

Total No. of Questions : 10]

SEAT No. :

P3644

[Total No. of Pages : 3

[4859] - 1001

B.E. (CIVIL)

Environmental Engineering - II
(2012 Pattern) (Semester - I)

Time :2.5Hours]

[Max. Marks :70

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

- Q1)** a) Discuss the physical, chemical and biological characteristics of domestic sewage from urban area. [5]
- b) Discuss the different systems of sewerage commonly used in India with their relative merits and demerits. [5]

OR

- Q2)** a) Discuss the effect of change of life style on sewage quality. Also write the typical characteristics of domestic sewage. [5]
- b) Write a short note on Oxygen Sag Curve. [5]

- Q3)** a) Design the scree chamber of an STP to treat a peak flow of 100 MLD of sewage. Assume inclination of bars 45° with horizontal, Size of bars: 10mm x 70 mm, 10 mm dimension facing the flow, clear spacing between bars as 50mm and the velocity through the screen as 0.8 m/sec at peak flow. [5]
- b) Explain ASP with neat sketch. Write advantages and limitations of conventional ASP. [5]

P.T.O

OR

- Q4)** a) Explain the biological principle of trickling filter with neat sketch. [5]
b) What is sludge bulking? Explain the control measures for the same. [5]

- Q5)** a) Design an oxidation pond for treating sewage from a residential colony having population of 10,000 with sewage flow rate of 120 lpcd with the following data. [8]

BOD₅ of raw sewage = 300 mg/l

Desired effluent BOD₅ = 30 mg/l

Location - 28° N

Elevation - 200 m above sea level

Temperature - 25°C

Sky clearance factor - 60%

BOD removal rate constant for the pond at 20° C as 0.1/d

Assume permissible organic loading at 28°N as 200 kg/ha.d.

- b) Discuss the phytoremediation technology for waste water treatment. Also discuss the advantages & limitations of this process. [8]

OR

- Q6)** a) Explain the Algal-Bacterial symbiosis in oxidation ponds. Discuss the design criteria of Oxidation Pond. [8]

- b) Explain the working principle and design criteria of Aerated lagoons. [8]

- Q7)** a) Discuss the working principle of package sewage treatment plant. Write the advantages and limitations of the same. [8]

- b) Discuss the various methods of sludge treatment. [8]

OR

Q8) Draw a neat sketch of conventional sludge digester and explain the following: [16]

- a) Different stages of the digestion process.
- b) Micro-organisms responsible for the process.
- c) Design parameters of anaerobic digester.
- d) Capacity of the digester.

Q9) Explain the source of wastewater generation its characteristics and treatment options for its wastewater with the help of suitable flow diagrams for following industries. [18]

- a) Dairy Industry.
- b) Sugar Industry.

OR

Q10) Write a short note on following.

- a) Disposal of effluent from Sugar Mill.
- b) Importance of Equalization and Neutralization for Industrial wastewater.
- c) Secondary treatment options for industrial wastewater. [18]



Total No. of Questions : 10]

SEAT No. :

P3233

[Total No. of Pages : 3

[4859] - 1002

B.E. (Civil) (Semester End)

TRANSPORTATION ENGINEERING

(2012 Pattern)

Time : 2.5 Hours]

[Max. Marks : 70

Instructions to the candidates :

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

- Q1)** a) The area of Maharashtra is 3,08,000 Sq. Km and there are 276 Towns as per 1981 census. Determine the lengths of different categories of roads to be provided in the state by the year 2001. [5]
- b) Explain Obligatory points. With sketches discuss how these controls alignment. [5]

OR

- Q2)** a) In a braking test, a vehicle travelling at a speed of 40 kmph was stopped by applying brakes fully and the skid marks were 8.5 m in length. Determine the average skid resistance of the pavement surface. [5]
- b) Explain with the help of neat sketches the methods of eliminating camber and introduction of superelevation. [5]
- Q3)** a) Enumerate the steps for practical design of Super elevation considering mixed traffic condition. [5]
- b) Discuss in brief the factors affecting the design of rigid pavement. [5]

OR

P.T.O.

- Q4)** a) Design a valley curve at the junction of a downward gradient of 1 in 30 and a level stretch from head light consideration. The stopping sight distance is 180 m. [5]
- b) Discuss in brief warping stresses and Frictional stresses in rigid pavement. [5]

- Q5)** a) Explain in brief the following : [2+2+2=6]
- i) Wind Rose Type 1
- ii) Taxiway
- iii) Airport Capacity
- b) Explain the characteristics of good airport layout. Draw a neat sketch of typical airport layout of single runway. [4+2=6]
- c) How Runway orientation should be done. ? Discuss. [4]

OR

- Q6)** a) Enlist and explain in brief the various aircraft characteristics. [2+4=6]
- b) Explain the following terms : [2×3=6]
- i) Hanger
- ii) Minimum Circling radius
- iii) Calm period
- c) Explain in brief the advantages and limitation of air transportation. [2+2=4]

- Q7)** a) State the various methods commonly used in estimation of flood discharge at a bridge site. How is the Linear Waterway of a bridge is fixed. [2+4=6]
- b) Calculate the flood discharge from the catchment of 65 Square Kilometers when the rainfall during the storm was 15cm. in two hours. The Time of concentration is 20 hours and the runoff coefficient for the catchment is 0.35. [4]
- c) What is scour depth? State the factors upon which pattern of scour depend. Why allowance should be made in the observed scour depth. [2+2+2=6]

OR

- Q8)** a) What is mean by Afflux? How does the magnitude of afflux influence the design? [2+4=6]
- b) Determine the waterway of the bridge across a stream with a flood discharge of $300 \text{ m}^3 / \text{sec.}$, velocity 1.5 m/ sec and width of flow at high flood level is 70 m . The allowable velocity under bridge is 1.8 m/ sec . Assume permissible safe velocity under the bridge is equal to 90% of allowable velocity under the bridge. [4]
- c) Derive an equation for Economical span of a bridge. State the assumptions clearly. [4+2=6]
- Q9)** a) Define Pier. State the various types of piers Also State the requirements of good pier. [2+2+2=6]
- b) What is Cut water and Ease Water? Why it is necessary? Sketch any two shapes of Cut water and Ease Water. [2+2+2=6]
- c) Write a short note on Erection and Maintenance of Bridges. [6]

OR

- Q10)** a) How will you account for the following in the design of Highway Bridge. [2+2+2=6]
- i) Centrifugal Force
- ii) Earthquake Force
- iii) Wind Load
- b) Define Bridge bearing. State the types of bearings. Why Bearings are necessary in bridges. [2+2+2=6]
- c) Explain the following with a neat sketches : [2+2+2=6]
- i) Arch culvert
- ii) Balanced Cantilever bridge
- iii) Traverser bridge



Total No. of Questions : 10]

SEAT No. :

P3645

[Total No. of Pages : 3

[4859]-1003

B.E. (Civil)

STRUCTURAL DESIGN AND DRAWING - III
(2012 Pattern)

Time : 3 Hours]

[Max. Marks : 70

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 and Q.9 or Q.10.*
- 2) *Figures in bold to the right indicate full marks.*
- 3) *IS: 456, IS: 1343, IS: 3370, IS: 1893 and IS: 13920 are allowed in the examination.*
- 4) *The designs should comply with the latest codal provisions.*
- 5) *If necessary, assume suitable data and indicate clearly.*
- 6) *Use of electronic pocket calculator is allowed.*

- Q1)** a) What is concordant cable profile? Explain with an example. [6]
b) An end block of a post tensioned beam is 350 mm × 500 mm. The effective prestressing force is 800 kN with the tendon placed centrally at the ends. The strength of concrete at transfer is 40 N/mm². Check the bearing stresses if a bearing plate of 200 mm × 200 mm is provided. [4]

OR

- Q2)** a) Explain load balancing concept with a suitable example. [6]
b) An end block of a post tensioned beam is 350 mm × 500 mm. The prestressing force is 800 kN with the tendon placed centrally at the ends. A bearing plate of 200 mm × 200 mm is provided. Calculate the bursting force and design the reinforcement using Fe 500. [4]

- Q3)** a) Explain the mechanism of transfer of pre-stress in pre-tensioned concrete members and highlight the role of transmission length. [4]
b) A two span continuous ground beam ABC has a span AB = 6 m and BC = 6 m. The beams are of size 230 mm × 600 mm. The total load on the beam is 25 kN/m (inclusive of its self-weight). The moment due to EQ loads is 125 kNm. Calculate the design moments only at the supports as per IS 1893. [6]

P.T.O.

OR

- Q4)** a) Explain the criteria for limit state of cracking in prestressed concrete members. [4]
- b) A two span continuous floor beam ABC has a span AB = 6 m and BC = 6 m. The beams are of size 230 mm × 600 mm. Considering the effect of reversal of loads, the design moments and shear are as follows:
 $M_{u,(A+)} = 150$ kNm, $M_{u,(A-)} = 350$ kNm, $M_{u,(AB+)} = 110$ kNm, $M_{u,(B+)} = 90$ kNm, $M_{u,(B-)} = 400$ kNm, $M_{u,(BC+)} = 90$ kNm, $V_{u,(AB)} = 180$ kN, $V_{u,(BA)} = 200$ kN, $V_{u,(BC)} = V_{u,(CB)} = 220$ kN. Design the beam AB only. Use M30 grade of concrete and steel of grade Fe 500. [6]

- Q5)** a) What are earth retaining structures? Give suitable examples. [4]
- b) Perform stability analysis for a T-shaped retaining wall and calculate the factor of safety against overturning, sliding and check for maximum pressure at the base. The details of the retaining wall are as follows:
Overall height = 5.0 m, thickness of stem at base = 350 mm and 200 mm at top, thickness of base slab = 350 mm, width of base slab = 2.70 m, width of toe = 0.80 m. The top surface of the backfill is horizontal and has the following properties: unit weight = 17 kN/m³, coefficient of friction between concrete and soil = 0.55, angle of repose = 30°, SBC of soil = 150 kN/m², depth of foundation = 1.0 m. [12]

OR

- Q6)** Design a L-shaped retaining wall to retain a backfill of 3 m. The backfill is horizontal and is subjected to a surcharge of 10 kN/m² acting over a length of 5 m from the face of the wall. The unit weight of the soil is 18 kN/m³, angle of repose = 30°, SBC of soil = 180 kN/m², good foundation is available at a depth of 1.0 m. Sketch the details of reinforcement in the wall and base slab. [16]

- Q7)** a) A slab-beam type combined footing is designed for two boundary columns A and B, 3 m apart. Sketch the typical details of reinforcement in the beam and slab in longitudinal and transverse sections. [3]
- b) Design a slab type combined footing for two columns spaced 3 m apart carrying a service load of 600 kN each. The columns are 300 mm × 300 mm. The SBC of soil is 180 kN/m². The width of the slab shall be taken as 2.0 m. Use M30 grade of concrete and steel of grade Fe 500. Sketch the details of reinforcement. [13]

OR

Q8) Design a slab-beam type combined footing for two boundary columns spaced 4.0 m apart. The columns are 300 mm × 300 mm. The working loads from the column are 700 kN each. The SBC of soil is 175 kN/m². Use M30 grade of concrete and steel of grade Fe 500. Sketch the details of reinforcement. **[16]**

Q9) a) A rectangular water tank 4.5 m × 2.25 m × 2.25 m is resting on ground. The tank wall is free at top and hinged at bottom. Determine the maximum bending moments at mid-span and support as per IS: 3370 in the long wall and short wall. **[6]**

b) Design the section of a circular water tank with flexible base and resting on ground. The wall is subjected to a maximum hoop tension of 260 kN. Use Fe 500 grade of steel and M 35 grade of concrete. The limiting design surface crack width may be taken as 0.1 mm. **[12]**

OR

Q10) a) Explain the procedure to assess the crack width in flexure in water retaining structures as per the latest codal provisions. **[4]**

b) Design a square water tank resting on ground for a capacity of 75,000 liters. Use M 30 grade of concrete and steel of grade Fe 500. Sketch the details of reinforcement. **[14]**



Total No. of Questions : 10]

SEAT No. :

P2042

[4859] - 1004

[Total No. of Pages : 3

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(2012 Pattern) (Elective- I)

Time : 2½Hours]

[Max. Marks : 70

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; and Q.9 or Q.10.*
- 2) *Figures in bold, to the right indicate full marks.*
- 3) *IRC: 6, IRC:112, IS 456, IS 800, IS 1343 and Steel table are allowed in the examination.*
- 4) *Neat diagrams should be drawn wherever necessary.*
- 5) *If necessary, assume suitable data and indicate clearly.*
- 6) *Use of electronic pocket calculator is allowed.*

Q1) What are IRC loading standards? Explain any one loading case. **[10]**

OR

Q2) Explain loading standards for railway bridges. **[10]**

Q3) What are Pigeaud's curves? Explain in brief. **[10]**

OR

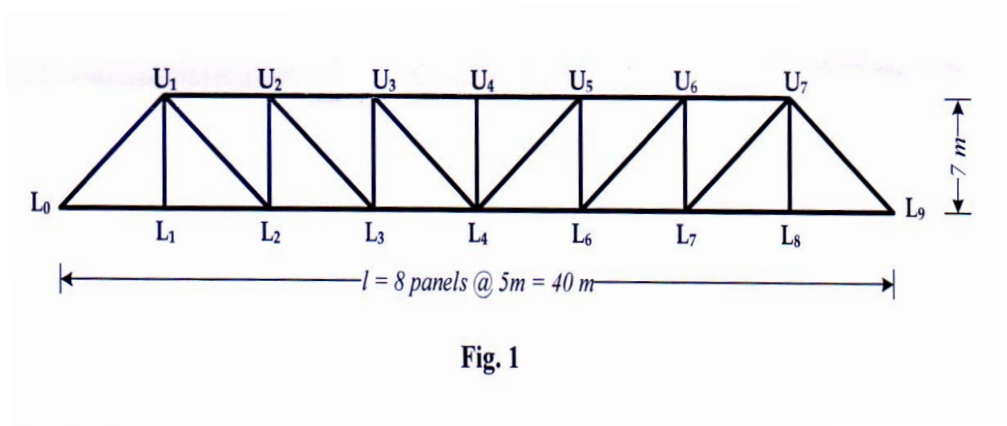
Q4) Show the placing of wheel loads for obtaining maximum bending moment and shear force on an interior panel of a T-beam deck slab bridge for IRC Class 70R and Class A loading. **[10]**

Q5) Design the members U_2-U_3 , U_2-L_2 for the broad gauge railway steel truss bridge shown in fig.1. The details are as follows. **[18]**

- a) Weight of stock rail =0.65kN/m,
- b) Weight of check rail =0.5kN/m
- c) Timber sleepers of size =(0.25×0.25×2.5) m@0.45m c/c
- d) Unit weight of timber =6.2kN/m³
- e) Spacing of truss = 6.0 m c/c

P.T.O.

- f) Equivalent uniformly distributed load for BM and SF are 3498kN and 3815kN respectively.
- g) $CDA = 0.324$



OR

Q6) For the problem given in Q.5 design the members L_2-L_3 and L_3-U_2 . [18]

Q7) Design an elastomeric bearing for the given data and also sketch the details. [16]

- a) Maximum normal load = 1250 kN.
- b) Minimum normal load = 400kN
- c) Lateral load = 35kN
- d) Longitudinal load = 85 kN
- e) Total longitudinal translation = 10mm
- f) Rotation at support = 0.001
- g) Shear modulus of elastomer = 1.0 N/mm^2
- h) Allowable compressive stress for concrete = 8 N/mm^2
- i) Allowable compressive stress for elastomer = 9 N/mm^2

OR

- Q8)** a) What are bearings? Explain the classification of various types of bearings with neat sketches. [8]
- b) Explain the design procedure for rocker bearing. [8]

- Q9)** a) Explain with neat sketches the different types of piers used for reinforced concrete and steel bridges. [8]
- b) Explain the loads considered in the design of piers and abutments. [8]

OR

Q10) Design a RC abutment for a RC T-beam deck slab bridge with the following data. [16]

- a) Span = 15m
- b) Width of carriageway = 7.5m
- c) Footpath = 1.5 m on either sides
- d) Live load on the deck slab = IRC Class A
- e) Dead weight of span = 4000 kN
- f) Longitudinal force = 200 kN
- g) Load on footpath = 5kN/m²
- h) RL of formation = 500.000 m; RL of cg of girder = 499.100 m; RL of center of bearing pin = 498.000 m; RL of bed level = 490.000 m.
- i) Unit weight of backfill soil = 18kN/m³
- j) Allowable bearing pressure = 250 kN/m²
- k) $\mu=0.35$, $\Phi=35^\circ$, Ground acceleration = 0.1g.
- l) Materials = M 30 grade concrete and steel of grade Fe500



Total No. of Questions : 10]

SEAT No. :

P3921

[Total No. of Pages : 5

[4859] - 1005

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

SYSTEMS APPROACH IN CIVIL ENGINEERING

(2012 Pattern) (Elective)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1) a)** What are the applications of systems approach in Civil Engineering? Describe with the help of suitable examples **[5]**
- b) A machine operator has to perform turning and threading on a number of different jobs. The time required for the operations for various jobs are as under. **[5]**

Job	Time for turning (minutes)	Time for threading (minutes)
1	3	2
2	5	4
3	8	8
4	2	5
5	9	3

Determine the order in which the jobs should be processed in order to minimize the total time required to turn out all the jobs. Also, find the total processing time and idle time for both operations.

OR

- Q2) a)** What are the conditions for Convex function and concave function? **[5]**
- b) A plant manufactures washing machines and dryer in three departments as stamping, motor & transmission, washer assembly and dryer assembly. The monthly capacities are as follows: **[5]**
- Stamping dept: 950 washers or 950 dryers
Motor & transmission dept: 1500 washers or 5000 dryers
Washer assembly: 8000 washers only
Dryers assembly: 5000 dryers only
Profits per piece of washers and dryers are Rs. 2500 and Rs 3000 respectively.
Formulate the L.P. model

P.T.O.

- Q3) a)** For the following functions, determine whether they are concave or convex [5]
- i) $F(x) = x_1^2 x_2$
- ii) $F(x) = x_1 + 5x_2$
- b) Define Local optima and global optima with the help of neat sketch. [5]

OR

- Q4) a)** Following is the arrival time and service time at a coffee shop. [6]

Interarrival time (minutes) : 0 0.5 1 1.5 2 2.5 3

Frequency (%) : 5 35 25 15 10 7 3

Service time (minutes) : 1 2 3 4 5

Frequency (%) : 5 25 35 20 5

Simulate the system for 10 arrivals and find the idle time for customer and waiter.

Use following random numbers:

For arrival : 21, 11, 71, 65, 41, 35, 17, 91, 07, 34

For service : 20, 72, 34, 54, 30, 22, 48, 74, 76, 02

- b) What are the assumptions for queuing model? [4]

- Q5) a)** In an investment project, only 8 units of money are available for allocation in unit amounts to three investment programmes. The return function for each programme is given below. It gives the return from investing x units of money in ith investment programme. Find the optimum investment policy. [10]

x	0	1	2	3	4	5	6	7	8
I	0	5	15	40	80	90	95	98	100
II	0	5	15	40	60	70	73	74	75
III	0	4	26	40	45	50	51	52	53

- b) Write short note on characteristics of Dynamic Programming. [6]

OR

- Q6) a)** A distance network consists of eleven nodes which are distributed as shown below. **[8]**

Arc	Distance	Arc	Distance
1-2	8	5-8	12
1-3	7	5-9	7
1-4	1	6-9	9
2-5	5	7-9	6
3-5	9	7-10	13
3-6	2	8-11	4
3-7	8	9-11	2
4-7	10	10-11	15

Find the shortest path from node 1 to 11 and the corresponding distance.

- b) Define Dynamic programming problem. List and explain the terminologies of dynamic programming problem. What are the application areas of dynamic programming. **[8]**

- Q7) a)** Solve by using graphical method **[6]**

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

Subject to :

$$x_1 + 2x_2 \leq 10$$

$$x_1 + x_2 \leq 6$$

$$x_1 - 2x_2 \leq 1$$

$$x_1, x_2 \geq 0$$

- b) Solve the example in Que 7 (a) by Simplex method. **[6]**
- c) What is meant by duality in LP? What are its applications? **[4]**

OR

Q8) a) Solve by using big M method. **[8]**

Maximize $Z = 4x_1 + 5x_2 - 3x_3$

Subject to

$x_1 + x_2 + x_3 = 10$

$x_1 - x_2 \geq 1$

$2x_1 + 3x_2 + x_3 \leq 40$

$x_1, x_2, x_3 \geq 0$

b) Solve the following with two phase method **[8]**

Minimize $Z = -x_1 - x_2$

Subject to $x_1 - x_2 - x_3 = 1$

$-x_1 + x_2 + 2x_3 - x_4 = 1$

$x_j \geq 0; j = 1, 2, 3, 4$

Q9) a) Determine optimum solution by using VAM method for following transportation problem. Optimize using u-v method **[10]**

Destination

		1	2	3	4	5	supply
origin	A	2	3	4	1	4	4
	B	11	7	7	3	8	8
	C	10	1	2	9	12	9
demand		3	3	4	5	6	

b) A project comprises of four jobs for which four contractors have submitted the tenders. Assign the project to the contractor for minimizing the total cost. **[8]**

		1	2	3	4
contractor	A	12	32	42	19
	B	11	37	47	23
	C	10	31	52	19
	D	13	30	49	25

OR

Q10)a) Solve the following cost minimizing transportation problem using [10]

- i) North West Corner method
- ii) Column Minima method
- iii) Row minima method
- iv) Least cost method

	D1	D2	D3	D4	D5	D6	available
O1	2	1	3	3	2	5	50
O2	3	2	2	4	3	4	40
O3	3	5	4	2	4	1	60
O4	4	2	2	1	2	2	30
Required	30	50	20	40	30	10	180

- b) A company is faced with the problem of assigning six different machines to five different jobs. The costs estimated in hundreds of rupees are given in the table below. [8]

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

Solve the problem to minimize the total cost.



Total No. of Questions : 10]

SEAT No. :

P3646

[Total No. of Pages : 2

[4859]-1006

B.E. (Civil Engineering) (End Semester)

ADVANCED CONCRETE TECHNOLOGY

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10.*
- 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.*
- 7) *Use of IS code 10262, 456 is not allowed.*

- Q1)** a) Write a short note on Self curing concrete. [4]
b) Explain grading curves of aggregate. How grading of aggregates affect on properties of concrete. [6]

OR

- Q2)** a) Write a short note on Pervious concrete. [4]
b) What are the factors affecting strength of concrete? Describe the influence of gel space ratio on strength of concrete . [6]

- Q3)** a) Write a short note on vacuum concrete. [4]
b) Write a short notes on non destructive testing methods [6]
i) Stress wave propagation method
ii) Nuclear methods

OR

- Q4)** a) Write a short note on Gap graded concrete. [4]
b) Explain the step by step procedure involved in the design of high performance concrete. [6]

P.T.O.

- Q5)** a) What are the factors affecting the fiber interaction with matrix?. [4]
b) Explain the historical development of fiber reinforced concrete composite. Explain the role of fibers improving the properties of concrete. [6]
c) Explain in detail interaction between fiber matrix composite under cracked and uncracked condition. [6]

OR

- Q6)** a) What is aspect ratio? How it can influence the properties of composites?[4]
b) Explain the basic concept of using fibers in the concrete composite? Explain the role of fibers improving the mechanical properties under tension and bending. [6]
c) Define fiber reinforced concrete composite. What are the different types of fibers used in the construction industry. Write the properties and application. [6]

- Q7)** a) Explain the behavior of hardened polymeric fiber reinforced concrete under flexure? [4]
b) What precautions should be taken during mixing and casting of fiber reinforced concrete composite? [6]
c) Which are the quality control tests conducted for steel fiber reinforced concrete composites? [6]

OR

- Q8)** a) Write a short note on Glass fiber reinforced concrete composite . [4]
b) Explain the behavior of hardened steel fiber reinforced concrete under compression? [6]
c) Which are the constituent materials used in the SIFCON? Explain the physical properties of each material ? [6]

- Q9)** a) Explain how ferrocement differs than concrete? Write about tensile property of ferrocement. [6]
b) Explain open mould technique for ferrocement with merits and demerits[6]
c) Define ferrocement. What are its applications? [6]

OR

- Q10)** a) What are the advantages Ferrocement? [6]
b) Explain the properties and specification of ferrocement material. [6]
c) Explain closed mould technique for ferrocement with merits and demerits. [6]



Total No. of Questions : 8]

SEAT No. :

P2008

[Total No. of Pages : 2

[4859]-1007

B.E. (Civil)

ARCHITECTURE AND TOWN PLANNING (Elective - I)
(End Sem.) (2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

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.*
- 2) *Assume suitable data if necessary.*
- 3) *Figures to the right indicate full marks.*

- Q1)** a) Explain **[6]**
i) Unity
ii) Balance as principles of architectural composition and observed impact. (sketch is expected).
b) Explain the importance of Landscaping in detail. **[7]**
c) Write a detailed note on "Neighbourhood planning". **[7]**

OR

- Q2)** a) Write a short note on "i) User friendly and ii) Utility of space", as important qualities of architecture. **[6]**
b) How and why "urban renewal" and "quality of life" concepts are interlinked? **[7]**
c) Write a detailed note on, " Goals and objectives" of town planning. **[7]**

- Q3)** a) Elaborate the importance of different civic surveys for development plan proposal. **[8]**
b) Explain the working of any one planning agency and its general organizational structure. **[9]**

OR

- Q4)** a) Elaborate the importance of i) Demographic and ii) Housing survey for new D.P. proposal. **[8]**
b) What is "traffic management" concept? Why ITS is important to support the same? **[9]**

P.T.O.

- Q5)** a) Write a short note on contents of MRTP Act, 1966 and process for preparation of D.P. [9]
b) Write about the importance of CRZ Act in relation with India. [8]

OR

- Q6)** a) Write a short note on, "New Town" development under MRTP Act. [9]
b) Write a short note on, "Smart City Guidelines" as per Govt. of India. [8]

- Q7)** a) Write a detailed note on special townships. [8]
b) Write a detailed note on GIS and its application in Town planning. [8]

OR

- Q8)** a) How "Rehabilitation" and "Resettlement" is promoted through LAAR Act 2013? [8]
b) Write a note on usage of GPS and RS in town planning. [8]



Total No. of Questions : 6]

SEAT No. :

P3647

[Total No. of Pages : 3

[4859]-1008

B.E. (Civil) (End Semester)

**ADVANCED ENGINEERING GEOLOGY WITH ROCK
MECHANICS**

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams should be drawn wherever necessary.*

Q1) a) Describe the Varieties of Deccan Trap Basalt. [6]

OR

b) Write a short note on Region 1 & 2. [6]

Q2) a) How location of spillway is decided on geological grounds? [7]

OR

b) How strength and water tightness of DTB affect the foundation of dam?[7]

Q3) a) Write a note on Percolation Tank on Amygdaloidal Basalt. [7]

OR

b) Explain various parameters of morphometric analysis of a river basin.[7]

P.T.O.

Q4) a) Describe 'Q' system of classification of rock in detail. [8]

b) Calculate Core recovery and RQD recovery from following table. [8]

Run in m	Piece No.	Length in cm.	Nature of fracture
0-3 m	1	10	J
	2	11	J
	3	07	J
	4	45	J
	5	55	J
	6	13	J
	7	50	J
	8	15	J
	9	8	J
3-6 m	10	90	M
	11	80	M
	12	120	M
	13	07	J

OR

a) What do you mean by mechanical and natural fractures during core logging? Explain in detail. [8]

b) Calculate Apparent resistivity values at different depth zones. [8]

Sr.No	R	a	$2\pi aR$
1	1.87	1	
2	1.66	2	
3	1.47	3	
4	1.32	4	
5	1.19	5	
6	1.09	10	

- Q5)** a) Is the Columnar basalt suitable/unsuitable for tunnel excavation? Give reasons. [10]
- b) Under what conditions scouring of pier of bridge take place? Discuss with suitable examples. [7]

OR

- a) Significance of fractures from tunneling point of view. [10]
- b) Can we locate a pier of bridge partly on weathered rock and on dyke.[7]

- Q6)** a) R.I.S. in deccan trap area. [10]
- b) Types of faults and recognition of them during civil engineering works. [7]

OR

- a) Differentiate between active faults and dead faults. [10]
- b) Dam building activity in seismic prone area. [7]



[4859]-1009

B.E. (Civil Engineering)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(Semester - I) (2012 Pattern) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 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.

- Q1) a) Write computer algorithm for Gauss Elimination Method. [6]
 b) Determine the prop reaction of the propped cantilever beam AB as shown in Figure 1 using flexibility matrix method. Take $EI = \text{constant}$. [6]

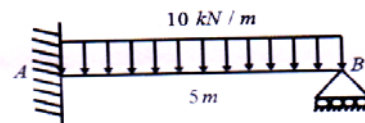


Figure 1

- c) Two bars one of aluminium and other of steel are joined together and subjected to load as shown in Figure 2. Determine the displacement at common joint. Take c/s area of aluminium bar 2000 mm^2 , c/s area of steel bar 400 mm^2 , Young's modulus of aluminium bar 70 GPa and steel bars 200 GPa . [8]

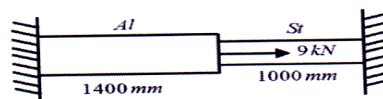


Figure 2

OR

- Q2) a) Explain Gauss Jordan Method with computer flowchart. [6]
 b) Determine the support reactions of the continuous beam ABC as shown in Figure 3 using flexibility matrix method. Take $EI = \text{constant}$. [6]

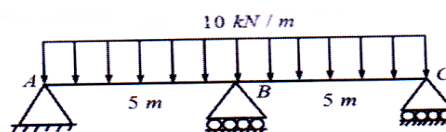


Figure 3

P.T.O.

- c) Derive the transformation matrix and stiffness matrix of two noded truss member with 04 D.O.F. [8]

- Q3) a) Explain structure approach and member approach for the analysis of framed structures. [4]
 b) Analyze the continuous beam ABC as shown in Figure 4 using stiffness matrix method. The beam is fixed at A and C and supported by spring at B. Take EI constant. Draw BMD. [14]

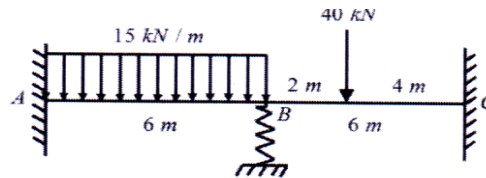


Figure 4

OR

- Q4) a) Derive the stiffness matrix of two noded frame element considering axial force, shear force and bending moment. [6]
 b) Determine the unknown joint displacements of the portal frame as shown in Figure 5 using stiffness matrix method. Take EI constant. [12]

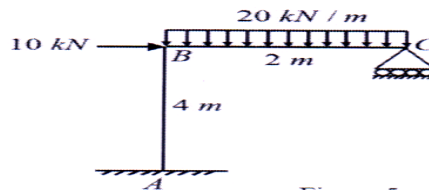


Figure 5

- Q5) a) Derive the stiffness matrix of two noded grid element of with 06 D.O.F., length L, flexural rigidity EI and torsional rigidity GJ. [8]
 b) Derive the transformation matrix of the grid element. [8]

OR

- Q6) Analyze the grid structure ABC as shown in Figure 6 using stiffness matrix method. Take $E = 210 \text{ GPa}$, $G = 84 \text{ GPa}$, $I = 16.6 \times 10^{-5} \text{ m}^4$, $J = 4.6 \times 10^{-5} \text{ m}^4$ for all elements. [16]

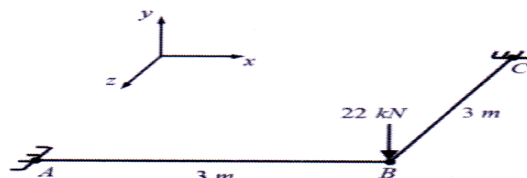


Figure 6

OR

- Q7)** For the truss shown in Figure 7, use stiffness matrix method to determine the deflections at the loaded joint. Take $E = 200 \text{ GPa}$ and c/s area of all members 1000 mm^2 . [16]

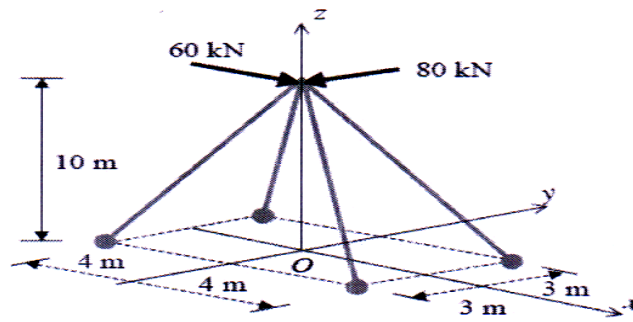
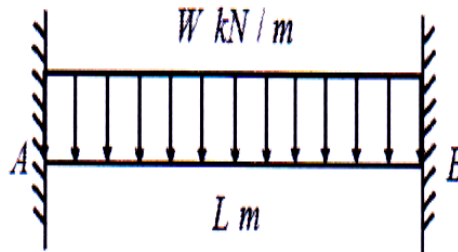


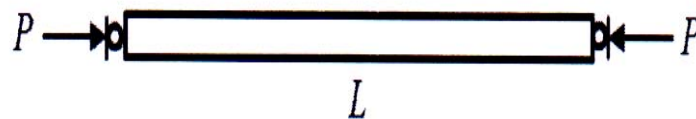
Figure 7

OR

- Q8) a)** A beam of span 'L' is fixed at both ends 'A' and 'B' and supports a uniformly distributed load of $W \text{ kN/m}$ over the entire span. Estimate the deflections of quarter span intervals using second order central difference formula. [8]



- b)** Estimate the lowest buckling load 'P' of a uniform pin ended column of length 'L' and flexural rigidity EI using three sub intervals. Apply finite difference method. [8]



Total No. of Questions : 12]

SEAT No. :

P2044

[Total No. of Pages : 2

[4859]-1010

B.E. (Civil)

**Integrated Water Resources and Planning
(Elective - II) (Semester - I) (2012 Pattern) (Endsem)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Write a note on "World water resources". [3]
b) Comment on "water infrastructure-problems and perspectives" [3]

OR

- Q2)** a) Explain in brief "water as finite resource". [3]
b) Write a note on "Riparian rights". [3]

- Q3)** a) Explain water laws and constitutional provision for water management. [3]
b) Write a note on "water scarcity". [3]

OR

- Q4)** a) Explain - Benefit cost analysis. [3]
b) What are the global and national perspectives of water crisis? [3]

- Q5)** a) Explain "inter basin water transfer". [4]
b) Explain "Water management in irrigation sector". [4]

OR

- Q6)** a) Write note on
i) Flood damage assessment
ii) Severity index [4]
b) What is the use of geoinformatics in management of flood? [4]

P.T.O.

- Q7)** a) What is navigation and recreational water demands? Explain how it is estimated. [8]
b) Write a note on estimation and forecasting of water demand for industrial sector. [8]

OR

- Q8)** a) Explain in detail necessity of water management in irrigation sector. [8]
b) What are consumptive and non consumptive demands? Explain in detail. [8]

- Q9)** a) What is "Decision support system for Integrated Water Resources Management (IWRM)" [8]
b) Write a note on "Protection of vital ecosystem". [8]

OR

- Q10)**a) What are the direct and indirect social impacts of water resources development? [8]
b) Write note on
i) Minimum Flow
ii) Water quality management. [8]

- Q11)**a) Write note on role of RS and GIS in watershed management. [8]
b) Explain in short about the two terms:
i) Genetic programming and
ii) Model Tree in water resources planning. [10]

OR

- Q12)**a) Explain data driven techniques in Artificial Neural Networks related to watershed management. [8]
b) How watershed are classified? Explain integrated approach for watershed management. [10]



Total No. of Questions : 10]

SEAT No. :

P3925

[Total No. of Pages : 3

[4859]-1011

B.E.

TQM & MIS IN CIVIL ENGINEERING (Elective - II)
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Ans Q1or Q2, Q3or Q4, Q5or Q6, Q7or Q8, Q9or Q10.*
- 2) *Figures to the right indicate full marks.*

- Q1)** a) With examples, explain any 2 definitions of quality and highlight the need for obtaining quality in a construction project. **[5]**
- b) As a project manager, explain any 5 important measures which you recommend so as to improve the quality of materials used in the construction project. **[5]**

OR

- Q2)** a) Explain with examples how the entry of the multinational construction companies (MNC'S) in the Indian Construction Business Market has impacted i) Quality of project in terms of the materials systems & processes to be used, and ii) Customer requirements. **[5]**
- b) As a quality manager, explain any 5 important major causes of absence of quality on construction projects which you have observed. **[5]**
- Q3)** a) Explain "Rework" and "Scrap" with proper examples and suggest how you can avoid them. **[2+2+1=5]**
- b) Highlight obstacles in implementation of TQM in the Indian construction sector. **[5]**

OR

- Q4)** a) Discuss how six sigma is an important tool in benchmarking, measuring and improving quality of concreting activity. **[5]**
- b) Discuss importance of deming's PDCA cycle with proper examples. **[5]**

P.T.O.

