluster. Compare cluster computing with Grid Computing. **[10]**
- 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 the following system. **[10]**
- i) Grid computing
- ii) Service Oriented Architecture
- b) What is Cloud computing? Explain types of cloud based on location and services. **[6]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2002

[Total No. of Pages : 3

[5254] - 173

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

ADVANCED COMPUTER ARCHITECTURE

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer any three questions from each section.*
- 2) *Answers to these 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) Mention the two categories of parallel Computers and explain the same with architecture. **[10]**
- b) Define and Explain following terms : **[8]**
- i) Grain Packing
 - ii) Coarse Grain
 - iii) Fine Grain

OR

- Q2)** a) What is parallel processing? State the following terms with respect to parallelism : **[10]**
- i) Thread Level Parallelism (TLP)
 - ii) Software Parallelism
 - iii) Instruction Level Parallelism (ILP)
 - iv) Speedup
- b) Explain how two architectural design approaches namely Super scalar and super pipeline improves pipelining performance with respect to following parameters : **[8]**
- i) Machine pipeline cycle
 - ii) Instruction issue rate
 - iii) Instruction issue latency

P.T.O.

- Q3)** a) For a linear pipeline processor, considering a single k-stage pipeline executing N instructions, obtain the various performance parameters. [8]
b) What is internal forwarding? Explain the various internal forwarding techniques. [8]

OR

- Q4)** a) Compare between arithmetic and instruction pipeline. Design a 6-bit multiplier using CSA tree. How it can be viewed as k-stage pipeline? [8]
b) Define static and dynamic pipeline. What is the use of Reservation Table? Explain the control strategy implemented for job sequencing problem. [8]

- Q5)** a) Describe following terms with respect to vector processors : [8]
i) Vector Stride
ii) Vector Chaining
iii) Vector Mask Register
iv) Vector Mask Control
b) Consider Mesh network as an interconnection network for array processors. Discuss in detail the parallel Algorithm for Matrix Multiplication. Obtain the time Complexity for the same. [8]

OR

- Q6)** a) How a 3-cube Network can be viewed as Multistage Network? [8]
b) Discuss any two Vector Optimization functions implemented in Vectorizing Compiler. [8]

SECTION - II

- Q7)** a) What is an Interprocess synchronization? How it is implemented at system level? Discuss the working of compare and swap instruction for the same. [10]
b) What is Interprocess synchronization and communication? Discuss the hardware support provided by machine architecture by means of suitable instructions for the same. [8]

OR

- Q8)** a) What is chip multiprocessing? With functional block diagram explain the architecture of IBM POWER4/POWER5 processor. [10]
- b) List different dynamic priority arbitration algorithms used in bus based multi-processor systems and discuss any two such algorithms in brief.[8]

- Q9)** a) What Basic Concept of Multithreading? Explain Multithreaded Architectures and its Computational Model for Parallel Processing System. [8]
- b) Compare efficiency of multithreading implemented in Superscalar architecture with respect to coarse grained, fine grained and simultaneous multithreading. [8]

OR

Q10) Write short note on any two : [16]

- a) Context Switching Policies of Multithreaded Architectures
- b) P threads
- c) Semaphore for multiprocessing

- Q11)**a) Explain following communication functions used in MPI : [8]
- i) MPI_Scatter()
- ii) MPI_Gather()
- iii) MPI_Bcast
- iv) MPI_Allgather
- b) With standard functions discuss how message passing is facilitated in PVM. [8]

OR

- Q12)**a) With standard constructs discuss the important features of CCC parallel programming language. [8]
- b) Compare between synchronous and Asynchronous parallel algorithms for multiprocessor systems and discuss standard primitives used. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2003

[Total No. of Pages : 3

[5254] - 174

B.E. (Computer Engineering)

PATTERN RECOGNITION

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Unit - I

- Q1)** a) Explain Pattern and Feature with suitable example. Distinguish between a pattern and a signal. [8]
- b) Explain the process of supervised pattern recognition. [8]

OR

- Q2)** a) Highlight the process of unsupervised pattern recognition. [8]
- b) What are feature vectors and classifiers? Explain with suitable example. [8]

Unit - II

- Q3)** a) Explain Bayes classification rule with suitable example. [8]
- b) What is discriminant function and how it helps to find decision surfaces? [8]

OR

- Q4)** a) Explain least square method with example. [8]
- b) Prove the statement "Bayesian classifier is optimal with respect to minimizing the classification error probability". [8]

P.T.O.

Unit - III

- Q5)** a) What are the differences between parametric and non-parametric estimation methods? [8]
b) Explain mixture model (Gaussian) for density estimation? [5]
c) What are advantages of Gaussian mixture model over other estimation? [5]

OR

- Q6)** a) What are different desirable properties of Maximum likelihood estimation method? [8]
b) Explain Bayesian estimation techniques for density estimation. [5]
c) What are advantages of Bayesian estimation over other estimation? [5]

SECTION - II

Unit - IV

- Q7)** a) Explain Hidden Markov model with example of well known coin-tossing (two coins) problem. [8]
b) Explain Principal component analysis along with the limitations of unsupervised techniques. [8]

OR

- Q8)** a) Explain the Hidden Markov Model with example of generating an observation string. [8]
b) What is Fisher discriminant analysis? How it is useful for classification purpose? [8]

Unit - V

- Q9)** Write notes on any two : [16]
a) Parzen-window method,
b) K-Nearest Neighbour method,
c) Perceptron.

OR

Q10) Write notes on any two :

[16]

- a) K-Nearest Neighbour method,
- b) Linear discriminant function based classifiers,
- c) Support vector machines.

Unit - VI

- Q11)** a) What do you mean by a decision tree? Explain its importance in pattern classification. **[8]**
- b) Explain the concept of clusters with example. **[5]**
- c) What are the basic steps that an expert must follow in order to develop a clustering task? **[5]**

OR

- Q12)** a) What do you mean by cluster validation? Explain in brief. **[5]**
- b) What are applications of Cluster analysis? Explain in brief. **[5]**
- c) What do you mean by a decision tree? How can you measure the information gain from a decision tree? **[8]**



Total No. of Questions : 12]

SEAT No. :

P2004

[Total No. of Pages : 3

[5254] - 175

B.E. (Computer Engineering)

HIGH PERFORMANCE NETWORKS

(2008 Pattern) (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 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.*
- 2) *Answers to the two sections should be written in separate answer-books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*
- 5) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Explain why half duplex operation of Gigabit Ethernet incorporates Carrier Extension. What are its drawbacks? **[8]**
- b) Explain the 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) Draw and explain ISDN protocol Architecture. **[8]**

OR

- Q4)** a) Describe the SS7 protocol architecture. **[8]**
- b) Draw and discuss LAPF Protocol Frame format. **[8]**

P.T.O.

- 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

- 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. :

P2005

[Total No. of Pages : 3

[5254] - 176
B.E. (Computer)
NEURAL NETWORKS
(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Draw a McCulloch Pitts Neuron model. Define the firing rule and explain how it performs the basic logic operations for NOR Gate. [8]
- b) What is Linear Separability? Illustrate with example. [8]

OR

- Q2)** a) What is weight vector in ANN training? How it is described in following learning laws : [8]
- i) Hebb's Law and
 - ii) Delta Learning Law
- b) Explain with example the task of pattern analysis as Classification and Clustering. Give examples of ANNs used for the same. [8]

- Q3)** a) Explain architecture, algorithm and applications of ADALINE and MADALINE. [10]
- b) Draw and explain the architecture of RBFN (Radial Basis Function) Network. How it act as classifier? [8]

OR

P.T.O.

- Q4) a)** Draw a 3-layer FeedForward Neural Network. Explain the Back propagation training algorithm in detail. [10]
- b) What is an Activation Function? How it helps in Neural Network training? Explain any two activation functions. [8]

- Q5) a)** Explain the architecture of Boltzmann machine. [8]
- b) With example illustrate the concept of stochastic update and thermal equilibrium. [8]

OR

- Q6) a)** What do you mean by associative learning? Discuss the architecture and operation of Hopfield Network. [8]
- b) What is meant by simulated annealing? What is annealing schedule? [8]

SECTION - II

- Q7) a)** What is vector quantization? Explain the algorithm and discuss how it can be used for pattern clustering. [10]
- b) Discuss the architecture of Recurrent Neural Network. [8]

OR

- Q8) a)** What is plasticity-stability dilemma problem? Explain the ART Training algorithm used for pattern clustering. [10]
- b) Explain how Support Vector Machine (SVM) can be used for pattern classification. [8]

- Q9) a)** Discuss in brief auto-association and hetero-association process used for neural processing. [8]
- b) Explain the use of ANN in character recognition. Comment on the feature vector and training required for the recognition task. [8]

OR

Q10)a) How can we solve the optimization problem by ANN? Discuss the practical difficulty in solving the travelling salesman problem by means of ANN. **[8]**

b) Draw and explain the architecture of Bidirectional Associative Memory. **[8]**

Q11)a) Compare Neuro Fuzzy systems with traditional Neural systems. State the advantages and disadvantages. **[8]**

b) What is Soft Computing? What are the application areas of Soft Computing? What do you mean by hybrid systems? **[8]**

OR

Q12)a) What do you mean by Fuzzy Logic? What is the use of membership function? Give any Two examples. **[8]**

b) Explain the architecture of any suitable Neuro Fuzzy system designed for pattern recognition task. **[8]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2006

[Total No. of Pages : 3

[5254]-177

B.E. (Computer Engineering)

ADVANCE DATABASES

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) State and explain different parallel system architecture [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) Round Robin partitioning
- ii) List partitioning

OR

Q2) a) What is parallelism? Explain the difference between interquery & Intraquery parallelism [8]

b) What are the different performance measure parameters in parallel system? Explain in brief. [8]

Q3) a) What is deadlock? How it has been handled in distributed system? [8]

b) Explain distributed transaction management and its types. [8]

OR

Q4) a) Explain the types of storage mechanism and failure in distributed system.[8]

b) State and explain distributed system architecture [8]

P.T.O.

- Q5)** a) Why do we have the XML DTD? Explain with an example. [8]
b) What is the role of middle tier? How it helps in client server communication? [10]

OR

- Q6)** Write short note on the following. [18]
a) XQUERY
b) Thin & Thick Client
c) 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 galaxy schema[6]

- Q9)** a) What is clustering? Explain the K-means clustering algorithm. [8]
b) What is Decision tree? Explain ID3 algorithm to create decision tree.[8]

OR

- Q10)**a) What is frequent item set ? State and explain Apriori algorithm ? [8]
b) Explain the following terms [8]
i) Machine learning
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. :

P2007

[Total No. of Pages : 2

[5254]-178

B.E. (Computer Engineering)

VLSI & Digital System Design

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

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) Compare Speed-Power performance of ECL, CMOS, BiCMOS. [9]
b) Explain types of technology scaling. [8]

OR

- Q2)** a) Explain layout design rules for devices and interconnects. [9]
b) Explain different tools for device simulation. [8]

- Q3)** a) Explain Shallow Trench Isolation (STI) with process flow. [8]
b) Explain fabrication process for CMOS device. [9]

OR

- Q4)** a) Explain fabrication of Cu interconnects with suitable diagram. [8]
b) Explain the different process options for device isolation. [9]

- Q5)** a) Explain basic properties of Silicon Wafer. [4]
b) Explain purification steps of raw- silicon wafer. [4]
c) Explain Chemical vapor oxidation technique. [8]

OR

- Q6)** a) Write a short note on [8]
i) Nano imprint lithography
ii) Electron-beam lithography
b) Explain the different techniques of etching [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) Write VHDL Code for Lift controller. [8]

- Q9)** a) Explain the types of programmable logic devices in detail. [8]
b) Explain Application Specific IC's Design flow. [4]
c) Explain CMOS inverter with VTC. [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) Explain the metastability in detail. [5]
b) List out different steps for designing clocked synchronous machine.[8]
c) Explain merits and demerits of CPLD. [4]

OR

- Q12)** a) Explain timing parameters for read and write operation in static RAM.[8]
b) For combinational logic explain the following [9]
i) Timing diagram
ii) Propagation delay
iii) Timing specification



Total No. of Questions : 12]

SEAT No. :

P2008

[Total No. of Pages : 4

[5254]-179

B.E. (Computer)

OPERATIONS RESEARCH

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer 3 questions from Section - I and 3 questions from Section - II.
- 2) Answer 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 right indicate full marks.
- 6) Assume Suitable data if necessary.

SECTION - I

- Q1)** a) Discuss the role of operational research models in decision making. [8]
b) Discuss the simplex method where it indicates existence of multiple optimal unbounded and infeasible solutions in linear programming problem. [8]

OR

- Q2)** a) Solve the linear programming problem using simplex method [10]

$$\text{Maximize } Z = 2x_1 - 4x_2 + 5x_3 - 6x_4$$

Subject to constraints

$$x_1 + 4x_2 - 2x_3 + 8x_4 \leq 2$$

$$-x_1 + 2x_2 + 2x_3 + 4x_4 \leq 1 \text{ and}$$

$$x_1, x_2, x_3, x_4 \geq 0$$

- b) State and explain in brief linear programming applications. [6]

- Q3)** a) What is decision making under uncertainty? Explain Laplace, Minimax, Savage and Hurwicz criteria. [8]

- b) Explain [8]

- i) Stochastic process
- ii) Markov process
- iii) Transition probability
- iv) Markov chain

P.T.O.

OR

- Q4) a)** The probability of demand for hiring cars on any day in a given city is as follows. [8]

No. of cars demanded	0	1	2	3	4
Probability	0.1	0.2	0.3	0.2	0.2

Cars have a fixed cost of Rs.90/- each day to keep the daily hire charges (variable costs of running) Rs.200/- If the car hire company owns 4 cars. What is daily expectation? If company is about to go into business and currently has no car, how many cars should it buy?

- b)** Solve the game whose pay off matrix is given below. [8]

Player B

Player A	B ₁	B ₂	B ₃	B ₄
A ₁	3	2	4	0
A ₂	3	4	2	4
A ₃	4	2	4	0
A ₄	0	4	0	8

- Q5) a)** What do you mean by queue discipline? Describe how customers are selected for service with respect to static and dynamic queue discipline? [9]
- b)** For M/M/1 queue determine [9]
- Expected No. of customers in system
 - Expected No. of customers in queue
 - Expected waiting time in system
 - Expected waiting time in queue

OR

- Q6) a)** Describe the characteristics of service mechanism (process) that are concerned with the manner in which customers are serviced with respect to queueing system. [9]
- b)** Four counters are being opened on the border of a country for checking of passports & necessary papers of the tourists. The tourists choose a counter at random. If the arrivals at the border is poisson at the rate λ and the service time is exponential with parameter $\lambda/2$. What is steady state average queue at each counter? [9]

SECTION - II

- Q7) a)** For following project draw network diagram and find project completion time. Find total float for each activity. **[10]**

Activity	Preceding Activities	Activity duration days
A	--	4
B	--	7
C	--	6
D	A,B	5
E	A,B	7
F	C,D,E	6
G	C,D,E	5

- b) Explain steps involved in Johnson's algorithm for 'n' Jobs 2 machines **[8]**

OR

- Q8) a)** Find optimal sequence for following sequencing problem. **[10]**

Jobs	Machines				
	M ₁	M ₂	M ₃	M ₄	M ₅
A	7	5	2	3	9
B	6	6	4	5	10
C	5	4	5	6	8
D	8	3	3	2	6

Also find total elapsed time

- b) Explain various application areas of PERT & CPM techniques. **[8]**
- Q9) a)** With help of suitable diagram discuss how to determine extreme points of an unconstrained type of continuous function? **[8]**
- b) What do you mean by separable and non linear convex programming? How will you solve the separable non-linear programming problem? **[8]**

OR

- Q10)**a) Explain general & canonical form of non-linear programming problem. [8]
b) Define separable functions. Give one example of separable function & non separable function. Explain separable programming problem. [8]

- Q11)**a) Explain backward & forward recursive approach to solve dynamic programming problem. [8]
b) How the linear programming problem can be formulated as dynamic programming problems? Explain [8]

OR

- Q12)**a) Write a note on applications of Dynamic programming in various areas. [8]
b) Define following terms with respect to dynamic programming [8]
i) Stage
ii) State
iii) State variables
iv) Decision variables
v) Optimal return
vi) State transformation function



Total No. of Questions : 12]

SEAT No. :

P2009

[Total No. of Pages : 3

[5254]-180

B.E. (Computer Engineering)

CLOUD COMPUTING

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer THREE questions from each section.*
- 2) *Answers to the TWO sections should be written in SEPARATE answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagram wherever necessary.*
- 5) *Make suitable assumptions wherever necessary.*

SECTION - I

- Q1)** a) What is On Demand Service? Describe in detail essential characteristics of cloud computing. [8]
b) Draw and explain NIST defined cloud framework. [8]
c) Define resource pooling in cloud computing. [2]

OR

- Q2)** a) Describe 4 types of Cloud computing deployment platforms each with examples. [8]
b) Explain the services provided by the Microsoft Azure. [8]
c) Define Utility Computing. [2]

- Q3)** a) What is necessity of Hypervisors ? Describe role of hypervisor for deployment web services. [8]
b) How AJAX application works? Explain the significant processing steps of asynchronous 'rich' interfaces application. [8]

OR

- Q4)** a) Describe the term 'Virtualization'. Discuss pitfalls of virtualization. Contrast between traditional server concept and virtual server concept. [8]
b) Explain how virtual machine technology enables decoupling physical hardware from virtual machine. What are the determination of virtual machine migrations. [8]

P.T.O.

- Q5) a)** Explain in detail the relational operation and enterprise batch processing using Map Reduce in Cloud File. [8]
- b) How Amazon dynamo works for data storage across distributed file systems? [8]

OR

- Q6) a)** Explain with suitable example how a batch processing could be executed in parallel using Mapreduce. [8]
- b) How big tables are stored on distributed file systems such as HDFS and Cloud file system? [8]

SECTION - II

- Q7) a)** Explain in detail security management in cloud system . Describe the following terms: [10]
- i) VPN Tunneling
 - ii) VM Security
 - iii) Virtual Threats
- b) Write in brief threats and vulnerability specific security management. [8]

OR

- Q8) a)** Explain in detail Identity and Access Management security in cloud environment. Discuss risks from multitenancy with respect to various cloud environments [10]
- b) Describe in detail VM security recommendations and VM specific security techniques. [8]

- Q9) a)** Describe intercloud environment and QoS issues in cloud computing.[8]
- b) Describe in detail streaming in Cloud for QoS monitoring deployed in cloud computing? [8]

OR

- Q10)a)** Explain in detail load distribution across multiple implementation. Describe in brief virtual and horizontal load distribution. [8]
- b) Explain in detail how Dependability, data migration in cloud computing environment. [8]

- Q11)**a) Explain representation of Eucalyptus with its components. [8]
b) Explain XEN cloud platform with suitable platform. [8]

OR

- Q12)**a) Explain in details Open Nebula cloud with its components. [8]
b) What is Nimbus? Explain the steps of Nimbus infrastructure. [8]



Total No. of Questions : 12]

SEAT No. :

P3336

[Total No. of Pages : 2

[5254]-180-A
B.E. (Computer)
INFORMATION SECURITY
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - A

- Q1)** a) What is confidentiality? Explain any one algorithm to implement confidentiality. [9]
b) Explain any one algorithm to implement classical cryptography. [9]
OR
- Q2)** a) Describe different policies of security in detail. [9]
b) What is information security? Discuss lifecycle of security in detail. [9]
- Q3)** a) Differentiate private and public key cryptography. [8]
b) What is IDEA? Explain idea in detail. [8]
OR
- Q4)** a) Explain DES algorithm & with suitable diagram in detail. [8]
b) Discuss different issues of cryptography. [8]
- Q5)** a) Explain ECC encryption algorithm in detail. [8]
b) Discuss different issues of generation of key. [8]
OR
- Q6)** a) What is DH? Explain DH. algorithm in short. [8]
b) Discuss uses of number theory in different algorithm for cryptography. [8]

P.T.O.

SECTION - B

- Q7)** a) Define MAC. Discuss applications of MAC in information security. [9]
b) What is PKI? Explain PKI in detail. [9]

OR

- Q8)** a) What is HMAC? Explain algorithm of HMAC in detail. [9]
b) Define DSA. Explain DSA algorithm in detail. With suitable diagram.[9]

- Q9)** a) What is SSL? Discuss SSL with application. [8]
b) What is IPSEC? What are different applications of IPSEC. [8]

OR

- Q10)**a) Define TLS. Discuss TLS with applications. [8]
b) What is IDS? Enlist different types of IDS with explanation. [8]

- Q11)**a) Enlist and explain different security services. [8]
b) Define PGP. Describe PGP in detail. [8]

OR

Q12) Write a short notes on following (any four) [16]

- a) PGP
- b) PEM
- c) S/MIME
- d) Standards of information security.
- e) Information security architecture



Total No. of Questions : 12]

SEAT No. :

P2010

[Total No. of Pages : 3

[5254]-181

B.E. (Information Technology)

INFORMATION ASSURANCE & SECURITY

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers 3 questions from Section - I and 3 questions from Section - II.
- 2) Answer to the two section 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) Explain the following terms with example. [8]
i) Authentication and Authorization
ii) Confusion & Diffusion
b) What is mean by modular arithmetic and exponentiation? [8]

OR

- Q2)** a) State & prove Fermat's theorem. [8]
b) List and briefly define types of cryptanalytic attacks based on what is known to attacker? [8]

- Q3)** a) What are the key requirements of message digest and why SHA is more secure than MDS? [8]
b) Describe the advantages and dis-advantages of symmetric and asymmetric key photography. [8]

OR

- Q4)** a) Draw AES block diagram and explain the steps in detail. [8]
b) In a public key cryptosystem using RSA, given $N = 209$ and the encryption key (E) as 23, find out the corresponding private key (D). [6]
c) What is message disest and give it's importance? [2]

P.T.O.

- Q5)** a) Explain X.509 standard for digital certificate. [9]
b) What is PKI? Explain the different PKI architectures. [9]

OR

- Q6)** a) What is key distribution center? What is certificate authority. Give any two names of CAS. [9]
b) What is man in the middle attack? Explain with example the Diffie-Hellman key exchange algorithm. [9]

SECTION - II

- Q7)** a) What problem was Kerberos designed to address? Describe Kerberos Realm. [8]
b) What is IPSEC? How does AH & ESP differs while working under tunnel mode & transport mode? [8]

OR

- Q8)** a) What is IDS? Explain working of honey pots an intrusion detection system. [8]
b) Discuss SSL with respect to 4 phases. [8]
i) Establish Security Capabilities.
ii) Server authentication & key exchange.
iii) Client authentication & key exchange.
iv) Finish

- Q9)** a) Explain ISO 27001 security standard & state its purpose. [8]
b) What is dual signature? Why dual signatures are needed? Explain mathematically & by schematic diagram how it is generated? [8]

OR

- Q10)**a) Explain & draw a model for ISMS (Information Security Management System) of PDCA Cycle (Plan, Do, Check, Act Phase) [8]
- b) Explain the concept of mobile payment system. [8]

Q11) Write a short notes on: (any three) [18]

- a) Electronic evidence
- b) Computer forensics
- c) Cyber terrorism
- d) Identity theft

OR

- Q12)**a) Describe the term "Industrial espionage" in detail with example. [9]
- b) Write short note on Indian IT Law 2000, 2008 amendments. [9]



Total No. of Questions : 12]

SEAT No. :

P2011

[Total No. of Pages : 3

[5254]-182

B.E. (Information Technology)

OBJECT ORIENTED MODELING AND DESIGN

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Write a short note on Reverse Engineering vs Forward Engineering. [6]
b) Explain the concept of Generalization and Inheritance with suitable example. [8]
c) Draw the object diagram for College Laboratory LAN network. [4]
- OR
- Q2)** a) How to apply constraints in Class Diagram. Explain it with suitable example. [6]
b) With the help of sample class model, explain the following : [8]
i) Attributes and associations
ii) Qualified association
iii) Multiplicity
iv) Association end names
c) Describe the software development life cycle of UML. [4]
- Q3)** a) Write a short note on Behavioral Diagrams in UML. [8]
b) Draw a class diagram for FILE MANAGEMENT SYSTEM (FMS). Make suitable additional assumptions about scope and working of your system (write down the scope too). The FMS has concepts of directories, subdirectories. FMS keeps information of directories as well as files for example file creation date, size of file, entries in directory etc. One also needs operation to move, delete, create etc. Your class diagram must show relevant attribute, methods and relationships. [8]

P.T.O.

OR

- Q4)** a) Write a short note on Role of Stereotypes in UML Diagram. [8]
b) Draw the Use Case diagram for Physical Bookstore Checkout System. Make the suitable assumptions. [8]

- Q5)** a) Draw UML Use Case diagram for Medical Insurance System using advanced notations The various participants of the same are Owner, Agents and Claimer. The corresponding use cases for these actors are Hire Agent, Fire Agent, Pay Salary, Make Policies, Make new clients, Describe Policy to Clients, Collect Policy Checks, Check details when policy is Claimed By Claimer, Check Medical Claim Papers, Fill Form To Take Policy, Pay Policy Checks, Claim Policy, Receive Money Of Policy Etc. [8]
b) Draw a class diagram for an "Online Movie Ticket Booking System" make suitable additional assumptions about scope and working of the system. [8]

OR

- Q6)** a) Write a note on Composite Structure Diagram. [4]
b) Does the actor always represent a human user? Justify with suitable example. [4]
c) Draw a class diagram for Online First Year Engineering Admission System using advanced notations. Assume suitable data. [8]

SECTION - II

- Q7)** a) Differentiate between: [8]
i) Sequence diagram and collaboration diagram
ii) Action State and Activity State
b) Draw the collaboration Diagram for Cancel Booking at the Restaurant Management System. [8]

OR

- Q8)** a) You have to model a software system for controlling a Air Conditioner (AC). The AC can be either ON or OFF. In the ON state there are two possibilities, COOLING mode or HEATING modes. There are buttons to change from one mode to other mode automatically based on room temperature crossing cutoffs (Cooling if temperature > 30 degree centigrade and Heating if temperature < 10 degree centigrade). All buttons work only if Power is On. Draw a state diagram for given system. [8]
b) What is the purpose of timing diagram? Explain with for example. [8]

- Q9)** a) How an activity diagram differs from traditional flowchart? Draw an activity diagram using swimlanes for ‘Purchasing Books from Book Stall’. Represent object flow. [10]
- b) Draw a sequence diagram for ‘Withdrawal of money from ATM System’. Represent following things: [8]
- i) Alt Operator
 - ii) Return Message
 - iii) Self Call

OR

- Q10)**a) What is history state? Explain with example. [6]
- b) Explain the concept of Advanced states with example. [6]
- c) Draw an Interaction Overview Diagram for a system of your choice. [6]

- Q11)**a) How do you model the Tables, Files, and Documents using components? Explain with example. [8]
- b) What is signal? How signals are modeled in UML? Explain with suitable example. [8]

OR

- Q12)**a) What is node and Artifact. Explain how to deploy an artifact to a node.[8]
- b) Explain the concept of Pattern and Frame with suitable example. [8]



Total No. of Questions : 12]

SEAT No. :

P2012

[Total No. of Pages : 2

[5254]-183

B.E. (Information Technology)

SOFTWARE TESTING AND QUALITY ASSURANCE

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain verification and validation testing with diagram. [8]

b) Explain System testing with suitable example. [8]

OR

Q2) a) Differentiate between White box and Black box testing. [8]

b) What is the difference between Regression testing and retesting? Explain in detail regression testing. [8]

Q3) a) Explain in detail Software testing lifecycle with suitable diagram. [8]

b) Draw and explain software defect life cycle. [8]

OR

Q4) a) Explain Test cases for Find and replace window. [8]

b) Why mutation testing is called fault based test approach? Explain with an example. [8]

Q5) a) Explain classification of Software measures. [8]

b) What are software metrics? Explain different scales of measurements with example. [10]

P.T.O.

OR

- Q6)** a) Explain with example the GQM method for identifying software measures? [10]
b) What are Product Quality Metrics & In Process Quality Metrics. [8]

SECTION - II

- Q7)** a) Define Quality. What is the difference between Quality Control & Quality Assurance? list SQA activities. [10]
b) Explain Ishikawa's Seven basic quality tools. [8]

OR

- Q8)** a) Explain the following software reliability quality attributes: [10]
i) Usability
ii) Maintainability
iii) Portability
iv) Integrity
v) Interoperability
b) Explain Software reviews, Inspections & Audits in detail. [8]

- Q9)** a) Explanation for the PDCA cycle with reference to ISO 9000:2000 with Diagram. [8]
b) Explain in detail maturity levels of CMM. [8]

OR

- Q10)** a) List all the requirements of ISO 9000 and ISO 9001. [8]
b) Explain the terms DMAIC and DMADV with reference to six sigma. [8]

- Q11)** a) Explain in detail the Quantitative Process Management KPA. [8]
b) Write a short note on: [8]
i) Peer reviews
ii) Defect prevention

OR

- Q12)** a) Explain: [8]
i) Organization process definition (OPD)
ii) Software product engineering (SPE)
b) What is Software Configuration management? How it is useful in Software Development Process? [8]



Total No. of Questions : 12]

SEAT No. :

P2013

[Total No. of Pages : 3

[5254]-184

B.E. (I.T.)

ADVANCED DATABASE MANAGEMENT SYSTEM

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) What is need of PL/SQL? Draw PL/SQL BLOCK structure and execution environment. Explain each block. [8]
- b) How can you trap exceptions in PL/SQL? Write a code fragment to trap any three exceptions. [8]

OR

- Q2)** a) Explain difference between procedure & function in PL/SQL. Write a procedure with example. [8]
- b) Explain PL/SQL Transactions. What is save point & cursor? [8]

- Q3)** a) What are TP Monitors? Explain the TP Monitor architectures. [8]
- b) What are compensating transactions? [8]

OR

- Q4)** a) Explain Transactional workflow with suitable example. [8]
- b) Write short note on Main Memory Databases. [8]

P.T.O.

- Q5)** a) Where you need to use complex data types? Also explain structured data types and inheritance declaration using SQL: 1999. [10]
- b) Explain collection and large object types-arrays and Multisets with example. [8]

OR

- Q6)** a) Describe XML query algebra operation. Describe use of X-Query for path Expression and FLWOR expression in DBMS. [8]
- b) Explain XML DTD representation for nested relational schema. [10]

SECTION - II

- Q7)** a) Explain Kimball database design methodology for data warehouse. [9]
- b) Present a diagrammatic representation of typical architecture and main components of data warehouse. [9]

OR

- Q8)** a) Define data warehouse. Explain each clause in the definition. Can RDBMSes be used instead of warehouses? Give reasons. [9]
- b) Describe how a dimensional model differs from an Entity-Relationship(ER) model. Present a diagrammatic representation of typical star schema and state its advantages and disadvantages. [9]

- Q9)** a) What is market basket analysis? Explain the algorithm that implements this concept. [8]
- b) Explain in detail any four OLAP functions which are extensions to SQL.[8]

OR

Q10) Write short notes on (any two) **[16]**

- a) Categories of OLAP tools.
- b) Supervised and Unsupervised learning.
- c) OLAP benchmarks and applications.

Q11)a) Explain Implicit Locking. How does Oracle implement it? **[8]**

b) Explain statistical database auditing. **[8]**

OR

Q12)a) Explain Oracle's named Exception Handlers. **[8]**

b) What is authorization, Encryption in terms of providing security for database? **[8]**



Total No. of Questions : 12]

SEAT No. :

P2014

[Total No. of Pages : 3

[5254]-185

B.E. (Information Technology)
ARTIFICIAL INTELLIGENCE
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the TWO sections should be written in separate 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 - A

- Q1)** a) Explain intelligence and Artificial intelligence systems. How do they distinguish? [8]
- b) Explain how Swarm Intelligent systems work? Give suitable example to justify your answer. [8]

OR

- Q2)** a) What is agent? Discuss about the various kinds of agents and their properties with neat diagram. [8]
- b) What is Turing test? Why it is done? [8]

- Q3)** a) Discuss the tic-tac-toe problem in detail and explain how it can be solved using AI techniques? [8]
- b) Explain A* algorithm with an example. What are the limitations of A* algorithm? [8]

OR

- Q4)** a) Compare and contrast Hill climbing with simulated annealing search. [8]
- b) With a neat diagram, explain Alpha-Beta pruning method. [8]

P.T.O.

- Q5)** a) Explain unification algorithm with suitable illustration. [9]
- b) Represent the following sentences using symbolic logic: [9]
- i) A drunker is enemy of him-self.
 - ii) Father of John loves the mother of Merry.
 - iii) All students like a good teacher.
 - iv) Fruits and vegetables are nutritious.
 - v) God helps those who help themselves.

Also explain the problems with predicate logic.

