

Total No. of Questions : 10]

SEAT No. :

P3520

[4959]-1001

[Total No. of Pages : 2

B.E. (CIVIL)

ENVIRONMENTAL ENGINEERING - II

(2012 Course) (Semester - I) (401001)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) State the procedure for DO fixation and hence explain the necessity of DO fixation during determination of DO in water. [5]
- b) Find min velocity and gradient required to carry coarse sand particles of size 1.5 mm and specific gravity 2.65 through a sewer of diameter 0.9m. Assume constants $\beta = 0.04$, $f = 0.03$ and $N = 0.013$. The sewer may be assumed to run half full. [5]

OR

- Q2)** a) Write Streeter-Phelps equation and explain the meaning each term involved in it. [5]
- b) Write a short note on pumping of sewage. [5]
- Q3)** a) Design a bar screen for a peak flow of 25 MLD. [5]
- b) What do you understand by trickling filter? Explain in detail with a neat sketch and biological processes involved in it. [5]

OR

- Q4)** a) Explain the purpose of providing grit chamber and give design criteria for grit chamber. [5]
- b) Explain terms with respect to activated sludge process. [5]
- i) HRT.
 - ii) SRT.
 - iii) MCRT.
 - iv) F/M Ratio.

P.T.O.

Q5) a) Explain with a neat sketch, the constructional features of a facultative stabilisation pond. [8]

Discuss the phytoremediation technology for waste water treatment.

b) Explain the principle of working of aerated lagoon. Also state the merits and demerits over aerated lagoon. [8]

OR

Q6) a) Differentiate between oxidation pond and aerated lagoon, with reference to HRT, organic loading method of aeration and operation cost. [8]

b) Explain root zone cleaning system for wastewater treatment. [8]

Q7) a) What do you understand by digestion of sludge? Differentiate between anaerobic and aerobic digestion. [8]

b) Write short note sludge drying bed. [8]

OR

Q8) a) What do you understand by sludge thickening? Enumerate various methods. Describe with the help of sketch gravity sludge thickener. [8]

b) Write short note on UASB process for waste water treatment. [8]

Q9) Give the range of important characteristics of waste water from following industry and draw a suitable flow diagram for treatment for each industry. [18]

a) Sugar industry.

b) Dairy industry.

c) Distillery industry.

OR

Q10)a) Write short note on. [9]

i) Equalization.

ii) Neutralization.

b) Discuss in brief various treatment processes adopted for treating industrial waste water. [9]



Total No. of Questions :10]

SEAT No. :

P3653

[4959]-1002

[Total No. of Pages :3

B.E. Civil

Transportation Engineering

(2012 Course) (Semester - I)

Time : 2.5 Hours

[Max. Marks :70]

Instructions to the candidates:

- 1) *Answer Q1 or Q2 Q3 or Q4 and Q5 or Q6 Q7 or Q8 Q9 or Q10.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables slide rule, Mollies charts, electronics pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*
- 6) *Neat diagrams must be drawn wherever necessary.*

- Q1)** a) Explain how master plan is prepared and the road development plan is phased. [5]
- b) What are the various objectives of preliminary survey for highway alignment? State only the various steps in the conventional method. [5]

OR

- Q2)** a) Explain in brief the salient features of Third twenty year road development plan 1981-2001. [5]
- b) Calculate the absolute minimum and ruling minimum radius of horizontal curve for a design speed of 80 Km/h. [5]

- Q3)** a) Write a short note on condition and collision diagram. [5]
- b) Calculate the spacing of expansion joint from the following data: [5]

Maximum joint width =2 cm

Temperature of laying concrete =20°C

Maximum Slab Temperature expected =55°C

Coefficient of thermal expansion of Concrete =10 X 10⁻⁶ per °C

OR

P.T.O.

- Q4)** a) The radius of a horizontal curve is 400 m, the total pavement width at curve is 7.6m and the super elevation is 0.07. Design the Transition curve length for a speed of 100 kmph. Assume Pavement to be rotated about inner edge. [5]
- b) Explain the CBR method of pavement design. [5]

- Q5)** a) Explain in the brief the following: [2+2+2=6]
- 1) Aileron
 - 2) Rudder
 - 3) Elevator
- b) Explain the various surveys and data to be collected for airport site selection. [4+2=6]
- c) Give different systems of classification of airport. [4]

OR

- Q6)** a) What do you understand by the term airport capacity? What the factors which affect the airport capacity? [2+4=6]
- b) Explain the following terms: [3x2=6]
- 1) Apron.
 - 2) Air Speed.
 - 3) Runway.
- c) Write a short note on basic runway length. [4]

- Q7)** a) What is the importance of hydraulic data in bridge design. [4]
- b) Describe the methodology involved in the use of rational method for computation of maximum flood discharge from small catchments. [6]
- c) Explain afflux. List and explain the different formulae used for estimation of afflux. [2+4=6]

OR

- Q8)** a) Distinguish between alluvial and quasi-alluvial streams. [2+2=4]
- b) A bridge need to be constructed across an alluvial stream having a discharge of 500 cumecs. Calculate the depth of maximum scour when the bridge consists of: [3+3=6]
- 1) Three spans of 15 m each.
 - 2) Four spans of 30 m each.
- Take $f=1.10$.
- c) Discuss the direct method of design of flood discharge in detail. Draw sketches wherever necessary. [4+2=6]

- Q9)** a) Define Abutment. State the various types of abutments. Also State the requirements of good Abutments. [2+2+2=6]
- b) Mention any ten loads to be considered in the design of bridge. Explain any one in brief [4+2=6]
- c) Write a short note on Erection and Maintenance of Bridges. [6]

OR

- Q10)**a) What are the causes of longitudinal forces in bridge? Explain in brief. [2+2+2=6]
- b) Define Bridge bearing. State the types of bearings? Why Bearings are necessary in bridges. [2+2+2=6]
- c) Explain the following with a neat sketches: [2+2+2=6]
- 1) Box Culvert.
 - 2) Swing bridge.
 - 3) Suspension bridge.



Total No. of Questions :10]

SEAT No. :

P3654

[4959]-1003

[Total No. of Pages :3

B.E. (Civil)

**Structural Design and Drawing -III
(2012 Pattern) (End Semester) (Semester - I) (401003)**

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, IS3370 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 are bonded and unbonded prestressed concrete members? **[4]**
- b) Calculate the loss of pre-stress due to elastic shortening of concrete in a simple supported pre-tensioned beam of effective span 20m. The cross-section of the beam is an I-section having the top and bottom flanges as (700 X 200) mm and the web of width 150 mm. The overall depth of the beam is 1,200 mm. The prestressing cable of cross-sectional area of 2,100 mm² is provided at 100 mm from the bottom. The initial pre-stress in steel may be taken as 1,360 N/mm². The stress in concrete at transfer is 30 N/mm². **[6]**

OR

- Q2)** a) What are Type -I, -II and , -III prestressed concrete members? **[4]**
- b) An end block of a post tensioned beam is 350 mm X 500 mm. The prestressing force is 900 kN with the tendon placed centrally at the ends. A bearing plate of 200 mm X 200 mm is provided. Check for the bearing stresses developed in concrete whose strength at transfer is 40 N/mm². **[6]**
- Q3)** a) Explain the necessity of designing anchorage zone in post tensioned beam with reference to stress trajectories. How the design of end block will be carried out. **[4]**

P.T.O.

- b) For an unbraced building having plan dimensions 30 m x 30 m, the total seismic load on a frame having 5 similar bays is 14800 kN. The building is situated in zone III. Footing is resting on medium soil. The total height of the building is 28 m with floor height as 4 m. Calculate the base shear and show shear distribution over the height of the building. [6]

OR

Q4) a) Explain the Indian standard code provisions for calculating the moment of resistance for rectangular beams. [4]

- b) A building consists of three frames comprising of three storey with two equal bays of 4 m width. The frames are placed 5m c/c. The lateral panel point loads of a frame are 18 kN at terrace floor and 24 kN at typical floor. Find the moments and shears in all beams for the internal frame by suitable method. [6]

Q5) a) For a T- shaped retaining wall draw the active earth pressure diagram showing the expression for maximum earth pressure for the following conditions. [4]

- i) Backfill is a completely submerged soil with top surface horizontal, and
ii) Backfill is horizontal with uniform surcharge w_s / unit run.

- b) Perform stability analysis for a T- shaped retaining wall provided to retain a horizontal leveled backfill which consists of two layers of 2 m each. The upper layer and bottom layer has unit weight respectively equal to 17 kN/m³ and 18 kN/m³ Angle of repose for both layers =30°, coefficient of friction between Concrete and soil = 0.55, 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 3.2 m. The backfill is horizontal; and is subjected to a surcharge of 10 kN /m² acting over a length of 2 m starting from 1 m from the face of the wall. The unit weight of the soil is 17 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)** Why it is necessary to combine the footing? [3]
- b) Design a slab-beam type combined footing for two boundary columns spaced 4.0 m apart. The columns are 230 mm X 400 mm. Both columns carry 600 kN characteristic loads. The SBC of soil is 200 kN / m². Use M30 grade of concrete and steel of grade Fe 500. [13]

OR

Q8) Design a slab type combined footing for two columns spaced 3.5 m apart carrying a service load of 600 kN and 1000 kN each. The columns are 400 mm X 400 mm and 600 mm X 600 mm respectively. The center of lighter column is 0.4 m from the property line. 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. [16]

- Q9) a)** A rectangular water tank 5 m X 2.5 m X 2.5 m high 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) Using limit state method, 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 240 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) Design the long wall for a rectangular water tank open at top resting on ground having a size of 8.0 m X 3.6 m X 2.5 m high. Use M 30 and Fe 500 grade material. Sketch details of reinforcement for the wall. [18]



Total No. of Questions :10]

SEAT No. :

P3655

[Total No. of Pages :3

[4959] - 1004

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(Elective - I) (2012 Course) (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) *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) Explain the loadings considered on highway RC bridges. **[10]**

OR

Q2) Write a note on different loadings adopted for railway steel bridges. **[10]**

Q3) Explain Pigeaud's curves with an example? **[10]**

OR

Q4) Explain the procedure to obtain maximum bending moment and shear force on an intermediate longitudinal girder. **[10]**

P.T.O.

Q5) Design the members L_0-L_1 , L_0-U_1 for the broad gauge railway steel truss bridge shown in Fig. 1. The details are as follows. **[18]**

- a) Weight of stock rail = 0.55 kN/m,
- b) Weight of check rail = 0.5 kN/m
- c) Sleepers of size = $(0.25 \times 0.25 \times 2.5)$ m @ 0.40 m c/c
- d) Unit weight of sleepers = 7.8 kN/m³
- e) Spacing of truss = 4.50 m c/c
- f) Equivalent uniformly distributed load for BM and SF are 2874 kN and 3161 kN respectively
- g) CDA = 0.361

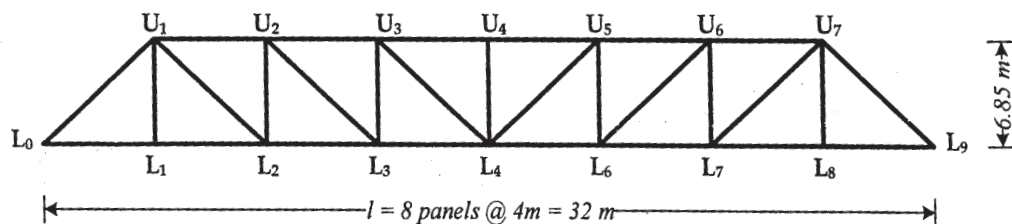


Fig. 1

OR

Q6) For the Problem given in Q.5 design the members U_1-L_2 and U_1-L_1 . **[18]**

Q7) Design a rocker bearing for the given data and also sketch the details. **[16]**

- a) Maximum normal load = 2250 kN
- b) Minimum normal load = 750 kN
- c) Lateral load = 48 kN
- d) Longitudinal load = 110 kN

OR

Q8) a) Explain the classification of various types of bearings with neat sketches. [8]

b) Explain the design procedure for elastomeric bearing. [8]

Q9) Explain the steps involved in design of abutment. [16]

OR

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

a) Span = 10m

b) Width of carriageway = 7.5 m

c) Live load on the deck slab = IRC Class AA

d) Dead weight of span = 3500 kN

e) Longitudinal force = 250 kN

f) Height of abutment from the top of footing to bearing level = 9.85 m

g) Unit weight of backfill soil = 18 kN/m³

h) Allowable bearing pressure = 225 kN/m²

i) Materials = M 30 grade concrete and steel of grade Fe 500



Total No. of Questions : 10]

SEAT No. :

P4901

[Total No. of Pages :4

[4959] - 1005

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

SYSTEMS APPROACH IN CIVIL ENGINEERING

(2012 Course)

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) Explain the applications of Systems Approach in following areas. [5]

- i) Production
- ii) Procurement
- iii) Marketing
- iv) Finance
- v) Personnel

b) State whether following functions are convex or concave. [5]

- i) $F(x) = x^3 - x^2 - x + 5$
- ii) $F(x) = x^2 \log(x)$

OR

Q2) a) Explain Hessian Matrix and state the conditions for concave and convex function for bivariable problems. [5]

b) State the points of differences between Dichotomous Search, Fibonacci and Golden section methods. [5]

Q3) a) Explain following notations which represent queuing models. [5]

- i) (M/M/1) : (SIRO/∞/∞)
- ii) (M/E/c) : (FCFS/N/∞)

b) Explain the steps in Lagrangian Multiplier technique of optimisation. [5]

P.T.O.

OR

- Q4) a)** Find the sequence that minimizes the total elapsed time to complete the following jobs in the order BA. [5]

		Jobs (Processing times in minutes)						
		1	2	3	4	5	6	7
machines	A	12	6	5	11	5	7	6
	B	7	8	9	4	7	8	3

Find total elapsed time.

- b) What is simulation? How can you use Monte Carlo simulation to solve industrial problems? [5]

- Q5) a)** What is Dynamic Programming? Write step by step procedure to solve the general problem by DP approach. [8]

- b) In an investment project, 10 units of money are available for allocation in three investment programmes. The returns are as follows. What is the optimal investment policy? [8]

	Returns											
	0	1	2	3	4	5	6	7	8	9	10	
Investment policy	A	0	5	15	40	62	80	88	90	98	110	115
	B	0	6	18	45	70	83	92	95	100	120	125
	C	0	4	13	42	60	78	85	88	95	100	105

OR

- Q6) a)** What is the need of Dynamic Programming? How is it different from LP? Write some applications of DP. [8]

- b) Find the shortest path from node 1 to node 11 through the network as given below. [8]

Node	Distance	Node	Distance	Node	Distance
1-2	5	3-6	5	5-10	5
1-3	2	3-7	2	6-9	8
1-4	7	3-8	1	6-10	4
2-5	8	4-6	6	7-9	4
2-6	9	4-7	8	7-10	3
2-7	6	4-8	7	9-11	2
3-5	4	5-9	9	10-11	3

Q7) a) Explain the meaning of duality in L.P. What are the advantages of solving a minimization problem by converting it into maximization problem? [6]

b) Solve the following by Simplex method. [6]

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

$$\text{Subject to } 3x_1 + 2x_2 \leq 8$$

$$5x_1 \leq 10$$

$$x_1 + x_2 \leq 8$$

$$-x_1 + x_2 \geq 4$$

$$x_1, x_2 \geq 0$$

c) Solve the following by graphical method [6]

$$\text{Minimize } Z = 60x + 40y$$

Subject to

$$3x + 10y \geq 240$$

$$10x + 10y \geq 160$$

$$20x + 60y \geq 480$$

$$x, y \geq 0$$

OR

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

$$\text{Maximize } Z = 4x_1 + 3x_2 + 5x_3$$

Subject to

$$x_1 + 3x_2 + 2x_3 \leq 10$$

$$2x_1 + 2x_2 + x_3 \geq 6$$

$$x_1 + 2x_2 + 3x_3 = 14$$

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

b) A pharmaceutical company produces two drugs A and B which are sold at a rate of Rs. 9.6 and Rs. 7.8 respectively. The main ingredients are x, y and z and they are required in the following proportions. [10]

Drugs	$x\%$	$y\%$	$z\%$
A	50	30	20
B	30	30	40

The total available quantities of different ingredients are 1600 in x , 1400 in y and 1200 in z the cost in Rs. of x, y and z per gm are Rs. 8, Rs.6 and Rs.4 respectively. Estimate the most profitable quantities of A and B to produce, using Simplex method.

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

		Destinations					
		1	2	3	4	5	Supply
Origins	A	2	11	10	3	7	6
	B	1	4	7	2	1	10
	C	3	9	4	8	12	9
Demand		4	4	4	7	6	

- b)** Assign the jobs to employees to minimize cost. **[6]**

		Employees			
		A	B	C	D
Jobs	1	7	9	3	3
	2	2	6	1	6
	3	6	5	3	4
	4	9	10	7	1
	5	5	2	2	4

OR

- Q10)a)** National Oil company has 3 refineries and 4 depots. Transportation cost per ton, capacities and requirements are as given below. Determine optimum allocation of output. **[8]**

		Capacity				
		D ₁	D ₂	D ₃	D ₄	(tons)
R ₁		5	7	3	10	700
R ₂		8	6	14	13	400
R ₃		12	10	9	11	800
Required		200	600	700	400	

- b)** Assign tasks to employees to minimize cost. **[8]**

		Tasks				
		1	2	3	4	5
Employees	A	25	30	70	40	60
	B	10	10	45	40	50
	C	55	40	25	55	40
	D	60	70	10	35	30
	E	30	55	60	20	35

XXXX

Total No. of Questions : 10]

SEAT No. :

P3979

[4959]-1006

[Total No. of Pages : 3

B.E. (Civil Engineering)

c:ADVANCED CONCRETE TECHNOLOGY (Elective - I)

(2012 Course) (End Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to 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) *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 sulpher infiltrated concrete. **[4]**
b) What is copper slag? What is the effect of copper slag using as a fine aggregate on workability and strength of the concrete? **[6]**

OR

- Q2)** a) Write a short note on structural light weight concrete. **[4]**
b) What do you mean by quality assurance ad quality control? Give the IS recommendations of quality assurance. **[6]**

- Q3)** a) Write a short note on ground penetration radar technique. **[4]**
b) Explain alkali aggregate reaction. State factors promoting and control of the reactions. **[6]**

OR

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

P.T.O.

- Q5)** a) Explain the historical development of fiber reinforced concrete composite. [4]
- b) Enlist different metallic fibers. Explain any two properties in brief. [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 carbon fibers and glass fibers. [6]
- c) Define fiber reinforced concrete composite? Enlist different naturally occurring fibers. Explain any two in brief. [6]

- Q7)** a) What are the different properties of hardened FRC? Explain any two properties. [4]
- b) What precautions should be taken during mixing and casting of fiber reinforced concrete composite? [6]
- c) Explain the behavior of SFRC under compression, tension and flexure? [6]

OR

- Q8)** a) Write a short note on Glass fiber reinforced concrete composite. [4]
- b) Explain the quality control tests conducted for steel fiber reinforced concrete composites. [6]
- c) Describe the SIFCON material with reference to definition, structure properties and its application. [6]

- Q9)** a) Define ferrocement? Write advantages of ferrocement? [6]
- b) Explain open mould technique for ferrocement with merits and demerits. [6]
- c) Explain the properties and specifications of ferrocement material. [6]

OR

- Q10)**a) Enlist factors affecting ferrocement material in fresh and hardened state. Explain the effect of water cement ratio on properties of ferrocement material? [6]
- b) Explain skeletal armature method of ferrocement along with merits and demerits. [6]
- c) What are the different tests conducted on cement mortar as a ferrocement material? Explain any one in detail. [6]

x x x

Total No. of Questions :8]

SEAT No. :

P3656

[Total No. of Pages :2

[4959] - 1007

B.E. (Civil)

ARCHITECTURE AND TOWN PLANNING

(End Semester) (Elective - I) (2012 Course) (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.*
- 2) *Assume suitable data if necessary.*
- 3) *Figures to the right indicate full marks.*

- Q1)** a) Explain in detail elements of Architectural Composition. [7]
b) Develop the, "Relation between quality at life and livability. [7]
c) Elaborate: benefits of town planning. [6]

OR

- Q2)** a) Elaborate following Qualities of Architecture: user friendly, contextual. [6]
b) Elaborate: Importance of sustainable architecture with case study. [7]
c) Write a short note on: Development Plan. [7]

- Q3)** a) What is the importance of civic surveys for DP? How these are carried out? [8]
b) Explain different Traffic transportation systems in town and its impact. [9]

OR

- Q4)** a) Explain functioning of any one Planning agencies in detail. [9]
b) Write a short note on traffic management. [8]

P.T.O.

- Q5)** a) Why MRTP Act 1966 is influential for DP? [8]
b) Elaborate the need of UDPFI guidelines for land use, infrastructure. [9]

OR

- Q6)** a) State & explain steps in the Legislative mechanism for preparation of DP. [8]
b) Write a short note on SEZ and its impact on economy. [9]

- Q7)** a) Write a note on Special townships. [8]
b) What are the applications of GIS in town planning? [8]

OR

- Q8)** a) Write a note on Land Acquisition Rehabilitation and Resettlement Act 2013. [8]
b) What are the applications of GPS in town planning? [8]



Total No. of Questions :6]

SEAT No. :

P3657

[Total No. of Pages :4

[4959] - 1008

B.E. (Civil Engg.)

e: ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS

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

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) Write short note on Geology of Maharashtra. **[6]**

OR

b) Describe the Varieties of Deccan Trap Basalt. **[6]**

Q2) a) Write a note on Engineering significance of Tachylytic Basalt. **[7]**

OR

b) How location of spillway is decided on geological grounds. **[7]**

Q3) a) What do you mean by watershed development? How the soil erosion is prevented. **[7]**

OR

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

P.T.O.

Q4) a) Explain in detail Bieniawski's Geomechanical classification. **[8]**

b) On the basis of core obtained in DTB which rocks are likely to be occurring at different levels & discuss their feasibility from dam foundation. **[8]**

Run in m	Piece No.	Length in cm.	Nature of fracture
3-6 m	1	10	J
	2	11	J
	3	100	M
	4	45	M
	5	55	M
	6	13	J
	7	50	J
	8	6	J
	9	8	J
6 - 9 m	10	90	M
	11	80	M
	12	120	M
	13	10	M

OR

a) Explain in detail electrical resistivity method 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

- Q5)** a) Whether the tunnels are suitable through limestone and quartzite. [10]
b) Explain in brief safe bearing capacity during bridge construction. [7]

OR

- a) Write note on Standup time of rock during tunneling. [10]
b) Write note on location and depth of drill holes at foundation of bridge.[7]

- Q6)** a) Explain suitability of DTB as construction material. [10]
b) Give the geological reasons of earthquake occurrence. [7]

OR

- a) Explain in detail influence of geology in planning. [10]
b) Write a note on foundation of monumental buildings with suitable examples. [7]



Total No. of Questions : 12]

SEAT No. :

P3658

[4959]-1009

[Total No. of Pages : 3

B.E. (Civil)

a-MATRIX METHODS OF STRUCTURAL ANALYSIS
(2012 Pattern) (Semester - I) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

SECTION - I

Q1) Write a note on:

[6]

- a) Importance of Matrix Algebra in Matrix Methods of Structural analysis.
- b) Gauss Jordan & Gauss Seidel iteration method.

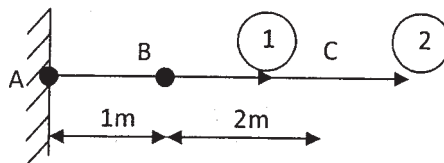
OR

Q2) Write a note on

[6]

- a) Ill conditioned matrix.
- b) Gauss Elimination Method.

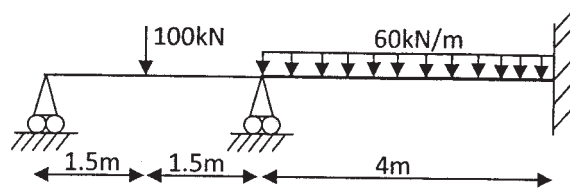
Q3) Two steel bars AB and BC, each having a cross-sectional area of 20mm^2 , are connected in series as shown in the figure. Develop the flexibility matrix with reference to coordinates 1 and 2 shown in the figure. $EI = 200\text{kN/mm}^2$. [6]



OR

P.T.O.