- Q5) a)** Elaborate with examples the difference between:
- i) Quality and Quality plan
 - ii) Quality control and Quality Assurance
 - iii) TQC and TQM
 - iv) Conformity and NCR
 - v) Kaizen and continual improvement. **[10]**
- b) Explain with examples the eight, ISO 9001 Quality Management System Standards used by construction organisations. **[8]**

OR

- Q6) a)** Explain in brief any 5 important documents which are a part of the contractor's quality manual, used by an ISO 9001 certified firm. **[10]**
- b) What is a concrete pour card? How is it used? Which are the parameters which are necessarily mentioned in the pour card and checked, before permitting the concrete pour? Explain. **[2+2+4=8]**
- Q7) a)** Differentiate between strategic planning, Management control and operational control with suitable examples and elaborate on how these differences need to be incorporated in framing the MIS, in order to have an effectiveness in the company's long term as well as short term management. **[8]**
- b) Explain in detail the "costing of poor quality" approach which you would adopt so as to convince the top management that "quality improvements are certainly needed, in case of the following defects:
- i) In majority of floor slabs and beams, the structural steel reinforcement is significantly exposed and corroded. **[4]**
 - ii) Toilet slabs waterproofing is improper. **[4]**

OR

- Q8)** a) With respect to the Concreting activity, Set the benchmarks for the following requirements,
- i) Acceptance/rejection criteria for compressive strength and tensile strength of Mix M45. [2]
 - ii) Water tightness of formwork used in self compacting concrete. [2]
 - iii) Dimensional accuracies for length, breadth, heights of beams/ columns concrete. [2]
 - iv) Minimum weight per unit length and minimum actual cross-sectional dia/ area for any particular reinforcement bar. [2]
- b) What is SCM? How is it used in TQM? What are its advantages? Explain with proper examples from a construction work. [2+2+4=8]

- Q9)** a) Explain in brief the contents of any 4 modules used in the ERP of a construction organisation. [8]
- b) Explain the role of a smart phone in the documentation as well as the control of resources used and activities/works executed, for quality reporting and enhancement, with proper examples. [8]

OR

Q10) Discuss advantages and limitations of

- a) ERP systems/ softwares used in construction [4]
- b) PRRT software used for Rework [4]
- c) GIS use in MIS of a construction organisation [4]
- d) GPS use in Materials and project tracking as well as control. [4]



Total No. of Questions : 12]

SEAT No. :

P3234

[Total No. of Pages : 3

[4859] - 1012

B.E. (Civil) (Semester - I)
EARTHQUAKE ENGINEERING
(2012 Pattern) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 , Q7 or Q8, Q9 or Q10, and Q11 or Q12.*
- 2) *Figures to the right indicate full marks.*
- 3) *IS 456, IS 1893, IS 13920 are allowed in the examination.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *If necessary, assume suitable data and indicate clearly.*
- 6) *Use of electronic pocket calculator is allowed.*

Q1) a) Define : **[4]**

- i) Focal Depth
- ii) Inter plate Earthquake

b) Explain the causes and types of earthquake. **[6]**

OR

Q2) a) Define Isoseismal and describe their uses? **[4]**

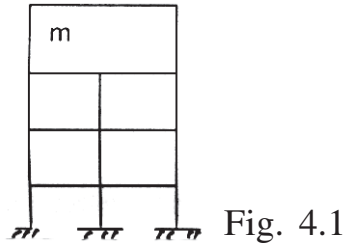
b) What do you understand by Magnitude and size of earthquake?
Classify the earthquake based on magnitude. **[6]**

Q3) A simply supported beam 4 m long supports mass of 1000kg at the center. Find the natural period and natural frequency. $E = 2.1 \times 10^6 \text{ kg/cm}^2$ & $EI = 10,000 \text{ kN.m}^2$. **[6]**

OR

P.T.O.

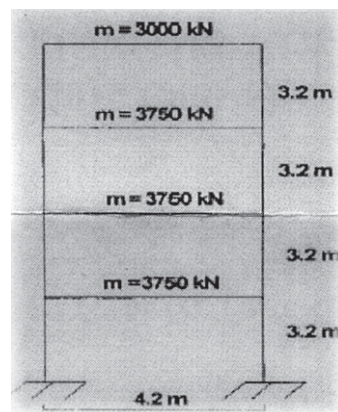
- Q4)** a) Derive the equation of motion for a damped but free vibration of a SDOF system. [3]
- b) Convert the mass $m = 20,000\text{kg}$ supported as shown in figure 4.1 into a mass and equivalent spring system (SDOF). Assume stiffness of each column 3kN/m for first and second storey and 2kN/m for top storey. [3]



- Q5)** Explain the following terms (Any two) : [6]
- Seismic Zoning.
 - Vertical irregularity in buildings.
 - Weak storey and Soft Storey.

OR

- Q6)** a) Calculate the distribution of base shear at each floor level as per seismic coefficient method for the OMRF without brick infill building shown in Fig. 6. 1. The building is located in Zone V. The frames are spaced at 4m c/c . Assume soil of Type II. [6]



- Q7)** A $(400 \times 400)\text{mm}$ column is reinforced with 8 - 16 # It is supported on isolated footing. The load coming on the footing is 450 KN and a moment of 30 KN-m . The SBC of the soil is 150 kN/m^2 Using M 25 grade of concrete and steel of grade Fe 415 Design footing. [16]

OR

- Q8)** a) What is Liquefaction? Write effects of liquefaction. [4]
b) What are the different soil improvement techniques to reduce liquefaction. [6]
c) What type of forces generated due to earthquake and Explain its effect on foundation. [6]

- Q9)** a) What are the various methods available to control the lateral forces acting on a structure? Explain in details. [8]
b) What are the basic precaution to be followed in rescue operations. [8]

OR

- Q10)** a) What is disaster management? Explain its various phases. [8]
b) Define Active and Passive control. Write different types of the passive control system and explain any one example. [8]

- Q11)** a) What is retrofitting and rehabilitation of structures? [8]
b) Explain the Shear Wall and its behavior? [10]

OR

- Q12)** a) Explain the techniques used for strengthening RCC beams and Columns. [8]
b) Explain any three retrofitting techniques used for masonry buildings? [10]



Total No. of Questions : 10]

SEAT No. :

P3235

[Total No. of Pages : 3

[4859] - 1013

B.E. (Civil)

ADVANCED GEOTECHNICAL ENGINEERING (Elective - II)

(2012 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

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

- Q1)** a) Enlist different 'Clay minerals' & explain the role of 'montmorillonite'. [5]
- b) Discuss any one of the following : [5]
- i) HRB classification
 - ii) Textural classification

OR

- Q2)** a) Discuss 'Biquet & lee' theory for reinforced soil foundations. [5]
- b) Explain K_a , K_p & K_o with examples. [5]

- Q3)** a) Explain the different types of Geosynthetics along with functions. [5]
- b) A wall with a smooth vertical back, 10m high, supports a purely cohesive soil with $c = 9.81 \text{ KN/m}^2$, & $\gamma = 17.66 \text{ KN/m}^3$. Determine [5]
- i) total Rankin's active pressure against the wall;
 - ii) position of zero pressure;

OR

P.T.O.

- Q4)** a) Compute the active earth pressure at a depth of 4.5 m in sand whose angle of friction is 37° , and density of 15.60 KN/m^2 in dry state. [5]
b) What is soil nailing? Under which situations it's applicable? [5]

- Q5)** a) Explain the following : [4×3=12]
i) Forced vibrations.
ii) Braken's method.
iii) Pauw's Analysis.
iv) Elastic half space method.
b) What are the different types of machine foundations? [4]

OR

- Q6)** a) Discuss the design criteria for impact type machines as per IS- 2974 (pt-II) - 1966. [8]
b) Resonance occurred at a frequency of 25 cycles /sec in a vertical block vibration test on block of $1\text{m} \times 1\text{m} \times 1\text{m}$. Determine C_u if the weight of oscillator is 700N & the force produced by it at 15 cycles/sec is 1200N. [8]

- Q7)** a) Explain the following : [4 × 3 = 12]
i) Bored compaction piles.
ii) Sand drains.
iii) Grouting.
iv) Vibroflotation.
b) Discuss the different methods for 'Grouting'. [6]

OR

- Q8)** a) Explain the steps for design of sand drains with following soil cases. [10]
i) Isotropic
ii) Anisotropic
b) Explain the stages of inserting reinforcement in vibro-expanded pile. [8]

- Q9)** a) Discuss the basic and composite Rheological models. [6]
b) Explain creep with the help of Rheological model. [6]
c) Explain 'Saint - Venants' model. [4]

OR

- Q10)** a) Discuss the following in details : [4 × 3 = 12]
i) Rheology & Rheological models.
ii) Compound Rheological models.
iii) Viscous models with spring & dashpot.
iv) Creep.
b) Explain in detail 'Maxwell model'. [4]



Total No. of Questions : 10]

SEAT No. :

P1853

[4859]-1014

[Total No. of Pages : 5

B.E. (Mechanical Engineering)
REFRIGERATION AND AIR-CONDITIONING
(2012 Course) (Semester - I) (402041)

Time : $2\frac{1}{2}$ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1) a)** A Carnot refrigerator requires 1.2 kW per ton of refrigeration to maintain a temperature of -35°C . Determine. **[6]**
- i) COP of the refrigerator
 - ii) The temperature at which the heat is rejected
 - iii) COP, if the cycle is used as a heat pump
- b) Discuss the necessity of phasing out of CFC refrigerants. List the alternative refrigerants. **[4]**

OR

- Q2) a)** A dense closed cycle refrigeration system operating between 4 bar & 16 bar extracts 126 MJ/hr. of heat from the cold chamber. Air enters the compressor at 5°C & into the expander at 20°C . Assuming compression & expansion to be isentropic, $C_p = 1.005 \text{ kJ/kg K}$, and $\gamma = 1.4$ determine: **[6]**
- i) Power required.
 - ii) Capacity of the plant in TR.
- b) What is sub-cooling? Explain the effect of sub-cooling of condensate with the help of T-s and P-h diagrams in VCC **[4]**

- Q3) a)** An ammonia refrigerator operates between -16°C and 50°C . The vapour is dry-saturated at the entry of the compressor and compression is isentropic. Assuming there is no undercooling, Determine **[6]**
- i) The mass flow rate and power input per kW of refrigeration
 - ii) COP of the system.
(Refer p-h chart attached)
- b) Mention the functions of each fluid in a three fluid vapour absorption system (Electrolux refrigerator) **[4]**

OR

P.T.O.

- Q4) a)** A vapour compression refrigeration system operates between -10°C and 45°C . The refrigerant is dry-saturated at the entry of the compressor and attains 102°C after compression. The temperature of liquid refrigerant at the entry of throttle valve is 35°C . $C_{pl}=1.62 \text{ kJ/kg K}$ [6]

Determine COP of the system.

Use following properties of the refrigerant

Sat. Temp. (T_{sat}) ($^{\circ}\text{C}$)	Specific enthalpy (kJ/kg)		Specific entropy (kJ/kg K)	
	h_f	h_g	s_f	s_g
-10	45.4	460.7	0.183	1.762
45	133	483.6	0.485	1.587

- b) Why is flash intercooler used in multistage compression? [4]

- Q5) a)** $1.5 \text{ m}^3/\text{s}$ of moist air at a state of 28°C dry-bulb, 21°C wet-bulb and 101.325 kPa flows across a cooler coil and leaves the coil at 13°C dry-bulb and specific humidity of 8.5 gm per kg of dry air. Determine the apparatus dew point, the contact factor and the cooling load. [5]

- b) Define: RSHF, GSHF and ESHF. Explain the procedure to draw the lines of RSHF, GSHF and ESHF on psychrometric chart. [7]

- c) Explain the ASHRAE comfort chart showing the comfort zones for winter and summer. [6]

OR

- Q6) a)** Define and explain the following: [8]

- i) Humidity ratio
- ii) Dew point temperature
- iii) Relative humidity
- iv) Wet bulb temperature

- b) Moist air at a state of 21°C dry-bulb, 15°C wet-bulb and 101.325 kPa barometric pressure enters a spray chamber. If, for each kilogram of dry air passing through the chamber, 0.002 kg of water at 100°C is injected and totally evaporated, calculate the moisture content, enthalpy and dry-bulb temperature of the moist air leaving the chamber. [5]

- c) Define Indoor Air quality. Discuss sources of pollutants in occupied room. [5]

Q7) a) Classify the air conditioning systems. Compare all air-air conditioning system with all water-air conditioning system. [8]

b) With neat diagram explain the working of single screw compressor. What are the advantages of it over reciprocating compressor? [8]

OR

Q8) a) With neat schematic explain the variable air volume air conditioning system. What are the advantages over constant volume system? [8]

b) Draw the constructional diagram for TXV and explain its working. What are the limitations TXV? [8]

Q9) a) Explain in brief the different types of filters used in air conditioning. [6]

b) Determine the duct sizes of the duct system as shown in Fig.1 using equal friction method. Determine the FTP and dampering required at each branch. Assume the velocity in main duct A as 300 mpm. Also dynamic loss coefficient in elbow $k=0.22$. Use static regain factor $R=0.75$. [10]

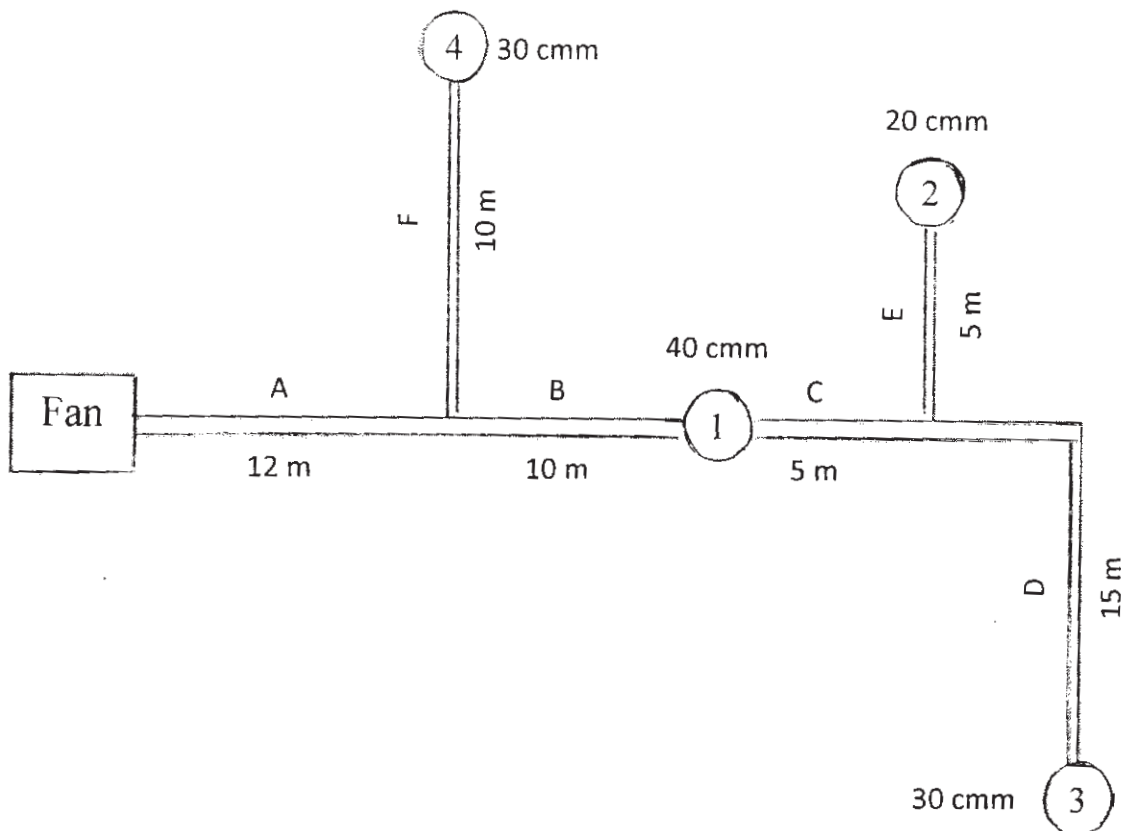


Fig. 1 - for Q. 9 b)

OR

- Q10)a)** Explain step by step the static regain method of duct design. List commonly used duct materials. [10]
- b) A 600 mm x 400 mm size duct carries 90 cmm of air having density of 1.2 kg/m^3 . Determine the equivalent diameter of the circular duct: [6]
- i) If the quantity of air carried in both the cases is same.
- ii) If the velocity of air in both the cases is the same.
- If friction factor, $f = 0.011$, find the pressure loss per 100 m length of duct. Find air power required.

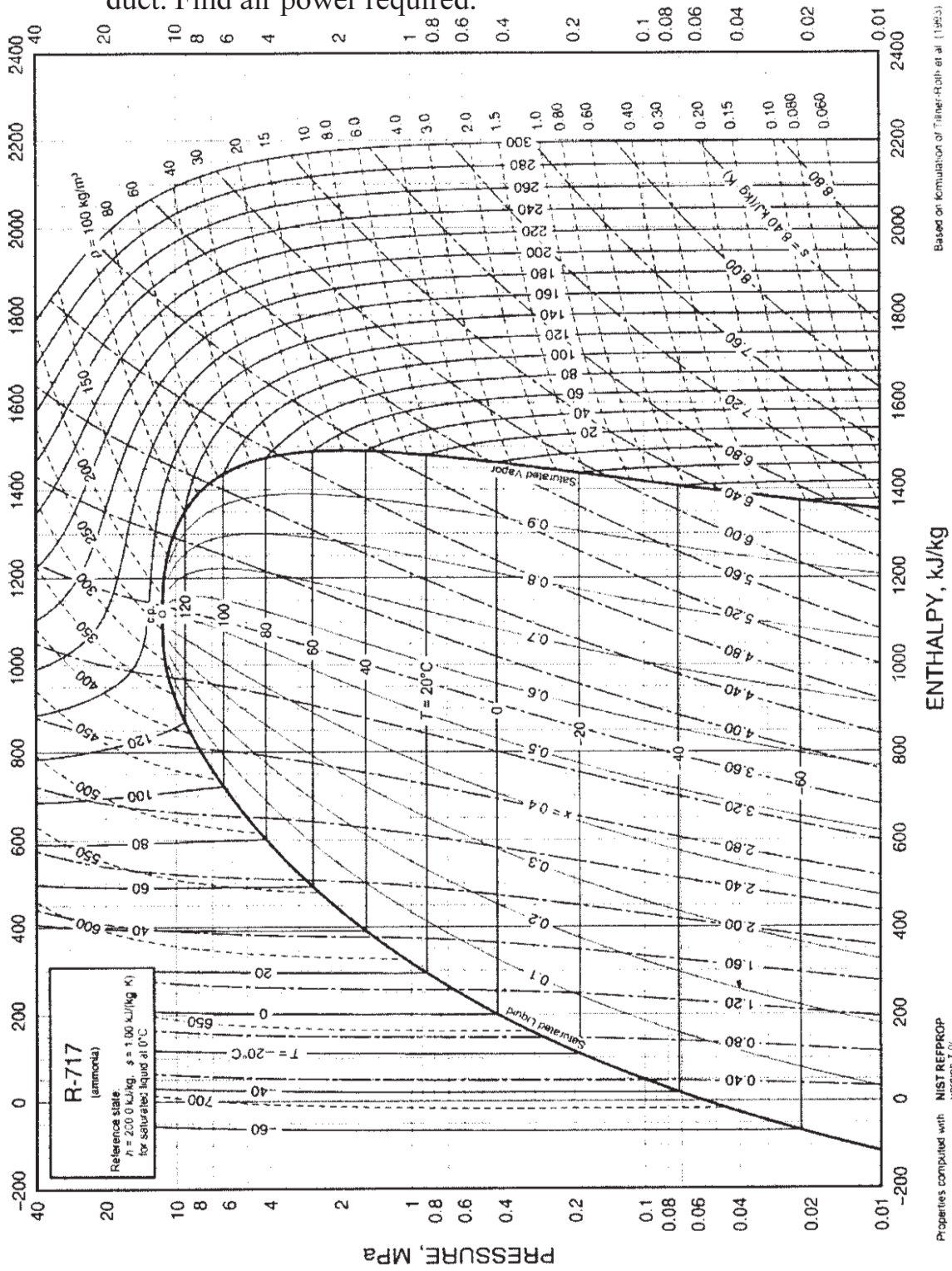
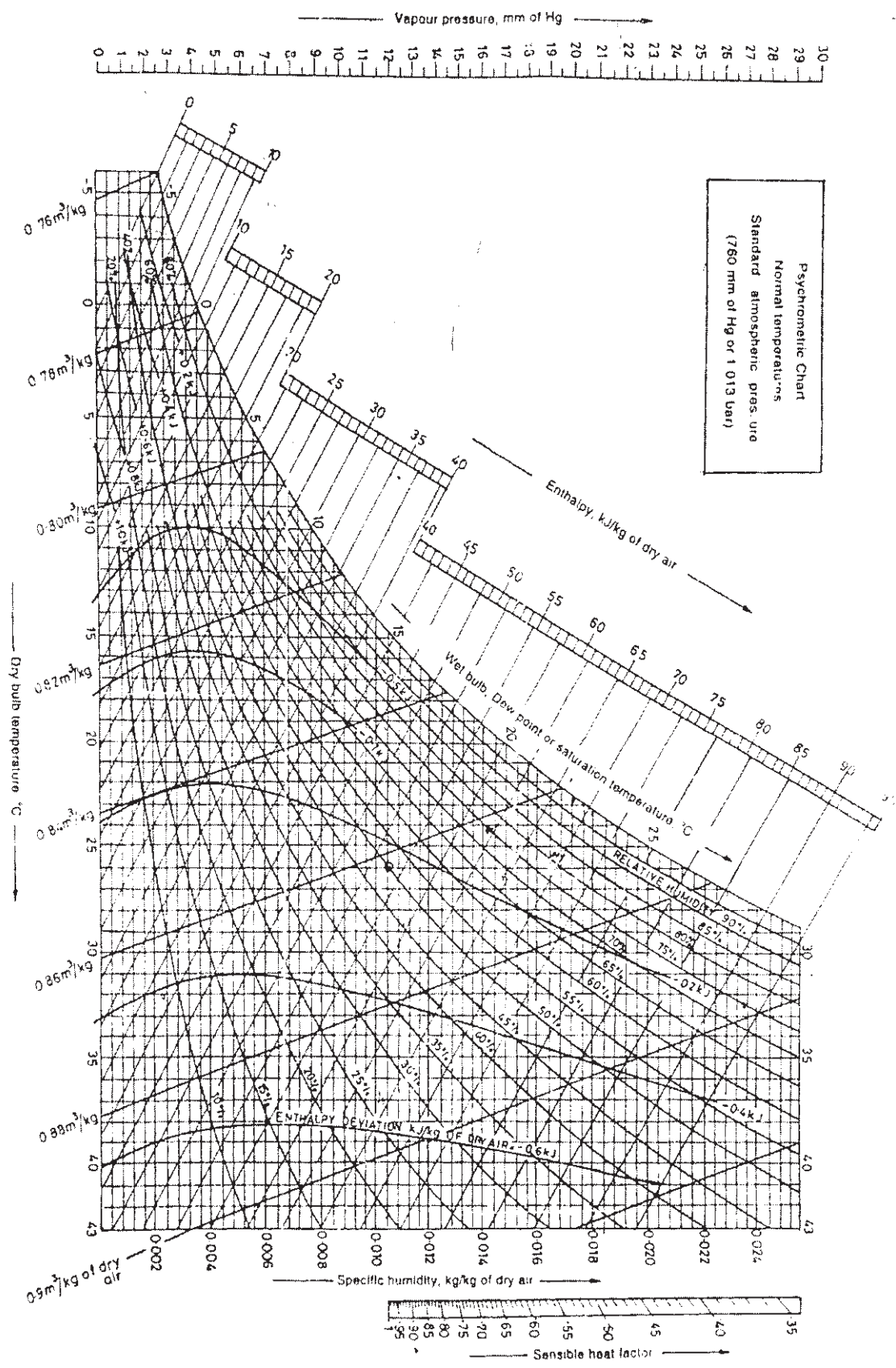


Fig. 16 Pressure-Enthalpy Diagram for Refrigerant 717 (Ammonia)



Total No. of Questions : 10]

SEAT No. :

P1854

[4859]-1015

[Total No. of Pages : 3

B.E. (Mechanical)

**CAD / CAM AND AUTOMATION
(2012 Course) (Semester-I) (End Sem)**

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answers in one answer book.*
- 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.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of calculator is allowed.*
- 6) *Assume suitable data if necessary.*

Q1) a) Line A(5, 5) B(10, 15) is to be rotated about point B by 60° in CCW direction find the new position of point A and B of line. **[6]**

b) In concatenated transformation why translation matrix to be written in homogeneous form also write translation matrix in homogeneous form. **[4]**

OR

Q2) a) Explain Geometric translational and rotational mapping and its need. **[6]**

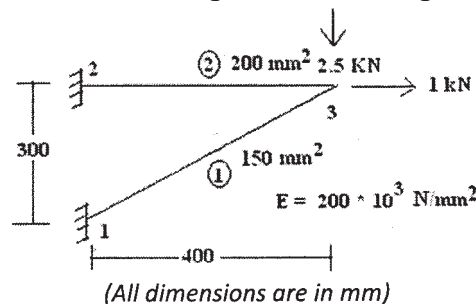
b) Explain Bezier synthetic curve. **[4]**

Q3) a) Explain CSG technique of solid modeling and its advantages and limitation. **[6]**

b) Explain the concept of shape function for 1-D element. **[4]**

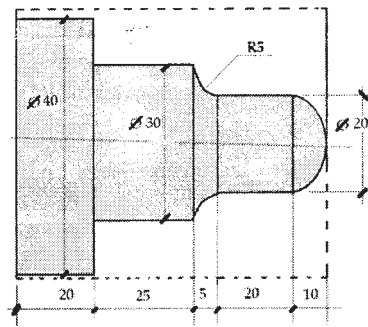
OR

Q4) For the truss element shown in the figure find Global stiffness matrix and write in the form $KQ = F$. Compute nodal displacements. **[10]**



P.T.O.

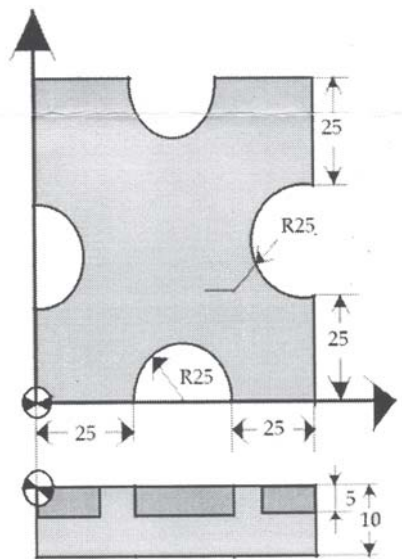
- Q5) a)** Explain the canned cycle for Drilling, Boring and Tapping. [8]
- b)** Write CNC part program for roughing and finishing using canned cycle for turned component as shown in figure. Assume Suitable cutting data. [10]



(All dimensions are in mm)

OR

- Q6) a)** Explain the concept of tool radius compensation while CNC programming and explain G codes and its format for cutter compensation. [6]
- b)** Write CNC part program for Milling and Drilling for component as shown in figure use concept of sub programming so that depth of cut per pass is 1 mm. Assume Suitable cutting data. [12]



(All dimensions are in mm)

- Q7) a)** Explain Rapid Prototyping (RP) systems in detail. List various RP techniques. Explain 3-D Printing with neat sketch. [8]
- b)** Explain Rapid Tooling in detail. List different Rapid Tooling methods. State benefits of them. [8]

OR

Q8) a) Write steps in *Fused Deposition Modeling (FDM)* with neat sketch. State its applications. [8]

b) Write steps in *Selective Laser Sintering method* with neat sketch. State its advantages. [8]

Q9) a) Classify robot on the basis of configuration and explain Articulated configuration of Robot with advantages limitation and applications. [10]

b) Explain various joints used in Robot. [6]

OR

Q10)a) Explain the FMS system with its relevance in present era of Flexible Automation. [8]

b) Explain Group Technology. Explain the optiz coding system. [8]



Total No. of Questions : 12]

SEAT No. :

P1997

[Total No. of Pages : 3

[4859] - 1017

B.E. (Mechanical) (Semester - I)
ENERGY AUDIT & MANAGEMENT
(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

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) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*

Q1) a) Write down the responsibilities of energy auditor. **[5]**

b) Discuss the environmental impact due to conventional energy use. **[5]**

OR

Q2) a) Explain current energy scenario in India. **[5]**

b) Write short note : **[5]**

I) Commercial energy and non commercial energy.

II) Renewable and non renewable energy.

Q3) a) Describe energy conservation opportunities in furnace system. **[5]**

b) Write down steps to carry out detailed energy audit. **[5]**

OR

Q4) a) Write down typical energy auditing format. **[5]**

b) Explain energy saving opportunities in steam system. **[5]**

P.T.O.

- Q5) a)** What is net present value of a project (life 2 years) which requires an investment of Rs.50, 000/- and yield Rs.30, 000/- in I year and Rs.40,000/- in the next year, if the interest rate is 10%. [5]
- b) Explain financial analysis method for simple payback period. [5]

OR

- Q6) a)** A sum of Rs.40,000 is deposited in a bank at the beginning of a year. The bank pays 8 % interest annually. How much money will be in bank account at the end of fifth year, if no money is withdrawn? [5]
- b) Annual saving after replacement of an boiler for I year is Rs. 5 Lacks, for II year is Rs.5,50,000 and for III year is 6,50,000 respectively. Total project cost is Rs. 13,50,000 considering cost of capital as 12%, what is the NPV of proposal. [5]

- Q7) a)** What is steam distribution system? Explain with neat sketch. [7]
- b) Find out the efficiency of the boiler by direct method with the data given below : [7]
- i) Type of boiler: coal fired
 - ii) Quantity of steam (Dry) generated: 8 TPH
 - iii) Steam pressure (Gauge) / Temp: 10 Kg/Cm²(G)/ 180°C
 - iv) Quantity of coal consumed: 1.8 TPH
 - v) Feed water temperature: 85°C
 - vi) GCV of coal : 3200 Kcal/Kg
 - vii) Enthalpy of steam at 10 Kg/cm² pressure : 665 Kcal/Kg (Saturated)
 - viii) Enthalpy of feed water: 85 Kcal/Kg

OR

- Q8) a)** Write down opportunities to increase boiler efficiency with neat sketch.[7]
- b) A Centrifugal pump is pumping 85 M³ / Hr of water and pressure rise in pump is 6 Kg/Cm² (gauge). If power drawn by motor is 25 Kw. Find out the pump efficiency. Assume motor efficiency as 90% and water density as 998 Kg/M³. [7]

Q9) a) Define power factor and explain how power factor improved with one example. [6]

b) The connected loads for Bungalow are as below

- i) 05 bulbs of 60W each
- ii) 06 fluorescent tubes of 40W each
- iii) An old refrigerator of 200W

It is decided to replace the bulbs and tubes with 11Cfl of 15W each and an old refrigerator by energy efficient refrigerator of 175W. Considering usages of 6 hours per day and an electrical tarrif of Rs. 4 per Kwh; calculate an annual electrical energy saving in Kwh and money. [7]

OR

Q10)a) What are the types of lamps used in lighting system. Write down their future with typical applications. [7]

b) What are the types of electrical motors? Explain energy efficient motor.[6]

Q11)a) What is the cogeneration ? Write down principal of cogeneration and its advantages. [7]

b) Explain concept of waste heat recovery. Write down benefits of waste heat recovery. [6]

OR

Q12)a) Explain the topping cycle and the bottoming cycle with sketch. [6]

b) Describe heat wheel used for waste heat recovery with neat sketch. [7]



Total No. of Questions : 10]

SEAT No. :

P3648

[Total No. of Pages : 3

[4859]-1018

B.E. (Mechanical) (End Semester)

TRIBOLOGY

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Write Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, whenever necessary.
- 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.

- Q1)** a) Explain the use of following additives. [6]
- i) E.P. additives
 - ii) Anti-friction additives
 - iii) Anti-wear additives
- b) Define friction. Explain basic modes of lubrication. [4]

OR

- Q2)** a) Explain the following terms of lubrication with their units. [6]
- i) SUS
 - ii) Kinematic Viscosity
 - iii) Viscosity Index
 - iv) Absolute Viscosity
 - v) Specific heat
 - vi) Relative Density
- b) Define 'wear'. What are the parameters which govern the wear. [4]

- Q3)** a) What is the effect of temperature and pressure on viscosity of lubricating oil? [2]
- b) Differentiate between long journal bearing and short journal bearing. [4]
- c) Explain the working principal of hydrodynamic bearing. [4]

P.T.O.

OR

- Q4)** a) What do you mean by stick-slip friction? [2]
b) Derive from basic principles two dimensional Reynolds equation taking usual notations. [8]

- Q5)** a) Derive the expression for flow rate through rectangular slot. What are the assumptions made while deriving the equation? [8]
b) Explain in brief the working principle of hydrostatic bearing. State the advantages and limitations of hydrostatic bearing. [8]

OR

- Q6)** a) Derive an equation for load carrying for given instantaneous velocity of approach and film thickness in case of circular plate approaching a plane. [8]

- b) The following data is given for a hydrostatic step bearing : [8]

Thrust load = 400 kN

Shaft speed = 700 rpm

Shaft diameter = 480 mm

Recess diameter = 240 mm

Oil-film thickness = 0.15 mm

Viscosity of lubricant = 160 SUS

Specific heat of lubricant = 1.76 kJ/kg°C

Specific gravity of lubricant = 0.86

Calculate :

- i) The supply pressure
- ii) The flow requirement in l/min
- iii) The fractional power loss
- iv) The pumping power loss and
- v) The temperature rise, assuming the total power loss in bearing is converted into the frictional heat.

- Q7)** a) How Elastohydrodynamic lubrication differs from hydrodynamic lubrication? Also Explain the Ertel-Grubin equation with its limitation in brief. [8]
b) State the merits , demerits and four applications of gas lubricated bearings. [8]

OR

- Q8)** a) What do you understand by gas lubricated bearings? Compare gas lubricated bearings with oil lubricated bearings based on the following parameters:
- i) Viscosity of lubricant
 - ii) Viscous resistance
 - iii) Frictional power loss
 - iv) Operating speed
 - v) Load carrying capacity
 - vi) Film thickness and surface finish. [8]
- b) Explain in brief about the active and passive magnetic bearings. What are its advantages over conventional bearings. [8]

- Q9)** Write a short note on the following (Any Three) : [18]
- a) Lubrication in rolling and forging.
 - b) Tribological aspects of wheel on rail road.
 - c) Hybrid bearing
 - d) Mechanics of tyre road interaction.

OR

- Q10)** a) Classify the Surface Engineering processes in detail. [6]
- b) Explain with neat sketch the Electroplating process [6]
- c) Explain in brief about porous bearing and foil bearing. [6]



Total No. of Questions : 10]

SEAT No. :

P3649

[Total No. of Pages : 6

[4859] - 1019

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

Reliability Engineering

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

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.*
- 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.*

Q1) a) State and explain the relationship between MTTF and Reliability. **[4]**

- b) In a test conducted for 48 hours under severe conditions on 500 pressure relief valves (PRVs), the following data was obtained for number of failed PRVs out of 500. Calculate the hazard rate as well as reliability and tabulate the results. **[6]**

Time interval (hrs.)	0-8	8-16	16-24	24-32	32-40	40-48
Number of failed PRVs	153	81	63	27	18	09

OR

Q2) a) Define central limit theorem. State its importance in several engineering applications. **[4]**

- b) For the block diagram shown in Fig.1, derive the equation using tie-set method to obtain the reliability of the system assuming the elements to be independent. Also, draw an equivalent block diagram for the minimal tie-sets and hence, find the reliability of the system if reliability of all elements is of 0.9. **[6]**

P.T.O.

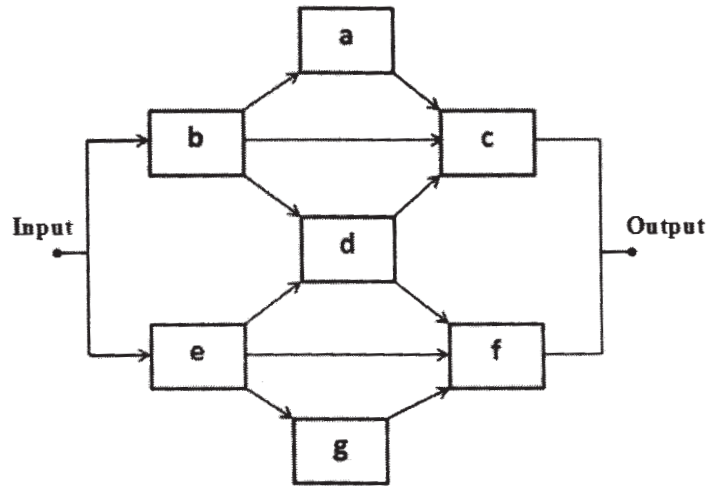


Fig. 1 Block diagram

- Q3) a)** What is k-out of n structure (k, n) system? Give two practical examples of a (k, n) system. **[4]**
- b)** A system S consists of sub-systems of A and B, each having reliability 'p'. In order to improve the reliability of the system, following three configurations of sub-systems are suggested as shown in Fig. 2. Obtain the reliability of each sub-system and determine amongst three which configuration has the highest reliability? Assume that the elements are independent. **[6]**

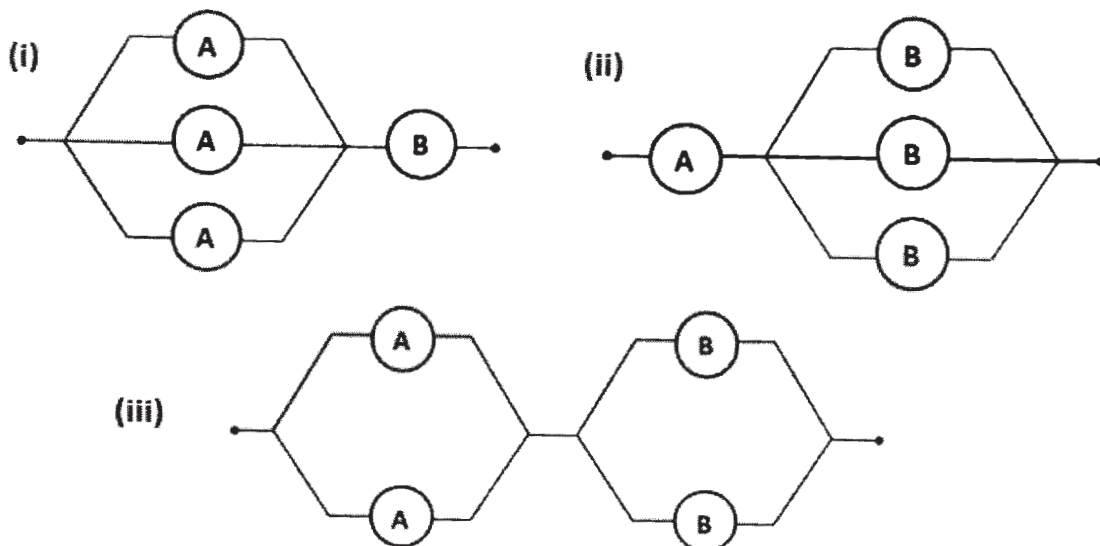


Fig. 2 Different configurations of sub-systems (i, ii and iii)

OR

Q4) a) A critical electronic instrument in a measurement laboratory goes out of order on an average once per 1000 hours of use. Assuming a constant hazard rate model, find out the probabilities of the instrument failing in 100, 500 and 700 hours of use as well as the reliabilities. **[4]**

b) A system consists of 4 subsystems in series. Each subsystem consists of some number of modules. Determine the mean lives and reliabilities of various subsystems so as to have system reliability of 0.95 for 30 hours mission time using “AGREE” method of allocation. The necessary information for subsystem is given below: **[6]**

Subsystem	Number of modules (in each subsystem)	Importance factor	Operating time (hours)
1	45	0.95	28
2	60	0.97	29
3	25	1.00	30
4	80	0.90	27

Q5) a) It has been observed that a failure pattern of an electronic system follows an exponential distribution with the probability of failure within 900 hours as 0.425. Obtain the inherent availability of the system over the same period of time if maintainability of the whole system over the same period of time is 0.85. Also, obtain the operational availability if administrative and logistic time is 240 hrs. Assume that the repair time follows an exponential distribution. **[8]**

b) Specify the functions to be performed by the reliability department to obtain the desired reliability. **[4]**

c) Availability is a complex function of reliability, maintainability and supply effectiveness. Comment on the statement. **[4]**

OR

Q6) a) A material handling system has to be designed with a reliability value of 0.9 for 1000 hours. An operational availability over the same period of time is required to be 0.85. If preventive maintenance downtime is ignored

and mean administrative and logistic time is 50% of mean time to repair, find [8]

- i) Mean Time To Repair (MTTR).
 - ii) Mean Down Time (MDT) and
 - iii) Inherent availability. Assume a constant hazard rate for failure.
- b) State at least eight applications of Built-In-Testing technique. [4]
- c) Classify the cost of reliability and describe how an accurate estimation of cost of unreliability provides benefit to the reliability engineer. [4]

Q7) a) Progress in tool wear is continuously monitored by three digital microscopes namely A, B and C, functioning independently. Each of the microscopes receives power supply from independent sources. Microscope A receives power from D and E sources and the power from any one source is sufficient for operation of microscope A. Microscope B receives power from F source. Microscope C receives power from G and H sources and the power from any one source is sufficient for operation of microscope C. To effectively monitor the tool wear, it is necessary that at least one of the microscope functions satisfactorily. Draw the block diagram for the complete system. Also, construct the fault tree and based on this, calculate the reliability of the system. The reliabilities of microscopes and failure rates of power sources can be referred from following table. [10]

Characteristics	Microscopes			Power sources				
	The reliability			The probability of failure				
	A	B	C	D	E	F	G	H
Components	0.989	0.996	0.975	0.003	0.003	0.005	0.006	0.006

- b) State the importance of [8]
- i) Consideration of human factors in design and design principles (Any four).
 - ii) Design of Experiments.