OR

- Q6)** a) Briefly explain semantic Network. Also give semantic nets to describe the following: [9]
- Nilesh is a writer
Nilesh lives in Bombay
Ishwar is a teacher
Ishwar lives in Bangalore.
Nilesh sent a copy of his book to Ishwar
Ishwar sent his thanks to Nilesh.
- b) Explain reasoning under uncertainty with suitable example. [9]

SECTION - B

- Q7)** a) What is for Blocks World Problem? Give an example heuristics function for Blocks World Problem. [8]
- b) What is non linear planning? Explain with suitable example. [8]
- OR
- Q8)** a) What is object recognition in computer vision? What are the applications of object recognition? [8]
- b) What are the different components of planning system? Explain them briefly. [8]

- Q9)** a) What do you understand by learning? Explain the various forms of learning. [8]
- b) What is an expert system? Explain its various parts. [8]

OR

- Q10)**a) What are the salient activities required in knowledge acquisition system achieved through interaction between domain experts? Explain with example. [8]
- b) What do you understand by Expert system Shell? Explain in details with example. [8]
- Q11)**a) Explain structured data representation in prolog. Also explain what are the data structures available in prolog? [9]
- b) What are the features of prolog language? Name the areas in which prolog programming language is used? [9]

OR

- Q12)**a) Define the terms chromosome, fitness function, crossover and mutation as used in Genetic Algorithms. Explain how Genetic Algorithms works?[9]
- b) Write a program to find that the year entered through user is a leap year or not using prolog. [9]



Total No. of Questions :12]

SEAT No. :

P2015

[Total No. of Pages : 4

[5254]-186

B.E. (I.T.)

COMPILER DESIGN

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) What do you mean by compiler? Explain analysis-synthesis model of compilation for $a = (b + c) * (d - e)$. [10]

b) Explain input buffering with example. What do you mean by sentinels? [6]

OR

Q2) a) Write different issues in lexical analysis. Also explain lexical errors and its recovery techniques for each error. [6]

b) Explain various compiler construction tools for the compiler design. [6]

c) Define tokens, Patterns and lexemes with example for each. [4]

Q3) a) Write algorithm for left recursion and for following grammar [6]

$S \rightarrow Aa \mid b$

$A \rightarrow Ac \mid Sd \mid \epsilon$

Eliminate left recursion.

b) For a given grammar [12]

$S \rightarrow iEtS \mid iEtSeS \mid a$

$E \rightarrow b$

Left factor the grammar then find First and Follow and build predictive parsing table, is this LL(1) grammar yes or no.

P.T.O.

OR

Q4) Construct Canonical parsing table for the grammar [18]

$S' \rightarrow S$

$S \rightarrow CC$

$C \rightarrow cC \mid d$

Q5) a) Write translation scheme for checking the types of statements for following grammar [8]

$S \rightarrow \text{id: =E}$

$S \rightarrow \text{if E then } S_1$

$S \rightarrow \text{while E do } S_1$

$S \rightarrow S_1; S_2$

With this also explain type checking of function with example.

b) Write shorts notes with example for each on [8]

i) S-attributed

ii) Inherited attributed

iii) Abstract syntax tree

iv) Dependency graph

OR

Q6) a) Construct syntax tree for $a-4+c$ and directed acyclic graph for $a + a * (b - c) + (b - c) * d$ and differentiate between syntax tree and directed acyclic graph. [8]

b) For grammar write down the semantic rules using the Stack of the S/R parser and Left recursive grammar with example. [8]

$L \rightarrow E \mathbf{n}$

$E \rightarrow E_1 + T \mid T$

$T \rightarrow T_1 * F \mid F$

$F \rightarrow (E)$

$F \rightarrow \text{digit}$

SECTION - II

- Q7) a)** Explain following with suitable example. [8]
- i) Activation record
 - ii) Control stack
 - iii) Binding and storage
 - iv) Displays.
- b) Explain static and Dynamic Scope in detail. Illustrate with example. [8]

OR

- Q8) a)** Explain following parameter passing with proper examples [8]
- i) Call by value
 - ii) Call by address
 - iii) Value result
 - iv) Copy rule
- b) How the records of nested procedures are maintained at run time, explain with the help of neat diagram. (Consider all cases) [8]

- Q9) a)** Explain back-patching with example. [4]
- b) Write Quadruple, Triple and Indirect Triple representation of following expression $d = -(a - b) + (a - c) + (a - c)$ with explanation. [12]

OR

- Q10) a)** What is Liveness? Explain Liveness calculation with suitable example. [10]
- b) In register allocation explain following with suitable example [6]
- i) Control and data flow graph
 - ii) Interference graph
 - iii) Spilling

- Q11)**a) Explain implementation of single and multi-inheritance in compiler design with block diagram. [10]
- b) How the compiler handles the following types of constructors in object oriented programming? Explain with example. [8]
- i) Parameterized constructors
 - ii) Default constructors
 - iii) Copy constructors
 - iv) Conversion constructors

OR

- Q12)**a) Explain implementation of class by compiler with block diagram. [6]
- b) How overloading and overriding are implemented in compiler. Explain with example. [8]
- c) Explain Object oriented features in compiler. [4]



Total No. of Questions :12]

SEAT No. :

P2016

[Total No. of Pages : 2

[5254]-187

B.E. (Information Technology)

ADVANCED OPERATING SYSTEMS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, and Q5 or Q6 from Section-I and Q7 or Q8, Q9 or Q10, 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 any four UNIX commands with example: [8]

b) Explain concept of process scheduling. [8]

OR

Q2) a) Explain multithreading with example. [8]

b) Explain various primitives used for process synchronization. [8]

Q3) a) Draw and explain PCB in KMOS. [8]

b) Explain significance and usage of system list and ready list in KMOS. [8]

OR

Q4) a) Explain functional specifications of process DISPATCH in KMOS. [8]

b) Explain IPC issues of KMOS. [8]

Q5) a) Differentiate between multitasking O.S. and multiprocessing O.S. What are the advantages of using multiprocessor systems? [8]

b) Explain parallel hardware and interconnections types. [10]

P.T.O.

OR

Q6) Write short notes on following (Any Three) [18]

- a) Operating system architecture
- b) Multi tasking OS
- c) KMOS
- d) Kernel mode processes

SECTION - II

Q7) a) Explain the concept of High memory mapping [8]
b) Explain allocation and deallocation of slab to cache. [10]

OR

Q8) a) Explain kmalloc (),vmalloc and kfree () functions. [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 any two disk scheduling algorithms. [8]
b) Explain the concept of I/O scheduler. [8]

Q11)a) Explain any two system calls related with file system management [8]
b) Explain the concept of file system abstraction [8]

OR

Q12)a) Define VFS. Explain its usage. [8]
b) Explain the process of mapping of file blocks with relevant system calls.[8]



Total No. of Questions : 12]

SEAT No. :

P3961

[Total No. of Pages : 3

[5254]-188

B.E. (Information Technology)

EMBEDDED SYSTEMS

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *In section I attempt : Q.No. 1 or Q.No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6. In section II attempt : Q.No. 7 or Q.No. 8, Q.No. 9 or Q.No. 10, Q.No. 11 or Q.No. 12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume Suitable data, if necessary.*

SECTION - I

Q1) a) What are the advantages of using ASIC & SOC in embedded systems? Explain. [8]

b) Classify embedded systems. Give examples for each category. [8]

OR

Q2) a) What are the characteristics of embedded systems? [6]

b) What are the features of ARM7? [6]

c) Differentiate between CISC and RISC. [4]

Q3) a) With the help of neat diagram, explain special structural units of processor to improve the performance in Embedded systems. [6]

b) Name the methods used for managing power & energy in an embedded system? [6]

c) Describe different types of memories those can be integrated in a processor? [6]

OR

P.T.O.

- Q4)** a) What is the difference between level 1 and level 2 cache? Which other techniques are used to improve memory performance? [6]
b) What is the importance of clocking unit in embedded systems? How does it affect performance of an embedded system? [6]
c) What is Watchdog timer? How is useful in an embedded system? [6]

- Q5)** a) What is RS-232C? Give details. [8]
b) Describe I²C protocol and the applications. [8]

OR

- Q6)** a) Which optical devices are used in the embedded systems? [4]
b) What is the topology used in USB protocol? [4]
c) How does host recognize the device insertion in USB protocol? [8]

SECTION - II

- Q7)** a) What are the different phases of software development cycle for a typical embedded system? [8]
b) What are queues in C language? What are their uses in embedded system programming? [6]
c) What are the advantages of using high level language instead of assembly language for embedded system programming? [4]

OR

- Q8)** a) When do you consider object oriented programming language for embedded systems? Explain. [6]
b) What is cross compiler? Give details. Give one example. [6]
c) How embedded system software can be debugged? Give one example for such a debugger. [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 cooperative round robin scheduling model for RTOS. What is interrupt latency time for this scheduling model. [10]

OR

- Q10)**a) With the help of neat diagram, explain cyclic scheduling with time slicing for RTOS. [8]
- b) Define and explain interrupt latency period. What is its significance in RTOS? [4]
- c) What is a Process and a Thread? [4]

- Q11)**a) Differentiate MicroC/OS-II and VxWorks based on features and their area of application. [6]
- b) With the help of neat system block diagram, explain the system requirements and tasks for chocolate vending machine. [10]

OR

- Q12)**a) How tasks are managed in MicroC/OS-II? Explain in detail. [8]
- b) With the help of neat diagram, explain synchronization of tasks and IPCs for smartcard application. [8]



Total No. of Questions : 12]

SEAT No. :

P2017

[Total No. of Pages : 2

[5254]-189

B.E. (Information Technology) (Semester - I)

MOBILE COMPUTING

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) What is cell splitting? Explain the two cell splitting methods with appropriate example. [10]

b) Compare hard hand off and soft hand off. [6]

OR

Q2) a) Draw the general PCS architecture and explain it. [8]

b) What are the effects of Fading? Explain distance dependent fading, Rayleigh fading, shadow fading. [8]

Q3) a) Explain with diagram A3, A5 and A8 algorithm in GSM. [8]

b) What are the functions of HLR VLR, EIR and AuC in GSM? [8]

OR

Q4) a) Compare the authentication procedure in IS-41 and GSM. [8]

b) Draw GSM MAP Service Framework and explain it. [8]

Q5) a) Draw and explain SMS protocol stack. [8]

b) Elucidate the techniques used to reduce the International Call Delivery Cost? [10]

P.T.O.

OR

- Q6)** a) What is the number portability? Describe three types of number portability.[10]
b) Compare between Prepaid mobile service and Postpaid mobile service.[8]

SECTION - II

- Q7)** a) Explain Wireless Application Protocol (WAP) model in detail. [8]
b) Compare GPRS with CDPD. What are the fundamental differences between the two services and what are the design guidelines shared by them? [8]

OR

- Q8)** a) Describe the GPRS architecture and protocols. [8]
b) Explain W-CDMA in detail. [8]

- Q9)** a) Explain in detail IP Packet delivery. [8]
b) Write a note on any one routing protocol in MANET : destination sequence distance vector, dynamic source routing. [8]

OR

- Q10)**a) Explain Various features and header format of IPv6. [8]
b) Explain Dynamic source routing in MANET. [8]

- Q11)**a) Explain in detail Wireless Broad Band (WiMAX) technology. [8]
b) Define Bluetooth.
Explain in detail Bluetooth technology with protocol stack. [10]

OR

- Q12)**a) What is UMTS? Draw its architecture and explain its radio interface.[10]
b) Write a short note on: (Any 2) (4 Marks Each) [8]
i) RFID
ii) W-LAN
iii) Java Card



Total No. of Questions : 12]

SEAT No. :

P2018

[Total No. of Pages : 2

[5254]-190

B.E. (Information Technology)
MULTIMEDIA SYSTEMS
(2008 Pattern) (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) *Answers to the Section-I and Section-II should be written in separate answersheets.*
- 4) *Figures to the right indicate full marks.*
- 5) *Draw appropriate diagrams where ever necessary.*
- 6) *Use of non programmable electronic calculator is allowed.*

SECTION - I

- Q1)** a) What are the goals and objectives of multimedia? [8]
b) What is Huffman coding? Convert the following using Huffman coding?[8]

A	B	C	D	E	F	G	H
64	16	144	16	4	36	144	32

OR

- Q2)** a) What are the characteristics of multimedia? [8]
b) What is LZW coding? Convert the '**banana band**' using LZW coding[8]

- Q3)** a) Elaborate any two methods of image enhancement in the context of digital images [8]
b) Elaborate GIF and TIFF file format [8]

OR

- Q4)** a) Elaborate arithmetic coding method in data compression [8]
b) Elaborate BMP and JPEG file formats [8]

P.T.O.

- Q5) a)** Elaborate on digital audio and any one CD format [10]
b) Elaborate the principles of MPEG audio compression [8]

OR

- Q6) a)** Elaborate characteristics of sounds [8]
b) Elaborate the delta modulation 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) Describe CCIR, CIF, SIF standards. [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.263 briefly.[10]

- Q9) a)** What is virtual reality? Elaborate CCD, VCR and 3D sound system. [8]
b) Elaborate VR hand glove [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]



Total No. of Questions : 12]

SEAT No. :

P2019

[Total No. of Pages : 3

[5254]-191

B.E. (Information Technology)
DISTRIBUTED SYSTEMS
(2008 Pourse) (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 jf necessary.*

SECTION - I

- Q1)** a) What are different transparencies available in distributed systems? Explain any two [8]
b) Explain challenge of heterogeneity in Distributed System and how it is overcome? [10]

OR

- Q2)** a) Explain Peer-to-Peer Architecture with a neat diagram and its advantage.[8]
b) Give different types of hardware resources and data or software resources that can be shared. Give examples of their sharing as it occurs in Distributed System [10]

- Q3)** a) What is a message broker? What are its characteristics? [8]
b) Define Sockets, Ports, IP Address and Connection oriented Protocol[8]

OR

- Q4)** a) Explain different Invocation Semantics [8]
b) What is CORBA? Describe the general organization of CORBA system with the help of neat diagram. [8]

- Q5)** a) How do you synchronize the clock with a computer? Can we use a GPS receiver for all computers in world? Justify your answer. [8]
b) Describe Cristian algorithm for clock synchronization [8]

P.T.O.

OR

- Q6)** a) Show the instances where we cannot conclude $C(a) < C(b)$ or $C(b) < C(a)$. Draw appropriate timing diagram. [8]
- b) What are the disadvantages of Centralized and Distributed Mutual Exclusion Algorithm. [8]

SECTION - II

- Q7)** a) What is automounting? Explain a simple automounter for NFS and how it help to improve the performance and scalability of NFS? [8]
- b) Compare NFS with CODA File System. [8]

OR

- Q8)** a) Explain in brief basic Secure File System and Serverless File System.[8]
- b) Write a short note on caching and replication in CODA file system. [8]

- Q9)** a) What is consistency model? Explain Monotonic writes and Writes follow reads in client centric consistency model? [8]
- b) Explain immutable file sharing semantics. Can a file system works if it support above immutable file sharing semantics. Justify your answer[8]

OR

- Q10)**a) Why replicas must be consistent? Explain following Data Centric Consistency Models. [8]
- i) Causal
- ii) Sequential
- b) Explain design and implementation issues of Distributed Shared Memory in details. [8]

- Q11)a) Explain [8]**
- i) Flat and Hierarchical groups
 - ii) Open and closed groups
- b) Explain basic reliable multicasting. How it could be made scalable?[10]

OR

- Q12)a) Explain [10]**
- i) FIFO ordering
 - ii) Causal ordering
 - iii) Total-Ordering
 - iv) No Ordering
- b) Explain Byzantine Generals Problem. Why do we need to have $3m+1$ total processes for system to work correctly, assuming non-faulty commander? [8]



Total No. of Questions : 12]

SEAT No. :

P2020

[Total No. of Pages : 3

[5254]-192

B.E. (Information Technology)
INFORMATION RETRIEVAL
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.*
- 2) *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) With the help of block diagram explain Information Retrieval System. In your words explain what do you mean by Information Retrieval? [8]
b) Explain Hierarchic clustering Algorithm? Comment if Hierarchic methods are suitable for document clustering? [8]

OR

- Q2)** a) What are different constituents of Classification Methods and with proper example explain relations that exist among them [8]
b) Define Clustering? Explain in detail various parameters used while designing any clustering algorithm [8]

- Q3)** a) Explain Suffix Array with the help of diagram. What do you mean by signature file? How it can be constructed. [8]
b) Explain Cellular multi-lists with proper example [8]

OR

- Q4)** a) What do you mean by Coordination level? [6]

For the following Ki list if the set of documents are:

K1-list: D1, D2, D3, D4

K2-List: D1, D2

K3-List: D1, D2, D3

K4-List: D1

Then for query **Q = K1 AND K2 AND K3** find out the answer

- b) Write Short Notes on : i) Inverted Index File ii) Index-sequential File [10]

P.T.O.

- Q5) a)** Explain the terms Precision and Recall [6]
Assume the following:
- A database contains 80 records on a particular topic
 - A search was conducted on that topic and 60 records were retrieved.
 - Of the 60 records retrieved, 45 were relevant.
- Calculate the precision and recall scores for the search.
- b) State & Explain User Oriented Measures with the help of Venn Diagram [6]
c) What are digital Libraries [6]

OR

- Q6) a)** Explain TREC document collection with tasks and Evaluation measures at TREC conferences [8]
b) Explain Harmonic Mean & E Measure [6]
c) Write Note on: OPAC [4]

SECTION - II

- Q7) a)** Describe Ontology in Information Retrieval and its use? [8]
b) What is Parallel Computing? Explain taxonomy of parallel architectures [8]

OR

- Q8) a)** With respect to various aspects discuss MIMD Architectures. [8]
b) Define Ontology? Explain in detail reasons to develop Ontology. [8]

- Q9) a)** What is the role of Multimedia in Commercial Database Management System? [8]
b) Discuss MULTOS in short. [8]

OR

- Q10) a)** Write note on Generic Multimedia Indexing Approach (GEMINI)? [8]
b) Discuss SQL3 in short. [8]

- Q11)**a) Discuss the centralized architecture of the search engine; Enlist the drawbacks of Harvest architecture. [10]
- b) What do you mean by Web crawler and briefly explain the working of web crawler [8]

OR

- Q12)**a) Write short notes on: Challenges in web search [6]
- b) What is Web Usage mining [6]
- c) Explain Meta searches with example [6]



Total No. of Questions : 12]

SEAT No. :

P2021

[Total No. of Pages : 3

[5254]-193

B.E. (Information Technology)

REAL TIME SYSTEMS (Theory)

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Describe any specific real time application. Draw neat block diagram of application. [8]
- b) What are the varies factor, that are to be consider while estimating the program run time. Explain any two in brief. [8]

OR

- Q2)** a) Describe in brief the effect of the following in estimation the run time of a program: [8]
- i) A pipelined architecture
 - ii) Use of cache
- b) Explain different issues in real time computing. Explain various characteristics of Real Time System. [8]

- Q3)** a) List down the suitable assumption for preemptive Earliest Deadline First Algorithm. In what way preemptive Earliest Deadline First Algorithm is different than Deadline Monotonic Algorithm.. [10]
- b) Describe the priority inheritance protocol. Give an example to show how this protocol can lead to deadlock. [8]

OR

P.T.O.

- Q4)** a) Consider: Task 1 = (p1,e1) = (2,0.9) [10]
Task 2 = (p2,e2) = (5,2.3)
- i) Find total processor utilization
 - ii) Find necessary and sufficient condition
- b) How are mode change implemented when the priority ceiling protocol is used to handle the access to critical section. [8]

- Q5)** a) List down and explain the different data typing features that could be useful in a real time programming language. [6]
- b) Describe the skeleton and optimistic algorithm under the two phase approach to improve predictability of real time transaction. [10]

OR

- Q6)** a) Explain how the two phase locking approach used in pessimistic concurrency control is disadvantage to real time system. How can it be modified to overcome the problem? [10]
- b) State the three properties that mechanisms must have for exception handling at run time in Ada language. [6]

SECTION - II

- Q7)** a) Explain Virtual Time Carrier Sensed Multiple Access (VTCSMA) algorithms with flow chart. [6]
- b) Explain the features of Polled Bus Protocol. What happens if two nodes A and B are starting arbitration simultaneously? [8]
- c) What is Timed Token protocol? How it is implemented. [4]

OR

- Q8)** a) Write a short notes on(Any Two) : [10]
- i) Stop & Go Multihop Protocol.
 - ii) Disk Scheduling Algorithms
 - iii) Resources reservation protocol
- b) Discuss the various communication medium used in real time networking.[8]

- Q9) a)** List all the capabilities of RTOS and explain any two of them. [8]
- b) Draw the block diagram of VxWorks real time operating system and describe its functionality. [8]

OR

- Q10)a)** Draw the block diagram of task management services. Explain the functionality of RTOS Kernals. [10]
- b) Explain in detail and draw the block diagram of RT Linux. [6]

- Q11)a)** Describe the following structure for hardware redundancy: [8]
- i) Static Pairing
- ii) Shift out Redundancy
- b) Explain Byzantine's algorithm for fault tolerance with an example. State the interactive consistency condition. [8]

OR

- Q12)a)** Explain reliability model for hardware redundancy. State reliability model require for permanent fault only. [8]
- b) Define the following term: [8]
- i) Hardware fault
- ii) Fault Latency
- iii) Error latency
- iv) Backward error require



Total No. of Questions : 12]

SEAT No. :

P2022

[Total No. of Pages : 3

[5254]-194

B.E. (Information Technology)
SOFTWARE ARCHITECTURE

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer three Que. from Section I and three Que. from Section - II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Make suitable assumptions wherever relevant and appropriate.*

SECTION - I

- Q1) a)** Define the given term/concept and give examples **[10]**
- i) Software architecture
 - ii) Stakeholders in architecture.
- b)** Explain Architecture Business Cycle activities in detail. **[8]**

OR

- Q2) a)** How the collaboration can be used to model the system of components and connectors. **[10]**
- b)** Explain with suitable example: **[8]**
- i) Architecture is high-level design.
 - ii) Architecture is the overall structure of the system.
 - iii) Behavior of each software element is part of the architecture.
 - iv) Architecture has component & connectors.

- Q3) a)** Write short note on following: **[8]**
- i) Modifiability Tactics
 - ii) Security Tactics
- b)** What is Quality Attributes? Explain quality attributes of web application? **[8]**

P.T.O.

OR

- 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) Describe Abstract Factory pattern with respect to intent, application and solution. [8]
b) With structure explain observer pattern. Give examples of the same. [8]

OR

- Q6)** a) With structure explain Singleton pattern. Give examples of the same [8]
b) Write a short note on Model View Controller (MVC) and its application?[8]

SECTION - II

- Q7)** a) Explain three-tier architecture with reference to presentation, business and persistence layers. [10]
b) Explain the concept of [8]
i) Loose Coupling.
ii) Addressing Quality attributes through multi tier architecture.

OR

- Q8)** a) Compare different architecture styles [10]
b) Write short note on [8]
i) Coupling in XML.
ii) Structure of XML

- 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)Short Notes on [16]

i) .NET web services

ii) .NET Remoting

iii) .NET assemblies

iv) Legacy Application



Total No. of Questions : 12]

SEAT No. :

P2023

[Total No. of Pages : 3

[5254]-195

B.E. (Information Technology)

ADVANCED GRAPHICS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain in detail. [6]

- i) Parallel Projection
- ii) Depth queuing.

b) Explain Polygon surface and polygon Meshes. [6]

c) Explain with mathematical model Bezier surface and B-Spline surface.[6]

OR

Q2) a) Explain following quadratic surfaces. [6]

- i) Ellipsoid
- ii) Torus

b) Explain Surface Rendering and polygon surfaces in detail. [6]

c) Explain the issues related to three dimensional display methods. [6]

Q3) a) What is animation? Explain different types of software's used for it. [8]

b) Discuss any four types of animators used in animation. [8]

OR

Q4) a) What is meant by Animation Language? Explain the types of animation languages with appropriate examples. [8]

b) Explain briefly various real time animation techniques used in computer assisted animation. [8]

P.T.O.

- Q5)** a) Explain in detail Quadtrees and Octrees. [8]
b) Explain desirable properties in solid representation. [8]

OR

- Q6)** a) Compare and contrast primitive instancing and boundary representation. [8]
b) Differentiate various solid modeling methods on following points. [8]
i) Uniqueness.
ii) Compactness and efficiency.
iii) Accuracy.
iv) Domain.

SECTION - II

- Q7)** a) Explain HLV & HLS color cones. [8]
b) Explain YIQ color model. How is YIQ to RGB conversion done? Explain. [6]
c) Write a short note on illumination model. [4]

OR

- Q8)** 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]

- 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) Explain illumination W.R.T. Ambience, Specular reflection and diffuse reflection. [8]
b) Explain Phongs illumination model in detail. [8]

- Q11)**a) Explain the factors affecting the design of virtual reality system. [8]
b) Explain driving simulation application and different virtual reality devices used in it. [8]

OR

- Q12)**a) What is VRML? Describe the basic structure of a VRML file. [8]
b) Discuss the virtual reality applications in manufacturing and Architecture field and in Robotics field. [8]



Total No. of Questions : 12]

SEAT No. :

P2024

[Total No. of Pages : 2

[5254]-196

B.E. (Information Technology)
ADVANCE COMPUTER NETWORK
(2008 Pattern) (Elective - III)

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) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) Explain the logical layers of ISO/OSI model in detail. [10]
b) Discuss in detail various principles of network design. [8]

OR

- Q2)** a) What are the Networking principles and Network services with Layered architecture? [12]
b) Explain in detail Internet, ATM and cell phone. [6]

- Q3)** a) Explain the ATM header with appropriate diagram. Explain the structure of the header. [8]
b) Explain mobility management issues in wireless networks. [8]

OR

- Q4)** a) What is Wireless communication and explain its architecture? [8]
b) Explain WDM system with diagram in Optical Networks. [8]

- Q5)** a) Explain in details various parameters specified in the Quality of Service. [6]
b) Explain Congestion control and Flow control mechanism of Datagram network w.r.t. Open Loop and Closed Loop. [10]

OR

- Q6)** a) Explain Congestion control mechanism of ATM network w.r.t. [8]
i) Internal congestion control
ii) Global congestion control
b) Explain Marcov Chain Models w.r.t. M/M/1 queue and M/M/2 queue. [8]

P.T.O.

SECTION - II

- Q7)** a) Write notes on: BGP and RIP [10]
b) What is Traffic Engineering and explain TE with MPLS. [8]

OR

- Q8)** a) Explain different BGP messages with their formats. [8]
b) What are VPNs? Explain the significance of tunneling in VPNs. [10]

- Q9)** a) Explain the general characteristics of Mobile IP. [6]
b) Explain various features of IPv6. [10]

OR

- Q10)**a) Explain RTP and RSVP [8]
b) Explain Application Programming Interface for IPv6. [8]

- Q11)**a) Explain cluster based network architecture for ad-hoc networks. [6]
b) What is ad hoc network? Explain its limitations and application areas.[10]

OR

- Q12)**a) Explain how firewall is implemented in the network. [8]
b) What are overlay networks? What is the importance of overlay networks?[8]



Total No. of Questions : 12]

SEAT No. :

P2025

[Total No. of Pages : 3

[5254]-197

B.E. (Information Technology)

BIO INFORMATICS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, and Q5 or Q6 from Section-I and Q7 or Q8, Q9 or Q10, and Q11 or Q12 from Section-II.
- 2) Answers 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) What is the scope of bioinformatics? Explain bioinformatics applications related to the following areas: **[10]**

Information Search & Retrieval.

Microarrays

Sequence Assembly

Pharmacogenomics

b) Discuss the various applications of BioInformatics and the associated technologies to those applications. **[8]**

OR

Q2) a) Explain with neat diagram the central dogma of molecular biology. Explain the molecules participating in Information flow and the various Functional Sites. **[10]**

b) Explain major types of Protein databases with most suitable example for each. **[8]**

Q3) a) What is the role of clustering in Microarray data? Discuss any two methods of clustering applied on gene expression data. **[8]**

b) Explain in brief the data visualization techniques applicable to BioInformatics. Discuss any two visualization tools with example. **[8]**

OR

P.T.O.

- Q4) a) Define Microarray. Explain the sources of variability in Microarray preparation and reading. Explain how statistical analysis can be used to reduce variability. [8]
- b) List various statistical analysis tools. What is meant by Sensitivity and Specificity of a tool? Explain in brief False Negative, True Negative, True Positive and False positive. [8]
- Q5) a) Explain the importance of pattern matching techniques in BioInformatics. List the various techniques of pattern matching. Elaborate any one technique in detail. [8]
- b) What are the types of machine learning processes? Explain any two machine learning processes. [8]

OR

- Q6) a) Explain the text mining with NLP Process. [8]
- b) Explain computational methods of Sequence alignment [8]
- i) Dynamic programming
- ii) Word method

SECTION - II

- Q7) a) Draw the block diagram of components of a modeling and simulation system including a model, database and engine. Also draw and explain the modeling and simulation process. [10]
- b) Differentiate between Ab-Initio and Heuristic methods of Protein structure prediction process [8]

OR

- Q8) a) Draw and explain Collaboration-Communication model with appropriate examples. [8]
- b) Describe in brief the Metropolis algorithm with Monte Carlo method by considering with its major issues like consistency and performance. [10]

- Q9)** a) Define raw score, bit score and e-value in BLAST. Also explain the steps applied by BLAST Algorithm to find a matching sequence. [8]
- b) Differentiate between FASTA and BLAST algorithms. [8]

OR

- Q10)**a) Discuss the applications of PSI-BLAST program which explores protein family relationships. [8]
- b) What is Hashing? How is it exploited in FASTA database algorithms?[8]

- Q11)**a) Discuss the various factors responsible for degradation in the ecosystem.[8]
- b) What is Biotechnology? How Genetic engineering tools work in Biotechnology? [8]

OR

- Q12)**a) How does Genetic engineering work? Which models are used for identifying the diseases. [8]
- b) Discuss in brief the role of pollutants in interchange and transformation of atmosphere, hydrosphere and lithosphere. [8]



Total No. of Questions : 12]

SEAT No. :

P2026

[Total No. of Pages : 3

[5254]-198

B.E. (Information Technology)

NEURAL NETWORK AND EXPERT SYSTEMS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer-books
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) Draw diagram of biological neuron and discuss its components [9]
b) With the help of suitable diagram discuss functioning of a simple artificial neuron. [8]

OR

- Q2)** a) List and explain topologies of neural networks. [8]
b) What is Perceptron model. Write an equation which describes the operation of the perception model of a neuron. [9]

- Q3)** a) What is difference between gradient descent method and 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

- Q4)** a) Write algorithmic steps of EBP learning algorithm in MLFFNN [8]
b) Comment on the the following performance issues of EBP. [9]
i) Advantages,
ii) Limitations

P.T.O.

- Q5)** a) Explain how Support Vector Machine is used for pattern analysis tasks [8]
b) What is basic concept of RVM? Explain how RVM is different from SVM? [8]

OR

- Q6)** a) What is significance of 'Regularization Theory'? Comment [8]
b) What do you understand by "Kernel" 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]



Total No. of Questions : 12]

SEAT No. :

P3337

[Total No. of Pages : 2

[5254]-199

B.E. (Information Technology)

GEO INFORMATICS SYSTEM

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) Explain the process of image enhancement in digital image processing. Explain with example the importance of preprocessing. [8]
b) Explain any four basic elements of image interpretation. [8]

OR

- Q2)** a) Explain visual image interpretation. Explain all basic elements of image interpretation with example. [8]
b) What are the different types of errors? Explain all methods used for correcting errors from digital images. [8]

- Q3)** a) Explain SAR and SLAR with suitable diagram. [9]
b) What are the different types of sensor parameters? Describe them. [9]

OR

- Q4)** a) Explain remote sensing and its types. Explain in detail the steps involved in remote sensing with example. [9]
b) Explain in detail the RADAR principle with equation. State the use of RADARs in remote sensing. [9]

- Q5)** a) Explain in detail the architecture of GIS. On which factors geographic integration of information can be done? [8]
b) What is map projection and its types? Explain the type's maps which can be produced by using GIS? [8]

OR

P.T.O.

- Q6)** a) Explain fundamental operations of GIS and theoretical framework of GIS along with diagram. [8]
b) Explain what is the M's of GIS? List and explain reasons for using computer in the process of making map. [8]

SECTION - II

- Q7)** a) What is the significance of GIS data modeling? Explain the stages in creating GIS data model with suitable diagram. [8]
b) Explain spatial data model. Consider any spatial information and represent its features using types of spatial data model. [8]

OR

- Q8)** a) What do you mean by Geospatial database? Explain the importance of digital database? [8]
b) What are the common errors in GIS databases? How can they be prevented or corrected? [8]

- Q9)** a) Classify the data involved in GIS? Explain the representation of Raster and Vector data model with suitable example? [8]
b) What is overlay analysis? Describe the process of digital terrain modeling. [8]

OR

- Q10)** a) What are the types of raster GIS models? Describe any two. [8]
b) Explain Binary and Index Model with suitable example. [8]

- Q11)** a) What is the role of GIS in municipal management? Explain in detail? [9]
b) Explain in detail objectives of design of GIS. How this will ensure the effectiveness of GIS? [9]

OR

- Q12)** a) Describe the software scenario in GIS focusing on functionalities, products and developers. [9]
b) What is the role of GIS in urban management? Explain in detail. [9]



Total No. of Questions : 12]

SEAT No. :

P2027

[Total No. of Pages : 3

[5254]-200

B.E. (Information Technology)

BUSINESS INTELLIGENCE

(2008 Course) (Elective - IV) (Open Elective)

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

SECTION - I

- Q1)** a) Discuss design and implementation aspects of OLTP system. [8]
b) Compare and contrast analytical queries with transactional queries. [8]

OR

- Q2)** a) Compare and contrast OLTP and OLAP. [8]
b) Explain components of data warehouse architecture with neat diagram. [8]

- Q3)** a) Explain star, snowflake and fact constellation schema with example. [8]
b) Explain transaction, recurring/periodic and accumulating snapshot types of dimensional modeling. [8]

OR

- Q4)** a) Anita is a customer with XYZ Inc. She first lived in Pune, Maharashtra. So, the original entry in the customer lookup table has the following record: Cust_id = 234, Cust_name= "Anita", State = "Maharashtra". At a later date, she moved to Indore, Madhya Pradesh on March, 2016. How should XYZ Inc. now modify its customer table to reflect this change? Elaborate three ways to handle this scenario. [8]
b) What is difference between fact and grain? Explain additive and semi additive fact with example. [8]

P.T.O.