Q4) Develop the Flexibility matrix for the beam shown below [6]



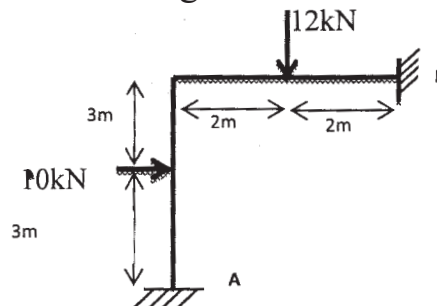
Q5) Develop the stiffness matrix with reference to coordinates 1 and 2 shown in the figure give in question 3 for the same data. [8]

OR

Q6) Develop the stiffness matrix for the beam shown in the figure give in question 4 for the same data. [8]

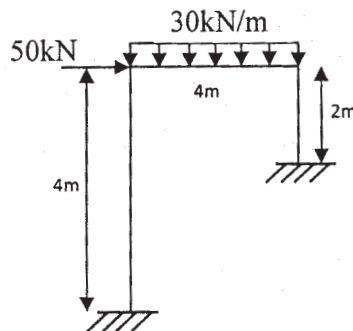
SECTION - II

Q7) Analyze the portal frame using Stiffness Method (EI Constant) [16]



OR

Q8) Analyze the portal frame as shown below by force method [16]



- Q9)** a) Differentiate between structure approach and member approach used in stiffness matrix method. Explain how support conditions are accounted in both approaches. [8]
- b) Using proper DOF's, write stiffness matrix equation for a member of orthogonal grid structure. [8]

OR

- Q10)**a) Show that stiffness matrix of a member of a structure in a structure coordinate system is obtained by transformation. [8]
- b) Explain properties and special characteristics of stiffness matrix of a structure. [8]

Q11) A single bay two storied frame is to be analyzed by computer programme of Stiffness matrix method [18]

- a) Prepare the flow chart for the programme and state input required for the same.
- b) How will you input support conditions of the structure.

OR

Q12) Explain in detail - Stiffness of a pin - joint for translation along coordinates i, j and k with example. [18]

x x x

Total No. of Questions : 12]

SEAT No. :

P3521

[4959]-1010

[Total No. of Pages : 2

B.E.(Civil)

INTEGRATED WATER RESOURCES AND PLANNING

(2012 Course) (Semester-I)(End semester)(Elective-II)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) What do you mean by Institutional frame work for water management. **[3]**

b) Comment on “water infrastructure-problems and perspectives”. **[3]**

OR

Q2) a) Explain in brief “Ground water ownership”. **[3]**

b) Write a note on “World water resources”. **[3]**

Q3) a) Explain water laws and constitutional provision for water management. **[3]**

b) What are the global and national perspectives of water crisis? **[3]**

OR

Q4) a) How Benefit cost analysis is carried out in IWRP explain. **[3]**

b) Write a note on “water scarcity”. **[3]**

Q5) a) What are the causes of flood? And explain in brief the control measures for it. **[4]**

b) State the principles of planning and financing of water resources project. **[4]**

OR

Q6) a) What are the control measures for water logging, salinity and siltation of storages? **[4]**

b) What is the use of geoinformatics in management of flood? **[4]**

P.T.O.

- Q7)** a) Explain in detail necessity of water management in irrigation sector. [8]
b) Write a note on estimation and forecasting of water demand for irrigation sector. [8]

OR

- Q8)** a) What is thermal and nuclear water demands? Explain how it is estimated. [8]
b) What are consumptive and non consumptive demands? Explain in detail. [8]
- Q9)** a) What is “Decision support system for Integrated Water Resources Planning (IWRP)” [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 [8]
i) Minimum Flow
ii) Water quality management.

- Q11)** a) Write note on role of RS and GIS in watershed management. [8]
b) Explain in short about the two terms: [10]
i) Contour bunding
ii) Check dams

OR

- Q12)** a) Explain necessity of soil and water conservation. [8]
b) How watersheds are classified? Explain integrated approach for watershed management. [10]



Total No. of Questions : 10]

SEAT No. :

P3522

[4959]-1011

[Total No. of Pages : 3

B.E.(Civil)

C-TQM & MIS IN CIVIL ENGINEERING

(2012Course) (Elcective -II)(Semester-I)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 or Q8, Q 9 or Q10.*
- 2) *Figures to the right indicate full marks.*

- Q1) a)** Explain PDCA cycle and its usefulness in Quality plan implementation with the help of practical examples **[2+4]**
- b) Differentiate between the contribution of Juran and Crosby. **[4]**

OR

- Q2) a)** What are quality objectives? How are they set? What is the basic purpose of setting these objectives? **[2+2+1]**
- b) Highlight 5 important functions to be performed by a quality manager.**[5]**
- Q3) a)** Discuss the advantages of implementing TQM in the Indian construction sector. **[5]**
- b) Explain “Backlogs” as a quality defect elaborating on the “reasons” and the “remedies”. **[5]**

OR

- Q4) a)** Explain 5 important principles of TQM with examples. **[5]**
- b) Elaborate on how the normal distribution and the six sigma technique are linked. Identify the actual levels for each sigma. **[5]**
- Q5) a)** Discuss and detail out the historical evolution from Quality → Quality Control → Quality Assurance → Total Quality Control → Total Quality Management with examples. Clearly explain each term and its importance. **[5+5]**

P.T.O.

- b) Elaborate with examples;-
- i) Leadership for quality attainment [2]
 - ii) Empowerment for human resources [2]
 - iii) Win- Win supplies, customer,relationship [2]
 - iv) Process based approach [2]

OR

Q6) Benchmark for quality aspects with respect to the providing and casting of M25 controlled concrete at site using a weigh batcher. Consider 9 important parameters for benchmarking. Identify. [18]

- a) minimum acceptable level and
- b) desirable quality level.(you are allowed to make provisions for tolerable allowances in each level)

Q7) a) What is an MIS? What parameters you will consider in preparing an MIS for a contractors organisation so as to monitor the quality of construction on a road project? Detail out. [2+10]

- b) Explain concepts of :-
- i) Hidden costs of Quality [2]
 - ii) Intangible benefits of Quality [2]
- (Use examples)

OR

- Q8)** a) Explain with applications
- i) Quality control charts [4]
 - ii) SCM [4]
 - iii) Kaizen [2]
 - iv) Zero defects [2]
- b) Explain what details get accounted while calculating the external failure costs? [4]

Q9) Detail out with examples the different modern devices and softwares used for measuring, documenting, reporting and correcting quality related data. **[16]**

OR

Q10) Write short answers to:-

- a) Loss of business on account of quality problems **[4]**
- b) Customer satisfaction and delight. **[4]**
- c) NC Report **[4]**
- d) ERP modules **[4]**



Total No. of Questions : 12]

SEAT No. :

P3980

[4959]-1012

[Total No. of Pages : 3

B.E. (Civil)

EARTHQUAKE ENGINEERING

(2012 Course) (Semester - I) (401005D) (End Sem) (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) Magnitude of earthquake
- ii) Intra plate Earthquake

b) Explain the interior of earth? What are different types of seismic waves?[6]

OR

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

b) Explain different causes of earthquake? [6]

Q3) A cantilever beam 3 m long supports mass of 100kg at the free end. 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 un-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]

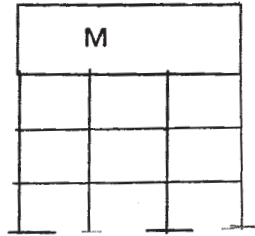


Figure 4.1

- Q5)** Explain the following terms (Any two) [4]
- Seismic Zoning.
 - Vertical irregularity in buildings.
 - Weak storey and Soft Storey.

OR

- Q6)** Calculate the distribution of base shear at each floor level as per seismic coefficient method for the OMRF without brick infill building of three storey shown in Fig.6.1. The building is located in Zone III. The frames are spaced at 3m c/c. Assume soil of Type II and floor height 3.5m at ground floor and 3m at remaining storey. The floor slabs are designed for a live load of 2 kN/m^2 and the roof is designed 1.5 kN/m^2 . [4]

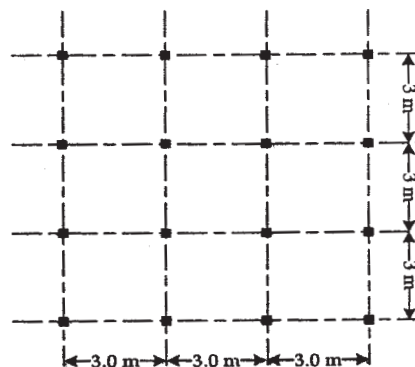


Figure 6.1

Q7) A (300x 300) mm column is reinforced with 8 -16mm ϕ . It is supported on isolated footing. The load coming on the footing is 500 KN and a moment of 30 KN-m. The SBC of the soil is 150 kN/m². Using M 25 grade of concrete and steel of grade Fe 415 Design footing. [16]

OR

Q8) a) What is Liquefaction? Explain types of liquefaction? [4]

b) What are the different methods to reduce liquefaction. [6]

c) Explain the techniques of soil improvement? [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 qualities of rescuer? [8]

b) Define Active and Passive control. Write different types of the passive control system and explain any one example. [8]

Q11)a) Explain need of retrofitting? [8]

b) Explain the Shear Wall and its behavior? [10]

OR

Q12)a) Explain the techniques used for Local Retrofitting? [8]

b) What is retrofitting and rehabilitation of structures? [10]

x x x

Total No. of Questions : 10]

SEAT No. :

P3659

[4959]-1013

[Total No. of Pages : 3

B.E. (Civil)

**e-ADVANCED GEOTECHNICAL ENGINEERING
(2012 Pattern) (Semester - I) (Elective - II) (End-Semester)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, and Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Answer to the two sections should be written in separate books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule, Mollies charts, electronics pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*
- 6) *Neat diagrams must be drawn wherever necessary.*

Q1) a) Discuss different soil classification system. **[4]**

b) Explain the following: **[6]**

- i) PRA classification
- ii) USCS classification

OR

Q2) a) Determine the active earth pressure at a depth of 5.0 m in sand whose angle of friction is 36° and density of 16.5 kN/m^2 in dry state. **[4]**

b) Explain the structure of montmorillonite and give role of montmorillonite in foundation engineering. **[6]**

Q3) a) Differentiate between Rankine's and Coulomb's earth pressure theories. **[4]**

b) Discuss the application of geosynthetics in geoenvironmental engineering. **[6]**

OR

P.T.O.

- Q4)** a) Discuss slope stabilization using soil nails. [4]
- b) What do you mean by “Reinforced Earth”? Give the advantages of reinforced earth structure. [6]

Q5) Explain the following:

- a) Soil as a mass spring system. [4]
- b) Barken’s method. [4]
- c) Pauw’s method. [4]
- d) Elastic half space method. [4]

OR

- Q6)** a) Resonance occurred at a frequency of 22 cycles/sec in a vertical vibration test of a block 1m * 1m* 1m. Determine the C_u of soil, if the weight of oscillator is 650N and the force produced by it at 12 cycles/sec is 1000N. [8]
- b) Discuss the design criteria for impact type machine as per IS-2974 (Pt II) -1966. [8]

- Q7)** a) Explain the steps for design of sand drains with the following cases:
- i) Isotropic case
- ii) Anisotropic case [8]
- b) Explain the stages for construction of bored compaction pile. [8]

OR

Q8) Explain the following:

- a) Vibroflotation. [4]
- b) Grouting. [4]
- c) Sand drains. [4]
- d) Freezing soil. [4]

Q9) a) Discuss the following in details. [3×4=12]

- i) Rheological Model and its utility
 - ii) Maxwell Model
 - iii) Creep
- b) Explain in detail “Saint Venant Model”. [6]

OR

Q10)a) Explain secondary consolidation in detail. [6]

- b) Reissner’s Model with spring and dashpot. [6]
- c) Explain basic and compound Rheological Models. [6]

x x x

Total No. of Questions : 12]

SEAT No. :

P3660

[4959]-1014

[Total No. of Pages : 3

B.E.(Civil)

DAMS AND HYDRAULIC STRUCTURES

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

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or 2,Q3or 4, Q5 or 6 , Q 7 or 8, Q 9 or 10 and Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data if necessary.*

Q1) a) Classify dams on the basis of function, hydraulic design, material of construction, structural design (with one example of each) and purpose. [6]

OR

Q2) What is a piezometer? Briefly explain following types of piezometers: [6]

- a) Pneumatic piezometer
- b) vibrating wire piezometer

Q3) Find the base width of an elementary profile of a gravity dam for 'no tension' and 'no sliding' criteria for following data.

- a) Height = 50m.
- b) Unit weight of construction material = 24 kN/m³.
- c) Unit weight of water = 10 kN/m³.
- d) Coefficient of uplift = 0.8
- e) Coefficient of friction = 0.75

Out of these two base widths, which one will you recommend? [6+2]

OR

- Q4)** a) State middle third rule. How it ensures no tension at base. [4]
- b) Differentiate between arch dam and buttress dam. [4]

P.T.O.

Q5) a) Give USBR recommendations for types of stilling basins to develop hydraulic jump. **[4]**

b) With the help of load curve explain 'load factor'. **[2]**

OR

Q6) a) Write a note on ski jump type energy dissipator. **[3]**

b) Why hydropower is treated as clean and cheap source of power generation **[3]**

Q7) a) Define phreatic line. **[2]**

b) Determine the phreatic line through homogeneous earthen dam section with following details.

i) Slope of upstream face = 3:1.

ii) Slope of downstream face = 2.5:1

iii) Top width = 10 m

iv) Height of dam = 23m

v) Free board = 3 m

vi) Length of horizontal drainage blanket = 30m

Note : (For calculation, consider interval of 'x' coordinates as 10m). **[8]**

c) Draw a labeled sketch of diversion headwork. Also enumerate the function of each component. **[4+4]**

OR

Q8) a) Define exit gradient. **[2]**

b) A weir of height 4 m is constructed on permeable foundation on horizontal floor of thickness 1m. Pile number-1 of 5m depth(measured from floor bottom) is provided on upstream of weir. Pile number-2 of 6m depth (measured from floor bottom) is provided on downstream of weir. The distance between piles is 20 m and total length of floor is 23 m. Determine the correction in magnitude and nature at key point CI due to mutual interference of pile number-2. The weir retains water upto full height. **[8]**

c) Draw a labeled section of zoned type earthen dam. Also enumerate the function of each component. **[4+4]**

Q9) a) Design an unlined alluvial trapezoidal canal section to carry a discharge of $8 \text{ m}^3/\text{s}$. The longitudinal slope is 1 in 3500 and the side slope is 0.5 H : 1 V. Use Lacey's theory and take silt factor $f = 0.9$. [8]

b) What is meant by canal lining. What are its advantages? [8]

OR

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

i) Canal escapes

ii) Ogee fall

b) Design an irrigation channel by Kennedy's theory to carry a discharge of 36 cumec. Take rugosity coefficient $N = 0.0225$ and critical velocity ratio $m = 1.05$. The channel has a bed slope of 1 in 5000 and side slope of 0.5H : 1V. Take initial trial depth as 2m. [8]

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

i) Super passage

ii) Level crossing

b) State objectives of river training. Briefly explain different methods of river training. [8]

OR

Q12)a) Write short notes on : [8]

i) Levees

ii) Spurs

b) Explain need and types of cross drainage works. Explain in detail siphon aqueduct. [8]



Total No. of Questions : 12]

SEAT No. :

P4537

[Total No. of Pages : 5

[4959] - 1015

B.E. (Civil)

QUANTITY SURVEYING, CONTRACTS AND TENDERS

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :-

- 1) *Answer Q.No 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 12.*
- 2) *Neat diagram should be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) What is an estimate? Hence state the different types and state under which conditions the particular estimate is prepared. **[3]**

b) What do you mean by contingencies? How much provision is made for contingencies while preparing estimate? **[3]**

OR

Q2) a) Explain the following with suitable example; **[3]**

i) The provisional sum item ii) Prime cost items

b) Explain the method of measurement and rule for making deductions for openings for following items; **[3]**

i) Plastering to the wall surface, and

ii) Brick masonry in superstructure.

Q3) Figure 1(A) & 1(B) shows plans & section of residential building. Determine the quantities of following items. **[8]**

i) Excavation in foundation

ii) UCR masonry in CM (1:6) in foundation

iii) Damp proof course

P.T.O.

OR

Q4) Refer Figure 1(A) & 1(B), determine the quantities of following items. [8]

- i) 12 mm thick internal plaster.
- ii) Steel reinforcement in slab for both rooms is 8mm Dia. bars provided at 120 mm c/c along short and long span with alternate bars bent up at support. Determine the quantity of reinforcement.

Q5) a) A person wish to sell his building at Rs 15.00 lakhs. The life of building may be considered as 80 years and scrap value as 10%. Find the depreciated value on the building if the current age of building is 20 year also at what price the building should be purchased. [4]

b) State true or false and comment on the following. [2]

- i) The amount of sinking fund to be accumulated is nothing but the total depreciation of the property.
- ii) Value of a building may be higher than it's estimated cost.

OR

Q6) What is reversionary value of land? Hence determine the present value of a building including land using following data. [6]

- i) Income available from the property : Rs 96000/- per annum.
- ii) Life of the property: 80 years.
- iii) The rate for redemption of is 6% and rate of interest on Government securities is 5%.
- iv) All outgoings: 35% of gross income.
- v) Present cost of land: Rs 30 lacs.

Q7) a) Explain the purpose of Rate analysis. What factors should be considered while working out rate per unit for an item and explain how specification of an item of work affect the rate of an item? [4]

b) Determine the material requirement for construction of 126 Cu.m of brick masonry in C.M. (1:6), also determine the quantity of water required if W/C ratio for the mortar is 0.55. [8]

- c) Prepare the rate analysis for Brick masonry in CM1:6 for super structure. The following rates for material & labour may be considered for rate analysis. [6]

- i) Cement = Rs 300/bag
- ii) Sand = Rs 1400/m³
- iii) Aggregate = Rs 1400/m³
- iv) Bricks = Rs 4500/1000No
- v) Steel = Rs 38,500/ MT

Labour rate/day

- i) Head mason = Rs 600/-
- ii) Mason = 450/-
- iii) Mazdoor = Rs 350/-
- iv) Bhisti/ Helper = Rs 300/-

OR

- Q8)** a) Draft a detailed specification with respect to materials, labour, workmanship, mode of measurement etc for the UCR masonry foundations and plinth. [6]
- b) What are the different factors to be considered while drafting specification of an item and explain the step by step method of drafting a specification? [6]
- c) Explain: [6]
- i) Advantages & Disadvantages of open specification
 - ii) Restricted Specification
 - iii) General specification for second class building

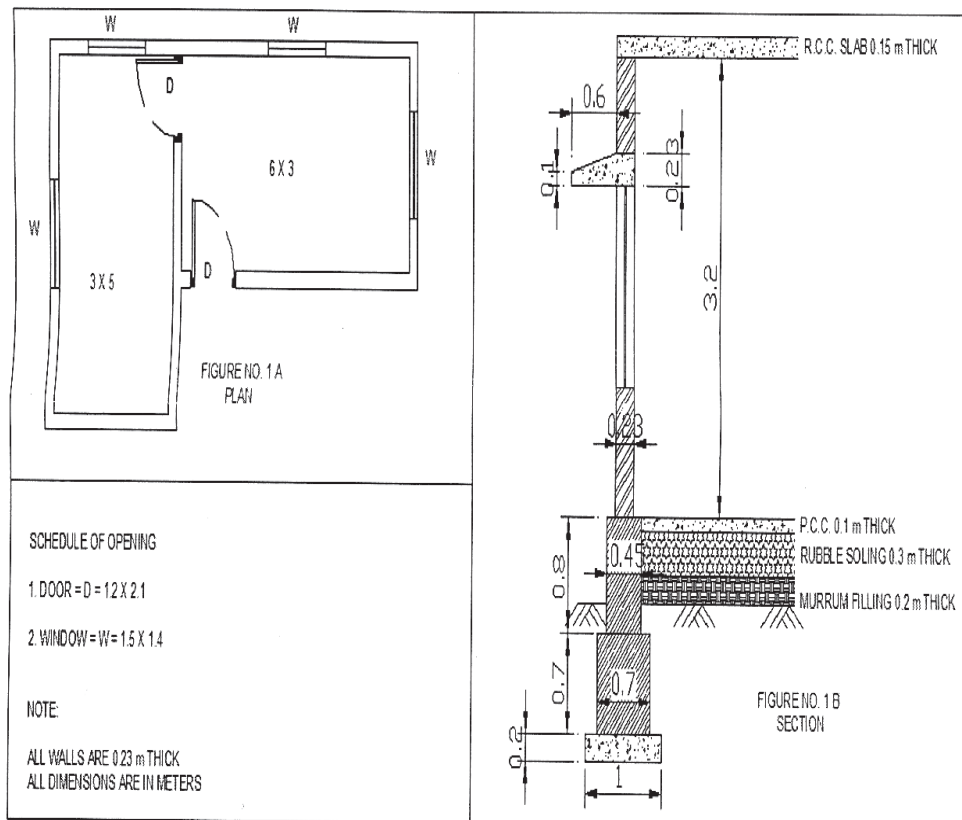
- Q9)** a) Explain the unbalanced tender with suitable example. [4]
- b) Write short note on (any three) : [6]
- i) Security deposit
 - ii) Pre-bid conference
 - iii) Liquidated damages
- c) Prepare a tender notice to be advertised in news paper for extension of a college building. The estimated amount is Rs 1.75 crores and work is to be completed in 15 months. Give also the pre qualification criteria's. [6]

OR

- Q10)**a) Explain the purpose of administrative approval and technical sanction during execution of civil engineering works. [6]
- b) Explain the organizational set up of P.W.D giving the hierarchy of the officers in the P.W.D. Explain the duties & responsibilities of each.[6]
- c) What is the necessity of engaging daily labour by P.W.D. Explain Muster Roll (MR). Draft a page of Register of Muster Roll form. [4]
- Q11)** a) Compare Lump Sum Contracts and Item Rate Contracts with reference to [6]
- i) nature of agreement,
 - ii) contract documents and
 - iii) advantages
- b) Explain the followings (any two) with suitable examples. [6]
- i) Valid contract
 - ii) Null of void contract
 - iii) Termination of contract
- c) What is a contract document and explain the contents of a contract document. [4]

OR

- Q12) a) Define Arbitration and need for arbitration. What are the powers and duties of arbitrators? [6]
- b) What are the different types of arbitration and explain any one. [4]
- c) Explain the necessary precaution the Engineer-in Charge should take to avoid arbitration. [6]



Total No. of Questions : 10]

SEAT No. :

P3661

[4959]-1016

[Total No. of Pages : 3

B.E.(Civil)

ADVANCED STRUCTURAL DESIGN

(2012 Course) (Elective-III)(Semester-II) (End Sem)(401009A)

Time : 2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q 7 or Q 8, and Q 9 or Q10.*
- 2) *Figures to the right indicate full marks.*
- 3) *All relevant IS codes and steel Table are allowed in the examination.*
- 4) *If necessary, assume suitable data and indicate clearly.*
- 5) *Use of electronic pocket calculator is allowed*

Q1) Design a column of effective length 2.1M. The design load on the column is 500 kN. The yield stress of steel is 240 N/mm² **[10]**

OR

Q2) Explain the following: **[10]**

- a) Collapse mechanism
- b) Lower bound theorem,
- c) Upper bound theorem and,
- d) Uniqueness theorem.

Q3) Obtain the plastic moment for the frame shown in Fig.1 **[10]**

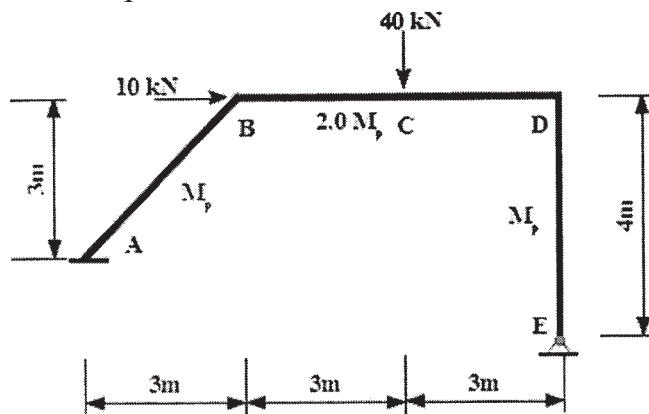


Fig. 1

OR

Q4) Write a note on forces acting on a steel chimney. **[10]**

P.T.O.