OR

- Q8) a)** A hydraulic circuit (system) is shown in Fig. 3. There are two supply lines having various valves (A, B, C, D and E) and gear pumps (P1 and P2) through which oil is supplied to machine from oil tank.

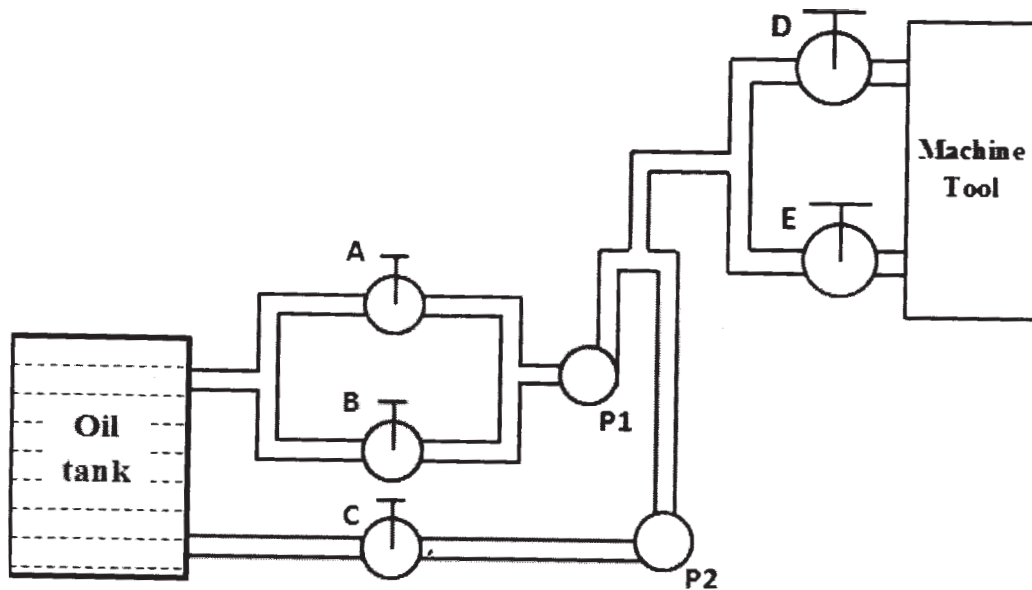


Fig.3 Hydraulic circuit to supply oil from oil tank to machine tool

The probability of failure of the valves and reliability of the gear pumps is given in following table. Draw the block diagram for the complete system. Also, construct the fault tree and based on this, calculate the reliability of the hydraulic circuit (system). **[10]**

Characteristics	Valves					Gear Pumps	
	The probability of failure					The reliability	
	A	B	C	D	E	P1	P2
Components	0.002	0.002	0.004	0.005	0.003	0.996	0.996

- b) State the purpose and applications of **[8]**
- i) MIL - Handbook 217F.
 - ii) Monte Carlo Simulation

Q9) a) The following data refers to a certain test of equipment: **[8]**

Failure number	1	2	3	4	5	6	7	8
MTTF (hrs.)	25	14	34	24	27	33	18	36

Find out the reliability of the equipment and plot the variation of reliability against time using :

- i) Mean ranking method and
 - ii) Median ranking method.
- b) What is FRACAS? State its application in manufacturing industry and explain how FMECA benefits the FRACAS. **[8]**

OR

Q10) a) The stress developed in a machine component is known to be normally distributed with a mean stress of 200 N/mm² and standard deviation of 30 N/mm². The mean material strength of machine component is 330 N/mm² and standard deviation of 45 N/mm². Assuming that the material strength of machine component and induced stresses are independent, determine :

- i) The probability of survival of machine component.
- ii) Average factor of safety and
- iii) Minimum and maximum values of factor of safety.

Extract the data from following table which shows the normal variant (Z) and $\Phi(Z)$.

Z	2.1	2.2	2.3	2.4	2.5	2.6
$\Phi(Z)$	0.9642	0.9722	0.9786	0.9836	0.9876	0.9906

[8]

- b) What is meant by accelerated test in evaluating reliability? Give at least six points of differences between Highly Accelerated Life Testing (HALT) and Accelerated Life Testing (ALT). **[8]**



Total No. of Questions : 10]

SEAT No. :

P1855

[4859]-1020

[Total No. of Pages : 2

B.E. (Mechanical)

d-MACHINE TOOL DESIGN

(2012 Course End Sem) (Elective-I)(Semester-I)

Time : 2 1/2 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer in one answer book.*
- 2) *Answer Q1 or Q2 , Q3 or Q4 ,Q5 or Q6, Q7 or Q8,Q9 or Q10.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

Q1) a) Explain Geometric Progression with suitable example. [4]

b) In Machine tool gear box, if number of speed steps are 12 and is to be realized in 3 steps, write down six various possible structural formula.[6]

OR

Q2) a) What are consideration in design of machine tools drives. [4]

b) Define static and dynamic stiffness. [6]

Q3) a) Explain various types of beds used in machine tool and their construction and design features (only three). [6]

b) Classify machine tools guide-ways. [4]

OR

Q4) a) Explain stick-slip motion in guide-ways. [4]

b) Write design procedure for Aerostatic slide-ways. [6]

Q5) a) Explain calculation for spindle design. [12]

b) What are function and design requirement of spindle. [6]

OR

Q6) a) Explain design of power screw with respect to wear resistance, strength and stiffness. [12]

b) Why re-circulating ball screws are used in precision machines. [6]

P.T.O.

- Q7)** a) Explain dynamic characteristics of cutting process. [8]
b) Explain vibration in machine tools. [8]

OR

- Q8)** a) Explain ergonomics consideration applied to design of control members push button, toggle , knobs and crank. [12]
b) Explain Adaptive Control system. [4]

- Q9)** a) What are design consideration in CNC machines. [8]
b) Explain recent trends in machine tools. [8]

OR

- Q10)**a) Explain various mechanical variators stepless speed regulations. [12]
b) Explain Hydraulic stepless regulations. [4]



Total No. of Questions : 10]

SEAT No. :

P3650

[Total No. of Pages : 3

[4859] - 1021

B.E. (Mechanical)

GAS TURBINES & PROPULSION

(2012 Pattern) (End Semester) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) Draw open cycle & closed cycle gas turbine with neat sketch. State the applications. [3]
- b) Compare ideal & actual Brayton cycle with the help of T-S diagram. [3]
- c) Write a note on atmospheric jet engines. [4]

OR

- Q2)** a) Explain the principle of aircraft propulsion. [4]
- b) In a gas turbine plant intake conditions are 1 bar & 27°C. The air is compressed to 4 bar with an isentropic efficiency of 85%. Isentropic efficiency of turbine is 85%. The maximum temperature is 572°C. Find the air-fuel ratio. Given : Cp for air as 1.005 kJ/kgK and for gas Cp is 0.996 kJ/kgK. [6]

- Q3)** a) Write a short note on turbo fan engines. [5]
- b) Explain various nozzle & diffuser losses in brief. [5]

OR

- Q4)** a) A propulsion unit is required to produce a thrust of 320 KN for 20 seconds. Calculate the mass flow rate of the propellant. Also find the volume flow rate of the propellant if the density of a propellant is 1020 kg/m³. Specific impulse is 2920 N.S/kg generated by the propellant. [6]
- b) Write the various parameters affecting the flight performance. [4]

P.T.O.

Q5) a) A single stage axial flow turbine (impulse turbine) is supplied with a gas at stagnation conditions of 4 bar, 650°C. The expansion of gas in nozzle is upto a pressure of 1 bar. The nozzle discharge angle is 15° to the plane of wheels. The blade speed is 360 m/s and the gas leaves the rotor blade in axial direction with a speed of 300 m/s. Assuming a nozzle efficiency of 96%, find:

- i) Rotor blade angles at inlet & outlet.
- ii) Work done per kg of air.
- iii) Power developed for gas flow of 25 kg/s.
- iv) Utilisation factor.
- v) Stage efficiency.

[10]

b) Discuss various losses associated with axial flow turbines. [6]

OR

Q6) a) In a single stage impulse turbine, gas enters at stagnation pressure of 4 bar and 1000 K and exit static pressure is maintained at 1.2 bar. The nozzle efficiency is 96%. The velocity of gas leaving the stage is at 290 m/s axially while the blade velocity is 320 m/s. The static head efficiency is 88%. The exit pressure from nozzle is 1.25 bar. Find

- i) Work done per kg of air.
- ii) Nozzle angle.
- iii) Blade inlet angle.
- iv) Blade outlet angle.
- v) Energy utilisation factor for the rotor.

[10]

b) Explain the effect of nozzle angle on work output and effect of axial discharge in axial flow turbines. [6]

- Q7)** a) An axial flow compressor draws air at 20°C and delivers it at 50°C. Assuming 50% degree of reaction, calculate the velocity of flow if blade velocity is 100 m/s, work factor is 0.85. Consider, $C_p = 1 \text{ kJ/kgK}$, $\alpha = 10^\circ$, $\beta = 40^\circ$. Also find the number of stages. [12]
- b) Explain the processes involved in an axial flow compressor with the help of T-S dia. [6]

OR

- Q8)** a) An axial flow compressor develops a pressure ratio of 1.2 in the first stage. The inlet conditions are 1 bar and 309 K. The overall efficiency of the compressor including bearing losses is 83%. The axial velocity is 0.47 times the blade velocity. The velocity diagram is symmetrical and the change of velocity of whirl at the mean radius is 0.5 times the axial velocity. Estimate the blade speed required and the absolute velocity of air leaving the stationary inlet guide vanes. [12]
- b) Compare radial & axial flow compressors. [6]

- Q9)** a) Discuss in detail the factors which are considered for evaluating the performance of combustion chambers. [8]
- b) What are the theories of combustion? Explain hydroxylation theory of combustion. [8]

OR

- Q10)** a) Explain the working of combustion chamber with swirl vanes. [8]
- b) Explain the methods of flame stabilisation in combustion chambers for gas turbine. [8]



Total No. of Questions : 10]

SEAT No. :

P4430

[4859]-1022

[Total No. of Pages : 2

B.E. (Mechanical)

PRODUCT DESIGN AND DEVELOPMENT

(2012 Pattern) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer in only one answer books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

Q1) Discuss Mission Statement and Technical Questioning in the context of Product. Design with suitable cases study. **[10]**

OR

Q2) Discuss the various roles of Product Design Team in detail. **[10]**

Q3) Explain how Standardization, Simplification and specialization help in better product design. **[10]**

OR

Q4) What is Product Life Cycle? Elaborate the life cycle phases for Bajaj Scooter and Tata Nano. **[10]**

Q5) Explain the procedure for Product Tear Down in detail. Discuss Force Flow Diagram and Subtract and Operate procedure with suitable example. **[18]**

OR

Q6) Elaborate the concept of Product Life Cycle Management in Detail. Discuss various phases of Product Life Cycle and corresponding technologies. **[18]**

Q7) a) Discuss Function Form Diagram with suitable example. **[8]**

b) What are local and regional issues for Environment? Elaborate. **[8]**

P.T.O.

OR

- Q8)** a) Explain any two Product Portfolios with suitable examples. [8]
b) Discuss the stepwise procedure for Benchmarking. [8]

- Q9)** a) Explain the role of vendors and customers in PLM Implementation. [8]
b) Explain Weighed Sum Assessment method with suitable example. [8]

OR

- Q10)** Explain the guidelines for Design for Manufacture. Design for Assemble and Design for 'Environment in detail'. [16]



Total No. of Questions :10]

SEAT No. :

P1856

[4859]-1024

[Total No. of Pages :4

B.E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

(2012 Pattern) (End - Sem.) (Semester - I) (402045 D) (Elective- II)

Time : 2½ Hours]

[Max. Marks :70

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.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) a) In following table, advanced machining processes are given on left hand side and two applications of each process are given on right hand side. Match the process with their correct applications. **[4]**

- | | |
|------------------------------------|--|
| i) High Energy Rate Forming (HERF) | a) Burr-free sharpening of hypodermic needles |
| ii) Electromagnetic Forming (EMF) | b) Profiling of worn locomotive traction motor gears |
| iii) Hydroforming | c) Crimping of metal strips |
| iv) Electrochemical Grinding (ECG) | d) Radar dishes |
| | e) Bending of thin tubes into complex shapes |
| | f) Ball Joint Assembly |
| | g) Medical and commercial cookware applications |
| | h) Aluminium tubes for bicycle frames |

b) Explain the importance of tool design in Friction Stir Welding (FSW)? Name any four commonly used tool (pin) profiles in FSW with neat sketches? **[6]**

OR

P.T.O.

Q2) a) Write down at least two applications of Friction stir welding in each of the following industries: [6]

- i) Aerospace,
- ii) Railway and
- iii) Land transport.

b) State whether the following statements are true or false: [4]

- i) In Roll forming, side rolls and cluster rolls are used to provide greater precision and flexibility and to limit stresses on the material.
- ii) Electrochemically ground specimens show relatively poor fatigue strength and poor dimensional tolerances.
- iii) Simultaneous drilling of multiple holes having high aspect ratio and different shapes can be obtained with ease using shaped-tube electrolytic machining (STEM).
- iv) Electromagnetic forming (EMF) process is only applicable for electrically conducting materials and is not suitable for large work pieces.

Q3) a) State with sketch the working principle and applications of the Electrolytic in-process dressing. [6]

b) Write down the advantages and limitations (four each) of the High Energy Rate Forming (HERF) process. [4]

OR

Q4) a) Explain with neat sketch the different machining zones in electrochemical grinding. [6]

b) Write down the unique features and process parameters of Electromagnetic Forming (EMF) process (four each)? [4]

- Q5)** a) List the performance characteristics of the ultrasonic micromachining process (USMM) and with cause and effect diagram show the various process parameters in USMM which influence the micromachining performance? [8]
- b) With a schematic of diamond turn machine (DTM) name the various components of DTM based on their functionality? [6]
- c) Differentiate the micro-electric discharge machining (micro-EDM) and EDM processes in terms of their interelectrode gap and specific energy of material removal? [2]

OR

- Q6)** a) State any four applications of micro-EDM process and with cause-effect diagram show the different process parameters in micro-EDM process which influence the process? [8]
- b) Explain the different contributing mechanisms of material removal that are involved in ultrasonic micromachining process (USMM)? [6]
- c) List four properties of diamond tools which considered them as the most suitable tool for diamond micromachining? [2]
- Q7)** a) What is additive manufacturing and classify the various processes according to the raw material used in the process? Also, state the advantages of additive manufacturing processes in comparison to subtractive manufacturing processes? [8]
- b) State with sketch the principle of Fused Deposition Modeling (FDM)? Also, list the general applications of FDM process. [6]
- c) State the applications of the Direct Write technology (DW)? [2]

OR

- Q8)** a) State with sketch the principle of Laminated Object Manufacturing (LOM)? Also, state the advantages and disadvantages of the LOM process (four each)? [8]

- b) Describe the process steps for manufacturing a component from design/drawing stage to finished component using an additive manufacturing process? [6]
- c) Give at least four points of comparison between the Selective Laser Melting (SLM) and Electron Beam Melting (EBM) process. [2]
- Q9)** a) State the advantages and limitations of Electron microscopes over Optical microscopes? (Three each) [6]
- b) Describe with schematic the basic components of Scanning Tunneling Microscope? [6]
- c) State with sketch the principle of the stylus type surface profilers? Also, state advantages and limitations of these contact-type profilers? [6]

OR

- Q10)** a) List out the equipments used for measurement of micro-machined parts and group them into two categories based on the principles used for dimensional and topographic inspection? [6]
- b) State with schematic the principle of Atomic Force Microscope (AFM)? Also, compare AFM with electronic microscopes in terms of characteristics of images captured? [6]
- c) State with schematic the principle and applications of Interference Microscopy? Also, state the major limitation of interferometry? [6]

EEE

Total No. of Questions : 8]

SEAT No. :

P3651

[Total No. of Pages : 2

[4859]-1026

B.E. (Electrical)

PLC AND SCADA APPLICATIONS

(2012 Pattern) (End Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.

SECTION - I

- Q1)** a) Write a short note on CPU. [7]
b) What are the different rules to draw ladder diagram. [7]
c) Explain Adjust and Observe method of PID tuning. [6]

OR

- Q2)** a) Explain Input output modules of PLC. [6]
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	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

- c) Explain Input ON/OFF devices. [6]

- Q3)** a) Explain thermal transducers with examples. [8]
b) How speed of the motor can be measured by PLC? [8]

OR

P.T.O.

- Q4)** a) Three motors are being controlled using three separate timers. Each motor will remain ON for 10 sec. After every 10 sec. previous motor stops and the next motor becomes ON. This will continue in a cycle. Switch I1 is used to start and I2 is used to stop the cycle. Following table explains the function. [8]

Inputs –Switches I1, I2		Outputs- Motors Q1, Q2, Q3			
I1=1 & I2=0	Timer	Time	Q1	Q2	Q3
---	T1	10s	1	0	0
---	T2	10s	0	1	0
---	T3	10s	0	0	1
I1=0 & I2=1	---	---	0	0	0

- b) Write a short note on DC motor speed control with solid state device.[8]

- Q5)** a) Define SCADA. [2]
 b) Explain SCADA architecture with neat diagram. [8]
 c) Explain application of SCADA in Petroleum Refining Process. [8]

OR

- Q6)** a) What are desirable properties of SCADA? [2]
 b) Explain generations of SCADA architecture. [8]
 c) Explain SCADA systems in operation and control of interconnected power system. [8]

- Q7)** a) Explain Open System Interconnection (OSI) model in detail. [8]
 b) Write note on DeviceNet communication layers. [8]

OR

- Q8)** a) Explain Flexible Function Block (FFB) protocol. [8]
 b) Explain the Modbus model. [8]



- b) For a given system, $\dot{x} = \begin{bmatrix} 0 & -2 \\ 1 & -3 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$, $y = [1 \ 0]x$, $x(0) = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$
 Obtain $x(t)$ for unit step input. [6]
- c) Draw circuit diagram of op-amp based lead/lag compensator, write transfer function and draw pole zero plot. [4]

Q3) a) In a unity feedback system an ideal relay with output equal to ± 1 unit is connected in cascade with $G(s) = \frac{20}{s(s+1)(s+3)}$ Determine amplitude and frequency of limit cycle if it exists by describing function method. [10]

- b) Explain any one peculiar behavior of nonlinear system : [6]
- i) Jump resonance
 - ii) Limit cycle
 - iii) Sub-harmonic oscillations

OR

Q4) a) A linear second order system is described by equation. [10]

$$\ddot{e} + 2\xi\omega_n \dot{e} + \omega_n^2 e = 0$$

where, $\xi = 0.3, \omega_n = 1 \text{ rad/sec}, e(0) = 2, \dot{e}(0) = 0$.
 Construct the phase trajectory using method of isoclines.

b) Explain different types of singular points of the phase trajectories. [6]

Q5) a) Draw the block diagram of digital control system & explain the function of each block in short. [10]

b) Determine inverse Z transform of [6]

i) $\frac{z^2 + 3z}{z^2 + 3z + 2}$

ii) $\frac{(1 - e^{-3T})z}{(z-1)(z - e^{-3T})}$

OR

Q6) a) Explain the sampling and reconstruction process, State the sampling theorem and give its importance. [10]

b) Solve the following equation by using z-transform method. [6]
 $x(k + 2) + 5x(k + 1) + 6x(k) = 0$ where $x(0); x(1) = 1$

Q7) a) Define Pulse Transfer Function and obtain the pulse transfer function of two systems in cascade with sampler in between. [8]

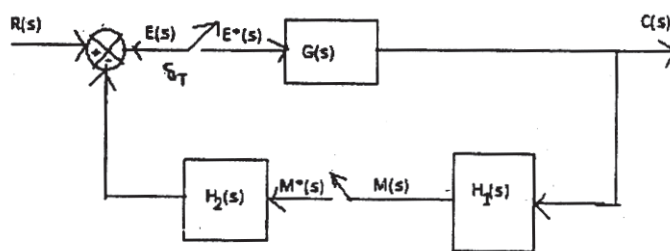
b) Obtain the direct and cascade realization of [10]

$$D(z) = \frac{z^2 + 5z + 2}{z^3 + 6z^2 + 4z + 1}$$

OR

Q8) a) Write a short note on Digital PID Controller. [8]

b) Obtain the closed loop pulse transfer function of the following system. [10]



Total No. of Questions : 10]

SEAT No. :

P2045

[4859] - 1029

[Total No. of Pages : 2

B.E. (Electrical) (Semester - I)
POWER QUALITY (End Semester)
(2012 Pattern) (Elective - I (b))

Time : 2.5 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1) a)** Why Power Quality has become important in today's context? **[5]**
- b) Explain voltage sag characteristics - point on wave initiation, missing voltage. **[5]**

OR

- Q2) a)** Discussion in brief any one over voltage mitigation technique. **[5]**
- b) Discuss how power quality is affected due to grounding problems. **[5]**

- Q3) a)** List various voltage sag mitigation techniques and explain any one. **[5]**
- b) What is flicker? List various sources of flicker. **[5]**

OR

- Q4) a)** Write short note on power quality problem characteristics as per IEEE Standard 1159. **[5]**
- b) Write short note on computer tools used for transient analysis. **[5]**

- Q5) a)** What is harmonics? Explain voltage and current harmonic distortion. **[9]**
- b) Explain in brief the impact of harmonics on active, reactive and apparent power. **[9]**

P.T.O.

OR

- Q6)** a) Write detail note on triplen harmonics. [9]
b) Discuss in detail various sources of harmonics. [9]

- Q7)** a) Explain the concept of point of common coupling and its use in harmonic study. [8]
b) Explain in brief devices for controlling harmonic distortion. [8]

OR

- Q8)** a) Explain in detail different principles of controlling harmonics. [8]
b) Discuss harmonic study procedure. [8]

- Q9)** a) List and explain use of various equipment's required for power quality monitoring. [10]
b) Write note on choosing PQ monitoring location. [6]

OR

- Q10)**a) Discuss different objectives/consideration for power quality monitoring.[10]
b) Write note on choosing PQ monitoring duration. [6]



Total No. of Questions : 7]

SEAT No. :

P3237

[Total No. of Pages : 3

[4859] - 1030

B.E. (Electrical Engineering) (End Semester)

RENEWABLE ENERGY SYSTEM

(2012 Pattern) (Elective - I)

Time : 2.5 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Solve Total Four Questions. Q1 is compulsory. Solve any one question from Q.2 and Q.3, Q.4 and Q.5; and Q.6 and Q.7.*
- 2) *Assume suitable data if necessary and as applicable.*
- 3) *Draw neat sketches wherever required.*

- Q1)** a) Describe the instrument used for measurement of solar global radiation. [5]
- b) List the different silicon technologies available for solar PV cell. Explain any one in detail. [5]
- c) What is Tip Speed Ratio (TSR)? Find TSR if the rotor speed is 214 rpm and wind velocity is 8 m/sec. and rotor diameter is $d = 4.2838$ m? What are the effects of more or less TSR on generation? [5]
- d) With the help of illustrative example, list the steps involve in designing Residential solar PV system. Assume the size of the home is 2 rooms consist of each dc electric load of one light (24W) and one fan (36 W) only. [5]
- Q2)** a) What are the Biomass Resources'? Explain with the help of block diagram a biomass based power generation. [8]
- b) An I. C. engine gives total output energy of 1000 kWh. Biogas from a Biogas plant is used as a fuel for I. C. Engine. The engine efficiency is 90% and biogas plant efficiency is 70%. Energy density of biogas is 250 kWh / Nm³. Cow dung is used as input energy source for biogas plant. Specific energy & density of Cow dung is 0.074 kWh/kg & 1500 kg/m³ respectively. Determine. [8]

P.T.O.

- i) Total volume of Biogas required in Nm³ (Normal cubic meter) as input to I. C. Engine?
- ii) Weight in kg & volume in m³ of biomass used?

OR

Q3) a) Explain fluidized bed type biomass gasifier in detail with neat diagram? [8]

- b) The following data is given for a biogas digester suitable for the output of five cows: Retention time = 30 days, temperature = 30°C, dry matter consumed per day = 4 kg, biogas yield = 0.28 m³/kg, Burning η = 60%, methane proportion = 0.8, heat of combustion of methane = 28 MJ/m³, density of dry material = 50 kg/m³. [8]

Find :

- i) Volume of biogas digester
- ii) Volume of biogas
- iii) Power available from digester

Q4) a) List the methods of Hydrogen storage? Explain any two? [8]

- b) A 12 V battery bank rated at 150 Ah under standard conditions need to deliver 600 Wh over a 12 h period every day. Calculate number of day's battery would able to supply, if depth of discharge (DOD) is [8]

- i) 100% at -10°C and
- ii) 50% at -25°C

OR

Q5) a) Name different energy storage systems? Explain any two energy storage systems? [8]

- b) A 100 Ah, 12 V battery with a rest voltage of 12.5 V is charged (at its current State of Charge) at a C/4 rate (a charge rate in amps of one-fourth the overall battery capacity in amp hours), during which time the applied voltage to the battery is 13.0 V. [8]

- i) Estimate the internal resistance of the battery?
- ii) Estimate the power and energy lost during charging?

- Q6)** a) Explain with the help of block diagram grid connected PV system. [8]
- b) A 1.2 V AAA battery costs Rs 20 each. It is rated for 60 mA at 16 Hrs. It is required to supply 1kWh of energy using this option. Determine its cost in Rs per kWh? If annual saving of Rs 5000/- is observed due to this, in how many years investment cost will be returned? [10]

OR

- Q7)** A person wants to purchase solar water heating system of Rs 20000/- It is require to do a down payment of Rs 4000/-. An annual end of year payment of Rs 2400/- is required for 10 years. However, the person elects to pay Rs 2200/- yearly and a balance payment at the end. Determine the value of balance payment if money is worth 10% interest. [18]



Total No. of Questions : 10]

SEAT No. :

P1857

[4859]-1031

[Total No. of Pages : 2

B.E. (Electrical)

**d - DIGITAL SIGNAL PROCESSING
(2012 Course) (Elective - I) (Semester - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *All questions carry equal marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) State and explain sampling theorem. **[5]**

b) Give frequency response of first order discrete system. **[5]**

OR

Q2) a) Explain linear convolution using z-transform. **[5]**

b) Give the properties of discrete time system. Explain any one detail. **[5]**

Q3) a) What do you mean z-transform and its ROC. **[5]**

b) Explain causality and stability of LTI system. **[5]**

OR

Q4) a) Explain linearity property of D.T.F.T. with proof. **[5]**

b) Explain properties of unilateral z-transform. **[5]**

Q5) a) Define Discrete Fourier Transform. Explain any two properties. **[8]**

b) Explain linear convolution using DFT. **[8]**

OR

P.T.O.

Q6) a) Determine DFT of following sequence $x(n)=\{1, 2, 1, 2\}$. [8]

b) Explain DIT-FFT algorithm in detail. [8]

Q7) a) What are ideal frequency selective filters? Explain each with Mathematical expressions. [8]

b) Explain design of butterworth IIR filter using bilinear transformation. [8]

OR

Q8) a) Design Direct Form-I and Direct Form-II structure of IIR filter. [8]

b) Compare analog filters with digital filters. [8]

Q9) a) Explain design of FIR Filter using window technique. [10]

b) Compare FIR and IIR filter. [8]

OR

Q10) Write short note on (any Two): [18]

a) Measurement of voltage and current using DSP.

b) Harmonic Analysis using DSP.

c) DSP based protective relay.



Total No. of Questions :8]

SEAT No. :

P1858

[4859]-1032

[Total No. of Pages :2

B.E. (Electrical)

**RESTRUCTURING AND DEREGULATION
(2012 Pattern) (Elective - II) (Semester - I) (403144)**

Time :2½ Hours]

[Max. Marks :70

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.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Explain the objectives of “Electricity Act 2003” with reference to Generation, Transmission and Distribution. Also explain the guidelines under this act. [6]
- b) What are various challenges before Indian Power Sector. [6]
- c) Explain following types of regulations: [8]
- i) Rate of return regulation.
 - ii) Performance based regulation.

OR

- Q2)** a) Explain the working of Indian Energy Exchange (IEX) for day ahead market. [8]
- b) Describe the desirable characteristics of tariff of electricity. [6]
- c) Explain role of regulation and evolution of regulatory commission. [6]
- Q3)** a) Write short note on following models based on industry structure and contractual arrangements: [8]
- i) Wholesale Competition.
 - ii) Retail Competition.
- b) Compare between ‘competition for the market’ and ‘competition in the market’. [8]

OR

P.T.O.

- Q4)** a) Explain the important changes occurred in Indian power sector after electricity reform. [8]
b) Explain various ISO (Independent System Operator) Models. [8]
- Q5)** a) State and explain various methods of transmission pricing. [8]
b) Specify peculiarities of electricity as a commodity. Explain rules that govern the electricity markets. [8]

OR

- Q6)** a) Compare integrated trading model and decentralized trading model. [8]
b) Explain Power Exchanges in India. Also explain the concept of market clearing price. [8]
- Q7)** a) Explain in detail congestion issue and management. [9]
b) State the key features of indian Grid code. Also explain transmission congestion issues. [9]

OR

- Q8)** a) What is the importance of transmission pricing under open access condition? State and explain major components of transmission costs. [9]
b) Explain three parts of Availability Based Tariff. Also explain how with implementation of ABT, the grid operation is improved in Indian power sector. [9]

EEE

Total No. of Questions :8]

SEAT No. :

P1859

[4859]-1034

[Total No. of Pages :3

B.E. (Electrical)

c-EXTRA HIGH VOLTAGE AC TRANSMISSION

(2012 course) (End- Semester) (Semester - I) (Elective - II) (403144)

Time :2½ Hours]

[Max. Marks :70

Instructions to the candidates:

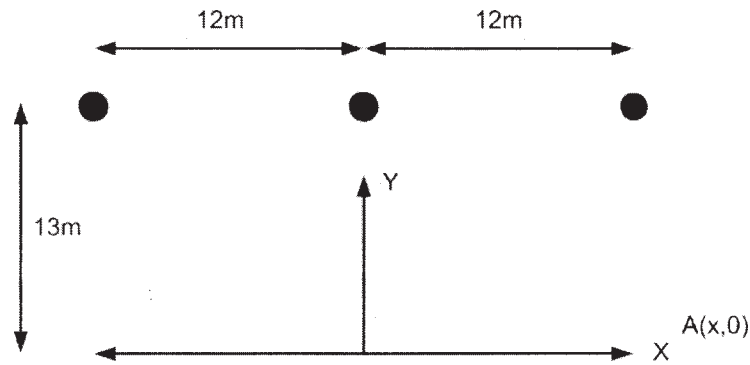
- 1) *Answer all questions.*
- 2) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of calculator is allowed.*

- Q1)** a) Explain concept of travelling waves and derive expression for equations of Travelling waves. [8]
- b) Explain properties of bundle conductor. [4]
- c) Derive expression for capacitance of single phase two conductor line. [8]

OR

- Q2)** a) Derive expression for inductance of multi conductor lines & state Maxwells coefficients. [8]
- b) Derive expression for maximum charge condition on a 3 phase line. [8]
- c) Explain role of EHV line in power transmission system and state advantages. [4]
- Q3)** a) Compute the r.m.s value of ground level electrostatics field of a 400 kV Line at its maximum operating voltage of 420 kV given: single circuit configuration $H = 13\text{m}$, $S = 12\text{m}$, conductor $2 \times 3.18\text{cm}$ diameter, $B = 45.72\text{cm}$, $N = 2$, Assume $D_i = D_i$ [10]

P.T.O.



- b) Discuss effect of high electrostatic field on: [8]
- i) Humans
 - ii) Animals
 - iii) Plants

OR

- Q4)** a) Derive expression for electrostatic induction on unenergized circuit of double circuit line. [10]
- b) Discuss effect of power frequency magnetic fields on human health and specify permissible limits. [8]

- Q5)** a) Explain formation of corona & define terms: [8]
- i) Corona inception voltage.
 - ii) Visual corona voltage.
- b) State & explain advantages & disadvantages of corona in brief. [8]

OR

- Q6)** a) Explain audible noise operation & characteristic limits for audible noise in Corona. [8]
- b) Discuss visual corona under standard operating condition and conditions other than standard operating condition. [8]

- Q7)** a) State and explain factors to be considered during design of EHV line based upon steady state limits. [8]
- b) Explain in detail properties of cable insulation materials. [8]

OR

- Q8)** a) Define $\tan \delta$ loss factor & derive an expression for insulation resistance of a cable. [8]
- b) Give classification of cable & explain any one in detail. [8]

EEE

Total No. of Questions : 8]

SEAT No. :

P3652

[Total No. of Pages : 2

[4859] - 1035

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

Introduction to Electrical Transportation Systems (Elective - II)
(2012 Pattern) (End Sem.)

Time : 2½ Hours]

[Max. Marks : 70

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.*
- 2) *Figures to the right indicate full marks.*

- Q1) a)** What are the modes of transportation? Explain in detail. **[12]**
- b) Explain the types of mechanical drives used in transportation system. **[8]**

OR

- Q2) a)** What are the advantages and disadvantages of **[8]**
- i) Electric traction.
 - ii) Electric vehicles.
- b) Explain different types of batteries with their characteristics. **[12]**

- Q3) a)** What are the components of motion control. Explain them in detail with a neat diagram. **[12]**
- b) Compare mechanical steering versus electric steering. **[4]**

OR

- Q4) a)** Explain the concept of driverless vehicle with a neat block diagram. **[10]**
- b) How road safety is achieved? **[6]**

P.T.O.

- Q5)** a) Write the differences between series and parallel configuration of hybrid cars. [4]
b) Explain typical power train architecture of hybrid cars. [10]
c) Compare AC and DC type of traction. [4]

OR

- Q6)** a) Explain one of the applications for high speed rail. [10]
b) Explain in detail one of the configurations of hybrid cars with a neat diagram. [8]

- Q7)** a) Explain the load characteristics of Elevator systems. [8]
b) Explain the control scheme used in traction type of elevators. [8]

OR

- Q8)** a) What are the considerations of energy efficient systems. [6]
b) Explain the concept of special vehicles in detail. [10]



Total No. of Questions : 8]

SEAT No. :

P3653

[Total No. of Pages : 2

[4859]-1036

B.E. (E & T/C)

VLSI DESIGN & TECHNOLOGY

(2012 Pattern) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer any one question out of Q.No.1 or 2, Q.No.3 or 4, Q.No. 5 or 6, Q.No.7 or 8.
- 2) Neat diagrams should be drawn wherever necessary.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assume suitable data, if necessary.

Q1) a) Write VHDL code for 8 bit serial in serial out shift register by structural & behavioural modeling methods. [7]

b) What is need of FPGA? List typical specifications of FPGA. [7]

c) Explain I/O architecture in detail. [6]

OR

Q2) a) What are flip flop timings? What is meta-stability? What are solutions? [7]

b) Explore the architecture of CPLD in detail. [7]

c) What are different wire parasitics? How do they play important role in routing? [6]

Q3) a) Derive the expressions for power dissipations in CMOS. What are the techniques to minimize the dissipations? [9]

b) Design CMOS logic for $Y = AB + CDEFG + H$. Compute area on chip. [9]

OR

Q4) a) What is power delay product? Derive the expression for it. What is its significance? [9]

b) Explain linear delay model in detail. [9]

P.T.O.

- Q5)** a) Compare push-pull, current source & active load inverters with respect to voltage gain, voltage range, output resistance & bandwidth in detail. [8]
b) Draw the schematic of CMOS differential amplifier and give the expressions for voltage gain, output resistance. CMRR & ICMR. [8]

OR

- Q6)** a) Draw common drain amplifier. Compare with common source & common gate amplifiers with respect to gain, output resistance & bandwidth. [8]
b) Draw & explain CMOS operational amplifier. Give the expressions for voltage gain & output resistance. [8]

- Q7)** a) What is need of DFT? Explain with suitable example. [8]
b) Explain fault models in detail. [8]

OR

- Q8)** a) With the interface ports involved, explain JTAG in detail. [8]
b) What is partial & full scan path? [8]



Total No. of Questions : 8]

SEAT No. :

P3654

[Total No. of Pages : 2

[4859]-1037

B.E. (E & TC)

**COMPUTER NETWORKS
(2012 Pattern) (Semester - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Draw OSI reference model and explain functions of data link layer and presentation layer. [7]
- b) A channel has data rate of 4kbps and propagation delay of 20ms. Calculate the frame size if the channel efficiency is 50%. [7]
- c) What is backbone network? What are its types? Explain with necessary diagrams. [6]

OR

- Q2)** a) Draw TCP/IP protocol suite. List with example addresses present at every layer. [7]
- b) Explain flow control in datalink layer. [7]
- c) Explain Basic service set and Extended service set in WLAN. [6]
- Q3)** a) Compare IPv4 and IPv6. [6]
- b) List the various protocols giving their significance at network layer. [6]
- c) Explain the various classes of IP addressing with their respective ranges. Also list the range of private IP addresses and the standard mask for first three classes of IP addresses. [6]

OR

P.T.O.