- Q5) a)** What are late arriving facts in ETL? How are they handled? [9]
b) Explain architecture of ETL and ETL process. [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 Quality
ii) Data enrichment
iii) Data staging

SECTION - II

- Q7) a)** List types of OLAP Servers. Explain any two OLAP Servers with its architecture. [8]
b) Explain different layers in reporting with their significance. [8]

OR

- Q8) a)** Write short note on Charts, Tables and Prompts. [8]
b) Explain ETL scheduling. How is data-level security implemented? [8]

- Q9) a)** Describe different steps in Text mining. What are the different issues to handle text data? [8]
b) Explain the concept & significance of Materialized View with suitable example. [8]

OR

- Q10) a)** What is regression? Explain linear and non-linear regression with example. [8]
b) Explain decision tree classification technique in detail. [8]

Q11)a) What is BIG Data? List the characteristics of BIG Data. Draw and explain the architecture of HIVE. [9]

b) Explain change data capture. Explain the significance of log-based techniques? [9]

OR

Q12)Write Short notes (any Three) [18]

a) BI on Cloud

b) Agile BI

c) Real time BI

d) PIG

e) Netezza



Total No. of Questions : 12]

SEAT No. :

P2028

[Total No. of Pages : 2

[5254]-201

B.E. (Chemical Engineering)

PROCESS DYNAMICS & CONTROL

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Assume suitable data, if necessary.
- 2) Neat diagrams must be drawn wherever necessary.

SECTION - I

Attempt following questions

Q1) a) Find the inverse Laplace transform of following Laplace equation. [10]

$$Y(s) = \frac{s-1}{s(s+1)(s+2)}$$

b) Using the final value theorem. find the final value of the function. [6]

$$y(t) = 1 - 5e^{-0.5t} \sin(6t+2)$$

OR

Q2) Develop the complete mathematical model of a mercury thermometer and also derive the final response equation for a step input in the bath temperature. [16]

Q3) a) Write the time and the Laplace transfer function equations of a PID controller and give the advantages and disadvantages of each P, I and D actions. [8]

b) For a second order system with following transfer function [8]

$$G(s) = \frac{1}{(25s^2 + 2s + 1)}$$

When a step change of magnitude 5 is introduced into the system find

- i) Rise time,
- ii) Ultimate value of response,
- iii) Decay ratio,
- iv) Overshoot

P.T.O.

OR

Q4) Derive the transfer function of a U-tube manometer second-order system, starting from the basic force balance equation. [16]

Q5) What is a root locus diagram and how is it used to find stability of a system? Explain stepwise construction of a root locus with a suitable example. [18]

OR

Q6) a) Check the stability of the closed loop system that has the following characteristic equation, $CE = 5s^4 + 4s^3 + 15s^2 + 2s + 3 = 0$ [9]

b) What is stability? Describe stability for a first-order process in terms of its transfer function. [9]

SECTION - II

Q7) Sketch the Bode plots of the following system, mentioning each step in detail, [16]

$$G(s) = \frac{1}{(4s+1)(s+1)}$$

OR

Q8) Explain the Bode plots of first-order and second-order systems with appropriate nature of graphs. [16]

Q9) a) Explain how dead time compensation is done in a typical control loop having a significant dead time with a block diagram. [8]

b) Explain feed-forward control system with a suitable example. [8]

OR

Q10) a) Explain split-range control system with a suitable example. [8]

b) What is inferential control ? Explain with a block diagram for distillation process control. [8]

Q11) a) Explain the process of conversion of analog signals to digital signals. [9]

b) Describe the plantwide control scheme for a plant with a heat exchanger. [9]

OR

Q12) Write short notes on:

i) Supervisory control and data acquisition system (SCADA). [9]

ii) Programmable logic controllers (PLCs). [9]



Total No. of Questions : 12]

SEAT No. :

P2029

[Total No. of Pages : 3

[5254]-202

B.E. (Chemical)

CHEMICAL REACTION ENGINEERING - II

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Derive an expression for time and conversion for chemical reaction control of spherical particle of unchanging in size. **[8]**

b) Solids of unchanging size, $R = 0.3\text{mm}$, are reacted with gas in a steady flow bench scale fluidized reactor with the following result.

$$F_o = 10\text{gm/sec.}, W = 1000\text{gm}, \bar{X}_B = 0.75$$

Also, the conversion is strongly temperature sensitive. Suggesting that the reaction step is rate controlling.

- a) Design a commercial sized fluidized bed reactor (find w) to treat 4 metric ton/hr of solid feed of size, $R = 0.3\text{mm}$ to 98% conversion.
- b) How large would a 2 staged fluidized bed to do this job? **[10]**

OR

Q2) Two small samples of solids are introduced into a constant environment oven and kept there for one hour. Under these conditions the 4mm particles are 58% converted, the 2mm particles are 87.5% converted.

- a) Find the rate controlling mechanism for the conversion of solid.
- b) Find the time needed for complete conversion of 1mm particles in this oven. **[18]**

P.T.O.

- Q3)** a) Derive the rate equation for the instantaneous reaction of fluid-fluid reaction. [8]
b) Explain film conversion parameter. [8]

OR

- Q4)** a) Derive the design equation of tower for fluid-fluid mass-transfer with reaction. [8]
b) Give the design of mixer-settlers. [8]

- Q5)** Write short notes on the following [16]
a) Adsorption mechanism
b) Mercury penetration method

OR

- Q6)** Write short notes on the following : [16]
a) Catalyst deactivation
b) Adsorption isotherm

SECTION - II

- Q7)** a) Explain mass transfer with reaction in the catalyst pellet with effectiveness factor. [9]
b) Explain the testing of pore resistance effects in the catalyst pellet. [9]

OR

- Q8)** a) Explain the major steps involved in the catalyst preparation. [9]
b) Derive an expression for gaseous diffusion in single cylindrical pore of the catalyst. [9]

- Q9)** a) Explain the mechanism of solid-catalysed reaction in detail. [8]
b) Derive the design equation of mixed flow catalytic reactor. [8]

OR

- Q10)** a) Explain differential reactor in detail. [8]
b) Explain differential and integral analysis in the integral reactor in detail. [8]

- Q11)** Write short notes on the following : [16]
a) Experimental recycle reactor
b) Fluidized bed reactor

OR

- Q12)** Write short notes on the following : [16]
a) Packed bed reactor
b) Trickle bed reactor



Total No. of Questions : 12]

SEAT No. :

P2030

[Total No. of Pages : 4

[5254]-203

B.E. (Chemical)

CHEMICAL ENGINEERING DESIGN - II

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1) a)** A jacketed agitated reactor consists of a vertical cylinder 1.2 m in diameter with a hemispherical base & flanged flat top. Jacket is fitted to the cylindrical section only and extends to a height of 0.9 m. Spacing between the jacket & vessel wall is 75 mm. The jacket is fitted with a spiral baffle. The pitch between the spirals is 200 mm. The jacket is used to cool the reactor contents with chilled water at 10°C @ 32,500 kg/h. Exit temperature of water is 20°C. Estimate the heat transfer coefficient at the outside wall of the reactor and pressure drop in the jacket. Density of water = 998 kg/m³, viscosity of water = 1.136 mNs/m², N_{pr} = 7.9, k_f = 0.59 w/m.k, j_f = 3.2 × 10⁻³. [10]
- b) Comment on selection of a jacket or a coil for a reaction vessel. [8]

OR

- Q2) 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 |

P.T.O.

Crown Radius	2130 mm
Knuckle Radius	128 mm
Straight Flange Length	60 mm
Internal Shell Pressure	0.55 N/mm ²
Internal Pressure Jacket	0.35 N/mm ²
Temperature	150°C
Material – Open Hearth Steel (15 - 200°C)	
Allowable stress	98 N/mm ²
Modulus of Elasticity	190×10 ³ N/mm ²
Poisson's Ratio	0.3

b) Explain the classification of reaction vessels. [6]

Q3) a) Explain the downcomer back up calculations for a sieve plate column with all the equations. [10]

b) Explain sieve plate performance diagram. [6]

OR

Q4) a) Find out the plate pressure drop and check the downcomer back up for the column with the help of following data: Diameter of column = 0.79 m, Area of column = 0.5 m², Volumetric flow rate of vapour = 1.13m³/s, Orifice coefficient = 0.84, Density of vapour = 0.70 kg/m³, Density of liquid = 950 kg/m³, Weir height = 50 mm. Weir length = 0.6 m, Hole diameter = 5 mm, Plate thickness = 5 mm, Height of overflow weir = 27 mm, Maximum liquid rate = 4.06 kg/s. [10]

b) Using van Winkle's correlation find the overall column efficiency for the following system. $\alpha_{LK} = 2.0$ [6]

Component	Mol fraction	μ (mNs/m ²)
Propane	0.05	0.03
i-butane	0.15	0.12
n-butane	0.25	0.12
i-pentane	0.20	0.14
n-pentane	0.35	0.14

- Q5) a)** Give advantages of plate column over packed column. [6]
- b) Sulphur dioxide produced by combustion of sulphur in air is absorbed in water. Pure SO_2 is then recovered from the solution by steam stripping. The feed is 5000 kg/h of gas containing 8% w/w SO_2 . A 95% recovery of SO_2 is required. The gas is cooled to 20 °C. Physical properties of gas can be taken as those for air. No. of overall gas transfer units = 8, Liquid flow rate = 29.5 kg/s. Find the diameter of column for a pressure drop of 20 mm $\text{H}_2\text{O}/\text{m}$ packing height. Data — Type of packing = Intalox saddle, Material = Ceramic, Size = 38 mm. $F_p = 170\text{m}^{-1}$, Gas density = 1.21 kg/ m^3 , Liquid density = 1000 kg/ m^3 , Liquid viscosity = 10^{-3} N.S / m^2 . [10]

OR

- Q6) a)** Explain the estimation of packed bed height for an absorption column with all the relevant equations. [10]
- b) What is the significance of mG_m/L_m in the design of packed column? [6]

SECTION - II

- Q7) a)** With neat sketch give a detailed procedure for the design of decanter.[8]
- b) 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^3 , Vapour density = 2.5 kg/ m^3 . Design the separator with demister pad. [10]

OR

- Q8) a)** Write about knockout drum, role of demister pads and reflux drum.[9]
- b) Make a preliminary design for a separator to separate a mixture of steam and water. Steam flow rate is 2,000 kg/h and water flow rate is 1,000 kg/h. operating pressure is 4 bar. Liquid density = 927 kg/ m^3 , Vapour density = 2.2 kg/ m^3 . Design the separator without a demister pad. [9]

- Q9) a)** Explain Pipe line networks and their analysis for flow in branches. [10]
- b) Discuss about the selection of optimum pipe diameter. [6]

OR

Q10)a) Water flows through a pipeline at 1 kg/s over a distance of 2 km. The impressed head of water is 9.8 m. What is the diameter of pipeline if $\rho = 1000 \text{ kg/m}^3$ and $\mu = 1 \text{ mNs/m}^2$. [8]

b) With neat sketches explain the different types of flanges used in piping networks. [8]

Q11)a) 30 kg/sec of water is to be transported through a steel pipeline to a location 2 km away. The frictional pressure drop across the pipeline is $50,000 \text{ N/m}^2$. Find the diameter of the pipeline. Roughness of pipeline is 4.1×10^{-5} . Density = 995 kg/m^3 , viscosity of water $0.8 \times 10^{-3} \text{ N.s/m}^2$. [8]

b) Explain the materials used for low, normal and high temperature service pipelines. [8]

OR

Q12)a) Why are standards required? Name a few standards followed in piping design. [7]

b) Explain types of gaskets and their selection. [9]



Total No. of Questions : 12]

SEAT No. :

P2031

[Total No. of Pages : 2

[5254]-204
B.E (Chemical) (Elective - I)
ENVIRONMENTAL ENGINEERING
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Answer any three question 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) Mention the environmental impact of nuclear power plant. **[16]**

OR

Q2) What is role of standards for air or water in pollution control studies? **[16]**

Q3) Explain the harmful effects of Pollen Grain on human health. **[16]**

OR

Q4) Describe working of sampling train in air sampling studies. **[16]**

Q5) How absorption is used for removal of sulphur dioxide? **[18]**

OR

Q6) Describe construction and working of fabric filter. **[18]**

P.T.O.

SECTION - II

Q7) What are various types of water pollutants? Discuss of its effects in detail.[16]

OR

Q8) How dissolved oxygen in a given water sample can be determined by Winkler's method? [16]

Q9) Draw a diagram of trickling filter. Label its parts. And Explain mechanism.[16]

OR

*Q10)*Classify various solid wastes and its effects on environment. [16]

*Q11)*Discuss De nitrification in detail. [18]

OR

*Q12)*Discuss Up-flow anaerobic sludge blanket reactor. [18]

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Total No. of Questions : 12]

SEAT No. :

P2032

[Total No. of Pages : 4

[5254]-205
B. E. (Chemical)
MEMBRANE TECHNOLOGY
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain the importance of separation operation in chemical manufacturing processes. **[6]**
- b) State the separation process used for separating mixture of constituents differing in particle size, vapor pressure, freezing point, affinity, electric charge and density. **[6]**
- c) Explain the criteria for selection of appropriate separation process for given application. **[6]**

OR

- Q2)** a) Classify membranes based on homogeneity, transport mechanism, nature of material, electric charge, morphology. **[6]**
- b) State advantage and limitations of membrane separation processes over conventional separation processes. **[6]**
- c) Explain the basic principle of membrane separation process with suitable sketch. **[6]**

P.T.O.

Q3) Explain the effect of following properties of polymeric membrane on separation characteristics. **[16]**

- a) Chain flexibility. (Effect of main chain and side groups).
- b) Chain interactions.
- c) Molecular weight

OR

Q4) Explain use of following polymeric materials for membranes casting. **[16]**

- a) Linear or branched chain polymers
- b) Copolymers (random, block, graft type.)
- c) Cross - linked type. (Give suitable applications)

Q5) Explain composite membranes and detail methods of preparation of composite membrane. **[16]**

- a) Interfacial Polymerization.
- b) Dip coating
- c) Plasma Polymerization

OR

Q6) Explain the following methods for preparation of membrane **[16]**

- a) Sintering
- b) Stretching
- c) Track etching
- d) Template leaching

SECTION - II

Q7) Explain the following methods of characterisation of UF membrane [16]

- a) Gas adsorption — desorption
- b) Thermoporometry
- c) Permporometry.
- d) Liquid displacement.

OR

Q8) What is characterisation of process membrane? Explain following methods of characterisation of membrane. [16]

- a) SEM
- b) Bubble - point method
- c) Mercury intrusion porometry
- d) Permeability method.

Q9) a) Distinguish between solution diffusion model and pore flow model. [8]

- b) Explain the following mechanisms used to describe transport through porous membranes. [8]
 - i) Surface of screen filtration.
 - ii) Depth filtration

OR

Q10)a) Explain the following mechanisms of transport through membranes. [8]

- i) Kundsens diffusion
- ii) Surface diffusion
- b) Explain transport in an ion exchange membrane process such as electro dialysis [8]

Q11) Explain the following membrane modules.

[18]

- a) Spiral wound module.
- b) Plate and frame module.
- c) Hollow fiber module
- d) Tubular module

OR

Q12)a) What is membrane fouling? State the sources and reduce the effect of fouling. **[6]**

b) What is concentration polarization in membrane? Explain the following models used for polarization of membrane. **[12]**

- i) Boundary layer film model
- ii) Gel layer model.

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Total No. of Questions : 12]

SEAT No. :

P2033

[Total No. of Pages : 3

[5254]-207
B.E. (Chemical)
CORROSION ENGINEERING
(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Compare the mechanisms of wet and dry corrosion [8]
- b) State and explain the Tafel equation. Mention its importance for studying corrosion. [8]

OR

- Q2)** a) How does a material of construction alter rate of corrosion? Support your answer with an industrial example. [8]
- b) Describe the working of reference electrodes used for corrosion measurement. [8]
- Q3)** a) With the help of an example explain pitting corrosion. [8]
- b) How galvanic corrosion can be prevented? [8]

P.T.O.

OR

Q4) a) Describe the intergranular corrosion. [8]

b) What is Fretting corrosion? How to identify it? [8]

Q5) Write short notes on : [18]

a) Thermodynamic aspects of corrosion

b) Evans diagram

c) Cathodic control

OR

Q6) a) Discuss the performance of steel pipes in marine environment. Comment on the critical issues. [10]

b) What is significance of Pilling Bedworth ratio? [8]

SECTION - II

Q7) a) Discuss why corrosion is considered to be the most important parameter while selecting material of construction for chemical process plants. [8]

b) Enlist different surface coatings available for preventing corrosion. [8]

OR

Q8) a) Discuss cavitation corrosion and remedial measures for controlling the same. [8]

b) What are various factors affecting corrosion of iron under aqueous media?[8]

- Q9)** a) Explain the concept of polarisation and corrosion potential. [8]
b) Explain the mechanism of oxidation corrosion. [8]

OR

- Q10)**a) Explain the concept of cell potential and polarization. [8]
b) Explain Pourbaix-diagram for Fe -H₂O system. [8]

- Q11)**a) Describe EMF series. [8]
b) Explain the role of alloying in preventing corrosion. Support your answer with an example. [10]

OR

Q12) Write short notes on the following : [18]

- a) Stress corrosion
- b) Pitting corrosion
- c) Dezincification



Total No. of Questions : 12]

SEAT No. :

P2034

[Total No. of Pages : 3

[5254]-208

B. E. (Chemical Engg.) (Semester - I)
CHEMICAL PROCESS SYNTHESIS
(2008 Pattern) (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) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.*
- 6) *Figures to the right indicate full marks.*

SECTION - I

- Q1)** a) What do you mean by process synthesis? What are the different steps for complete engineering design and development of new process? [8]
- b) Explain in short the hierarchy of process design and onion model. [8]

OR

- Q2)** a) Explain the concept of simulation & optimization of flow sheet structure with the help of heat exchanger network. [8]
- b) Discuss the concept of Reactor performance. [8]
- Q3)** a) Explain the different approaches to chemical process design with advantages and disadvantages. [8]
- b) Write the general classification of the types of reaction systems. Explain for series reactions. [8]

P.T.O.

OR

- Q4)** a) What are the methods of separation of homogeneous mixtures? Explain.[8]
b) Explain the role of temperature and pressure during the choice of reactor.[8]

- Q5)** a) Explain the concept of azeotropic distillation as choice of separator. [10]
b) Write a short note on- idealized Reactor Models. [8]

OR

- Q6)** a) When and how you select the absorption and drying operation as a choice of separator? [8]
b) Write note on any two: [10]
i) Choice and selection criteria CSTR reactor
ii) Absorption
iii) Process Synthesis

SECTION - II

- Q7)** a) Explain the concept of direct and indirect sequencing using simple column. [8]
b) Explain the with diagram the concept of side rectifier and stripper arrangement. [8]

OR

- Q8)** a) Discuss thermal coupling of the pre-fractionators arrangement. [8]
b) Write a short note on- distillation sequencing using thermal coupling.[8]

- Q9)** a) Explain in detail the composite curves with suitable example. [10]
b) Explain threshold problems in heat exchange network. [6]

OR

- Q10)** a) Write a short note on- integration of refrigeration cycles. [8]
b) Explain graphically heat recovery pinch. [8]

- Q11)** a) Explain the intensification of hazardous materials. Discuss major hazards in process plants. [12]
b) Write a short note on- Safety Devices [6]

OR

- Q12)** a) What are safety and health considerations during the synthesis of chemical process? [10]
b) Write a short note on — quantitative measures of inherent safety. [4]
c) What are the preventive measures taken to avoid explosion? [4]



Total No. of Questions : 12]

SEAT No. :

P2035

[Total No. of Pages : 2

[5254]-209

B. E. (Chemical) (Elective - II)

ADVANCED MATERIALS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain in detail Austempered Ductile Iron. [8]

b) Discuss Advanced Metallic Systems. [8]

OR

Q2) a) Write down the different types of steels used in chemical industries.[8]

b) Write down the different types Steels for special applications with example.[8]

Q3) Explain in detail advanced polymeric materials with example. [16]

OR

Q4) a) Describe the different types of polymeric materials with example in detail.[8]

b) Describe Polymer Technology. [8]

Q5) Explain different Advanced processing methods for Engineering Materials. [18]

OR

P.T.O.

Q6) Discuss in detail Advanced Ceramic Materials with examples used in chemical industrial Applications. [18]

SECTION - II

Q7) a) Write down the Physical and Chemical properties of Composite Materials. [9]

b) Explain different advanced processing methods for Engineering Materials.[9]

OR

Q8) Explain Reinforcing mechanisms and matrix materials with example in detail.[18]

Q9) a) Write down the different advantages and disadvantages of Polymer Composites. [8]

b) Describe fabrication methods of Ceramic Composites. [8]

OR

Q10)a) Write down the industrial applications of ceramic materials. [8]

b) Explain Carbon composites, their properties, fabrication methods and their applications. [8]

Q11) Define Nanomaterials with example. Write down the synthesis of nonmaterial's and what are the different applications of nonmaterials in chemical industries.[16]

OR

Q12) Explain in detail with diagram any two methods for testing of Nanomaterials.[16]



Total No. of Questions : 12]

SEAT No. :

P2036

[Total No. of Pages : 3

[5254]-210

B. E. (Chemical Engineering) (Semester - I) (Elective - II)

POLYMER TECHNOLOGY

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

Q1) Explain in detail different factors which need to be considered for determining mechanical properties of polymers. Explain the properties of polymers based on Tacticity. **[18]**

OR

Q2) Explain the properties of polymers based on geometric isomerism and chemical composition. Distinguished between Linear, Branch and Cross linked Polymers with one example each. **[18]**

Q3) a) Explain with one example in detail Solution Polymerization Technique. **[10]**
b) Write a note on Condensation Polymerization. **[6]**

OR

Q4) a) Explain in detail with examples Emulsion Polymerization Technique. **[8]**
b) Write a note on "Bulk polymerization". **[8]**

P.T.O.

Q5) Explain in detail with one example each the effect of Molecular weight on properties of polymers. [16]

OR

Q6) a) Find the Number average, weight average Molecular weight and polydispersity Index of the given mixture which is composed of 15 molecule of 10,000 monomer lengths and 190 molecules of 20,000 monomer lengths and 251 molecules of 2000 monomer lengths. [10]

b) Write a note on “Effect of Molecular weight on Engineering Properties of Polymers”. [6]

SECTION - II

Q7) Discuss the mechanism of Free Radical Polymerization and derive necessary equations kinetics of Free Radical Polymerization. Discuss Gel Effect in Chain Growth Polymerization. [16]

OR

Q8) Discuss “Coordination Polymerization”. Explain with example importance of Chain Transfer Agents. [16]

Q9) a) Explain Sheet 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 polymer processing.[10]

b) Discuss the following additives with the importance: Plasticizer, Filler, fire retardant. [8]

Q11) Give technology overview for the following polymer.

[16]

- a) Butyl rubber,
- b) Nylon 66,
- c) unsaturated polyester

OR

Q12) Write a short note on reactor systems used for LDPE and PP.

[16]

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Total No. of Questions : 12]

SEAT No. :

P2037

[Total No. of Pages : 3

[5254]-211

B. E. (Chemical Engineering)

PIPING DESIGN AND ENGINEERING

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain the role of piping engineer in Construction and Commissioning phase of a chemical process? [8]

b) Explain the different minor losses occurring in piping systems? [8]

OR

Q2) a) Explain the pipe sizing steps based on available pressure drop? [8]

b) Discuss the different approaches used in the calculation of total pressure drop for parallel piping systems. [8]

Q3) a) Which are the different elements alloyed in carbon steel for modifying its chemical composition to obtain the desired mechanical and physical properties? [10]

b) State and explain the various types of codes used in piping industry?[8]

OR

Q4) a) Write down the different grades of stainless steel used for piping material components? [10]

b) Discuss the different sections of ASME B31 Code for Pressure Piping?[8]

P.T.O.

- Q5) a)** State the advantages and disadvantages of globe valves? Also write down the applications of globe valves? [8]
- b) Discuss the working principle and applications of Rupture Disks? [8]

OR

- Q6) a)** Discuss the different guidelines in selecting a suitable valve for any application? [8]
- b) Explain the different control valve styles? [8]

SECTION - II

- Q7) a)** How to determine the pipe size for steam piping? [10]
- b) Explain the Homogeneous and Heterogeneous Flow in slurry pipe lines?[8]

OR

- Q8) a)** How to calculate NPSHa and NPSHr? How to increase NPSHa? [8]
- b) Explain the design and engineering of the slurry piping system components with the help of following points : [10]
- i) Line sizing and pressure drop
 - ii) Special considerations of slurry handling
 - iii) Pumps for slurry
 - iv) Instrumentation

- Q9) a)** Write down the typical layout considerations of Pumps and Storage tanks? [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) State and explain the considerations involved in the pipe rack design?[8]

b) Which are the factors considered when the designer is locating equipment in the plot plan? [8]

Q11)a) Discuss the design criteria used in insulation system design for piping applications? [8]

b) Write down the different insulation material classifications mostly used in the industrial and commercial piping industry? [8]

OR

Q12)Write short notes on : [16]

a) Flare selection and sizing

b) Critical and Optimum thickness of insulation



Total No. of Questions : 12]

SEAT No. :

P2038

[Total No. of Pages : 3

[5254]-212
B. E. (Chemical)
ADVANCED SEPARATION PROCESSES
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) What is cross flow filtration? What are its advantages over dead end filtration? [6]

b) Explain in detail 'Adsorption Cycle' with neat sketches. [10]

OR

Q2) a) Explain the details the design of chromatography. [8]

b) Explain the basic concept of HPLC process. [8]

Q3) a) Give the application of chromatography in separation of enzymes and proteins. [8]

b) Explain adsorption mechanism in separation of fluid-solid system. [8]

OR

Q4) a) Give the advantages of membrane separation process over other separation technique. [8]

b) Explain the basic types of modules used in Reverse Osmosis. [8]

P.T.O.

- Q5)** a) Calculate the osmotic pressure of a solution containing 0.10 gmol NaCl/1000g H₂O at 25°C. Density of water = 997.0 kg/m³ [6]
- b) Write down the classification of the membrane process. [8]
- c) Explain the following terms : [4]
- i) Rejection
- ii) Permeate

OR

Q6) Discuss the following in detail.

- a) Characteristics of the complexing agent used in chemical-complexation. [9]
- b) Reactive distillation process [9]

SECTION - II

- Q7)** a) Write down the flotation techniques classification on the basis of mechanism of separation and size of material separated. [9]
- b) Explain 'Collapse and drainage phenomena'. [9]

OR

Q8) Write short notes on

- a) Design and development of flotation equipment. [9]
- b) Application of flotation technique. [9]

Q9) Write short notes on.

- a) Temperature Swing Adsorption (TSA) [8]
- b) Pressure Swing Adsorption (PSA) [8]

OR

Q10) Write down the applications of chromatography in separation of enzymes and proteins, industrial examples in detail. **[16]**

Q11) Write short notes on : **[18]**

- a) Adductive Crystallization.
- b) Zone Electrophoresis

OR

Q12)a) Explain the adsorption properties and applications of molecular sieve. **[9]**

b) Explain Continuous Adsorption process. **[9]**



Total No. of Questions : 12]

SEAT No. :

P2039

[Total No. of Pages : 3

[5254]-213

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

PETROLEUM REFINING

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Give brief account on origin, composition and exploration techniques of crude? [8]

b) Describe the tests and properties of diesel and engine oil [8]

OR

Q2) a) Why Pre-refining operation is necessary in the petroleum Industry and give brief account on cetane number & octane number. [10]

b) Discuss the growth of petrochemical Industry in India? [6]

Q3) What are different types of pipe still heaters? Describe the advantages and mechanism of electric desalting with schematic diagram. [16]

OR

Q4) Describe vacuum distillation unit with suitable diagram and distinguish between ADU and VDU with respect to various processing parameters? [16]

P.T.O.

Q5) a) What is reforming process? Describe reforming process with schematic diagram. [9]

b) What is refining operation? Describe acid refining techniques with schematic diagram? [9]

OR

Q6) Write short notes on : [18]

a) Coking operation

b) Fluid Catalytic Cracking

c) Hydro-cracking

SECTION - II

Q7) Why desulphurization is necessary in the refinery? Discuss Hydro-desulphurization process with typical schematic diagram along with reaction and operating parameters. [18]

OR

Q8) a) Describe HDM process along with schematic diagram. [9]

b) What is the need of chemical refining? Describe chemical refining operation with diagram. [9]

Q9) a) What are additives? Note various additives used in petroleum fractions. [8]

b) What is the blending operation and explain the line blending operation? [8]

OR

Q10) a) Discuss various strategies of marketing of petroleum and petroleum products. [8]

b) Write a note on storage of petroleum products. [8]

- Q11)**a) Write various catalyst used in different process in petroleum refinery?
Discuss latest advancement in catalyst? [8]
- b) Enlist various public and private sector refineries in India? And briefly discuss on “**Indian Scenario of processing of petroleum fractions**”. [8]

OR

Q12) Explain role of refinery in power generation. Write application of refinery products as fuel for power generation. [16]

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Total No. of Questions : 12]

SEAT No. :

P2040

[Total No. of Pages : 2

[5254]-214
B. E. (Chemical)
PROCESS MODELING & SIMULATION
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)* a) Differentiate between “batch” and “continuous process”. [8]
b) Differentiate between “Mass transfer limited” reactor and “Chemical-rate limited” reactor. [8]

OR

- Q2)* Explain the Scope and coverage of Process Models in detail. [16]

- Q3)* Write short notes on: [18]
a) Law of conservation of momentum
b) Transport laws
c) Equations of state.

OR

- Q4)* A perfectly mixed, isothermal CSTR has an outlet weir. The flow rate over the weir is proportional to the height of liquid over the weir, h_{ow} to the 2.5 power. The weir height is h_w . The cross sectional area of the tank is A . Assume constant density. A 1st order reaction takes place in the tank, $A K B_{\rightarrow}$. Derive the model equations describing the system. [18]

P.T.O.

Q5) Write model for PFR. [16]

OR

Q6) Develop a mathematical model for double effect evaporator. Write assumptions. Draw a figure. [16]

SECTION - II

Q7) Develop a model for absorption column. [16]

OR

Q8) Write the Model equations for “Condenser and Reflux drum” in ideal binary distillation column. [16]

Q9) Benzoic acid is continuously extracted from toluene using water as solvent in a cascade of stages in series. Each stage consists of [18]

- a) a mixture where vigorous stirring of the contents takes place and
- b) a settler where the mixture pumped from the mixer is allowed to settle into layers. The upper toluene layer and the lower water layer are removed separately. Develop a mathematical model to find the final fraction of benzoic acid extracted for the case of counter current operation.

OR

Q10) Develop a model for Activated Sludge Process. [18]

Q11) What is Process Simulation? Explain any simulator with a proper example. [16]

OR

Q12)a) Distinguish between design mode and analysis mode in process simulation

- b) What is tearing a system equations ? Discuss any one algorithm for this purpose.

[16]



Total No. of Questions : 12]

SEAT No. :

P2041

[Total No. of Pages : 3

[5254]-215

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

**PROCESS ENGINEERING COSTING & PLANT DESIGN
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION-I

- Q1)** a) Explain factors affecting process selection. [8]
- b) Write a note on flow sheet preparation. [8]

OR

- Q2)** a) Discuss in detail the techno-economic feasibility of report of a project. [8]
- b) Explain the factors that govern selection of plant location. [8]

- Q3)** a) Define depreciation and discuss its need and significance? [8]
- b) Explain impact of taxes and insurance on economic situation of an industry. [8]

OR

P.T.O.

- Q4) a)** Explain the methods for determining depreciation. [8]
- b) A heat exchanger has been designed for use in a chemical process. A standard type of heat exchanger with a negligible scrap value costs Rs. 4000 and will have a useful life of 6 years. Another proposed heat exchanger of equivalent design capacity costs Rs. 6800 but will have a useful life of 10 years and a scrap value of Rs. 800. Assuming an effective compound interest rate of 8% per year, determine which heat exchanger is cheaper by comparing capitalized costs. [8]

- Q5) a)** Explain in detail mathematical methods for profitability evaluation with neat diagram. [9]
- b) Explain cost indexes and explain their importance while estimating equipment costs by scaling such as six-tenth-factor rule. [9]

OR

- Q6) a)** Explain with a neat sketch cumulative cash position showing effects of cash flow with time for an industrial operation neglecting time value of money. [9]
- b) Explain cost indexes and explain their importance while estimating equipment costs by scaling such as six-tenth-factor rule. [9]

SECTION-II

- Q7) a)** Explain with a neat sketch the break — even chart for production schedule and its significance for optimum analysis. [8]
- b) Give difference between market survey and market research. [8]

OR

- Q8) a)** Explain graphical and analytical procedure for optimization with two or more variables. [8]
- b) Write a note on optimum conditions in cyclic operations. [8]

- Q9)** a) Write a note on Pinch Technology. [9]
 b) Derive the following equation for the optimum outside diameter of insulation on a wire for maximum heat loss:

$$D_{\text{opt}} = \frac{2k_m}{(h_c + h_r)_c}$$

Where k_m the mean thermal conductivity of the insulation and $(h_c + h_r)_c$ is the combined and constant surface heat transfer coefficient. The values of k_m and $(h_c + h_r)_c$ can be considered as constants independent of temperature level and insulation thickness. [9]

OR

- Q10)** a) Explain preparation of Techno-economic feasibility report. [9]
 b) Derive the equation for optimum cooling water flow rate in condenser. [9]

Q11) Define CPM and PERT and explain the application of the same for setting up a new Chemical plant. Define the activities involved in this project and construct the network diagram. [16]

OR

- Q12)** a) Differentiate between CPM and PERT. Give one example of each. [8]
 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. [8]

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



Total No. of Questions : 12]

SEAT No. :

P2042

[Total No. of Pages : 2

[5254]-216

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

ARTIFICIAL INTELLIGENCE IN CHEMICAL ENGINEERING

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Contrast algorithmic and non-algorithmic processing. How are they different?[16]

OR

Q2) Qualitatively modeling a chemical process is assisted by AI. Write the points supporting the statement with explanations. [16]

Q3) A binary distillation column is to be designed using AI. Describe various steps in using AI for designing the system. [16]

OR

Q4) Develop the algorithm of AI to model the performance of PFR. [16]

Q5) Describe the inference engine as the component of Expert System tool. [18]

OR

P.T.O.