- Q5)** A square slab of span 4.5 m is simply supported at two opposite sides as shown in Fig.2. The slab carries a uniformly distributed load of 15kN/m^2 . The slab is isotropically reinforced with an ultimate positive moment of resistance of 90 kN-m/m . Calculate the ultimate concentrated load P_u that can be placed at the center of free edge that would cause a flexural failure. [18]

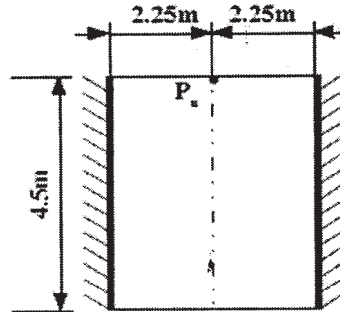


Fig. 2

OR

- Q6)** Design the simply supported rectangular slab shown in Fig.3. The factored load may be taken as 9kN/M^2 . Use M20 grade of concrete and Fe 500 grade of steel. Take $l_x=4.0\text{ m}$ and $l_y = 1.9\text{m}$ [18]

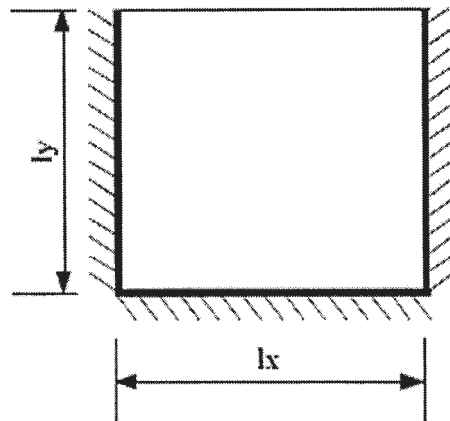


Fig. 3

- Q7)** An elevated square water tank is 6 m in size and 4 m high. It is supported on a concrete staging of 8 columns. The height of the staging is 16m. Bracings are provided at a vertical spacing of 4m. The circular columns of the staging are 500 mm in diameter. The structure is located in zone III and founded on Type III type of soil. Assume suitable dimensions for various elements and mention them clearly. Analyze the tank for tank full condition. [16]

OR

- Q8)** a) For the problem in Q.7 analyze the tank for tank empty condition. [12]
b) Explain convective mass and impulsive mass. [4]
- Q9)** a) What are proportionate and non-proportionate shear walls? [8]
b) Explain the classification of shear walls based on the aspect ratio [8]

OR

- Q10)** a) What are boundary elements in a shear wall? How is load carry capacity calculated? [8]
b) Explain coupled shear wall with a neat sketch. [8]



Total No. of Questions : 10]

SEAT No. :

P3662

[4959]-1017

[Total No. of Pages : 2

B.E.(Civil)

ADVANCED FOUNDATION ENGINEERING

(2012 Pattern) (Elective-III)(End Semester) (Semester-II)(401009B)

Time : 2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q 7 or Q 8, Q 9 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, Mollier charts, electronic pocket calculator is allowed.*
- 5) *Assume suitable data if necessary.*

Q1) a) Explain how you will plan the subsoil investigations for offshore structures. **[5]**

b) Write a short note on Design of piles subjected to tensile load. **[5]**

OR

Q2) a) Explain the friction piles and bearing piles with suitable sketches. **[5]**

b) Explain in brief any one case history of failure of foundations. **[5]**

Q3) a) What are the design guidelines for construction of stone columns? Explain in brief. **[5]**

b) Explain the seismic refraction method with a suitable sketch. **[5]**

OR

Q4) a) Draw a neat sketch of sand drain and explain any five design guidelines. **[5]**

b) How the design of piles subjected to lateral loads is carried out? Explain in steps. **[5]**

Q5) a) What are the components of total settlement of a footing in a clay. Explain how they are estimated. **[8]**

b) What are the TS code provisions for design of raft foundation. **[8]**

OR

Q6) a) Explain the conventional method for design of raft foundations. State the basic assumptions of this method. **[8]**

b) Write the equations proposed by Terzaghi for estimations of safe bearing pressure for strip, square, circular and rectangular footing. **[8]**

P.T.O.

- Q7)** a) Draw a neat sketch of well foundation and explain the design guidelines as per IS provisions. [8]
- b) Draw a neat sketch of rockfill dam and explain various components of rockfill dam. [8]

OR

- Q8)** a) Explain the forces acting on well foundation. Also state the assumptions made in the analysis of well-foundation. [8]
- b) What are the various types of cofferdam? Explain any one in detail. [8]
- Q9)** a) Explain the various types of conduits used with suitable sketches. [9]
- b) Explain how vertical load on ditch conduit is estimated. [9]

OR

- Q10)** a) Explain the positive projecting conduits and negative projecting conduits with suitable sketches. [9]
- b) Write a short note on “Imperfect ditch conduit. [9]



Total No. of Questions : 12]

SEAT No. :

P4538

[Total No. of Pages : 4

[4959] - 1018

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

HYDROPOWER ENGINEERING

(2012 Pattern) (Elective - III(c))

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :-

- 1) *Answer any six questions from Q.No. 1 or 2, Q.No. 3 or 4, Q.No. 5 or 6, Q.No. 7 or 8, Q.No. 9 or 10, Q.No. 11 or 12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed*
- 5) *Assume suitable data if necessary.*

- Q1)** a) What is the effect of climate change on Hydropower? Elaborate with suitable example. [3]
- b) Considering the day by day increasing demand of water, discuss the future prospects of water power in India. [4]

OR

- Q2)** a) Discuss the significance of national power grid. [4]
- b) What are the opportunities and threats in hydropower development in India? [3]
- Q3)** a) What is run off river plants? Explain in detail. [3]
- b) When a runoff river plant operates as a peak load station with a weekly load factor of 25%, all its capacity is firm capacity. What must be the minimum flow in the river so that the station may serve as the base load station? It is given that rated installed capacity of the generator is 10000 kW. Operating head is 20m. Plant efficiency is 80%. Estimate the daily load factor of the plant if the stream flow is 20cumec. [4]

P.T.O.

OR

- Q4)** a) A closed cycle plant with a gross head of 350m has a head race tunnel 4 m dia and 700 m long. The powerhouse discharge directly in the lower reservoir. The flow velocity is 6.5 m/s. and the friction factor (f) is 0.018. If the overall efficiencies of pumping and generation are 85% and 88% respectively. Estimate the plant efficiency. [4]
- b) Enlist the components of high head diversion plant and give two examples of such plant. [3]
- Q5)** a) Write the significance of load factor on the cost of hydropower generation. [3]
- b) What are the load curve and load duration curves? [3]

OR

- Q6)** a) Write the significance of diversity factor on the cost of hydropower generation. [3]
- b) Elaborate the different methods to meet the demand of variable loads on power plants. [3]
- Q7)** a) Write notes on flowing types of intakes : [6]
- i) run of river intake
- ii) canal intake
- iii) tower intake.
- b) What are the measure electrical equipments used in power plants? [5]
- c) What is the necessity of cooling the transformers? Elaborate different methods of it. [5]

OR

- Q8)** a) Write note on pressure shafts and trash racks. [6]
- b) Advantages and disadvantages of underground power plants. [4]
- c) Explain different methods of air cooling of generators. [6]

- Q9)** a) Explain the governing system of turbines at any hydroelectric power plant. [5]
- b) What is cavitation and how can you minimize it? [5]
- c) What are the three types of surge tanks? Draw line diagrams and explain all the three types in brief. [6]

OR

- Q10)**a) Explain the classification of turbines based on [6]
- i) pressure
- ii) head and
- iii) flow direction
- b) A power house is equipped with four units of vertical shafts pelton turbines to be coupled with 70000kVA, 3 phase, 50 Hz generators. The generators are provided with 10 pairs of poles. The gross design head is 505 m and the transmission efficiency of headrace tunnel and penstocks together is to be 94%. The four units together will provide power of 250000kW with the efficiency of 90%. The nozzle efficiency is 0.98. Find the design discharge for the turbine, jet diameter and number of jets, the nozzle tip diameter and specific speed. [10]

- Q11)** a) The cost of a small power plant is Rs 2×10^6 having the life expectancy of 20 years. The net annual installment to recover the cost is Rs. 20000. The interest is 12%. Using sinking fund method find the salvage value of the plant after 20 years of service. [6]
- b) Write a note on selection of power plants for power generation. [6]
- c) What are the performance and operating characteristics of a power plant. [6]

OR

- Q12) a)** A power plant of 210 MW is installed when the capital cost is 18000/kW. The interest and depreciations are 12%. Annual load factor is 60%. Annual capacity factor is 54%. Annual running charges Rs 200×10^6 . Energy consumed by power plant auxiliaries is 6%. Calculate cost of power generation for kWh. [6]
- b) Write down the economic load sharing between base load and peak load plants. [6]
- c) Write a note on tariff for electrical energy and types of tariffs for hydropower plants. [6]



Total No. of Questions : 10]

SEAT No. :

P3663

[4959]-1019

[Total No. of Pages : 2

B.E.(Civil)

**d: AIR POLLUTION AND CONTROL
(2012 Course)(Semester-II) (Elective-III)(End Sem)**

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 or Q 8, Q 9 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 are allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) What are the scales of meteorology? Explain. [6]

b) Explain the purpose of ambient air sampling and stack gas sampling.[4]

OR

Q2) a) A thermal power plant burns 120 tonnes of coal with 5.5% of sulphur content. Calculate minimum stack height required. The particulate concentration in flue gases is 10 g/m³ and the gas flow rate is 15m³/sec. [6]

b) Enlist primary meteorological factors influencing air pollution & explain each in brief. [4]

Q3) a) Write a short note on High volume sampler with sketch. [6]

b) What are the causes of indoor air pollution? [4]

OR

Q4) a) Explain Chemosphere and Ionosphere. [6]

b) Explain method of measurement of odour [4]

Q5) a) Explain with a sketch principle of bag filter. State factors required considering while selecting filter media for fabric filter. [8]

P.T.O.

- b) Design a parallel type electrostatic precipitator with 10 channels to handle 12000 m³/hr of gas for efficiency of i) 95%, ii) 97% and iii) 99%. Assume [8]
- i) velocity of particle = 0.1 m/sec,
 - ii) height of plate = 2m and
 - iii) spacing between plates = 0.15m

OR

- Q6)** a) Explain working principle of a gravity settling chamber with a neat sketch and how the smallest size of particles removed can be found out?. [8]
- b) Explain control of air pollution at source by process modification, change of raw materials and equipment modifications. [8]
- Q7)** a) Explain the important provision made in “THE AIR (Prevention and control of Pollution) ACT 1981”. [8]
- b) Write in tabular form emission standards for parameters CO and HC for mobile sources: [8]
- i) Passenger cars and
 - ii) Heavy Diesel vehicles as per Central pollution Control Board Norms (Bharat Stage-III and IV)

OR

- Q8)** a) What is land use planning? Explain its importance in controlling air pollution. [8]
- b) Explain Cost-benefit analysis (CBA) or Cost-Benefit Ratio in view of: Purposes of CBA, Process, Evaluation, and Cost-benefit ratio analysis with example. [8]
- Q9)** a) Explain roles of Environment Consultant and the State Pollution Control Board in the EIA Process. [9]
- b) What is a need of Environmental Impact Assessment (EIA)? Also write about Indian policies requiring EIA. [9]

OR

- Q10)** a) Explain the EIA cycle and procedures. [9]
- b) Write a short note on the following EIA methodologies: [9]
- i) Ad Hoc Method and
 - ii) Checklists



Total No. of Questions :8]

SEAT No. :

P3981

[4959]-1020

[Total No. of Pages :3

B.E. (Civil Engineering)

FINITE ELEMENT METHOD IN CIVIL ENGINEERING

(2012 Course) (Semester - II) (Elective - III)

Time : 2½ Hours

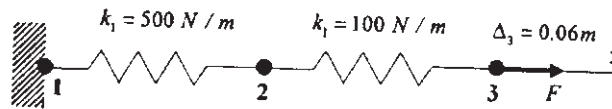
[Max. Marks :70]

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain in brief 2D and 3D Pascal's triangle with example. [6]
- b) Determine elongation at node 2 and pulling force 'F' at node 3 for the spring assembly given below. Take pull at node 3 is 0.06m. [6]

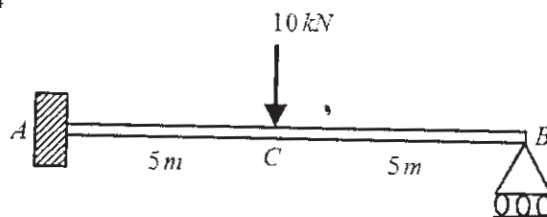


- c) Derive stiffness matrix and transformation matrix for two noded frame element considering axial deformation, transverse deformation and rotation. [8]

OR

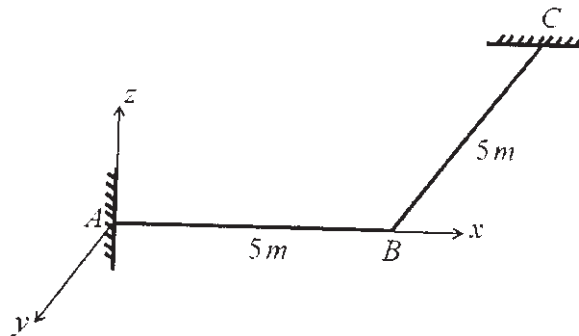
- Q2)** a) Explain in brief state of stress and state of strain at a point in 3D elasticity problem. [6]
- b) Obtain rotation at B for the beam shown below using finite element method. [6]

Consider given beam as one element. Take $E = 2 \times 10^8 \text{ kN/m}^2$ and $I = 4 \times 10^{-6} \text{ m}^4$



P.T.O.

- c) Derive the stiffness matrix for the grid elements as shown in Figure. Take flexural rigidity EI and torsional rigidity GJ same for both the elements. [8]



Q3) a) Explain difference between CST and LST element. [6]

b) Derive stiffness matrix for the two noded bar element using finite element formulation. [12]

OR

Q4) a) Write short note on applications of 3D elements in FEM and draw neat sketch of hexahedron element in natural coordinate system [6]

b) Derive strain displacement matrix $[B]$ for the four noded rectangular element using finite element formulation. [12]

Q5) a) Derive the shape function for two noded bar element using polynomial in Cartesian coordinate system. [6]

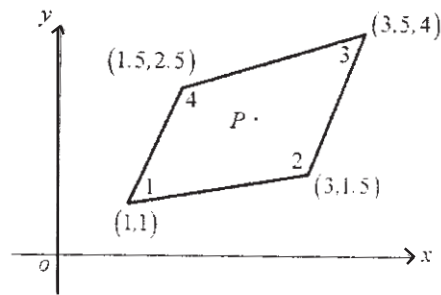
b) Derive shape functions for the four noded and nine noded rectangular elements in natural coordinate (ξ, η) system using Lagrange's interpolation function. [10]

OR

Q6) a) Derive area coordinates for the three noded CST element. [8]

b) Derive shape functions for the two noded beam element using polynomial in Cartesian coordinate system. [8]

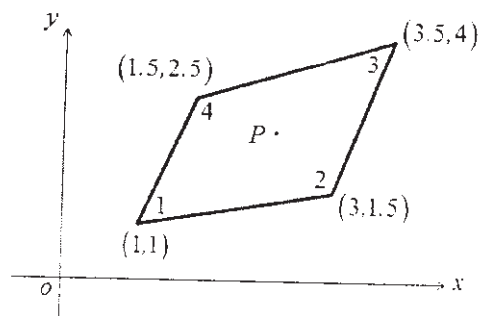
- Q7) a)** Determine Cartesian coordinates of the point P ($\xi=0.8, \eta=0.9$) as shown in Figure. **[8]**



- b) Explain in brief isoparametric, superparametric and subparametric elements with suitable example. **[8]**

OR

- Q8)** Derive the Jacobian matrix for the four noded quadrilateral isoparametric elements as shown in Figures. **[16]**



Total No. of Questions : 10]

SEAT No. :

P3982

[4959]-1021

[Total No. of Pages :2

B.E.(Civil)

CONSTRUCTION MANAGEMENT

(2012 Course)(End Sem)(Elective-IV) (Semester-II) (401010)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 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) Infrastructure development in india has contributed majorly in the country's economic transformation and growth during the last decade. Justify the statement **[5]**

b) Draw a work break down structure for road project **[5]**

OR

Q2) a) Discuss in detail various factors affecting project scheduling **[5]**

b) Write short note on: Balance sheet **[5]**

Q3) a) Explain the term "Project Management Consultancy" **[5]**

b) What are the objectives of Method study **[5]**

OR

Q4) a) Discuss the various aspects of Building & Other construction workers act 1996 **[5]**

b) Write short note on: Need of working capital **[5]**

Q5) a) What are the various steps involved in mitigation of risk **[6]**

b) Explain in details value analysis procedure **[6]**

c) What are the various application of value engineering in construction sector **[6]**

OR

P.T.O.

- Q6)** a) Write short note on: [8]
i) Simulation Analysis
ii) Decision tree analysis
- b) Discuss in detail Renewable & Non Renewable energy sources. [6]
c) What are the various advantages of value analysis. [4]
- Q7)** a) What are the objectives of material management [6]
b) A construction company purchases 10,000 bags of cement annually. Each bag of cement cost Rs.350/- and cost incurred in procuring each lot is Rs. 100/-. The cost of carrying is 25%. Find EOQ. [6]
c) Discuss in detail objectives of performance appraisal. [4]

OR

- Q8)** a) Write short note on: [8]
i) Classification of Materials
ii) Codification of Materials
- b) Define the term staffing. What are the various internal factors affecting staffing. [4]
c) Explain the need of Human Resource development in construction project. [4]
- Q9)** a) Explain in detail importance of artificial intelligence in infrastructure projects [6]
b) Define neural network. What is forward and backward propagation in ANN? [6]
c) What are the applications of fuzzy logic [4]

OR

- Q10)**a) Write short note on: Genetic Algorithm [6]
b) Explain the concept of biological neural networks. [6]
c) What is an expert system? Write down the applications of expert system in construction. [4]



Total No. of Questions : 10]

SEAT No. :

P4934

[Total No. of Pages : 5

[4959]-1022

B.E. (Civil)

ADVANCED TRANSPORTATION ENGINEERING

(Elective - IV(B))

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) Figures to the right indicate full marks.

Q1) Explain the following models in brief.

- a) Fratar model [5]
- b) Furness model [5]

OR

Q2) Explain the gravity model used for trip distribution, in detail. [10]

Q3) Compare and contrast between.

- a) ARR and IRR [5]
- b) NPV and B/C ratio [5]

OR

Q4) a) Discuss the limitations of the BOT types of projects implemented in the highway sector in Maharashtra. How these limitations can be overcome? [4+2]

- b) Explain the salient aspects of the proposed Mumbai - Nagpur superfast expressway; including the benefits from the project. [4]

Q5) a) Explain with an example the moving vehicle survey method used for determining the journey times as well as the delay times, also for determining the hourly traffic flow. [10]

- b) Explain grade separated intersection with a neat labelled sketch, highlighting the necessity as well as the salient features. [6]

OR

P.T.O.

Q6) Explain the process of :

- a) Synchronizing the traffic control signals with the traffic intensity considering mixed flow conditions and the turnings provided. [6]
- b) Conducting parking surveys and utilizing the data generated for reducing congestion. [4]
- c) Carrying out traffic studies based on use of modern technology including sensors and automation. [6]

Q7) a) Elaborate on the modifications and the provisions made in the IRC - 37, (2012) edition of the guidelines on the design of flexible pavements as compared with the previous edition. [6]

b) Design a flexible pavement for the following data and draw a typical cross - section: [10]

- i) 2 lane single carriageway
- ii) Initial traffic in the year of completion in both directions together - 2000 CVPD.
- iii) Traffic growth rate - 4%
- iv) Design life - 12 years.
- v) Terrain - rolling.
- vi) C.B.R. for subgrade varies between 4% to 5%.

OR

Q8) a) Explain the procedure and the computations involved in the conduct of the benkelman beam deflection method as per the IRC codal provisions. What are the advantages and limitations of this method? Elaborate. [7+3]

b) Explain the following:

- i) AASHTO guidelines [3]
- ii) Measurement of skid resistance and its importance. [3]

- Q9) a)** Design an overlay as per IRC - 81 for the following data: **[12]**
- i) Four lane carriageway.
 - ii) Initial traffic before start of the construction, considering two way traffic in both directions - 4500 CVPD.
 - iii) Total construction period - 2 years.
 - iv) Traffic growth rate - 8%
 - v) Design life - 10 years
 - vi) Average annual rainfall - 120 cms
 - vii) Characteristic deflection of existing pavement - 0.600mm.
 - viii) Average temperature - 38°C.
 - ix) Subgrade soil : clayey.
 - x) Plasticity index is more than 15 and based on the moisture content and the rainfall value, consider a correction factor of 1.050.
 - xi) Terrain - rolling.
- b) Discuss the advantages of rigid pavements over the flexible pavements. **[6]**

OR

- Q10)a)** Elaborate on the modifications and the provisions made in the IRC - 58, (2012) edition of the guidelines on the design of rigid pavements as compared with the previous edition. **[6]**
- b) Design the tie bars considering plain bars, for the following data: **[8]**
- i) Slab thickness - 32 cms.
 - ii) Lane width - 4 m.
 - iii) Coefficient of friction - 1.5
 - iv) Concrete density - 2350 kg/m³
 - v) Allowable tensile stress in the plain bar - 1150kg/cm²
 - vi) Allowable bond stress in the plain bar - 16 kg/cm²
 - vii) Diameter of tie bar - 10 mm
 - viii) Consider concept of the loss of bond.
- c) Explain PCR and its importance in distress surveys. **[4]**

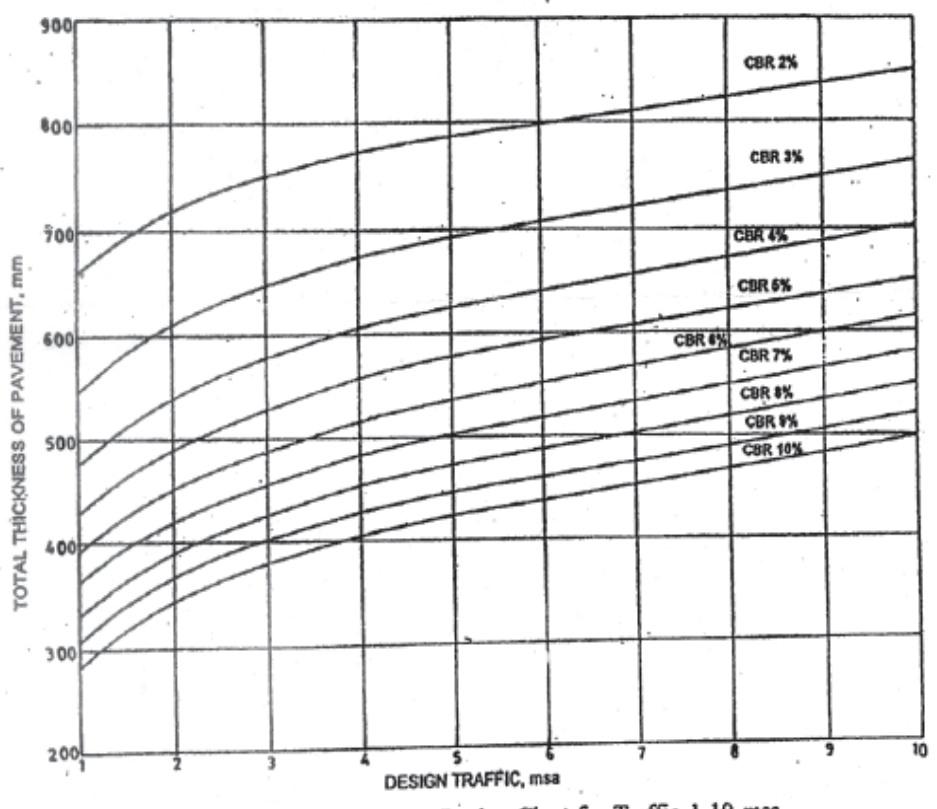


Fig. 1. Pavement Thickness Design Chart for Traffic 1-10 msa

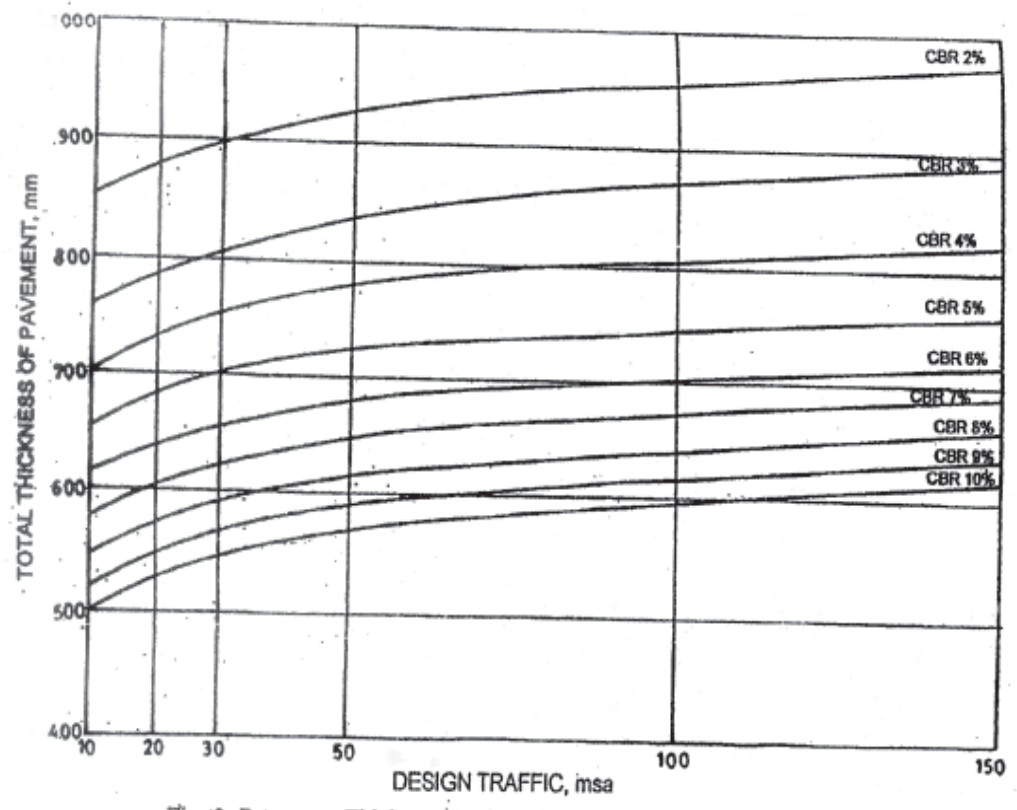


Fig. 2. Pavement Thickness Design Chart for Traffic 10-150 msa

$$h = R \log_{10} \frac{\Delta_0}{\Delta}$$

Where h = thickness of granular overlay (WBM) in mm

Δ_0 = Characteristics deflection,

Δ = allowable deflection

R = Constant, whose value may be taken as 550.