- Q4)** a) Draw and explain IPv4 frame format. [6]
b) Write short note on DHCP. [6]
c) Give the classification of commonly used Unicast Routing protocols and explain Distance Vector Routing protocol with an appropriate example. [6]

- Q5)** a) Draw the TCP frame format. Explain the use of flags. [6]
b) Explain the reliability, delay, jitter and bandwidth requirements for the internet applications E-mail and video conferencing. [6]
c) Explain in brief port numbers and socket address. [4]

OR

- Q6)** a) Explain 3 way/step handshaking for connection establishment and 4 step connection termination. [6]
b) Explain the features of Stream Control Transmission Protocol (SCTP). [6]
c) Draw and explain UDP frame format. [4]

- Q7)** a) What are the main responsibilities of Application Layer? Explain in brief. [6]
b) Explain DNS in Internet. [6]
c) Explain the RSA algorithm. Also explain its limitations. [4]

OR

- Q8)** a) Compare symmetric and asymmetric cipher. [6]
b) Write short note on electronic mail system. [6]
c) Explain the Substitution cipher with its advantages and disadvantages. [4]



Total No. of Questions : 8]

SEAT No. :

P3655

[Total No. of Pages : 3

[4859] - 1038

B.E. (E & TC) (Semester - I)

Microwave Engineering

(2012 Pattern) (End Sem.)

Time : 2.30 Hours]

[Max. Marks : 70

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.*
- 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.*

- Q1)** a) The TE_{10} mode is propagated in a rectangular waveguide of dimensions $a = 6\text{cm}$ and $b = 4\text{ cm}$, by means of a travelling detector. The distance between a maximum and minimum is found to be 4.55 cm . Find the frequency of the wave. [7]
- b) State different types of stripline and distinguish between Stripline and Microstrip line in detail. [7]
- c) What is the significance of scattering matrix? Write the properties of S-matrix. [6]

OR

- Q2)** a) Explain the terms with respect to waveguide: [7]
- i) Dominant Mode.
 - ii) Cut-off Frequency.
 - iii) Guide Wavelength.
- b) Explain any two applications of circulator. [7]
- c) The collinear ports 1 and 2 of a Magic Tee are terminated by impedances of reflection coefficients $\rho_1 = 0.5$ and $\rho_2 = 0.6$. The difference port 4 is terminated by an impedance with reflection coefficient of 0.8. If 1W power is fed at sum port 3, calculate the power reflected at port 3 and the power divisions at the other ports. [6]

P.T.O.

- Q3)** a) What are the limitations of conventional tubes at microwave frequencies and how to overcome these limitations? [9]
- b) How the oscillations are sustained in Cavity Magnetron? Explain the process of phase focusing effect. [9]

OR

- Q4)** a) Explain the operation of Travelling Wave Tube with its slow wave structure. [9]
- b) A two cavity Klystron amplifier has the following specifications: [9]
- Beam Voltage : $V_0 = 900 \text{ V}$
Beam Current : $I_0 = 30 \text{ mA}$
Frequency : $f = 8 \text{ GHz}$
Gap spacing in either cavity : $d = 1 \text{ mm}$
Spacing between centers of cavities : $L = 4 \text{ cm}$
Effective shunt impedance : $R_{sh} : 40 \text{ k}\Omega$
- Determine :
- The electron velocity.
 - The dc transit time of electron.
 - The input voltage for maximum output voltage.
 - The voltage gain in decibels.

- Q5)** a) Draw equivalent circuit of Varactor diode. Explain in detail its construction and operation. [8]
- b) Explain principle of operation, IV characteristics and equivalent circuit of microwave Tunnel diode. [8]

OR

- Q6)** a) Explain Gunn effect using two valley model. Mention its typical characteristic and applications of Gunn diode. [8]
- b) With suitable expression explain power frequency limitations of microwave transistor. [4]
- c) In a Gunn diode with active length $20 \mu\text{m}$, the drift velocity of electrons is $2 * 10^7 \text{ cm/s}$. Calculate natural frequency of the diode and its critical voltage. [4]

- Q7)** a) Explain any two methods of measuring impedance of a terminating load in a microwave system. [8]
- b) Enlist methods of measuring the Q of a cavity resonator. Explain any one method in detail. [8]

OR

- Q8)** a) Explain with neat block diagram power measurement of microwave generator using [8]
- i) Bolometer.
- ii) Calorimeter.
- b) Describe in detail the techniques used for VSWR measurement. [8]



Total No. of Questions : 12]

SEAT No. :

P3926

[Total No. of Pages : 3

[4859]-1039
B.E. (E & TC)
DIGITAL IMAGE PROCESSING (Elective - I)
(2012 Pattern) (Semester - I)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Neat diagrams must be drawn whenever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *You are advised to attempt not more than 6 questions.*
- 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.*

- Q1)** a) What is color model? Compare RGB & YIQ color model with their applications. **[4]**
- b) Explain use of logical operation in short. **[2]**

OR

- Q2)** a) Compute the length of the shortest distance using 4,8 and m path connectivity between p & q.

Let $V = \{1,2\}$

	3	1	2	1	(q)
	2	2	0	2	
	1	2	1	1	
(p)	1	0	1	2	

[3]

- b) Explain image subtraction operation in detail along with its application. **[3]**
- Q3)** a) Explain how power-law transformation can be used for gamma correction. **[4]**
- b) Explain the difference between image enhancement & restoration? List various algorithms used for the processing in case of restoration. **[3]**

P.T.O.

OR

- Q4)** a) Answer the following related to histogram of an image [4]
i) If all pixels in an image are shuffled, will there be any change in the histogram. Justify your answer.
ii) Can two different image have same histogram? Justify your answers.
b) Explain the notch filtering in frequency domain. [3]

- Q5)** a) Explain arithmetic coding with example. [4]
b) Explain how bit plane coding is useful for run length coding. [3]

OR

- Q6)** a) Explain w.r.t. image compression fidelity criteria. [4]
b) What is DCT? How DCT helps to achieve compression. [3]

- Q7)** a) Explain the various types of thresholding techniques used in image segmentation. [9]
b) What is morphology? Explain the dilation of binary image A by structuring element B. [9]

$$A = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

OR

- Q8)** a) What is edge detection? Compare first order & second order edge detector operator w.r.t. an image. Which one will be used in which application. [9]
b) What is Region Growing? Explain the techniques of Region splitting & Region merging. [9]

- Q9) a)** Explain 4 directional & 8 directional chain coding with example. Assume suitable distance between chain code. [8]
- b) Explain following regional descriptors
- i) Topological
 - ii) Texture [8]

OR

- Q10 a)** What is PCA? How PCA is used for description/representation of an image. [8]
- b) What are the different ways of image boundary representation? How fourier descriptors are used for boundary representation & what are its advantages. [8]
- Q11 a)** What is feature? What is feature extraction, feature selection & classification. Explain the concepts with the help of example application. [8]
- b) Explain content based image Retrieval application in detail. [8]

OR

- Q12 a)** What are the different pattern classification algorithms? Explain any one in detail. [8]
- b) Explain the various applications of image processing in medical field. [8]



Total No. of Questions : 10]

SEAT No. :

P3238

[Total No. of Pages : 2

[4859] - 1040

B.E. (ESTC)

EMBEDDED SYSTEM & RTOS

(2012 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Explain the characteristics of embedded system. [5]
b) Explain the waterfall model. [5]

OR

- Q2)** a) Write a program in embedded C to implement scheduler. [7]
b) Explain the different states of task. [3]

- Q3)** a) Explain the classification of embedded system. [3]
b) Write a program in embedded C to implement semaphore. [7]

OR

- Q4)** a) Write a program in embedded C to implement mailbox. [7]
b) Compare MUCOS RTOS with LINUX RTOS. [3]

- Q5)** a) Explain the importance of embedded Linux in the development of embedded system. [8]
b) Explain the memory storage considerations for embedded Linux system. [8]

OR

P.T.O.

Total No. of Questions : 12]

SEAT No. :

P1860

[4859]-1041

[Total No. of Pages : 3

B.E. (E & TC)

**c - SOFTWARE DEFINED RADIO
(Semester - I) (2012 Course) (Elective - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain with neat block diagram of Duplexer & Diplexer. [4]
b) Explain the various characteristics of the RF front-end topologies. [4]

OR

- Q2)** a) Explain with suitable diagram the AGC operating modes. [4]
b) Draw & explain the Dual conversion Transmitter. [4]

- Q3)** Explain the following parameters w.r. to the data converters. [6]
a) Signal-to-Noise-and-Distortion Ratio (SINAD).
b) Effective Number of Bits (ENOB).

OR

- Q4)** State and explain the applications of FPGA in SDR. Comment of Power Management issues in DSP/ASIC/FPGA. [6]

P.T.O.

Q5) For a single-stage decimator LPF, compute the approximate length and number of multiplications per second using the Kaiser formulae for the following specifications: [6]

Sampling rate = 90 KHz

Decimation factor = 90

Passband = 0 to 450 Hz

Transition band = 450 to 500 Hz

Passband ripple, $\delta_p = 0.002$

Stopband ripple, $\delta_s = 0.001$

OR

Q6) What is the benefit of using the multi-stage structures of a decimator or interpolator when large changes of sampling rates are required. [6]

SECTION - II

Q7) a) Explain the following term w.r.to vector channel modeling: [9]

i) Angle of Arrival (AOA).

ii) Array Calibration.

iii) Array Ambiguity.

b) What is Smart Antenna? List the benefits & drawbacks of smart antenna system. [9]

OR

Q8) a) What is fully Adaptive array? Explain the LMS algorithm for smart antenna system. [9]

b) Explain with neat diagram the principles of MIMO-OFDM (case study). [9]

Q9) a) Draw neat block diagram of OFDM transmitter. Explain the function of constellation mapper & IFFT block. [8]

b) What is Cognitive Radio? How CR is different than the SDR. [8]

OR

- Q10)a)** Enlist the Benefits & Applications of OFDM. [8]
- b) Explain the following concepts with respect to cognitive radio. [8]
- i) Spectrum sensing-basic assignment methods.
- ii) Dynamic Spectrum Access (DSA) - mention 4 capabilities.

- Q11)a)** Explain the concept of Vertical & Horizontal handoff. [8]
- b) Explain the four classes of adaptation in SPECTRA programming environment. [8]

OR

- Q12)a)** Explain in detail the Beagle board based SDR. [8]
- b) Explain the operating modes of PSCR. [8]



Total No. of Questions : 8]

SEAT No. :

P1861

[4859]-1042

[Total No. of Pages : 2

B.E. (E & TC)

**d - INDUSTRIAL DRIVES AND CONTROL
(2012 Course) (Semester - I) (End Sem) (Elective - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Draw equivalent circuit diagram of DC series motor and state the equations that govern the operation of motor. [8]
- b) Draw and explain the power circuit of single phase semi-converter feeding a separately excited DC motor. Explain with typical waveforms, the operation in continuous and discontinuous armature current modes. [8]
- c) With the help of a simple block diagram, explain different components of a motor drive system. [4]

OR

- Q2)** a) Explain advantages and limitations of rotor resistance control of Induction motor? [6]
- b) What is slip power recovery? Draw the circuits used to recover slip power. [6]
- c) With the neat circuit diagram explain working of Switched Reluctance motor drive. Why is it preferred as adjustable speed drive? [8]

- Q3)** a) Mention various types of stepper motors. Explain the operation of any one type of stepper motor. Enlist various applications of Stepper motors. [8]
- b) A 200 steps per revolution stepper motor is rotating a screw and nut arrangement having a pitch of 5 mm. Calculate the number of pulses required to give to stepper motor to move the nut by 10 cm, if motor is driven in half step mode or full step mode. [8]

OR

P.T.O.

Q4) a) With the help of a neat circuit diagram and waveforms explain the operation of 3 phase brushless dc motor drive. State the applications of 3 phase brushless dc motor drive. [10]

b) With the help of suitable diagram, explain Chopper drive for a stepper motor. [6]

Q5) a) Draw equivalent circuit of a basic solar cell, explain each component. What is the reason of reduction in solar output with increase in temperature? [6]

b) With the help of neat block diagram explain stand alone, hybrid and grid connected PV power system. [6]

c) What is the need of charge controller in Photovoltaic Power Systems? Explain any one type of charge controller in PV power system. [6]

OR

Q6) a) Draw diagram and explain different parts of a horizontal axis wind mill. State the relation of wind velocity and power output? [6]

b) With the help of neat block diagram explain the working of grid connected wind power system. [6]

c) What are different types of batteries used for solar application? Explain Float cum Boost charging method for lead acid batteries. [6]

Q7) a) Explain the operation of neural network based PWM controller. [8]

b) How we can apply Fuzzy logic system in power electronics? Explain any typical application. [8]

OR

Q8) a) Explain the operation of neural network based control system. Explain general design methodology of neural network based system. [8]

b) What is Neuro fuzzy system? Explain Adaptive network based Fuzzy Interface System. [8]



Total No. of Questions :8]

SEAT No. :

P1862

[4859]-1043

[Total No. of Pages :3

B.E. (E & TC)

a-MULTIRATE AND ADAPTIVE SIGNAL PROCESSING

(2012 Pattern) (Elective - II) (Semester - I)

Time :2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) Attempt Q. No. 1 or Q. No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No.7 or Q.No.8.
- 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.

Q1) For the signal $f(t)$ shown in fig 1.

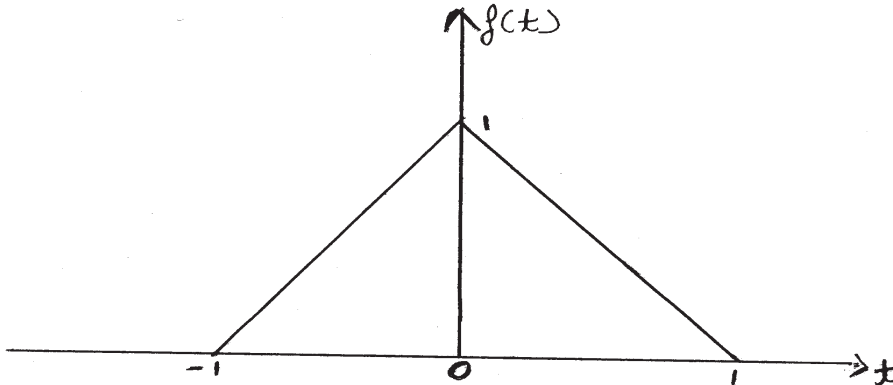


Fig 1

- a) Find the time - bandwidth product. [10]
- b) Project the signal on subspace V_0 & V_1 . Prove that $V_1 = V_0 \oplus W_0$. Sketch the respective projections. [10]

OR

- Q2) a) What is decimation? Discuss the software implementation of decimator with the help of suitable flowchart. [8]

P.T.O.

- b) Explain the following terms with relevant mathematical expressions: [12]
- Instantaneous frequency
 - Complex signal
 - Scalogram
 - Function spaces

Q3) If $x(n) = \{6, 7, 2, 3\} \in V_2$, decompose $x(n)$ till V_0 using Haar wavelet packets. Show perfect Reconstruction. Sketch the basis functions used in reconstruction stage. [18]

OR

Q4) a) Discuss the MRA axioms with reference to concept of nested subspaces. [6]

b) Draw Haar two-band filter bank structure and derive the expressions for [12]

- Perfect reconstruction condition
- Alias cancellation condition.

Q5) Consider a two coefficient adaptive filter shown in fig 2

$E[d^2(n)] = 4$ and the autocorrelation matrix is given as, $R_x = \begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix}$. The cross-correlation matrix, $P_{dx} = [-1 \ 1]^T$

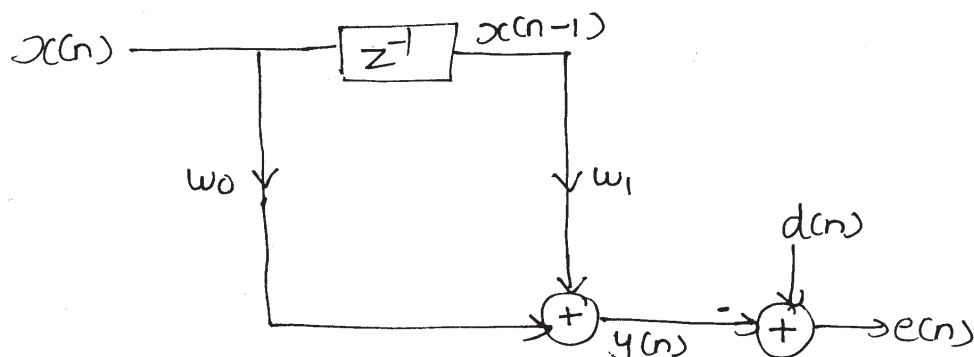


Fig 2.

- a) Find optimum weight vector, W^o . Find minimum cost, J_{\min} . [8]
- b) Assume $w_0 = 1$, find $J(w)$, using the concept of derivatives, find optimum value of w_1 & $J(w)$. [8]

OR

- Q6)** a) Starting with the equation for the mean square error, derive the Wiener - Hopf equation. [8]
- b) Discuss the basic LMS adaptive algorithm, with suitable flowchart. [8]

Q7) Given $x(n) = \{8, 9, 7, 4\} \in V_2$. Develop wavelet lifting scheme. Decompose the signal upto V_0 subspace. Show perfect reconstruction. Clearly show 'split' 'update' & 'predict' stages with their outputs. Also show how the computations take place in place. [16]

OR

- Q8)** Write short notes (any two): [16]
- a) Efficient D to A conversion in Hi-fi system.
- b) Subband coding of speech signals.
- c) Adaptive telephone echo cancellation.

EEE

Total No. of Questions :8]

SEAT No. :

P1863

[4859]-1044

[Total No. of Pages :2

B.E. (E & TC)

b-ELECTRONIC PRODUCT DESIGN

(2012 Pattern) (Elective - II) (End - Sem) (Semester - I) (404185)

Time :2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Attempt Q. No. 1 or Q. No. 2, Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No.7 or Q.No.8.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable additional data if necessary.*
- 5) *Use of nonprogrammable calculator is permitted.*

- Q1)** a) Explain successful design elements in Electronic Product design. [7]
- b) How to formulate specifications? Explain difference between specifications and requirements with suitable example. [6]
- c) State different software models. Explain waterfall model of software development with suitable diagram. [7]

OR

- Q2)** a) Explain the concept of design for manufacturing in electronic product Design. [7]
- b) Draw a flow chart of formulation of test plan and explain. Explain how test plan is formulated. [6]
- c) What is real time software? Explain its significance in product design with example. [7]
- Q3)** a) Explain configurations of routing topologies in PCB layout Designing.[7]
- b) Explain importance of grounding methodologies. compare those Technologies. [7]
- c) Write short notes on: [4]
- i) Image planes.
 - ii) Functional partitioning.

OR

P.T.O.

- Q4) a)** Write short notes on: [10]
- i) Bypassing and decoupling capacitors.
 - ii) Impedance matching.
- b) Explain design techniques for ESD protection. [4]
- c) What are the design techniques used to prevent crosstalk. [4]

- Q5) a)** Write short notes on (any two): [8]
- i) Active components
 - ii) Passive components
 - iii) Electromechanical Components
- b) What are the steps of debugging? [8]

OR

- Q6) a)** Compare different types ADCs with respect to parameters: Resolution, conversion time, power dissipation, errors. [8]
- b) Explain validation and verification in manufacturing of electronic product with suitable flow chart. [8]
- Q7) a)** What are the methods of documentation? [8]
- b) Explain the need of documentation? [8]

OR

- Q8) a)** What is bill of material? Explain with example. [8]
- b) Explain visual techniques of documentation. [8]

EEE

Total No. of Questions :12]

SEAT No. :

P1864

[4859]-1045

[Total No. of Pages :3

B.E. (E & TC)

PLC's & AUTOMATION

(2012 Course) (Elective - II) (End - Sem.) (Semester - I) (404185 C)

Time :2 ½ hours]

[Max. Marks :70

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 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.*

- Q1)** a) Explain control system evaluation criteria with details. [4]
b) Write a short note on industrial automation. [4]

OR

- Q2)** a) Explain self regulation & human aided control system with suitable example. [4]
b) What are the effects of modern developments in automation on global competitiveness. [4]

- Q3)** Explain smart & Intelligent transmitters & their features. [6]

OR

- Q4)** Suppose the temperature range 20°C to 120°C is linearly converted to the standard current range of 4 to 20 mA. What current will result from 66°C? What temperature does 6.5 mA represent? [6]

- Q5)** Draw & explain analog implementation of PID controller. [6]

OR

- Q6)** Write short note on VFD & it's applications. [6]

P.T.O.

- Q7)** a) Define the term PLC. Explain in detail architecture of PLC. [8]
- b) Prepare the ladder diagram of control problem. The global objective is to heat a liquid to a specified temperature and keep it there with string for 30 min. [10]

The hardware has following characteristics.

- i) START push button is NO, STOP is NC.
- ii) NO and NC are available for the limit switches.

The event sequence is

- 1) Fill the tank.
- 2) Heat & stir the liquid for 30 min.
- 3) Empty the tank.
- 4) Repeat from step 1.

With suitable assumptions sketch the system diagram and construct the ladder diagram for the same.

OR

- Q8)** a) What is HMI? Explain different types of HMI's used in PLC. [6]
- b) Explain PLC programming standard IEC61131. [6]
- c) Explain following interfacing terms related to PLC. [6]
- i) ERP
 - ii) RFID

- Q9)** a) Draw & explain block diagram of SCADA system. [8]
- b) Write difference between DCS & SCADA. [8]

OR

- Q10)a)** Write functions of RTU & MTU in SCADA system. [8]
- b) List the specifications of DCS. Explain the input, output modules of DCS. [8]
- Q11)a)** Draw & explain the structure of NC system. List the different applications of NC. [8]
- b) Write a short note on following Industrial communication. [2x4=8]
- i) HART protocol
- ii) Device net

OR

- Q12)a)** Explain basic needs of CNC machines. Discuss the factors due to which CNC machines have taken over from NC machine tools. [8]
- b) Write a short note on: [2x4=8]
- i) Profibus - PA
- ii) CAN

EEE

Total No. of Questions : 8]

P3922

SEAT No. :

[Total No. of Pages : 2

[4859] - 1046

B.E. (E & TC) (Semester - I)

ARTIFICIAL INTELLIGENCE

(2013 Pattern) (Elective - II) (End Semester)

Time : 2.5 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 , Q7 or Q8.
- 2) Figure to the right indicates full marks.
- 3) Assume suitable data if necessary.

- Q1)** a) What do you mean by agent function? Elaborate it with suitable example. [7]
b) Explain Greedy best-first search with suitable example. [7]
c) Explain Current-best-hypothesis learning algorithm. [6]

OR

- Q2)** a) List different properties of task environment. Give the suitable example. [6]
b) What is first order logic? Show with an example how it is used to represent knowledge. [7]
c) Explain how reinforcement learning differs from statistical learning. [7]

Q3) Write short note on: [18]

- a) Instance based learning
- b) Ensemble based learning
- c) Explanation based learning

OR

- Q4)** a) Explain decision tree learning algorithm with suitable example. [9]
b) What is probabilistic reasoning? Explain Bay's rule. [9]

P.T.O.

- Q5)** a) What is an expert system? List out the different characteristics of expert system. [8]
- b) Explain Waltz's algorithm with example. [8]

OR

- Q6)** a) Explain Expert system constituents with an example of "Medical Diagnosis System". [8]
- b) Explain the process of image understanding in detail. [8]

- Q7)** a) What is probabilistic language processing? Explain probabilistic language models. [8]
- b) Explain the significance of Morphological Analysis and Pragmatic Analysis in the Natural Language Processing with suitable example. [8]

OR

- Q8)** a) Explain in detail ambiguity and disambiguation. [8]
- b) Explain how semantic interpretation is carried out in NLP. [8]



Total No. of Questions : 10]

SEAT No. :

P1970

[Total No. of Pages : 2

[4859]-1047

B.E. (Electronics Engg.) (End Semester)

VLSI DESIGN

(2012 Pattern)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) What is feature size and λ ? List basic λ rules in CMOS design? [6]
b) Write short note on velocity saturation. [4]

OR

- Q2)** a) Derive the expression for Dynamic power dissipation. [5]
b) Draw block diagram and explain architecture of FPGA. [5]

- Q3)** a) Write a VHDL code for BCD to seven segment Decoder. [5]
b) Explain Noise margin. Give its expressions. [5]

OR

- Q4)** a) Explain various attributes in VHDL with suitable examples. [5]
b) What is metastability? How can it be removed? [5]

- Q5)** a) Compare SRAM and DRAM. List various types of memories. [8]
b) Draw any 2 schematics of DRAM cells. Explain Write and Read operation of any one of them. [8]

OR

- Q6)** a) Draw and explain the schematic of SRAM cell with necessary peripherals. [8]
b) Write short note on : [8]
i) Refresh circuit
ii) Sense amplifier

P.T.O.

- Q7)** a) What are challenges in routing? Explain switch box routing. [8]
b) Explain floor planning, its purposes and the rules. [8]

OR

- Q8)** a) What is Global routing. Explain Maze and line probe routing algorithms in detail. [8]
b) Explain Power distribution and power optimization in details. [8]

- Q9)** a) What are stuck open, stuck short faults? Also explain stuck at 1 and stuck at 0 faults with example. [9]
b) What is Built in self test? Explain BIST for RAM. [9]

OR

- Q10)** a) What is need of Boundary scan? Explain Boundary scan technique in detail. [6]
b) What is necessity of DFT. [4]
c) What is Test access port? Explain TAP controller with help of state machine. [8]



Total No. of Questions : 8]

SEAT No. :

P1865

[4859]-1048

[Total No. of Pages : 2

B.E. (Electronics)

**ELECTRONICS SYSTEM DESIGN
(2012 Course) (Semester-I) (End Sem) (404202)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer the questions 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) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Explain industrial product design with the help of case study in detail. Explain their classification. [8]
- b) Explain the following terms of DAC: [6]
- i) Resolution.
 - ii) Maximum sampling rate.
 - iii) Total harmonic distortion and noise.
- c) What are the factors affecting on selection of buses and protocols in high speed electronics product. [6]

OR

- Q2)** a) Explain the different soldering techniques used in large scale production and high reliability product. [8]
- b) What are different DAC techniques? Compare on the basis of accuracy. [6]
- c) Design and explain Interfacing of LCD with microcontroller. [6]
- Q3)** a) Explain different stages of software development in electronic product. [8]
- b) Write a note on debugging tools and techniques for software design. [8]

OR

P.T.O.

- Q4)** a) Explain the factors affecting on the choice of assembly language and high level language with example. [8]
- b) Write note on: [8]
- i) Compiler.
- ii) Simulator.

- Q5)** a) What are the different PCB Design issues for high speed integrated circuits. Explain in detail. [10]
- b) Explain the importance of shielding and grounding. [8]

OR

- Q6)** a) What are the different PCB Design issues of analog and mixed signal Circuits. Explain in details. [10]
- b) List different EMI/EMC standards. Explain its important. [8]

- Q7)** a) Explain how debugging of electronics circuit is carried out by logic analyzer. [8]
- b) Explain with suitable example of vibration testing. [8]

OR

- Q8)** a) Specify with justification the choice of environmental testing to be carried out on following electronic product: [8]
- i) Washing Machine.
- ii) ECG.
- b) Write a notes on: [8]
- i) Digital storage oscilloscope.
- ii) Mixed single oscilloscopes.



Total No. of Questions : 8]

SEAT No. :

P1971

[Total No. of Pages : 2

[4859]-1049

B.E. (Electronics Engg.) (End Semester)

ADVANCED POWER ELECTRONICS

(2012 Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Calculate the peak value of circulating current for 3 phase circulating current type dual converter consisting of three phase fully controlled bridges for the given data. The input to the dual converter is 3 phase, 400V, 50Hz; firing angle $\alpha_1 = 60^\circ$, $\alpha_2 = 120^\circ$ and the value of current limiting inductance is 15 mH. **[4]**
- b) What is the need of Power factor conditioning in converters? Explain the operation of single phase diode rectifier with boost chopper for line current wave shaping. **[8]**
- c) With the help of neat circuit diagram and waveforms explain the operation of single phase bridge Diode Clamped Multilevel inverter. State its features, advantages and disadvantages. **[8]**

OR

- Q2)** a) What is dual converter? Explain in detail the operation of single phase dual converter with circulating current. Draw all the necessary waveforms. Derive an expression for circulating current. **[8]**
- b) Explain the operation of Double sided PWM converter system using single phase H-bridge converter. **[6]**
- c) With the help of circuit diagram and waveforms explain the operation of Single phase to Single phase bridge type step down cycloconverter to get output frequency $\frac{1}{2}$ of the input frequency. **[6]**

P.T.O.

- Q3)** a) What are DC motor performance parameters? Explain in brief. [4]
b) What is the need of reversible drives? Explain with circuit diagrams the operation of four quadrant chopper drive with suitable load. [6]
c) What is braking? Explain Regenerative braking of DC machine. Mention its advantages and disadvantages. [6]

OR

- Q4)** a) Draw and explain the power circuit of single phase semi-converter feeding a separately excited DC motor. Explain with typical waveforms, the operation in continuous and discontinuous armature current modes. [8]
b) With the help of a neat block diagram, explain the operation of Microcontroller based DC drive. State its advantages. [8]
- Q5)** a) Explain the significance of V/f control for 3 phase Induction motor. Explain the requirement of a 3 phase induction motor drive. [8]
b) What is the need of vector control in Induction Motors? Briefly explain Vector control of induction motors. [8]

OR

- Q6)** a) With the help of suitable circuit diagram and waveforms explain the working of Variable frequency PWM VSI Drives. [8]
b) Explain electromagnetic braking of 3 phase Induction motors. [4]
c) Explain any one protection circuit for 3 phase Induction motor. [4]

- Q7)** a) With the help of a neat circuit diagram and waveforms explain the operation of 3 phase brushless dc motor drive. State the applications of 3 phase brushless dc motor drive. [10]
b) With the help of block schematic explain the typical Switched Reluctance motor drive. State advantages and disadvantages of Switched Reluctance motor drive. [8]

OR

- Q8)** Write Short notes on : [18]
i) Cylindrical rotor motor Drive
ii) Synchronous Reluctance motor drive
iii) Salient pole motor Drive

RRRR

Total No. of Questions : 10]

SEAT No. :

P1866

[4859]-1050

[Total No. of Pages : 3

B.E. (Electronics)

IMAGE PROCESSING AND MACHINE VISION

(2012 Course) (End Sem.) (404204 A) (Semester - I) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1) a)** Explain how uniform sampling and quantization is used in image digitization. Explain gray level resolution. What is false contour effect?[6]
- b) Explain connectivity and adjacency between the pixels. Where the concept of connectivity is used in Image Processing. [4]

OR

- Q2) a)** Define: [6]
- i) Connected Set.
 - ii) Region of the image and boundary of the region.
 - iii) Euclidean distance between pixels $p(x, y)$ and $q(s, t)$.
- b) Explain how the forward and inverse 2D Discrete Fourier Transform (DFT) is computed? [4]

- Q3) a)** Explain how the Laplacian mask is designed? Comment on the resultant image after applying Laplacian? What do you mean by High boost filtering? [6]
- b) Explain the following methods of image enhancement in spatial domain:[4]
- i) Contrast Stretching.
 - ii) Bit plane slicing.

OR

P.T.O.

Q4) a) Gray level histogram of three bit image is given below. **[6]**

Gray Level	0	1	2	3	4	5	6	7
Frequency	123	78	281	417	639	1054	816	688

Perform Histogram equalization and write gray histogram of equalized image.

b) Compare Discrete Cosine Transform (DCT) and Discrete Fourier Transform (DFT). **[4]**

Q5) a) What is image segmentation? What are the different approaches of image segmentation? Explain different edge detection approaches used in segmentation. **[8]**

b) What is the role of illumination in segmentation by thresholding? Explain Optimal thresholding technique. **[8]**

OR

Q6) a) Explain in detail region splitting and merging technique used in image segmentation. **[8]**

b) Explain how Hough transform is used after edge detection in joining straight lines. **[8]**

Q7) a) Explain the following with respect to compression: **[8]**

i) Compression ratio.

ii) Coding redundancy.

iii) Interpixel redundancy.

iv) Psycho-visual redundancy.

b) With the help of suitable block diagram explain the process of image encoding and decoding in JPEG image compression standard. **[10]**

OR

- Q8)** a) Generate an optimal Huffman code for source emitting pixels with probability given below $p_1 = 0.1$ $p_2 = 0.4$ $p_3 = 0.06$ $p_4 = 0.1$ $p_5 = 0.04$ $p_6 = 0.3$ Calculate average bits/symbol. **[10]**
- b) Explain the meaning of objective Fidelity criteria and subjective Fidelity in terms of image compression. Explain any one metrics used for measurement of objective and Subjective fidelity of the compressed image. **[8]**
- Q9)** a) What is image restoration? What is the difference between image restoration and image enhancement? Explain with block diagram the image degradation/restoration process model. **[8]**
- b) Explain with suitable block diagram, fingerprint based security system. Which fingerprint features are used for matching? **[8]**

OR

- Q10)** a) What the different techniques used to estimate the degradation models in image restoration? **[8]**
- b) Explain the principle of multispectral satellite imaging? List the applications of multispectral satellite image processing. **[8]**



Total No. of Questions : 8]

SEAT No. :

P3239

[Total No. of Pages : 2

[4859] - 1051

B.E. (Electronics) (Semester - I)
EMBEDDED SYSTEMS AND RTOS
(2012 Pattern) (Elective - I) (End - Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Answer any 4 questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of non programmable electronic pocket calculators is allowed.*

- Q1)** a) Define critical section macros and explain critical section methods in $\mu\text{C}/\text{OS-II}$. [7]
- b) What is time to market? Draw and explain simplified revenue model & also calculate losses if product is delayed by 4 and 8 weeks, assuming product life to be 52 weeks. [7]
- c) Explain embedded development life cycle stages. [6]

OR

- Q2)** a) Define the context Switching. What are the steps involved in $\mu\text{cos -II}$ context switching? Why it puts additional burden on OS? [7]
- b) Explain with neat diagram of adaptive cruise control of vehicle with its hardware and software requirements. [7]
- c) What do you understand by the term “clock tick” in RTOS? Explain the time management functions in $\mu\text{cos - II}$. [6]

- Q3)** a) How does a Semaphore solve the shared resource problem? Explain the $\mu\text{C}/\text{OS-II}$ services offered for semaphore management. [8]
- b) Explain `OSMutexCreate()` function. [8]

OR

P.T.O.

- Q4)** a) State the structure of Event Control Blocks? Show how Tasks and Interrupt service routines (ISR) can interact with each other through an ECB. [8]
- b) Explain event Flag management. [8]

- Q5)** a) Explain Queue management in μ cos - II RTOS. [8]
- b) Explain porting of μ cos - II RTOS for any controller. [8]

OR

- Q6)** a) Explain the various kernel objects for interprocess communication in μ cos - II. [8]
- b) Explain Memory management in μ cos - II RTOS and draw MCB structure. [8]

- Q7)** a) Explain building a file system in embedded Linux. [8]
- b) Explain the BIOS and the role of boot loader in embedded Linux. [10]

OR

- Q8)** a) Explain the concept of loadable device driver for Linux kernel. [8]
- b) Explain the process of booting on embedded system using U_boot. [10]



Total No. of Questions : 8]

SEAT No. :

P1867

[4859]-1052

[Total No. of Pages : 2

B.E. (Electronics)

BIOMEDICAL INSTRUMENTATION

(2012 Course) (Elective - I) (404204 C) (End Sem.) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 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.*

- Q1) a)** Explain Electro conduction system of heart with neat diagram. **[8]**
- b) Explain fiber optic sensor for Temperature measurement. **[6]**
- c) Write short note on nervous system. **[6]**

OR

- Q2) a)** Explain: **[8]**
- i) Accuracy
 - ii) S/N ratio
 - iii) Sensitivity
 - iv) Hysteresis in relation to medical instruments
- b) Explain the effect of various artifacts on recording of biomedical signal. **[6]**
- c) What is electro cardiography? Explain in detail cardiac cycle. **[6]**

- Q3) a)** Explain basic requirement of implantable pacemaker. List the type of pacemaker. Explain any one in detail. **[8]**
- b) Explain finger plethysmography with diagram and graph. **[8]**

OR

P.T.O.

- Q4)** a) Write short note on DC Defibrillator. [8]
b) Draw block diagram of central monitoring system & explain in detail. [8]

- Q5)** a) Explain grounding & shielding techniques used in hospital. [8]
b) Describe the working of flame photometer. [8]

OR

- Q6)** a) Discuss various issues of noise pollution around hospital. [8]
b) Explain in detail the working of dialysis system. [8]

- Q7)** a) Explain CT scanner working principle and scanning system. [10]
b) Explain how laser are used in vision correction. [8]

OR

- Q8)** a) What is biotelemetry? Explain the component of biotelemetry system. [10]
b) Explain merits and demerits of MRI system. [8]



Total No. of Questions : 8]

SEAT No. :

P3656

[Total No. of Pages : 2

[4859] - 1053

B.E. (Electronics) (Semester - I)
Advanced Measurement Systems
(2012 Pattern)

Time : 2.30 Hours]

[Max. Marks : 70

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.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Explain in detail signal integrity design issues. [6]
b) Draw the architecture and explain in detail Logic Analyzer. State its applications. [8]
c) Explain embedded communication using CAN. [6]

OR

- Q2)** a) State and explain electrical validation and debug with MSO Series Oscilloscopes. [8]
b) Explain hardware design and testing methods of Spectrum Analyzer. [6]
c) Explain serial bus decode test instruments for USB and PCI Express. [6]

- Q3)** a) Explain measurement of microwave power bridge circuit using thermistors and barraters. [8]
b) Explain single line cavity coupling system for wavelength measurement. [8]

OR

- Q4)** a) Draw and explain the fundamental set up for advanced radar system. [8]
b) What are microwave enclosures and electromagnetic compatibility? Explain EMI and EMC measurements. [8]

P.T.O.

- Q5)** a) What is virtual instrumentation? Explain test system development using virtual instrumentation. [8]
b) Explain the application of TDM and PSK in instrumentation. [8]

OR

- Q6)** a) Explain hardware and software role in virtual instrumentation. [8]
b) Explain Lab View based Data acquisition system design. [8]

- Q7)** a) Explain application of counter for frequency and capacitance meter. [6]
b) What are the types of ADC and DAC? Enlist the specifications of ADC and DAC. [6]
c) Explain data loggers in detail. [6]

OR

- Q8)** Write short note on any three: [18]
a) Automation in digital instruments.
b) Analog mixers.
c) V to F converter.
d) Universal Counter.