Q6) What is Object-Oriented Programming? How is Structuring of an object-Oriented Program performed? [18]

SECTION-II

Q7) Note the network steps involved in developing Frame based system for a set of two interacting tanks [18]

OR

Q8) Open-air evaporation of brine to produce salt is an energy-intensive unit operation. Develop fuzzy logic sets to describe the system. [18]

Q9) Explain Encapsulation in Object Oriented Programming. [16]

OR

Q10) Write in details on Message Passing in Object Oriented Programming. [16]

Q11) With flowchart, describe Clear Programming Methodology. [16]

OR

Q12) With neat diagram, write in details on the Elements of a Blackboard System. [16]



Total No. of Questions : 12]

SEAT No. :

P2043

[Total No. of Pages : 3

[5254]-218
B. E. (Chemical) (Semester - II)
CHEMICAL PROCESS SAFETY
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Define Relative Toxicity and Threshold Limit Values? [8]
- b) Write a short note on Dose versus Response Curves? [8]

OR

- Q2)** Explain in detail any one significant chemical plant disaster and the importance of safety in chemical process industry? [16]
- Q3)** Explain Material Data Safety Sheets (MSDS) with the format during an industrial hygiene study? [16]

OR

- Q4)** a) How will you evaluate exposure to volatile toxicants by monitoring? [8]
- b) Explain the importance of industrial hygiene. What are the government regulations related to industrial hygiene? [8]

P.T.O.

- Q5)** a) Air contains 5 ppm of diethylamine (TLV-TWA of 10 ppm), 20 ppm of cyclohexanol (TLV-TWA of 50 ppm), and 10 ppm of propylene oxide (TLV-TWA of 20 ppm). What is the mixture TLV-TWA? [9]
- b) Distinguish between fire and explosion. Explain Fire Triangle in detail?[9]

OR

Q6) Explain the following: [18]

- a) Boiling liquid expanding vapour explosion (BLEVE)
- b) Flammability characteristics of liquids and vapors
- c) Minimum oxygen concentration and inerting
- d) Deflagration and Detonation
- e) Confined and Unconfined explosion
- f) Flammability limits

SECTION - II

- Q7)** a) Describe in brief storage and handling of flammable and toxic chemicals?[8]
- b) Explain the various safety devices for relieving pressure. [8]

OR

Q8) Explain in detail different methods to prevent fire and explosion? [16]

- Q9)** a) Explain the concept of HAZOP study and state guide words used for the HAZOP procedure? [8]
- b) Write a short note on Event Trees and Fault Trees? [8]

OR

Q10)a) Describe process hazard checklists in detail? [8]

b) What are the basic preventive and protection measures to hazards? [8]

Q11)a) Discuss the Emergency shutdown systems? [8]

b) How are disasters tackled? Explain the plan for emergency. [10]

OR

Q12) Explain briefly [18]

a) Role of Computers in safety

b) Technology and process selection

c) Prevention of hazard human element

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Total No. of Questions : 12]

SEAT No. :

P2044

[Total No. of Pages : 3

[5254]-221
B. E. (Chemical)
CATALYSIS
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)* a) Give the classification of the catalyst with suitable examples. [8]
b) Explain the application of the catalysis to industrial processes in the inorganic and biochemical industries. [8]

OR

- Q2)* a) Give the preparation methods of the catalyst in detail. [8]
b) Explain the mechanism of heterogeneous catalysis with an examples. [8]

- Q3)* a) Explain the mechanism of adsorption and its isotherms in detail. [8]
b) Give the experimental methods to determine the rate of solid-catalyzed reaction. [8]

OR

- Q4)* Write short notes on the following : [16]
a) Diffusion effects in the catalyst.
b) Lagmuir adsorption isotherm.

P.T.O.

Q5) The catalytic reaction $A \rightarrow 4R$ is studied in a plug flow reactor using various amounts of catalyst and 20lit/hr of pure A feed at 3.2 atm and 117°C. The concentration of A in the effluent stream is recorded for the various runs as follows : **[18]**

Run	-	1	2	3	4	5
Catalyst used (Kg)	-	0.02	0.04	0.08	0.12	0.16
$C_{A_{out}}$ (moi/lit)	-	0.074	0.06	0.044	0.035	0.029

Find a rate equation for this reaction, using the integral method of analysis.

OR

Q6) a) Explain the mechanism of gas-solid catalyzed reaction in detail. **[9]**

b) Explain the catalyst poisoning in detail. **[9]**

SECTION - II

Q7) a) Explain the Helium - mercury method in detail. **[8]**

b) Explain the BET method in detail. **[8]**

OR

Q8) a) Give the steps of deactivation of the catalysis and explain in detail. **[8]**

b) Explain the triphase catalysis. **[8]**

Q9) Write the short notes on the following : **[16]**

a) Templeted Molecular sieves

b) Modification of zeolites.

OR

- Q10)**a) Give the industrial applications of the zeolites. [8]
b) Explain the catalyst cracking in detail. [8]

- Q11)**a) Derive the m-m kinetics of the enzyme catalysed reaction. [9]
b) Explain inhibition in biocatalyst. [9]

OR

- Q12)**a) Give the kinetics of competitive inhibition. [9]
b) Give the features of m-m kinetic equation. [9]



Total No. of Questions : 12]

SEAT No. :

P2045

[Total No. of Pages : 3

[5254]-223

B. E. (Chemical) (Semester - II)
FUEL CELL TECHNOLOGY
(2008 Pattern) (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) Compare among PEM fuel cell, phosphoric acid fuel cell, molten carbonate fuel cell and solid oxide fuel cell, on the basis of electrode, electrolyte, operating temperature, efficiency. Draw a neat figure in each case. [12]
- b) Compare between Fuel Cell and Battery. Discuss their working in Electric Vehicles [6]

OR

- Q2)** a) Describe Mobile Electrolyte Alkaline Fuel Cell and Static Electrolyte Alkaline Fuel Cell. [12]
- b) Give advantages and disadvantages of Fuel Cell Technology [6]

- Q3)** 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. [16]

P.T.O.

Calculate :

- i) Standard open circuit potential.
- ii) Open circuit potential at the operating conditions.

OR

Q4) a) For a standard SOFC following data are available : **[8]**

Average current density	:	14 A/m ²
Active anode surface area	:	0.2 m ²
Fuel Flow rate	:	25 mol/h
Fuel Composition	:	H ₂ 85% and CO 15%
Air Flow rate	:	20 mol/h
Output Potential	:	230 V
Lower Heating Value of fuel	:	30000 kcal/Kg

Calculate :

- i) fuel utilization factor,
 - ii) air ratio,
 - iii) power output and
 - iv) fuel efficiency
- b) A current density of 12 A/m² is obtained when pure hydrogen is 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/sm².atm respectively. Calculate concentration over potential across cathode and anode. **[8]**

Q5) Derive Nernst equation for calculating open circuit potential of SOFC using H₂ as a fuel and O₂ as an oxidizer. What is the importance of Nernst equation?**[16]**

OR

Q6) a) Explain various methods for production of Hydrogen. What are the uses of hydrogen? **[8]**

b) Explain schematically the working principle of SOFC and give advantages and drawbacks of SOFC. **[8]**

SECTION - II

- Q7)** a) Explain the mechanism of oxidative reforming of methane [9]
b) Explain the effect of limiting reforming factor on the performance of SOFC.[9]

OR

- Q8)** a) What are the advantages and limitations of direct oxidation of hydrocarbons? How these limitations can be removed? [9]
b) Explain different types defect structure in solids and Kroger Vink notations [9]

- Q9)** 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) Design a planner SOFC to generate 250 KW power for ethanol as a fuel[8]

OR

- Q10)**a) Calculate mole fraction of defect at 200 and 1100° C. Defect energy is 75 KJ/mol. Comment on the significance of results. [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 [16] aspects:

- 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]



Total No. of Questions : 12]

SEAT No. :

P2046

[Total No. of Pages : 3

[5254]-224

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

PETROCHEMICAL ENGINEERING

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

SECTION - I

- Q1)** a) Discuss about the basic raw material for petrochemical synthesis along with their sources? [6]
- b) What are the main basic building blocks of petrochemical industry explain with suitable examples? Describe the methods of preparation of feed stocks for petrochemical production? [10]

OR

- Q2)** a) What are the key issues and challenges for petrochemical industry in India? [8]
- b) Discuss in details about the petrochemical Industry in India? [8]

- Q3)** Describe ADU with suitable Diagram? Distinguish between CDU and VDU.[16]

OR

- Q4)** Enumerate the synthetic chemical intermediates and products from olefins and describe the production of ethylene by naphtha cracking process. [16]

P.T.O.

Q5) a) Describe with schematic diagram low molecular hydrocarbon cracking techniques. [8]

b) Describe in brief about the production of low molecular hydrocarbon furnace techniques? [10]

OR

Q6) Write a note on following : [18]

a) Fluid Catalytic Cracking.

b) Growth of petrochemical Industry in India

c) Delayed coking

SECTION - II

Q7) Along with schematic diagram and major engineering problems describe the production of ketons & its Engg Problems. [16]

OR

Q8) With neat schematic diagram describe about the production of Maleic acid by air oxidation of benzene and its Engg Problems. [16]

Q9) a) What is addition polymerization? Describe the steps and mechanism of condensation polymerization. [10]

b) Explain Classification of different polymerization process along with its advantage and disadvantage. [6]

OR

Q10)a) With neat sketches explain in detail about production of PVC along with its engineering problems. [10]

b) What are various polymeric products? Differentiate between different polymerization processes. [6]

Q11)a) Discuss Importance of energy recovery and cogeneration of power in petrochemical plants? [8]

b) Discuss Safety consideration in petrochemical plants. [10]

OR

Q12) Write a note on following :

[18]

- a) Marketing strategies of petrochemical products?
- b) Pollution control norms in petrochemical Industry
- c) Environmental Challenges in Petroleum Industry



Total No. of Questions : 12]

SEAT No. :

P2047

[Total No. of Pages : 3

[5254]-225

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

COMPUTER - AIDED PROCESS CONTROL

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Draw block diagram of computer aided process control architecture. Explain each component involved. **[18]**

OR

Q2) What is SCADA? Explain in detail. Enlist at least five applications off SCADA. State advantages of it. **[18]**

Q3) a) What is multivariable process control? Explain the loop interactions for the system with two input two output variables. **[8]**

b) Based on Process Gain Matrix, suggest the pairing rules for input and output variables for MIMO systems. **[8]**

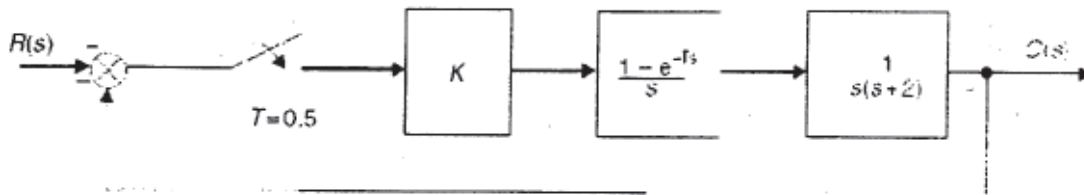
OR

Q4) a) Explain the digital control system with the help of block diagram. Explain the importance of each block. **[10]**

b) Can the loop interaction be eliminated? What strategy can be applied to eliminated loop interactions in MIMO systems. **[6]**

P.T.O.

- Q5)** Following figure shows digital control system. With $K=2$ and sampling time 0.5 seconds. Determine (a) Open loop pulse transfer function (b) Closed loop pulse transfer function. [16]



OR

- Q6)** a) Find the z-transformations of following functions. [8]
- $f(t) = 1$
 - $f(t) = e^{(-at)}$
 - $f(t) = \cos(\omega t)$
 - $f(t) = \sin(\omega t)$
- b) Explain stability of MIMO control systems? [8]

SECTION - II

- Q7)** a) Explain data transfer techniques for computer aided process control. [8]
- b) Explain the role of real time programming languages in Computer Aided Process Control. [8]

OR

- Q8)** Explain the use of software used to simulate process control models. What is the role of MATLAB and Simulink in Process Control Simulation? [16]

- Q9)** What is Distributed Control System? Explain in detail with the help of neat diagram. Enlist advantages and disadvantages. [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) MIMO control for Distillation column with two products
- b) Plant Wide Control
- c) Evolution of Computer Aided Control

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) Hold Devices



Total No. of Questions : 12]

SEAT No. :

P2048

[Total No. of Pages : 3

[5254]-236

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

POLYMER REACTION ENGINEERING

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two Sections should be written in separate books.*
- 2) Draw neat diagrams wherever necessary.*
- 3) Figures 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) Discuss the importance of molecular weight and Molecular weight distribution of polymer. Explain the characteristics of Chain Growth Polymerization and Explain the distinctive features of Polymer Reaction Engineering. **[18]**

OR

Q2) Discuss in brief polymerization processes by using reactant preparation, polymerization and separation. Explain the different parameters used for designing of polymerization reactor. **[18]**

Q3) Derive the necessary relationship obtained in giving Molecular weight distribution in CSTR for free radical type polymerization. Discuss all the mechanism steps to be used in Free radical polymerization with one suitable example. **[16]**

P.T.O.

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]
- Q5)** Write a Note on: Aqueous emulsifier solution and Auto Acceleration effect in free radical polymerization. [16]

OR

- Q6)** Styrene is polymerized in batch reactor at 80°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 $K_o = 3 \times 10^{-6} \text{ sec}^{-1}$, $k_p = 176 \text{ lit/gmole}\cdot\text{sec}$, $k_c = 3.6 \times 10^7 \text{ lit/gmole}\cdot\text{sec}$, $f = 0.6$ 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. :

P2049

[Total No. of Pages : 3

[5254]-243

B. E. (Polymer Engineering)

PROCESSING OF COMPOSITES

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *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) Explain various types and applications of glass fibers. Discuss various types of reinforcements used in composites with neat sketches. Explain in detail with any two examples Treatment of Carbon and Kevlar Fibers and its use in Polymer Composites. **[18]**

OR

Q2) Explain the properties and applications of polyamide fibers. Explain with one example Treatment of Glass Fibers and its use in Polymer Composite. **[18]**

Q3) a) Explain in detail Metal matrix composites **[8]**

b) Explain in detail Injection molding of Thermoset. **[8]**

OR

P.T.O.

- Q4)** a) Write a short note on Bulk Molding Compounds. [8]
b) Explain how to determine the Curing Characteristics of Resin-Catalyst Combination. [8]

Q5) Explain in detail with neat diagram the Pultrusion process. [16]

OR

Q6) Explain with applicable diagrams in detail structural reaction injection moulding and Discuss resin transfer moulding in short. [16]

SECTION - II

Q7) a) Explain in detail with applicable diagrams Resin Film Infusion, Structural Reaction Injection Molding. [12]

b) Discuss the various raw materials and additives including the matrix material and the reinforcements used in Autoclave Processing. [6]

OR

Q8) Discuss in detail Matrix flow model, Application of Pultrusion and Design considerations for Pultrusion die. [18]

Q9) a) Discuss different types of Adhesive used in Composites and explain modes of failure in adhesive bonding. [8]

b) Write a note on Machining of composites. [8]

OR

Q10)a) Explain thermo mechanical model as applied to filament winding. [8]

b) Discuss the effect of various process parameters on filament wound products. [8]

Q11)a) Explain Applications of carbon nano-tubes composites. [6]

b) Differentiate between Polymer Nano-composites with other normal composites. [10]

OR

Q12) Explain classification of nano-particles and with two case studies explain Polymer nanocomposites. [16]

❧❧❧

Total No. of Questions : 12]

SEAT No. :

P2050

[Total No. of Pages : 3

[5254]-247

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

POLYMER THERMODYNAMICS AND BLENDS

(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate books.*
- 2) Draw neat diagrams wherever necessary.*
- 3) Figures to the right indicate full marks.*
- 4) Assume suitable data, if necessary.*
- 5) Use of logarithmic table, electronic pocket calculators is allowed.*

SECTION - I

Q1) a) Explain the following terms : **[8]**

Phase Rule, Intensive Properties, Enthalpy, Internal Energy.

b) Describe second law of thermodynamics and State Limitations of The First Law Of Thermodynamics. **[8]**

OR

Q2) State the importance of entropy in the explanation of free energy change in process. Explain the isothermal process. Explain thermodynamic criteria of polymeric dissolution. Describe the condition under which it is not a spontaneous process. **[16]**

Q3) Discuss with necessary diagram the effect of molecular weight on the Phase stability. Explain the importance of temperature with necessary diagram on the miscibility of polymer blend systems. **[18]**

P.T.O.

OR

Q4) Explain the term Phase Equilibria. Write a short note on Criterion of Phase stability. [18]

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) 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. [8]

b) Explain the term Polymer alloys and blends with its importance. Discuss in detail all E's or advantages in employing polymer blend technology.[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]



Total No. of Questions : 8]

SEAT No. :

P2156

[Total No. of Pages : 4

[5254]-251
B.E. (Petroleum Engineering)
RESERVOIR ENGINEERING - II
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Question No 2 and 8 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) Derive the continuity equation for a single phase fluid flowing through a one dimensional porous media. **[6]**
- b) Write down the diffusivity equation, along with all types of initial, inner boundary and outer boundary conditions available for solving it. **[10]**

Q2) Following data is given :

$$q = 30 \text{ stb/d}$$

$$h = 140 \text{ ft}$$

$$B = 1.47 \text{ RB / STB}$$

$$k = 0.2 \text{ md}$$

$$c_t = 1.4 \times 10^{-5} \text{ psi}^{-1}$$

$$\mu = 0.72 \text{ cp}$$

$$r_w = 0.5 \text{ ft}$$

$$P_i = 3100 \text{ psi}$$

P.T.O.

porosity = 20%

$r_e = 2800\text{ft}$

Calculate the reservoir pressure at the radius of 1 ft, 5 ft, 10 ft and 50 ft after 3 hours of oil production. [18]

- Q3)** a) Explain the concept of Superposition in time, with appropriate figures.[4]
b) What are the different types of flow regimes that you see in a typical well test interpretation curve? Explain them with appropriate figures. [4]
c) A new oil well produced 400 stb/day for $2\pm$ days; then it was shut-in for a pressure buildup test, during which the data in Table below were recorded. The other data were: $B_o=1.25\text{rb/stb}$, $h = 20\text{ ft}$, $\phi = 0.20$, $r_w=0.29\text{ ft}$, $ct= 19.5 \times 10^{-6}$, and viscosity = 1.1 cP. From these data, estimate the formation permeability, k , μ , and skin factors. Use the Semi-Log graph. [8]

Shut-in time, Del-t (hr)	$(t_p + \text{Del-t})/\text{Del-t}$	p_{ws} (psia)
0	-	1165
2	37.0	1801
4	19.0	1838
8	10.0	1865
16	5.5	1891
24	4.0	1905
48	2.5	1925

- Q4)** a) What do you mean by DST? How is it different from a PBU and DD test?[6]
b) Explain the various flow periods of a DST, along with appropriate figures.[10]

SECTION II

- Q5)** a) What is pseudo pressure?
b) Explain Isochronal and Modified Isochronal Well test. [16]

- Q6)** Explain flow regimes in horizontal well test. [16]

Q7) Explain Type curves for Decline curves.

[16]

Q8) Define and explain the pressure derivative plot. Draw and explain the diagnostic plot giving five examples.

[18]

Formulas for the exam

For E (i) function values, refer to the table given with the examination paper

$$p = p_i + 70.6 \frac{qB\mu}{kh} \text{Ei} \left(- \frac{948\phi\mu c_i r^2}{kt} \right)$$

$$t_D = \frac{0.000264kt}{\phi\mu_o c_i r_w^2}$$

$$p_{ws} = p_i - \frac{162.6 q_o \mu_o \beta_o}{kh} \log \left[\frac{t_p + \Delta t}{\Delta t} \right]$$

$$p_D = -\frac{1}{2} \text{Ei} \left(-\frac{r_D^2}{4t_D} \right)$$

$$s = 1.151 \left[\frac{p_{1hr} - p_{ws}(\Delta t=0)}{m} - \log \left(\frac{k}{\phi\mu_o c_i r_w^2} \right) + 3.23 \right]$$

$$p_{wf} = p_i - \frac{162.6 q_o \mu_o \beta_o}{kh} \left[\log t + \log \left(\frac{k}{\phi\mu_o c_i r_w^2} \right) - 3.23 + 0.869s \right]$$

$$p = p_i + 70.6 \frac{qB\mu}{kh} \left[\ln \left(\frac{1,688\phi\mu c_i r^2}{kt} \right) \right]$$

$$\frac{(3.975 \times 10^5) \phi\mu c_i r_w^2}{k} < t < \frac{948\phi\mu c_i r_e^2}{k}$$

$$p_{1h} = p_i + m \left[\log \left(\frac{k}{\phi\mu_o \beta_o c_i r_w^2} \right) - 3.23 + 0.869s \right]$$

$$p(r,t) = LS(r,t) = p_i - \frac{70.6 Q \mu}{k h} \left[-E_i \left(-\frac{948.1 \Phi \mu c_i r^2}{k t} \right) \right]$$

$$k = \frac{162.6 q_o \mu_o \beta_o}{mh}$$

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	4.725	4.545	4.392	4.259	4.142
0.01	4.038	3.944	3.858	3.779	3.705	3.637	3.574	3.514	3.458	3.405
0.02	3.355	3.307	3.261	3.218	3.176	3.137	3.098	3.062	3.026	2.992
0.03	2.959	2.927	2.897	2.867	2.838	2.810	2.783	2.756	2.731	2.706
0.04	2.681	2.658	2.634	2.612	2.590	2.568	2.547	2.527	2.507	2.487
0.05	2.468	2.449	2.431	2.413	2.395	2.377	2.360	2.344	2.327	2.311
0.06	2.295	2.279	2.264	2.249	2.235	2.220	2.206	2.192	2.178	2.164
0.07	2.151	2.138	2.125	2.112	2.099	2.087	2.074	2.062	2.050	2.039
0.08	2.027	2.015	2.004	1.993	1.982	1.971	1.960	1.950	1.939	1.929
0.09	1.919	1.909	1.899	1.889	1.879	1.869	1.860	1.850	1.841	1.832
0.10	1.823	1.814	1.805	1.796	1.788	1.779	1.770	1.762	1.754	1.745
0.11	1.737	1.729	1.721	1.713	1.705	1.697	1.689	1.682	1.674	1.667
0.12	1.660	1.652	1.645	1.638	1.631	1.623	1.616	1.609	1.603	1.596
0.13	1.589	1.582	1.576	1.569	1.562	1.556	1.549	1.543	1.537	1.530
0.14	1.524	1.518	1.512	1.506	1.500	1.494	1.488	1.482	1.476	1.470
0.15	1.464	1.459	1.453	1.447	1.442	1.436	1.431	1.425	1.420	1.415
0.16	1.409	1.404	1.399	1.393	1.388	1.383	1.378	1.373	1.368	1.363
0.17	1.358	1.353	1.348	1.343	1.338	1.333	1.329	1.324	1.319	1.314
0.18	1.310	1.305	1.301	1.296	1.291	1.287	1.282	1.278	1.274	1.269
0.19	1.265	1.261	1.256	1.252	1.248	1.243	1.239	1.235	1.231	1.227
0.20	1.223	1.219	1.215	1.210	1.206	1.202	1.198	1.195	1.191	1.187
$-Ei(-x), 0.00 < x < 2.09, \text{interval} = 0.01$										
x	0	1	2	3	4	5	6	7	8	9
0.0	+ [∞]	4.038	3.335	2.959	2.681	2.468	2.295	2.151	2.027	1.919
0.1	1.823	1.737	1.660	1.589	1.524	1.464	1.409	1.358	1.309	1.265
0.2	1.223	1.183	1.145	1.110	1.076	1.044	1.014	0.985	0.957	0.931
0.3	0.906	0.882	0.858	0.836	0.815	0.794	0.774	0.755	0.737	0.719
0.4	0.702	0.686	0.670	0.655	0.640	0.625	0.611	0.598	0.585	0.572
0.5	0.560	0.548	0.536	0.525	0.514	0.503	0.493	0.483	0.473	0.464
0.6	0.454	0.445	0.437	0.428	0.420	0.412	0.404	0.396	0.388	0.381
0.7	0.374	0.367	0.360	0.353	0.347	0.340	0.334	0.328	0.322	0.316
0.8	0.311	0.305	0.300	0.295	0.289	0.284	0.279	0.274	0.269	0.265
0.9	0.260	0.256	0.251	0.247	0.243	0.239	0.235	0.231	0.227	0.223
1.0	0.219	0.216	0.212	0.209	0.205	0.202	0.198	0.195	0.192	0.189
1.1	0.186	0.183	0.180	0.177	0.174	0.172	0.169	0.166	0.164	0.161
1.2	0.158	0.156	0.153	0.151	0.149	0.146	0.144	0.142	0.140	0.138
1.3	0.135	0.133	0.131	0.129	0.127	0.125	0.124	0.122	0.120	0.118
1.4	0.116	0.114	0.113	0.111	0.109	0.108	0.106	0.105	0.103	0.102
1.5	0.100	0.0985	0.0971	0.0957	0.0943	0.0929	0.0915	0.0902	0.0889	0.0876
1.6	0.0863	0.0851	0.0838	0.0826	0.0814	0.0802	0.0791	0.0780	0.0768	0.0757
1.7	0.0747	0.0736	0.0725	0.0715	0.0705	0.0695	0.0685	0.0675	0.0666	0.0656
1.8	0.0647	0.0638	0.0629	0.0620	0.0612	0.0603	0.0595	0.0586	0.0578	0.0570
1.9	0.0562	0.0554	0.0546	0.0539	0.0531	0.0524	0.0517	0.0510	0.0503	0.0496
2.0	0.0489	0.0482	0.0476	0.0469	0.0463	0.0456	0.0450	0.0444	0.0438	0.0432
$-Ei(-x), 2.0 < x < 10.9, \text{interval} = 0.1$										
x	0	1	2	3	4	5	6	7	8	9
2	4.69×10^{-2}	4.26×10^{-2}	3.72×10^{-2}	3.25×10^{-2}	2.84×10^{-2}	2.49×10^{-2}	2.19×10^{-2}	1.92×10^{-2}	1.69×10^{-2}	1.48×10^{-2}
3	1.30×10^{-2}	1.15×10^{-2}	1.01×10^{-2}	8.94×10^{-3}	7.89×10^{-3}	6.87×10^{-3}	6.16×10^{-3}	5.45×10^{-3}	4.82×10^{-3}	4.27×10^{-3}
4	3.78×10^{-3}	3.35×10^{-3}	2.97×10^{-3}	2.64×10^{-3}	2.34×10^{-3}	2.07×10^{-3}	1.84×10^{-3}	1.64×10^{-3}	1.45×10^{-3}	1.29×10^{-3}
5	1.15×10^{-3}	1.02×10^{-3}	9.08×10^{-4}	8.09×10^{-4}	7.19×10^{-4}	6.41×10^{-4}	5.71×10^{-4}	5.09×10^{-4}	4.53×10^{-4}	4.04×10^{-4}
6	3.60×10^{-4}	3.21×10^{-4}	2.86×10^{-4}	2.55×10^{-4}	2.28×10^{-4}	2.03×10^{-4}	1.82×10^{-4}	1.62×10^{-4}	1.45×10^{-4}	1.29×10^{-4}
7	1.15×10^{-4}	1.03×10^{-4}	9.22×10^{-5}	8.24×10^{-5}	7.36×10^{-5}	6.58×10^{-5}	5.89×10^{-5}	5.26×10^{-5}	4.71×10^{-5}	4.21×10^{-5}
8	3.77×10^{-5}	3.37×10^{-5}	3.02×10^{-5}	2.70×10^{-5}	2.42×10^{-5}	2.16×10^{-5}	1.94×10^{-5}	1.73×10^{-5}	1.55×10^{-5}	1.39×10^{-5}
9	1.24×10^{-5}	1.11×10^{-5}	9.99×10^{-6}	8.95×10^{-6}	8.02×10^{-6}	7.18×10^{-6}	6.44×10^{-6}	5.77×10^{-6}	5.17×10^{-6}	4.64×10^{-6}
10	4.15×10^{-6}	3.73×10^{-6}	3.34×10^{-6}	3.00×10^{-6}	2.68×10^{-6}	2.41×10^{-6}	2.16×10^{-6}	1.94×10^{-6}	1.74×10^{-6}	1.56×10^{-6}



Total No. of Questions : 8]

SEAT No. :

P2157

[Total No. of Pages : 2

[5254]-252
B.E. (Petroleum Engineering)
FORMATION EVALUATION
(2008 Pattern)

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 right side indicate full marks.*
- 4) Assume additional data if required.*

SECTION I

Q1) Why is logging of oil wells necessary? What are the different types of openhole logs? List their applications. Explain how logging is useful in various stages of exploration. **[15]**

Q2) Draw a neat diagram and explain the nature of borehole environment and various zones of penetration. **[15]**

Q3) How is 'SP' curve generated? How is Formation Water Resistivity (R_w) calculated from SP curve? What are the uses of 'SP' curve? **[15]**

P.T.O.

Q4) Write notes on any two of the following : **[20]**

- a) Efficiency of well logging,
- b) Factors influencing drilling time,
- c) Comparison between wireline openhole logs and MWD,
- d) Cement Evaluation Logs.

SECTION II

Q5) Explain in brief the procedure of examination of well cuttings and core analysis as an aid of formation evaluation, **[15]**

Q6) Give various types of cross plots. How is each useful in Formation Evaluation? **[15]**

Q7) Explain the Quick Look Method of log interpretation. How cyclicity in sedimentation is recognized using quick look method. Draw sketches. **[15]**

Q8) a) Write short notes on any two of the following : **[10]**

- i) Productivity Testing,
- ii) Empirical relationship between water resistivity, porosity and water saturation,
- iii) Logging While Drilling (LWD) Tools,
- iv) Radioactivity detectors in logging.

b) Write a detailed note on 'Mud logging' **[10]**



Total No. of Questions : 6]

SEAT No. :

P2158

[Total No. of Pages : 2

[5254]-253

B. E. (Petroleum Engineering) (Semester - I)
WELL ENGINEERING AND DESIGN
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer all questions.*
- 2) *Write 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) What is GTO? Explain it in detail. **[12]**
- b) Casing shoe depth = 8,000 ft TVD and 8,250ft MD **[6]**
- Mud weight = 10 ppg, LOT Pressure = 1,200Psi
- Find out formation leak off pressure and LOT Value.
- Q2)** a) Discuss double build up curve geometry in detail. **[8]**
- b) Write short note on MWD tool. **[8]**
- Q3)** a) Discuss early warning signs of kick in detail. **[6]**
- b) Discuss wait and weight method of well control in brief. **[10]**

P.T.O.

SECTION - II

- Q4)** a) Write note on drill string vibrations. [4]
b) Explain drill string design consideration in detail. [12]
- Q5)** a) What is hydraulics? Explain Bit nozzle selection in detail. [8]
b) Draw circulation system of drilling rig. [8]
- Q6)** a) Discuss Liner cementation in detail. [8]
b) Write short note on : [10]
i) AFE
ii) Cement rheology



Total No. of Questions : 8]

SEAT No. :

P2159

[Total No. of Pages : 2

[5254]-254
B. E. (Petroleum)
PETROLEUM EXPLORATION
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answers to the two sections should be written in separate answer books.*
- 2) Questions 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) What is a gravimeter? What are the types of gravimeter? Explain the construction of Lactose Romberg Gravimeter. **[15]**

Q2) a) Draw and explain Schlumberger arrangement of electrical resistivity survey. **[10]**

b) What are the different modes of transport of microseepages of petroleum from reservoir to surface? **[5]**

Q3) a) What is Normal Move out (NMO)? How is normal move out correction applied to a horizontal and a dipping reflector? **[10]**

b) How is geochemical method effectively used as an exploration tool in new areas? **[5]**

P.T.O.

Q4) Answer any two from the following : **[20]**

- a) Time Lapse Seismic
- b) AVO
- c) Elastic properties of rocks
- d) CDP method of seismic reflection.