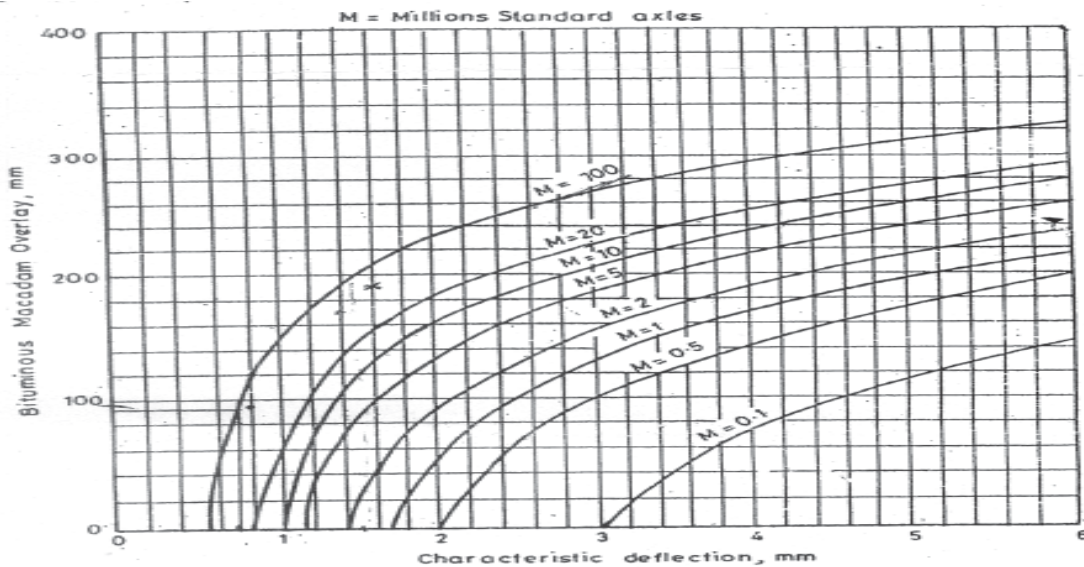


Fig. 25.1. Overlay thickness design curves (IRC).

The latest, IRC guidelines (1997) (Ref.1), does away with the above equation (25.4) and on the other hand, gives a set of curves for determining the overlay thickness. These curves are given in fig. 25.1 The thickness is in terms of bituminous macadam construction. In case other materials are used, the following conversion factors are adopted:

1 cm of bituminous macadam = 1.5 cm of WBM/ WMM/BUSG
 = 0.7 cm of Dense Bituminous
 Macadam/

Bituminous concrete/Semi- Dense
 Bituminous concrete.

25.3.3 TRRL procedure

A detailed procedure for overlay design has been developed by TRRL (Ref.2.) The method is based on extensive measurements of surface deflection and their relationship with.



Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 4

P3664

[4959]-1023

B.E. (Civil)

**STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS
(2012 Course) (Elective-IV) (401010 C) (Semester-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) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Use of electronic pocket calculator is allowed in the examination.*
- 5) *Use of cell phone is prohibited in the examination hall.*

Q1) a) Explain False Position Method with suitable example. **[4]**

b) By using Bisection Method, find an approximate root of equation:
 $\cos x = 1/x$, that lies between $x = 1$ and $x = 1.5$. Carry out computations upto 3 iterations. **[6]**

OR

Q2) a) Explain Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule and its applications with suitable examples. **[5]**

b) Evaluate $\int_0^{\pi} \sin x \, dx$ by using Gauss Legendre two point formula. **[5]**

Q3) a) Write short notes on: **[4]**

- i) Gauss two point formula.
- ii) Trapezoidal Rule and its use.

b) Solve the following equation by Gauss Jordan Method **[6]**

$$x + y + z = 8$$

$$2x + 3y + 4z = 18$$

$$4x + 3y + 2z = 15$$

OR

P.T.O.

Q4) a) Explain optimization techniques and its applications. [4]

b) Solve by Gauss Elimination Method [6]

$$x_1 + x_2 - x_3 = 5$$

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

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

Q5) a) Explain the role of statistics in engineering applications. [3]

b) From the following data calculate mean, mode and median. [6]

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
Number of Students	29	224	465	582	634	644	650	653	655

c) The following table gives length of life in hours for 400 excavators. [7]

Length of life (hours)	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	2400-2599
Number of excavators	12	30	65	78	90	55	36	25	09

Calculate:

- Average length of life of an excavator.
- Standard deviation of the length of life of excavator.
- The percentage number of excavators where length of life of excavator falls within $\bar{X} + 2\sigma$

OR

Q6) a) What are various relationships between measures of dispersion. [3]

b) In a survey of 35 families in a village, the number of children per family recorded and the following data obtained:

1, 0, 2, 3, 4, 5, 6, 7, 2, 3, 4, 0, 2, 5, 8, 4, 5, 12, 6, 3, 2, 7, 6, 5, 3, 3, 7, 8, 9, 7, 9, 4, 5, 4, 3.

Represent the data in the form of a discrete frequency distribution. [6]

- c) Goals scored by two teams in a football match are as follows: [7]

No. of goals scored in a football match	No. of football matches played	
	Team "A"	Team "B"
0	15	20
1	10	10
2	07	05
3	05	04
4	03	02
5	02	01
Total	42	42

Calculate coefficient of variation and state which team is more consistent.

- Q7)** a) A fair dice is tossed twice. Find the probability of getting a 4, 5 or 6 on the first toss and 1, 2, 3 or 4 on the second toss. [4]
- b) In a distribution exactly normal 6% of items are under 30 and 75 are under 60. What is the mean standard deviation distribution and normal distribution. [6]
- c) Explain χ^2 test and write constant of χ^2 distributions. [7]

OR

- Q8)** a) To test a desirability of a certain modification in typists desks, 9 typists were given 2 tests of nearly as possible the same nature, one on the desk in use and the other on the new type. The following difference in the number of words typed per minute were recorded: [6]

Typists	A	B	C	D	E	F	G	H	I
Increase in no. of words	2	4	0	3	-1	4	-3	2	5

Does the data indicate the modification in desk promotes speed in typing? [6]

- b) A coin is tossed six times what is the probability of obtaining four or more heads? Use Binomial method. [5]

- c) Fit a Poisson Distribution to the following data and calculate theoretical frequencies: [6]

Deaths	0	1	2	3	4
Frequency	122	60	15	02	01

- Q9) a) Calculate the Karl Pearson's co-efficient of correlation between expenditure and sale. [8]

Expenditure	39	65	62	90	82	75	25	98	36	78
Sales	47	53	58	86	62	68	60	91	51	84

- b) Height of the two buildings A and B are given below. Find Height of the building B, when the height of the building A is 70ft. [9]

Ht of Building 'A' (ft)	71	68	66	67	70	71	70	73	72	65	66
Ht of Building 'B' (ft)	69	64	65	63	65	62	65	64	66	59	62

OR

- Q10)a) Using Newton's method of interpolation estimates from the following data the number of employees carrying Rs. 240 or more but less than Rs. 250 per day. [9]

Earning less than	200	250	300	350	400
No. of workers	296	599	804	918	466

- b) From the following data obtain the regression equation. [8]

x	6	2	10	4	8
y	9	11	5	8	7



Total No. of Questions : 10]

SEAT No. :

P3983

[4959]-1024

[Total No. of Pages :2

B.E.(Civil)

PLUMBING ENGINEERING

(2012 Course)(Semester-II)(Elective-IV)(Open Elective)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 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 norms for water quality as per CPCB and also explain plumbing for public health engineering. **[6]**

b) Write a note on Green Plumbing Code Supplement India(GPCS-I) **[4]**

OR

Q2) a) Describe the role of Plumbing consultant while executing plumbing work in the building industry. **[6]**

b) Explain local laws laid down by municipal corporation for plumbing regarding rain water harvesting **[4]**

Q3) a) Comment on workmanship and minimum standards in plumbing. **[5]**

b) Explain how hot water is distributed considering safety, and energy conservation. **[5]**

OR

Q4) a) State velocity, pressure, temperature limitations in plumbing and Explain its importance in plumbing design. **[6]**

b) How backflow is prevented in water supply and what is its importance in plumbing **[4]**

Q5) a) Explain horizontal wet vent and vertical wet vent with neat sketch. **[8]**

b) Comment on “plumbing system needs to breathe”. State maximum value of pneumatic pressure difference in Pascal’s so that the seal is protected, State vent terminals as per code. **[10]**

OR

P.T.O.

- Q6)** a) How does grease trap works explain with neat sketch also explain its maintenance? [8]
b) State the trap requirements as per uniform plumbing code for [10]
i) Design of trap
ii) Trap seal and trap seal protection
iii) Trap setting and protection

- Q7)** a) State requirements of a sanitary closet. Explain Washout Water Closets & Hopper Closets with neat sketch. [8]
b) Explain drainage air test & drainage water test procedures. [8]

OR

- Q8)** a) Explain sizing of house drain & sizing its vent pipe. [8]
b) Explain basic guide to calculate falls and gradients for drainage. [8]

- Q9)** a) Explain RCC, PVC, Nu-Drain, and Stoneware for building sewers. [8]
b) Explain requirements for brick built manholes for sewer line with neat sketch. [8]

OR

- Q10)** a) Explain design of plumbing systems for multi-storey buildings [8]
b) Explain drainage system considerations for multi-storey buildings. [8]



Total No. of Questions : 8]

SEAT No. :

P3665

[Total No. of Pages : 2

[4959]-1025

B.E. (Civil)

GREEN BUILDING TECHNOLOGY

(2012 Course) (Semester-II) (Open Elective) (End Sem.)

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

- Q1)** a) Explain how different green materials are applied for interior and exterior building components. [6]
- b) Write a short note on climate responsive - architecture. [7]
- c) Why EIA is said to be strategic tool for sustainable development? [7]

OR

- Q2)** a) Write a note on Indoor Environmental Quality and the materials affecting the same. [7]
- b) Write a note on building envelop and factors affecting the same. [7]
- c) Discuss in brief the energy management system of a residential township- (flow chart is expected). [6]

- Q3)** a) Write a note on solar energy and its applications; (sketch expected). [8]
- b) Explain with neat sketch, "Composting Methods". [8]

OR

- Q4)** a) Write a note on wind energy and its applications. [8]
- b) How will you achieve maximum daylight and ventilation in multistoried buildings with different orientations of buildings.
(Explain with suitable sketches) [8]

P.T.O.

- Q5)** a) What is the importance of CDM? What is its impact in relation with developed and developing countries? [9]
- b) Write a note on Kyoto protocol. [8]

OR

- Q6)** a) Explain with flow chart, various stages under CDM. [9]
- b) Discuss in detail the salient features of ECBC code. [8]

- Q7)** a) What is the significance of rating systems in sustainable urban development? [8]
- b) Explain in detail, “LEED - India” rating system. [9]

OR

- Q8)** a) What benefits are given to, “Rated Buildings”. [8]
- b) Compare and contrast between “BREEAM and Estimada”. [9]



Total No. of Questions : 8]

SEAT No. :

[Total No. of Pages : 3

P3666

[4959]-1026

B.E. (Civil Engineering)

FERROCEMENT TECHNOLOGY

(End Sem.) (2012 Pattern) (Elective-IV) (Semester-II) (Open Elective)

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) Write prescriptions where indicated and in the use of drugs their doses should be given.*

- Q1) a)** Discuss 'raw materials' & 'tools' required for Ferrocement construction. **[6]**
- b) Discuss 'three stage behavior of ferrocement in tension'. **[6]**
- c) Discuss strength through shape for structural elements. **[6]**

OR

- Q2) a)** Discuss 'Ferrocement as substitute for conventional building materials'. **[6]**
- b) Discuss the methods of mortar application while constructing the ferrocement elements. **[6]**
- c) What are the various recommendations made by ACI for designing a ferrocement structure. **[6]**

- Q3) a)** Write note on building components using ferrocement, discuss 'ferrocrete floors' in detail. **[8]**
- b) Determine the quantities for a ferrocement hemisphere dome.

The dome thickness is 40mm and base diameter as 8m with central height 2m skeletal steel - 8mm dia bars, 400 mm c/c circumferentially and 500 mm c/c radially at the base.

P.T.O.

The mesh reinforcement consisting of 2 layers of weldmesh, one on each face of size $100 \times 100\text{mm} \times 10 \times 10\text{g}$ and 4 layers of chicken mesh.

$13 \times 13\text{mm} \times 24 \times 24\text{g}$ (two on each face) being tied tightly over the skeleton and impregnated with cement mortar of 1:2 mix by volume.[10]

OR

Q4) a) Explain earthquake resistant properties of ferrocement. [8]

b) Determine quantities of material required for a ferrocement partition wall 30mm thick of size $5\text{m} \times 2\text{m}$. [10]

Skeletal steel → 8mm dia, 500mm c/c in both direction.

Weld mesh → $150\text{mm} \times 150\text{mm} \times 12 \times 12\text{g}$

Chicken mesh → 2 layers, (one layer on each face)

$13 \times 13\text{mm} \times 24 \times 24\text{g}$

rich cement mortar 1:3 mix by volume.

Q5) a) What are the advantages of ferrocement for using it for water retaining structures. [5]

b) Discuss various types of tanks, those can be constructed using ferrocement. [6]

c) Explain components of ferrocement retaining wall. [6]

OR

Q6) a) Enlist various types of retaining walls and explain counterfort retaining wall. [6]

b) Write note on 'Ferrocement Water proofing'. [5]

c) Discuss Ferrocement septic tanks. [6]

- Q7)** a) Discuss various types of large size structures and their purpose. [6]
b) Write note on design of ferrocement transmission line poles. [5]
c) Enlist various ferrocement structures those can be cast using precast technique. [6]

OR

- Q8)** a) Explain factors which influence the choice of casting between precast and cast-in-situ method. [6]
b) Write note on Ferrocement Domes. [6]
c) Discuss use of ferrocement for hydraulic structures. [5]



Total No. of Questions :10]

SEAT No. :

[Total No. of Pages : 2

P3667

[4959]-1027

B.E. (Civil)

SUBSEA ENGINEERING

(2012 Course) (Open Elective) (Elective-IV) (Semester-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 sketches must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of non-programmable calculator.*
- 5) *Assume suitable data, if necessary.*

Q1) a) Sketch typical subsea oil exploration set up showing important components. **[4]**

b) Explain the over view of oil and gas industry with its international scenario. **[6]**

OR

Q2) a) Draw neat diagram showing components of subsea establishment for oil exploration. **[4]**

b) Explain the over view of oil and gas industry with its international scenario. **[6]**

Q3) a) Explain technological challenges as Civil Engineer for sub sea oil exploration. **[6]**

b) Differentiate between shallow and deep water oil exploration with respect to geography, Potential, technological challenges in exploration, route for development of oil exploration. **[4]**

OR

Q4) a) Explain relation between major components of subsea production system with the help of suitable flow chart. **[6]**

b) State hoe shallow water and deep water oil exploration influences subsea production system. **[4]**

P.T.O.

- Q5)** a) Write the purpose/function of each subsea system in oil exploration process. [8]
- b) Explain role of unmanned and manned intervention method for subsea oil exploration. [8]

OR

- Q6)** a) Explain the design features of subsea pipe line system. [8]
- b) Explain how electrical, acoustic, hydraulic systems work for application in subsea engineering. [8]

- Q7)** a) Explain with suitable illustration economic decision in field development. [8]
- b) Explain civil engineering risks at field development. [9]

OR

- Q8)** a) Explain types of foundations at subsea establishments. [9]
- b) Explain load considerations for subsea foundation design. [8]

- Q9)** a) Sketch typical off shore trussed structures showing typical design loads under consideration. [9]
- b) Discuss typical design options available for deep water pipe/riser design. [8]

OR

- Q10)**a) Water pipe of 60mm diameter contains oil pressure head 100mm. Find the thickness of metal required if weight of oil is 8500 N/m^3 , when $D/t \geq 31$ and $D/t \leq 30$. Density of sea water 10300 N/m^3 and permissible stress in metal is 250 MPa. [9]
- b) Write short note on design parameters of manifold. [8]



Total No. of Questions :12]

SEAT No. :

P3668

[Total No. of Pages : 3

[4959]-1028

B.E. (Civil)

MECHANICS OF WAVES

(2012 Course) (Elective-IV) (Open Elective) (401010 DV) (Semester-II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt 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) *Your answer will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

Q1) a) Discuss classification of waves in detail. **[4]**

b) Write a short note on WAVEWATCH III: a numerical model. **[3]**

OR

Q2) a) Define fully developed sea, partially developed sea, swell. **[4]**

b) Write a short note on SWAN: a numerical model. **[3]**

Q3) a) Derive equation for celerity starting from linear dispersion relationship. **[3]**

b) Enlist assumptions made in wave theories. **[4]**

OR

Q4) a) For a wave height of 2.5m and 10 sec period obtain maximum horizontal and vertical displacement of water particle with mean position at (i) SWL (ii) sea bed. Depth of sea bed = 12m. **[4]**

b) Derive expression for group wave velocity. **[3]**

P.T.O.

- Q5) a)** Write short notes on wave breaking, wave set up. [2]
- b) A wave of significant height 3.5m and period 10 sec in deep water travels towards shore parallel to bed contours. If its crest makes an angle of 30 with bed contour of 12m before refraction calculate wave height after crossing the contour. [4]

OR

- Q6) a)** Write a short note on shoaling. [3]
- b) Draw sketches for wave refraction in different cases. [3]

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

H_s (in m)	0	1	2	3	4	5
No. of observations	1198	999	322	112	15	2

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

- b) Write short note on Pierson-Muskowitz Spectrum. [4]
- c) What is long term wave height statistics? Name various distribution used to achieve the same while explaining Weibull distribution in detail. [6]

OR

- Q8) a)** The annual maximum wave heights observed at Pondecherry in m are as follows; 4, 5.23, 3.77, 5.88, 4.53, 4.59, 3.94, 3.12, 3.42, 6.96, 6.24, 4.43, 2.05, 5.23, 2.34, 1.25, 1.67, 3.45, 3.67, 2.35. Find wave height of 50 year return period. For $N = 20$, $\bar{y}_n = 0.5236$, $S_n = 1.0628$. [6]
- b) Write short note on JONSWAP method. [4]
- c) Distinguish between short term analysis-long term analysis, probability density function-probability distribution function. [6]

- Q9) a)** Draw neat figure for describing typical beach profile and explain the terms: the beach and near shore zone. [4]

- b) What are the man made causes of shore line erosion, elaborate in detail. [6]
- c) What are the different shore protection methods, explain in detail. [6]

OR

- Q10)a)** Define the sea, surf zone, currents, tides, storm surge, tsunamis. [5]
- b) What are the natural causes of shore line erosion, elaborate in detail. [5]
 - c) Write note on: [6]
 - i) Normal shore response.
 - ii) Beach response to storms.

- Q11)a)** What are the profiles? What is profile accuracy? Mention four types of errors related to profile accuracy? [6]
- b) Explain in detail two zone of littoral transport. [6]
 - c) Determine the total sediment transport due to waves and currents for the following data. Consider a deep water wave of height 2m period = 10 secs and with 70° angle. Adopt Bijker's formula for estimating bed load transport. [6]

Data: $\rho_w = 1025 \text{ kg/m}^3$, $\nu = 10^{-6} \text{ m}^2 / \text{s}$, $U = 0.7 \text{ m/s}$, $\rho_s = 2650 \text{ kg/m}^3$, $s = 2.59$, $h = 2.5 \text{ m}$, $d_{50} = 0.20 \text{ mm}$, $H_r = k_s = 100 \times d_{50}$, $w_s = 0.025 \text{ m/s}$, $k = 0.4$.

OR

- Q12)a)** Determine the sediment transport rate along a coast for the following conditions. $H_0 = 5 \text{ m}$, $T = 12 \text{ sec}$. Angle of wave approach in deep waters $\alpha_0 = 30^\circ$ and breaker index $K_i = 0.78$. [6]
- b) What is Littoral drift? Explain how it occurs with neat diagrams. [6]
 - c) What is onshore and offshore transport and sediment effects on it. [6]



Total No. of Questions :10]

SEAT No. :

[Total No. of Pages :6

P3669

[4959] - 1031

B.E. (Mechanical)

REFRIGERATION AND AIR - CONDITIONING

(2012 Course) (Semester - I) (402041)

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) *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 are the limitations of Reversed Carnot cycle? **[4]**

b) Define followings terms: **[6]**

- i) ODP
- ii) GWP
- iii) LCCP
- iv) EER
- v) SEER
- vi) IPLV

OR

Q2) a) Give the layout of an ice - plant and explain briefly how ice is manufactured. **[4]**

b) A Freon 12 Simple Vapour compression system operating at a condenser temperature of 40°C and an evaporator temperature of 0°C develops 15 tons of refrigeration. Using the P- h diagram for Freon 12, Determine; **[6]**

P.T.O.

- i) The discharge temperature and mass flow rate of refrigerant circulated.
- ii) The theoretical piston displacement of the compressor and piston displacement per ton of refrigeration.
- iii) The theoretical horse power of the compressor and horse power per ton of refrigeration.
- iv) The heat rejected in the condenser
- v) The Carnot COP and actual COP of the cycle.