Total No. of Questions : 10]

SEAT No. :

P1868

[4859]-1054

[Total No. of Pages :3

B.E. (Electronics)

DSP PROCESSORS

(2012 Pattern) (Semester - I) (404205A) (Elective-II)

Time : 2 $\frac{1}{2}$ Hours]

[Max. Marks : 70

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.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicates full marks.
- 4) Assume suitable data if necessary.

Q1) a) Explain the Fixed point and Floating point number format. What are the criteria for selecting the number format to be used while designing the DSP based system? **[4]**

b) For the IIR filter, determine $H(z) = \frac{z-1}{(z-0.25)(z-0.5)}$ **[6]**

- i) Frequency response function
- ii) Impulse response
- iii) Step response

OR

Q2) a) What is the need of shifter used in DSP architecture? Explain with suitable cases. **[5]**

b) What distinguishes a digital signal processor from a general purpose microprocessor with regard to basic capabilities? Explain. **[5]**

Q3) a) What is meant by overflow and underflow in an arithmetic computation? How is an overflow condition detected? **[5]**

b) Explain the barrel shifter used in DSP architecture with suitable diagram. **[5]**

OR

P.T.O.

Q4) a) What is DFT and FFT? Which is computationally efficient? Explain with suitable Numerical values. [5]

b) What are the various addressing modes used in DSP implementation? Explain any two with suitable example. [5]

Q5) a) What are the characteristics of FIR filter? Explain its implementation using block diagram. [8]

b) Explain the Q-notations used in DSP algorithm implementation? [3]

c) What is an Adaptive filter? Explain the implementation of adaptive filter with suitable diagram and mathematical equation? [6]

OR

Q6) a) Explain the implementation of IIR filter using suitable diagram and mathematical equation? [8]

b) What are the values represented by the 16-bit fixed point number $N=4000h$ in the Q15 and Q7 notations? [4]

c) Explain the implementation of 2-D signal processing operations in DSP architecture. [5]

Q7) a) Determine the following for a 128-point FFT computations? [6]

i) Number of stages

ii) Number of butterflies in stage

iii) Number of butterflies needed for the entire computation.

b) Explain the implementation 8 point DIT FFT algorithm using signal flow graph and number of arithmetical computation involved. [11]

OR

- Q8)** a) If number of data points available in input sequence is 7 then. [4]
- i) What is the length of FFT you will select for computation? Why?
 - ii) What happens if length of FFT is more than sufficient?
- b) What is the need of scaling in FFT computation? What happens if scaling is not proper? [5]
- c) A time domain sequence of 73 elements is to be convolved with another time-domain sequence of 50 elements using DFT-IDFT, method. To implement DFT-IDFT, DIT-FFT algorithm is to be used. Determine the total number of complex multiplications needed to implement the convolution. Assume that each butterfly computation requires one complex multiplication. [8]
- Q9)** a) What is DMA? Explain its operation with suitable example. [8]
- b) Explain the following in context with DSP. [8]
- i) Multichannel Buffered Serial Port (McBSP)
 - ii) CODEC

OR

- Q10)**a) What is an interrupt? Explain the handling of interrupts by the DSP processor? [8]
- b) Explain the programmed I/O interface with suitable example? [8]



Total No. of Questions : 8]

SEAT No. :

P4433

[4859] - 1055

[Total No. of Pages : 2

B.E. (Electronics)
ROBOTICS AND AUTOMATION
(2012 Pattern) (Elective - II (b))

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Draw neat diagrams wherever necessary.*
- 2) *Write side figures indicate marks.*
- 3) *Solve Q. 1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
- 4) *Assume data necessary.*

- Q1)** a) What is automation? What are the effects of modern developments in automation on global competitiveness? [8]
- b) What are the various components in robot drive systems hydraulic/pneumatic systems? [6]
- c) What are the specifications of robot? How robots are classified? [6]

OR

- Q2)** a) What are the basics and need of CNC machines? What are the applications of CNC machines in manufacturing? [8]
- b) What are the various components in robot drive systems hydraulic, pneumatic and electric system? [6]
- c) What are the different actuators are used in robotics systems [6]
- Q3)** a) Direct and inverse kinematics for industrial robots for position and Orientation redundancy? [10]
- b) What is RPY representation in robotics applications? [6]

OR

- Q4)** a) Explain the terms [8]
- i) Degree of freedom
 - ii) Workspace
 - iii) Kinematics
 - iv) Dynamics in regards with robotic systems?

P.T.O.

- b) Explain the terms [8]
- i) Manipulator
 - ii) Jacobian Joint
 - iii) End effector
 - iv) Velocity - direct and Inverse velocity analysis?

- Q5)** a) What are the dynamics of systems of interacting rigid bodies? [8]
b) What is D-H convention? What are the dynamics considerations in robotic applications? [8]

OR

- Q6)** a) Explain Trajectory planning for Flexible Robots? [8]
b) Explain
 - i) Newton-Euler Dynamics of Robot
 - ii) Newton-Euler formulation for RR & RP manipulators? [8]

- Q7)** a) Explain the role of fuzzy controller in robotics applications? [9]
b) Explain robotic vision systems in complex control system? [9]

OR

- Q8)** a) Explain the role of neural controller in robotics applications? [9]
b) Write in short about human robotic interaction? [9]



Total No. of Questions :8]

SEAT No. :

P1869

[4859]-1056

[Total No. of Pages :2

B.E. (Electronics)

c-ELECTRONICS IN AGRICULTURE

(2012 Pattern) (End Sem.) (Semester - I) (404205) (Elective -II)

Time :2½ Hours]

[Max. Marks :70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Define Data Logger and State its applications in Agriculture. [8]
b) Draw and Explain block diagram of agricultural robot using virtual instrumentation. [8]
c) State the factors influencing PH. [4]

OR

- Q2)** a) State types of soil moisture measuring techniques and explain any two in detail. [8]
b) State the different techniques for measuring PH. Explain any one in detail. [8]
c) List various types of Sensors used in the field of Agriculture. [4]

- Q3)** a) Explain uses of remote sensing in agricultural and water management sector. [6]
b) What are the constraints for farmers to adopt precision Agriculture? [6]
c) Write a note on Farm Management Information System. [6]

OR

- Q4)** a) How precision farming is applicable within fruits & vegetables sectors?[6]
b) State & explain components of precision farming. [6]
c) State the applications of GPS in Agriculture. [6]

P.T.O.

- Q5)** a) What do you mean by Yield Monitoring & Mapping? [6]
b) List the types of Spraying Equipment and explain any one in detail. [6]
c) State the various aspects of crop protection. [4]

OR

- Q6)** a) State various precision Agriculture technologies & its applications. [6]
b) Discuss Climate control in the Greenhouse for Protected cultivation. [6]
c) Explain the concept of Weed activated spraying. [4]
- Q7)** a) Write a note on Agricultural weather monitoring system. [6]
b) Explain the Governance products & services in the field of Agriculture. [6]
c) What are the benefits of Greenhouse Automation? [4]

OR

- Q8)** a) Describe the Roles of Electronic Governance in Agriculture sector. [6]
b) Draw & explain Electronic Control System for grape drying process. [6]
c) List various services provided on Agricultural Portal. [4]

EEE

Total No. of Questions : 10]

SEAT No. :

P3657

[Total No. of Pages : 2

[4859] - 1057

B.E. (Electronics) (Semester - I)
MOBILE COMMUNICATION
(2012 Pattern) (Elective - II)

Time : $2\frac{1}{2}$ Hours]

[Max. Marks : 70

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.
- 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.

Q1) a) Explain the call processing in mobile communication using flow diagram. [5]

b) Explain the free space propagation model. [5]

OR

Q2) a) Find the 3-dB bandwidth for a Gaussian low pass filter used to produce 0.25 GMSK with a channel data rate of $R_b = 270$ Kbps. What is the 90% bandwidth in the RF channel? Specify the Gaussian filter parameter α . [5]

b) Differentiate between equalizer and diversity techniques. [5]

Q3) a) Describe the evolution of generation of mobile communication. [5]

b) Classify & describe spread spectrum modulation techniques. [5]

OR

Q4) a) In the us digital cellular system if $P_c = 900$ MHz and the mobile velocity is 70 km/hr, calculate the received carrier frequency if the mobile

- i) directly toward the transmitter (Positive Doppler shift),
- ii) directly away from transmitter (Negative Doppler shift) and
- iii) In a direction perpendicular to the direction of the arrival of the transmitted signal.

b) Brief a note on Brewster angle.

[10]

P.T.O.

- Q5) a)** Describe the following characteristics of speech signal-probability density function, Auto Correlation Function, Power Spectral Density Function. **[10]**
- b) List the criterias for selection of speech coders for mobile communication. **[8]**

OR

- Q6) a)** Explain packet radio access techniques using the ALOHA protocol and compare i-persistent, non-persistent and p-persistent CSMA techniques. **[10]**
- b) With neat block diagram explain the function of each block of GSM speech encoder. **[8]**
- Q7) a)** Describe the working principle of common channel signalling techniques. **[8]**
- b) Describe the fixed network transmission hierarchy system in detail. **[8]**

OR

- Q8) a)** Explain the network architecture of UMTS. **[8]**
- b) Explain cellular packed switched architecture for PCN. **[8]**
- Q9) a)** Describe the architecture of GSM system. **[8]**
- b) Classify & explain in brief the significance of forward & reverse channel in CDMA. **[8]**

OR

- Q10) a)** Explain the call set up process from mobile to mobile of GSM system. **[8]**
- b) List out the specification of IS-95 CDMA system and compare GSM and CDMA system. **[8]**



Total No. of Questions : 10]

SEAT No. :

P1870

[4859]-1058

[Total No. of Pages : 2

B.E. (Information Technology)
INFORMATION AND CYBER SECURITY
(2012 Course) (Semester - I) (New)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q3 or Q.4,Q.5 or Q.6, Q.7 or Q.8,Q9 or Q.10*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) State the Chinese Remainder theorem with example. [6]
b) In a public key cryptosystem using RSA, given $N=187$ and the encryption key (E) as 17, find out the corresponding private key (D). [4]

OR

- Q2)** a) Draw AES block diagram and explain the steps in detail. [6]
b) Define following. [4]
i) Discrete logarithm
ii) Fermat theorem

- Q3)** a) Explain X.509 standard for Digital Certificate. [6]
b) Explain permutation and substitution steps in DES algorithm. [4]

OR

- Q4)** a) Using Euclidean algorithm calculate [4]
i) GCD (48, 30)
ii) GCD (105, 80)
b) What problem was Kerberos designed to address. Describe Kerberos realm. [6]

P.T.O.

- Q5)** a) Define IKE protocol and illustrate IKE format in detail. [8]
b) Discuss SSL with respect to four phases [8]
i) Establish security capabilities
ii) Server authentication and key exchange
iii) Client authentication and key exchange
iv) Finish

OR

- Q6)** a) Explain various categories of Intrusion Detection system (IDS) [8]
b) How AH and ESP are differs while working under transport and tunnel mode. [8]
- Q7)** a) Describe the classification of Cyber Crime. [10]
b) Define cyber security and information security with example. [6]

OR

- Q8)** a) Explain with example how social engineering is playing wide role in cyber crime. [10]
b) Write a short note on Indian legal perspective. [6]
- Q9)** a) What is SQL injection? Explain in detail. [8]
b) Write short note on: [10]
i) Indian IT act
ii) Different ways of password cracking

OR

- Q10)** Define and differentiate
a) Proxy server and an anonymizer. [6]
b) DOS and DDOS [6]
c) Virus and worm. [6]



Total No. of Questions : 10]

SEAT No. :

P3240

[Total No. of Pages : 3

[4859] - 1059

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

SOFTWARE MODELING AND DESIGN

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Use UML.2 notations for drawing UML diagrams.*

- Q1)** a) What is an association class? What is a ternary association? Elaborate both with an example. [6]
- b) In the context of state diagram, what are concurrent substates? Elaborate with an example. [4]

OR

- Q2)** a) Draw a class diagram for the given description with appropriate relationships, relationship names, and multiplicity. [6]
- A person owns multiple documents. Each document is composed of paragraphs that are, in turn, composed of characters. The copy operation propagates from document to paragraph to characters. Copying a paragraph copies all the characters in it. The operation does not propagate in reverse direction; a paragraph can be copied without copying the whole document.
- b) In the context of use case diagram, elaborate what is include and extend with the help of an example. [4]

- Q3)** a) Construct the activity diagram of the given description using swim lanes. A customer decides to purchase a DVD player. He begins by calling the sales department of the DVD shop. They tell him to talk to customer support. He then calls customer support; they put him on hold while talking to engineering. Finally customer support tells the customer about several DVD player options. The customer chooses a DVD player and makes payment to the accounts department. The DVD player is shipped by the dispatch department. The customer receives the DVD player. [6]

P.T.O.

- b) The use case 'Login' accepts userid and password from the user. The system validates them and displays a message 'Log in is successful'. Draw a sequence diagram for this. [4]

OR

- Q4)** a) Draw state diagram for ATM machine. [6]

ATM machine is idle until an ATM card is inserted. Then it becomes active. Within being in the active state, it validates the card(validating) first. After card validation, it can process a transaction like (transaction processing) a withdrawal or deposit cash or a view balance or print receipt. After the processing is complete, card is ejected and it goes to idle state.

- b) State the steps to construct the domain state model. [4]

- Q5)** a) Elaborate how a software designer organizes a system into a subsystem. [8]

- b) Describe batch transformation and continuous transformation. [8]

OR

- Q6)** a) In the context of reuse in system design elaborate 'libraries' and 'pattern'. [8]

- b) In the context of system design elaborate management of data storage. [8]

- Q7)** a) Define a design pattern. What is the basis on which the design patterns are classified? Name the types of design pattern with one example of each type. [8]

- b) For the description given below, draw the class diagram and identify the roles for a state design pattern. Mention the roles identified for each class and its relevant behaviour in the class diagram.

When a book has isbn number, price, title and one or more authors. When it is bought in the library it gets 'purchased' state, when it is added to a catalogue it goes to 'catalogued' state. When the cataloguing is complete it goes to 'Available on stack' state. When it is borrowed by a member it goes to 'borrowed' state. When it is returned by a member it goes to 'available on stack' state. [8]

OR

- Q8)** a) Write complete documentation of adapter design pattern. [8]
b) For the description given below, draw the class diagram and identify the roles for a strategy design pattern. Mention the roles identified for each class and its relevant behaviour in the class diagram.

Grand health club offers a scheme for membership of the health club. The options available for registering are 'yoga' and 'aerobics'. The monthly charges for aerobics membership are 2000.00. The monthly charges for yoga membership are 1000.00. The members can avail a single option out of the two options. If a person books for three months, he gets 20% discount. If he books for six months, he gets 25 percent discount. If he books for nine months, he gets 35% discount. If he books for one year, he gets 50% discount. [8]

- Q9)** a) Define the following terms : [8]
i) fault
ii) failure
iii) software validation
iv) software verification
v) white box testing
vi) black box testing
b) Elaborate the V model of testing in detail. [10]

OR

- Q10)** a) What is testing driven development approach of development? Elaborate. [8]
b) A strong password for a system is defined as, [10]
It should be of at least 8 characters
It should not contain space character
It should contain at least 1 special character
It should contain at least 1 digit
It should contain at least 1 capital letter
Write 5 test cases to check that system accepts correct password & rejects incorrect (one which do not follow above rules) password.



Total No. of Questions : 10]

SEAT No. :

P1871

[4859]-1060

[Total No. of Pages : 3

B.E. (I.T.)

MACHINE LEARNING

(2012 Course) (414455) (End Semester) (Semester-I)

Time : 2¹/₂ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Draw neat diagrams wherever necessary.*
- 2) *Assume suitable data, if necessary.*
- 3) *Figures to the right indicate full marks.*

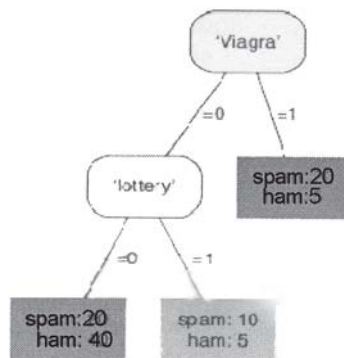
Q1) a) Explain predictive and descriptive tasks. **[5]**

b) Prove with an example **Accuracy = 1-error rate.** **[5]**

OR

Q2) a) Define class probability estimator. State mathematical model of class probability estimator. Is that a predictive or descriptive task? Justify. **[5]**

b) What is majority class decision rule? Using following feature tree, write decision rules for majority class. **[5]**



Q3) a) What is a slack variable? Discuss margin errors. **[5]**

b) Explain ridge regression and lasso. **[5]**

OR

Q4) a) Consider the following three-class confusion matrix. **[5]**

P.T.O.

		Predicted		
Actual		15	2	3
		7	15	8
		2	3	45

Calculate precision and recall per class. Also calculate weighted average precision and recall for the classifier.

b) Explain the term bias-variance dilemma. [5]

Q5) a) Explain with the help of diagrams and equations Minkowski, Euclidean, Manhattan and Hamming distances. [8]

b) What is a feature tree? Write the Grow Tree algorithm to generate feature tree. Explain the role of best split in this algorithm. [10]

OR

Q6) a) Explain support and confidence with the help of formulae. Calculate support, and confidence for the following example. [8]

Transaction	Items
1	nappies
2	beer, crisps
3	apples, nappies
4	beer, crisps, nappies
5	apples
6	apples, beer, crisps, nappies
7	apples, crisps
8	crisps

b) Write an algorithm for K-means clustering. Describe its working in brief using example. [10]

- Q7)** a) Distinguish between discriminative learning models and generative learning model with suitable examples. [8]
- b) Define: [8]
- 1) Bernoulli's distribution.
 - 2) Binomial distribution.
 - 3) MAP decision rule.
 - 4) Maximum likelihood function.

OR

- Q8)** a) Write a note on Naïve Bayes Classification algorithm. [8]
- b) Explain in brief logistic regression. Compare simple regression and logistic regression. [8]
- Q9)** a) Explain reinforcement learning. [8]
- b) Explain bagging and boosting as ensemble methods. [8]

OR

- Q10)**a) Explain data stream and online learning. [8]
- b) Explain multitask learning. [8]



Total No. of Questions : 8]

SEAT No. :

P3241

[Total No. of Pages : 2

[4859] - 1061

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

SOFT COMPUTING

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Neat diagram must be drawn whenever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Comment on differences between behaviour of intelligent system and knowledge based system? [6]
- b) List out the strength and weaknesses of artificial neural network. [6]
- c) Explain with neat diagram the architecture of Hopfield neural network. [8]

OR

- Q2)** a) Explain various techniques for knowledge representation. [8]
- b) With neat diagram explain learning in perceptron model. [6]
- c) Explain the steps involved in clustering by KNN. [6]

- Q3)** a) Explain following fuzzy set operations with example. [9]
- i) Empty fuzzy set
 - ii) Normal fuzzy set
 - iii) Equal fuzzy set
- b) List out the characteristics features of fuzzy logic. [8]

OR

P.T.O.

- Q4)** a) What is the Alpha-Cut method for discrete fuzzy sets? Explain following arithmetic operations. [9]
i) Addition
ii) Subtraction
b) List the merits and demerits of fuzzy logic. [8]

- Q5)** a) Explain how genetic algorithm differs from conventional optimization algorithms. [8]
b) What are operators in Genetic Algorithms? List and Explain GA operators in brief. [9]

OR

- Q6)** a) Explain how genetic algorithms are different from evolutionary programming. [8]
b) Is it advisable to apply genetic algorithm for all kinds of optimization problems? Justify. [9]

- Q7)** a) Describe an application of fuzzy for character recognitions. [8]
b) Describe an application how soft computing can be used in software engineering. [8]

OR

- Q8)** a) Describe an application of evolutionary computing in image processing. [8]
b) Describe an application how soft computing can be used in semantic web. [8]



Total No. of Questions : 10]

SEAT No. :

P1872

[4859]-1062

[Total No. of Pages : 2

B.E. (I.T.)

**b - USABILITY ENGINEERING
(2012 Course) (Elective - I) (Semester - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 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.*

- Q1)** a) List and explain various attributes of system acceptability. [4]
b) Good error messages are important part of usability heuristics. Explain with example. [6]

OR

- Q2)** a) Explain the importance of human factors in design. [4]
b) Explain the stages of the usability engineering lifecycle model. [6]

- Q3)** a) List various issues related to interaction design. Explain with example. [4]
b) Explain the importance of “Know the user” in usability process. [6]

OR

- Q4)** a) Discuss goals of user interface design. [4]
b) Why is it important to perform an analysis of the financial impact of the usability on the system. [6]

- Q5)** a) Explain various usability inspection methods with example. [8]
b) What are various stages of usability testing? List them and explain in detail. [10]

OR

P.T.O.

- Q6)** a) What is the concept of focus groups? Explain in detail. [8]
b) Usability Laboratories is important part of usability testing. Explain with diagram. [10]

- Q7)** a) Explain principles of good user interface design. [8]
b) Discuss different advantages and disadvantages of paper-based Documentation. [8]

OR

- Q8)** a) What is the concept of internalization & localization related to user interface? Explain with example. [8]
b) How Interactive tutorials are useful to understand user interface? [8]

- Q9)** a) Explain in detail intelligent user interfaces. [8]
b) Write a short note on (Any 2): [8]
i) CAUSE Tools.
ii) Ubiquitous computing.
iii) Ethics of Usability.

OR

- Q10)**a) Explain the role of user interface designer & developer. [8]
b) Write a short note on (Any 2): [8]
i) Collaborative Systems.
ii) Organizational role and structure in usability.
iii) Web analytics.



Total No. of Questions : 8]

SEAT No. :

P1873

[4859]-1063

[Total No. of Pages : 3

B.E. (Information Technology)

MODERN COMPILERS

(2012 Pattern) (Elective - I) (End Sem) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Define callee-save and caller-save registers. How do the use of registers save time for programming languages? **[6]**
- b) Draw control-flow graph for the given code. Find the live ranges of a, b, c. **[6]**

```
a = 0
L1 : b = a + 1
c = c + b
a = b*2
if a <N goto L1
return c
```

- c) Explain the terms Mutator and incremental garbage collection. Explain Tricolor Marking along with its algorithm. **[8]**

OR

- Q2)** a) When we say that a “variable escapes”? For each variable a, b, c, d in the given program, find whether it escapes and why? **[6]**

```
int f(int a, int*b)
{
    int c[3], d;
    d = a + 1;
    b = g (c, & b);
    return c[1] + b;
}
```

P.T.O.

- b) Write Maximal Munch algorithm for optimal tiling instruction selection and comment on its efficiency. [6]
- c) Explain copying garbage collection with a neat diagram. Write Cheney's algorithm and comment on its cost. [8]

- Q3)**
- a) Explain Higher-order functions and Functional programming language in brief. What are three flavors of Functional programming language? [6]
 - b) What is closure? How it can be implemented using Heap-allocation? [6]
 - c) Explain tail position with suitable example. Write the steps to implement tail call. [6]

OR

- Q4)**
- a) Define inline expansion. Explain the rules for inline expansion. [6]
 - b) Explain call-by-name and call-by-need with respect to lazy evaluation. [6]
 - c) Explain strictness analysis. [6]

- Q5)**
- a) Explain Inter-procedural data-flow analysis in brief. Describe different functions for flow-insensitive side effect analysis. [8]
 - b) What are possible caches in a system? Describe different approaches for instruction-cache optimization. [8]

OR

- Q6)** a) Define call-graph. Draw call-graph for given code: [8]

```

Procedure f()
begin
    call g()
    call h()
End
procedure g()
begin
    call h()
    call i()
end
procedure h()
begin
end
procedure i()
begin
end

```

- b) What is inter-procedural optimization? Describe different kinds of inter-procedural optimizations. [8]

Q7) a) What are reasons for variable aliases? Explain variable aliases based on type and based on flow. [8]

- b) What is reaching definitions? Write in and out definitions for reaching definitions. [8]

OR

Q8) a) Explain transformations using dataflow analysis using suitable examples. [8]

- b) Explain explicit and implicit parametric polymorphism with suitable examples. [4]

- c) Draw IR tree representation and quadruple: $a = b[i] + c$. [4]



Total No. of Questions : 10]

SEAT No. :

P1874

[4859]-1064

[Total No. of Pages : 3

B.E. (Information Technology)
d - PARALLEL ALGORITHMS AND DESIGN
(2012 Course) (Semester - I) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) With respect to hypercube model, what is a hypercube connection? What is the diameter of an n-node hypercube? **[4]**

b) Write algorithm for performing summation $S = A(1)+A(2)+A(3)...+A(n)$ for shared memory model. **[6]**

OR

Q2) a) Design the parallel algorithm to construct merging network and use the same for merge sort. **[6]**

b) Differentiate between the hypercube and cube connected cycle parallel model. **[4]**

Q3) a) What is mean by speed up in parallel algorithms? How much performance gain is achieved by parallelizing a given application over a sequential implementation? **[5]**

b) Write a short note on message passing and shared memory. **[5]**

OR

Q4) a) What is common CRCW PRAM? What is the impact of limiting PRAM model to a fixed number of processors or a fixed memory size? **[5]**

b) What is data parallelism? Explain is it similar to pipelining. Discuss. **[5]**

P.T.O.

Q5) a) Analyse MESH Transpose. Check Mesh Transpose algorithm for optimality. [8]

b) Write algorithm for matrix multiplication using cube connected structure. [8]

OR

Q6) a) Explain the combinatorial algorithm with example. [8]

b) Explain Conjugate Gradient Method-Sequential Algorithm. [8]

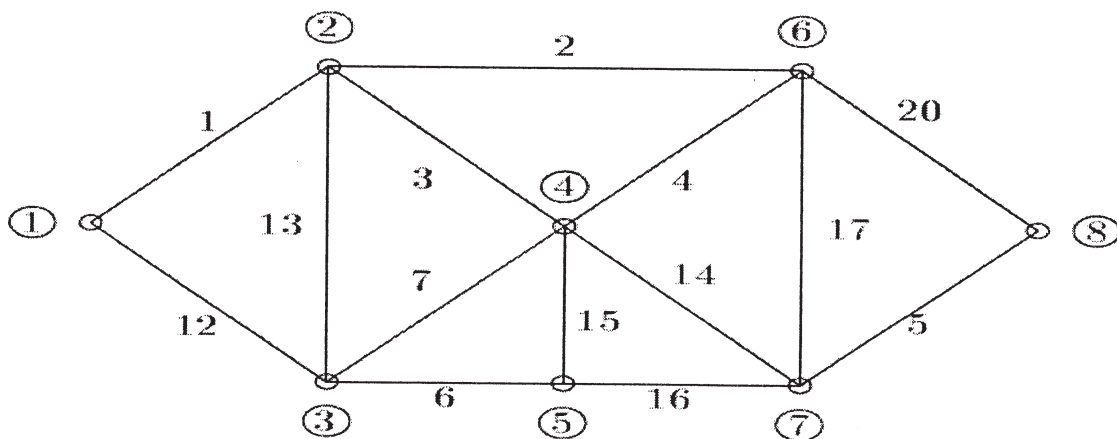
Q7) a) Write short note on any 3: [12]

- i) Permutation in parallel computing.
- ii) Combination in parallel computing.
- iii) Derangements in parallel computing.
- iv) The applications of Depth First Search.

b) Define Graph? State and explain type of Graphs? [6]

OR

Q8) a) What is MST? Solve Given problem using Kruskal parallel computing algorithm. [12]



b) Explain the need of BFS Traversal of graph algorithm. [6]

- Q9)** a) Explain the terms and its stages with neat Diagram. [8]
- i) Pipelines.
 - ii) Homomorphism.
- b) Explain the knapsack problem with branch and bound algorithm? [8]

OR

- Q10)**a) What is computer algebra system? Draw and explain its framework. [8]
- b) Explain Homomorphism-based Structured in Parallel Programming? [8]



Total No. of Questions : 10]

SEAT No. :

P1972

[Total No. of Pages : 2

[4859]-1064(A)

B.E. (Information Technology) (Semester - I)

CLOUD COMPUTING (End Sem.)

(2012 Pattern) (Elective - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.
- 2) Figures to the right indicate full marks.

Q1) a) Discuss pros and cons of CC. **[5]**

b) Explain applications of virtualization. **[5]**

OR

Q2) a) Explain the cloud cube model. **[5]**

b) Explain different levels of virtualization. **[5]**

Q3) a) State and describe life cycle of SLA. **[6]**

b) Define following terms **[4]**

i) Community Cloud

ii) Hypervisor

OR

Q4) a) Explain the model for federated cloud computing. **[6]**

b) Explain in brief following terms : **[4]**

i) Public cloud economics

ii) VMware

Q5) a) Discuss with diagram surfaces of attacks in Cloud Computing. **[8]**

b) What are the several useful implications of the fact that 'OS state is saved in file and copied & shared'? **[8]**

P.T.O.

OR

- Q6)** a) Enlist & describe security risks posed by shared images. [8]
b) Define steps to build DomU managed by Dom0. [4]
c) Discuss the nasty tricks played by malicious Dom0. [4]

- Q7)** a) Describe Amazon EC2 cloud in brief considering following points: [8]
i) AMI & Instances
ii) Amazon S3
iii) Databases
iv) Amazon Cloud Watch
b) Explain with diagram the term 'Cloud Stack'. [8]

OR

- Q8)** a) Explain Google App Engine with diagram. [8]
b) Explain the open source cloud 'Eucalyptus'. [8]

- Q9)** a) Explain in brief any two ubiquitous computing applications. [8]
b) State and explain with diagram Human Centered Design Life Cycle. [10]

OR

- Q10)** a) Write short note RFID tag. [8]
b) Describe in brief any five network design issues. [10]



Total No. of Questions :10]

SEAT No. :

P1875

[4859]-1065

[Total No. of Pages :2

B.E. (IT)

BUSINESS INTELLIGENCE

(2012 Course) (Elective - II) (Semester - I) (414457 A)

Time :2½ Hours]

[Max. Marks :70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) Compare and contrast OLTP and OLAP. [4]
b) Discuss in brief the applications of Business Intelligence. [6]

OR

- Q2)** a) Describe the major components of a data warehouse. [5]
b) Explain dimensional model for retail sales industry. Model should have at least one fact table and two dimensional tables. [5]
- Q3)** a) Explain Fact and Dimension table with an example. [4]
b) Explain transaction, recurring/periodic and accumulating snapshot types of dimensional modeling. [6]

OR

- Q4)** a) What are late arriving facts in ETL? How are they handled? [4]
b) What is lookup and time lag? Explain in terms of extraction process of ETL. [6]
- Q5)** a) Explain 3 types of report elements. Explain each one in detail. [9]
b) Explain materialized view with help of example. [7]

OR

P.T.O.

- Q6)** a) What is ad hoc reporting? How is it useful for generating reports in Business Intelligence? Explain with example. [7]
- b) Explain the importance of security while creating Business Intelligence Reports. Explain different types of securities in reporting. [9]
- Q7)** a) Write short note on (Any two): [8]
- i) Predictive analysis
- ii) Text mining
- iii) In-memory analytics
- b) What is decision tree? How is it used for business Analytics? Explain with example. [8]

OR

- Q8)** a) What is meant by hierarchical clustering? List the methods in it and explain any one in detail. [8]
- b) Explain different data visualization techniques. Describe the features of Tableau. [8]
- Q9)** Write a short note on any 3 of the following (6 marks each): [18]
- a) Pig data types and commands
- b) Real time BI
- c) BI on cloud
- d) Operational BI

OR

- Q10)** a) What is Big data? List the characteristics of Big Data. Draw and Explain architecture of HIVE. [9]
- b) What are the different types of BI? Explain Agile BI and Embedded BI in detail. [9]

EEE

Total No. of Questions :10]

SEAT No. :

P1876

[4859]-1066

[Total No. of Pages :3

B.E. (IT)

SERVICE ORIENTED ARCHITECTURE

(2012 Course) (End-Sem) (Semester - I) (414457 B) (Elective - II)

Time :2½ Hours]

[Max. Marks :70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

- Q1)** a) Explain Common Misperceptions about SOA. **[5]**
- b) Explain in detail about coordinator service composition with activation and completion process with neat sketch. **[5]**

OR

- Q2)** a) Explain in detail about three different layers of service abstraction. **[5]**
- b) Enlist pitfalls of adopting SOA. **[5]**
- Q3)** a) Explain importance of service description in SOA and state difference between abstract description and concrete description. **[5]**
- b) Compare SOA with Client Server architecture. **[5]**

OR

- Q4)** a) Explain message information header and different fields that MI header includes provided by WS-addressing. **[5]**
- b) Explain different roles played by service during runtime processing of messages. **[5]**
- Q5)** a) With neat diagram explain SOA delivery lifecycle phases. **[9]**
- b) With neat diagram explain step by step process of service modeling. **[9]**

OR

P.T.O.

- Q6)** a) Explain following delivery strategies of SOA. [9]
- i) Top-down strategy
 - ii) Bottom-up strategy
 - iii) The agile strategy
- b) Enlist and explain the sources from which services can be derived and types of derived services. [9]
- Q7)** a) Explain with example following elements of XSD. [8]
- i) *Schema* element
 - ii) *Element* element
 - iii) *ComplexType* element
 - iv) *Import* and *Include* element
- b) Explain different steps of composing SOA. [8]

OR

- Q8)** a) Explain following service interface design tools with their pros and cons. [8]
- i) Auto generation
 - ii) Design tools
 - iii) Hand Coding
- b) Explain structure of SOAP message and following basic elements of SOAP language [8]
- i) *envelope* element
 - ii) *header* element
 - iii) *body* element
 - iv) *fault* element

- Q9)** a) With neat diagram explain step by step process of application service design. [8]
- b) With neat diagram explain step by step process of task centric service design. [8]

OR

- Q10)**a) Explain following elements of WS-BPEL language basics: [8]
- i) *process* element
 - ii) *partnerLinks* and *partnerLink* element
 - iii) *partnerLinkType* element
 - iv) *Sequence* element
- b) Write short note on mapping of SOA and cloud computing. [8]

EEE

Total No. of Questions : 10]

SEAT No. :

P3242

[Total No. of Pages : 2

[4859] - 1067

B.E. (Information Technology) (Semester - I)

E & M GOVERNANCE

(2012 Pattern) (Elective - II)

Time : 2 Hours]

[Max. Marks : 70

Instructions to the candidates :

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

Q1) a) What are the reasons for using the Internet as a basic infrastructure for e-Business? [6]

b) What is meant by the terms front-office and back-office systems? [2]

OR

Q2) a) What are the main business and technical e-Business challenges? [6]

b) What is the key difference between e-Commerce and e-Business? [2]

Q3) a) Firm 'A' only has business-to-business clients, like sport shops, warehouses and small bag shops. One of their key business processes is order acquisition (which includes negotiating with potential clients). [10]

i) Give an example of a sub process and a compound activity of this business process.

ii) Different characteristics of business processes can impact the extent to which they can be automated. What can you say about the mentioned business process and the possibilities to automate it?

OR

P.T.O.

- Q4)** a) Explain similarities and differences between the following concepts: business unit value chain, industry value chain, supply chain, logistics. [4]
- b) What is a business process? List the seven characteristics of a business process. [6]

- Q5)** a) What are the advantages and disadvantages of a biased market? [8]
- b) Explain why it is important for an industrial company to have full management attention for its purchasing process. [8]

OR

- Q6)** a) Which three factors contribute to the success of e-markets? Give one example for each factor. [8]
- b) Give advantages of integrating e-procurement with a company's ERP-system. [8]

- Q7)** a) Explain location based service and its potential in the context of m-commerce. [8]
- b) Explain framework for m-commerce. What are the implementation challenges in m-commerce? [8]

OR

- Q8)** a) Define m-commerce and explain how an e-government could use it to increase its efficiency and effectiveness. [8]
- b) Write a short note on m-commerce life cycle. Discuss advantages and disadvantages of m-commerce. [8]

- Q9)** a) Discuss the five major m-commerce applications, and provide a specific example of how each application can benefit a business. [6]
- b) Discuss how m-commerce can expand the reach of e-business. [6]
- c) What are various mobile commerce services for consumer? Explain. [8]

OR

- Q10)** a) The mobile devices of the future will be more powerful, less heavy, and comprise new interfaces to the user and to new networks. Describe the special technologies used in m-commerce. [6]
- b) What are the emerging live issues in mobile commerce? [6]
- c) What are various mobile commerce services for business? Explain. [8]



Total No. of Questions : 10]

SEAT No. :

P1877

[4859]-1068

[Total No. of Pages : 2

B.E. (Information Technology)
GEO INFORMATICS SYSTEM
(2012 Pattern) (Elective - II) (414457 D) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) Explain in detail types of map scale. **[6]**

b) What is the role of computer in Map Production. **[4]**

OR

Q2) a) Explain in detail SLAR. **[6]**

b) List and explain satellite system. **[4]**

Q3) a) What are the imaging sensor system? **[6]**

b) Explain Three dimensional interpretation Method. **[4]**

OR

Q4) a) Write short note on IRS. **[5]**

b) Write & explain aerial photo interpretation. **[5]**

Q5) a) Explain factors that affecting the Reliability of GIS data. **[8]**

b) Write a short Note on (Any two): **[8]**

i) RMS Error.

ii) Location Error.

iii) Topological Error.

OR

P.T.O.

- Q6)** a) What are the sources of error in GIS & its effects? [8]
b) Explain the error which may occur in vector GIS? Explain the error caused to data during vector to raster conversation? [8]

- Q7)** a) What are the attributes of data query? [8]
b) Explain in detail raster data query. [8]

OR

- Q8)** a) What are application of buffering? [8]
b) How pattern analysed in vector data? [8]

- Q9)** a) What is open source GIS? Explain with example. [9]
b) Explain GIS can be used for vehical routing & scheduling by muncial corporation assume suitable data. [9]

OR

- Q10)**a) Draw & explain architecture of ITS. [9]
b) What is the role of GIS in urban Management? Explain in brief. [9]



Total No. of Questions : 8]

SEAT No. :

P1878

[4859]-1069

[Total No. of Pages : 3

B.E. (I.T.)

NATURAL LANGUAGE PROCESSING

(2012 Pattern) (414457 E) (Elective - II) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) a) How Natural Language Understanding System is evaluated? [6]

b) Consider the following context-free grammar [6]

S -> NP VP N -> dog V -> sees

NP -> Det N N ->cat V -> hates

VP -> V N -> mouse V -> sneezes

VP -> V NP Det -> the

Which of the following sentences are recognized by this grammar, and why?

- i) the mouse hates
 - ii) the cat the mouse hates
 - iii) the mouse hates the mouse
- c) Build an ATN for accepting the simple assertive statements like, [8]**
- The dog barked.
- The cat saw Jill.
- Jack saw the baboon.