SECTION - II

Q5) What are “Seismic facies”? How are they mapped? **[15]**

Q6) Explain deterministic and probabilistic approach in risk analysis with the help of suitable examples. **[15]**

Q7) Discuss in details volumetric and material balance methods of reserves estimation giving advantages of each. **[15]**

Q8) a) How one may proceed for exploration of hydrocarbons taking into consideration basin classification and history of occurrence of hydrocarbons? **[10]**

- b) How different maps are created using quality database of important parameters on reservoir scale? How static components are different from dynamic attributes. List them. **[10]**



Total No. of Questions : 8]

SEAT No. :

P2160

[Total No. of Pages : 2

[5254]-255

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

**ADVANCED INSTRUMENTATION & PROCESS
CONTROL IN PETROLEUM INDUSTRY**

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three questions from each section.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *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) With suitable block diagram explain digital control system. [6]
- b) Explain methods of speed control of dc motors. [6]
- c) Explain methods for measurement of pressure. [6]
- Q2)** a) Explain construction and working of any two liquid level measuring instruments. [8]
- b) Explain construction and working of any two methods for measurement of viscosity. [8]

P.T.O.

- Q3)** a) Explain feed forward control system. [8]
b) Explain PLC control systems used in digital control system. [8]
- Q4)** a) Explain HMI used in control systems. [8]
b) Derive and explain dynamic characteristics of first-order systems. [8]

SECTION - II

- Q5)** a) Explain control systems used for oil & gas separators. [8]
b) Explain types of pressure relief system. [8]
- Q6)** a) Explain the SCADA system used in Petroleum industry. [8]
b) Explain subsea sand monitoring system. [8]
- Q7)** a) Explain production control system. [8]
b) Explain electro-piloted control systems. [8]
- Q8)** Write short notes on the following : [18]
a) Process safety management systems
b) Hydraulic actuators
c) ESD systems.



Total No. of Questions : 12]

SEAT No. :

P2161

[Total No. of Pages : 3

[5254]-258

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

PETROLEUM REFINING TECHNOLOGY

(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate 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 indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Give the classification of crude oil. [8]
- b) Explain : Carbon residue, Cetane Number, Smoke point. [8]

OR

- Q2)** a) Write a note on the Nelson Complexity factor. [8]
- b) Describe in brief the overall refinery flow. [8]
- Q3)** a) What are the factors affecting desalting operation? [8]
- b) Write a note on the vacuum distillation unit. [8]

P.T.O.

OR

Q4) a) Discuss the various types of reflux in the ATU. [8]

b) Enlist and discuss the auxiliary equipment in distillation. [8]

Q5) a) Discuss the catalysts used in the catalytic cracking process. [9]

b) Discuss the need for hydrocracking process and explain any one. [9]

OR

Q6) a) Discuss the air blowing process. [9]

b) Write a note on the flexi coking unit. [9]

SECTION - II

Q7) a) With the help of a neat diagram, explain alkylation using hydrofluoric acid. [8]

b) Explain the semiregenerative process for catalytic reforming. [8]

OR

Q8) a) Discuss the isomerization process to increase the octane number. [8]

b) Give the reactions taking place in the catalytic reforming. [8]

Q9) a) Write a note on propane dewaxing. [8]

b) Explain the process of solvent extraction in case of lube oil base stock by NMP. [8]

OR

Q10)a) Write a note on the dewaxing aids. [8]

b) Discuss the various finishing process in the production of lube oil. [8]

Q11)a) What are the various ways of hydrogen recovery in refineries? Discuss any one. [9]

b) Write a note on water pollution due to refineries. How is it controlled?[9]

OR

Q12)a) Write a note on the batch and the line blending process. [9]

b) Write a note on the Claus process for sulphur recovery. [9]



Total No. of Questions : 8]

SEAT No. :

P2162

[Total No. of Pages : 2

[5254]-260

B. E. (Petroleum Engineering)

NON-CONVENTIONAL HYDROCARBON RESOURCES

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Questions no 4 of Section I and Questions no 8 of Section II is compulsory. Answer any two questions each from section I and section II out of remaining questions.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat diagrams whenever necessary.*

SECTION - I

Q1) Explain with the help of neat diagram the continuous accumulation system. How does it differ from conventional system? **[15]**

Q2) Give in brief Systematic Workflow Process for Heavy-Oil Characterization. **[15]**

Q3) Draw a Schematic diagram of CBM reservoir to understand heterogeneity. How does it differ from Shale Gas? **[15]**

Q4) Write in brief on any two of the following : **[20]**

- a) Experimental Techniques used to Measure Gasification Rates
- b) Simplified Process Schematic for Fischer-Tropsch Coal-to-Liquids Systems
- c) Petrophysical characteristics of a tight reservoir.
- d) TOC % in Tight Gas sand, shale gas and CBM

P.T.O.

SECTION - II

Q5) Describe the CBM gas production profile with the help of neat diagram [15]

Q6) Write a detailed note on hydraulic fracturing operations in shale gas development. [15]

Q7) a) Discuss in brief different types of fracturing fluids and additives. [10]

b) What are the direct and indirect methods of Coal Liquefaction? [5]

Q8) Write notes on any two of the following : [20]

- a) Inhibition of hydrate formation
- b) Dual water system in shale
- c) Cambay shale as resource of shale gas
- d) CBM in India



Total No. of Questions : 12]

SEAT No. :

P2163

[Total No. of Pages : 3

[5254]-261

B. E. (Petroleum)

CARBON MANAGEMENT IN PETROLEUM INDUSTRY

(Elective - II) (2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) What is Kyoto protocol? Explain its objective in detail. **[18]**

OR

Q2) Describe, 'carbon cycle', and its role in carbon management, in detail. **[18]**

Q3) 'This is an arrangement under the Kyoto Protocol allowing industrialized countries with a green house gas reduction commitment to invest in emission reducing projects in developing countries as an alternative to what is generally considered more costly emission reductions in their own countries.' Describe this arrangement in detail with its advantages and disadvantages. **[16]**

OR

P.T.O.

Q4) Explain carbon emission calculation with at least two examples in detail. [16]

Q5) Describe in brief carbon capture and sequestration in deep geological formations. [16]

OR

Q6) a) Discuss any one case study of carbon sequestration. Include, objectives, challenges, methodology and advantages in it. [12]

b) Explain biological approach of carbon sequestration. [4]

SECTION - II

Q7) What is clean development mechanism? Describe at least four processes that have been developed and useful under clean development mechanism to minimize the impact of carbon footprint. [18]

OR

Q8) Discuss in detail role of 'sustainable development' in industrialization and globalization for long term benefits. [18]

Q9) a) Differentiate between biogas, biofuel and solid biomass. [6]

b) What is bio-gas? Explain the systematic process of, 'bio-gas generation'. Write its advantages and limitations. [10]

OR

Q10) Discuss in detail energy production from biomass. Include the general techniques of energy production from biomass and limitations of each in brief. [16]

Q11) a) Describe the challenges involved in carbon dioxide storage into depleted or partially depleted oil reservoirs as an option to minimize CO_2 emissions. [8]

b) Write in detail general methods of energy saving and energy management. [8]

OR

Q12) Write short notes on :

[16]

- a) Importance of clean development mechanism.
- b) Use of standards in carbon management.
- c) alternative sources of energy.
- d) Emission reduction methods.



Total No. of Questions : 8]

SEAT No. :

P2164

[Total No. of Pages : 4

[5254]-262

B.E. (Petroleum Engineering)

**IMPROVED OIL RECOVERY AND RESERVOIR SIMULATION
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *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) Explain in detail, the purpose, objectives and uses of reservoir simulation. [6]
b) How does reservoir simulation play a central role in field development?
Explain in detail with diagrams. [10]

- Q2)** a) Explain in detail 3 implicit and 3 explicit methods of discretizing an equation. Discretize the following equation given below, using 1 of the above defined explicit and 1 implicit scheme [10]

$$\frac{\partial u}{\partial t} - \alpha \frac{\partial^2 u}{\partial x^2} = 0$$

- b) Write the 1-D horizontal general fluid flow equation for oil, water and gas (both undersaturated as well as saturated) [8]

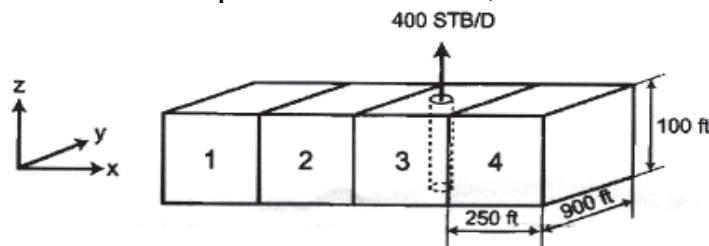
P.T.O.

- Q3)** a) Explain the difference between advection and convection, with appropriate equations. [6]
- 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 : $u_1 = 0 @ x = 0$ and $u_4 = -1 @ x = 1$

- Q4)** a) A well produces @ 300 STB/D. Dimensions of the block are - $\Delta x = 150$ ft; $w = 800$ ft; $h = 100$ ft; $kx = 170$ 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)** With the help of a diagram, explain the impact of wettability, contact angle and surface tension on the effectiveness of an EOR method. [16]
- Q6)** How is In-situ combustion different from steam injection? Elaborate with a diagram. [16]
- Q7)** Explain waterflooding models with their assumptions. Also, explain in detail, the difference between areal and vertical efficiency. [16]
- Q8)** Write short notes on (any three) : [18]
- Huff and puff method
 - Mobility ratio for effective EOR
 - Fractional flow theory
 - Buckley Leveret Model

Formulas / Equations for the exam

$$\int_{t^n}^{t^{n+1}} \{T_{x_{i-1/2}} [(p_{i-1} - p_i) - \gamma_{i-1/2}(Z_{i-1} - Z_i)]\} dt + \int_{t^n}^{t^{n+1}} \{T_{x_{i+1/2}} [(p_{i+1} - p_i) - \gamma_{i+1/2}(Z_{i+1} - Z_i)]\} dt$$

$$+ \int_{t^n}^{t^{n+1}} q_{m_i} dt = \frac{V_{b_i}}{\alpha_c} \frac{d}{dp} \left(\frac{\phi}{B} \right)_i [p_i^{n+1} - p_i^n],$$

$$\int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i-1/2}} dt - \int_{t^n}^{t^{n+1}} w_x \Big|_{x_{i+1/2}} dt + \int_{t^n}^{t^{n+1}} q_{m_i} dt = m_{a_i}$$

$$T_{z_{i,j,k-1/2}}^m [(p_{i,j,k-1}^m - p_{i,j,k}^m) - \gamma_{i,j,k-1/2}^m (Z_{i,j,k-1} - Z_{i,j,k})]$$

$$+ T_{y_{i,j-1/2,k}}^m [(p_{i,j-1,k}^m - p_{i,j,k}^m) - \gamma_{i,j-1/2,k}^m (Z_{i,j-1,k} - Z_{i,j,k})]$$

$$+ T_{x_{i-1/2,j,k}}^m [(p_{i-1,j,k}^m - p_{i,j,k}^m) - \gamma_{i-1/2,j,k}^m (Z_{i-1,j,k} - Z_{i,j,k})]$$

$$+ T_{x_{i+1/2,j,k}}^m [(p_{i+1,j,k}^m - p_{i,j,k}^m) - \gamma_{i+1/2,j,k}^m (Z_{i+1,j,k} - Z_{i,j,k})]$$

$$+ T_{y_{i,j+1/2,k}}^m [(p_{i,j+1,k}^m - p_{i,j,k}^m) - \gamma_{i,j+1/2,k}^m (Z_{i,j+1,k} - Z_{i,j,k})]$$

$$+ T_{z_{i,j,k+1/2}}^m [(p_{i,j,k+1}^m - p_{i,j,k}^m) - \gamma_{i,j,k+1/2}^m (Z_{i,j,k+1} - Z_{i,j,k})]$$

$$+ q_{sc_{i,j,k}}^m = \frac{V_{b_{i,j,k}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j,k}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j,k}^n \right],$$

$$T_{y_{i,j-1/2}}^m [(p_{i,j-1}^m - p_{i,j}^m) - \gamma_{i,j-1/2}^m (Z_{i,j-1} - Z_{i,j})]$$

$$+ T_{x_{i-1/2,j}}^m [(p_{i-1,j}^m - p_{i,j}^m) - \gamma_{i-1/2,j}^m (Z_{i-1,j} - Z_{i,j})]$$

$$+ T_{x_{i+1/2,j}}^m [(p_{i+1,j}^m - p_{i,j}^m) - \gamma_{i+1/2,j}^m (Z_{i+1,j} - Z_{i,j})]$$

$$+ T_{y_{i,j+1/2}}^m [(p_{i,j+1}^m - p_{i,j}^m) - \gamma_{i,j+1/2}^m (Z_{i,j+1} - Z_{i,j})] + q_{sc_{i,j}}^m = \frac{V_{b_{i,j}}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_{i,j}^{n+1} - \left(\frac{\phi}{B} \right)_{i,j}^n \right]$$

$$\int_{r^n}^{r^{n+1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i-1/2}}^{x_{i+1/2}} dt - \int_{r^n}^{r^{n-1}} \left(\frac{u_x A_x}{B} \right) \Big|_{x_{i+1/2}}^{x_{i-1/2}} dt + \int_{r^n}^{r^{n+1}} q_{sc_i} dt = \frac{V_{b_i}}{\alpha_c} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right].$$

$$T_{x_{i-1/2}}^m [(p_{i-1}^m - p_i^m) - \gamma_{i-1/2}^m (Z_{i-1} - Z_i)] + T_{x_{i+1/2}}^m [(p_{i+1}^m - p_i^m) - \gamma_{i+1/2}^m (Z_{i+1} - Z_i)] + q_{sc_i}^m = \frac{V_{b_i}}{\alpha_c \Delta t} \left[\left(\frac{\phi}{B} \right)_i^{n+1} - \left(\frac{\phi}{B} \right)_i^n \right].$$

$$T_{x_{i+1/2},k} = \left(\beta_c \frac{k_x A_x}{\mu B \Delta x} \right) \Big|_{x_{i+1/2},k} = \left(\beta_c \frac{k_x A_x}{\Delta x} \right)_{x_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{x_{i+1/2},k} = G_{x_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{x_{i+1/2},k}$$

$$T_{y_{i+1/2},k} = \left(\beta_c \frac{k_y A_y}{\mu B \Delta y} \right) \Big|_{y_{i+1/2},k} = \left(\beta_c \frac{k_y A_y}{\Delta y} \right)_{y_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{y_{i+1/2},k} = G_{y_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{y_{i+1/2},k}$$

$$T_{z_{i+1/2},k} = \left(\beta_c \frac{k_z A_z}{\mu B \Delta z} \right) \Big|_{z_{i+1/2},k} = \left(\beta_c \frac{k_z A_z}{\Delta z} \right)_{z_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{z_{i+1/2},k} = G_{z_{i+1/2},k} \left(\frac{1}{\mu B} \right)_{z_{i+1/2},k}$$



[5254]-263
B. E. (Petroleum)
PETROLEUM PRODUCTION ENGINEERING - II
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) a) Design a horizontal two-phase separator to process crude into gas flowing at the rate of 10 MMSCFD having specific gravity 0.7, and oil at the rate 1000 bopd with 50° API gravity. The operating pressure and temperature are 900 psia and 50° F respectively.

Data: $\mu=0.01$ cp, $Z=0.85$, $d_m=140$ micron, $C_D=0.34$ (initial value), density of water= 62.4 lb/ft³. residence time= 2 min. **[14]**

Calculate :

- i) Terminal velocity of liquid drops (ft/s).
- ii) Reynolds's no. Re (Comment on nature of flow).
- iii) Drag coefficient. C_D
- iv) If calculated value of C_D does not match with the initial value, then using iterative procedure calculate final values of Re, C_D , and hence the terminal velocity.
- v) Effective length L_{eff} based on liquid capacity constraint and Seam-to-seam length L_{SS} of the vessel (for different values of diameter of the separator -16, 20,24, 30,36,42,48inches).
- vi) Calculate the slenderness ratio.

P.T.O.

Select the required size (diameter d and seam-to-seam length L_{ss}) of the separator so that the slenderness ratio is close to 3.

- b) Explain advantages and limitations of vertical separators. [4]

OR

Q2) a) Discuss in detail, step by step design procedure for a horizontal three-phase separator. [12]

- b) Explain control loops for interface level control with and without oil chamber. [6]

Q3) a) Draw schematic sketch of a vertical heater treater and explain working of It. [10]

- b) Explain the operations to be performed in treating produced water. [6]

OR

Q4) a) Calculate diameter and height of vertical separator for produced water treating system at the rate of 5000 bpd (S.G=40° API, viscosity=1 cp). The diameter of oil droplets to be separated is 200 micron (with S.G.=0.8). Take $F=1$ and retention time=10 min. [8]

- b) Explain construction and design considerations for any one kind of storage tanks used to store crude oil. [8]

Q5) a) Explain Pilling and Bed worth rule and find out the nature of the film when Aluminum oxidizes to Al_2O_3 . Given [8]

- i) atomic weight of oxygen =14 g,
- ii) Atomic weight of Aluminum= 26.98 g,
- iii) Density of Aluminum=2.70 g/cc,
- iv) Density of Aluminum oxide=3.70 g/cc.

- b) Explain Anodic coatings and Cathodic coatings. [4]

- c) Differentiate between dry corrosion and wet corrosion. [4]

OR

- Q6)** a) For Cathodic protection, a ship hull requires current density of 18 mA/mt². Zinc (divalent) used as sacrificial anode. What is the quantity of Zinc required per mt² of hull surface for protection to last 10 years? Given 1 mole of Zinc has mass of 0.06537 kg. Number of electron in 1 A/ sec= 6.25×10^{18} . [8]
- b) Explain factors affecting corrosion rate. [4]
- c) Describe Pitting corrosion and Crevice corrosion. [4]

SECTION - II

- Q7)** a) Explain, 'formation damage'. [4]
- b) Write various reasons for occurrence of formation damage. [6]
- c) What will be the impact of incorrect sizing of a surface production facility and its components on overall production performance of a reservoir? Explain. [8]

OR

- Q8)** a) List various reasons for decline in oil and or gas production from a hydrocarbon reservoir. Write the solution in brief to each of the reason.[10]
- b) Write the various causes of scale formation. [4]
- c) Describe scale remediation techniques in detail. [4]
- Q9)** a) Describe gas hydrate problem at surface production system. [8]
- b) Explain consequences of sand production in wells and at surface. [8]

OR

- Q10)**a) Explain gravel pack job in wells. [8]
- b) Explain use of slotted liners and wire-wrapped screens. [8]

Q11) Write short notes on:

[16]

- a) horizontal well completions.
- b) challenges associated with well stimulation.
- c) multilateral wells.
- d) subsea production system.

OR

Q12) Discuss in detail various methods of heavy oil recovery.

[16]



Total No. of Questions : 6]

SEAT No. :

P2166

[Total No. of Pages : 2

[5254]-264

B. E. (Petroleum Engg.)

ADVANCE DRILLING ENGINEERING

(2008 Pattern)

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) Discuss Block and tackle system in detail. [8]
- Q2)** a) What is casing buckling? Explain different types of buckling in detail. [9]
b) Write note on corrosion mechanism. [9]
- Q3)** a) Discuss importance of USIT log in detail. [8]
b) Explain use of mud logging in brief. [8]

P.T.O.

SECTION - II

- Q4)** a) Explain Chemo-Poro-Thermo- Plastic behavior of rock. [9]
b) Write short note on hydro fracturing. [9]
- Q5)** Write short note on : [16]
a) MPD
b) UBD
- Q6)** a) Explain horizontal well completion design in brief. [8]
b) Discuss tubing design consideration in detail. [8]



Total No. of Questions : 6]

SEAT No. :

P2167

[Total No. of Pages : 2

[5254]-265
B. E. (Petroleum Engg.)
DEEP WATER TECHNOLOGY
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer all questions.*
- 2) *Write Section I and Section II on separate answer papers.*
- 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 dynamic positioning of a drilling vessel in detail. [9]
b) Discuss the lowering procedure of TBG and structural casing with suitable sketch. [9]
- Q2)** a) Explain casing design for dual gradient wells in detail. [8]
b) Write note on trip Margin and choke line friction loss. [8]
- Q3)** a) Describe deep water cementation in detail with illustrative figure. [8]
b) Explain in detail Mohr's coulomb criteria 2D-3D system in detail. [8]

P.T.O.

SECTION - II

- Q4)** a) Discuss depth and design limitations of SPAR platform in brief [8]
b) Discuss offshore structures in brief. [8]
- Q5)** a) Write short note on risers for production operations. [8]
b) Draw subsea BOP and explain its components in brief. [8]
- Q6)** a) Discuss subsea oil and gas pipelines design considerations in brief. [8]
b) Write short note on [10]
i) Offshore vessel
ii) Storage tank



Total No. of Questions : 10]

SEAT No. :

P2168

[Total No. of Pages : 4

[5254]-269

B. E. (Petroleum Engineering) (Elective - IV)

**PETROLEUM PRODUCTION ENHANCEMENT AND
OPTIMIZATION
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections must be written in separate answer books.*
- 2) *Answer 3 questions from Section I and 3 questions from Section II*
- 3) *Figures to the right indicate full marks.*
- 4) *Q 2 (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) On what basis can one classify stimulation candidates as good or bad?[6]
- b) Explain with equations and appropriate diagrams, the concept of Young's Modulus and Poisson's Ratio. 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

P.T.O.

- 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) Explain with a diagram how the ISIP is computed during a DataFrac operation. [8]

Q3) a) With the help of a diagram, explain the various pressure terms used in DataFrac and calibration test. [10]

- b) Write short notes on: [6]
- Near wellbore pressure losses
 - 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 Tubing diameter

iii) Pressure drop in tubing Vs Production rate at optimum GLR and for various GLR values.

b) How choke differ from other completion equipment such as SSV or SSSV? List the reasons for which it is often necessary to control the flow through chokes. **[6]**

Q7) Draw the sequence of flow regimes that takes place before liquid loading of a gas well. Draw schematic sketches and explain in brief any three techniques to unload the liquid from a gas well **[16]**

OR

Q8) a) Write the various techniques or tools that are available to improve the production performance of a field. Explain any one of them along with application **[8]**

b) What is real time monitoring? Write the benefits of real time monitoring of surface and subsurface production system in oil and gas field. How it is useful in the diagnosis of system performance? Explain in brief **[8]**

Q9) Discuss in brief, how long term planning and optimization techniques of well completion or well design for a high pressure, high permeability reservoir will help you to minimize following problems along with better production management and minimum water and gas coning **[16]**

- a) Well stimulation
- b) Re-perforation with reference to OWC and GOC
- c) Water and gas shut off jobs

OR

Q10) Discuss any one case study, in detail to explain the application and scope of production optimization that was applied either for a well bore or a field to improve the productivity **[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. :

P2169

[Total No. of Pages : 2

[5254]-270

B. E. (Petroleum Engineering)
WELL CONTROL METHODS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer all questions.*
- 2) *Write section I and section II on separate 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 Eaton's equation to find pore pressure using sonic log and bulk density log. [8]

b) Casing shoe depth= 8,000ft TVD and 8,250ft MD Mud weight = 10 ppg, LOT Pressure= 1, 200Psi [4]

Find out formation leak off pressure and LOT Value

c) Explain gas cut mud and connection gas in brief. [4]

Q2) a) What is MAASP? For casing shoe at 9,000ftTVD MAASP with 11 ppg mud was 1, 500psi, what shall be the MAASP if mud density increased to 12 ppg, while drilling at 12,000ft. [8]

b) Write note on trip Margin and choke line friction loss. [8]

P.T.O.

- Q3)** a) Draw line up for soft shut in and Explain Shut in procedure while drilling on jack up rig. [9]
- b) Write short note on Mud gas separator and Vacuum degasser in brief [9]

SECTION - II

- Q4)** a) Discuss wait and weight method of well control in detail. [8]
- b) Explain volumetric method of well control in detail. [8]
- Q5)** a) Discuss well control in multilateral wells. [10]
- b) Explain effect of plugged, partially plugged nozzles on well control methods. [8]
- Q6)** a) Discuss BOP accumulator system in detail. [8]
- b) It was decided to test the BOP with cup tester at 3,200 psi. The cross sectional area between casing and drill pipe is 63.9 sq. in. Calculate the tensile force created on the drill pipe. [2]
- c) Write short note on Annular preventer. [6]



Total No. of Questions : 8]

SEAT No. :

P2170

[Total No. of Pages : 4

[5254]-275

B.E. (Petrochemical)

NOVEL SEPARATION PROCESSES

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Answer Any Three Questions from each Section.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary.

SECTION - I

Q1) Answer the following :

[18]

- a) Explain the classification of membrane separation Processes.
- b) Classify Adsorptive bubble separation techniques with suitable example.
- c) Write a brief note on : “Microemulsion and Macroemulsions”.

Q2) A liquid containing dilute solute A at a concentration 2.75×10^{-2} kgmole/m³ is flowing rapidly by membrane of thickness, 3×10^{-5} m. the distribution coefficient is 1.5 and diffusivity is given by 6.5×10^{-11} m²/s. in the membrane. The concentration on the other side is 5×10^{-3} kgmole/m³. The mass transfer coefficient k_{c1} is large and considered to be infinity and $k_{c2} = 2.05 \times 10^{-5}$ m²/s. [16]

P.T.O.

- a) Derive the equation to calculate the steady state flux of component A and make a sketch.
- b) Calculate the flux and concentration at the membrane interphase.

Q3) Classify the models for gas separation by membranes. Develop a model for Complete-mixing process for membrane separation processes. State clearly the assumption made. Discuss the solution strategy for the same. **[16]**

Q4) a) A membrane is to be used to separate a gaseous mixture of A and B in one of the chemical complex near Mumbai. The following information is known: **[10]**

Data:

Feed flow rate = $2 \times 10^5 \text{ cm}^3 \text{ (STP)/s}$

Feed composition of A = 0.5 mole fraction

Desired composition of reject = 0.25 mole fraction

Thickness of membrane = $2.54 \times 10^{-3} \text{ cm}$

Pressure on feed side = 100 cm Hg

Pressure on permeate Side = 25 cm Hg

Permeability of A, P_A = $50 \times 10^{-10} \text{ cm}^3 \text{ (STP). cm / (s.cm}^2 \text{.cm. Hg)}$

Permeability of B, P_B = $5 \times 10^{-10} \text{ cm}^3 \text{ (STP). cm / (s.cm}^2 \text{.cm. Hg)}$

Assuming complete mixing model, calculate the following :

- i) the permeate composition
 - ii) the fraction permeated
 - iii) membrane area
- b) Discuss various membrane separation processes with their applications **[6]**

SECTION - II

Q5) A waste stream of alcohol vapor in air from a process was adsorbed by activated carbon particles in a packed bed having a diameter of 4 cm and length of 14 cm containing 79.2 g of carbon. The inlet gas stream having a concentration of c_0 of 600 PPM and a density of 0.00115 g/cm^3 entered the bed at a flow rate of $754 \text{ cm}^3/\text{s}$. Data gives the concentration of the breakthrough curve. The break-point concentration is set at $c/c_0 = 0.01$. Do as follows :

Data Breakthrough concentration:

Time, h	c/c_0	Time, h	c/c_0
0	0	5.5	0.658
3	0	6.0	0.903
3.5	0.002	6.2	0.933
4	0.030	6.5	0.975
4.5	0.155	6.8	0.993
5	0.396	-	-

- a) Determine the break-point time, the fraction of total capacity used up to the break point, and the length of the unused bed. Also determine the saturation loading capacity of the carbon.
- b) If the break-point time required for a new column is 6.0 h, what is the new total length of the column required?

[18]

Q6) a) Discuss in brief the process principles involved in Pressure Swing Adsorption (PSA) and Temperature Swing Adsorption (TSA) with industrial applications. [10]

- b) Classify Chromatographic separation techniques. [6]

Q7) Suppose you are working as *Separation Technologist* in one of the leading MNC's R& D center at Pune. Your company has been contracted to purify a new peptide mixture, which has been produced by XYZ company. Your research department has optimized the separation on two existing columns and the production department needs to know which column can operate at the higher volumetric flow rates. Suggest which column is suitable for given separation. Since the stationary phase chemistries are slightly different, each column is operated at different mobile phase mixture so you will need to take this consideration for your calculations. **[16]**

Data:

Column-I	Column-II
Mobile Phase: 50/50 MeOH/H ₂ O by weight	Mobile Phase: 70/30 MeOH/H ₂ O by weight
$d_{col} = 0.5\text{cm}$	$d_{col} = 1\text{ cm}$
$L_{col} = 25\text{cm}$	$L_{col} = 50\text{cm}$
$\epsilon_c = 0.4888$	$\epsilon_c = 0.5330$
$d_p = 10\mu\text{m}$	$d_p = 10\mu\text{m}$

Q8) Write Short notes on : **[16]**

- Reactive Distillation
- Isoelectric Focusing
- Super Critical Fluid Extraction



Total No. of Questions : 12]

SEAT No. :

P2171

[Total No. of Pages : 3

[5254]-276

B. E. (Petrochemical Engineering) (Elective - I)
ELEMENTS OF FLUIDIZATION ENGINEERING
(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer 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 indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Give the advantages and disadvantages of fluidized beds. [6]
b) Draw the various contacting schemes of solid and gas. [6]
c) Write a note on the different fluidization regimes. [6]

OR

- Q2)** a) Give the design of industrial gas distributors. [9]
b) What are the factors affecting fluidization quality. [9]
- Q3)** a) Give the need for classification of particles in fluidization. [8]
b) How will you estimate the minimum fluidization velocity. [8]

P.T.O.

OR

- Q4)** a) Explain the Geldart classification of particles. [8]
b) Write a note on the terminal velocity of particles. [8]

- Q5)** a) Classify the measurement techniques in fluidization. [8]
b) Write a detailed note on the non-interfering diagnostic techniques. [8]

OR

- Q6)** a) Write a note on mapping of fluidization regimes. [8]
b) Calculate u_t for the sharp irregular sand particles having the following data: [8]

Air $\rho_g = 1.2 \times 10^{-3} \text{ g/cm}^3$, $\mu = 1.8 \times 10^{-4} \text{ g/cm.s}$

Sand: $d_p = 160 \text{ }\mu\text{m}$, $\phi_s = 0.67$, $\rho_s = 2.6 \text{ g/cm}^3$

SECTION - II

- Q7)** a) What is Biot number? Give its significance in fluidization. [8]
b) Write a note on heat transfer in circulating fluidized bed. [8]

OR

- Q8)** a) Write a note on fast fluidized systems. [8]
b) Describe the heat transfer in vertical cylinder to bed. [8]

- Q9)** a) Give the effect of pressure on fluidized bed. [8]
b) Write a note on sintering and agglomeration of particles in fluidized beds. [8]

OR

Q10)a) What is slugging? Give its significance. [8]

b) Write a note on particle residence time fluidized bed. [8]

Q11)a) Describe the working of a chemical looping reactor. [9]

b) Give the factors affecting the design of catalytic reactors. [9]

OR

Q12)a) Write a note on fluidized bed dryers. [9]

b) Interpret the mass transfer coefficients in fluidized beds. [9]



Total No. of Questions : 12]

SEAT No. :

P2172

[Total No. of Pages : 2

[5254]-278

B. E. (Petrochemical Engineering) (Elective - II)

OPTIMIZATION TECHNIQUES FOR PROCESS INDUSTRIES

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) With pictorial representation, explain the stochastic programming framework.[16]

OR

Q2) Note the subtypes and explain the Preference Based Methods in Optimization.[16]

Q3) Explain the solution approach for single variable optimization scenarios using bracketing method. [16]

OR

Q4) Products I and II that are manufactured by a Chemical firm are sold at the rate of Rs. 21 and Rs. 27, respectively. Both products have to be processed on machines R and J. Product I requires 1 minute on A and 2 minutes on B where as Product II requires 1 minute on each machine. Machine A is not available for more than 6 hours 40 minutes/day, whereas machine B is not available for more than 10 hours. Formulate the problem for profit maximization. Solve this problem using the simplex method. [16]

P.T.O.

Q5) Illustrate the Unconstrained NLP with the concept of local minimum and saddle point. [18]

OR

Q6) Develop the solution for the following Non Linear Programming optimization scenario : [18]

$$\text{Maximize } Z = x_1 \times x_2$$

$$x_1, x_2$$

subject to

$$2x_1 + 2x_2 \leq 16 \text{ perimeter constraint}$$

$$x_1 \geq 0 ; \quad x_2 \geq 0$$

SECTION - II

Q7) With neat diagram, explain the Constrained NLP minimization with inequalities. [16]

OR

Q8) With schematic, note the application of Newton Raphson method in solving NLPs. [16]

Q9) Explain the Tree and Network Representation in Discrete Optimization. [16]

OR

Q10) How are the depth-first and breadth-first Branch-and-bound strategies are used in determining optimum parameters? Write the algorithm of the strategies. [16]

Q11) Draw the Heat Exchange Network in Isomerization Unit of a Refinery and note energy optimization opportunities. [18]

OR

Q12) Sulphur recovery unit in a refinery has reduced the recovery efficiency. With labeled diagram, show different sections and enlist non ideality scenarios. [18]



Total No. of Questions : 12]

SEAT No. :

P2173

[Total No. of Pages : 3

[5254]-280

B. E. (Petrochemical Engineering) (Elective - II) (Semester - I)

NATURAL GAS TECHNOLOGY

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer Q.No. 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

SECTION - I

Q1) a) Elaborate on geographic distribution by type of gas. [8]

b) Describe origin of natural gas. [8]

OR

Q2) a) Explain in detail bacterial gas reservoir. [8]

b) Discuss the outlook for world gas production. [8]

Q3) a) Explain in detail analysis of composition of natural gas. [8]

b) Discuss well selection, conditioning and sampling of condensate gas. [6]

c) Discuss measurements taken during sampling. [4]

OR

P.T.O.