- Q3)** a) Discuss why refrigerators are so selected that evaporator pressures and condenser pressures are greater than atmospheric pressure? [4]
- b) Mention the function of each fluid in a three fluid vapour absorption system. [6]

OR

- Q4)** a) Draw neat compact diagram of Lithium bromide water absorption refrigeration system and explain its working. List out the major fields of application of this refrigeration system. [6]
- b) Draw a vapour compression system having individual compressors with compound compression and flash intercooling. [4]

- Q5)** a) Moist air at standard atmospheric pressure is passed over a cooling coil. The inlet state - DBT 30°C, RH 50% and exit state - DBT 15°C, RH 90%. Show the process on psychrometric chart. Determine the amount of heat and moisture removed per kg of dry air. [6]
- b) Calculate:
- i) Relative humidity
 - ii) Humidity ratio
 - iii) Dew point temperature
 - iv) Density
 - v) Enthalpy of atmospheric air when the DBT is 35°C, WBT is 23°C and barometer reads 750 mm of Hg. [10]

OR

- Q6)** a) Derive an expression for specific humidity and show that it is a function of vapour pressure and barometric pressure of air. [6]
- b) A building has the following calculated cooling loads: [10]
 RSH gain = 310 kW, RLH gain = 100kW
 The space is maintained at the following conditions:
 Room DBT = 25°C, Room RH = 50%
 Outdoor air is at 28°C and 50% RH. And 10% of mass of air supplied to the building is outdoor air. If the air supplied to the space is not to be at a temperature lower than 18°C, Find:
- Minimum amount of air supplied to space in m³/s.
 - Volume flow rates of return air, exhaust air and outdoor air
 - State and volume flow rate of air entering the cooling coil
 - Capacity, ADP, BPF and SHF of cooling coil

- Q7)** a) State the factors which should be taken into consideration while selecting a system of air-conditioning. [6]
- b) Explain briefly the following control devices: [8]
- Thermostats
 - Automatic humidity control
 - Air movement control
 - Automatic temperature control
- c) Enumerate the functional elements of a control unit. [4]

OR

- Q8)** a) Explain briefly the following types of reciprocating compressors: [6]
- Open type vertical reciprocating compressor
 - Semi sealed type
 - Hermetically sealed type
- b) Give the main types of condensers in use with specific application of each type. [6]
- c) Explain with neat sketches the following evaporators: [6]
- Flooded type evaporator
 - Dry expansion evaporator

Q9) a) Define the following as applied to 'Air distribution': **[8]**

Intake, Outlet, Grille, Register, Diffuser, Throw, Drop and Primary air.

b) The main supply air duct of an air - conditioning system is 100cm X 90 cm in cross section and carries 10m³/s of air. It branches off into two ducts, one 80cm X 80cm and the other 80cm X 60 cm, if the mean velocity in the larger branch is 9m/s, find the mean velocities in the main duct and smaller branch. **[8]**

OR

Q10)a) Explain any two of the following air distribution system: **[6]**

i) Ejector system

ii) Downward system

iii) Upward system

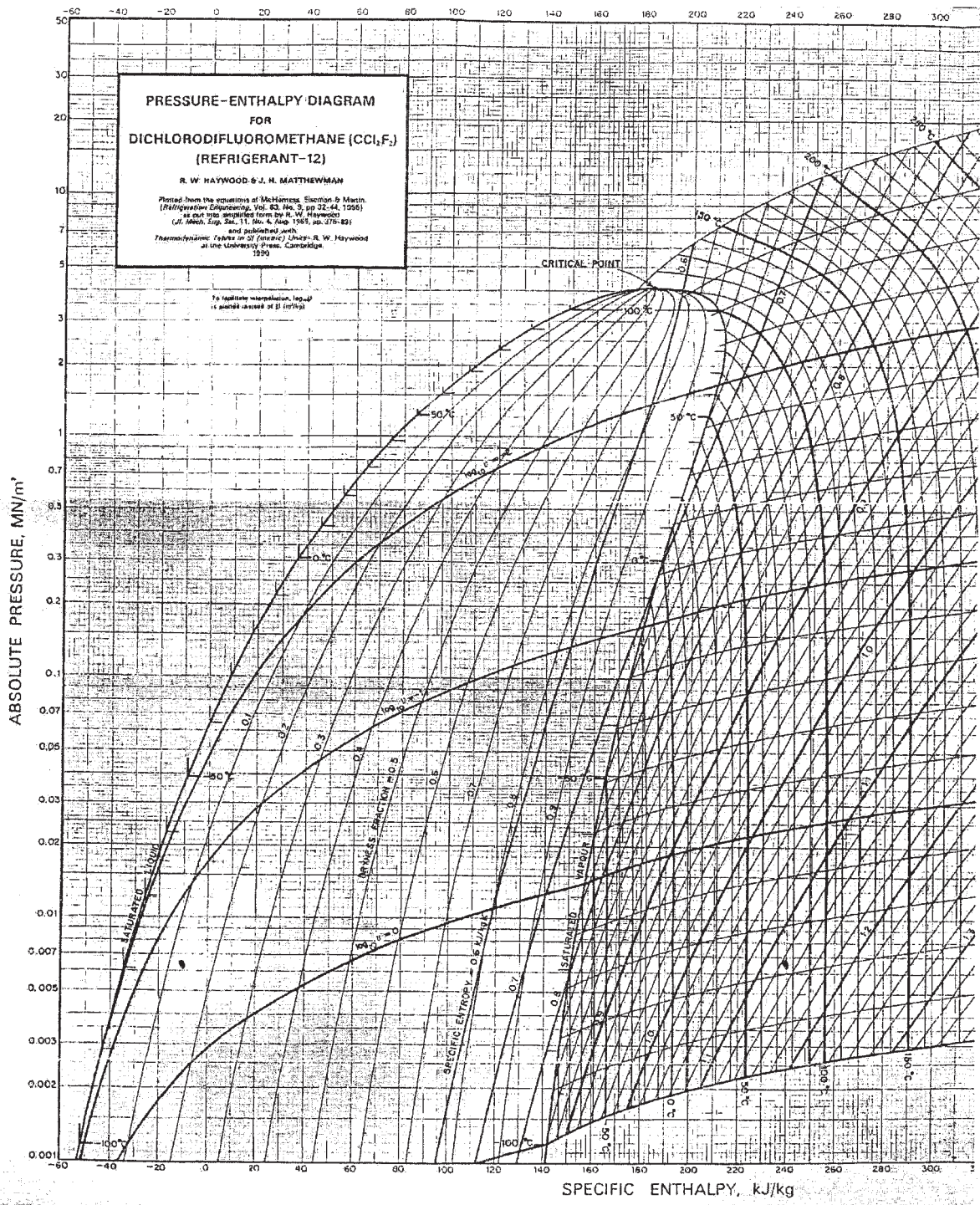
b) A centrifugal fan with 90cm X 70cm outlet is moving standard air at a rate of 11.5m³/s through a system which consists of straight inlet and outlet ducts. The inlet duct is 90 cm in diameter and 15m long. The outlet duct is 100cm in diameter and 60m long. There is a fan diffuser between the fan discharge and the 100cm diameter duct for which the pressure loss is one third the difference in velocity pressures. The pressure drop at the filter, damper and cooling coil in the inlet duct is 15mm H₂O. The loss at the entry to the inlet is 0.5 X velocity pressure. The friction factor for the outlet duct is 0.0035 and that for the inlet duct is 0.004.

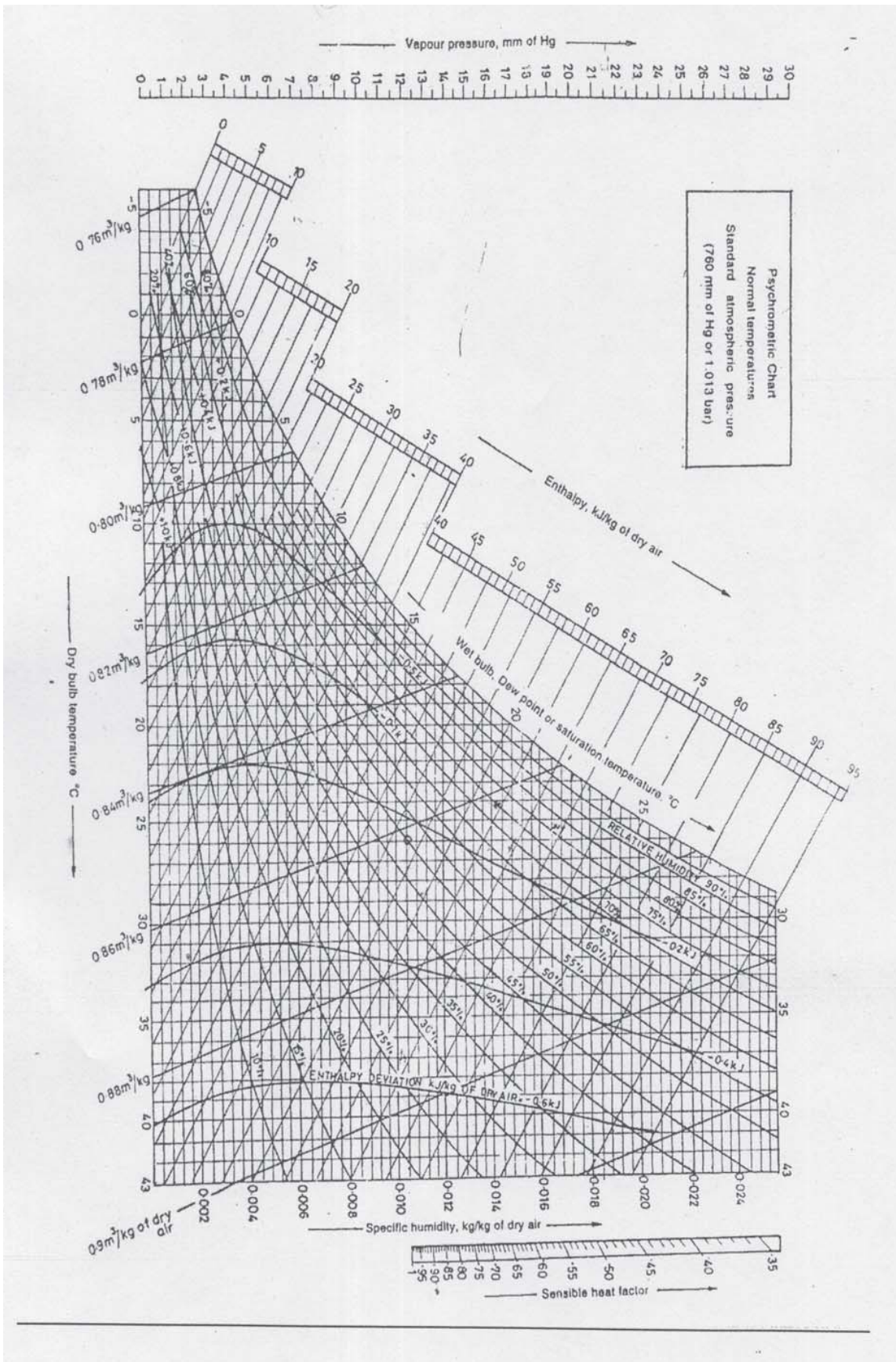
i) Determine the fan total pressure

ii) Determine the static pressures at fan inlet and outlet

The air is sucked in by the inlet duct and delivered by the outlet at atmospheric pressure. **[10]**

Pressure-enthalpy diagram for Freon 12





Total No. of Questions :10]

SEAT No. :

P3670

[Total No. of Pages :4

[4959] - 1032

B.E. (Mech.)

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

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Answer in one answer books.*
- 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) A Line PQ has coordinates P (5, 5) and Q (5, 105). Find the new coordinates of line if line is transformed to make it horizontal, keeping point P intact. [6]
- b) Compare Hermit cubic spline, Bezier curve and B - Spline curve. [6]

OR

- Q2)** a) Write a short note on Constructive Solid Geometry (CSG) technique.[4]
- b) For the loading shown in fig. 1, find nodal displacements, elemental stresses and support reaction. [8]

Geometrical information: Cross section area = 225 mm² and Length = 300 mm.

Material Properties: E = 80,000 N/mm².

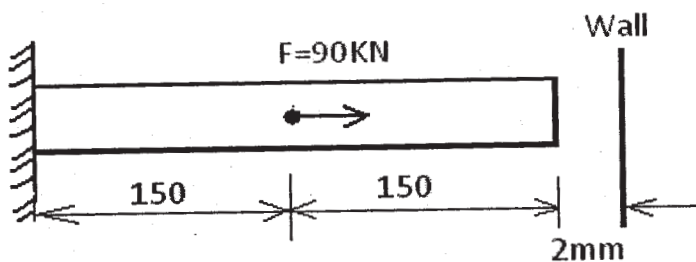


Fig.1

P.T.O.

- Q3)** a) Write a short note on Concatenated Transformation with examples. [4]
 b) Derive a relation between Local coordinate and Global coordinate systems in FEM. [4]

OR

- Q4)** a) Compare Solid Modeling with Wire - frame Modeling. [4]
 b) Explain Direct stiffness method to compute Element Stiffness Matrix of 1 - D element. [4]

- Q5)** a) Write a short notes with neat sketch on following: [8]

- i) Direct Numerical Control (DNC) system.
 ii) Tool radius and length compensation in milling.

- b) Write a manual part program for milling and drilling the machine part as shown in fig.2, using G and M codes. Assume suitable data for speed, feeds

- Thickness of plate is 20mm. Use *cuter radius compensation* for milling.
- Use *Peck - drill* cycle for drilling at (0, 0): Diameter 10 mm and Depth 15 mm. [10]

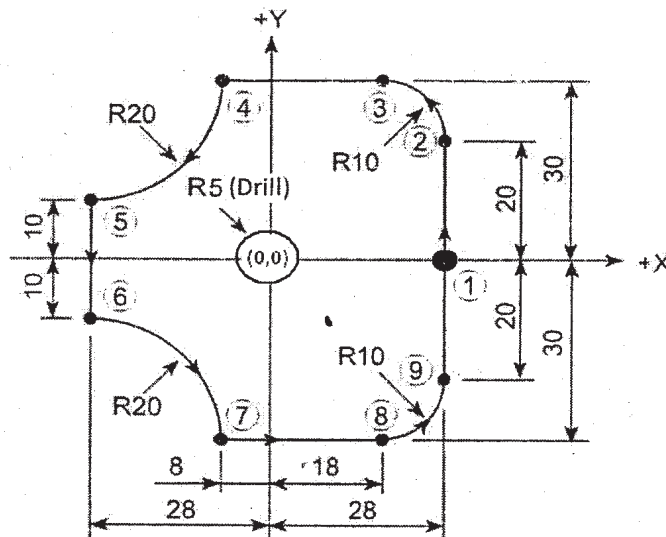


Fig.2 (All dimensions are in mm)

OR

Q6) a) Write a complete part program using G and M codes for the job shown in fig. 3. Assume suitable speed and feed for machining. [12]

- **Billet size** - Diameter: 60 mm and Length: 90 mm.
- **Thread:** Major Diameter, $D_0 = 20$ mm, Minor Diameter, $D_c = 17$ mm and Pitch: 2.5mm, Groove: Width = 5 mm and depth = 2.5 mm.

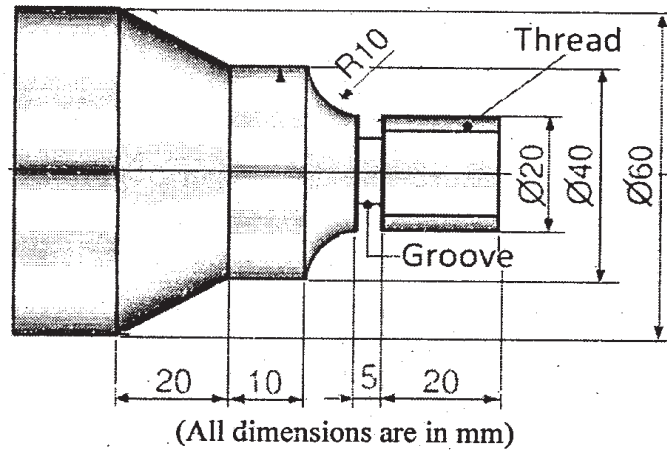


Fig.3

b) Explain with neat sketch: Machine Origin, Work Piece Origin and Program Origin. State importance of each. (*Origin may be treated as Reference*) [6]

Q7) a) Write steps in **Laminated Object Manufacturing** with neat Sketch. State its applications. [8]

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

OR

Q8) a) Write steps in **Stereo lithography process** with neat sketch. State its limitations. [8]

b) Explain different steps in **Rapid Prototyping (RP) Systems**. Also write a short note on Rapid Tooling. [8]

- Q9)** a) Define Industrial Robot. Explain 04 Parameters in robot selection. [8]
- b) How does FMS ensure *Flexibility* in Manufacturing? Explain elements of FMS. [8]

OR

- Q10)**a) Explain the term “*Work Volume or Work Envelope*” of Robot. List various work volumes. [8]
- Explain *Cylindrical Robot Work Envelope*.
- b) What is Group Technology (GT)? Discuss machine cell design in GT? [8]



Total No. of Questions :10]

SEAT No. :

P3671

[4959]-1033

[Total No. of Pages :4

B.E. (Mechanical)

Dynamics of Machinery

(2012 Course) (End Sem) [402043]

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) *Draw Neat diagrams wherever necessary.*
- 4) *Use of scientific calculator is allowed.*
- 5) *Assume suitable data wherever necessary.*
- 6) *Figures to the right indicate full marks.*

- Q1) a)** Why single cylinder engines cannot be balanced completely? **[4]**
- b) A 3 cylinder radial engine has cylinders located 120° from each other. Reciprocating mass of each cylinder is 1.2 kg. Length of crank is 75 mm and each connecting rod is 250 mm long. Find out maximum primary and secondary unbalance forces, if the engine runs at 2500 rpm. **[6]**

OR

- Q2) a)** Explain with displacement-time plot, the overdamped, critically damped and underdamped vibratory systems. Give suitable examples **[4]**
- b) A spring mass system has spring stiffness “k” N/m and a mass of “m” kg it has natural frequency of vibration as 12 Hz. An extra 2 kg mass is coupled to “m” and the natural frequency reduces by 2Hz Find the values of k and m. **[6]**
- Q3) a)** Define the following terms related to vibrations: **[4]**
- i) Logarithmic decrement.
 - ii) Damping coefficient.
 - iii) Damping factor.
 - iv) Critical damping coefficient.

P.T.O.

- b) A horizontal spring mass system with Coulomb damping has a mass of 5.0 kg attached to a spring of stiffness 980 N/m. If the coefficient of friction is 0.025, calculate. [6]
- The number of cycles corresponding to 50% reduction in amplitude, if the initial amplitude is 50 mm.
 - The time taken to achieve this 50% reduction.

OR

- Q4)** a) Explain frequency response curve with neat diagram. [4]
- b) Derive an expression for magnification factor for steady state amplitude of vibration subjected to external excitation $F_0 \sin \omega t$. [6]

- Q5)** a) Explain with neat diagram mathematical model of a motorbike [4]
- b) Two subway cars as shown in following Fig. 1, have 2000 kg mass each and are connected by a coupler. The coupler can be modeled as a spring of stiffness $k = 280$ kN/m. Write down the equations of motion and determine the natural frequencies and mode shapes. [12]



Fig. 1

OR

- Q6)** a) Explain the concept of torsionally equivalent shaft and derive the equation for its equivalent length. [4]
- b) The flywheel of an engine driving a dynamo has mass of 200 kg and has a radius of gyration of 300 mm. The shaft at the flywheel end has an effective length of 250 mm and is 50 mm Diameter the armature mass is 225 kg and has a radius of gyration of 255 mm. The dynamo shaft has a diameter of 43.75 mm and a length of 200 mm. Neglecting the inertia of the shaft and coupling calculate the frequency of the torsional vibrations and position of node. Take the modulus of rigidity for shaft material as 80 GPa. [12]

- Q7)** a) Explain the following terms: [4]
- i) Vibration isolation.
 - ii) Force transmissibility.
- b) What are the various methods of vibration control? [6]
- c) A machine of one tonne is acted upon by an external force of 2450 N at a frequency of 1500 rpm. To reduce the effects of vibration, isolator of rubber having a static deflection of 2 mm under the machine load and an estimated damping $\zeta = 0.2$ are used. Determine. [8]
- i) The force transmitted to the foundation.
 - ii) The amplitude of vibration of machine.
 - iii) The phase lag.

OR

- Q8)** a) Explain with neat diagram the working principle of seismic instrument. [4]
- b) Explain the ISO standards for vibration measurement. [6]
- c) An instrument of 50 kg mass is located in an airplane cabin which vibrates at 2000 cpm with an amplitude of 0.1 mm. Determine the stiffness of the four steel springs required as supports for the instrument to reduce its amplitude to 0.005 mm. Also calculate the maximum total load for which each spring must be designed. [8]

- Q9)** a) Explain the working of a microphone. [4]
- b) Explain the various methods of industrial noise control [6]
- c) When operating independently in the presence of background noise measurement at a given location of the sound pressure level for machines 1, 2 and 3 are respectively 88 dB, 90 dB and 87 dB. When the machines are turned off, the sound pressure level at the same point is 86 dB. Determine the overall sound pressure level of the 3 machines independent of the background noise [6]

OR

- Q10)** a) Explain anechoic chamber and reverberant chamber [4]
- b) Derive a relation between sound intensity level and sound pressure level. [6]
- c) A home theatre installation has 5 full range speakers. The 3 front ones are each capable of producing a sound pressure level of 90 dB at the listening position. The 2 rear ones are each capable of producing a sound pressure level of 85 dB at the listening position. What is the total sound pressure level that the whole installation of 5 speakers is capable of producing at the listening position? [6]



Total No. of Questions :12]

SEAT No. :

[Total No. of Pages :4

P3672

[4959] - 1034

B.E. (Mechanical)

ENERGY AUDIT & MANAGEMENT

(Semester - I) (Elective - I) (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, Q.9 or Q.10, Q. 11 or Q. 12.*
- 2) *Draw Neat diagrams wherever necessary.*
- 3) *Use of scientific calculator is allowed.*
- 4) *Assume suitable data wherever necessary.*

SECTION - I

Q1) a) What are the various types of energies. Explain each type in brief. **[5]**

b) Write short notes on **[5]**

i) Energy policy

ii) Energy action planning

OR

Q2) a) Describe energy and environment. **[5]**

b) Explain need for renewable energy. **[5]**

Q3) a) Describe Energy Conservation Opportunities in Boiler system. **[5]**

b) Define energy Audit? Explain Walkthrough or Preliminary energy audit. **[5]**

OR

P.T.O.

- Q4) a)** Explain need of Energy Audit. [5]
b) List down opportunities for energy conservation in HVAC System. [5]

- Q5) a)** Calculate NPV of a project whose capital cost is 30,000 and gives annual saving of 6,000 each year for a period of 10 years. The annual discount rate is 8%. [5]
b) A sum of Rs. 60,000 is deposited in a bank at the beginning of a year. The bank pays 6% interest annually. How much money will be in bank account at the end of fifth year, if no money is withdrawn? [5]

OR

- Q6) a)** A Company invests Rs. 20 lacks and completes an energy efficiency project at the beginning of year 1. The firm is investing its own money and expects an internal Rate of return, IRR, of at least 26% on constant positive annual net cash flow of Rs 3 lacks, over a period of 10yr, Starting with year 1.
i) Will the project meet the firm Expectations? [5]
b) Calculate the IRR of above Numerical. [5]

SECTION - II

- Q7) a)** Explain Typical Furnace Features with neat diagram. [7]
b) Calculate the Efficiency of Boiler by Direct Method.
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
v) Feed water temperature : 70°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. [6]

OR

- Q8)** a) Enlist and discuss the energy saving methods for pumping system. [6]
- b) Calculate the efficiency of Boiler By direct Method. [7]
- i) Type of boiler: Coal fired
 - ii) Quantity of steam (dry) generated : 10 TPH
 - iii) Steam pressure (gauge) / temp : 10 Kg/cm²(G)/160°C
 - iv) Quantity of coal consumed : 2
 - v) Feed water temperature : 80°C
 - vi) GCV of coal: 12000 KJ/Kg
 - vii) Enthalpy of steam at 10 Kg/cm² pressure: 2500 KJ/Kg (Saturated)
 - viii) Enthalpy of feed water : 320 Kcal/Kg
- Q9)** a) The connected load for hostel is as below [7]
- i) 190 Fluorescent tubes of 55 W each magnetic ballast.
 - ii) 20 Fluorescent tubes of 40W each electronic ballast.
 - iii) 1 old fan 100W each
- It is decide to replace the all tubes of 20 W and old fan by new fan of 80W. Considering usage of 06 hrs per day and an electrical tarrif of Rs. 4 per k Wh. Calculate energy saving of tubes and fans replacement.
- b) Explain types of lamps used in lighting system. [6]

OR

Q10) a) Explain why efficiency of Energy efficient motor is more than conventional motor. [7]

b) The Connected loads for shop are as below [6]

i) 10 Bulbs of 60 W each

ii) 08 Fluorescent tubes of 50 W each

iii) An old Refrigerator of 300 W

It is decided to replace the bulbs and tubes with 12 CFL of 16 W each and an old refrigerator by energy efficient refrigerator of 150 W. Considering usages of 8 hours per day and an electrical tariff of Rs. 5 Per KWh; Calculate an annual electrical energy saving in KWh and Cost.

Q11) a) Classify waste heat recovery with example. Write down benefits. [7]

b) Compare topping cycle and bottoming cycle of cogeneration with example. [7]

OR

Q12) a) Explain in brief [7]

i) CDM Project

ii) Carbon Credit Calculation

b) How does a plate heat exchanger work? Give typical example. [7]



Total No. of Questions :10]

SEAT No. :

[Total No. of Pages :4

P3673

[4959] - 1035

B.E. (Mechanical)

TRIBOLOGY

(End Semester) (Semester - I) (2012 Course) (402044 B)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) Write 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) Compare sliding and rolling contact bearing in terms of the following:[6]

- i) Magnitude of load
- ii) Starting friction
- iii) Nature of the load
- iv) Positional accuracy
- v) Speed
- vi) Noise

b) Define friction and wear. Explain different laws of friction. [4]

OR

Q2) a) Define Tribology. Mention minimum five tribological adverse effects generally arises in Industry. [6]

b) List the different theories of wear and also list the different friction measuring methods. [4]

P.T.O.