OR

P.T.O.

Q2) a) Describe the flow of information in Natural Language Understanding System. [6]

b) Consider the following CFG: [6]

S → NP V

S → NP AUX V

NP → ART N

Trace one of the chart parsers in processing the sentence

1 The 2 man 3 is 4 laughing 5

with the lexicon entries:

the: ART

man: N

is: AUX

laughing: V

Show every step of the parse, giving the parse stack, and drawing the chart each time a non-terminal constituent is added to the chart.

c) Describe Unification Grammar in detail. [8]

Q3) a) How does Shift Reduce Parser encode uncertainty to improve the efficiency while parsing? Explain with proper example. [9]

b) Explain Probabilistic Context-Free Grammar in detail. [9]

OR

Q4) a) What are “Maximum Likelihood Estimator” and “Expected Likelihood Estimator”? How do they contribute in the prediction? [9]

b) How does Best-First Parsing algorithms improve the efficiency of the parser? [9]

Q5) a) How does the relative scoping of the quantifiers and operators add to the complexity of ambiguity in the Logical form? Justify with appropriate examples? [8]

b) What is WordNet? How can it help the user? [8]

OR

- Q6)** a) What is Ontology? Explain in detail. [8]
b) Explain the term Semantic Ambiguity? Briefly explain any two linguistic tests to define the notion of Semantic Ambiguity. [8]

- Q7)** a) Explain the use of BLEU metric used in assessing the quality of Machine translation? [8]
b) Write a detail note on Automatic Text Clustering. [8]

OR

- Q8)** a) What is Semantic Web Search? How does it improve the accuracy of the search contents? [8]
b) Explain the use of WER metric in Machine Translation. [8]



Total No. of Questions : 10]

SEAT No. :

P1879

[4859]-1072

[Total No. of Pages : 2

B.E. (Computer Engineering)

SMART SYSTEM DESIGN AND APPLICATIONS

(2012 Course) (End-Semester) (410443) (Semester-I)

Time : 2½ Hours]

[Max. Marks : 70

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, and Q. 9 or Q. 10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Explain the architecture of a general learning agent. [6]
b) Explain any two local search algorithms. [6]
c) Explain the procedure for conversion of FOL to CNF with example.[8]

OR

- Q2)** a) Explain any three foundations of intelligent systems? [6]
b) Describe effectiveness of a alpha-beta pruning. [6]
c) Write a note on planning graphs. [8]

- Q3)** a) Explain the baye's rule and its use with a suitable example. [6]
b) Explain Bayesian networks with a suitable example. [6]

OR

- Q4)** a) Write a note on Hidden Markov Models. [6]
b) Explain the construction of Dynamic Bayesian Networks with a suitable example. [6]

- Q5)** a) Explain any one supervised learning approach. [6]
b) Explain Nonparametric Models. [6]

OR

P.T.O.

- Q6)** a) Write a note Artificial Neural Networks. [6]
b) Explain Ensemble Learning. [6]

- Q7)** a) What are the Information Retrieval characteristics? How to Evaluate and Refine Information Retrieval system. [6]
b) Explain the procedure for Machine translation. [6]

OR

- Q8)** a) Describe Robotic Perception in brief. [6]
b) Write a note on Robotic Software Architectures. [6]

- Q9)** a) Describe the Basis of Utility Theory. [6]
b) How to Evaluate and Choose the Best Hypothesis. [8]

OR

- Q10)**a) How to Represent and Evaluate decision problem with a decision network. [6]
b) Explain any four prime application domains of robotics technology. [8]



Total No. of Questions : 8]

SEAT No. :

P1880

[4859]-1073

[Total No. of Pages : 2

B.E. (Computer Engineering)

IMAGE PROCESSING

(2012 Course) (410444 A) (End Sem) (Elective - I) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) *Neat diagram should be drawn wherever necessary.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain elements of image processing in detail. [6]
b) Explain the method of contrast stretching using histogram equalization. [8]
c) With the help of appropriate mask explain the following: [6]
i) Point detection.
ii) Line detection.
iii) Edge detection.

OR

- Q2)** a) Define Digital Image. Explain different types of digital image. What is mean by sampling and quantization? [8]
b) Explain first derivative and second derivative method of detecting edges in the image. [6]
c) Explain region split and merge technique with example and draw its quad tree representation. [6]
- Q3)** a) What is the need for Image compression? Explain redundancy in images. Explain. [8]
b) Define feature and pattern. Explain in brief relationship between image processing and object recognition. [8]

OR

P.T.O.

- Q4)** a) Explain any two object recognition method. [8]
- b) For the image shown below, compute the degree of compression that can be achieved using Huffman coding of pixel values. [8]

$$\begin{bmatrix} 3 & 3 & 3 & 2 \\ 2 & 3 & 3 & 3 \\ 3 & 2 & 2 & 2 \\ 2 & 1 & 1 & 0 \end{bmatrix}$$

- Q5)** a) What are the medical Imaging modalities? Explain in brief. [10]
- b) Explain picture archives and communication systems (PACS). [8]

OR

- Q6)** Write a short note on any three: [18]
- a) Images from X-rays and its application.
- b) Images from r-rays.
- c) Does and risk.
- d) Ultrasound

- Q7)** a) Explain remote sensing process and state advantages and limitation of remote sensing? [8]
- b) Explain in brief elements of visual image interpretation? How these elements help us to interpret remote sensing imagery? [8]

OR

- Q8)** Write short note on any two: [16]
- a) Coordinate system for photogrammetry.
- b) Photogrammetric Imaging devices.
- c) Radargrammetry and Radar Interferometry.



Total No. of Questions : 12]

SEAT No. :

P1881

[4859]-1074

[Total No. of Pages : 2

B.E. (Computer Engineering)

COMPUTER NETWORK DESIGN AND MODELING

(410444 B) (Elective - I) (2012 Course) (Semester - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

Q1) State and explain various performance characteristic in details. **[6]**

OR

Q2) Give an example of a mission critical application for the government or commercial environment. Why this application is considered as mission critical? **[6]**

Q3) With the help of suitable diagram explain the requirement analysis process. What is the need of developing service metric? **[7]**

OR

Q4) Write a short notes on: **[7]**

- a) Developing RMA requirements.
- b) Requirement mapping.

Q5) Explain the concept of flow models with the help of peer-to-peer and client-server models. **[7]**

OR

Q6) Develop a flow model for real time flows. How to characterize the flows for this model? Explain in detail. **[7]**

P.T.O.

- Q7)** a) Explain the various routing mechanisms. [10]
b) What is subnetting? Explain variable length subnetting. [6]

OR

- Q8)** a) State and explain the internal and external relationships in architectural considerations. [10]
b) Explain the concept of supernetting in details. [6]

- Q9)** a) Discuss the performance mechanisms; also compare DiffServ and IntServ. [10]
b) Write a short note on developing goals for performance. [6]

OR

- Q10)** a) What are the major components of the evaluation process for vendors, service providers, and equipment? Explain in detail. [10]
b) What is equipment evaluation? Which of the following evaluation criteria most likely apply to equipment evaluations, which ones apply to service-provider evaluations, and which apply to both? [6]
- Available service-level agreements (SLAs)
 - Mean time between failure (MTBF)
 - Mean time between service outage (MTBSO)

- Q11)** a) Explain the terminology and components of discrete-event simulation also explain the principle of discrete event simulation. What are the types of simulation runs? [12]
b) What is object aggregation? Explain various events in NS3 or equivalent. [6]

OR

- Q12)** a) Write a short notes on: [12]
i) Importance of Modeling and Simulations in Computer networks.
ii) OMNeT++.
iii) Modeling network elements.
b) What is smart pointer? Explain in details. [6]



Total No. of Questions : 10]

SEAT No. :

P2046

[4859] - 1075

[Total No. of Pages : 2

B.E. (Computer Engg.)

ADVANCED COMPUTER PROGRAMMING (Elective - I)

(2012 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Figures to the right indicate full marks.*
- 2) *Assume suitable data, if necessary.*

Q1) a) What is EJB? How it is different from RMI. What are the major categories of EJB? **[5]**

b) What is concurrency? What are the basic approaches to achieve concurrency? **[5]**

OR

Q2) a) What is the difference between SOAP web service and Restful Web service? What is the significance of SOAP, WSDL and UDDI in SOAP web service. **[5]**

b) What is string Tokenizer and Observable in java? Explain any two methods of these utilities? **[5]**

Q3) a) Explain use of simple lock in a producer consumer problem. **[5]**

b) Explain following java collection framework? **[5]**

i) Hashmap ii) Treemap iii) Itrators

OR

Q4) a) Write a simple program using locks and condition variables. **[5]**

b) How to use timestamp in the distributed request scheduling problem? **[5]**

Q5) a) What are the advantages of JSP over Java servlets? Expalin life cycle of a JSP. **[8]**

b) Explain how Ajax is used for development of Rich Internet Applications (RIA). Give the examples of Ajax effects which improve the web page interactivity **[9]**

P.T.O.

OR

- Q6)** a) Explain HTML Document Object Model (DOM) with suitable example. [8]
b) Explain the following JDBC API components: [9]
- DriverManager, SQLException, Connection, Statement, ResultSet

- Q7)** a) What are column oriented databases? Compare column oriented databases with relational databases. [8]
b) What is HDFS? How it is different from traditional file systems? [8]

OR

- Q8)** a) What are document oriented databases? Give MongoDB database example for shopping application. [8]
b) What is the difference between traditional RDBMS and Hadoop? [8]

- Q9)** a) Draw a diagram for MapReduce system showing different stages/phases like input-split, shuffle, sort, combine etc. [8]
b) Explain the following execution modes of Pig: [9]
i) Local mode ii) MapReduce mode

OR

- Q10)**a) Which interfaces need to be implemented to create Mapper and Reducer for the Hadoop? [8]
b) Explain the functionalities of : [9]
i) Mapper ii) Combiner
iii) Reducer iv) Partitioner



Total No. of Questions : 8]

SEAT No. :

P3658

[Total No. of Pages : 4

[4859] - 1076
B.E. (Semester - I)
DATA MINING TECHNIQUES & APPLICATIONS
(2012 Pattern) (End Sem.)

Time : $2\frac{1}{2}$ Hours]

[Max. Marks : 70

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.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data if necessary.

Q1) a) For each of the following queries, identify and write the type of data mining task. [6]

- i) Find all credit applicants who are poor credit risks.
- ii) Identify customers with similar buying habits.
- iii) Find all items which are frequently purchased with milk.

b) Consider the following: [6]

Transaction	Items
t_1	Bread, Jelly, Peanut Butter
t_2	Bread, Peanut Butter
t_3	Bread, Milk, Peanut Butter
t_4	Beer, Bread
t_5	Beer, Milk

Calculate the support and confidence for the following association rules

- i) Bread \rightarrow PeanutButter.
- ii) Jelly \rightarrow Milk.
- iii) Beer \rightarrow Bread.

P.T.O.

c) Consider the ten records given below

[8]

ID	Income	Credit	Class	X_i
1	4	Excellent	h_1	X_4
2	3	Good	h_1	X_7
3	2	Excellent	h_1	X_2
4	3	Good	h_1	X_7
5	4	Good	h_1	X_8
6	2	Excellent	h_1	X_2
7	3	Bad	h_2	X_{11}
8	2	Bad	h_2	X_{10}
9	3	Bad	h_3	X_{11}
10	1	Bad	h_4	X_9

Calculate the prior probabilities of each of the class h_1, h_2, h_3, h_4 and probabilities for data points X_2, X_4, X_7 and X_8 belonging to the class h_1 .

OR

- Q2)** a) Define Data Mining. Draw a pyramid showing relationship between Data Mining and Business Intelligence. Write types of users at different levels in the Pyramid. [6]
- b) Write a pseudo code for Apriori algorithm and explain. [6]
- c) Write a pseudo code for the construction of Decision Tree. State and justify its time complexity also. [8]

- Q3)** a) Using K-means Clustering, cluster the following data into 2 clusters. [8]
 $\{2, 4, 10, 12, 3, 20, 30, 11, 25\}$
 Show each of the steps.
- b) Draw a diagram showing different approaches used for Clustering. [3]
- c) Many clustering algorithms need to determine the distance between two clusters. Write the formula to determine the distance between two given clusters K_1 and K_2 using Single-link, Complete-link and Average methods. [6]

OR

Q4) a) Define Clustering. State the space complexity, time complexity and type (hierarchical, Partitional etc.) for following clustering algorithms [9]

- i) Composite-link.
- ii) MST.
- iii) K-means.

b) Differentiate between K-means and K-mediod Clustering algorithms. [2]

c) Consider the following matrix. [6]

Item	A	B	C	D	E
A	0	1	2	2	3
B	1	0	2	4	3
C	2	2	0	1	5
D	2	4	1	0	3
E	3	3	5	3	0

Draw the resultant Dendrograms when Single-link and composite-link clustering algorithms are used.

Q5) a) Consider the following 4 documents D_1 , D_2 , D_3 and D_4 . For each document D_i , various terms that occur in document D_i is provided. [6]

$D_1 = \{\text{To do is to be to be is to do}\}$

$D_2 = \{\text{To be or not to be I am what I am}\}$

$D_3 = \{\text{I think therefore I am}\}$

$D_4 = \{\text{Do do do da da da Let it be let it be}\}$

Write the equations and calculate the Term frequency “tf”, Inverse Document Frequency “idf” and “tf-idf” for the terms “to” and “do” for the documents D_1 and D_4 .

b) A webmaster at XYZ organization learns that high percentage of users have following pattern of reference to pages

$\langle P, Q, P, R \rangle$

What modification would be suggested if Web Usage Mining is used? State various purposes of Web Usage mining. [5]

- c) Enumerate various Text Operations (also called Pre-processing) that are used by an Information Retrieval System. [6]

OR

- Q6)** a) Draw a neat diagram showing retrieval process of an IR system and briefly describe its components. [6]
- b) Explain Precision and Recall. When a query “q” was fired for an IR system having 100 relevant documents w.r.t. the query “q”, the system in all retrieved 68 documents out of the total collection of 600 documents. Out of 68 retrieved documents, 40 documents found to be relevant. What is the Precision and Recall of the system w.r.t. the given query “q”. [4]
- c) What is web crawler? Explain the working of a basic crawler. [7]

- Q7)** a) Define Big Data. State a few challenges of Big Data. [6]
- b) Compare Business Intelligence and Big Data. [4]
- c) Write a note on Reinforcement Learning. [6]

OR

- Q8)** a) Draw a diagram showing generalized systemic Machine Learning Framework. Briefly explain. [6]
- b) What are the sources for Structured, semi-structured and Unstructured data? [6]
- c) Write a note on Multi-perspective learning. [4]



Total No. of Questions :10]

SEAT No. :

P1882

[4859]-1077

[Total No. of Pages :2

B.E. (Computer Engineering)

PROBLEM SOLVING WITH GAMIFICATION

(2012 Course) (Theory) (Semester - I) (410445 A) (Elective - II)

Time :2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Attempt questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.*
- 2) *Assume suitable data, if necessary.*

Q1) a) Explain Point Systems. [5]

b) How Gamification could be employed for the betterment of an individual? [5]

OR

Q2) a) Can behavioral shift be achieved with Gamification? Justify your opinion with example. [5]

b) What is Gamified loyalty? Explain with suitable example. [5]

Q3) a) Does prediction system have any significance in game designing? Describe your views. [5]

b) Explain the Various stages of Mastery. [5]

OR

Q4) a) What are the game elements? Describe the same in the context of 8 queens' problem. [5]

b) What are the different categories of Players mentioned by Bartle? [5]

Q5) a) What do you mean by Game mechanics? What different Game mechanics can be used for user engagement in Social Networking? [10]

b) How the participant can be motivated to participate in any activity? [5]

c) How Game Mechanics are different from the Game Dynamics? [3]

OR

P.T.O.

- Q6)** a) What are the most commonly used Game Mechanics used for User Engagement? Explain any five mechanics. [10]
- b) Explain how Feedback mechanism is helpful. Explain with example of one of the social problems. [5]
- c) Explain significance and relevance of participant's profile in context of Gamification. [3]
- Q7)** a) How commonly used Game Mechanics could be designed and realized using any tool? [10]
- b) How the behavior of the user could be quantified and studied to know the engagement in Social network? [6]

OR

- Q8)** a) What are the considerations one must do while designing the Game Mechanics? [10]
- b) How analytics can help to know the success of the Program? Explain with any example. [6]
- Q9)** a) Design your solution as a solution architect for new product promotion using any Gamification tool. [8]
- b) What are various advantages of Gamification tool? [8]

OR

- Q10)**a) How Gamification tool can be used to develop the solution to improve teaching learning process. [8]
- b) List and explain features of any Gamification tool. [8]

EEE

Total No. of Questions :10]

SEAT No. :

P1883

[4859]-1078

[Total No. of Pages :2

**B.E. (Computer Engineering)
PERVASIVE COMPUTING**

(2012 Pattern) (Elective - II) (Semester - I) (410445 B)

Time :2½ Hours.]

[Max. Marks :70

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Explain any two location management techniques in mobile computing. [6]
b) Discuss following technologies related to Pervasive Computing: [4]
i) Memory
ii) Processors

OR

- Q2)** a) Explain the concept of caching in mobility. [6]
b) Explain Smart Buildings and Home automation. [4]
- Q3)** a) Explain the concept of Mobile IP. [6]
b) Explain the concept of Hidden UI. [4]

OR

- Q4)** a) Explain Human centered Design Life cycle. [6]
b) Explain perfecting in mobility management. [4]
- Q5)** a) Explain Context aware computing and various types of contexts with example. [10]
b) Explain Different services that should be provided by middleware in pervasive applications. [8]

OR

P.T.O.

- Q6)** a) What is Mobile Middleware? Explain Adaption in Mobile Middleware. **[10]**
b) Explain the concept of ‘Agent’ related to mobile middleware and services offered by Agent. **[8]**
- Q7)** a) Explain the traditional security issues in pervasive applications. **[10]**
b) Explain Detectability and Resource depletion in Wireless Network. **[6]**

OR

- Q8)** a) Explain various security issues in Ad Hoc Networks. **[10]**
b) Explain “Man in the middle” attack in detail. **[6]**
- Q9)** a) Explain Social Networking and Media Exchange Example for smart interactions. **[10]**
b) Explain various issues related to distributed systems interaction to be more intelligent. **[6]**

OR

- Q10)** Write notes on: **[16]**
- a) Wearable computer
b) Cyber Physical Systems

EEE

Total No. of Questions :10]

SEAT No. :

P1884

[4859]-1079

[Total No. of Pages :2

B.E. (Computer Engineering)

EMBEDDED SECURITY

(2012 Pattern) (End Sem.) (Elective - II) (Semester - I) (410445 C)

Time :2½ Hours.]

[Max. Marks :70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to right indicate full marks.*

- Q1)** a) Explain in brief eBay data breach. **[5]**
- b) Comment on: Open source software best practice as a counter measures to Heartbleed attack. **[5]**

OR

- Q2)** a) Explain architecture of Intel AMT. **[5]**
- b) Explain advantages and drawbacks of embedded security and management engine. **[5]**
- Q3)** a) Explain load integrity for threat analysis and mitigation. **[6]**
- b) Write a short notes on next generation EPID. **[4]**

OR

- Q4)** a) Explain working of SIGMA protocol in detail. **[6]**
- b) Explain in detail security requirements of security and management engine. **[4]**
- Q5)** a) Explain in detail Architecture for Embedded IPT (Intel Platform Trust Technology). **[8]**
- b) Explain Rooting/Jailbreaking attacks with its type. **[8]**

OR

P.T.O.

- Q6)** a) Write a short notes on: [8]
i) Boot attack
ii) Evil Maid attack
b) Compare Integrated vs. Discrete TPM. [8]
- Q7)** a) Explain in detail Digital Rights Management (DRM). [8]
b) What is the role of following in software based end to end protection.[8]
i) Content Server
ii) License Server
iii) Software Stack
iv) External Display

OR

- Q8)** a) Explain in detail HDCP (High bandwidth digital content protection). [8]
b) Explain Dynamic Application Loader with neat diagram. [8]
- Q9)** a) Explain how embedded security is provided for IOT (Internet of Things). [9]
b) Write a short note on: [9]
i) Trusted Platform Module (TPM)
ii) Software Guard Extension

OR

- Q10)**a) Explain in detail IOT reference architecture. [9]
b) Write a short note on: [9]
i) Protected Input and Output.
ii) Anonymous Authentication and Secure Session Establishment.

EEE

Total No. of Questions :10]

SEAT No. :

P1885

[4859]-1080

[Total No. of Pages :2

**B.E. (Computer Engineering)
MULTIDISCIPLINARY NLP**

(2012 Pattern) (Elective - II) (Semester - I) (410445 D)

Time :2½ Hours]

[Max. Marks :70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*
- 4) *Figures to right indicate full marks.*

- Q1)** a) Elaborate the difference between formal and natural language. [5]
b) Define metaphor. Explain with example. [5]

OR

- Q2)** a) Define and list lexical knowledge structures. Elaborate any three lexical knowledge networks available and their features. [7]
b) Explain syntax, semantics and pragmatics of a language. [3]
- Q3)** a) Explain the purpose of viterbi algorithm. What are the steps in viterbi algorithm. [8]
b) Write short notes on applications of NLP. [2]

OR

- Q4)** Write short notes on: [10]

- a) Hidden Markov modelling
- b) Morphological analysis

- Q5)** a) Explain with block diagram the Auditory system. [8]
b) Write short notes on “speech chain”. [8]

OR

P.T.O.

- Q6)** a) Write short notes on “speech perception”. [8]
b) Define speech processing. Elaborate on the major problems addressed in speech processing. [8]
- Q7)** a) Explain Wordnet theory with suitable example. [8]
b) Write short notes on “Word sense disambiguation. [8]
c) Differentiate between supervised and unsupervised learning. [2]

OR

- Q8)** a) Explain the need of multilingual dictionaries. [8]
b) Elaborate on Indian language Wordnet features. [4]
c) Explain semantic role labelling. [6]
- Q9)** a) Elaborate on the following terms: [8]
i) Text entailment
ii) Sentiment analysis.
- b) Write short note on python language toolkit (NLTK). [8]

OR

- Q10)**a) Define cross language information retrieval (CLIR). Explain CLIR architecture with block diagram. [8]
b) Write short note on “Robust and scalable machine translation. [8]

EEE

[4859]-1081

B.E. (Chemical)

PROCESS DYNAMICS & CONTROL**(2012 Pattern) (Semester - I)***Time : 2½ Hours]**[Max. Marks : 70**Instructions to the candidates:*

- 1) *Neat diagram must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

Q1) a) What are the design elements of control system? Explain with suitable examples. [5]

b) Derive the transfer function and time domain equation for a pure capacitive process subjected to unit step input. [5]

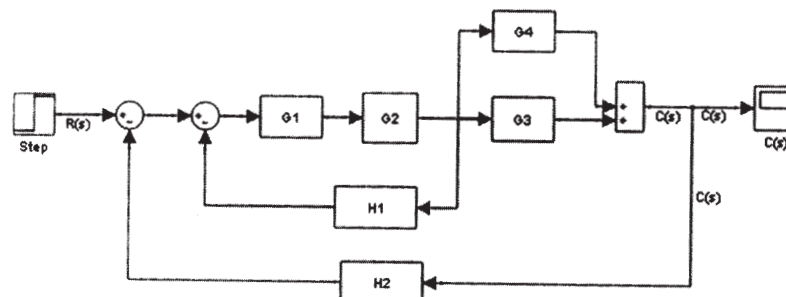
OR

Q2) a) A thermometer showing steady state temperature of 20° C is suddenly immersed into a hot bath at 100° C. If the time constant of thermometer is 5 sec, determine the following; [6]

- i) Thermometer reading after 5 sec.
- ii) Time required reading 80°C on Thermometer.
- iii) Time required for 80% response.

b) Sketch the overshoot and decay ratio versus damping factor ξ if damping factor ξ is varied from 0 to 1. [4]

Q3) Reduce the following block diagram and obtain the transfer function $C(s)/R(s)$: [10]

**P.T.O.**

OR

- Q4)** Write short notes on : [10]
a) Controller tuning.
b) ISE, IAE, ITAE.

- Q5)** a) Sketch the Bode diagram for PD controller. [9]
b) Sketch the Nyquist diagram for PI controller. [9]

OR

- Q6)** a) Derive the response of general first order system to sinusoidal input. Define amplitude and phase lag. [10]
b) Discuss the following : [8]
i) Gain margin & phase margin.
ii) Nyquist stability criteria.

- Q7)** Discuss in detail with a neat sketch of following : [16]
a) Cascade Control system for CSTR.
b) Auctioneering Control.

OR

- Q8)** Draw a neat sketch of following and explain with suitable examples: [16]
a) Adaptive control.
b) Override control for steam distribution system.

- Q9)** Draw the instrumentation diagram for Heat Exchanger control system and discuss the plant wide control in detail. [16]

OR

- Q10)** Write short notes on : [16]
i) DCS.
ii) PLC & SCADA system.
iii) Digital approximation of classical controllers.
iv) Role of digital computers in control.



Total No. of Questions : 10]

SEAT No. :

P1973

[Total No. of Pages : 2

[4859]-1082

B.E. (Chemical)

CHEMICAL REACTION ENGG. - II

(2012 Pattern) (End Sem.)

Time : 2 ½ Hours]

[Max. Marks : 70

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.
- 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.

- Q1) a) Explain the film conversion parameter in fluid - fluid reaction. [5]
b) Explain the selection of model for non-catalytic reaction of particle. [5]

OR

- Q2) Derive an equation for calculation of tower height for fast reaction when straight mass-transfer without reaction take place. [10]

- Q3) a) Give the catalyst preparation method. [5]
b) Explain the Mercury-Helium method in detail. [5]

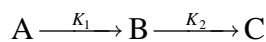
OR

- Q4) a) Explain Lagmuir adsorption isotherm with the assumption. [5]
b) Explain Mercury-Penetration method in detail. [5]

- Q5) a) Explain the selectivity for a porous catalyst in a parallel and series reaction. [9]
b) Explain the effect of Thiele modulus on effectiveness factor in cylindrical pore catalyst pallet. Give the testing method for pore resistance. [9]

OR

- Q6) a) Determine the selectivity of the catalyst used in the following reaction:



the diffusion resistance in the pore of the catalyst as:

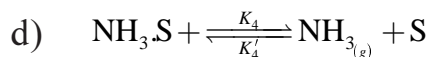
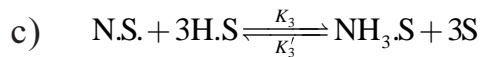
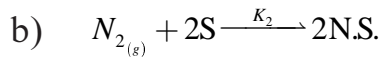
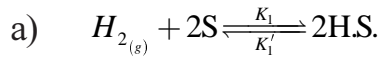
- i) Strong pore resistance
- ii) Negligible pore resistance.

For the catalyst, $\frac{K_1}{K_2} = 16$ and $\left(\frac{C_B}{C_A}\right)_b = 1$ Assume equal effective diffusivities for A and B. [12]

P.T.O.

b) Explain Knudsen diffusivity and molecular diffusivity in detail. [6]

Q7) For synthesis of NH_3 over an iron catalyst develop the rate expression for the following mechanism: [16]



Assume

i) The total concentration, $C_T = C_S + C_{\text{N-S}}$

ii) Step - 2 is a rate controlling and step 1,3&4 are in equilibrium.

OR

Q8) Find amount of catalyst needed for 35% conversion of reaction, $\text{A} \rightarrow 4\text{R}$ for a feed rate of 2000 mol/hr of pure A at 3.2 atm and 117°C temperature in

a) Packed bed reactor with very high recycle rate

b) Packed bed reactor with no recycle rate.

[16]

Q9) a) Explain the fluidized bed reactor in detail. [8]

b) Explain Trickle bed reactor in detail. [8]

OR

Q10) a) Give the M-M- kinetic eqⁿ and explain the features of the M-M- kinetics. [8]

b) Explain the procedure for determining the M-M kinetic constants in a mixed flow reactor. [8]



Total No. of Questions : 10]

SEAT No. :

P3660

[Total No. of Pages : 3

[4859] - 1083

B.E. (Chemical) (Semester - I)
Chemical Engineering Design - II
(2012 Pattern) (End Sem.)

Time : 2½ Hours]

[Max. Marks : 70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

Q1) 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 vapours = 1.13 m³/s, Orifice coefficient = 0.84, Density of vapours = 0.70 kg/m³, Density of liquid = 950 kg/m³, Weir height = 50 mm, Weir length = 0.6 m, Hole diameter = 5mm, Plate thickness = 5mm, Height of overflow weir = 27mm, Maximum liquid rate = 4.06 kg/s. **[10]**

OR

- Q2)** a) Explain in detail Onda's method for prediction of HTU. Give the necessary equations. **[8]**
- b) Explain the use of hold - down plate in packed column. **[2]**
- Q3)** a) Using Cornell's method estimate the height of packing Z for the absorption column to absorb SO₂ in water at 20° C with the help of following data: Number of transfer units $N_{OG} = 8$, the liquid mass flow rate $(L_w^*) = 16.7 \text{ kg/m}^2.\text{s}$, Diffusivity $D_L = 1.7 \times 10^{-9} \text{ m}^2/\text{s}$, $D_v = 1.45 \times 10^{-5} \text{ m}^2/\text{s}$, Viscosity $\mu_v = 0.018 \times 10^{-3} \text{ N.s/m}^2$ and $\mu_L = 1 \times 10^{-3} \text{ N.s/m}^2$. Density $\rho_L = 1000 \text{ kg/m}^3$, $\rho_v = 1.21 \text{ kg/m}^3$. With 60% flooding condition $K_3 = 0.85$, H_G factor $(\psi_h) = 80$ and at $(L_w^*) = 16.7 \text{ kg/m}^2.\text{s}$, H_L factor $(\phi_h) = 0.1$. Take $Z = 8\text{m}$ as initial estimate. **[8]**

P.T.O.

- b) Explain the difference between random packing and structured packings. [2]

OR

- Q4)** a) Explain the estimation of optimum pipe diameter. [3]

- b) Water flows through a pipeline at 1 kg/s, over a distance of 2 km. The impressed head of water = 9.8 m. What is the diameter of pipeline if density = 1000 kg/m³ and viscosity = 1 mN.s/m². [7]

- Q5)** a) Natural gas with a specific gravity 1.20 at 1,43,000 kPa and 45°C is being blown down to 1,02,000 kPa. The flow rate could be from 95 m³/ day to 39 m³/ day. The drop through the pressure reducing regulator is 3,100 kPa, leaving 1,000 kPa for the pipe. The pipe length is 140 m upstream of the regulator and 8.7 m downstream. Determine the upstream and downstream pipe diameters.

Molecular weight of gas = 20, $\psi = 0.6$ [8]

- b) What are codes and standards and their importance in piping design. [8]

OR

- Q6)** a) Explain the pipeline design for transportation of crude oil. [8]

- b) Water is flowing through a pipeline at a rate of 1 kg/sec. The internal diameter of the pipeline is 25 mm and the length of pipeline is 2200 m. Estimate the pressure drop in the pipeline. The density = 1000 kg/m³ and viscosity = 1 mNs/m². [8]

- Q7)** a) Write a note on non-stream heating systems using thermic fluids. [8]

- b) Explain in detail the boiler feed water treatment. [8]

- c) Explain temporary hardness and permanent hardness. [2]

OR

- Q8)** a) What is the use of compressed air in industries and explain the different types of compressed air. [7]
- b) What are boiler mountings? Explain the different boiler mountings and their functions. [9]
- c) Explain dryness fraction of steam. [2]
- Q9)** a) Write in brief about maintenance of gate valve and globe valve. [8]
- b) Explain in detail about HAZOP studies. [8]

OR

- Q10)** a) State different types of maintenance and explain corrective or breakdown maintenance. [8]
- b) Define viscosity, pour point, flash point, and fire point properties of lubricant and explain their significance in context of lubrication. [8]



Total No. of Questions : 10]

SEAT No. :

P3243

[Total No. of Pages : 2

[4859] - 1084

B.E. (Chemical) (Semester - I)
ENVIRONMENTAL ENGINEERING
(2012 Pattern) (End Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Answer any five questions.*
- 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.*

Q1) Discuss nitrogen cycle in detail. **[10]**

OR

Q2) Discuss carbon cycle with figure. **[10]**

Q3) Draw a neat sketch of fabric filter and explain its working. **[10]**

OR

Q4) Draw a neat sketch of settling chamber and explain its working mechanism. **[10]**

Q5) Explain the following terms : **[16]**

- a) Volumetric loading rate (VL)
- b) Food to mass ratio (F/M)
- c) Hydraulic Retention Time
- d) Mean cell residence time
- e) Recycle ratio
- f) Mixed Liquor Suspended Solids (MLSS)

OR

P.T.O.

Q6) Calculate L & K using least square method for the following BOD data.[16]

T days	2	4	6	8	10
Y mg/lit	11	18	22	24	26

Q7) Explain activated sludge process with neat diagram. [18]

OR

Q8) Explain Trickling filter with neat diagram. [18]

Q9) Write short notes on : [16]

- a) Composting
- b) Disinfection by UV.

OR

Q10) Discuss in detail about : [16]

- a) Sanitary land filling.
- b) Incineration.



Total No. of Questions : 10]

SEAT No. :

P3244

[Total No. of Pages : 2

[4859] - 1086

**B.E. (Chemical Engineering)
CORROSION ENGINEERING
(2012 Pattern) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer any five questions.*
- 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.*

Q1) Discuss thermodynamic aspects of corrosion. [10]

OR

Q2) Derive Nernst equation. [10]

Q3) Discuss Tafel equation. [10]

OR

Q4) Explain Galvanic corrosion in detail. [10]

Q5) Discuss the remedial measures for corrosion, in detail. [16]

OR

Q6) Explain pitting corrosion, in detail. [16]

Q7) Discuss in detail the corrosion testing procedure. [18]

OR

P.T.O.

Q8) Write in detail about the effects of aqueous media on Iron & steel related with corrosion. **[18]**

Q9) What are the chemical and mechanical methods of surface treatment coatings? **[16]**

OR

Q10) Write notes on : **[16]**

- a) Cathodic protection.
- b) Modification of metals.



Total No. of Questions : 10]

SEAT No. :

P2012

[4859] - 1087

[Total No. of Pages : 2

B.E. (Chemical Engg.) (Semester - I)
PETROLEUM REFINING (Elective - I)
(2012 Pattern)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) Give brief account on origin and formation of Petroleum? **[5]**

b) Discuss the Tests and properties of Diesel **[5]**

OR

Q2) What is the significance of reforming process? Describe different types of pipe still heaters with suitable examples? **[2 + 8]**

Q3) a) Describe the various methods of Exploration of petroleum crude **[5]**

b) What are different Pre-refining operations used in refinery **[5]**

OR

Q4) a) What is cracking operation? Differentiate between thermal cracking and catalytic cracking **[6]**

b) Explain the mechanism and need of hydro cracking in refinery **[4]**

Q5) a) What are various properties of lube oil? Discuss the lube oil production process with schematic diagram **[3 + 7]**

b) Describe the dewaxing process with typical schematic diagram? **[7]**

OR

Q6) a) Why additives are added in the petroleum products? Discuss in brief about the additives used for lube oils? **[7]**

b) Describe the Manufacture of Bitumen with typical schematic diagram? **[10]**

P.T.O.

Q7) Why desulphurization is necessary in the refinery? Discuss Hydro-desulphurization process with typical schematic diagram along with reaction and operating parameters [16]

OR

Q8) Describe the Environmental and Pollution control aspects in refinery [16]

Q9) a) What are additives? Note various additives used in petroleum fraction?[8]

b) Explain different methods for blending used in refinery? [9]

OR

Q10)a) Explain Different methods used for storage of petroleum products? [8]

b) Explain strategies of marketing of petroleum products? [9]



Total No. of Questions : 10]

P3923

SEAT No. :

[Total No. of Pages : 2

[4859] - 1088

B.E. (Chemical) (Semester - I) (End Sem.)

CHEMICAL PROCESS SYNTHESIS

(New Pattern)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) Explain the concept of Onion Model. **[6]**

b) List out different steps involved in process design. **[4]**

OR

Q2) Discuss idealized reactor model. **[10]**

Q3) Explain in short different parameters in choice of reactor. **[10]**

OR

Q4) a) Explain different types of reaction system. **[6]**

b) Discuss in brief reactor performance. **[4]**

Q5) Explain with sketches the concept of heat integration of sequences of simple distillation column. **[16]**

OR

Q6) a) Discuss optimization of reducible structure. **[8]**

b) Explain threshold problems in heat exchanger network. **[8]**

P.T.O.

- Q7)** a) What are composite curves? How you will obtain them? [8]
b) How a problem table algorithm is formed? [8]

OR

- Q8)** a) Explain the concept of Pinch technology. [8]
b) Explain graphically heat recovery pinch. [8]

- Q9)** a) Explain the intensification of hazardous materials and attenuation of hazardous materials. [12]
b) Discuss major hazards in process plants. [6]

OR

- Q10)** Write short note on: [18]
a) Fire and explosion
b) Quantities measures of inherent safety.



Total No. of Questions : 10]

SEAT No. :

P4428

[Total No. of Pages : 2

[4859]-1089

B.E. (Chemical)

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

(2012 Pattern) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

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.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.

Q1) a) Differentiate between entrepreneur and manager. [4]

b) Explain attributes required in successful entrepreneur. [6]

OR

Q2) Explain schemes offered by various commercial banks and financial institutions like: [10]

a) SIDBI

b) Venture capital funding

Q3) Explain the role of National Institute of Entrepreneurship and Small Business Development (NIESBUD) and Small Industries Service Institute (SISI) in entrepreneurship development. [10]

OR

Q4) Discuss in detail the reasons for low / no women entrepreneurs. [10]

Q5) Write short notes on (any four): [16]

a) Theory of five competitive forces (Porter)

b) Team role theory (Belbin)

c) Stages of team development (Tuckman)

d) Communication styles with examples

e) Verbal and nonverbal communication

OR

P.T.O.