- Q4)** a) Discuss the phase diagram of a reservoir fluid. [8]
 b) Find the viscosity for a gas with composition in mole % of $C_1=90.5$, $C_2 = 2.3$, $C_3 = 2.3$ at 3000 psia and 540 °R. [6]

Data:

Mi	Pci	Tci	μ_{lgi}
16.043	667.8	343.1	0.0110
30.070	707.8	549.8	0.0092
44.097	616.3	665.7	0.0082

- c) Elaborate on heating value of natural gas. [4]

- Q5)** a) Explain in detail predicting hydrate formation by equilibria chart method. [6]
 b) Explain in detail phase diagram for hydrate formation. [6]
 c) Elaborate on heating value of natural gas. [4]

OR

- Q6)** a) Discuss kinetics of hydrate formation. [6]
 b) Discuss modeling and kinetics of hydrate formation based on semi empirical correlation. [6]
 c) Write a short note on Nucleation. [4]

SECTION - II

- Q7)** a) Explain in detail dehydration of natural gas by absorption. [8]
 b) Describe with flow sheet refrigeration cycle by expansion turbine for natural gas. [8]

OR

- Q8)** a) Give different properties of suitable solvent. [8]
 b) Discuss in detail gas permeation. [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) Describe in detail different gas chains. [6]

OR

- Q10)**a) Describe in detail steady state flow in pipeline [6]
 b) Discuss safety precautions for natural gas pipeline. [6]
 c) Write a short note on LNG carriers. [6]

- Q11)**a) Describe with flow sheet Fisher-Tropsch synthesis process in moving bed reactors. [8]
 b) Write a short note on [8]
 i) Production of synthesis gas by indirect conversion process
 ii) Production of gasoline from methanol

OR

- Q12)**a) Explain in detail methanol production using ICI process. [8]
 b) Describe with flow sheet routes for the chemical conversion of methane.[8]

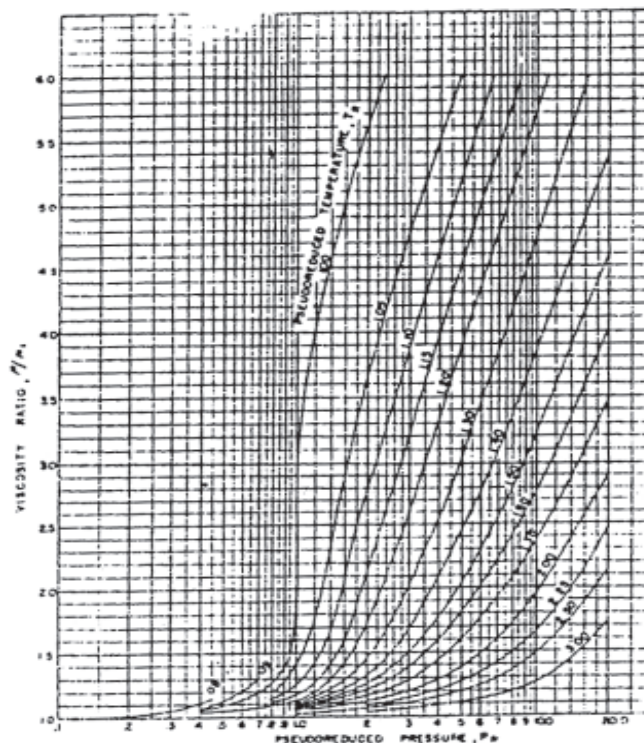


Figure 4. b Viscosity ratio versus pseudoreduced pressure.

❧❧❧

Total No. of Questions : 8]

SEAT No. :

P2174

[Total No. of Pages : 2

[5254]-283

B. E. (Petrochemical) (Semester - II)
PLANT DESIGN & PROCESS ECONOMICS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) State the standard sources of information required for plant design. [6]
b) Describe color code used for pipelines. [6]
c) Describe stages of chemical engineering project. [6]
- Q2)** a) Explain the guidelines for good plant location and layout. [8]
b) Describe the activities involved in plant operation and control. [8]
- Q3)** a) Describe safety measures for plant equipment and personnel. Working in chemical plant. [8]
b) With suitable example distinguish between block diagram, PFD and P&ID diagrams. [8]
- Q4)** a) Explain uses of milestone chart/GANT chart & bar chart in project engineering. [8]
b) Explain PERT & CPM techniques used for project monitoring and control.[8]

P.T.O.

SECTION - II

- Q5)** a) Explain the factors considered in economic decision making in chemical process industry. [8]
- b) Explain the total cost components of a chemical plant. [8]
- Q6)** a) A factory producing 150 items a day involves a direct material cost of Rs. 200, direct labor cost of Rs. 200 and overhead cost of Rs. 225. Assuming a profit of 10% of the selling price and distribution marketing cost is 30% of the manufacturing cost, calculate selling price of one item. [8]
- b) Define cost indices and state William's sixth-tenth rule. [8]
- Q7)** a) Explain the guidelines for choice among alternative investments. [8]
- b) A company has 3 alternative investments given below. If company in-charge expects 15% ROR on original investment, which will be suitable? [8]

Item	Investment-I	II	III
Initial fixed capital	1,00,000	1,70,000	2,10,000
Working capital investment	10,000	10,000	10,000
Annual cash flow	30,000	52,000	59,000
Annual expenditure	15,000	28,000	21,000

- Q8)** Write short notes on the following : [18]
- a) Methods of estimation of fixed capital.
- b) Present worth and discount annuities.
- c) Break - even analysis.



Total No. of Questions : 12]

SEAT No. :

P2175

[Total No. of Pages : 2

[5254]-284

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

PROCESS MODELING AND SIMULATION

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Explain effect of Chemical Kinetics for governing process models. **[16]**

OR

Q2) Describe the Steady and Unsteady types of mathematical models. **[16]**

Q3) An oil stream passes through the tube side of a tube-in-shell heat exchanger and is heated by condensing steam on the shell side. The steam condensate leaves through a steam trap. We want to control the temperature of the oil leaving the heat exchanger. Develop the schematic as a basis for process design. **[18]**

OR

Q4) A fluid of constant density ρ is pumped into a cone-shaped tank of total volume $(H \pi R^2)/3$. The flow out of the bottom of the tank is proportional to the square root of the height h of the liquid in the tank. Derive the relation describing the system. **[18]**

P.T.O.

Q5) Two phase separator at a refinery production facility expresses its behavior by following differential equation : **[16]**

$$\frac{dy}{dx} = x^2 + y^2$$

Solve the system equation by using fourth order Rungee-Kutta method to find y at x = 0.2 and x = 0.4 using h = 0.2

OR

Q6) Explain steps involved in deriving solution of a system using Linear Programming method Simplex. **[16]**

SECTION - II

Q7) Note any four Fluid Packages and write operating parametric regions of Peng Robinson property package. **[18]**

OR

Q8) With sketch, note the material balance and relative volatility governing equations in simple distillation process model development. **[18]**

Q9) Apply the State Space Modeling to Absorption unit and deduce the model. **[16]**

OR

Q10) Describe the Construction of State Equations from Differential Equations. **[16]**

Q11) With classifications, briefly note any two applications of empirical models leading to process optimization in Hydro desulphurization process. **[16]**

OR

Q12) Draw a neat sketch and explain Isomerization unit optimization in a refinery. **[16]**



Total No. of Questions : 8]

SEAT No. :

P2176

[Total No. of Pages : 3

[5254]-289

B. E. (Petrochemical Engineering)
CATALYST SCIENCE AND TECHNOLOGY
(2008 Pattern) (Elective - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Question No. 1 and 8 are compulsory. Answer any two 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 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 and explain the following terms : **[8]**
- i) Functionality
 - ii) Turnover Number
 - iii) Selectivity
 - iv) Activity
- Q2)** a) Discuss identifying limiting step in catalytic reaction. **[8]**
- b) Write a note on: Homogeneous and Heterogeneous Catalysis. **[8]**
- Q3)** a) 1200 ml of water has 144 grammes of glucose dissolved in it. If the solution is mixed with 500 grammes of virgin activated alumina, how much glucose will remain in solution when equilibrium has been reached? **[8]**
- b) Explain the pore size distribution method. **[8]**

P.T.O.

- Q4) a)** A colored substance (B) is to be removed from a mineral oil by adsorption with clay particles at 25 °C. The original oil has a color index of 200 units / 100 kg oil, while the decolorized oil must have an index of only 20 units / 100 kg oil. The following experimental adsorption equilibrium data have been measured in a laboratory :

C_B .color units / 100 kg oil	q_B , color units/100 kg clay
200	10
100	7.0
60	5.4
40	4.4
10	2.2

- Fit the experimental data to the Freundlich adsorption isotherm $q_B^* = AC_B^{1/n}$. Compute the mass in kg of clay needed to treat 500 kg of oil if one equilibrium contact [10]
- b) Explain the BET method to determine the surface area of catalysts by giving mathematical expressions. [6]

SECTION - II

- Q5) a)** Explain the role promoters in synthesis of catalysts. [6]
- b) Explain various methods for catalyst manufacture.. Explain precipitation method in detail. [10]
- Q6) a)** Explain various sources of acidity in catalyst surface. [6]
- b) With the help of neat diagram discuss synthesis of methanol process with emphasis on catalyst used, operating condition, reaction time and regeneration of catalysts. [10]
- Q7) a)** Discuss the manufacture process of ammonia synthesis. Give schematic diagram of reactor configuration, catalyst used, operating conditions and hot spot formation. [10]
- b) Write a brief note on: Trickle bed reactor [6]

Q8) Write notes on :

[18]

- a) Multiphase catalysis for processing of Hydrocarbons
- b) Fischer-Tropsch Synthesis
- c) Shape Selective catalysts



Total No. of Questions : 6]

SEAT No. :

P2177

[Total No. of Pages : 2

[5254]-291
B. E. (Printing)
TECHNOLOGY OF GRAVURE
(2008 Pattern)

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) Electronic engraving gives consistent reproduction than etching. Explain. [18]

OR

Explain Gravure cylinder making by indirect laser process. [18]

Q2) Explain chrome plating process of a gravure cylinder. [16]

OR

Explain the variables of copper plating for gravure cylinder. [16]

Q3) Explain in detail Gravure process. [16]

OR

Explain water based inks used in gravure process. [16]

P.T.O.

SECTION - II

Q4) The ink rheology plays an important role in ink transfer. Explain [18]

OR

Explain in detail doctor blade pressurization system of gravure press. [18]

Q5) Explain the impact of ESA on print quality. [16]

OR

Explain the different pressurization systems of an impression system. [16]

Q6) Explain in detail ELS technology for a Gravure press. [16]

OR

Explain the importance of Idler Rollers. [16]



Total No. of Questions : 6]

SEAT No. :

P2178

[Total No. of Pages : 3

[5254]-294

B. E. (Printing)

QUALITY CONTROL TECHNIQUES IN PRINTING

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain Quality Cost concept in detail with examples of each type of quality cost. [8]
- b) Describe in detail the concept of Quality Control with respect to printing industry. [8]

OR

- a) List out quality specification in detail. [8]
- b) Explain the concept of quality control considering any one printing process. [8]

- Q2)** a) PQR company produces dampening solution which must contain 3 % of alcohol. The company tries to maintain the actual percentage in the range of + - 0.3. It tests 5 samples per hour. The following table shows the result of last five samples. Construct a control chart for X & R. Examine whether the process is under control. $A_2=0.5768, D_3=0, D_4=2.115$ [10]

P.T.O.

Sample No.	1	2	3	4	5
1	2.9	2.8	3.0	2.8	3.1
2	2.9	3.2	3.0	3.0	3.0
3	3.0	3.3	2.1	3.1	2.9
4	3.0	3.0	3.4	3.0	3.0
5	2.9	3.0	3.1	2.9	3.1

- b) What are different types of sampling plans [8]

OR

- a) 10 printed samples of size 100 were studied critically for total number of defectives in it. The details of number of defectives in each sample are given below. All samples are accepted by quality control Department of the company. Construct a control chart & comment of result. [9]

SampleNo.	1	2	3	4	5	6	7	8	9	10
No. of Defectives	2	3	1	1	2	3	3	2	2	0

- b) 10 samples each size of size 50 of offset machine blowers were tested in pressure testing. The result of the inspection are given below. [9]

SampleNo.	1	2	3	4	5	6	7	8	9	10
No. of Defects	2	0	2	0	2	3	2	3	2	3

- Q3)** a) Explain in detail Project Production & Mass Production. [8]
b) Describe World Class Manufacturing system. [8]

OR

- a) Explain in detail types of Production system. [8]
b) Explain computer Integrated Manufacturing system. [8]

SECTION - II

- Q4)** a) Explain following properties related to substrate [9]
i) Gloss ii) Opacity
iii) Porosity iv) Smoothness
b) Explain the need of checking viscosity of ink & factors on which viscosity is depending. [9]

OR

- a) Explain following properties related to Ink [9]
- i) Flow
 - ii) Color
 - iii) Opacity
 - iv) Adhesion
- b) Explain Inventory management in Printing Industry. [9]

- Q5)** a) Explain Flexography process control with help of profile creation. [8]
- b) Explain in short any four file formats. [8]

OR

- a) Explain Offset Lithography process control with help of profile creation.[8]
- b) Explain various types of profile & need to create profile. [8]

- Q6)** a) Explain in short following Press Standards GRACoL, SWOP [8]
- b) Explain the process of press standardization & characterization for Screen printing. [8]

OR

- a) Explain the process of press standardization & characterization for Offset printing. [8]
- b) Explain various test forms and test elements in detail. [8]



Total No. of Questions : 6]

SEAT No. :

P2179

[Total No. of Pages : 4

[5254]-301

B.E. (Printing)

PRINT PRODUCTION PLANNING & CONTROL

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

Q1) Explain the classification of Production Systems in detail with suitable examples.[16]

OR

Explain the functions of Production Planning and Control in detail with suitable examples.

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

- i) Draw network diagram & find the critical path
- ii) 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_o	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

- i) Draw the project network and determine expected project length.
- ii) Calculate the Std. Dev. And variance of the project
- iii) What is the probability that project will be completed no more than 4 weeks earlier than expected time.
- iv) If the project due date is 19 weeks, what is the probability of not meeting the due date.

Given data: $Z= 1.33, P= 0.9082$
 $Z= 0.67, P= 0.7486$
 $Z= 1.28, P=0.9$

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

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.

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.

	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
	50	80	70	140	

Demand →

↑
Supply

OR

Solve the following Transportation problem with NWCM and LCM

	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.



Total No. of Questions : 6]

SEAT No. :

P2180

[Total No. of Pages : 2

[5254]-302
B. E. (Printing) (Elective - III)
ELECTRONIC PUBLISHING
(2008 Pattern)

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) Figures to the right indicate full marks.*

SECTION - I

Q1) Answer any two.

[18]

- a) Explain the following HTML tags with example and syntax
 - i) <table>
 - ii) <P>(Paragraph)
 - iii) <div>
- b) Explain different image file formats in detail. Compare and explain which image file format is best in web page.
- c) Write HTML program to generate the table as shown in picture below.

Day	Title	Date
Some text should be written in this column	Some text should be written here	Please insert picture here

Q2) Solve any two

[16]

- a) Explain what is E-Publishing. Explain any four examples of e-publishing.
- b) Explain JPEG, PNG and GIF file formats in detail. Compare and explain which image file format is best in web page.
- c) Explain different features of e-pub, Mobi and AZW file format

P.T.O.

Q3) Answer any two **[16]**

- a) Explain any 4 differences between XML and HTML with example.
- b) Create an SQL database to store information of 5 employees. First table should contain Employee Name and Employee number. Second table should contain Post and Salary Third table should contain Joining date and Skills.
- c) Explain the following SQL statements with example
 - i) DELETE
 - ii) UPDATE
 - iii) INSERT

SECTION - II

Q4) Answer any One : **[16]**

- a) Explain concept of typography with example.
- b) Explain concept of indexing. Write HTML program to design two pages shown below such that
 - i) Next and Previous shown in are hyperlinks
 - ii) For Page 1: When click on Next button, page2 should be loaded
 - iii) For Page 2 when click on 'Previous' button, Page 1 should be loaded

Q5) Explain any two : **[16]**

- a) Explain necessity of E-publication text formats.
- b) Explain any one e-commerce application.
- c) Explain use of E-publishing in the field of printing.

Q6) Explain any two : **[18]**

- a) Explain main features of dot net like common language runtime (CLR), cross language interoperability.
- b) Explain enterprise content management system (ECMS).
- c) Explain web content management system (WCMS).



Total No. of Questions : 6]

SEAT No. :

P2181

[Total No. of Pages : 2

[5254] - 305
B.E. (Printing)
FLEXIBLE PACKAGING
(2008 Pattern)

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 the role of Polyethylene in Packaging. **[18]**

OR

Explain the considerations of packaging liquid products.

Q2) Explain in detail sections of rotogravure process for flexible packaging. **[16]**

OR

Explain in detail unit configurations of Flexography for flexible packaging.

Q3) Explain along with diagram extrusion techniques. **[16]**

OR

Explain along with diagram lamination process.

SECTION - II

Q4) Explain in detail tube making process for packaging of cosmetics. **[16]**

OR

Explain in detail Retort concept for liquid product.

P.T.O.

Q5) Explain the types of caps for various applications. **[16]**

OR

Describe skin packaging technique for a given product.

Q6) Explain the packaging methods for non-alcoholic beverages. **[18]**

OR

Mention deterioration factors for the following :

- a) Cooked Meat
- b) Biscuits
- c) Beer

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2182

[Total No. of Pages : 3

[5254] - 312

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) With neat sketch explain characteristics of meter out circuit. [10]
b) For a 40 KN press tool weigh 3 KN. Calculate the pressure required for pressing operation if bore diameter of cylinder is 50 mm, rod diameter is 30 mm and counter balance valve is used in circuit. [8]

OR

- Q2)** a) With neat sketch, explain working of bent axis type axial piston pump and derive expression for flow rate. [6]
b) Draw and explain hydraulic sequencing circuit to extend cylinder A and then cylinder B. Cylinder B first retracts and then cylinder A retracts. [12]

- Q3)** a) Explain with neat sketch working of proportional flow control valve and also state its applications. [8]
b) What size of accumulator is necessary to supply 5000 cm³ of fluid in a hydraulic system having maximum operating pressure of 200 bar, which drops to minimum 105 bar. Assume adiabatic expansion and compression of gas with pre-charge of accumulator at 70 bar. [8]

OR

P.T.O.

Q4) a) Calculate the tube thickness of a hydraulic cylinder having following data : **[8]**

i) Tensile strength of cylinder material (S_{ut}) = 7300 kgf/cm²

ii) Cylinder bore (d_1) = 50 mm.

iii) System pressure (P) = 200 kgf/cm²

iv) Factor of safety (f_{os}) = 4 : 1

b) A hydraulic cylinder having bore diameter of 120 mm and a rod diameter of 80 mm is connected regeneratively. The flow rate from full bore end on retract is 135 l/min. Calculate the extend speed and extend thrust if maximum pressure is 90 bar. **[4]**

c) Draw symbols for : **[4]**

i) Pressure and temperature compensated flow control valve

ii) 4 × 3 direction control valve

iii) Variable displacement pressure compensated bi-directional pump

iv) Sequencing valve

Q5) a) Draw a suitable pneumatic circuit for an automated production line involves metal blocks being placed in a furnace for heat treatment. One cylinder is used to open/close the furnace door and another pushes the metal blocks into the furnace. **[12]**

i) An operator pushes a button to start the process.

ii) Cylinder A retracts to raise the furnace door.

iii) Cylinder B extend and pushes the metal block into the furnace.

iv) Cylinder B retracts.

v) Cylinder A extend and closes the furnace door.

b) Explain types of pneumatic motors. **[4]**

OR

Q6) a) Explain with suitable application example the electro-pneumatic system. **[8]**

b) Explain with suitable examples the use of shuttle valve and twin pressure valves in pneumatic circuit design. **[8]**

SECTION - II

- Q7)** a) Discuss various instrumentation systems for detecting cracks, flaws and in-homogeneities. [8]
b) With the help of block diagram explain application of 8085 microprocessor to control the temperature of oil fired furnace. [8]

OR

- Q8)** a) Load the bit pattern 47H in register B and 6BH in register C. Mask all bits except D0 from registers B and C. If D0 is at logic 1 in both the registers turn on the light connected to D0 position of the output port; otherwise turn off the light. [8]
b) Draw block diagram of Microcontroller Architecture. [8]

- Q9)** a) Draw ladder diagram to perform following operations of a washing machine : [8]
i) Switch on the motor pump
ii) Switch off the pump after 70 seconds
iii) Switch on the heater for 30 seconds
iv) Switch off the heater
b) Explain various input & output devices of PLC. [8]

OR

- Q10)** a) Describe the criteria used to measure the performance of sensors. [8]
b) Explain adaptive control optimization. [8]

- Q11)** a) Explain with neat sketch various elements automated part feeder system. [9]
b) Explain various indexing mechanisms. [9]

OR

- Q12)** Write short notes on : [18]
a) Robot configurations
b) Transfer mechanisms
c) Types of escapements



Total No. of Questions : 12]

SEAT No. :

P2183

[Total No. of Pages : 5

[5254] - 313
B.E. (Production)
OPERATIONS RESEARCH
(2008 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Unit - I

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

Minimize $Z = 2y_1 + 3y_2$

Subject to $y_1 + y_2 \geq 5$

$y_1 + 2y_2 \geq 6$

$y_1, y_2 \geq 0$

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

OR

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

Minimize $z = 2x_1 + 3x_2$

Subject to $2x_1 + 2x_2 \geq 30$

$x_1 + 2x_2 \geq 10$

$x_1 \geq 0, x_2 \geq 0$

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

P.T.O.

Unit - II

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

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

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

OR

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

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

b) Explain MODI method **[6]**

Unit - III

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

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

Sales marketing in zones ₹. x 000

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

OR

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

SECTION - II

Unit - IV

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

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

When should the machine be replaced?

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

OR

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

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

Unit - V

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

OR

- Q10) a)** A particular item has a demand of 9000 units per year. The cost of one procurement is ₹. 100 and the holding cost per unit is ₹. 2.40 per year. The replacement is instantaneous and no shortages are allowed. Determine **[10]**
- 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]**

Unit - VI

- 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		Crach	
	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 id ₹.10.

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

OR

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

- Difference between PERT and CPM
- Resource smoothing
- Dummy in network analysis
- Difference between activity and event

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

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

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

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2184

[Total No. of Pages : 3

[5254] - 316

B.E. (Production Engg.)

POWDER METALLURGY (Elective - I)

(2008 Pattern) (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 from Section I and Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12 from Section II.
- 2) Answers to the two sections should be written in separate books.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Figures to the right indicate full marks.

SECTION - I

- Q1)** a) With the help of a neat sketch, explain the working of the vertical gas atomizer. [6]
- b) What is the principle of Elutriation method of particle size measurement? How do we apply Stoke's law for particle size measurement? [6]
- c) Explain the Pyron process of powder production. [6]

OR

- Q2)** a) Explain the carbonyl process of powder production with a neat diagram. [6]
- b) What are the factors which promote powdery deposits in electrolytic cell? [6]
- c) Explain the factors which favor fine particle size in atomizing process. [6]
- Q3)** a) Write a note on effective tooling design? State the various materials used for dies and punches. [8]
- b) What are the means to avoid rejection due to fracturing of green compacts. [8]

P.T.O.

OR

- Q4)** a) Compare the advantages of dry milling and wet milling. Explain the importance of lubrication. [8]
b) Explain the stages of compaction with a suitable diagram and How can we avoid the large variation of green density of compact? [8]

- Q5)** a) How does particle size, particle shape, particle structure and green density affect Solid state sintering. [8]
b) Write short notes on Liquid phase sintering and Activated Sintering. [8]

OR

- Q6)** a) Explain the importance of the different atmospheres used in sintering furnaces. [8]
b) Explain the three zones of the mesh belt conveyor sintering furnace with the help of a diagram. [8]

SECTION - II

- Q7)** a) Explain with a neat diagram the Injection moulding process. [8]
b) Compare CIP process with HIP process. [8]

OR

- Q8)** a) State the advantages and disadvantages of isostatic compaction over die compaction. [8]
b) Explain roll compaction and the effects of powder characteristics on powder rolling. [8]

- Q9)** a) What are nanosize particles? What are the problems associated with handling such particles? [8]
b) What are the advantages and limitations of the Infiltration process. [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) Thermal spraying
ii) Case hardening heat treatments given to P/M parts

Q11) With the help of a neat flow chart explain production details of the following : **[18]**

- a) Diamond Impregnated cutting tools
- b) One Automotive application
- c) Gears

OR

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

- a) Porous bearings
- b) Cermets
- c) One Aerospace application

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2185

[Total No. of Pages : 3

[5254] - 317

B.E. (Production)

MICROPROCESSORS APPLICATIONS

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Explain any four features of microcontrollers and microprocessors. [8]
b) With the help of block diagram. explain the architecture of microcontroller. [8]

OR

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

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

OR

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

P.T.O.

- Q5) a)** Draw and explain architecture of 8051. [10]
b) Explain Roll of Stack and Stack Pointer of 8051 in detail. [8]

OR

- Q6) a)** Explain timer's and counters modes in 8051 with TMOD and TCON.[10]
b) Explains program counter of 8051 with the help example in detail. [8]

SECTION - II

- Q7) a)** Write a program to ADD two 16 bit nos. stored at 20H &30H. Store result at 50H. [8]
b) Explain following instructions of 8051. [8]
i) OR
ii) RRC
iii) DNZ
iv) AND

OR

- Q8) a)** Write a program to arrange the numbers in ascending order. [8]
b) Describe in details, [8]
i) Assembler
ii) Compiler

- Q9) a)** What do you mean by PLC? Explain its features and application with examples. [8]
b) Interface Stepper motor to 8051. Explain interface signals with diagram. Write assembly language program to rotate stepper motor in clockwise direction. [8]

OR

- Q10)a)** Draw the ladder diagram for Furnace system and explain it. [8]
b) Interface 4 x 4 keypad with Microcontroller. Draw interfacing diagram. Write assembly program to display each key on 16 × 2 LCD to 8051.[8]

- Q11)a)** Design a Speed controller system for DC motor. Suggest suitable sensors, signal conditioning and microcontroller. Draw the flowchart for the system. **[10]**
- b) How RS232 Serial Communication Standard is interfaced with the 8051 microcontroller. Explain the interface with diagram. **[8]**

OR

- Q12)a)** Design a system for Data acquisition using 8051 microcontroller for pressure and level measurement. Draw circuit diagram with suitable sensor and signal conditioning. Display the parameters on LCD. Write the Flowchart and algorithm. **[12]**
- b) Explain the USB communication protocol. **[6]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2186

[Total No. of Pages : 3

[5254] - 318

B.E. (Production Engineering)

ERGONOMICS AND HUMAN FACTORS IN ENGINEERING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *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) Write short note on following ergonomic concepts :

[18]

- a) Measures of Physiological Functions
- b) Strength and Endurance
- c) Human Physical Activities

OR

Q2) 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]**

Unit - II

Q3) a) Describe any three principles of arrangements of components with example. **[8]**

b) Compare between work surface height and working height. **[8]**

OR

P.T.O.

- Q4) 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]

Unit - III

- Q5) a)** Write a note on general location of displays and controls within workspace. [8]
b) Explain any four important functions of controls. Discuss with suitable examples. [8]

OR

- Q6) a)** Discuss any one special control device with a neat sketch. [8]
b) Write a note on concept of visibility [8]

SECTION - II

Unit - IV

- Q7) a)** How is Color System defined in Human Factors Engineering? Describe with a neat sketch. [9]
b) Discuss noise exposure limits. [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)** Describe the process of muscle mechanism with a suitable diagram. [8]
b) Differentiate between aerobic and anaerobic glycolysis. [8]

OR

- Q10) a)** Write a note on work and rest cycles. [8]
b) Effect of environmental conditions on energy expenditure, Discuss. [8]

Unit - VI

Q11)a) Human Factors in system design : discuss the concept. [8]

b) Describe the importance of HFE data in interface design. [8]

OR

Q12)a) What is safety? Discuss basis for defining safety considerations. [8]

b) Discuss any one case of ergonomically designed product in your opinion. [8]



Total No. of Questions : 12]

SEAT No. :

P2187

[Total No. of Pages : 3

[5254] - 319

B.E. (Production Engineering)

MATERIALS AND LOGISTICS MANAGEMENT

(2008 Pattern) (Revised) (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 Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 4) *Use of electronic pocket Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

SECTION - I

Q1) a) Explain the concepts Value Analysis and Value Engineering giving example. **[9]**

b) What is Material Requirement Planning (MRP1)? Explain in detail. **[9]**

OR

Q2) a) What are the objectives of materials management? **[9]**

b) What are the factors influencing Make or Buy decision. Explain in brief. **[9]**

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

b) Explain different objectives of Purchasing. **[8]**

OR

Q4) a) What are the factors to evaluate potential Supplier? **[8]**

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

P.T.O.

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

OR

- Q6) a)** Explain various causes of surplus and obsolete stock. [8]
- b) Explain and differentiate between : [8]
- i) Centralized and Decentralized stores
- ii) Annual stock taking and Continuous stock taking

SECTION - II

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

OR

- Q8) a)** What is the importance of warehouse? List the types of warehouses. [8]
- b) List and explain in brief economic and service benefits of warehousing. [8]

- Q9) a)** Explain various risks of supply chain management. [8]
- b) Explain drivers of supply chain management 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) Define following terms related to inventory and show diagrammatically. [9]

i) safety stock

ii) Reorder level

iii) Lead time

iv) Average inventory level

b) Explain Fixed Period (P) system and Fixed Quantity (Q) system in brief. [9]

OR

Q12)a) Derive the formula for EMQ when replenishment is non instantaneous (Gradual). State the assumptions made. [9]

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

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2188

[Total No. of Pages : 3

[5254] - 320

B.E. (Production Engineering)

SIMULATION AND MODELING

(2008 Pattern) (Elective - II) (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) *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) Explain various areas of applications of simulation. [8]
b) Discuss different probability laws in simulation modeling. [8]

OR

- Q2)** a) Discuss different terminologies related to statistic calculation. [8]
b) Discuss simulation concept by considering queue formed at railway reservation counter. [8]

Unit - II

- Q3)** a) Monte Carlo simulation is a special case of stochastic simulation? Comment. [8]
b) Explain concept of simulation with suitable example in processing of job on machine. [8]

OR

- Q4)** a) Discuss the simulation applications in production management. [8]
b) Discuss Monte-Carlo simulation methods and their application in inventory. [8]

P.T.O.

Unit - III

- Q5)** a) Explain different methods for data representation. [10]
b) Explain methods for Generation of pseudo random numbers. [8]

OR

- Q6)** a) Discuss one and two tail test. [10]
b) Explain the methods for testing assumptions. [8]

SECTION - II

Unit - IV

- Q7)** a) State factors considered in selecting generator for random numbers. [8]
b) With suitable example describe output analysis for steady state simulation. [8]

OR

- Q8)** a) Discuss steps of fitting distribution data. [8]
b) With illustrative example describe the output analysis for dynamic state simulations. [8]

Unit - V

- Q9)** a) Discuss the factors for simulation of mass type manufacturing Industries. [9]
b) Discuss about a simulation of an automated warehouse system. [9]

OR

- Q10)** a) Discuss the factors for simulation of batch type manufacturing Industries. [8]
b) Discuss simulation of a reservation counter at bus station. [10]

Unit - VI

- Q11)**a) Explain in detail important feature of ARENA simulation software. [8]
b) Discuss programming language used in simulation in software. [8]

OR

- Q12)**a) Write comparison of simulation software with programming languages. [8]
b) Discuss the steps for development of simulation software for decision making of parts. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2189

[Total No. of Pages : 3

[5254] - 321

B.E. (Production S/W)

PLANT ENGINEERING AND MAINTENANCE

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Unit - I

- Q1)** a) What are the consequences of insufficient maintenance? Explain. [8]
b) What are the Primary and Secondary functions of plant engineering? [8]

OR

- Q2)** a) Write short note on :
i) Training of Maintenance workforce
ii) Assessment of maintenance work [8]
b) Briefly explain the objectives of planned preventive maintenance. [8]

Unit - II

- Q3)** a) What is the significance of PQ analysis and PQRST concept in systematic layout planning process? [10]
b) Explain the importance of auxiliary services while finalizing the plant layout. [8]

OR

P.T.O.