Q3) a) Explain four important causes of friction. [2]

b) A short hydrodynamic journal bearing refers the following data: [8]

Journal speed = 35 revolutions per seconds (rps)

Length of bearing (l) = $0.5 \times$ Journal diameter (d)

Radial clearance (c) = $0.001 \times$ Journal diameter (d)

Eccentricity ratio (ϵ) = 0.65

Flow rate of Lubricant (Q_s) = 3.45 litre per hour

Radial Load (W) = 1000 N

Calculate:

i) Journal Diameter

ii) Radial clearance

iii) Dimensions of the bearing

iv) Minimum oil film Thickness

v) Absolute viscosity of the lubricant

OR

Q4) a) What do you mean by abrasive wear and fatigue wear? [2]

b) Derive from basic principles two dimensional Reynolds equation taking usual notations. [8]

Q5) a) The following data is given for a hydrostatic step bearing. **[8]**

Thrust load = 450 KN

Shaft speed = 750 rpm

Shaft diameter = 400 mm

Recess diameter = 250 mm

Viscosity of lubricant = 30 cP

Specific heat of lubricant = 2 kJ/kg °C

Specific gravity of lubricant = 0.86

Calculate:

- i) The optimum oil-film thickness for minimum power loss
 - ii) The fractional power loss
 - iii) The pumping power loss and
 - iv) The temperature rise, assuming the total power loss in bearing is converted into the frictional heat.
- b) Explain the phenomenon of squeeze film lubrication. State and Explain any SIX practical examples of squeeze film action. **[8]**

OR

Q6) a) A circular plate of 250 mm diameter is approaching towards a fixed plane surface. Plate and fixed surfaces are separated by an oil film thickness with a viscosity of oil as 150 cP. A load of 15 KN is supported by a film. Calculate the time required for reducing the film thickness from 0.25 to 0.0125 mm. Also approximate square plate of dimensions [D×D] based on the parameters in this problem Where D is side of square plate and is equal to diameter of circular plate. **[8]**

- b) Explain in brief the working principle of hydrostatic bearing. State the advantages and limitations of hydrostatic bearing. **[8]**

- Q7)** a) Explain the phenomenon of Elastohydrodynamic lubrication and state its applications. [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: [8]
- i) Viscosity of lubricant
 - ii) Viscous resistance
 - iii) Frictional power loss
 - iv) Operating speed
 - v) Load carrying capacity
 - vi) Film thickness and surface finish
- b) How Elastohydrodynamic lubrication differs from hydrodynamic lubrication? Also Explain the Ertel-Grubin equation with its limitation in brief. [8]

Q9) Write a short note on the following: (Any Three) [18]

- a) Mechanics of tyre road interaction
- b) Selection of coatings
- c) Porous bearing
- d) Foil bearing

OR

- Q10)**a) Explain the properties and parameters of coatings. [6]
- b) Explain with neat sketch the Electroplating process. [6]
- c) Classify the surface engineering processes in detail. [6]



[4959] - 1036

B.E. (Mechanical Engineering) (Semester - I)
RELIABILITY ENGINEERING (C) (Elective)
(2012 Pattern)

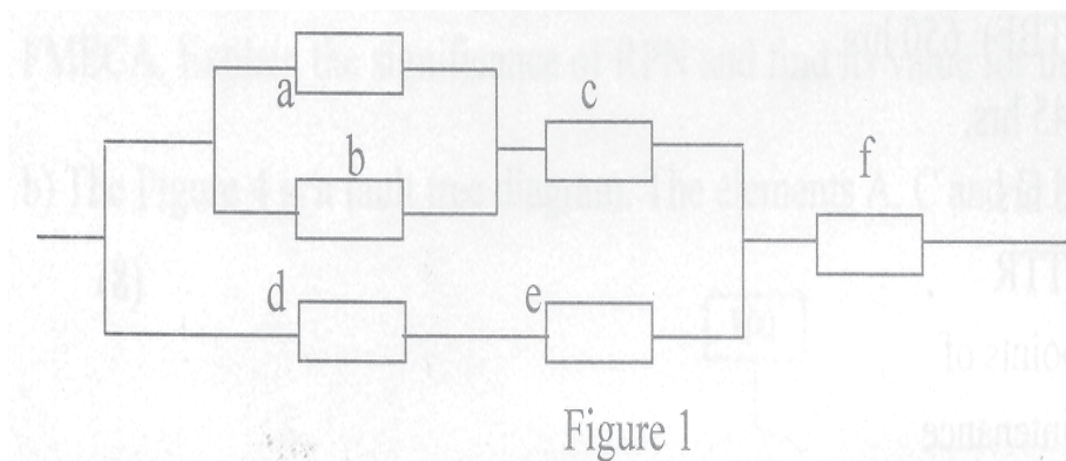
Time : 2½ Hours]

[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) Define and explain in brief [4]**
- i) Cumulative distribution Function
 - ii) Failure Density
- b) Define cut set and tie set. What is minimal set? Find the different minimal cut and tie sets for the system given in figure 1. [6]**



OR

P.T.O.

Q2) a) Explain in brief about mutually exclusive events with appropriate examples. [4]

b) The tests are conducted on 500 screws and the results are tabulated as given below. Find the failure density, hazard rate of the screws. [6]

Time interval (hrs)	0-10	10-20	20-30	30-40	40-50
Number of failed screws	174	126	85	75	40

Q3) a) Compare in tabulated format different probability distributions in detail. [4]

b) A system has the mission time is 200 hours & the system reliability required is 0.80. It consists of four subsystems A, B, C & D having failure rates 0.007, 0.004, 0.005 & 0.003 respectively per hour. Find the failure rate as well as reliability of each subsystem for the entire mission using ARINC method. [6]

OR

Q4) a) Explain different laws of probability with examples. [4]

b) The three main units connected in series together make an assembly of machine which requires reliability of 0.68. The individual reliabilities of units are 0.75, 0.84, 0.92 respectively. Explain and find how the reliability of machine should be apportioned among these units with minimum effort technique. [6]

Q5) a) A bearing is to be designed with a reliability value of 0.98 for an operation of 1200 hrs. Find the availability of a bearing over the same period of time if ratio of mean time to repair (MTTR) to mean time between failure (MTBF) is 0.3. Also find MTBF, MTTR, failure rate and mean repair rate assuming constant hazard for failure and repair. [8]

b) Explain:

i) Carderock model

ii) Design for maintainability [8]

OR

Q6) a) The following data is collected for a machine tool gear box. Find operational availability and inherent availability, the failure rate and mean repair rate assuming constant hazards for failure and repair.

Mean time between failures (MTBF): 650 hrs.

Mean time to repairs (MTTR) : 45 hrs.

Mean waiting time for repairs : 6 hrs.

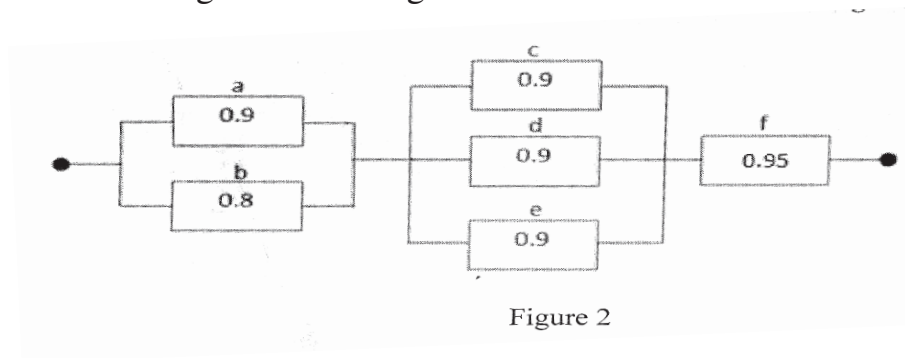
Administrative time : 50% of MTTR [8]

b) Write down the salient points of

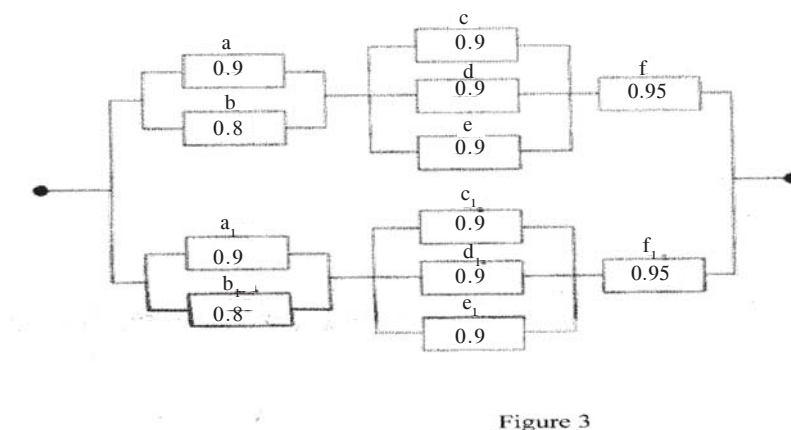
i) Reliability centred maintenance

ii) Technology aspect in reliability management [8]

Q7) a) Draw the fault tree diagram and calculate the reliability of the system represented by block diagram shown in figure 2. The reliability of each element is as given in the figure 2. [10]



The figure 3 represents unit redundancy applied to the system in figure 2. Explain the reasons for unit redundancy and find the reliability of system shown in figure 3.



- b) Explain
- i) The methodology of constructing fault tree diagram.
 - ii) Taguchi method
- [8]

OR

Q8) a) Consider a case study for FMECA analysis and explain the steps involved in carrying FMECA. Explain the significance of RPN and find its value for the case study. [9]

b) The figure 4 is a fault tree diagram. The elements A, C and D have failure. [9]

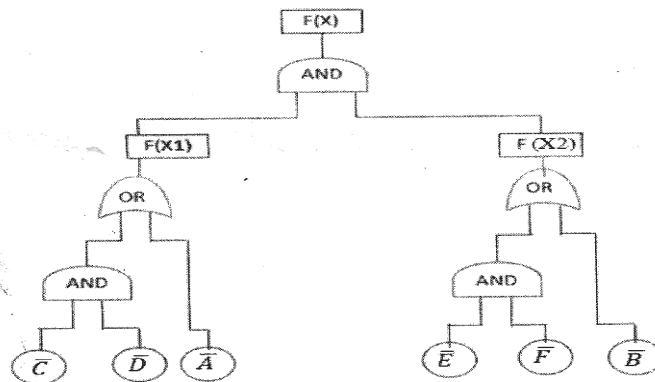


Figure 4

rates 0.002, 0.001 and 0.004 per hour respectively. The elements B, E and F have failure rates 0.001, 0.003 and 0.002 per hour respectively. Draw the block diagram of the system and find out the failure rate of the system.

Q9) a) Explain the Markov model. Explain in detail its application in reliability analysis of system having constant hazard rate. [8]

b) The following data is obtained while testing of a rubber gasket. [8]

Failure number	1	2	3	4	5	6	7	8	9
MTTF (hrs)	27	21	14	30	33	39	28	20	23

Plot the variation of reliability against time using

- i) Mean ranking method and
- ii) Median ranking method

OR

Q10)a) Write short notes on

- i) Load-strength interaction
 - ii) Reliability data acquisition and its graphical analysis [8]
- b) The stress developed in a crank shaft is known to be normally distributed with a mean stress of 120 N/mm^2 and standard deviation of 24 N/mm^2 . The mean material strength of crank shaft is 245 N/mm^2 and standard deviation of 39 N/mm^2 . Assuming that the material strength of crank shaft and induced stresses are independent, determine average factor of safety, minimum and maximum values of factor of safety. [8]



Total No. of Questions : 12]

P4904

SEAT No. :

[Total No. of Pages : 2

[4959]-1037

B.E. (Mechanical)

(D) : MACHINE TOOL DESIGN

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

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

SECTION - I

Q1) Explain with any one practical example why geometric progression is used in machine tool drive speed regulation. **[10]**

OR

Q2) Explain the design procedure of speed gear box for spindle drive by considering all safety factors. **[10]**

Q3) a) A bed subjected to torsional loading is constructed as a closed box type structure, while a bed subjected to bending is constructed as I-section Why? **[2]**

b) Explain static and dynamic stiffness in machine tool structures. **[8]**

OR

Q4) With the schematic, explain the stress analysis of Lathe Bed. **[10]**

Q5) a) Discuss the functions and types of guide-ways. **[5]**

b) What is stick-slip motion in slide-ways. Explain. **[5]**

OR

P.T.O.

Q6) Explain the design criteria and calculations of any one slide-ways. [10]

SECTION - II

Q7) a) Discuss the different factors for the design of sliding friction power screws. [6]

b) Describe with neat sketch spindle unit of a milling machine. [6]

OR

Q8) a) Explain the methods of preloading of antifriction bearings. [6]

b) Explain why the distribution of load over the threads is uniform in a ball lead screw in comparison with sliding friction lead screw. [6]

Q9) With the help of block diagram, explain the experimental method for determination of dynamic characteristic of equivalent elastic system. [12]

OR

Q10) Explain the effect of forced vibration due to perturbation of the cutting process on machine tools. [12]

Q11)a) Explain retrofitting with reference to Lathe machine. [8]

b) Discuss the design considerations for step-less drive. [8]

OR

Q12)a) With the help of applications, explain recent trends in machine tools. [8]

b) Explain the ergonomics considerations applied to the design of control members and location of displays. [8]



Total No. of Questions : 10]

SEAT No. :

P3984

[4959]-1038

[Total No. of Pages : 3

B.E. (Mechanical)

**GAS TURBINE & PROPULSION (Elective - II)
(2012 Course) (Semester - I) (402045A) (End Sem.)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to 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) Write assumptions made in analysis of compressible fluid flow under steady state conditions and derive continuity equation. **[6]**

b) An aeroplane is flying at a speed of 800 kmph at a high altitude where the atmospheric air temperature is -73°C . Calculate the sonic velocity and its Mach number. Assume $R = 287 \text{ Nm/kg.K}$. **[4]**

OR

Q2) a) In an oil gas turbine plant, air is compressed from a pressure of 1 bar and temperature of 300K upto a pressure of 5 bar. The oil used has calorific value of 42500 kJ/kg and the combustor efficiency is 95%. Hot gases leaves the combustion chamber at 1000 K. The isentropic efficiency of the turbine & compressor are 90% and 85% respectively. Assuming the mass flow rate of air at 1kg/s, find power output of the plant. **[6]**

b) With the help of neat diagrams, explain the effect of reheat gas turbine cycle on specific work output and thermal efficiency. **[4]**

Q3) a) Compare the steam & gas turbine power plants. **[6]**

b) Mention the various advantages & disadvantages of the pulse jet engines. **[4]**

OR

P.T.O.

Q4) a) In a gas turbine cycle, air at 27°C and 0.98 bar is compressed to 6 bar. The temperature of air is increased to 750°C as it passes through the combustion chamber. The isentropic efficiencies of compressor & turbine are 0.8 and 0.85 respectively. Determine the efficiency of the plant. [6]

b) Define:-

i) Propulsive power,

ii) Propulsive efficiency [4]

Q5) a) A single stage impulse turbine has the blade velocity of 300 m/s. The gas velocity at entry to stage is at 800 m/s having the nozzle angle of 16° . The rotor blades are symmetrical. Assuming a friction factor of 0.9, find:

i) Work output

ii) Utilisation factor for the stage,

iii) Stagnation temperature drop in turbine,

iv) Stagnation pressure ratio if inlet temperature is 1000 K and the total head isentropic efficiency is equal to utilisation factor. [10]

b) Discuss the effect of nozzle angle on work output in case of impulse turbine. [6]

OR

Q6) a) Derive the equation of the condition of maximum utilisation factor for a velocity compounded impulse turbine. State clearly the assumptions made. [10]

b) Discuss the performance curves of gas turbines. [6]

Q7) a) An axial flow compressor having 8 stages and 50% reaction design compresses air in the pressure ratio of 4:1. The air enters the compressor at 20°C and flows through it with a constant speed of 90 m/s. The rotating blades of the compressor rotates with a mean speed of 180 m/s. Take isentropic efficiency of the compressor as 82%. Calculate:

i) Work done by the machine

ii) Blade angles

Take, $\gamma = 1.4$ & $C_p = 1.005$ kJ/kg K. [12]

b) Differentiate between turbine blading & axial flow compressor blading. [6]

OR

Q8) a) Explain the following:

i) flow coefficient,

ii) rotor pressure flow coefficient,

iii) rotor enthalpy drop coefficient,

iv) diffuser enthalpy drop coefficient [12]

b) Explain the design and off - design characteristics of an axial flow compressor. [6]

Q9) a) Discuss how a reactive mixture is formed in a combustion chamber of a gas turbine with all steps involved. [8]

b) What are the factors involved in combustion of liquid fuel in the combustor? What are the aspects considered in design of a combustor? [8]

OR

Q10) a) Explain the annular combustion chamber with a neat sketch and also explain which type of method is used in it for flame stabilisation. [8]

b) Why cooling of flame tubes is necessary and what are the methods employed? Discuss various methods with the help of neat sketches. [8]

x x x

Total No. of Questions : 10]

SEAT No. :

P4935

[Total No. of Pages :2

[4959]-1039
B.E. Mechanical Engg.
Product Design and Development
(2012 Pattern)

Time : 3 Hours]

[Maximum Marks : 70

Instructions to the candidates:

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

Q1) Define product design. Enlist & elaborate different factors affecting product design. **[10]**

OR

Q2) Explain Technology forecasting with s-curve. **[10]**

Q3) Discuss different types customer needs in detail **[10]**

OR

Q4) What is concept selection? Explain pugti's chart with example. **[10]**

Q5) a) Explain systematic procedure of product tear down **[9]**

b) What is force flow diagram. Apply & Explain for paper punching machine. **[9]**

OR

Q6) a) Define Benchmarking. Explain stepwise procedure for Benchmarking. **[9]**

b) Explain function form diagram with suitable example. **[9]**

P.T.O.

- Q7)** a) Explain guidelines for design for manufacture. [8]
b) Discuss design for robustness in detail. [8]

OR

- Q8)** a) What is life cycle assessment? Explain any one method in detail. [8]
b) Discuss regional & Global issues of environment pollution. [8]

- Q9)** a) What is product lifecycle? Explain different phases of life cycle for Bajaj Scooter. comment on current phase of product. [8]
b) Discuss different Element of Product life cycle management in detail. [8]

OR

- Q10)** Explain the product life cycle phases & corresponding technologies applied in with suitable case study. [16]



Total No. of Questions : 12]

SEAT No. :

P3674

[4959]-1040

[Total No. of Pages : 8

B.E. (Mechanical)

OPERATIONS RESEARCH (Elective - II)
(2012 Course) (Semester - I) (402045 C)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to 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) An industry is producing two jobs x and y. The manpower requirement per unit of the job x and y are 4 man hours and 3 man hours. The processing time needed per unit is expressed as 1 and 2 machine hours respectively. The raw material demand are as 0.3 and 0.2 kg per unit. The weekly availability of man hours, machine hours and raw materials are 100 man hour, 80 machine hour and 30 kg respectively. It is estimated that the profit per unit of x and y are as Rs. 5 and Rs. 3 respectively. Determine how much of jobs x and y are to be produced per week to maximize profit. Formulate the linear programming problem only. [8]

OR

- Q2)** a) Explain basic steps involved in construction of decision tree. [4]
b) Explain minimax principle and maximin principle. [4]

Q3) Solve the following transportation problem and use stepping stone method to test optimality of the solution. [8]

		Destination				Supply
		D ₁	D ₂	D ₃	D ₄	
Plant	I	2	3	11	7	6
	II	1	0	6	1	1
	III	5	8	15	9	10
Requirement		7	5	3	2	

OR

P.T.O.

Q4) A college is having a degree programme for which the effective semester time available is very less and the programme requires field work. Hence, a few hours can be saved from the total number of class hours and can be utilized for the field work. Based on past experiences, the college has estimated the number of hours required to each subject by each faculty.

The course in its present semester has 5 subjects and the college has considered 6 existing faculty members to teach these courses. The objective is to assign the best 5 teachers out of these 6 faculty members to teach 5 different subjects so that the total number of class hours required is minimized. The data of this problem is summarized as below. Solve the assignment problem optimally? [8]

		Subjects				
		1	2	3	4	5
Faculty	1	30	39	31	38	40
	2	43	37	32	35	38
	3	24	41	33	41	34
	4	39	36	43	32	36
	5	32	49	35	40	37
	6	36	42	35	44	42

Q5) A and B play a game in which each three coins, a 5 paise, 10 paise and 20 paise coins. Each player selects a coin without the knowledge of the other's choice. If the sum of the coins is an odd amount, A wins B's coins. If the sum is even, B wins A's coins. Find the optimal strategies for the players and the value of the game. [6]

		Player B		
		5	10	20
		I	II	III
Player A	5	-10	15	25
	10	15	-20	-30
	20	25	-30	-40

OR

Q6) Following figures related to the toy manufacturing company.

[6]

Variable cost per unit = Rs. 8

Sales price per unit = Rs. 14

Total units sold = 50,000

Fixed cost = Rs. 12,000

Calculate

- a) P/V ratio,
- b) B.E.P. in units,
- c) B.E.P. in sales,
- d) Margin of Safety,
- e) Total Profit.

Q7) a) The demand for an item in a company is 18000 units per year, and the company can produce the item at the rate of 3000 per month. The cost of one setup is Rs. 500 and the holding cost of one unit per month is 15 paise. The shortage cost of one unit is Rs. 240 per year. Determine the optimum manufacturing quantity and the number of shortages. Also determine the manufacturing time and the time between set-ups. **[8]**

b) The firm is considering the replacement of a machine, whose cost price is Rs. 12200 and the scrap value is Rs. 200. From experience the running costs are found to be as follows: **[6]**

Year	1	2	3	4	5	6	7	8
Running Cost (Rs.)	200	500	800	1200	1800	2500	3200	4000

When should machine be replaced?

OR

Q8) a) The pattern of the demand for the seasonal product is as follows: **[8]**

Demand (in units)	1	2	3	4	5	6	7	8
Probability	0.05	0.10	0.15	0.20	0.20	0.15	0.10	0.05

The cost of the product is Rs. 120 per unit and selling price is Rs. 150. How many units should be purchased for the season so as to maximize the expected profit? Also, if the salvage price of the product is Rs. 50 then would there be any change in the purchase decision?

b) The following normality rates have been observed for certain type of fuse: **[6]**

Week	1	2	3	4	5
Percentage failing by the end of the week	5	15	35	57	100

There are 1,000 fuses in use and it costs Rs. 5 to replace an individual fuse. If all fuses were replaced simultaneously it would cost Rs. 1.25. It is proposed to replace all fuses at fixed intervals of time, whether or not they have burnt out, and to continue replacing burnt out fuses as they fail. At what time intervals should the group replacement be made? Also prove that this optimal policy is superior to the straight forward policy of replacing each fuse only when it fails.

Q9) a) On an average 96 patients per 24 hour day require the service of an emergency clinic. Also on 10 minutes of active attention assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs. 100 per patient treated to obtain an average service time of 10 minutes and that each minute decrease in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the size of the queue from 1.33 to 0.5 patient? **[8]**

- b) There are seven jobs, each of which has to go through two machines A and B in the order AB. The processing times in hours are as follows:[8]

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine the sequence of these jobs that will minimize the total elapsed time T. Also find T and idle time for machines A and B.

OR

- Q10)a)** A typist in an office receives an average of 22 letters per day for typing. The typists work 8 hours per day and it takes on an average 20 minutes to type a letter. The company has determined that the cost of letter waiting to be mailed is 50 paise per hour and the equipment operating cost plus salary of typist is Rs. 40 per day. What is the total cost of waiting letters to be mailed? [8]

- b) Find an optimal sequence for the following sequencing problem of four jobs and five machines, when passing is not allowed. Its processing time (in hours) is given below: [8]

Job	Machine				
	M1	M2	M3	M4	M5
A	7	5	2	3	9
B	6	6	4	5	10
C	5	4	5	6	8
D	8	3	3	2	6

Also find the total elapsed time?

Q11)a) An insurance company has decided to modernize and refit one of its branch offices. Some of the existing office equipment's will be disposed of but the remaining will be returned to the branch after the completion of the renovation work. Tenders are invited from the number of selected contractors. The contractors would be responsible for all the activities in connection with the renovation work expecting the prior removal of the old equipment and its subsequent replacement. The major elements of the project have been identified, as follows along with their durations and immediately preceding elements. **[12]**

Activity	Description	Duration (weeks)	Immediate predecessors
A	Design new premises	14	-
B	Obtain tenders from contractors	4	A
C	Select the contractor	2	B
D	Arrange details with selected contractors	1	C
E	Decide which equipment is to be used	2	A
F	Arrange storage of equipment	3	E
G	Arrange disposal of the other equipment's	2	E
H	Order new equipment	4	E
I	Take delivery of new equipment	3	H,L
J	Renovations takes place	12	K
K	Remove old equipment for storage and disposal	4	D,F,G
L	Cleaning after the contractor has finished	2	J
M	Return old equipment for storage	2	H,L

- i) Draw the network diagram between various activities of the project.
 - ii) Calculate the minimum time that the renovation can take from the design stage.
 - iii) Calculate the independent float that is associated with the non-critical activities in the network diagram.
- b) Differentiate CPM and PERT. [6]

OR

- Q12)a)** A civil engineering firm has to bid for the construction of a dam. The activities and their time estimate are given as below: [12]

Activity	Optimistic	Most likely	Pessimistic
1-2	14	17	25
2-3	14	18	21
2-4	13	15	18
2-8	16	19	28
3-4 (dummy)	0	0	0
3-5	15	18	27
4-6	13	17	21
5-7 (dummy)	0	0	0
5-9	14	18	20
6-7 (dummy)	0	0	0
6-8(dummy)	0	0	0
7-9	16	20	41
8-9	14	16	22

The policy of the firm with respect to submitting is to bid the minimum amount that will provide a 95% of probability of at best breaking-even. The fixed costs for the project are eight lakhs and the variable costs are 9000 every day spent working on the project. The duration is in days and the costs are in rupees.

What amount should the firm bid under this policy?

b) Write a short note on (any one) [6]

i) Goal programming.

ii) Simulation

x x x

Total No. of Questions : 10]

SEAT No. :

P3675

[4959]-1041

[Total No. of Pages :4

B.E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) *All Questions are compulsory i.e. solve 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 if necessary.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) a) Match the characteristics and /or application given on right hand side with the appropriate advanced manufacturing processes given on left hand side. **[4]**

Advanced Manufacturing Processes	Process characteristics and/or applications
i) Electromagnetic forming	a) Use of eddy current
ii) Flow forming	b) Thin-walled, seamless rocket motor and missile castings
iii) Hydro forming	c) Radiator forms
iv) Roll forming	d) Work hardening, micro-cracks and thinning at bends
v) High velocity forming	e) Electrohydraulic forming
vi) High energy rate forming	f) Crimping of metal strips
vii) Explosive forming	g) Mostly water is used as a medium of energy transfer
viii) Shear spinning	h) Production of conical and axisymmetric parts

P.T.O.