- Q6)** a) Explain in detail situational leadership theory by Blanchard. [8]
b) Discuss different communication forms employed in organizations with example. [8]

- Q7)** a) Explain the concept of six sigma. [8]
b) Explain business excellence through kaizen. [8]

OR

- Q8)** a) Explain in detail project management concepts with example. [12]
b) Give steps wise procedure involved in using Microsoft project. [4]

- Q9)** a) Explain in detail integrated marketing communications. [9]
b) Explain product, promotion and pricing of marketing with example. [9]

OR

- Q10)** Discuss in detail the different techniques used in gathering, analyzing and interpreting the data for marketing decisions. [18]



Total No. of Questions : 10]

SEAT No. :

P3661

[Total No. of Pages : 3

[4859] - 1090

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

PIPING DESIGN AND ENGINEERING (Elective - II)

(2012 Pattern)

Time :2.5Hours]

[Max. Marks :70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain the pipe sizing steps based on available pressure drop? [5]
- b) A waterline 5000 m long is composed of three sections A,B and C. Section A has a 200 - mm inside diameter and is 1500 m long. Section C has a 400 - mm inside diameter and is 2000 m long. The middle section B consists of two parallel pipes each 3000 m long. One of the parallel pipes has a 150 - mm inside diameter and the other has a 200 - mm inside diameter. Assume no elevation change throughout. Calculate the pressures and flow rates in this piping system at a flow rate of 500 m³/h, using the Hazen - Williams formula with a C factor of 1.20. [5]

OR

- Q2)** a) Explain the classification of flanges based attachment, pressure temperature rating, facing and material of construction? [7]
- b) Explain the different control valve styles? [3]
- Q3)** a) Write down in brief the classification of safety relief valve along with working principle? [6]
- b) Explain the types of piping materials used for various temperature and pressure conditions? [4]

P.T.O

OR

- Q4)** a) Discuss the working principle and applications of Rupture disks? [6]
b) Explain the different minor losses occurring in piping systems? [4]
- Q5)** a) A steam piping system transports 20,000 lb/h of dry saturated steam at 150 psia. If the velocity is limited to 3000 ft/min, what size pipe is required? Calculate the pressure loss due to friction in 500 ft of pipe using the Unwin and Darcy equations and compare the answers obtained. (specific volume = 3.015 ft³/lb) [8]
b) Discuss the different approaches used for calculating the pressure drop in compressed air systems? [8]

OR

- Q6)** a) How to calculate NPSHa and NPSHr? How to increase NPSHa? [8]
b) Explain the Homogenous, Heterogeneous flow and deposition velocity in slurry pipe lines? [8]
- Q7)** a) Discuss the design criteria used in insulation system design for piping applications. [8]
b) Explain the design procedures for insulation of piping based on the different criteria's? [8]

OR

- Q8)** a) Calculate the heat gain on a typical chilled water pipe in an enclosed space. [8]

Following data is available:

Pipe size: NPS 2 (DN 50),

2.375 = in (60 mm) actual OD

Operating temperature: 42 °F

Ambient temperature : 95 °F

Insulation thickness : 2 in (mm) nominal

2.11 in (54 mm) actual

Insulation type: Cellular glass

Length of pipe : 120 linear ft (36.5m)

b) Explain critical thickness of insulation and insulation materials for cold piping? [8]

Q9) a) Explain the types of plot plan and their advantages? [9]

b) Discuss the following points for locating the pipe racks of a process unit [9]

i) Pipe rack width and number of levels

ii) Elevations and bent spacing

OR

Q10)a) Discuss in detail the typical piping layout considerations for the equipments (Any two) [9]

i) Distillation column

ii) Heat exchanger

iii) Pump

iv) Storage tank

b) Explain the concept of PFD, P&ID and utility diagram? [9]



Total No. of Questions : 10]

SEAT No. :

P3245

[Total No. of Pages : 3

[4859] - 1091

B.E. (Chemical) (Semester - I)
ADVANCED SEPARATION PROCESSES
(2012 Pattern) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

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

- Q1)** a) Describe the design of multi-component distillation column by Thiele-Geddes method in detail. [5]
- b) What are low key and high key components? [5]

OR

- Q2)** a) Explain the principle, working & applications of extractive distillation using typical schematic diagram. [8]
- b) Describe the various methods of classification of multi-component distillation. [2]

- Q3)** a) Differentiate between homogeneous & heterogeneous azeotropic distillation techniques? [3]
- b) Explain the principle, working & applications of reactive distillation using typical schematic diagram. [7]

OR

- Q4)** a) Explain column sequencing in distillation with example. [4]
- b) Give the principles and applications of reactive crystallization techniques. [6]

P.T.O.

- Q5)** a) What is fouling and concentration polarization? discuss the methods of controlling fouling. [6]
 b) Explain the principle, working & applications of reverse osmosis techniques along with design equation? [10]

OR

- Q6)** a) The permeability of methane through a certain membrane has been determined at various temperatures and pressures from 5 to 70 bar. It was found that the permeability coefficient was invariant to pressure. The values of P at the various temperatures are given below. [6]

T (°C)	P (Barrer)
10	1.8
20	3.5
30	6.3
40	10.1

Is the material a glass or an elastomer?

Determine the activation energy

- b) What is working principal and mechanism of pervaporation? Discuss the flux equation along with application. [10]
- Q7)** a) Describe temperature swing adsorption (TSA) and pressure swing adsorption (PSA) techniques along with typical schematic diagram.[8]
 b) Explain various methods of classification of chromatographic techniques and describe principal and design equation of liquid chromatographic techniques. [10]

OR

- Q8)** a) What are different adsorption isotherms? Describe various adsorption isotherms? [6]
 b) A solution of washed, raw cane sugar, 48% sucrose by weight, is colored by the presence of small quantities of impurities. It is to be decolorized at 80°C by treatment with an adsorptive carbon in a contact filtration plant. The data for equilibrium adsorption isotherms were obtained by adding various amounts of the carbon to separate bathes of original solution and observing the equilibrium colour reached in each case. The data, with the quantity of carbon expressed on the basis of the sugar content of the solution, are as follows:

Kg carbon/kg dry sugar	0	0.005	0.01	0.015	0.02	0.03
Color removed	0	47	70	83	90	95

The original solution has a colour concentration of 20, measured on an arbitrary scale, and it is desired to reduce the colour to 2.5% of its original value. [12]

- i) Convert the equilibrium data to $Y^* = \text{colour units/kg sugar}$, $X = \text{colour units/kg carbon}$. Do they follow the Freundlich equation? If so, what are the equation constants?
- ii) Calculate the necessary doses of fresh carbon, per 1000kg of solution, for single stage process.
- iii) Calculate the necessary carbon dosages per 1000 kg of solution for two stage counter current treatment, using the minimum total amount of fresh carbon.

Q9) a) Explain the principle, working & applications of zone electrophoresis techniques? [8]

b) Describe adsorption properties of foams and modes of operation of foam fractionation? [8]

Q10) a) Explain the principle, working & applications of zone refining techniques? [8]

b) Describe Principle, mechanism and applications of froth flotation techniques? [8]



[4859] - 1092

B.E (Instrumentation And Control)
PROCESS INSTRUMENTATION - I
(2012 Pattern) (Semester - I)

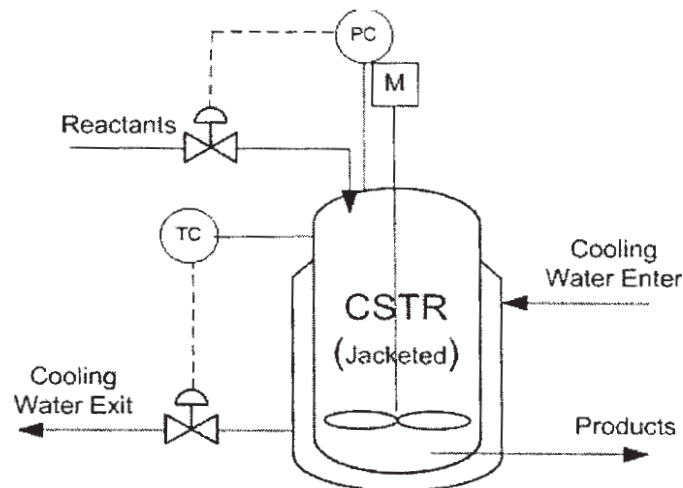
Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) All questions are compulsory
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of non-programmable calculator is allowed.
- 5) Assume suitable data, if necessary.

- Q1)** a) Explain various capacitive elements in process with example [4]
 b) Identify various process variables associated with process associated with process shown in figure. Classify these variables in Controlled variable, Manipulated Variable and Load Variable [6]



OR

- Q2)** a) Explain linearization of equal percentage valve into linear valve. [3]
 b) Explain the effect of tuning on dynamic behavior of manipulated behaviour and tuning values can be set for proper behavior of manipulated variable behaviour [7]

P.T.O

- Q3)** a) Explain various properties associated with gas processes. [5]
 b) Compare performance of Control valve and pump as final control element in flow control. [5]

OR

Q4) Explain what is scaling? For following data [10]

Signal	variable	Range	Normal Value
B	F	0–100gpm	60gpm
A	T_2	25–75 ⁰ F	50 ⁰ F
C	T_1	0–55 ⁰ F	34 ⁰ F
E	Q	0 – 60000 BTU/hr	48000 BTU/hr

- a) Normalize the equation $Q = Fk (T_2 - T_1)$
 b) Fit the above equation in terms of Signal Name.

- Q5)** a) What are the implementation issues of cascade control system? [9]
 b) Explain Ration control with suitable example [9]

OR

- Q6)** a) What are different ways to improve nonlinear process performance? Explain in brief Dead Band & Dead Zone. [9]
 b) What is ‘Split Range Control’? Illustrate using suitable application. [9]

- Q7)** a) What is an interaction in process? Explain its effect on stability and tuning of Multiloop control system. [8]
 b) Explain in brief procedure for calculating Relative Gain Array for 2 x 2 system list important properties of RGA. [8]

OR

Q8) a) A system, gain matrix is given by

$$\begin{bmatrix} \frac{14e^{-2s}}{12s+1} & \frac{8e^{-1.2s}}{3s+1} \\ \frac{3e^{-s}}{2s+1} & \frac{4e^{-1.4s}}{4s+1} \end{bmatrix}$$

- i) Calculate the relative gain array matrix for given system,
 - ii) Select suitable controlled-manipulated variable pairing [8]
- b) What is decoupling? List different methods to decouple the process variables. Explain any one in detail. [8]

- Q9)** a) Explain Measurement feasibility and Accuracy in respect to process control design problem. [8]
- b) Explain sequence of design steps in brief [8]

OR

- Q10)**a) Explain why large plants are decompose and explain it with suitable example [8]
- b) Explain how process control design problem is define. [8]



[4859] - 1094

B.E. (Instrumentation and Control Engineering)**DIGITAL CONTROL****(2012 Pattern) (Semester - I)***Time : 2½ Hours]**[Max. Marks : 70**Instructions to the candidates :*

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.
- 2) Neat diagrams must be drawn whenever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data, if necessary.

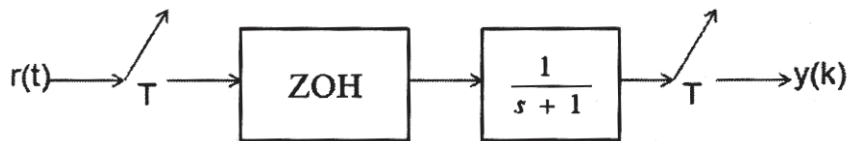
Q1) a) Explain Basic building blocks of Discrete Time Control systems. [6]**b) Find the pulse transfer function of system shown in figure 1. [4]**

Figure 1

OR

Q2) a) Solve the difference equation by use of z transform method. [6]

$$x(k+2) + 3x(k+1) + 2x(k) = 0 \text{ with } x(0) = 1, x(1) = 1$$

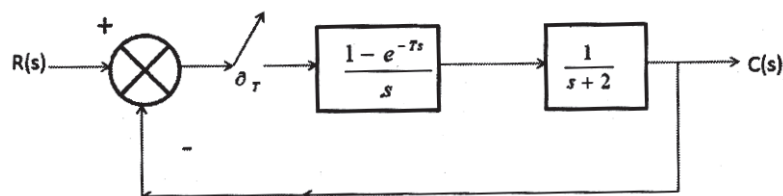
b) Explain the term Zero Order Hold. [4]**Q3) a) Determine the stability of closed loop system given in figure 2. [6]****(T = 1sec)**

Figure 2

b) Explain concept of ringing of poles. [4]

OR

P.T.O.

Q4) a) Characteristic equation of system is $z^3 + 2.1z^2 + 1.44z + 0.32 = 0$, Test the stability of system using bilinear transformation & routh array method. [6]

b) Explain stability regions in S-plane, Z-plane & W-plane with neat sketches. [4]

Q5) a) Obtain state transition matrix $\Psi(k)$ for following discrete time system. [8]

$$x(k+1) = \begin{bmatrix} 0 & 1 \\ -0.24 & -1 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix}$$

b) Determine Eigen values and Eigen vectors of following state matrix. [8]

$$G = \begin{bmatrix} -1 & 0 & 1 \\ 1 & -2 & 0 \\ 0 & 0 & -3 \end{bmatrix}$$

OR

Q6) a) Obtain discrete time state model of system for given continuous time system model using sample time $T = 1$ sec. [10]

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \text{ and}$$

$$y = [1 \quad 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

b) Obtain state space representation of following pulse transfer function of system in canonical forms. [6]

$$\frac{Y(z)}{U(z)} = \frac{z^{-1} + 2z^{-2}}{1 + 4z^{-1} + 3z^{-2}}$$

- Q7)** a) Find state feedback gain matrix for system such that desired closed loop poles are placed at $z = -3 + 4j$, $z = -3 - 4j$. (Using transformation Method and Ackerman Formula). **[10]**

$$x(k+1) = \begin{bmatrix} 0 & 1 \\ -25 & -6 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(k) \text{ and } y(k) = [3 \ 1]x(k)$$

- b) Consider the system $x(k+1) = \begin{bmatrix} 0 & 1 \\ -0.16 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(k)$ & **[8]**
 $y(k) = [1 \ 1]x(k)$

Design full order observer for system such that system have deadbeat response.

OR

- Q8)** a) Transform following State model into controllable canonical form. **[12]**

$$x(k+1) = \begin{bmatrix} 0 & 0 & -3 \\ 1 & 0 & -7 \\ 0 & 1 & -5 \end{bmatrix} x(k) + \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix} u \text{ and } y(k) = [0 \ 0 \ 1]x(k)$$

- b) Investigate the controllability and observability of system given below. **[6]**

$$x(k+1) = \begin{bmatrix} 1 & -2 \\ 1 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 1 & -1 \\ 0 & 0 \end{bmatrix} u \text{ and } y(k) = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} x(k)$$

- Q9)** a) Explain the terms; **[4]**

- i) Optimal Control
- ii) Performance Index

- b) Consider the discrete time control system defined by **[12]**

$$x(k+1) = 0.1354x(k) + 0.8646u(k), x(0) = 1$$

Determine the optimal control Law to minimize the following performance index;

$$J = \frac{1}{2}[x(5)]^2 + \frac{1}{2} \sum_{k=0}^4 [x^2(k) + u^2(k)]$$

OR

Q10) Consider following discrete time control system defined by **[16]**

$$x(k+1) = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u(k) \text{ and } x(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}.$$

Determine the optimal control sequence $u(k)$ that will minimize the following

performance index. $J = \frac{1}{2} x^*(5) S x(5) + \frac{1}{2} \sum_{k=0}^4 [x^*(k) Q x(k) + u^*(k) R u(k)]$

$$Q = S = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \text{ and } R = 1$$



Total No. of Questions : 10]

SEAT No. :

P3924

[Total No. of Pages : 2

[4859]-1095

B.E. (Instrumentation & Control)

ADVANCED BIOMEDICAL INSTRUMENTATION (Elective)

(2012 Pattern) (Semester - I) (End - Semester)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) Explain the Principle of coulter type blood cell counter for RBC & WBC measurement. [6]

b) Explain the Principle of the finger tip pulse Oximetry [4]

OR

Q2) a) Define Biotelemetry? Elaborate on the role of telemetry system in medical field. [6]

b) What is an auto analyzer? Enlist various subsystems of auto analyzer. [4]

Q3) a) Draw and explain the static X- ray Generation method. [6]

b) Enlist the frequency ranges used in Ultrasound medical imaging for various applications. Specify the relationship between depth of penetration and frequency in ultrasound imaging. [4]

OR

Q4) a) Explain the operating principle of PET scans. [5]

b) What is CT - number (Hounsfield No.). Justify with the reason, why CT scans have window selection control on its Control Panel? [5]

P.T.O.

Q5) a) What is the necessity of pacemaker? Explain, briefly the various modes of pacing. [10]

b) Explain various modes of ESU? Enlighten the different ESU electrode system configuration. [8]

OR

Q6) a) What is the necessity of a defibrillator? What is a defibrillator. Describe Working of DC defibrillation with neat sketch. [10]

b) Distinguish between AC Defibrillator and DC defibrillator. [8]

Q7) a) Explain thermal and non thermal interaction of tissue with LASER. [8]

b) Explain the properties of LASER [8]

OR

Q8) a) Explain different applications of LASER in the field of ophthalmology [8]

b) What is an endoscope? Explain the construction with the help of a neat diagram. [8]

Q9) a) Define orthosis and Prosthesis concepts used in rehabilitation engineering. Briefout on Main types of frame design for the wheel chair. [8]

b) Draw and explain the structure of a nephron. [8]

OR

Q10) a) Explain in brief various types of dialysers used for hemodialysis. [8]

b) Explain the four critical performance factors in wheel design to optimize the interaction of wheel with the ground. [8]



OR

- Q6)** a) What is Vapour Compression Cycle? Explain any one type of evaporator used in Vapour Compression cycle with neat sketch. [10]
b) Explain Unit Heater with neat sketch. [8]

- Q7)** a) Explain VRV system with neat sketch. [8]
b) Explain Absorption Chiller with neat sketch. [8]

OR

- Q8)** a) List Different Types of Boiler, Explain any one type of boiler with neat sketch. [8]
b) List Different types of condenser used in vapour compression cycle, Explain any one type of compressor with neat sketch. [8]

- Q9)** a) What is BAS System, Explain Field level components in BAS System with neat sketch. [8]
b) Explain Architecture of DDC with neat sketch. [8]

OR

- Q10)** a) Explain MODBUS protocol with neat sketch. [8]
b) Explain in Detail BACnet protocol with neat sketch. [8]

❧❧❧

B.E. (Instrumentation and Control Engineering)
c-ADVANCED CONTROL SYSTEM
(Semester-I) (2012 Course) (406264) (Elective-I)

Time : 3 Hours]

[Max. Marks : 70

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.
- 2) Assume suitable data if necessary.
- 3) Figures to the right indicate full marks.

- Q1) a)** Explain in brief the concept of Limit cycle. [3]
- b)** Obtain the range of k for which the system shown in figure is stable by using describing function method. [7]

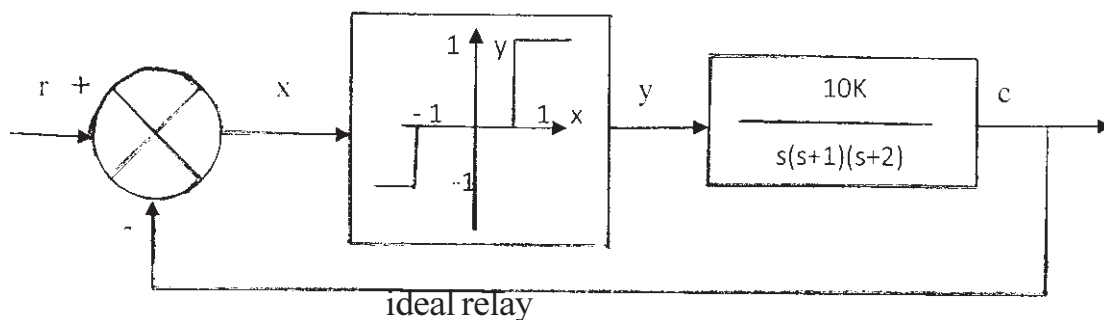


Figure:Q.1b

OR

- Q2) a)** Explain in brief the concepts of Dominant pole. [4]
- b)** State the Sylvester's Theorem. Show that following quadratic form is positive semi definite. $Q(x) = x_1^2 + 5x_2^2 + x_3^2 - 4x_1x_2 + 2x_2x_3$ [6]
- Q3) a)** Explain the block diagram of model reference adaptive control system. [4]
- b)** Explain in detail direct method of Lyapunov. [6]

OR

P.T.O.

- Q4)** a) Explain in brief the Popov's method and its extensions. [4]
 b) Explain with neat diagram of direct and indirect MRAs. [6]

- Q5)** a) Explain in detail Different approaches to self-tuning regulator. [6]
 b) In the self-tuning regulator following input output data has been obtained from the real plant. [10]

Time(t)	Input data u(t)	Output data y(t)
1	2.0	0.0
2	1.0	4.0
3	2.0	-2.0
4	1.5	4.0
5	1.0	2.0

Use any regression to fit a model with the structure $y(t)+ay(t-1)=bu(t-1)+e(t)$ where $e(t)$ = error signal.

OR

- Q6)** a) Explain in detail Recursive parameter estimation of STR [8]
 b) Explain with neat diagram of implicit and explicit self tuning regulator. [8]

- Q7)** a) Explain in detail robustness studies of multivariable system. [8]
 b) Explain adaptive control technique for control of pulp and dryer control. [8]

OR

- Q8)** a) Explain the recent trends in adaptive control system. [8]
 b) Explain adaptive control technique for control of distillation column control. [8]

- Q9)** a) Explain the requirements for the formulation of an optimal control problem. [6]
 b) Obtain the control law that minimize the performance index [12]

$$J = \int_0^{\infty} (x_1^2 + u^2) dt$$

For the system given below:
$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

OR

Q10a) Explain in detail Linear Quadratic optimal regulator problems. [6]

b) The first order system is described by the differential equation [12]

$$\dot{x}(t) = 2x(t) + u(t)$$

It is desired to find the control law that minimizes the performance index

$$J = \frac{1}{2} \int_0^{t_f} (3x^2 + \frac{1}{4} u^2) dt, \quad t_f = 1 \text{ sec} .$$



Total No. of Questions : 10]

SEAT No. :

P1887

[4859]-1098

[Total No. of Pages : 2

B.E. (Instrumentation & Control)
d-ADVANCED SENSORS (406264 D)
(2012 Course) (Elective-I) (Semester - I) (End Sem)

Time : 2:1/2 Hours

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) Explain various factors considered in selection of sensors. **[5]**

b) Give detail classification of temperature sensor with their ranges and operating principles. **[5]**

OR

Q2) a) Explain dynamic characteristics of sensor with examples. **[5]**

b) Give detail classification of level sensor with their ranges and operating principles. **[5]**

Q3) a) Discuss design considerations and selection criteria for sensor fabrications. **[5]**

b) With neat block diagram explain manufacturing process of sensor in detail. **[5]**

OR

Q4) a) List different techniques for used for sensor fabrication. Explain any one in detail. **[5]**

b) Write note on latest trends in sensor fabrication. **[5]**

P.T.O.

- Q5)** a) List different chemical sensors and give importance of each sensor. [8]
b) Explain working and characteristics of biosensors. [8]

OR

- Q6)** a) Give different types of gas sensors. Explain any one in detail. [8]
b) Explain working of fiber optic sensor with neat sketch. [8]

- Q7)** a) Explain term smart sensor. Give its importance in industry. [8]
b) List different smart sensors. Explain any application of it. [8]

OR

- Q8)** a) Explain signal conditioning and signal conversions in smart sensors. [8]
b) List smart temperature IC sensors. Explain any one in detail. [8]

- Q9)** a) Give various applications of Chemical sensors. [9]
b) Explain how and where biosensors are used in industry. [9]

OR

- Q10)** a) Explain fiber optic sensors used in pH measurement with neat sketch. [9]
b) Discuss application gas sensors in gas analyzers. [9]

XXX

Total No. of Questions : 10]

SEAT No. :

P2013

[4859] - 1099

[Total No. of Pages : 2

B.E. (Instrumentation and Control)
E : ADVANCED DIGITAL SIGNAL PROCESSING
(Semester - I) (2012 Pattern) (Elective - I)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Assume suitable data if necessary.*
- 2) *Use of Calculators, log tables, charts is allowed.*
- 3) *Figures to the right side indicate full marks.*

Q1) a) Decimate the signal $x(n) = 2^n$ by factor 2 for the $n > 0$ and $x(n) = 0$ for $n \leq 0$. [5]

b) Explain Wigner Ville distribution with its properties. [5]

OR

Q2) Decompose the filter $H(Z)$ given by,

$$H(Z) = 2.1 - 0.5z^{-1} + 0.3z^{-2} - 4.2z^{-3} + 0.6z^{-4} - 1.4z^{-5} - 0.2z^{-6} - 0.7z^{-7}$$

into 3 component polyphases filters and draw its efficient structure. [10]

Q3) a) Discuss imaging and aliasing phenomenon in sampling rate conversion process. [5]

b) Discuss WSS signals and linear systems. [5]

OR

Q4) a) Interpolate the signal $x(n) = 2^n$ by factor 2 for the $n > 0$ and $x(n) = 0$ for $n \leq 0$. [5]

b) Define and explain the properties of STFT. [5]

Q5) a) Compare parametric and non parametric method of PSD estimation. [6]

b) Explain modified periodogram PSD estimation method. [10]

OR

Q6) a) Explain ARMA model PSD estimation method. [10]

b) Discuss the applications of PSD estimation. [6]

P.T.O.

- Q7)** a) Explain LMS adaptive filtering algorithm with suitable block diagram. [10]
b) Explain echo cancellation using adaptive filtering. [8]

OR

- Q8)** a) Explain RLS adaptive filtering algorithm with suitable block diagram. [12]
b) Explain homomorphic signal processing. [6]

- Q9)** a) Draw and explain block diagram of ADSP 21xxx DSP processor. [12]
b) Discuss the need of DSP processor architecture. [4]

OR

- Q10)** a) Explain addressing modes in DSP processor. [12]
b) State the features of DSP processors. [4]



Total No. of Questions : 10]

SEAT No. :

P3247

[Total No. of Pages : 2

[4859] - 1100

B.E. (Instrumentation and Control)

OPTO - ELECTRONICS INSTRUMENTATION

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain the properties of Laser radiation. [5]
b) Explain distributed feedback laser with the help of neat diagram. [5]

OR

- Q2)** a) Explain an application of laser in holography. [5]
b) A stepindex fiber has core and cladding refractive indices 1.50 and 1.48 respectively. Determine its [5]
i) Numerical apperture (NA),
ii) The critical angle of refraction at core-cladding interface.

- Q3)** a) What is graded index fiber? How does it work? What are its major advantages? [4]
b) Briefly discuss the optical signal loss due to signal attenuation during propogation through fiber by [6]
i) light absorption phenomenon,
ii) fiber bending phenomenon.

OR

P.T.O.

Q4) What are various measurement techniques of losses in optical fibers? Explain each in short. [10]

Q5) a) Explain the optoelectronic integration techniques in detail. [8]

b) Explain the polarization transformation and frequency translation methods with the help of neat diagrams. [8]

OR

Q6) a) Explain the beam splitter and directional coupler with the help of neat diagrams. [8]

b) Explain any one optical fiber amplifier with the help of neat diagram. [8]

Q7) a) Explain the basic optical fiber sensor system with the help of neat schematic. [8]

b) Explain fiber optic-displacement sensor the help of neat diagram. [8]

OR

Q8) a) Explain the Michelson interferometric displacement sensor with the help of neat schematic. [8]

b) Explain the advantages and disadvantages of fiber optic sensors. [8]

Q9) a) Explain the medium-distance laser vibrometry with its neat schematic. [9]

b) Explain various configurations of two-beam laser interferometer. [9]

OR

Q10) a) Explain how lasers are used in measurement of long-distance with the help its schematic. [9]

b) Explain signal processing for the two-frequency laser interferometer. [9]



Total No. of Questions : 10]

SEAT No. :

P3248

[Total No. of Pages : 2

[4859] - 1102

B.E. (Instrumentation and Control) (Semester - I)

ROBOTICS & AUTOMATION

(2012 Pattern) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Define ROBOT. Give laws of Robotics in details. [5]
b) Explain technical features of an Industrial Robot. [5]

OR

- Q2)** a) Explain main components of Robotics system in details. [5]
b) Explain low level and high level machine vision in Robotics system. [5]

- Q3)** Classify robots based on their motion system in details with neat diagram. [10]

OR

- Q4)** a) What is automation? Give different types of automation. [5]
b) Explain basic building blocks of automation system in details. [5]

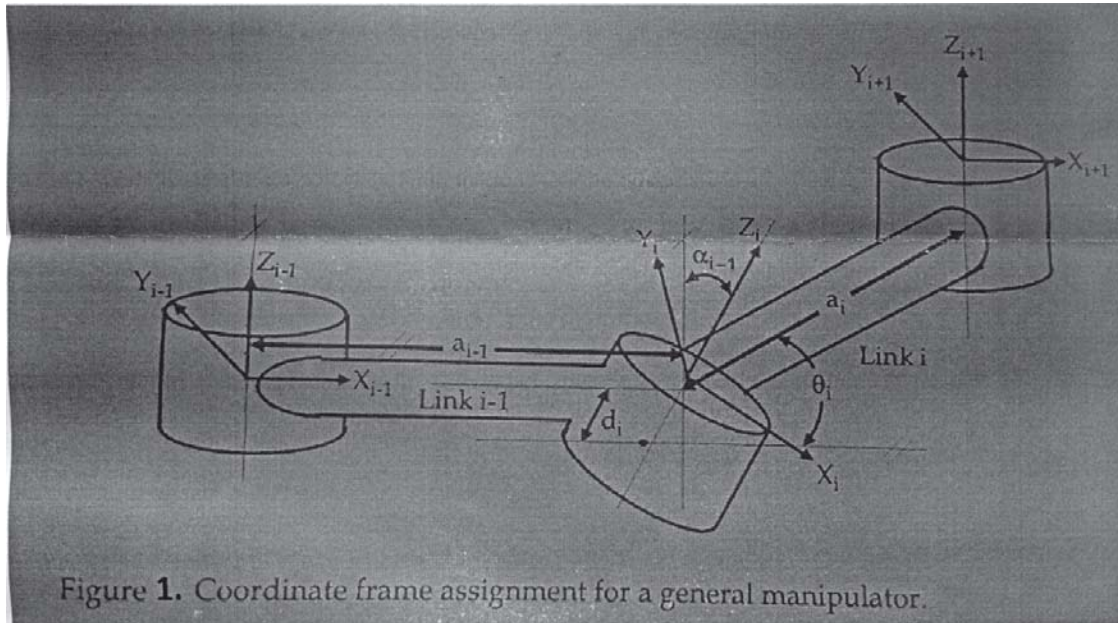
- Q5)** a) Explain Robot kinematics and dynamics in details. [8]
b) Explain position control and force control in robot systems with neat diagram. [8]

OR

P.T.O.

Q6) Develop a mathematical model using forward kinematics for general manipulator with coordinate frame assignment as shown in figure 1. Obtain [16]

- a) General transformation matrix for a single link.
- b) The forward kinematics of the end- effector with respect to base frame. Assume suitable notations for model.



- Q7)** a) Explain robot programming languages in details. [8]
 b) Explain use of Programmable Logic Controller (PLC) for controlling Industrial Robot. [8]

OR

- Q8)** a) Explain levels of Robot programming in details. [8]
 b) Explain some problems peculiar to Robot programming in details. [8]

Q9) Write short notes on : [18]

- a) Selection of Robots for applications.
- b) Robot cell design c) Multiple Robots.

OR

Q10) Explain Robots in manufacturing and non-manufacturing applications with examples and neat suitable diagrams. [18]



Total No. of Questions :10]

SEAT No. :

P1888

[4859]-1103

[Total No. of Pages :2

B.E. (Instrumentation and Control)

SENSOR NETWORKS

(2012 Pattern) (End- Sem) Elective - II) (Semester - I) (406265 D)

Time :3 Hours]

[Max. Marks :70

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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain a communication in a wireless sensor networks. **[4]**
- b) Write a short note on:
- i) Design constraints of WSN **[3]**
 - ii) Security in WSN **[3]**
- c) Explain field programmable gate array (FPGA) in detail. **[5]**

OR

- Q2)** a) Compare traditional networks and wireless sensor networks. **[5]**
- b) Explain basics of sensor classifications in WSN with examples. **[5]**
- c) Explain IMote Node Architecture in detail. **[5]**
- Q3)** a) Describe prototype of pipeline monitoring in detail. **[10]**
- b) Compare Serial Peripheral Interface (SPI) and Inter Integrated circuits (I²C). **[5]**

OR

P.T.O.

- Q4)** a) Explain the processing components of the artificial retina in detail with suitable diagram. [5]
b) Write a short note on precision agriculture. [5]
c) Describe architecture of a wireless sensor node. [5]

- Q5)** a) Explain different types of channels in detail of channel encoding. [7]
b) Describe signal propagation using the relationship between the transmitted power and the Received power. [8]

OR

- Q6)** a) Explain pulse code modulation and delta modulation with suitable diagrams. [7]
b) Explain source encoding with calculations of efficiency of a source encoder in detail. [8]

- Q7)** a) Explain the contention free and contention based medium access protocol in detail. [7]
b) Explain the MAC protocols and its control layers in details. [8]

OR

- Q8)** a) Explain sensor MAC of contention based MAC protocols. [7]
b) Write a short note on mobility adaptive hybrid MAC. [8]

- Q9)** a) Explain Hierarchical routing with suitable diagrams. [5]
b) Explain destination sequenced distance vector. [5]

OR

- Q10)** a) Explain optimized link state routing of proactive routing. [5]
b) Write a short note on SPIN-PP of data centric Routing. [5]

EEE

Total No. of Questions : 10]

P4427

SEAT No. :

[Total No. of Pages : 2

[4859] - 1104

B.E. (Instrumentation & Control) (Semester - I)
FAULT DETECTION AND DIAGNOSIS (Elective - II)
(2012 Pattern)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answers should be written in same answer book.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*
- 4) *Use of electronic pocket calculator is allowed.*

Q1) a) Which are the different approaches in fault diagnosis. **[5]**

b) Explain the various tasks implemented in fault diagnosis. **[5]**

OR

Q2) a) Explain in brief the faults occurred with examples. **[5]**

b) Explain in brief the different issues in fault detection. **[5]**

Q3) a) Explain the role of additive mathematical modeling in fault analysis. **[5]**

b) Explain in brief the stability analysis in fault analysis. **[5]**

OR

Q4) a) Write a short note on bath tub curve. **[5]**

b) Explain the reliability function. **[5]**

Q5) a) Write a short note on residual structure. **[8]**

b) Explain the parity equation. **[8]**

OR

Q6) a) Explain with diagram the canonical structure. **[8]**

b) Explain how the parity equation is implemented. **[8]**

Q7) a) Which are the different faults? Explain any one in detail. **[10]**

b) Write a short note on linearly dependent column. **[6]**

P.T.O.

OR

- Q8)** a) Explain with example the exhaustive tests. [8]
b) Explain in detail pseudorandom tests. [8]

- Q9)** a) Enlist the modern strategies in FDD. Explain any one with example. [10]
b) Explain the application of fuzzy logic in FDD. [8]

OR

- Q10)** a) Write a short note on statistical testing of residual generators. [10]
b) Explain the application of neural networks in FDD. [8]



Total No. of Questions : 11]

SEAT No. :

P1889

[4859]-1105

[Total No. of Pages : 3

B.E. (Automobile)

AUTOMOTIVE REFRIGERATION AND AIR CONDITIONING

(2012 Course) (Semester - I)

Time : $2\frac{1}{2}$ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Figures to the right side indicate full marks.*
- 2) *Use of steam tables, slide rule, electronic calculator, and psychrometric chart is allowed.*
- 3) *Assume suitable data if necessary.*
- 4) *Solve 6 questions 1 or 2,3 or 4,5 or 6,7 or 8,9 or 10,& 11 is compulsory.*

Q1) a) Compare VCC with VAC [4]

b) A refrigerator using carnot cycle require 1.25 kW per tonne of refrigeration to maintain a temp of -30°C. Find

i) COP

ii) Temp at heat rejected & heat rejected per tonne of refrigeration. [4]

OR

Q2) a) Calculate CoP, mass flow of refrigerant and compressor input in kW for following system parameter.

i) Refrigerant R22, condensing temp 40°C and evaporating temp is 0°C

ii) Temp of refrigerant entering the compressor is 5°C leaving the compressor is 60°C and leaving the condenser is 30°C respectively

iii) Heat rejection in condenser is 200 kW. [6]

b) Applications of refrigeration and air conditioning. [2]

Q3) Explain environmental concerns/Legislation for automotive A/C systems. [6]

OR

Q4) Explain various components of air conditioning system. [6]

P.T.O.

Q5) What are various ducts? Which is mostly use in A/C system? Why? [6]

OR

Q6) Enlist various air distribution modes and explain any one of them. [6]

Q7) a) Define following properties. [8]

- i) DBT
- ii) WBT
- iii) Relative humidity
- iv) Dew point temp

b) Calculate all psychrometric properties of moist air at 36°C and 20°C WBT without using psychrometric chart. [8]

OR

Q8) a) Short note on Bypass factor of coil & sensible heat factor [8]

b) Humidity ratio of atmospheric air at 28°C dry bulb temp and 760 mm of Hg is 0.016 kg/kg of dry air calculate. [8]

- i) Partial pressure of water vapour
- ii) Relative Humidity
- iii) Dew point temp
- iv) Sp enthalpy

Q9) a) A vehicle cabin is to be maintained at 24°C DBT & 60% RH under following condition: Outdoor conditions = 38°C DBT and 28°C WBT
Sensible heat load in cabin = 46.4 kW latent heat load in cabin = 11.6 kW
total infiltration air = 1200 m³/hr Apparatus Dew point Temperature = 10°C
Quantity of air from the cabin = 60%. If the quantity of recirculated air is mixed with the conditioned air after cooling coil. Find following:

- i) the condition of air recirculated air
- ii) the condition of air before entering the cabin
- iii) The mass of air entering the cabin
- iv) The mass of total air passing through the cabin
- v) By pass factor of cooling coil
- vi) The refrigeration load on the coil in TR [12]

b) Write note on effect of air conditioning load on engine performance. [4]

OR

Q10) a) In an ambulance AC system all outside air is supplied as per medical requirement following data is noted **[12]**

Outside design condition 38°C DBT and 27°C WBT

Inside design condition 24°C DBT and 50% RH

Room sensible heat load 25 kW

Room latent heat load 3 kW

By pass factor of coil 0.01

Ventilation requirement 30 cmm

Find

- i) Apparatus Dew point
- ii) Dehumidifier air quantity
- iii) Condition of air enter & leaving coil
- iv) Capacity of cooling coil.

b) Write note on **[4]**

- i) Sensors and actuators
- ii) Pressure switching devices.