- Q4)** a) What do you understand by product layout, process layout and cellular layout? [8]
- b) Write short notes on : [10]
- i) Use of computer for optimization of layouts
- ii) Muther's plant layout procedure

Unit - III

- Q5)** a) Discuss the maintenance problems occurring in product and process type industries. [8]
- b) Explain the duties and responsibilities of a maintenance engineer. [8]

OR

- Q6)** a) Describe how store management can help in keeping a better spare parts inventory. [8]
- b) Describe following types of maintenance Plant Engineering & Maintenance, May 2017 [8]
- i) Preventive maintenance
- ii) Condition based maintenance

SECTION - II

Unit - IV

- Q7)** a) Briefly explain the concept of life cycle costing of equipment. [8]
- b) How can effectiveness of preventive maintenance help the maintenance department? [8]

OR

- Q8)** a) Discuss why it is essential to consider the economic aspect of the maintenance function. [8]
- b) Discuss the various distribution functions used for the estimation of reliability in the performance of the maintenance function. [8]

Unit - V

- Q9)** a) Enumerates some short term measures which the maintenance personnel can implement to achieve energy conservation. [8]
- b) Explain plant safety against the mechanical hazards. [8]

OR

- Q10)**a) Explain in short the various fire prevention practices. [8]
- b) Differentiate between 'Ground conveyor system' and overhead conveyor system'. [8]

Unit - VI

- Q11)**a) Specify the areas where terrotechnology practices can be applied effectively. [10]
- b) Differentiate between the Spectrometric oil analysis procedure and the Magnetic plug inspection system. [8]

OR

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

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2190

[Total No. of Pages : 4

[5254] - 322

B.E. (Production Engineering)

**COMPUTER INTEGRATED DESIGN AND MANUFACTURING
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Attempt any 3 questions from each section.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicates full marks.*
- 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) The three vertices of triangle PQR are: P (50, 20), Q (110, 20) and R (80, 60). Determine the coordinates of the vertices for the new reflected triangle, if it is reflected about x-axis. **[8]**
- b) A triangle ABC with vertices A (30, 20), B (90, 20) and C (30, 80) is to be scaled by a factor of 0.5 about a point x (50, 40). Determine the new position of the triangle. **[8]**

OR

- Q2)** a) Explain the various types of topologies used in computer network. **[6]**
- b) A triangle ABC is represented as A (15, 15), B (70, 15) and C (40, 60). If it is mirrored about a line $x = 60$. Determine the new coordinates of the triangle and represent the transformation with neat sketch. **[10]**
- Q3)** a) Explain the relationship between the Natural coordinate system and Global coordinate system in finite element analysis. **[6]**

P.T.O.

- b) A stepped bar is made of two materials joined together as shown in Fig. 1. The bar is subjected to axial pull of 10kN. Determine the displacement and stresses in each of the section. [12]

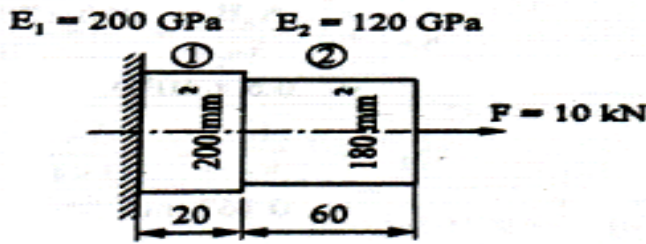


Fig. 1

OR

- Q4) a) Explain following with sketch related to FEA [8]

- i) Member
- ii) Degree of freedom
- iii) Local axis

- b) Fig. 2 shows 3 springs having stiffness 5, 10 and 15 N/mm respectively are connected in series. One end of the assembly is fixed and a force of 30 N is applied at the other end. Evaluate the deflection of individual springs. [10]

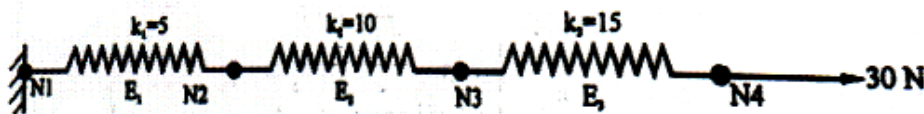


Fig. 2

- Q5) a) Explain the tool offset and cutter diameter compensation in CNC programming. [8]

- b) Write a manual part program to finish the stepped shaft as shown in Fig. 3 and the tool path is shown in Fig. 4. Assume spindle speed as 400 rpm and feed rate as 0.5 mm/rev. [8]

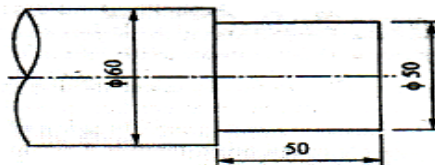


Fig. 3

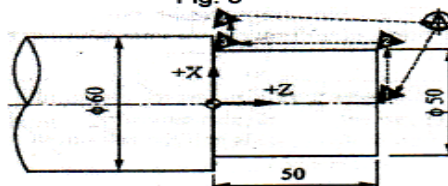
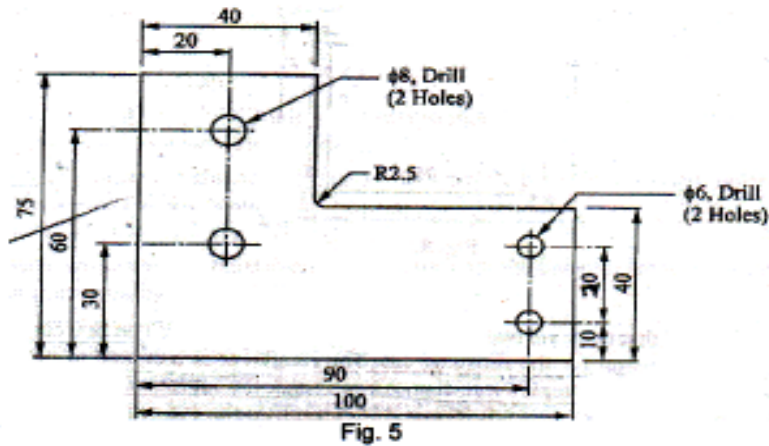


Fig. 4

OR

- Q6)** a) Explain the canned cycle for drilling and tapping. [8]
b) Write a CNC program in G and M codes for milling the sides of the part as shown in the Fig. 5 also write remark for each block. [8]



SECTION - II

- Q7)** a) Write short note on robot programming. [8]
b) Explain the different techniques of concurrent Engineering. [8]

OR

- Q8)** a) Explain in brief material requirement planning. [8]
b) Explain following terms related to Robot technology : [8]
 - i) Work Volume
 - ii) Spatial resolution
 - iii) Accuracy
 - iv) Repeatability

- Q9)** a) Explain the opitz part classification and coding system. [8]
b) What is Cellular Manufacturing? Explain the different cell formation techniques in cellular manufacturing. [10]

OR

- Q10)**a) Write short note on the analytical models of FMS. [8]
b) Explain the suitable example Production Flow Analysis (PFA). [10]

- Q11)**a) Explain the Siemens Model of CIM. [8]
b) What is Rapid Prototyping (RP)? Explain the application of rapid tooling methods to press tool manufacture. [8]

OR

- Q12)**a) Explain the IBM concept of CIM. [8]
b) What is 3D printing? Explain how product is manufactured from it. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2191

[Total No. of Pages : 3

[5254] - 323

B.E. (Production)

PROCESS PLANNING AND TOOL SELECTION (PPTS)

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer three question from section I and three question 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) Explain DFM & DFA. [8]

b) Explain general manufacturing processes. [8]

OR

Q2) a) Why there is so much emphasis on the integration of the design and manufacturing of the product? What is the role of product designer in it. [8]

b) Discuss input, output in view to Product engineering department. [8]

Q3) a) What sort of information can the process planner obtain from the engineering drawing of the component. [8]

b) What are the three basic methods by which surface roughness is measured? Explain each of them. What is the difference between surface irregularities and profile. [8]

OR

P.T.O.

- Q4) a)** What is meant by geometry of form. Define [8]
- i) Flatness
 - ii) Angularities
 - iii) Roundness
 - iv) Concentricity
- b) What key points to be considered in determining the nature of work to be performed and Nature of surfaces on the workpiece. [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)** Explain the steps involved in machine selection method with a neat flow chart. [8]
- b) What are the advantages of using commercial tooling over regular and special tooling what Should be the order of procurement of tools. [8]

OR

- Q8) a)** Explain the prime accuracies and producible accuracies of equipment. How to fine process Capability of lapping machine. [8]
- b) What are the constraint on tool selection? Discuss the most influential factors in terms of a Performance of a tool. [8]

- Q9) a)** Explain major operations, How to differ major operations from principle process Operations. [8]
- b) Discuss the role of CAPP in modern manufacturing. [8]

OR

Q10)a) Explain the benefits of CAPP and discuss an approach of generative CAPP system. [8]

b) How to identify critical areas? Explain and differentiate between product and process critical areas. [8]

Q11) Prepare the process sheet for the component as shown in fig. 1. It requires a batch of 1000 Nos. The process sheet must contain detailed manufacturing plan with operation sequence, Equipment, tooling, process parameters and sample calculation of operation time. [18]

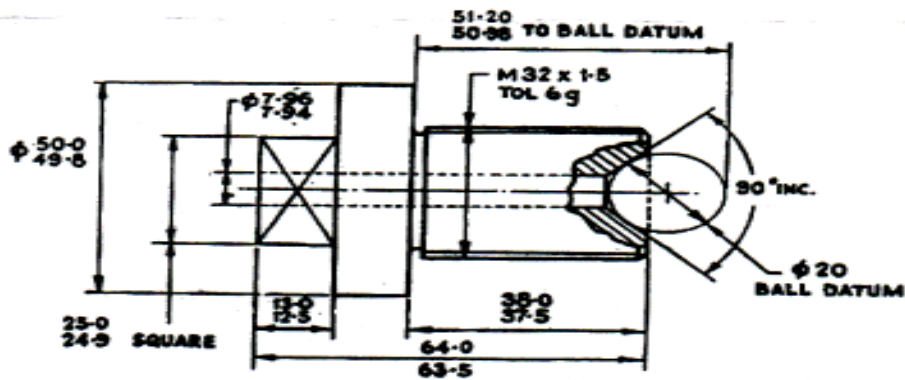
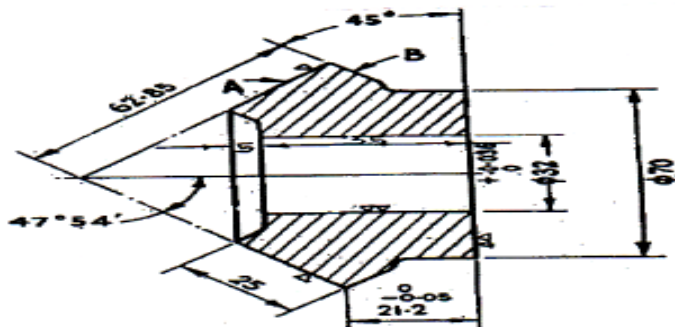


FIG. NO. 1, MATERIAL: M.S. BAR STOCK.
SPINDLE

OR

Q12) Prepare the process sheet for the component as shown in fig. 2. The required quantity : 5000 Nos./Month. Write detailed manufacturing plan operation sequence, Equipment and Tooling selection, process parameters with sample calculation. [18]



MATERIAL :- C.I.
FIG. NO. 2. CAST GEAR BLANK

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2192

[Total No. of Pages : 3

[5254] - 324

B.E. (Production Engineering)

AUTOMOBILE ENGINEERING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

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 “Chassis” in automobile? [2]

OR

- Q2)** a) Explain the difference between Two and Four Stroke Engines. [8]
b) Explain various types of fuel flow systems. [8]
c) What do you mean by articulated vehicle? [2]

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 epicyclie 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

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2193

[Total No. of Pages : 3

[5254] - 326
B.E. (Production)
METAL WORKING TRIBOLOGY
(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Unit - I

- Q1)** a) What are the different techniques of surface contact examination? Explain in detail. [6]
- b) Explain concept of Ergodicity. [10]

OR

- Q2)** a) Explain concept of Ergodicity. [6]
- b) Evaluate contact stiffness of any joint. Explain how? [10]

Unit - II

- 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) Differentiate between adhesive and abrasive theories of friction. [8]
- b) What are the technological properties of surface friction? [10]

P.T.O.

Unit - III

- Q5)** a) Define wear. Explain different forms of wear. [6]
b) What are the sources and causes of wear and effect of wear on properties of metals. [10]

OR

- Q6)** a) Explain “abrasive wear” with its applications. [6]
b) Write Short Note On Following (any 2) [10]
i) Fretting wear
ii) Stick regime
iii) Mechanism of wear
iv) Corrosion wear

SECTION - II

Unit - IV

- Q7)** a) Explain hydrodynamic lubrication with the help of neat sketches? [8]
b) Explain “Boundary” friction with application. [8]

OR

- Q8)** a) What is boundary lubrication? Explain with the help of sketches in details. [8]
b) What is the function of lubricants? Discuss various types of lubricants. What is the function of lubricants? Discuss various types of lubricants. [8]

Unit - V

- Q9)** a) Derive ‘Petroff’ equation involving concentric bearing. [10]
b) State and prove the pressure equation of journal bearing? [8]

OR

- Q10)** a) Elaborate different modes of lubrication. [10]
b) Explain significance of “Bearing power”. [6]

Unit - VI

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

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

OR

Q12)a) Derive squeeze film equation for 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. :

P2194

[Total No. of Pages : 6

[5254] - 327

B.E. (Production)

FINITE ELEMENT ANALYSIS

(2008 Pattern) (Elective - III)

Time : 3 Hours]

[Max. Marks : 100

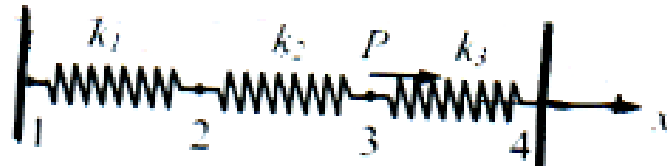
Instructions to the candidates :

- 1) *Answer three questions from Section I and three questions from Section II.*
- 2) *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) Enlist different methods of weighted residuals and any one in brief. [6]

b)  [10]



Given : For the spring system shown above,

$$k_1 = 100\text{N/mm}, k_2 = 200\text{N/mm}, k_3 = 100\text{N/mm}$$

$$P = 500\text{N}, u_1 = u_4 = 0$$

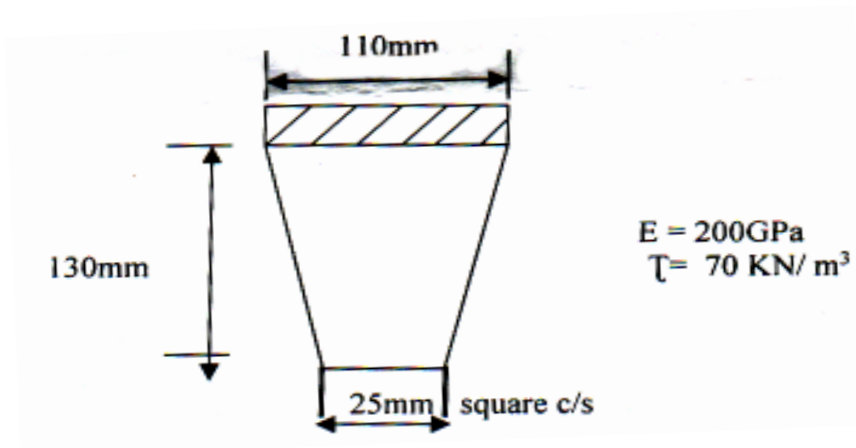
- Find :
- i) the global stiffness matrix
 - ii) displacements of nodes 2 and 3
 - iii) the reaction forces at nodes 1 and 4
 - iv) the force in the spring 2

OR

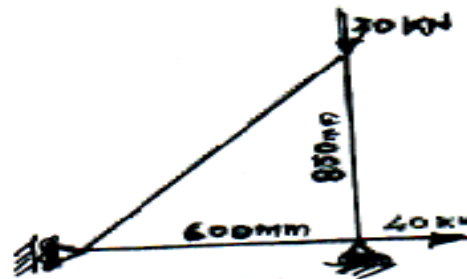
Q2) a) Derive stiffness matrix and load vector using potential energy approach.[6]

P.T.O.

- b) Find the deflection at free end under its own weight using 1, 2, 3 elements for taper Bolt (bar) refer fig. [10]



- Q3) a) Explain the concept of Local and Global co-ordinate system with respect to truss element. [8]
- b) A three bar truss is shown in Figure. Modulus of elasticity of the material $2 \times 10^5\text{ N/mm}^2$. The cross sectional area of the element is 50 mm^2 . [10]



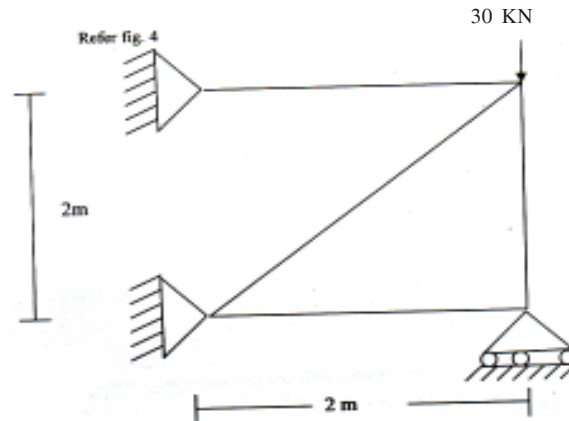
Determine :

- The element stiffness matrix
- Global stiffness matrix
- Nodal displacement
- Stresses in each element
- Reaction force

OR

- Q4) a) Explain the assembly of global stiffness matrix for the banded and skyline solutions. [8]

- b) Consider a four bar truss as shown. It is given that $E = 200 \times 10^9 \text{ N/m}^2$ and $A = 500\text{m}^2$. [10]
- Determine the element stiffness matrices for each element
 - Assemble the structural stiffness matrix 'K' for entire truss
 - Using the elimination approach, Solve for the nodal displacement
Calculate the reaction forces.



- Q5) a) Briefly discuss Iso-parametric representation. [4]
- b) Fig. 5. shows an indeterminate pin connected plane stress with cross sectional area of Diagonal members equal to 2000 mm^2 and all other members with cross sectional area of 1000 mm^2 . If Young's modulus $E = 200\text{kN/mm}^2$. [12]
- Assemble global stiffness matrix
 - Determine load vector if temperature of member 1 - 3 increases by 25°C . Given $\alpha = 12 \times 10^{-6}/^\circ\text{C}$
 - Determine load vector if member 1 - 3 is longer by 0.2mm .
 - Introduce Boundary Conditions

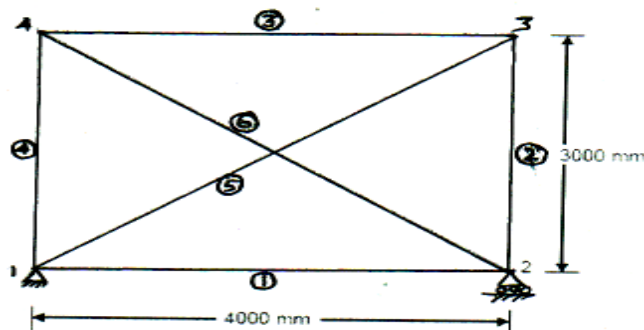
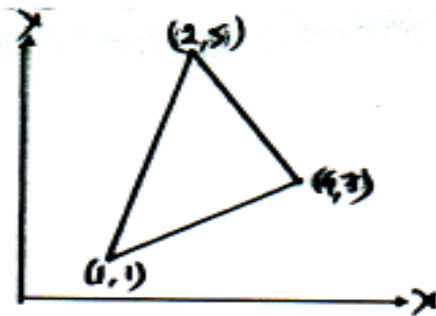


Fig.5

OR

- Q6) a)** How to do problem modeling? [4]
- b) For a CST element shown in Fig. Obtain the strain-displacement matrix. Assume Poisson's ratio is zero and Young's modulus is constant. [12]



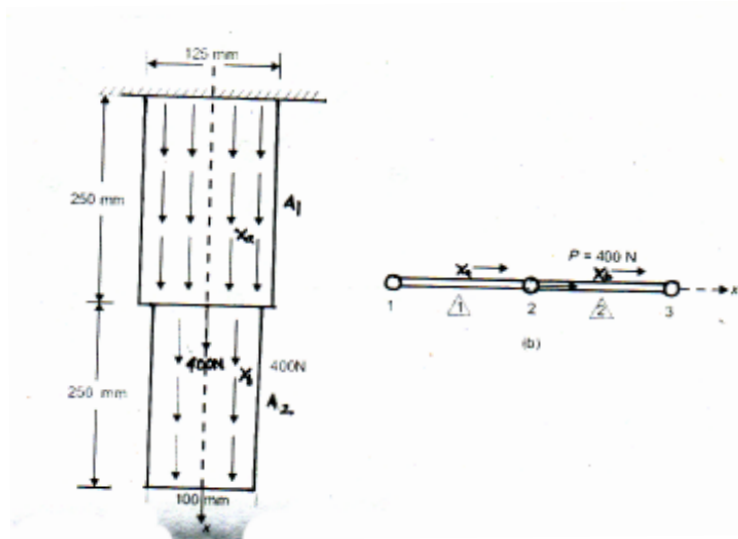
- i) Derive stiffness matrix for a CST element by direct approach.
- ii) Differentiate between the terms 'lumped loads' and consistent loads.

SECTION - II

- Q7) a)** Derive the equation of four-Node Quadrilateral for axisymmetric problems. [4]
- b) The thermal conductivity of a stainless steel rod of 0.1 m length and area of cross section of 1 cm² is 20 W/m-°C. The rate of heat generation in the rod is 10⁵ W/m³. One end of the rod is kept at 0°C and the other end at 100°C. The rod is insulated except at the ends. Using finite element with two elements, find out the temperature at the mid-point of the rod. Also, find out the heat flow at the ends of the rod using FEM. Compare the results with the exact solution. [12]

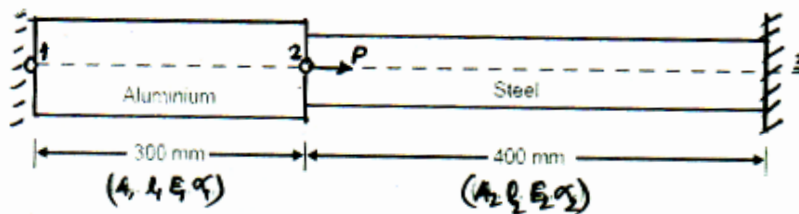
OR

- Q8) a)** Give the finite element modeling of the triangular element. [4]
- b) The thin plate of uniform thickness 20 mm is as shown in Figure In addition to the self-weight, the plate is subjected to a point load of 200N at mid-depth. The Young's modulus $E = 2 \times 10^5$ N/mm² and unit weight $\rho = 0.8 \times 10^{-4}$ N/mm². Analyze the plate after modeling it with two elements and find the stresses in each element. Determine the support reactions also. Ref fig. below. [12]



Q9) a) Give the governing differential equation for steady state heat transfer - 1D & 2D heat conduction & convection. [4]

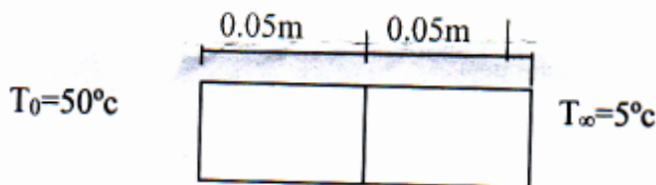
b) Determine the nodal displacements at node 2, stresses in each material and support reactions in the bar shown in Fig. due to applied force $P = 400 \times 10^3 \text{ N}$ and temperature rise of 30°C . Given : $A_1 = 2400 \text{ mm}^2$ $A_2 = 1200 \text{ mm}^2$ $E_1 = 0.7 \times 10^5 \text{ N/mm}^2$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



OR

Q10)a) Explain Galerkin's approach for heat conduction. [4]

b) Determine the temperature distribution in the wall and the heat input at left surface of the wall $L = 0.1 \text{ m}$, $k = 0.01 \text{ W/m}^\circ \text{C}$, $\beta = 25 \text{ W/m}^2 \text{ }^\circ \text{C}$. Solve for nodal temperatures. [12]



Q11) Write short notes on :

[18]

- a) Global stiffness matrix
- b) Weighted residual method
- c) Boundary conditions
- d) Quality checks

OR

Q12) Make a flow chart of FEM program for solving the plane stress problem; it should have a provision for adaptively refining the mesh based on the error analysis. **[18]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2195

[Total No. of Pages : 2

[5254] - 328

B.E. (Production)

WORLD CLASS MANUFACTURING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Q1) a) Discuss excellence related to manufacturing. **[8]**

b) What is Hall's frame work WCM? **[8]**

OR

Q2) a) Discuss meaning of excellence in business. **[8]**

b) Explain Maskell's WCM model. **[8]**

Q3) a) List best practices of WCM. **[8]**

b) What is value added manufacturing? **[8]**

OR

Q4) a) How bench marking is useful to WCM systems? Explain it. **[8]**

b) What are the principles of Toyota Production System? **[8]**

P.T.O.

- Q5) a)** Discuss maintenance practice of leading WCM plant. [8]
b) Explain lean production system. [10]

OR

- Q6)** Write short notes on following. [18]
a) 5S
b) Visual Control from WCM
c) Production Planning and Control department of WCM plant

SECTION - II

- Q7) a)** Explain characteristics of Human Resource Department of Toyota organization. [8]
b) Discuss impact of motivation and reward for continuous improvement. [8]

OR

- Q8) a)** What is significance of inter discipline training in WCM organization. [8]
b) Discuss merits of HR department of WCM organization. [8]

- Q9) a)** What is modern performance measurement system? [8]
b) Explain advantages of POP system? [8]

OR

- Q10) a)** Discuss six sigma philosophies. [8]
b) What is TOPP system of WCM performance? [8]

- Q11) a)** What is agile manufacturing? [8]
b) Explain case study of leading organization related to WCM. [10]

OR

- Q12) a)** Explain green manufacturing with its importance. [8]
b) Explain any one case study of MNC related to WCM. [10]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2196

[Total No. of Pages : 6

[5254] - 331
B.E. (Production S/W)
OPERATION RESEARCH AND MANAGEMENT
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answer any 3 questions from each section.*
- 2) *Answer 3 questions from Section I and 3 questions from Section II.*
- 3) *Answer to the two sections should be written in separate books.*

SECTION - I

- Q1)** a) What are the essential characteristics of linear programming model? [6]
b) Solve the problem [10]

$$Z = 2x_1 + 5x_2$$

Subjected to

$$40x_1 + 35x_2 \leq 24$$

$$2x_1 + 3x_2 \leq 60$$

$$4x_1 + 3x_2 \leq 96$$

$$x_1, x_2 \geq 0$$

OR

- Q2)** a) Explain two phase method of solving LPP. [6]
b) Two products A & B are manufactured by a firm. Profits of A & B are Rs. 30/- and Rs. 20/- respectively. Products are to be processed on two machines i.e milling and grinding. The capacities and time required to produce a unit are as below, [10]

Machine	Product P1	Product P2	Capacity
Milling	3	1	1500 man-hours/months
Grinding	1	1	1000 man-hours/months

How many products are to be manufactured of A & B so as to maximize profits?

P.T.O.

- Q3) a)** Explain Least cost method of allocation for transportation problem. [6]
- b) Obtain the initial basic solution for the following transportation problem using i) NWCM ii) LCM & iii) VAM. [10]

	M ₁	M ₂	M ₃	Capacity
F ₁	10	3	9	400
F ₂	12	10	5	300
F ₃	8	11	12	300
Requirement	200	300	500	

OR

- Q4) a)** Explain different applications of Transportation & Assignment Models. [6]
- b) Following data gives cost incurred on performing different tasks on different machines. Find optimum allocation. [10]

	Machines			
Tasks	10	12	15	9
	8	6	3	10
	4	5	12	17
	11	6	9	12

- Q5) a)** What are the assumptions and limitations of EOQ formula? [6]
- b) A particular item has a demand of 9000 units/year. The cost of one procurement is Rs. 100/- and the holding cost per unit is Rs. 2.40/- per year. The replacement is instantaneous and no shortages are allowed. Determine. [12]
- Economic lot size
 - No of orders per year
 - Time between orders
 - Total cost per year if the cost of one unit is Rs. 1/-

OR

- Q6) a)** Explain steps of processing n jobs through two machines. [6]
- b) A manufacturing company processes 6 different jobs on two machines A & B. No of units of each job and its processing time on A & B are given below. Find the optimal sequence of processing. [12]

Job no	No of units of each job	Processing time	
		M/C-A (Min)	M/C-B (Min)
1	3	5	8
2	4	16	7
3	2	6	11
4	5	3	5
5	2	9	7.5
6	3	6	14

SECTION - II

- Q7) a)** A milk plant at a city distributes its product by trucks, loaded at the loading dock. It has its own fleet of trucks plus trucks of a private transport company. This transport company has complained that sometime its trucks have to wait in line and thus the company loses money paid for a truck and driver that is only waiting. The company has asked the milk plant management either to go in for a second loading dock or discount prices equivalent to the waiting time. The following data are available: [10]

- i) Average arrival rate (all trucks) = 3 per hour.
 ii) Average service rate = 4 per hour.

The transport company has provided 40% of the total number of trucks. Assuming that these rates are random according to Poisson distribution, determine.

- I) The probability that a truck has to wait.
 II) The waiting time of a truck that waits.
 III) The expected waiting time of company truck per day.

- b) Solve the following game using principal of dominance : [8]

		I	II	III	IV	V
A	1	4	2	0	2	1
	2	4	3	1	3	2
	3	4	3	7	-5	1
	4	4	3	4	-1	2

OR

Q8) a) Solve the following game : **[8]**

		B's strategy		
		I	II	III
A's strategy	I	0	-2	7
	II	2	5	6
	III	3	-3	8

b) A bank has one typist. Since the typing work varies in length (no of pages to be typed), the typing rate is randomly distributed approximately a poisson distribution with mean service rate of 8 letters per hour. The letters arrive at a rate of 5 per hour during the entire 8 hour work day. If the type-writer is valued at Rs. 1.50/- per hour, determine. **[10]**

- i) Equipment utilization
- ii) The percent time arriving letter has to wait
- iii) Average system time

Q9) a) Discuss the importance of replacement models. **[6]**

b) The rainfall distribution in monsoon season is as follows : **[10]**

Rain in cm	0	1	2	3	4	5
Frequency	50	25	15	5	3	2

Simulate the rainfall for 10 days using following random numbers :
67, 63, 39, 55, 29, 78, 70, 06, 78, 76 find average rainfall.

OR

Q10)a) Define Simulation model. Distinguish between Deterministic and stochastic simulation models. **[6]**

b) The data of the running costs per year and resale value of equipment whose purchase price is Rs. 2,00,000/- is as below **[10]**

Years of Service	1	2	3	4	5	6	7
Running cost (Rs.)	30000	38000	46000	58000	72000	90000	1,10,000
Resale value (Rs.)	1,00,00	50000	25000	12000	8000	8000	8000

What is the optimum period of replacement?

Q11)a) Explain following terms in PERT/CPM

[6]

- i) Earliest time
- ii) Latest time
- iii) Total activity time
- iv) Event Slack
- v) Critical Path

b) The activities involved in a PERT project are detailed in the following table : **[10]**

Job	Duration		
I - J	a	m	b
1 - 2	3	6	15
2 - 3	6	12	30
3 - 5	5	11	17
7 - 8	4	19	28
5 - 8	1	4	7
6 - 7	3	9	27
4 - 5	3	6	15
1 - 6	2	5	14
2 - 4	2	5	8

- i) Draw a network diagram.
- ii) Find the critical path after estimating the earliest and latest event times for all nodes.
- iii) Find the probability of completing the project before 31 days.
- iv) What is the chance of project duration exceeding 40 days?
- v) What will be the effect on the current critical path if the most likely time of activity 3 - 5 gets revised to 14 instead of 11 days given above?

OR

Q12)a) Explain in details Forward and Backward pass method also explain total float, free float and independent float. **[8]**

b) A small assembly plant assemble PCs through 9 interlinked stages according to following precedence/process : **[8]**

Stage From - to	Duration (hours)
1 - 2	2
1 - 3	2
1 - 4	1
2 - 5	4
3 - 6	8
3 - 7	5
4 - 6	3
5 - 8	1
6 - 9	5
7 - 8	4
8 - 9	3

- i) Draw 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, free float and independent float.



Total No. of Questions : 12]

SEAT No. :

P2197

[Total No. of Pages : 3

[5254] - 332
B.E. (Production S/W Engineering)
MECHATRONICS & ROBOTICS
(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) What is the basic element of open loop system? Explain with example. [9]
- b) Discuss the major features of mechatronic system with the help of a typical example. [9]

OR

- Q2)** a) Discuss following with neat sketches any 3 [12]
- i) Pneumatic Comparators
 - ii) Summing amplifier
 - iii) Pulse amplitude modulation
- b) State and explain signal conditioning process. [6]

- Q3)** Explain along with Architecture 8085 Microprocessor. [16]

OR

- Q4)** a) How does microcontroller differ with microprocessor? [4]
- b) What is sequential logic system? Explain SR flip-flop. [4]
- c) Explain flag register. [4]
- d) Explain [4]
- i) D flip-flop and
 - ii) Digital comparator

P.T.O.

- Q5)** a) How interfacing device is selected? Explain serial interfacing. [8]
b) What do you understand by one byte, two byte and three byte instructions? Give example of each. [8]

OR

- Q6)** Explain with neat sketches : [16]
a) Polling and interrupts
b) Handshaking
c) Serial Interfacing
d) Bidirectional Buffer

SECTION - II

- Q7)** a) Explain following basic structure of PLC. [8]
b) Draw the ladder diagram for automatic packing of 1 lit. water bottle. [8]

OR

- Q8)** a) Explain two of the Following : [8]
i) Feedback Effect
ii) Rotary Encoder
iii) Potentiometers
b) Explain the importance of ladder diagram. [4]
c) What are the different symbols used in PLC ladder diagram? [4]

- Q9)** Explain in detail hydraulic system used in deep drawing press in detail along with design Calculation. [16]

OR

- Q10)** Explain following with neat diagram : [16]
a) Journal Bearings
b) Cam and Cam followers
c) 5/2 and 3/2 direction control valve

Q11)a) Explain different types of sensors used in robot used for spray painting application. **[16]**

b) Define Yaw, Pitch and Roll of robot wrist? **[2]**

OR

Q12)a) What is a Pay load? State its role in robot design. **[6]**

b) Explain the following : **[12]**

i) Degree of freedom

ii) Spatial Resolution

iii) Work Envelope

iv) Repeatability

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P4365

[Total No. of Pages : 3

[5254]-333

**B.E. (Production Sandwich Engg.)
ADVANCED PRODUCTION TECHNOLOGY
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

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

- a) High Speed Machining Technology
- b) Dry machine tool and requisite equipments
- c) Hard Part Machining

OR

Q2) 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]**

Q3) Discuss the following: **[16]**

- a) Nano Metrology
- b) Ultra-precision machines
- c) Abrasive Flow Machining

OR

Q4) Discuss the following: **[16]**

- a) Nano-Scale Machining
- b) Magnetic Abrasive Finishing
- c) Magnetic Float Polishing

P.T.O.