- b) With a neat sketch explain the principle of friction stir welding (FSW)? Also, state the important process parameters which affect the performance of FSW. [6]

OR

- Q2)** a) State whether the following statements are true or false: [4]
- i) the spinnability of the material is dependent on the material to be shear form.
 - ii) In backward flow forming spun material flows under the roller in opposite direction of the feed motion of roller and towards the unsupported end of the mandrel.
 - iii) Electrohydraulic forming can be used to form poor conducting work materials.
 - iv) Large and thick parts can be economically and efficiently shaped by explosive forming in comparison to electromagnetic forming (EMF) process.
- b) Describe with a neat sketch the different metallurgical zones in friction stir welding. [6]

- Q3)** a) Write down the advantages and limitations of squeeze casting process (four each). [4]
- b) With a neat sketch explain the principle of shaped tube electrolytic machining. Also, state the process parameters which affect the overall process performance. [6]

OR

- Q4)** a) Explain the principle of laser heat treatment and name any four different types of laser sources used in heat treatment. [4]
- b) With a neat sketch explain the principle of electrochemical grinding (ECG) process. Also, state the applications of ECG. [6]

- Q5) a)** Describe with a neat sketch the principle of micro-ultrasonic machining process (micro-USM). Also, classify micro-USM process based on machine tool characteristics and different tool heads. [8]
- b) Give the classification of micro-electric discharge machining (micro-EDM) technology used for manufacturing of micro features (Types of micro-EDM process). Also, state the advantages and limitations of micro-EDM process (four each). [8]

OR

- Q6) a)** Describe single point diamond turning in terms of its process characteristics, the machine tool, materials machined and from quality control aspects. [8]
- b) State the principle of micro-electric discharge machining (micro-EDM) process with a neat sketch and give its four applications and two points of differences from EDM process. [8]
- Q7) a)** What is additive manufacturing? State its benefits over subtractive manufacturing processes and also, name the seven categories of additive manufacturing processes with suitable applications of each category of additive manufacturing process. [8]
- b) State the principle of powder bed fusion additive manufacturing process with a neat sketch. Also, state its advantages and limitations (four each). [8]

OR

- Q8) a)** With neat sketches describe step by step material extrusion process and how, it differs from the sheet lamination process. Also, state the advantages and disadvantages of sheet lamination process (four each)? [8]
- b) What is direct write technology (DW)? Give classification of DW technology and their applications. How this technology differs from 3D printing technology? [8]

- Q9)** a) State the different types of electron microscopes and with a sketch explain in principle how electron microscopes get differ from optical microscopes? [6]
- b) Explain with sketch the principle of online dimensional measurement using laser-based diffraction method technique. [6]
- c) Explain with sketch the principle of scanning tunneling microscopy using constant current mode and constant height mode [6]

OR

Q10) Write short notes on following micro machining measuring instruments: [18]

- a) Atomic force microscope (AFM).
- b) Interference comparators.
- c) Optical microscopes.

x x x

Total No. of Questions : 10]

SEAT No. :

P3676

[4959]-1042

[Total No. of Pages : 3

B.E.(Mechanical)

POWER PLANT ENGINEERING
(2012Pattern) (402047)(Semester-II)(End Semester)

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,Q 9 or Q.10.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figure to the right side indicate full marks.
- 4) Use of calculator, steam tables is allowed.
- 5) Assume suitable data, if necessary.

SECTION-I

- Q1)** a) Explain with neat sketch load curve and load duration curve. [4]
b) Discuss the role and participation of private sector in development of power sector in India. [6]

OR

- Q2)** a) Explain with neat sketches mechanical dust collectors. [6]
b) Draw a neat diagram of fluidized bed boiler. Discuss its merits and demerits. [4]
- Q3)** a) Explain in details various plants used based on the availability of quality of water. [6]
b) Write a short note on: Nuclear waste disposal. [4]

OR

- Q4)** a) The following common load data is available in share for a base load power station and stand by power station. [6]
Base load station annual output = 150×10^6 KWh
Stand by station annual output = 15×10^6 KWh
Base load station capacity = 50MW
Standby station capacity = 22MW
Maximum demand on base load station=35MW
Maximum demand on standby station = 20MW
Determine the following for both power stations:
i) Load Factor ii) Capacity factor
- b) What is the necessity of condenser in a steam power plant? [4]

P.T.O.

- Q5) a)** Derive the equation of thermal efficiency of Brayton Cycle. [6]
- b) The pressure ratio used in an open cycle gas turbine power plant is 6.5. The pressure and temperature of air entering in the compressor are 1 bar, 300K. Intercooling arrangement is used to reduce the work of compression. The maximum temperature of the cycle is limited to 850K. If the power plant capacity is 10MW, find the thermal efficiency of the plant and air consumption per hour if calorific value is 45000kJ/kg. Assume compression in both the stages and expansion in turbine are isentropic. Take $\gamma = 1.4$ (air and gas), $C_p = 1 \text{ kJ/kgK}$ (air and gas). Assume perfect intercooling. [10]

OR

- Q6) a)** Write a short note on combined cycle plants. [6]
- b) An open cycle gas turbine plant works on Brayton cycle. The maximum pressure and temperature of the cycle are limited to 5 bar, 900K. The pressure and temperature at the inlet to the compressor are 1 bar and 300K. Reheating is used at the pressure of 2.5 bar where the temperature of the gases is increased to its original turbine inlet temperature. Mass flow rate of the air in the plant is 10kg/s. Determine the thermal efficiency and capacity of the plant in MW. The exhaust pressure of the gases leaving the plant is 1 bar. Assume compression and expansion are isentropic. Take $\gamma = 1.4$ (air and gas), $C_p = 1 \text{ kJ/kgK}$ (air and gas), CV of the fuel 40000kJ/kg. Neglect pressure losses in the system. Do not neglect the mass of the fuel. [10]

- Q7) a)** Discuss the parameters to be considered for site selection of wind power plant. [8]
- b) Explain with neat sketch the construction and working of photovoltaic power system and fuel cell. [10]

OR

- Q8) a)** Discuss any two type of the horizontal axis wind mills with suitable sketches. [8]
- b) Explain flat plate and parabolic solar collectors with neat diagrams. [10]
- Q9) a)** Enlist the protective equipment and explain the working of circuit breaker in power plant. [8]

- b) What are different pollutants due to thermal power plants and explain their effects on human health. [8]

OR

- Q10)**a) Write a short on exciters used in the power plants. [8]
- b) Explain the noise pollution caused by thermal power plant and its control. [8]



Total No. of Questions :10]

SEAT No. :

P3677

[4959]-1043

[Total No. of Pages :4

B.E. (Mechanical)

MECHANICAL SYSTEM DESIGN

(2012 Course) (End - Semester) (402048)

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) What are the different parameters considered in kinematic design of multi speed gear box? Explain any two in brief. **[4]**

b) Define the following terms: **[6]**

- i) Population
- ii) Sample
- iii) Random variables

Also explain the concept of reliability based design.

OR

Q2) a) Write advantages and disadvantages of arithmetic, geometric and Harmonic progression. **[4]**

b) A particular type of rolling contact bearing has a normally distributed time to failure, with a mean of 10,000 hrs and a standard deviation of 750h. If there are 100 such bearings fitted at a time, how many may be expected to fail within the first 11000 h?

(Area below normal curve from $Z = 0$ to $Z = 1.35$ is given below) **[6]**

Z	0	1	2	3	4	5
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115

P.T.O.

- Q3) a)** What do you understand by take up device in belt conveyors? State different types of take up devices used in belt conveyors. Explain any one? [4]
- b) A three idler, troughed belt, horizontal conveyor is to be used for transporting 500 ton of iron per hour having mass density of iron ore is 1700 kg/m^3 . If the belt speed is 2 m/sec , determine the required effective belt width. Take surcharge factor = 0.1. [6]

OR

- Q4) a)** Why idlers are used in belt conveyors? Also draw different types of idlers used in belt conveyors. [4]
- b) A belt conveyor is to be designed to carry the iron ore at the rate of 350 ton/hour with following details: [6]

Weight density of material = 16700 N/m^3

Angle of repose of material = 15°

Belt speed = 120 m/min

Material factor for plies $k_1 = 2.0$

Belt tension and arc of contact factor = $k_2 = 70$

No. of plies for belt = 4 (Take : $C = 0.075$, $S = 80 \text{ mm}$).

Determine

- i) Width for belt.
- ii) Diameter and length of drive pulley.
- Q5) a) i)** What is autofrettage? Explain any one method of prestressing the cylinders. [4]
- ii) Derive Birnie's equation. Explain under what conditions it is used. [4]
- b) Explain the basic principle of the area compensation method. Also explain area compensation for nozzle with its equations. [10]

OR

- Q6) a) i)** The piston rod of a hydraulic cylinder exerts an operating force of 12kN. The friction due to piston packing and stuffing box is equivalent to 10% of the operating force. The pressure in the cylinder is 10 MN/m². The cylinder is made of cast iron FG 200 and factor of safety is 5. Determine the diameter and thickness of cylinder. **[4]**
- ii) A hydraulic cylinder with closed ends is subjected to an internal pressure of 15 MPa. The inner and outer diameters of the cylinder are 200 mm and 240 mm respectively. The cylinder material is cast iron FG 300. Determine the factor of safety used in design. If the cylinder pressure is further increased by 50%, what will be the factor of safety? **[4]**
- b) A pressure vessel consists of cylinder shell with 2m inside diameter and 10 mm thickness. It is subjected to design pressure 0.75 MN/m² and having nozzle of inner diameter 300 mm and wall thickness of 10mm. The corrosion allowance is 2 mm and weld efficiency is 0.85. The extension of nozzle inside and outside the shell is 15mm. Take $S_{yt} = 210$ MPa. A reinforcing pad of 10mm thick plate is provided for opening. Factor of safety = 1.5. Determine the dimensions of reinforcing pad. **[10]**
- Q7) a)** Explain the step by step procedure for designing of cylinder of IC engine. **[6]**
- b) Determine the dimensions of the cross section of the connecting rod for a diesel engine with following data: **[10]**

Cylinder bore = 95 mm

$$\sigma_c = 298 \text{ N/mm}^2$$

Length of connecting rod = 350 mm

Maximum gas pressure = 4 MPa

Factor of safety = 6

OR

- Q8) a)** Explain the step by step procedure for designing of crank shaft of IC engine. **[6]**

b) Cylinder of four stroke diesel engine has following specifications: [10]

Cylinder bore = 145 mm

Factor of safety =5

Cylinder material = FG200

Poisson's ratio = 0.25

Maximum gas pressure = 3.5 MPa

Reboaring allowance = 5mm

Determine thickness of cylinder wall and calculate stresses in the cylinder wall.

Q9) a) Explain the procedure of solving optimum design problems with redundant specifications. [6]

b) A tensile bar of length 400mm is subjected to constant tensile force of 3000N. If the factor of safety is 2, design the bar diameter, using Johnson's method, with the objective of minimizing material weight using optimum material from the list given in Table 1. [10]

Material	Density (ρ) Kg/m ³	Cost (c) Rs/Kg	Syt N/mm ²
Steel	7800	28	400
Aluminum alloy	2800	132	150
Titanium Alloy	4500	2200	800

Table 1

OR

Q10)a) Explain the design considerations for design of castings. [6]

b) In lightweight equipment, a shaft is required to transmit 40KW power at 480 RPM. Required stiffness of shaft is 90N-m/Degree. Factor of safety based on S_{ys} is 1.5.

Using max shear stress theory of failure design the shaft with the objective of minimum weight by using optimum material from the list given in Table 1 above. Assume $G = 70,000 \text{ N/mm}^2$ for all materials. [10]

EEE

Total No. of Questions : 10]

SEAT No. :

P3523

[4959]-1044

[Total No. of Pages : 5

B.E. (Mechanical)

REFRIGERATION AND AIR-CONDITIONING EQUIPMENT DESIGN

(2012 Course) (Elective - III) (Semester - II) (402049 A)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer three questions out of 6.*
- 2) *Solve Q1 or 2, Q3 or 4, Q5 or 6,*
- 3) *All the three questions should be solved in one answer book and attach extra supplements if required.*
- 4) *Draw Diagrams wherever necessary.*
- 5) *Use of scientific calculator is allowed.*
- 6) *Assume suitable data wherever necessary.*

Q1) What is dry ice? Explain with schematic diag. the method of manufacturing dry ice. **[10]**

OR

Q2) A two cylinder, single acting reciprocating compressor with 5% clearance is used in a R-12 refrigerating cycle to take refrigerating capacity at 7.2 TR at 5°C (3.6 bar) refrigerating temperature and 40°C (9.6 bar) condensing temperature. The compressor index is 1.15. The speed of the piston is limited to 3 m/s. Take L/D = 0.8, specific volume as 0.0525 m³/kg. Determine **[10]**

- i) Power
- ii) Volumetric efficiency
- iii) COP
- iv) Bore & stroke
- v) RPM

Temperature (°C)	Pressure (bar)	h_f	h_g
5	3.6	40.69	189.65
40	9.6	74.59	203.2

P.T.O.

Q3) a) Discuss specific types of insulations used for low temperature applications. [5]

b) Explain the construction working of pilot-operated solenoid valve. [5]

OR

Q4) a) Write a short note on defrost method for multiple evaporator systems. [5]

b) Sketch and explain Claude cycle using T-s and p-h diagram. [5]

Q5) a) Explain the operational considerations of condensers. [4]

b) Design R-22 condenser to meet the following conditions; [12]

Refrigeration load	30 TR
Condensing temperature	37.78°C
Evaporating temperature	-1.11°C
Water inlet temperature	25.55°C
Water flow rate per TR	0.00757 m ³ /min
Heat rejection factor	1.013
Maximum tube length & diameter	3.6576 m & 2.54 cm
Fouling factor	0.001 m ² K/W
HTC inner & outer side respectively	6000 W/m ² .K & 1500 W/m ² .K

State the selection basis of condenser.

OR

- Q6)** a) Write a short note on “Pump Circulation System”. [8]
b) Explain design considerations of evaporator. [8]

Q7) A test is performed on an induced draft counter flow cooling tower. The following observations are made: [16]

Water flow rate: 12.67 kg/s

Air flow rate: 11.9 kg/s

Water entering temperature: 36.3°C

Water leaving temperature: 32.1°C

Ambient air conditions: 43.3°C DBT, 25.6°C WBT

If the dimensions of the tower are length $L = 3.9624$ m, width $W = 2.616$ m and height $H = 2.438$ Determine the following:

- Value of the performance coefficient.
- The wetted area of tower if air HTC is 83 W/m²K.
- Value of mass transfer coefficient.
- Tower efficiency.

OR

- Q8)** a) Discuss various types of non-mechanical draft cooling tower. [8]
b) Explain the thermal analysis of cooling tower. [8]

- Q9) a)** In steam jet refrigeration the dry saturated motive steam is supplied at 6 bar. The amount of motive steam per unit mass of flash vapour is 2 kg/kg. The quality of vapour at the beginning of compression is 0.9. The condensing and flash vapour temperature is 40°C and 5°C respectively. The compression efficiency is 0.78. Obtain the TR of the system for 0.8 kg/s of motive steam and volume of vapour handled by the ejector. **[12]**

P (bar)	T _{sat} (°C)	V _f (m ³ /kg)	V _g (m ³ /kg)	h _f (kJ/kg)	h _{fg} (kJ/kg)	h _g (kJ/kg)	S _f (kJ/kgK)	S _{fg} (kJ/kgK)	S _g (kJ/kgK)
6	158.85	1.1006	.316	670.56	2086.3	2756.8	1.9312	4.8288	6.76
0.07384	40	1.0078	19.52	167.57	2406.7	2574.3	.5725	7.6845	8.2570
0.00872	5	1.0001	147.12	20.98	2489.6	2510.6	0.0761	8.9496	9.057

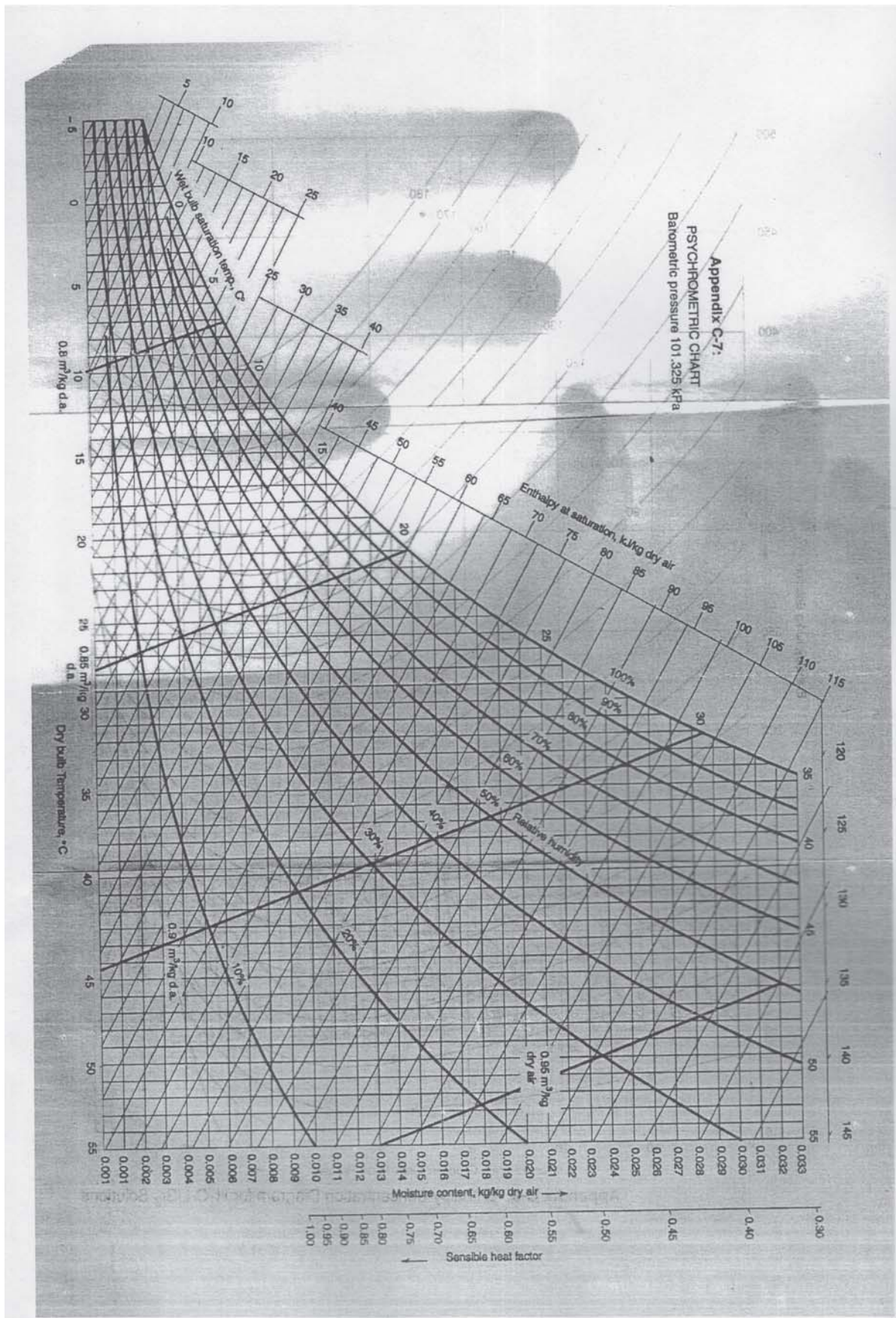
- b) What is heat pipe? Explain advantages of heat pipe over other heat transport material. **[6]**

OR

Q10) Write a short note on:

[18]

- Vortex Tube.
- Thermoelectric Refrigeration.
- Magnetic Refrigeration.



X X X

Total No. of Questions : 10]

SEAT No. :

P3678

[4959]-1045

[Total No. of Pages : 2

B.E.(Mechanical)

ROBOTICS

(2012 Course) (Elective-III)(Semester-II) (End Sem)(402049B)

Time : 2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Figures to the right indicate full marks.*
- 2) *Draw neat figures wherever necessary.*
- 3) *Use of Scientific calculators is allowed.*

Q1) a) Define a robot with neat sketch. Explain anatomy of robot. **[4]**

b) A camera locates an object by **[6]**

$$\text{camera } T \text{ Object} = \begin{bmatrix} 0 & -1 & 0 & 50 \\ 1 & 0 & 0 & -85 \\ 0 & 0 & 1 & 25 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

The camera is then translated by 20 units along Z axis of the object, and then rotated about its own X axis by -90° . Determine the new relation between camera and the object.

OR

Q2) a) Explain the construction and working of Brushless DC Motor with neat sketch. State its advantages and disadvantages. **[4]**

b) Explain in detail degree of freedom of parallel mechanism with suitable example. **[6]**

Q3) a) Explain the design considerations of gripper selection? **[4]**

b) Explain in details the singularity analysis in serial and parallel manipulators. **[6]**

OR

Q4) a) Classify the sensors and discuss the factors to be considered for its selection. **[4]**

b) Explain in detail the concept of Velocity Propagation **[6]**

P.T.O.

- Q5)** a) What are the different tools used in simulation of robotics? [6]
b) Explain in details, Euler-Lagrange formulation for dynamics. [10]

OR

- Q6)** a) What is RIDIM? What are the features of RIDIM? [6]
b) Write notes on [10]
i) Recursive Forward Dynamics Algorithm
ii) Recursive Inverse Dynamics Algorithm

- Q7)** a) Explain in detail the Turning Method of PID control. [10]
b) First joint of 3R robot is to be rotate form 20° to 65° in 5 seconds. Determine the linear trajectory and its rotation after 3 seconds. [6]

OR

- Q8)** a) Explain in detail Trajectory planning of robot with its terminology. [6]
b) Discuss potential field method.
The second joint of a SCARA manipulator is required to move from $\theta_2=30^\circ$ to 150° in 5 seconds. Find the cubic polynomial to generate the smooth trajectory for the point. What is the maximum velocity and acceleration for this trajectory? [10]

- Q9)** a) Explain in details the image processing techniques and image segmentation. [12]
b) Discuss in details, problem solving through forward and backward search in artificial intelligence. [6]

OR

- Q10)** a) Write short notes on following(any two) [8]
i) Linear Kalman filter
ii) Sampling and quantization
iii) Image acquisition and masking.
b) Explain in details the need and applications of artificial intelligence. [10]



Total No. of Questions : 12]

SEAT No. :

P3679

[4959]-1046

[Total No. of Pages : 3

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

(2012 Course)(Elective-III)(End Sem) (Semester-II) (402049C)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Explain the Productivity Models any two in Industrial Engineering. **[6]**

OR

Q2) Write short note on Span of Control. Factors determining span of control. **[6]**

Q3) Explain the Performance rating and factors affecting the performance rating. **[7]**

OR

Q4) Explain Two handed process Chart with suitable example. **[7]**

Q5) Define standard time of operations. List its various uses. **[7]**

OR

Q6) What is Allowance? Explain any two types of allowances. **[7]**

Q7) a) Define production control. What are different techniques of production control. **[8]**

b) Star wars Co. Ltd. Uses simple exponential smoothing with smoothing constant $\alpha = 0.2$ to forecast the demand. The forecast for the first week of March was 400 units & the actual demand turns out to be 450 units. **[8]**

i) Estimate the demand for the second week of March.

ii) If the actual demand for the second week of March is 400 units. Forecast the demand up to April second week. Assume that the demand for subsequent weeks are 465, 434, 420, 498, 462, 470 units.

OR

P.T.O.

Q8) a) The following data relates the cost of production and sales prices. [8]

1986 1987 1988 1989 1990 1991 1992 1993 1994

Costs	203	216	223	239	248	253	279	301	311
Prices	225	242	250	271	275	277	255	318	329
Establish the coefficient of correlation between cost.									

b) Write short note on MRP & MRP-II [8]

Q9) a) A company is setting an assembly line to produce 192 units per eight hour shift. The information regarding work elements in terms of times & immediate predecessors are given. [9]

Work A B C D E F G H I J

Element										
Time(Sec)	40	80	30	25	20	15	120	145	130	115
Immediate	None	A	D,E,F	B	B	B	A	G	H	C,I
Predecessors										

i) What is the desired cycle time?

ii) What is the theoretical number of stations?

iii) Use largest work element time rule to work out a solution on a precedence diagram

iv) What are the efficiency and balance delay of the solution obtained?

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

i) Travel Chart

ii) ABC analysis

iii) Line or Product layout

OR

Q10) a) What is Inventory control & the objectives of Inventory control. [8]

b) A pharmacy company has a demand for 10,00,000 bottles. Each empty bottles costs the company Rs.1. Empty bottles are supplied by M/s Rupa glass Ltd. The recorder level system of stock replenishment is followed. Ordering Rs.12.5 order and Inventory carry cost is 25 percent of cost per bottle. The demand is constant throughout the year. The lead time is 15 days. [9]

Determine.