Q11) Write note on any three: **[18]**

- i) Leak detection and detectors
- ii) Refrigerant recovery; recycle and charging
- iii) Initial vehicle inspection
- iv) Odor removal & retrofitting
- v) Refrigerant recovery; recycle and charging



Total No. of Questions : 9]

SEAT No. :

P1890

[4859]-1106

[Total No. of Pages : 2

B.E. (Automobile)

AUTOMOTIVE CHASSIS AND SYSTEMS

(2012 Course) (Semester-I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

Q1) What do you mean by steering geometry? Explain the procedure for checking front wheel geometry. **[8]**

Q2) a) What is hydro-elastic suspension system? **[4]**

b) Explain stabilizer bar suspension. **[2]**

Q3) Explain different types of tyre wear and also causes of tyre wear. **[6]**

Q4) a) Write the function and requirements of braking systems. Enlist different types of brakes and explain any one. **[10]**

b) Explain with the help of neat sketch hydraulic braking system. **[8]**

OR

Q5) a) Explain regenerative braking system with simple layout. **[8]**

b) What is drum brake? Explain the construction of drum brake. **[6]**

c) What are different brake friction materials. Explain in details. **[4]**

Q6) a) Draw the simple layout of ESP system. Explain its operation. **[8]**

b) What is role of safety system in Automobile and requirements of safety systems? **[8]**

OR

P.T.O.

Q7) a) Explain active safety and passive safety. Also enlist types of active and passive safety. [8]

b) What are the latest trends in traffic system for improve road safety. [8]

Q8) a) Draw the simple lay out of vehicle chassis and show the location of all the components. [8]

b) What are the different causes of chassis failure. Explain in details. [8]

OR

Q9) a) Explain the manufacturing processes for vehicle chassis. [8]

b) What are the different types of disc brake and explain any one in details. [8]



Total No. of Questions : 10]

SEAT No. :

P1998

[Total No. of Pages : 3

[4859] - 1107

B.E. (Automobile Engg.)

MACHINE AND VEHICLE DYNAMICS

(2012 Pattern) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :-

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

Q1) a) Explain in brief about partial Balancing. [6]

b) Explain the terms: [4]

i) Coefficient of damping

ii) Critical coefficient damping

OR

Q2) a) Explain direct-reverse crank method in brief. [6]

b) Write a short note on viscous damping. [4]

Q3) a) Completely balanced rotating machine have four masses 50, 30, 20, 40kg with radius 0.1m, 0.1m, 0.2m & 0.2m respectively at distance 1m from each other. Draw force & couple polygon. [6]

b) Define logarithmic decreament. [4]

P.T.O.

OR

Q4) a) In spring mass damper system $m = 10\text{kg}$, $k = 16\text{kN/m}$ & $C = 1600\text{ N-s/m}$. The mass is displaced 0.1m & released with velocity of 2 m/s in the return motion find, [6]

- i) Circular frequency
- ii) Damping factor
- iii) Displacement after $1/100\text{ sec}$.

b) Why balancing is necessary. [4]

Q5) a) Explain with neat sketch, Dynamic axial load. [10]

b) What will be the impact of vehicle performance if clutch is replaced by torque convertor. [6]

OR

Q6) a) Enlist various forces on vehicle in running state & explain Draw bar pull. [10]

b) What are different co-ord. Systems used in vehicle dynamics. [6]

Q7) a) Following Data is obtain from vehicle test.

Engine inertia : 0.8 kg-m-s^2

RPM/Torque (N - M):

RPM	Torque	RPM	Torque
800	120	3200	190
1200	132	3600	198
1600	145	4000	200
2000	160	4400	201
2400	175	4800	198
2800	181	5200	180

Transmission Data:

Gear	1	2	3	4	5
Inertia	1.3	0.9	0.7	0.5	0.3
Ratio	4.28	2.79	1.83	1.36	1.00
η	0.966	0.967	0.972	0.973	0.970

Final Drive: Inertia: 1:2 Ratio : 2.92 $\eta = 0.99$

Wheel size (radius) : 12.59 inch

Calculate effective inertia for each gear. [10]

b) Explain ABs in brief. [8]

OR

Q8) a) Consider a truck with weight 3000 kg. braking from 100 km speed on level surface which develop brake force of 1000 N. Find out. [10]

- i) Deacceleration
- ii) Stopping Distance
- iii) Time to stop vehicle
- iv) Power Absorbed during Braking

b) Write a short note on differential. [8]

Q9) a) Write a short note on active-semiactive suspension. [8]

b) Explain in brief neutral steer, over steer & understeer. [8]

OR

Q10)a) How ride will affect vehicle performance? [8]

b) Explain tyre nomenclature & its impact on vehicle handling. [8]

XXXX

Total No. of Questions : 10]

SEAT No. :

P1975

[Total No. of Pages : 2

[4859]-1108

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

FUNDAMENTALS OF COMPUTATIONAL FLUID DYNAMICS

(2012 Pattern) (End Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data if necessary.*
- 4) *Use of scientific calculator is allowed.*

- Q1)** a) What two applications of CFD are being used in power generation industry? What kind of data is collected and how this is useful in increasing efficiency in power generation? [6]
- b) What is the future of CFD? [4]

OR

- Q2)** a) Write the equation that defines substantial derivative for the transport of temperature in terms of the local acceleration derivative and the advection derivative of the temperature. [6]
- b) Obtain the general analytical solution for Laplace equation for one dimensional case. [4]

- Q3)** a) Which of the following: forward difference, backward difference, and central difference is most accurate and why? [6]
- b) What is control volume method? [4]

OR

- Q4)** a) What are various boundary conditions in FVM? Explain with example. [6]
- b) Differentiate explicit and implicit method. [4]

- Q5)** a) Solve the following system of equations by Gauss-Siedel method: [10]
- $$2x+4y+6z=22$$
- $$3x+8y+5z=27$$
- $$-x+y+2z=2$$
- b) Write a note on Stability Criteria. [6]

OR

P.T.O.

- Q6) a)** A bar having temperature on the left hand boundary is taken to be 100° C and right hand side boundary is insulated so the heat flux across it is 0. The heat is lost to surrounding by convective heat transfer. Solve the matrix equation for the matrix given below by TDMA. **[10]**

$$\begin{bmatrix} 20 & -5 & 0 & 0 & 0 \\ -5 & 15 & -5 & 0 & 0 \\ 0 & -5 & 15 & -5 & 0 \\ 0 & 0 & -5 & 15 & -5 \\ 0 & 0 & 0 & -5 & 10 \end{bmatrix} \begin{bmatrix} Q_1 \\ Q_2 \\ Q_3 \\ Q_4 \\ Q_5 \end{bmatrix} = \begin{bmatrix} 1100 \\ 100 \\ 100 \\ 100 \\ 100 \end{bmatrix}$$

- b) Explain Navier-Stoke's equation for incompressible flow using SIMPLE algorithms. **[6]**

- Q7) a)** Derive the 2D convection diffusion equation with suitable application. **[8]**

- b) Write a short note on : **[8]**

- i) Upwind differencing scheme
- ii) Central differencing scheme

OR

- Q8) a)** What is predictor corrector method of finite volume method? **[8]**

- b) Write an algorithm for PISO. **[8]**

- Q9)** Write a short note on (any 3) : **[18]**

- a) Discretization in CFD
- b) Preprocessor, Solver and Postprocessor
- c) Inlet and outlet boundary condition
- d) Introduction to turbulence models

OR

- Q10)** Write a short note on (any three) : **[18]**

- a) Different types of three dimensional meshing
- b) Practical guidelines for CFD simulation processes
- c) Enlist CFD software's and steps involved for solving problem
- d) k-e method



Total No. of Questions : 08]

SEAT No. :

P1891

[4859]-1109

[Total No. of Pages :5

B.E. (Automobile Engineering)

FUNDAMENTALS OF FINITE ELEMENT ANALYSIS

(Semester-I) (2012 Course) (Elective-I) (416491 B) (End Sem)

Time : 2 1/2 Hours]

[Max. Marks : 70

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.*
- 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.*

Q1) a) Describe in detail the steps involved in solving structural problem. [6]

b) Determine the nodal displacement and stresses in each element as shown in figure 1.1. Consider the force $P=400$ KN. [8]

Given: $A_1=2400$ mm²

$A_2=1200$ mm²

$L_1=300$ mm

$L_2=400$ mm

$E_1=0.7 \times 10^5$ N/mm²

$E_2= 2 \times 10^5$ N/mm²

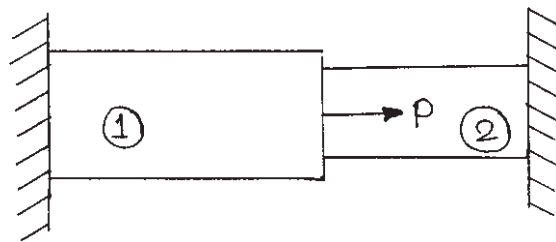


Figure 1.1

c) Using area coordinate derive the shape function for CST element. [6]

OR

P.T.O.

- Q2) a) Describe in detail the concept of Cholesky's decomposition, and banded skyline solutions to solve the simultaneous equations in matrix form. [6]
- b) Determine the extension of the bar as shown in figure 2.1. Consider two elements and $E=2 \times 10^5 \text{ N/mm}^2$. [8]

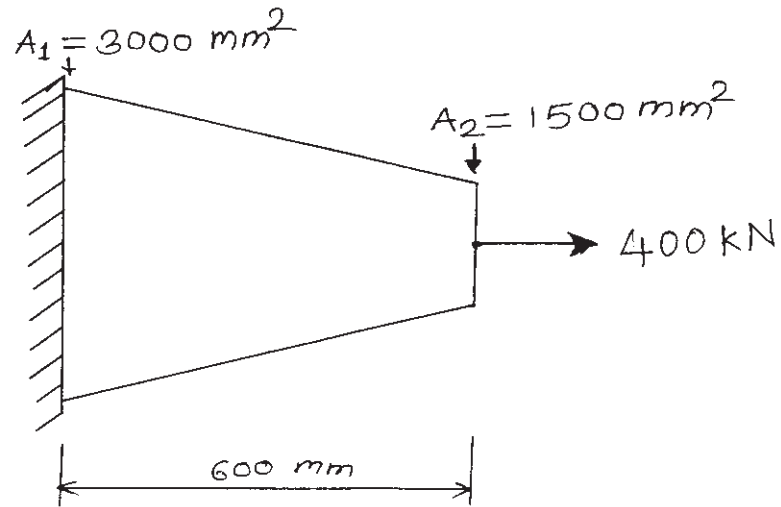


Figure 2.1

- c) Evaluate the shape function N_1 , N_2 & N_3 at the interior point P for triangular element shown in figure 2.2. [6]

Point	X Coordinate	Y Coordinate
1	1.5	2
2	7	3.5
3	4	7
P	3.85	4.8

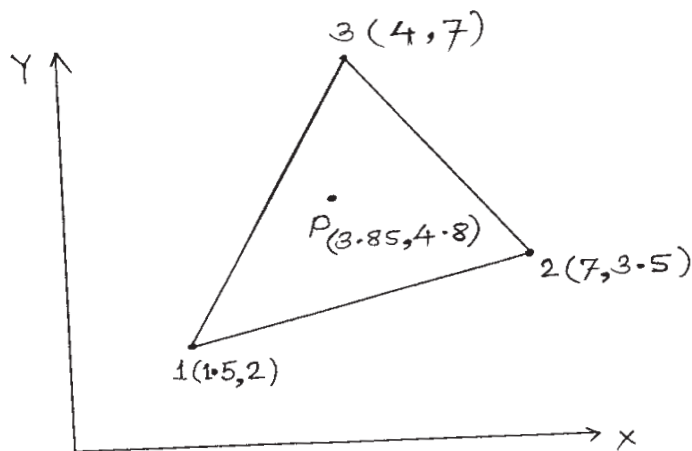


Figure 2.2

Q3) a) Write a short note (Any two): [8]

- i) Jacobian matrix
- ii) Submodeling
- iii) Isoparametric Element

b) Evaluate the integrals using two point Gaussian quadrature.(5 marks each).[10]

i) $I = \int_{-1}^1 (3^x - x) dx$

ii) $I = \int_3^5 \frac{1}{x} dx$

OR

Q4) a) Derive shape function for 8 noded rectangular serendipity element. [8]

b) The iso-parametric shape functions for CST element as shown in figure 4.1 are given as $N_1 = \zeta$, $N_2 = \eta$, and $N_3 = 1 - \zeta - \eta$. Evaluate shape functions at interior point P. Also, if temperatures at node 1,2 and 3 are 25° , 30° , and 50° respectively, evaluation the temperature at the interior point P.[10]

Point	X Coordinate	Y Coordinate
1	2	2
2	5	3
3	3	10
P	3	6

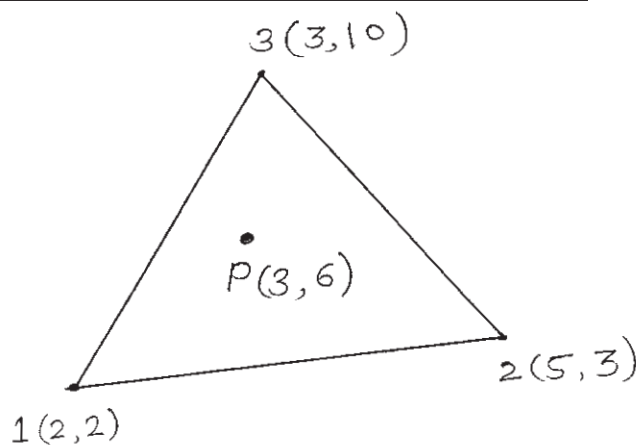


Figure 4.1

- Q5) a) Derive elements stiffness matrix formulation for one dimensional steady state Heat Conduction problems. [8]
- b) A composite wall consists of three materials as shown in figure 5.1. The outer temperature in $T_0=20^\circ\text{C}$. Convection heat transfer takes place on the inner surface of the wall with $T_\infty=800^\circ\text{C}$ and $h=25\text{ W/m}^2\cdot^\circ\text{C}$. Determine the temperature distribution in the wall. [8]

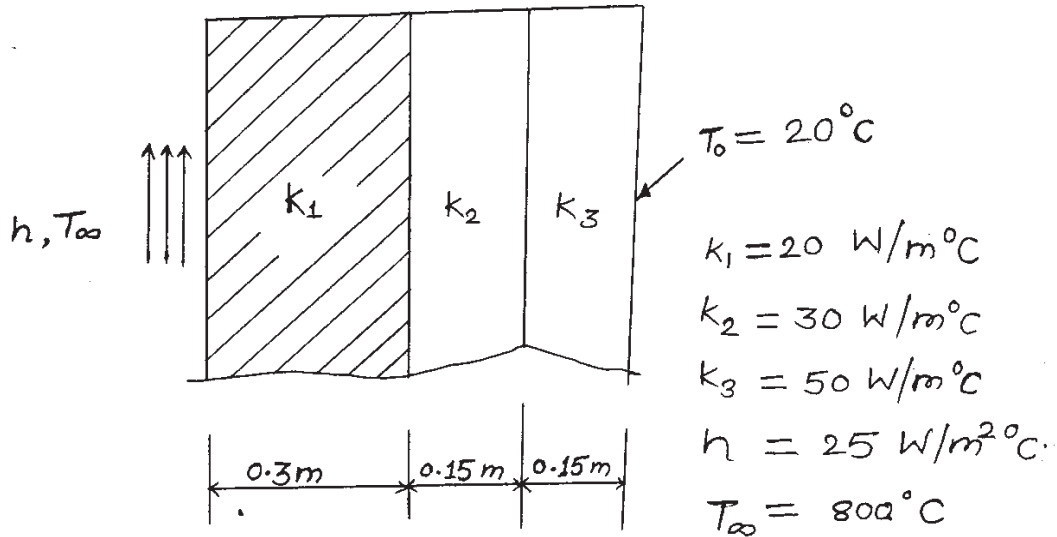


Figure 5.1

OR

- Q6) The fin shown in figure 6.1 is insulated on the perimeter. The left end has a constant temperature of 100°C . A positive heat flux of $q=5000\text{ W/m}^2$. Acts on the right end. Let $K_{xx}=6\text{ W/(m}^\circ\text{C)}$ and cross sectional area $A=0.1\text{ m}^2$. Determine the temperatures at $L/4$, $L/2$, $3L/4$, and L where $L=0.4\text{ m}$. [16]

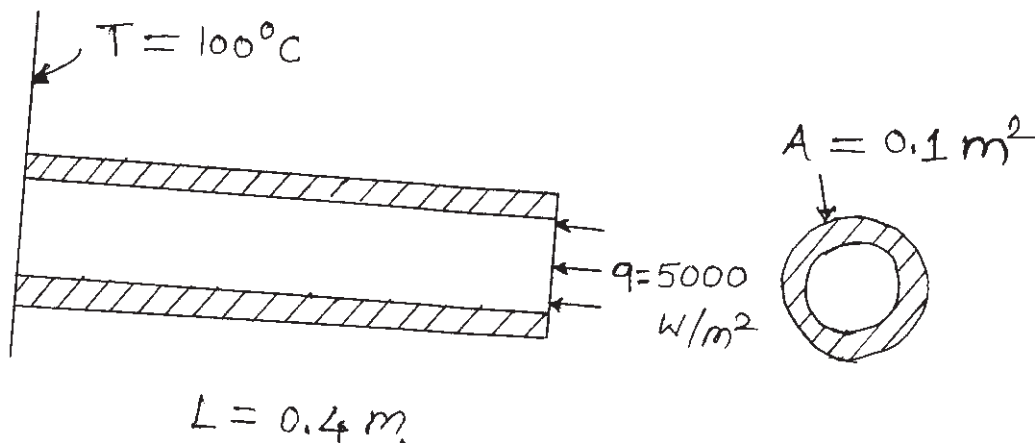


Figure 6.1

- Q7) a)** Explain the difference between lumped mass matrix and consistent mass matrix. [8]
- b)** For bar element shown in figure 7.1 with length $L=2.5$ m, $E=210$ GPa, $\rho = 7850$ kg/m³. Determine the first two natural frequencies by using lumped mass Matrix. Consider two elements. [8]

$$\text{Lumped Mass Matrix } [m^e] = \frac{\rho A l}{2} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

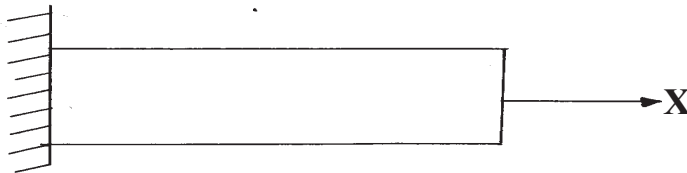


Figure 7.1

OR

- Q8) a)** Types of error in FEA & explain mesh refinement used in adaptive mesh refinement process. [8]
- b)** Obtain the first non-zero natural frequency using consistence mass matrix of vibration for a uniform rod by FEM with two elements. Consider $L=2$ m, $E=200$ GPa, $\rho = 7850$ kg/m³ [8]

$$\text{Consistence Mass Matrix } [m^e] = \frac{\rho A l}{6} \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$$



Total No. of Questions : 10]

SEAT No. :

P3663

[Total No. of Pages : 4

[4859] - 1110

B.E (Automobile)

CAE & Automation

(2012 Pattern) (Elective - I) (End - Sem)

Time : 2 ½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) The end points for line L_1 are $P_1 (-2,3,5)$ and $P_2 (4,6,-2)$. The end points for line L_2 are $P_3 (-5,8,9)$ and $P_4 (1,11,2)$, Find. **[6]**

- i) Parametric eqⁿ of the lines
 - ii) Are the two lines parallel or perpendicular?
 - iii) The co - ordinates of the point of intersection, if any
- b) Write a short note on transformation matrix for Isometric projections. **[4]**

OR

Q2) a) A triangle PQR with vertices P (2,5), Q (6,7) and R (2,7) is to be reflected about a line $2y = x + 6$ Determine: **[6]**

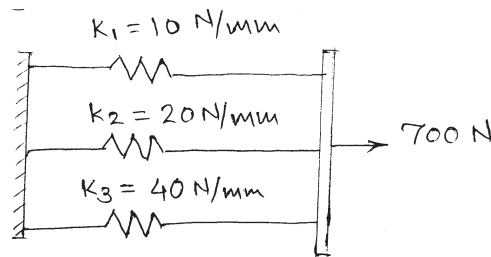
- i) Concatenated matrix
 - ii) The Co - ordinates of the matrices for the reflected triangle.
- b) Explain constructive solid geometry in detail. **[4]**

Q3) a) What is inverse transformation matrix? Obtain the inverse transformation matrices for the following operation:

- i) Translation
- ii) Rotation
- iii) Scaling **[4]**

P.T.O

- b) Fig. shows three springs having stiffness 10,20 and 40 N/mm, connected in parallel. One end of Assembly is fixed and a force of 700N is applied at the other end. Using finite Element Method determine the deflection of individual springs. [6]

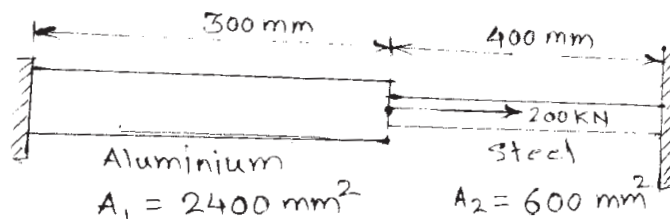


OR

- Q4) A stepped bimetallic bar made of Aluminium ($E = 70 \times 10^3 \text{ N/mm}^2$) and steel ($200 \times 10^3 \text{ N/mm}^2$) is subjected to an axial load of 200KN, as shown in fig. using the finite element method.

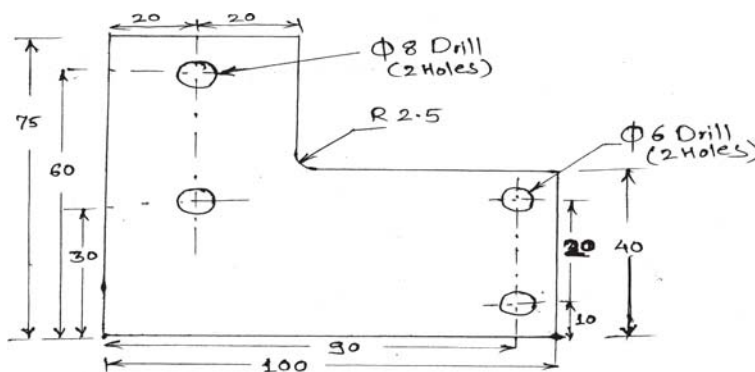
Determine:

- i) Nodal displacement
- ii) Stresses in each material
- iii) Reaction forces at the support.



[10]

- Q5) a) Write a manual part program for drilling and milling an L - Bracket as shown in fig. Assume a 5 mm diameter milling cutter. Feed rate 480 mm/min. and necessary drill sizes for drilling with a spindle speed of 1600 rpm. The tool position in the z direction is manually controlled.

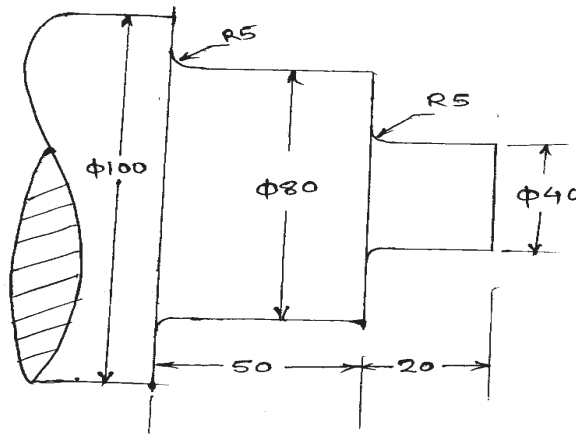


[12]

- b) What are the two types of Adaptive control? Describe with neat sketch. [6]

OR

- Q6) a) Write a manual part program for machining the components shown in figure. Use roughing and finishing cycles for part programming assume spindle speed as 200 rpm and feed rate 0.5 mm/rev



[12]

- b) What are the steps involved in Integration of CAD, NC and CAM. [6]

- Q7) a) Following table shows the operations required for the different parts of a product.

Part	1	2	3	4	5	6
Operations required	1,3,5	2,4	6,7	2,4	1,5	6,7

Prepare the incidence matrix and group the parts with respect to operations required. (Using clustering method). [8]

- b) What is ASRS? Explain with neat sketch. [8]

OR

- Q8) a) What is FMS? Describe various layouts of FMS. [8]

- b) Explain Geneva Mechanism with neat sketch & state its application. [8]

- Q9)** a) What is Robot? Explain different joints used in robot with neat sketch. **[8]**
- b) Compare electric, Hydraulic & Pneumatic actuator on the basis of
- i) Pay load capacity
 - ii) Accuracy & Precision
 - iii) Ease of control
 - iv) Compactness **[8]**

OR

- Q10)**a) Explain different types of drives used in robot. **[8]**
- b) Write short note on. **[8]**
- i) Cartesian configuration robot.
 - ii) Cylindrical configuration robot.



Total No. of Questions : 10]

SEAT No. :

P1999

[Total No. of Pages : 3

[4859] - 1111

**B.E.(Automobile) (Semester - I)
HYBRID AND FUEL CELL VEHICLE
(Elective - II(a)) (2012 Pattern) (End Sem)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :-

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, electronic pocket Calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) What are the components of an electric vehicle? Give advantages and disadvantages of electric vehicles. **[5]**

b) Explain the construction and working of AC synchronous motor. **[5]**

OR

Q2) a) Explain the construction and working of AC induction motor with neat sketch. **[5]**

b) Explain the configuration and operating modes of parallel mild hybrid electric drive train with their layout. **[5]**

Q3) a) Explain combined hybrid configuration with neat sketch. **[5]**

b) Draw and explain ideal performance characteristics for a vehicle traction power plant and typical performance characteristics of electric motors for traction. **[5]**

P.T.O.

OR

- Q4)** a) Explain grid connected hybrid vehicles. [5]
b) Differentiate between series hybrid and parallel hybrid configurations. [5]

- Q5)** a) Explain charging and discharging of Lead Acid Battery with its chemical reaction. [8]
b) Write a short note on: [8]
i) Battery Ratings
ii) Battery Capacities

OR

- Q6)** a) Enlist the different types of battery failures. Explain each one in detail. [8]
b) Write a short note on: [8]
i) Battery Performance
ii) Battery Efficiency

- Q7)** a) With neat sketch explain Proton Exchange Membrane (PEM) fuel cell. [9]
b) Explain Solid Oxide fuel cell with neat sketch. [9]

OR

- Q8)** a) With neat sketch explain molten carbonate fuel cell. [9]
b) Explain fuel cell electric vehicle with neat layout? Also give the advantages of the same. [9]

Q9) a) With the help of neat sketch explain the ultra high speed flywheel as an energy storage device. [8]

b) Enlist the types of accumulators? Explain gas loaded accumulator with neat sketch. [8]

OR

Q10)a) With neat sketch explain the working of vane pump. [8]

b) A hydraulic motor operating at 75 bar pressure, has a volumetric displacement of $175 \text{ cm}^3/\text{rev}$. The motor runs at 2000rpm to deliver a torque of 175 N.m, while using a flow rate of 375 lpm. Determine the volumetric, mechanical and overall efficiencies. Also determine the actual power delivered by the motor. [8]

xxxx

Total No. of Questions :10]

SEAT No. :

P1892

[4859]-1112

[Total No. of Pages :2

B.E. (Automobile)

AUTOMOTIVE MATERIALS

(2012 Pattern) (End- Sem) (Semester - I) (416492 B) (Elective - II)

Time :2 hrs 30 min]

[Max. Marks :70

Instructions to the candidates:

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Assume suitable data, if necessary.*
- 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.*

- Q1)** a) Explain the selection criteria for shape factor, elastic-extrusion in detail with application. **[5]**
- b) Draw material property chart for modulus fracture & explain in detail.**[5]**

OR

- Q2)** a) Explain significance of material property chart and its application for material selection. **[5]**
- b) Explain selection criteria for bending and twisting with its application in automobile. **[5]**
- Q3)** a) What are the characteristics of composite materials? Explain in brief.**[5]**
- b) Explain the different types of plastics & their applications. **[5]**

OR

- Q4)** a) What are the characteristics of ceramic materials? **[5]**
- b) Give applications of ceramics in automobile. **[5]**
- Q5)** a) Explain Thermal spraying in detail and also write the advantages and disadvantages. **[8]**
- b) Write the names of different methods of mechanical surface treatment & explain any one in detail. **[8]**

OR

P.T.O.

Q6) a) Explain diamond coating with neat sketch & also write the advantages & disadvantages of it. [8]

b) Describe in detail conversion coating with its applications. [8]

Q7) a) Write the advantages & disadvantages of dual phase steel with applications. [8]

b) Explain the applications of smart materials in automobiles & its advantages. [8]

OR

Q8) a) Explain the modern material - metallic glass with advantages and applications for automotive purpose. [8]

b) Explain the composition of Nano-crystalline material & write advantages & application of it. [8]

Q9) a) Explain the material selection criteria for cylinder block and justify the answer. [9]

b) Write the application of non-metallic material polymer for automotive purpose. [9]

OR

Q10) a) What is the selection criteria for the cylinder head material & justify your answer. [9]

b) Write the advantages, disadvantages & applications of composite material in automobile. [9]

EEE

B.E. (Automobile) (Semester - I)
AUTOMOTIVE HYDRAULICS & PNEUMATICS
(2012 Pattern) (Elective - II (C)) (End Sem.)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer five questions.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.

- Q1)** a) What are the effects of temperature & pressure on hydraulic fluids. Explain in details? [6]
 b) Draw and explain quick acting coupling. [4]

OR

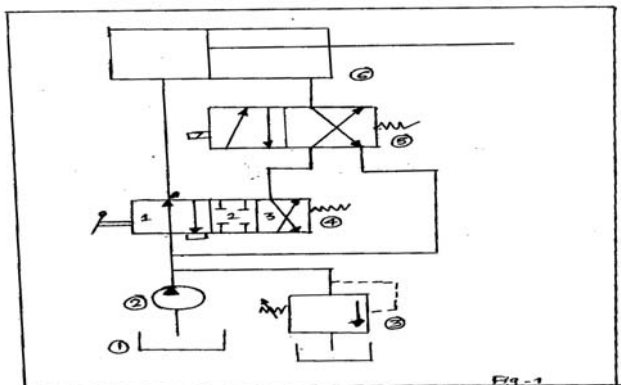
- Q2)** a) Describe the construction of hoses with a diagram & Explain function of each element. [6]
 b) Differentiate between positive & Non-Positive displacement pump [4]

- Q3)** a) What is mean by burst pressure & working pressure. [2]
 b) Discuss Hydraulic cylinder cushioning with neat sketch. [8]

OR

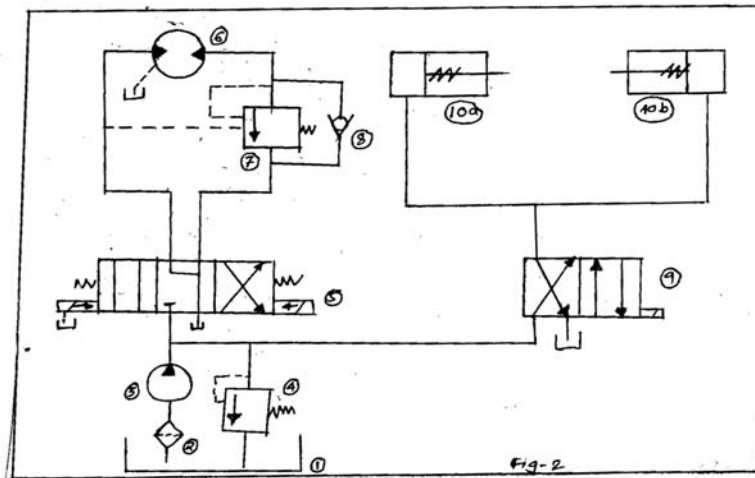
- Q4)** a) Draw symbol of compressor & variable. capacity hydraulic pump. [2]
 b) Classify DCV & Explain with neat sketch of shuttle valve. [8]

- Q5)** a) Explain a circuit for Automatic cylinder Reciprocating of double acting cylinder using solenoid Actuation. [8]
 b) Analyze the given Hydraulic circuit. [8]



OR

- Q6) a) Explain the Hydraulic clamping circuit using pressure sequencing valve. [8]
b) Analyse the circuit. [8]



- Q7) a) Write short note on 'lubrications mufflers and dryers' for pneumatics system. [8]
b) A hydraulic system consists of Two cylinders required to be operate as per following sequences. [8]
i) Cylinder A Extends ii) Cylinder B Extends
iii) Cylinder A Retracts iv) Cylinder B Retracts
Develop Pneumatics circuits using pilot operated 4/2 DCV and roller operated valve

OR

- Q8) a) Write short note on (any two) [8]
i) Solenoid operated DCV
ii) Sequence valve
iii) Unloading valve
b) Explain selection criteria for compressor. [8]

- Q9) a) Discuss in details the application of Hydraulic accumulator (Piston type) [8]
b) Draw and explain power steering circuit use in automotive. [10]

OR

- Q10) a) Discuss in details the application of Hydraulic accumulator as a Hydraulic shock absorber. [8]
b) Draw and explain pneumatic circuit for door operation in vehicle. [10]

RRRR

Total No. of Questions : 12]

SEAT No. :

P2000

[Total No. of Pages : 3

[4859] - 1114

**B.E.(Mechanical Sandwich) (Semester - I)
AUTOMOBILE ENGINEERING (Self Study - III)
(2012 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 side indicate full marks.*
- 4) Use of Calculator is allowed.*
- 5) Assume suitable data, if necessary.*

SECTION - I

- Q1) a)** Name and draw the various types of drives used in automobile. Discuss the relative advantages and disadvantages of each drive over other.[10]
- b) Explain with neat sketch Hotchkiss drive. [6]

OR

- Q2) a)** Explain with neat sketch semi-floating type, full-floating type rear axle. [10]
- b) Compare merits and demerits of the frameless construction with those of conventional framed construction. [6]

- Q3) a)** Explain with neat sketch constructional details of torque converter.[8]
- b) Explain construction of tubeless tyre with neat sketch. [8]

P.T.O.

OR

Q4) a) What is the necessity of gearbox at all in the automobile when the engine speed can be varied by means of an accelerator? Explain. [8]

b) Describe with neat sketch construction of alloy wheel. [8]

Q5) a) Explain following terminologies related to steering. [10]

i) Caster

ii) Camber

iii) King pin inclination

iv) Toe in and toe out

v) Scrub radius

b) Draw the layout of air suspension system and explain its working principle. [8]

OR

Q6) a) Explain with neat sketch construction and working of power steering used in modern automobiles. [10]

b) Explain with neat sketch master cylinder used in hydraulic brakes. [8]

SECTION - II

Q7) a) Explain what do you understand by active safety and passive safety system in automobile. What are the components of it? [8]

b) Explain any four types of sensors used in today's automobile. [8]

OR

- Q8) a) Write short note on [6]**
- i) Crashworthiness structure
 - ii) AIS regulations
- b) Why electronic engine control is implemented in modern automobile? Explain. [4]
- c) What is meant by electronic engine control system? Explain with block diagram. [6]

- Q9) a) Explain the following tests carried out for vehicle. [10]**
- i) Crash test
 - ii) Emission test
- b) Why stability of vehicle is important? Justify. [6]

OR

- Q10)a) How performance of vehicle can be improved? What are various vehicle Performance parameters? Explain. [10]**
- b) Describe various types of road test tracks for testing of vehicles. [6]
- Q11)a) How tractors are specified? Explain light and medium duty tractors.[8]**
- b) Draw and explain various types of multi-axle vehicle layout [10]

OR

- Q12)a) Explain constructional details of transport vehicle. [8]**
- b) Draw and explain layout of tanker and dumper. [10]

XXXX

Total No. of Questions : 12]

SEAT No. :

P4426

[Total No. of Pages : 3

[4859]-1115

**B.E. (Mechanical Sandwich)
Power Plant Engineering
(2012 Pattern) (Self Study - IV)**

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer any three from section 1 and 2.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables slide rule. mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) A steam turbine receives steam at 15 bar and 350°C and exhaust to condenser at 0.06 bar .Determine the thermal efficiency .Specific steam consumption and work ratio of ideal Rankine cycle [8]
- b) Explain the device which is used to find calorific value of liquid fuel. [8]

OR

- Q2)** a) A steam turbine receives steam at 20 bar and 400°C and exhaust to condenser at 0.06 bar. Determine the thermal efficiency , Specific steam consumption and work ratio of ideal Rankine cycle. [8]
- b) Explain the Boys gas calorimeter to find calorific value of gaseous fuel.[8]

- Q3)** a) What are the features of high pressure boilers. [4]
- b) Explain with neat sketch Benson boiler. What are the advantages of Benson boiler. [8]
- c) Explain the concept of fluidized bed combustion. [5]

OR

P.T.O.

- Q4)** a) Explain with neat sketch Velox boiler. What are the advantages of Velox boiler. [8]
b) Explain various methods of treatment of feed water. [5]
c) Compare induced draught and forced draught system. [4]

- Q5)** a) Discuss the parameters on which the selection of site for hydraulic power plant depend. [6]
b) Give comparison of hydraulic turbine. [6]
c) What do you mean by spillway? What are various types? [5]

OR

- Q6)** a) Explain with neat sketch pumped storage plant. [6]
b) On what basis you will select Francis, Pelton and Kaplan turbine for particular site. [6]
c) What do you mean by draft tube? What are the various types of draft tube? [5]

SECTION - II

- Q7)** a) Explain with neat sketch BWR power plant. [6]
b) What do you mean by radioactive decays and radioisotopes. [6]
c) What is heat rate and incremental heat rate. [5]

OR

- Q8)** a) Differentiate between PWR and BWR. [6]
b) Discuss various factors while selecting a site for nuclear power plant. [6]
c) Differentiate between uncontrolled and controlled chain reaction. [5]

- Q9)** a) Give the classification of gas turbines. [6]
b) Compare open cycle and closed cycle gas turbines. [6]
c) What are the relative merits and demerits of tidal power plant. [5]

OR

- Q10)a)** What is regeneration? How it improves efficiency of open cycle gas turbine plant. [6]
- b) Explain fuel cell power plant. [6]
- c) What are the limitations solar thermal, and wind power plant. [5]

- Q11)a)** Explain what you understand by base load and peaking load. Why are base load plants loaded heavily? [6]
- b) Explain the effect of load factor on the cost of electricity generated. [4]
- c) What do you understand by depreciation? How is the depreciation rate determined? [6]

OR

- Q12)a)** Explain the following.
- i) Demand factor
- ii) Average load
- iii) Diversity factor [6]
- b) How is load duration curve constructed. [4]
- c) A 2000 MW thermal power station supplied power to a system having maximum and minimum demand of 1900 MW and 1200 MW respectively in a year. By assuming load duration curve to be straight line over year, calculate i) Load factor ii) Capacity factor iii) Reserve factor. [6]