- Q5)** 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]

OR

- Q6)** Discuss the following: [16]
a) Computer Aided Inspection
b) Enterprise Resource Planning
c) Cellular Manufacturing Systems
d) Rapid Prototyping

SECTION - II

- Q7)** Explain the following: [18]
a) Centrifugal and Revolving Feeder
b) Design for Automated Assembly
c) Automated Factory
d) Features of Toyota Production System.

OR

- Q8)** Explain the following: [18]
a) Industrial Robots
b) Analytical Model of FMS.
c) Petrinets
d) Automated Workpiece Handling

- Q9)** Explain the following: [16]
a) Hydraulic Actuators
b) Hydraulic Proportional Valves
c) Air Motors
d) Advantages of Pneumatic Mechanisms

OR

Q10) Explain the following:

[16]

- a) Hydraulic Valves
- b) Hydraulic Servo Mechanism
- c) Standard Components for Pneumatic Mechanisms
- d) Applications of Pneumatic Mechanisms

Q11)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]**

OR

Q12)a) Describe the types and construction details of Piston Pumps and Gear Pumps. **[8]**

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



Total No. of Questions : 12]

SEAT No. :

P2198

[Total No. of Pages : 2

[5254] - 335

B.E. (Production Sandwich Engineering)

AUTOMOBILE ENGINEERING

(2008 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Unit - 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]

Unit - II

- Q3)** a) What is the purpose of a radiator in an automobile? Explain its construction. [6]
b) What is the optimum cooling? Explain. [6]
c) What is pressure cap? Draw Diagram for the same. [4]

OR

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

P.T.O.

Unit - III

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

OR

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

SECTION - II

Unit - IV

- Q7) a)** Explain the operation of an epicyclic gear box. [8]
b) What is hydraulic clutch? How dose 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]

Unit - V

- 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]

Unit - VI

- 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. :

P2199

[Total No. of Pages : 3

[5254] - 336

B.E. (Production - Sandwich)

**COMPUTER INTEGRATED MANUFACTURING AND
INDUSTRIAL ROBOTICS**

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) List Out the different models used in CIM? Draw the neat sketch of IBM Models and compare various Models? [12]
b) Explain Role of Models in CIM along with suitable example. [4]

OR

- Q2)** a) List out the different methods of Rapid Prototyping. Explain any one Method in detail along with suitable example for artificial Foot. [8]
b) Explain the following in detail. [8]
i) Concept of Solid ground Curing.
ii) Application Rapid tooling methods to Forging pf connecting rod.

- Q3)** a) Explain the Basic Structure of Robot used in sheet metal working. [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 expression. [12]
b) Explain the Concept of Spatial mechanism. [4]

P.T.O.

- Q5) a)** Explain the Hybrid of drives used in Robotics. [6]
b) Using a schematics diagram represent a hydraulic circuit to explain the Drives system of Robot playing football Shoulder & Arm expansion Respectively. [12]

OR

- Q6) a)** Explain pneumatic 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 6kg rectangular block is gripped in the middle and lifted vertically At velocity 1 m/s. If it accelerates to this velocity at 37.5 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 Fragile by using FEA. [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 Digital system? What are the types of vision sensors used to take the image of an object in Coal Mines. [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 Robot in Medical Field for performing of Heart Operation. [6]

OR

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

- a) Interfacing of robotics with Cloud Computing.
- b) Obstacles avoidance technique in robotics in Packing Industry.
- c) Languages used for programming in robot.



Total No. of Questions : 12]

SEAT No. :

P2200

[Total No. of Pages : 3

[5254] - 338

B.E. (Production Sandwich Engineering)

ERGONOMICS AND HUMAN FACTORS IN ENGINEERING

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Answers to the two sections should be written in separate answer books.*
- 2) *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

Unit - I

Q1) Write short note on following ergonomic concepts **[18]**

- a) Human Physical Activities
- b) Measures of Physiological Functions
- c) Strength and Endurance

OR

Q2) 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]**

Unit - II

Q3) a) Explain the principles of use of anthropometric data in design. Explain any two with examples. **[8]**
b) Compare between work surface height and working height. **[8]**

OR

Q4) a) Write a note on mirror image arrangements. **[8]**
b) Explain the principles of seat design. Discuss with a good example. **[8]**

P.T.O.

Unit - III

- Q5) a)** Write a note on general location of displays and controls within workspace. [8]
- b) Explain any four important functions of controls. Discuss with suitable examples. [8]

OR

- Q6) a)** Discuss any one special control device with a neat sketch. [8]
- b) Write a note on concept of visibility. [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. :

P2201

[Total No. of Pages : 3

[5254] - 339

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

MATERIALS MANAGEMENT AND LOGISTICS

(2008 Pattern) (Elective - II) (Revised)

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) Explain the concepts Value Analysis and Value Engineering giving example. [9]

b) What is Material Requirement Planning (MRP1)? Explain in detail. [9]

OR

Q2) a) What are the objectives of materials management? [9]

b) What are the factors influencing Make or Buy decision. Explain in brief. [9]

Q3) a) Explain Import Cycle with flowchart. [8]

b) Explain different objectives of Purchasing. [8]

OR

Q4) a) What are the factors to evaluate potential Supplier? [8]

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

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

b) Explain waste disposal system in brief. [8]

OR

P.T.O.

- Q6)** a) Explain various causes of surplus and obsolete stock. [8]
- b) Explain and differentiate between : [8]
- i) Centralized and Decentralized stores
- ii) Annual stock taking and Continuous stock taking

SECTION - II

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

OR

- Q8)** a) What is the importance of warehouse? List the types of warehouses. [8]
- b) List and explain in brief economic and service benefits of warehousing. [8]

- Q9)** a) Briefly explain ABC analysis with suitable example. [8]
- b) Spartans engineering needs 5400 units/year of bought out component which will be used in its main product. The ordering cost is Rs. 250 per order and carrying cost per unit per year is Rs. 30. Find [8]
- i) Economic order quantity
- ii) Number of orders per year
- iii) Time between successive orders

OR

- Q10)** a) List and explain different types of costs in inventory. [8]
- b) Derive the Economic Order Quantity (EOQ) formula for the Purchase model without shortages. [8]

Q11)a) Define following terms related to inventory and show diagrammatically.[9]

i) Safety stock

ii) Reorder level

iii) Lead time

iv) Average inventory level

b) Explain Fixed Period (P) system and Fixed Quantity (Q) system in brief. [9]

OR

Q12)a) Derive the formula for EMQ when replenishment is non instantaneous (Gradual). State the assumptions made. [9]

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

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2202

[Total No. of Pages : 5

[5254] - 340

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

FINANCIAL MANAGEMENT AND COST CONTROL

(2008 Pattern) (Elective - II - III)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) 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.
- 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 any four ratios with example. [8]

OR

- Q2)** a) What is Profit maximization? Explain what actions company should take to Improve it? [8]
- b) Explain functions of finance management. Explain the difference between finance and accounting relating to the treatment of funds and decision making. [8]
- 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 45% 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]

P.T.O.

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) Explain what are the sources of working capital. [9]
- b) ABC. 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 month under. [8]

month under

FIFO & LIFO methods :

2015

1st January	Opening stock	200 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) BE P.

ii) Profit if sales are 15% above break-even volume.

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2203

[Total No. of Pages : 3

[5254] - 341
B.E. (Production S/W)
PRODUCT DEVELOPMENT
(2008 Pattern) (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 books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume Suitable data, if necessary.*
- 6) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

SECTION - I

Unit - I

- Q1)** a) What do you mean by product design? Explain the role of customer in design of a new product. [9]
- b) Explain Standardization, Simplification & Specialization in product design. [9]

OR

- Q2)** a) Explain Product Verification & Product Validation in short with example. [8]
- b) Write short notes on : [10]
- i) Design by evolution and innovation
 - ii) Factors in product design

Unit - II

- Q3)** a) What is Technology forecasting? Explain S-curve. [8]
- b) Explain the following terms
- i) Customer Needs
 - ii) Mission Statement and Technical Questioning [8]

OR

P.T.O.

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

Unit - III

- Q5) a)** Explain functional modeling and decomposition. [8]
- b) Explain augmentation & aggregation in short? [8]

OR

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

SECTION - II

Unit - IV

- Q7) a)** Write Short Notes on : [9]
- i) Force Flow Diagrams
 - ii) Applications of Product Teardown
- b) What is product tear down process & explain its different methods. [9]

OR

- Q8) a)** What is indented assembly cost analysis & explain function form diagrams. [9]
- b) Explain in short product portfolio and architecture. [9]

Unit - V

- Q9)** a) Explain need and importance of design for environment. [8]
b) Explain phases of product life cycle with its corresponding technologies. [8]

OR

- Q10)**a) What is product testing & explain following terms : [8]
i) Field trials
ii) Virtual Trial
iii) Iterations
b) Explain the guidelines to be followed in the design of the parts for the following processes : [8]
i) Casting
ii) Forging

Unit - VI

- Q11)**a) What is link between product data & product workflow? Explain the PLM in detail. [8]
b) Explain different Phases of Product Life Cycle in short. [8]

OR

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

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2204

[Total No. of Pages : 3

[5254] - 342

B.E. (Production Sandwich Engineering)

SUPPLY CHAIN MANAGEMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Unit - I

- Q1)** a) Describe the role of forecasting in SCM. [10]
b) Write a note on risk management in SC Forecasting. [8]

OR

- Q2)** a) Discuss primary and secondary objectives of Supply Chain Management. [9]
b) Define SCM and draw a function diagram for the same. Discuss with an example. [9]

Unit - II

- Q3)** a) Identify cycles & push-pull boundary in supply chain when you are Purchasing TABLET PC from a shop in your city. [8]
b) Describe any three steps in basic approach to design forecasting. [8]

OR

- Q4)** a) Discuss measures of forecast errors in brief. [8]
b) Discuss components of SC forecast and types of forecasting methods? [8]

P.T.O.

Unit - III

- Q5)** a) Discuss in brief the role of IT in Network Design. [9]
b) Discuss characteristics of information in detail with example for SC. [7]

OR

- Q6)** a) Discuss the role of transportation in supply chain? Mention the various modes of transportation with their strengths and weaknesses. [8]
b) Discuss any two strategic factors and two Technological factors in network design in SC. [8]

SECTION - II

Unit - IV

- Q7)** a) Discuss various options available for designing of transportation network. [9]
b) Explain the basic purchasing cycle and the role of purchasing manager in Detail. [9]

OR

- Q8)** a) Write short note on facility location decisions in supply chain. [9]
b) Discuss the role of transportation in supply chain? Mention the various modes of transportation with their strengths and weaknesses. [9]

Unit - V

- Q9)** a) Discuss the impact of E business in customer service. [8]
b) List the various obstacles for coordination in supply chain. [8]

OR

- Q10)** a) How the design of distribution network has been effected due to evolution of E business. [8]
b) What is bullwhip effect and how does it relate lack of coordination in supply chain? [8]

Unit - VI

- Q11)**a) Write a note on impact of financial factors in supply chain decisions. **[8]**
- b) Write a note on decision trees. How does it help in evaluating SC requirements. **[8]**

OR

- Q12)**a) How do you evaluate a decision using financial perspective? Explain with SC requirements. **[8]**
- b) Enlist any five factors influencing financing decisions in SC. Describe any two. **[8]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2205

[Total No. of Pages : 2

[5254] - 343

B.E. (Production Sandwich)

PLANT ENGINEERING AND MAINTENANCE

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) What is parato chart? Explain it. [8]
b) Explain assessment process of maintenance? [8]
- OR
- Q2)** a) Discuss significance of training of maintenance and safety. [8]
b) Explain productivity measurement techniques. [8]
- Q3)** a) Explain various types plant facility. [8]
b) What is importance of plat facility and layout planning? [8]
- OR
- Q4)** a) Explain PQRST analysis. [8]
b) Discuss advantages of layout. [8]
- Q5)** a) Explain various types of maintenance. [8]
b) Discuss spare part management system in detail. [10]

OR

P.T.O.

- Q6)** Write short notes on following. **[18]**
- a) Software for classification and coding.
 - b) Simulation of inventory planning.
 - c) Maintenance of process types industries.

SECTION - II

- Q7)** a) Explain life cycle costing. **[8]**
b) How mathematical model is formulated for life cycle costing? **[8]**

OR

- Q8)** a) How preventive maintenance is affects on life cycle costing? **[8]**
b) Explain reliability and hazard function. **[8]**

- Q9)** a) What are accident prevention practices and codes? Explain it in detail. **[8]**
b) Write short note on, recycling of wastes. **[8]**

OR

- Q10)** a) Explain energy conservation and audit. **[8]**
b) Discuss importance of plant safety and fire protection in detail. **[8]**

- Q11)** a) What is ferrography and hot ferrography. **[8]**
b) What is reliability centered maintenance. **[10]**

OR

- Q12)** a) What do you understand from Total Productive Maintenance? **[8]**
b) Explain RAM analysis in detail. **[10]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2206

[Total No. of Pages : 3

[5254] - 344

B.E. (Production S/W)

**INDUSTRIAL RELATIONS & HUMAN RESOURCE
MANAGEMENT**

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

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) *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

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

P.T.O.

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

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2207

[Total No. of Pages : 2

[5254] - 351
B.E. (Bio-Technology)
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) Explain the “Three Phase Strategy” for the application of downstream processing techniques. **[16]**

OR

Q2) What are the major classes of bioproducts? How design criteria will vary according to type of products? Explain. **[16]**

Q3) What is spectrophotometry? Explain instrumentation of spectrophotometry. **[16]**

OR

Q4) Write short notes on : **[16]**

- a) NMR
- b) Atomic absorption spectroscopy

Q5) Explain the process of Gel filtration chromatography in details. **[18]**

OR

Q6) Explain the process of reverse phase chromatography in details. **[18]**

P.T.O.

SECTION - II

- Q7)** a) Differentiate between Gas and Liquid chromatography. [6]
b) Draw chromatogram and explain each term involved in it. [10]

OR

- Q8)** What are the salient features of liquid chromatography? Describe LC-MS in detail. [16]

- Q9)** Write short notes on : [18]

- a) Molecular Sieves
b) Supercritical fluid extraction

OR

- Q10)** Write short notes on : [18]

- a) Precipitation
b) Aqueous two phase systems

- Q11)** Write short notes on : [16]

- a) Citric Acid
b) Peptide antibiotics

OR

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

- a) Beer
b) Xanthan

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2208

[Total No. of Pages : 4

[5254] - 352

B.E. (Biotechnology)

INSTRUMENTATION AND PROCESS CONTROL

(2008 Pattern) (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) *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 Optical Pyrometer. [8]
- b) With the help of neat sketch, explain the principle and working of Bimetallic Thermometer. [8]

OR

- Q2)** Explain in brief working principle of following instruments [16]
- a) Radiation Pyrometer
 - b) McLeod pressure gauge
 - c) Thermocouple
 - d) Electromagnetic flow meter

- Q3)** a) Derive the transfer function for a First order system with step input. [8]
- b) With a neat sketch. For first order system, explain effect of change in Gain and Time constant. [4]
- 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. Calculate temperature reading after 2 min. [4]

OR

P.T.O.

- Q4) a)** Write a short note on Seebeck and Peltier effect. [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 4 is introduced in to a system having the transfer function. [10]

$$\frac{Y(S)}{X(S)} = \frac{4}{(S^2 + 1.6S + 4)}$$

Determine

- i) Percent Overshoot
 - ii) Maximum value of Y (t)
 - iii) Ultimate value of Y (t)
 - iv) Period of oscillation
- 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

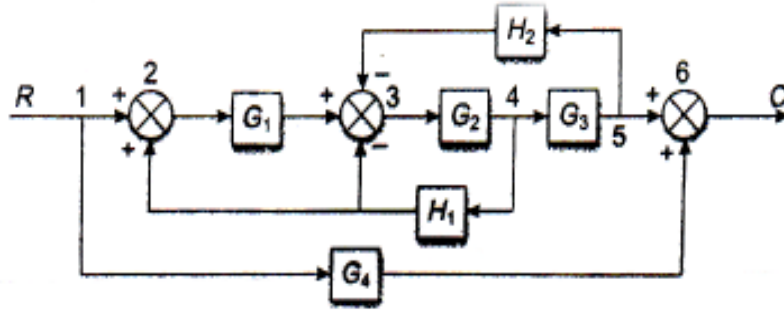
- Q6) a)** Derive transfer function for Interacting tank system. [8]
- b) Derive the transfer function for a damped vibrator system and state the significance of the constants appearing in the transfer function. [10]

SECTION - II

- Q7) a)** Differentiate between [6]
- i) Positive and Negative feedback
 - ii) Servo and Regulator Problem
- b) What is PID controller? 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 having. [8]

$$G(s) = \frac{10}{s(1 + 0.01s)(1 + 0.1s)}; H(s) = 1$$

- b) Write a note on C-C tuning method. [8]

OR

- Q10)a)** Plot the root locus pattern for a system whose forward path transfer function is [12]

$$\frac{K(s + 1)}{s(s + 2)(s^2 + 2s + 5)}$$

- b) With respect to frequency response analysis define the following terms. [4]
- i) Amplitude Ratio High frequency asymptote
 - ii) Low frequency asymptote
 - iii) High frequency asymptote
 - iv) Corner Frequency

Q11) Classify control systems based on number of measured variables and number of manipulated variables. Explain Cascade controller with a neat sketch and suitable example. **[16]**

OR

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

- a) Ratio control system
- b) Split Range Control
- c) Override control system
- d) Foam Controller

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2209

[Total No. of Pages : 2

[5254] - 354

B.E. (Biotechnology)

ENVIRONMENTAL BIOTECHNOLOGY

(2008 Pattern) (Elective - I) (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) 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) Enlist the water quality standards mentioned by WHO and MPCB. [18]

OR

Q2) A completely mixed activated sludge process is to be used to treat wastewater flow of 500m³/Hr. having a soluble BOD₅ of 250mg/L. The concentration of soluble BOD₅ escaping treatment is 10mg/L. Design criteria. [18]

Y = 0.5, k = 5day⁻¹, K_d = 0.06 day⁻¹, K_s = 100kg/L and the concentration of MLVSS(X) = 200mg/L Calculate the following :

- a) Treatment efficiency
- b) Mean cell residence time
- c) Volume of aeration tank

Q3) Write in detail about : [16]

- a) Rotating biological contactors
- b) Aerated lagoons

OR

Q4) Answer the following : [16]

- a) Explain in detail about fluidized bed reactor employed for the treatment of waste water. Write about its advantages and disadvantages.
- b) Describe in detail about oxidation ditches.

P.T.O.

- Q5)** Discuss in detail about. [16]
- a) Neutralization process for treatment of waste water.
 - b) Equalization and proportioning of waste water.

OR

- Q6)** Write down the treatment strategies for industrial effluent of following industry. [16]
- a) Dairy
 - b) Sugar

SECTION - II

- Q7)** Draw a schematic and describe the operating principle of : [18]
- a) Gravitational settling chambers
 - b) Electrostatic precipitator

OR

- Q8)** Describe about : [18]
- a) Basic design and operating principle of cyclone separator.
 - b) Sampling and analysis of air pollutants.

- Q9)** Describe in detail about the following solid waste disposal methods : [16]
- a) Sanitary land filling
 - b) Incineration

OR

- Q10)** Discuss different types of biomedical waste and its treatment process. Write a note on minimization of biomedical waste. [16]

- Q11)** Describe in detail about the process of wormicomposting and liquid phase bioremediation. [16]

OR

- Q12)** Describe in detail about : [16]
- a) Recycling of wastes
 - b) Vermicomposting

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2210

[Total No. of Pages : 2

[5254] - 357

B.E. (Biotechnology)

BIOENERGY AND RENEWABLE RESOURCES

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

- Q1)** a) What are the advantages and limitations of renewable energy sources?[9]
b) What is meant by renewable energy sources? Explain in brief these energy sources with special reference to Indian context. [9]

OR

- Q2)** a) Describe briefly conventional and non-conventional energy sources. [9]
b) What are the prospects of non-conventional energy sources in India? Explain. [9]

- Q3)** a) Explain with neat sketch working of wind energy systems with main components. [8]
b) Describe binary cycle system for liquid dominated system. [8]

OR

- Q4)** What is Geothermal energy? Give the applications of geothermal energy. Enlist the general categories of geothermal resources and describe any two in details. [16]

- Q5)** a) Explain methods to produce hydrogen from solar energy. [8]
b) Describe the principle of power generation in solar photo voltaic system. [8]

OR

- Q6)** Explain the principle of conversion of solar energy into heat? What are the main components of flat plate solar collector, explain the function of each.[16]

P.T.O.

- Q7)** a) Explain with neat flowchart the steps involved in biodiesel production at industrial level. [9]
b) Define biodiesel and properties of biodiesel. [9]

OR

Q8) Explain a biodiesel production cases with a neat sketch. [18]

- Q9)** a) What are the challenges in butanol fermentation? Explain any two approaches to overcome them. [10]
b) Why pretreatment is required for lignocellulosic material? Explain in detail any two methods of pretreatment. [6]

OR

Q10) What is aim of pretreatment? Explain dilute acid hydrolysis and alkali pretreatment. Enlist the drawbacks of both the methods. [16]

Q11) What is biogas? Describe the anaerobic process of biogas production. Illustrate the advantages of anaerobic digestion and the factors affecting generation of gas. [16]

OR

Q12) Describe in detail about following biogas plant. [16]

- a) Continuous and batch types
b) The dome and drum types
c) Different variations in the drum type

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2211

[Total No. of Pages : 2

[5254] - 358
B.E. (Biotechnology)
BIOMATERIALS
(2008 Pattern) (Elective - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Define composite biomaterials. Advantages of composite materials. [8]
b) Explain the properties and biomedical applications of three natural polysaccharides. [8]

OR

- Q2)** List out any four mechanical properties of materials and describe their importance for the application in biomaterials. [16]

- Q3)** What is a biomaterial? Define biocompatibility and host response with one detailed casestudy. [16]

OR

- Q4)** What are biodegradable plastics? Explain types of biodegradable plastics with applications. [16]

- 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) What is the difference between Polyhydroxyalkanoates and biodegradable polymers? [9]
b) What are different classes of hydrogels? Discuss swelling property of hydrogel and its application in medicine. [9]

P.T.O.

SECTION - II

Q7) Why membrane bioreactors are preferred in the production of polymer precursor. Explain it with one example. **[18]**

OR

Q8) Explain fermentative production of following polymers along with its properties and application : **[18]**

- a) Polycaprolactone
- b) PHA

Q9) a) Give structure, properties and functions of chitin and chitosan. **[8]**

- b) How can we use stress strain diagram in selecting the most appropriate materials for orthopedic biomaterials. **[8]**

OR

Q10) List a type of materials used in each of the following medical applications : **[16]**

- a) Skin repair
- b) Bone plates
- c) Contact lenses
- d) Tissue engineering scaffold

Q11) What are medical fibers? Name and explain processes for preparation of biofibers with its application and importance. **[16]**

OR

Q12) a) Explain mass spectrometry and atomic force microscopy for analysis of polymer structure. **[8]**

- b) Draw a chemical structure and write a note on “Biomedical applications of Pullulan”. **[8]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2212

[Total No. of Pages : 2

[5254] - 359

B.E. (Biotechnology)

**STEM CELL BIOLOGY AND REGENERATIVE MEDICINE
(2008 Pattern)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Q1) Describe the in detail with suitable examples how regenerative medicine is practiced. **[18]**

OR

Q2) What are stem cells? Why are they so important in the organism's life? Which are the different properties of stem cells which can be harnessed for the betterment of human life? **[18]**

Q3) Write a note on lineage tracing technique in identification of stem cells. **[16]**

OR

Q4) How is the DNA sequencing carried out? What is the difference in the sequencing technique of microorganism and that of Human? **[16]**

Q5) Explain what Embryonic stem cells are used. How are they isolated, what are the growth factors and other requirements to keep them as ESCs. **[16]**

OR

Q6) How are hematopoietic stem cells isolated and cultured? **[16]**

P.T.O.

SECTION - II

Q7) Describe in brief the guidelines laid down by the government for stem cell research in India. **[18]**

OR

Q8) How is the stem cell research categorised in India? What are the guidelines for stem cell banking and distribution of Human Embryonic Stem Cells? **[18]**

Q9) Explain how the stem cell research can help in curing of the wounds caused due to burns? **[16]**

OR

Q10) Discuss and comment on the use of Stem Cells for the treatment of Parkinsons disease. **[16]**

Q11) Describe in detail how tissue engineering is helping generate tissues which are lost due to wounds and burn injuries. **[16]**

OR

Q12) Write a note on gene therapy. **[16]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2213

[Total No. of Pages : 2

[5254] - 360

B.E. (Biotechnology)

BIOPROCESS MODELING AND SIMULATION

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

Q1) Define the following with a suitable example. **[16]**

- a) Mathematical Modelling
- b) Degrees of freedom and it's variations
- c) Chemical Equilibria
- d) Phase Equilibria

OR

Q2) With a neat sketch, explain different phases 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]**

P.T.O.

Q5) Write short notes on various variables and parameters used in the modeling of Fermenter and Bioreactor. [16]

OR

Q6) Briefly explain with suitable examples the classification of mathematical models based on : [16]

- a) State of the process
- b) Variation of independent variables

SECTION - II

Q7) 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(μ_{net}) of the organisms.
- c) Find the cell (biomass) concentration in the recycle stream.
- d) Find the cell concentration in the centrifuge effluent (X_2).

Q9) Write short notes on Activated Sludge systems. Model activated sludge systems with proper diagram and assumptions. [16]

OR

Q10) Explain in detail the Biological treatment of waste water by using Biological film. [16]

Q11) Model a reactor with mass transfer and prove that the degrees of freedom are zero. [16]

OR

Q12) Model a multi component batch distillation column and prove that the system is critically specified. [16]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2214

[Total No. of Pages : 2

[5254] - 362

B.E. (Biotechnology)

FOOD BIOTECHNOLOGY

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) What are the potential applications of food irradiation? What type of food can be irradiated? [8]
- b) Explain different methods used for preserving fruits and vegetables in industries. [8]

OR

- Q2)** Write a short note on biotechnology in relation to food industry. [16]

- Q3)** Explain the technique of Modified Atmosphere Packaging in detail. What are its advantages and applications? [18]

OR

- Q4)** Explain the following processes in detail : [18]
- a) HTST treatment
 - b) Microwave processing

- Q5)** Explain the design, working and applications of : [16]
- a) Dryer
 - b) Refrigerator

OR

P.T.O.

- Q6) a)** What is thermal death kinetics of micro-organisms? Explain in brief the following : **[8]**
- i) Thermal Death Time
 - ii) D value
 - iii) Z value
- b)** Pooled raw milk at the processing plant has bacterial population of $4 \times 10^5/\text{mL}$. It is to be processed at 79°C for 21 seconds. The average D value at 65°C for the mixed population is 7 min. The Z value is 7°C . How many organisms will be left after pasteurization? What time would be required at 65°C to accomplish the same degree of lethality? **[8]**

SECTION - II

Q7) Write a note on production and use of microbial polysaccharides in food. **[16]**

OR

Q8) Explain in brief use of solid state bioprocessing for functional food ingredients. **[16]**

Q9) How various enzymes are used in different food industries? Explain the production of any two enzymes in detail. **[18]**

OR

Q10) Explain the use of enzymes in beer mashing and chill proofing. **[18]**

Q11) What is food industrial waste? Explain in brief the solid waste treatment methods used in food industries. **[16]**

OR

Q12) How is food industrial waste classified? Explain in detail. **[16]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2215

[Total No. of Pages : 2

[5254] - 364

B.E. (Biotechnology)

INTRODUCTION TO SYSTEMS BIOLOGY

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) Solve Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8, Q.9 OR Q.10, Q.11 OR Q.12,
- 2) 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) Write the properties that provide a systems level understanding of a biological system. [18]

OR

Q2) What was the goals of HGP? What are the pros and cons of HGP? [18]

Q3) What is structural genomics? Write about potential impact of structural genomics on drug discovery. [16]

OR

Q4) Describe the applications of comparative genomics in reconstruction of metabolic pathways and gene identification. [16]

Q5) Enlist and explain different Methods for Measuring Gene Expression. [16]

OR

Q6) Answer the following : [16]

- a) What is Affimatrix microarray?
- b) Explain global analysis of gene expression?

P.T.O.

SECTION - II

Q7) Write short notes on : **[18]**

- a) CHIP on CHIP assays
- b) CpG island microarray

OR

Q8) What are the different model organisms of epigenetics? Explain with at least one case study? **[18]**

Q9) Explain in detail about superfamily of Cytochrome P450 enzyme. **[16]**

OR

Q10) What is the difference between Phase I and Phase II reaction? What type of enzymes are involved in each phase? **[16]**

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

- a) Detection techniques used (NMR, MS)
- b) Identification and quantification

OR

Q12) Write in brief about the technologies used in proteomics. Explain any 1 in detail. **[16]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2216

[Total No. of Pages : 4

[5254] - 366

B.E. (Biotechnology)

IPR, BIOETHICS AND REGULATIONS

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

- 1) *Solve Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8, 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) What are the conditions in which IECs waive consent?
- b) What are ethics? Are ethical decisions important? What happens without ethics?

OR

Q2) Answer the following :

[18]

- a) Describe the composition of ethics committee.
- b) ICMR guidelines for epidemiological studies.

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 change 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 consider such manufacture process? **[16]**

Q5) Answer the following : [16]

- a) What is a patent? What rights does a patent provide? How long does patent protection last in India?
- b) What is patent cooperation treaty (PCT)? Who coordinates the activities of PCT? What is the need for PCT?

OR

Q6) Answer the following : [16]

- a) Describe the requirements of patentability.
- b) Explain the benefits of patenting.

SECTION - II

Q7) Answer the following : [18]

- a) Differentiate between
 - i) Trademark and domain name
 - ii) Copyright and trademark
- b) Differentiate between infringement and passing off of trademarks in India.

OR

Q8) What is mean by trademark? What are well known trademarks and associated trademark? What is the term of a registered trademark. [18]

Q9) Why we need good manufacturing practices? What are the basic personnel safety and hygiene requirements in food industry? For drug products formulated with preservatives to inhibit microbial growth, is it necessary to test for preservatives as part of batch release and stability testing? [16]

OR

Q10) What are cGMP? What are the fundamentals of cGMP's? Where did the food drug and cosmetic come from? What happens if cGMP's are not followed? What are the consequences of non compliances? [16]

Q11) Answer the following :

[16]

- a) What is meant by quality assurance and quality control? Describe the various steps involved in QC of any biotech product.
- b) Describe the significance of clinical trial.

OR

Q12) Answer the following :

[16]

- a) What are the basic requirements to import goods? What is import general manifest?
- b) What is meant by quality assurance? What are the factors which influence the quality?

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P2217

[Total No. of Pages : 3

[5254] - 367

B.E. (Biotechnology)

INDUSTRIAL ORGANIZATION AND MANAGEMENT

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

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates :

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

SECTION - I

- Q1)** a) Discuss about partnership and joint stock company. [8]
b) Write a note on : [8]
i) Partnership deeds
ii) Scientific management

OR

- Q2)** a) Explain Management By Objectives (MBO). [8]
b) State various forms of business. Explain cooperative societies in detail. [8]

- Q3)** a) Discuss the role of trade union of India. [8]
b) What is motivation? How it is important for industry prospective. [8]

OR

- Q4)** a) Explain the selection process in a small scale chemical industry. [8]
b) Discuss about : [8]
i) Strike
ii) Lock out

P.T.O.

- Q5) a)** What is inventory built up? Explain in detail A-B-C policy and its objectives. [9]
- b) What is store keeping? State various functions of storekeeper in a chemical Industry. [9]

OR

- Q6) a)** Explain Economic Ordering Quantity (EOQ). Derive. [12]

$$Q = \sqrt{\frac{2PD}{HC}}$$

- b) Write notes on : [6]
- i) Bin Cards
- ii) Stores Ledger

SECTION - II

- Q7) a)** What are the various methodologies used for effective marketing strategies in the competitive market? [9]
- b) Define market research. What are the different methods of market research? [9]

OR

- Q8) a)** What is sales forecasting? Explain the two types of sales forecasting in detail. [9]
- b) Explain Sales and channels of distribution. Explain each channel of distribution with an appropriate example. [9]

- Q9) a)** Explain the following : [8]
- i) ISO system
- ii) ISO 9001
- b) Write an explanatory note on Total Quality Management (TQM). [8]

OR

- Q10) a)** Explain the role of Quality Circles for Quality Management of a process industry. [8]
- b) Explain in detail various steps in exporting equipment to a foreign based customer. [8]

Q11)a) Explain the term Agreement in Contract Act. Explain the various types of Contract according to enforceability, formation and performance. [8]

b) Discuss on : The concept of contract Act. [8]

OR

Q12)Discuss on : [16]

a) Factories Act

b) Monopolies Restrictive Trade Practices and

c) SIMO chart

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