- i) EOQ
- ii) Lead time Consumption
- iii) Reorder level
- iv) Average inventory

Q11) a) The fixed costs for the year 1979-80 are Rs.5,00,000 variable cost per unit is Rs.25. The estimated sales for the period are valued at Rs.15,00,000. Each unit sells at Rs.150. Determine: [9]

- i) Break even Point
- ii) Rs.12,00,000 will be the likely sales turnover for the next budget period, calculate the estimated contribution and Profit.
- iii) If a profit target of Rs.6,50,000 has been budgeted, compute the turn over required.

b) Define cost and give the basis of classification of cost. [8]

OR

Q12) a) Write a short note on Net Present Value(NPV)& Internal Rate of Return(IRR). [9]

b) Explain the Process of Manpower planning and Advantages. [8]



Total No. of Questions : 10]

SEAT No. :

P3680

[Total No. of Pages : 3

[4959]-1047

B.E. (Mechanical / Sandwich)

COMPUTATIONAL FLUID DYNAMICS

(2012 Pattern) (End Sem.) (Semester-II) (402050 A) (Theory)

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) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of electronic calculator is allowed.*
- 5) *Your answer will be valued as a whole.*
- 6) *Assume suitable data, if necessary.*

- Q1)** a) Write 1D governing equations each in Cartesian coordinates and label each term used for CFD analysis. **[5]**
- b) Justify the need of equation of state required to carry out solution of governing equations. **[5]**

OR

- Q2)** a) Give examples of three types of grid and explain any two with neat sketch. **[5]**
- b) Explain Alternating Direction Implicit method with neat sketch and the numerical method. **[5]**

- Q3)** a) Explain the central difference approach in numerical method. Write three equations citing example. **[4]**
- b) Given the function $f(x) = 0.45 x^2$; find the first derivative of f at $x = 3$; using forward, backward and central differencing of order (Δx) . Use a step size of $\Delta x = 0.1$. **[6]**

OR

P.T.O.

Q4) A horizontal pipe having a surface temperature of 67 C and diameter of 25cm is buried at a depth of 1.2 meter in the earth location where $k = 1.8 \text{ W/m. } ^\circ\text{C}$. The earth surface temperature is 15°C . Calculate the heat lost by the pipe per unit length. **[10]**

Q5) Considering first order wave equation, explain first order forward, central difference with respect X derive from Euler explicit form. **[16]**

OR

Q6) a) What is it that makes a given calculation go unstable? Explain considering three types of errors and its correlation state the stability condition. **[10]**

b) What is CFL number? **[6]**

Q7) a) Justify the need of Semi implicit method for pressure linked equations. **[10]**

b) Write steps to write algorithm for Semi Implicit method for pressure linked equations. **[6]**

OR

Q8) a) What are the boundary conditions for the pressure correction method? **[6]**

b) For the pressure correction formula, justify the need of Finite Volume approach. Explain X-momentum equation grid schematic for effective control volume. **[10]**

Q9) a) Explain the impact of Computational Fluid Dynamics in automobile and internal combustion engine applications. **[10]**

b) Illustrate the following steps of pre-processing: **[8]**

i) Creation of geometry.

ii) Mesh generation.

- iii) Selection of physics & fluid properties.
- vi) Specify boundary conditions.

OR

Q10)a) Explain any two turbulence models; **[10]**

- i) RANS.
- ii) $k - \epsilon$ and
- iii) $k - \omega$.

b) How the graphical plots such as stream-lines; velocity vector plots; and animation are giving a precise picture of the analysis of computational fluid dynamics? **[8]**



Total No. of Questions : 10]

SEAT No. :

P4540

[Total No. of Pages : 4

[4959] - 1048

B.E. (Mechanical)
FINITE ELEMENT ANALYSIS
(2012 Course) (Elective - IV(b))

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :-

- 1) *Draw suitable neat diagrams, wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if required.*

Q1) a) Write down the basic steps of FEA and list down methods adopted for Finite Element Formulations. [6]

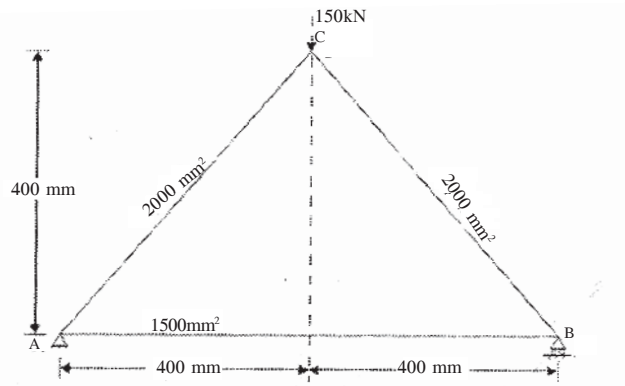
b) Write a note on Plane Stress Formulations and explain its applications. [4]

OR

Q2) a) Explain step by step procedure for Weighted Residual Method. [6]

b) Explain CST element. [4]

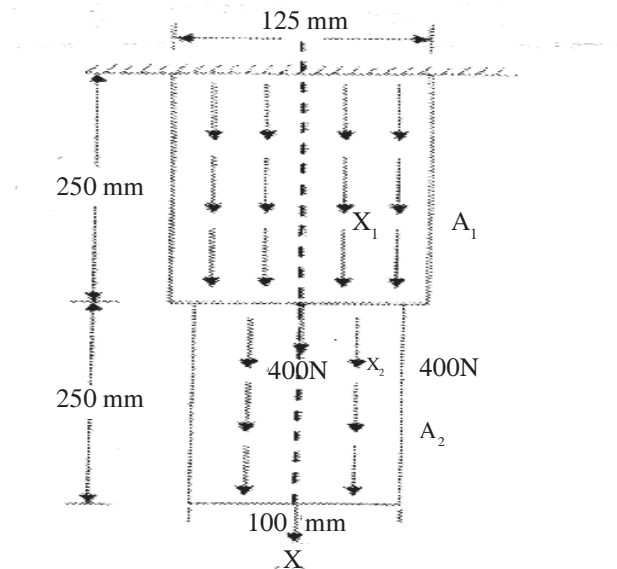
Q3) Determine stresses and reaction forces in Truss structure shown below. Take $E = 200\text{GPa}$. [10]



P.T.O.

OR

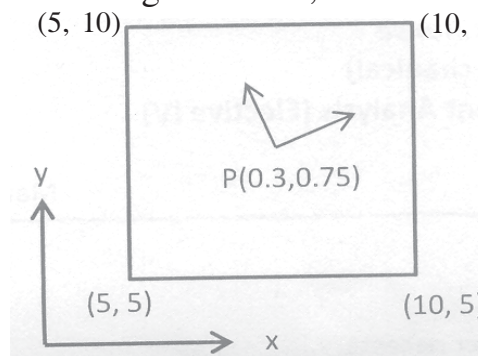
- Q4) a)** The thin uniform thickness 20 mm is shown in figure. In addition to the self weight, the plate is subjected to point load of 400 N at mid-depth. The Youngs Modulus $E = 200 \text{ GPa}$ and unit weight $\rho = 0.8 \times 10^{-4} \text{ N/mm}$. Analyse the plate after modeling it with two elements and find deformations in nodes. [6]



- b) What is meant by Pascal's Triangle and how it is used in decision of interpolation function in element formulations. [4]

- Q5) a)** Explain what is Isoparametric formulations and what is meant by Iso, Super and Sub Parametric Formulation. [6]

- b) Point P is located in rectangular element having natural coordinates (0.3,0.75) as shown in figure below, determine X and Y coordinates of point P. [6]



- c) Explain step by step procedure of Gauss 2-point and 3-point Numerical integration method and how it is applied in isoparametric formulations? [6]

OR

Q6) a) Explain concept of rigid body modes and constant strain rates and how it is ensured in isoparametric formulations. Write down rules of isoparametric formulations. [8]

b) Determine integration of following function by using Gauss 2-point and 3-point method and compare with exact solution. [10]

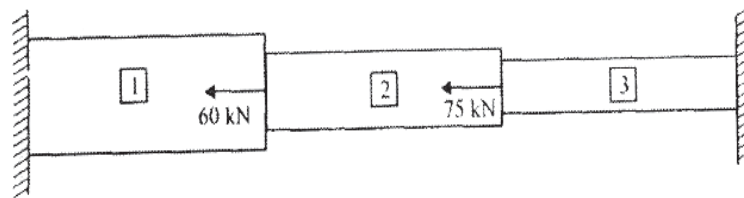
$$\int_5^{10} (1 + x + x^2) dx$$

Q7) a) Write down governing equation of steady state Heat Transfer and also write down elemental stiffness matrix and compare with Bar element.[6]

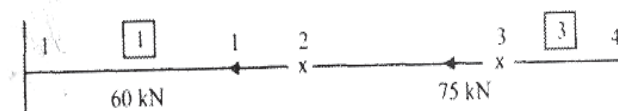
b) A metallic fin, with thermal conductivity 70 W/m °K, 1 cm radius and 5 cm long extends from a plane wall whose temperature is 140°C. Determine the temperature distribution along the fin if heat is transferred to ambient air at 20°C with heat transfer coefficient of 5 W/m² °K. Take two elements along the fin. [10]

OR

Q8) a) A composite bar of 3 different materials, rigidly fixed at both the ends, is subjected to a uniform temperature rise of 80°C. In addition, axial loads, are applied at two points on the bar as shown. Determine the displacements stress and support reactions. [10]



	Section-1	Section-2	Section-3
Material	Bronze	Aluminium	Steel
Area of cross section (mm ²)	2400	1200	600
Length (mm)	800	600	400
Modulus of elasticity(GPa)	83	70	200
Coefficient of thermal expansion (/°C)	18.9×10^{-6}	23×10^{-6}	11.7×10^{-6}



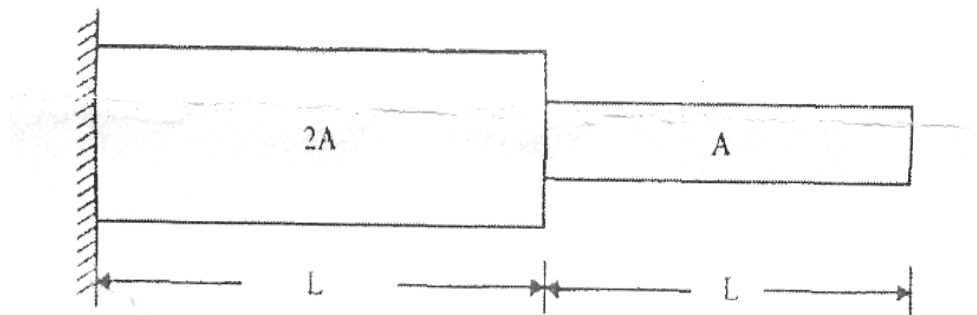
b) Write a note on Heat Transfer through Pin-Fin, explain with appropriate governing equations. [6]

- Q9) a)** Write down a dynamic equation and explain each term. Convert this into a Eigen value problem and explain its significance. [6]
- b) Consider the Three element model of fixed free bar as shown in figure undergoing axial vibrations. [10]

Let $L = 1\text{m}$. $A = 30 \times 10^{-6} \text{ m}^2$, $E = 2 \times 10^5 \frac{\text{N}}{\text{mm}^2}$, $\rho = 7800 \text{ kg/m}^3$, using lumped mass matrix determine natural frequencies of bar.

OR

- Q10)a)** Write down consistent and lumped mass matrices for following elements. [6]
- Bar Element
 - Plane Stress Element
 - Triangular Element
- b) Find the natural frequencies of longitudinal vibrations of the same stepped shaft of areas A and $2A$ and of equal lengths (L), when it is constrained at one end, as shown below. [10]



Total No. of Questions :10]

SEAT No. :

[Total No. of Pages : 2

P3681

[4959]-1049

B.E. (Mechanical)

DESIGN OF PUMPS, BLOWERS & COMPRESSORS

(2012 Course) (Elective-IV) (End Sem.) (Semester-II) (402050 C)

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) *Answers for questions should be written in one single answer sheet only.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat figures should be drawn, wherever necessary.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

Q1) a) Write a short note on stage “velocity triangles”. **[5]**

b) Write a short note on “Dimensional parameters”. **[5]**

OR

Q2) a) Explain the different applications of compressors, fans and blowers. **[5]**

b) Explain the Basic Equation of Energy Transfer between fluid and rotor. **[5]**

Q3) a) What is slip? Explain the concept of negative slip. **[5]**

b) Explain Air vessel in “Reciprocating Pumps”. **[5]**

OR

Q4) a) Explain construction and working of a “Reciprocating pump” with neat sketch. **[5]**

b) Explain “Indicator Diagram” in reciprocating pumps. **[5]**

Q5) a) Discuss the various “Applications of Fans and Blowers”. **[8]**

b) Explain different criterias for “selection of fan s and blowers”. **[8]**

OR

P.T.O.

- Q6)** a) How does the dust erosion of centrifugal impeller occurs? What is its effect on the performance. [8]
- b) Explain the function of an “Aerofoil” and discuss characteristic curves of an “Aerofoil”. [8]

- Q7)** a) Explain different steps involved in designing of “Centrifugal Blowers”. [8]
- b) Write a short note on “Design procedure, selection & optimization of blowers”. [8]

OR

- Q8)** a) Explain performance of “Axial fans” with neat graphs. [8]
- b) Explain the different “fan stage parameters” with usual notations. [8]

- Q9)** a) Explain with neat sketch working of centrifugal compressor”. [8]
- b) A centrifugal compressor takes air at 01 bar and 20°C and delivers with total head pressure ratio of 03 bar at the rate of 20 kg/min. The air velocity at the inlet is 60m/s. The isentropic efficiency of the compressor is 70%. Determine: [10]
- i) The total head temp. of air at the exit of compressor and
- ii) B.P. required to run the compressor assuming the mechanical efficiency as equal to 95%.

OR

- Q10)**a) Explain in details “Performance characteristic curves of An Axial Flow Compressor”. [8]
- b) A centrifugal compressor running at 20,000 rpm takes air at 17°C. Using the following data, find the following parameters. [10]
- i) Temperature rise of air passing through the compressor.
- ii) The static pressure ratio.

Take ϕ_s (slip factor) = 0.80; Isentropic efficiency (η Isentropic) = 0.70; outer diameter of the Impeller = 50cm. Assume the absolute velocity of Air Entering and leaving the compressor are same.



Total No. of Questions :12]

SEAT No. :

P3682

[Total No. of Pages :4

[4959] - 1050

B.E. (Mech. S/W)

AUTOMOBILE ENGINEERING

(Self Study - III) (2012 Course) (402064) (Semester - I) (Elective - I)

Time : 3 Hours]

[Max. Marks :100

Instructions to the candidates:

- 1) *Answer three questions from Section I and three questions from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 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 do you understand by vehicle layout. **[2]**
- b) Explain the following types of layout **[8]**
- i) Front Engine Front Drive
 - ii) Rear Engine Rear Drive
- c) Explain the working of differential used in rear axle. **[6]**

OR

- Q2)** a) With a neat sketch explain the working of full floating or semi - floating Rear Axle Hub. **[5]**
- b) Describe any two chassis types. **[6]**
- i) Backward controlled
 - ii) Forward controlled
 - iii) Semi forward controlled
- c) With a neat sketch explain the construction of one type of Front Axle. **[5]**

P.T.O.

- Q3)** a) What are the desirable properties of clutch lining material. [6]
- b) Explain with neat sketch working of synchromesh Drive. [6]
- c) Explain the need of propeller shaft in Rear Drive vehicle. [3]
- d) Explain the working of universal Joint. [3]

OR

- Q4)** a) Name three types of clutch & explain one of them. [6]
- b) Explain the working with neat sketch [6]
- i) Fluid Flywheel

OR

- ii) Torque converter
- c) Sketch & describe the working of two piece propeller shaft. [6]

- Q5)** a) Explain any two [6]
- i) Over steer & under steer
- ii) Cornering Force
- iii) Slip angle
- b) Compare the following [4]
- Coil spring Vs Leaf spring suspension
- c) Sketch & describe the working of Drum Brake. [6]

OR

- Q6)** a) With a neat sketch explain the working of power steering. [6]
- b) What do understand by sprung mass & unsprung mass in suspension.[4]
- c) Sketch & explain the working (any one): [6]
- i) Hydraulic Braking system
- ii) Pneumatic Braking system

SECTION - II

- Q7)** Write short note on following: [16]
- a) Types of impacts
- b) Rollover
- c) Speedometer
- d) Sensors used in automobiles.

OR

- Q8)** a) Write short note on various AIS Regulations. [8]
- b) Write short note on various crumple zones of automobile. [8]
- Q9)** a) Describe various types of tests carried out on chassis dynamometer.[10]
- b) Explain with neat sketch SAE vehicle axis systems. [6]

OR

Q10) Write short note on following (any four)

[16]

- a) Frontal impact test.
- b) Side impact test
- c) Pole impact test
- d) Pedestrian impact test
- e) Coast down test

Q11) Write short note on (any three)

[18]

- a) Bulldozers
- b) Tankers
- c) Dumpers
- d) Hydraulic dozers.

OR

Q12)a) Explain with neat sketch types of multi axle vehicle layouts.

[10]

- b) Differentiate the light, medium and heavy duty tractors on the basis of specifications and functional parameters. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3581

[Total No. of Pages : 3

[4959]-1051

B.E. (Mechanical S/W)

POWER PLANT ENGINEERING

(2012 Pattern) (Self Study - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

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

SECTION - I

- Q1)** a) Explain pulverized coal firing system with neat sketch. [8]
b) Write a short note on classification of fuels. [8]

OR

- Q2)** a) Explain with neat sketch what is Fluidized Bed combustion. [8]
b) Explain the working of a Reheat cycle with a schematic layout and T-S diagram. [8]

- Q3)** a) Draw a neat sketch of Benson boiler and discuss its merits and demerits as compared with velox boiler. [8]
b) Discuss various factors which are to be considered while selecting site for thermal power plants. [8]

OR

- Q4)** a) Explain with neat sketch working of Electrostatic precipitator. [8]
b) Write a short note on a travelling Grate stoker. [8]

P.T.O.

- Q5)** a) Explain working of Pelton Wheel turbine with neat sketch. [9]
b) Explain working of Hydropower plant with a neat sketch. [9]

OR

- Q6)** a) Write a short note on working of Kaplan turbine. [9]
b) Explain advantages & disadvantages of Hydro-Power plant. [9]

SECTION - II

- Q7)** a) Explain with neat sketch main parts of nuclear reactor & working of each part. [8]
b) Write a short note on Nuclear waste disposal. [8]

OR

- Q8)** a) Write a short note on Nuclear fission. [8]
b) Describe with neat sketch main components & working of diesel power plant. [8]

- Q9)** a) Explain with neat sketch working of simple gas power plant. [8]
b) Explain with neat sketch working of Bio mass plant. [8]

OR

- Q10)** a) Explain with neat sketch working of open cycle and closed cycle gas power plant. [8]
b) Write a short note on tidal power generation. [8]

- Q11)** a) Explain the terms : Load factor, Reserve factor, Plant use factor and Capacity factor. [8]

- b) The rated capacity of power plant is 400 MW. The peak load on the plant is 350 MW. The various consumer groups having maximum demand of 120 MW, 100 MW, 80 MW & 90 MW are connected to the power plants. The annual load factor is 0.8. Calculate : [10]

- i) The average load
- ii) The capacity factor
- iii) Demand factor
- iv) Reserve factor
- v) The diversity factor

OR

Q12) a) A power station has to supply load as follows :

Time (hours)	0-6	6-8	8-10	10-12	12-16	16-20	20-22	22-24
Load (MW)	40	80	90	100	75	120	100	80

Capacity factor of the plant is 0.6

Work out following :

[9]

- i) Load Curve
- ii) Average Load
- iii) Load factor of the plant
- iv) Reserve factor
- v) Capacity of the plant

b) Prove that for economic load distribution between power plants A and B

$$\frac{dI_A}{dL_A} = \frac{dI_B}{dL_B} \cdot$$

[9]



Total No. of Questions : 10]

SEAT No. :

P3582

[Total No. of Pages : 4

[4959]-1052

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

MECHANICAL VIBRATIONS

(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) Draw neat diagrams wherever necessary.
- 3) Use of scientific calculator is allowed.
- 4) Assume suitable data wherever necessary.
- 5) Figures to the right indicate full marks.

- Q1)** a) Explain static and dynamic balancing. [4]
- b) A 3 cylinder radial engine has cylinders located 120° from each other. Reciprocating mass of each cylinder is 1.2 kg. Length of crank is 75 mm and each connecting rod is 250 mm long. Find out maximum primary and secondary unbalance forces, if the engine runs at 2500 rpm. [6]

OR

- Q2)** a) Explain with displacement-time plot, the overdamped, critically damped and underdamped vibratory systems. Give suitable examples. [4]
- b) A spring mass system has spring stiffness “k” N/m and a mass of “m” kg. It has natural frequency of vibration as 12 Hz. An extra 2 kg mass is coupled to “m” and the natural frequency reduces by 2 Hz. Find the values of k and m. [6]

- Q3)** a) Define the following terms related to vibrations : [4]
- i) Logarithmic decrement
 - ii) Damping coefficient
 - iii) Damping factor
 - iv) Critical damping coefficient

P.T.O.

- b) A gun barrel, weighing 600 kg has a recoil spring of stiffness 345 N/mm. If the barrel recoils 1 m on firing, find : [6]
- The initial recoil velocity of the gun
 - The critical damping coefficient which is engaged at the end of recoil stroke.

Assume no energy is lost in the recoil of the barrel.

OR

- Q4) a) Derive a relation to determine the loss of amplitude per cycle in case of Coulomb damping. [4]
- b) A flywheel is mounted as shown in following fig.1. If the flywheel mass is 500 kg and radius of gyration is 0.5 m and if the shaft is of 50 mm diameter, find the natural frequency of this system. Assume modulus of rigidity to be 80 GPa. [6]

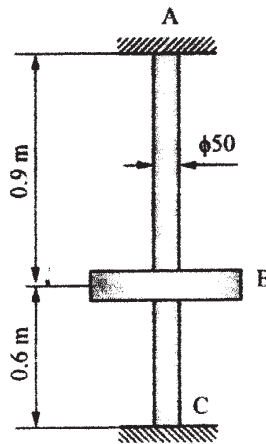


Fig. 1

- Q5) a) Explain frequency response curves with neat diagram. [6]
- b) The rotating machine having total mass of 20 kg. has an eccentric mass of 1.5 kg with eccentricity 25 mm. The machine rotates at 720 rpm. If the amplitude of vibration which is 20 mm, lags the eccentric mass by 90° , determine : [10]
- The natural frequency of the system
 - The damping factor
 - The amplitude and phase angle when eccentric mass rotates at 1440 rpm.

OR

- Q6)** a) Derive an expression of magnification factor in case of steady state forced vibrations. [6]
- b) A machine part of mass 4 kg vibrates in a viscous fluid. Find the damping coefficient when a harmonic excitation force of 50 N results in a resonant amplitude of 250 mm with a period of 0.4 sec. If the excitation frequency is 2 Hz, find the percentage increase in the amplitude of forced vibration when the damper is removed. [10]

- Q7)** Set up the differential equations of motion for an automobile having the following data and determine the two natural frequencies and principal modes of vibrations of the automobile : [16]

Weight of automobile = 2000 N;

Radius of gyration about its CG = 1.1 m

Wheel base = 3 m

Distance between front axle & CG = 1.4 m;

Combined stiffness of front springs = 6×10^6 N/m;

Combined stiffness of rear springs = 6.5×10^6 N/m

OR

- Q8)** a) Explain following terms : [4]
- i) Mode shapes
 - ii) Eigen vector
 - iii) Eigen value
 - iv) Mathematical modelling
- b) The flywheel of an engine driving a dynamo has mass of 200 kg and has a radius of gyration of 300 mm. The shaft at the flywheel end has an effective length of 250 mm and is 50 mm diameter. The armature mass is 225 kg and has a radius of gyration of 255 mm. The dynamo shaft has a diameter of 43.75 mm and a length of 200 mm. Neglecting the inertia of the shaft and coupling, calculate the frequency of the torsional vibrations and position of node. Take the modulus of rigidity for shaft material as 80 GPa. [12]

- Q9)** a) Explain the ISO standards for vibration measurement. [4]
- b) Explain the construction and working of piezoelectric accelerometer with neat diagram. [6]

- c) A machine of one tonne is acted upon by an external force of 2450 N at a frequency of 1500 rpm. To reduce the effects of vibration, isolator of rubber having a static deflection of 2 mm under the machine load and an estimated damping $\zeta = 0.2$ are used. Determine : [8]
- i) the force transmitted to the foundation
 - ii) the amplitude of vibration of machine
 - iii) the phase lag

OR

- Q10)** a) Explain various methods of vibration control? [4]
- b) Explain the principle and working of undamped dynamic vibration absorber with neat diagram. [6]
- c) An instrument of 50 kg mass is located in an airplane cabin which vibrates at 2000 cpm with an amplitude of 0.1 mm. Determine the stiffness of the four steel springs required as supports for the instrument to reduce its amplitude to 0.005 mm. Also calculate the maximum total load for which each spring must be designed. [8]



Total No. of Questions : 10]

SEAT No. :

P3583

[Total No. of Pages : 3

[4959]-1053

B.E. (Mechanical) (S/W) (End Semester)

INDUSTRIAL HYDRAULICS & PNEUMATICS

(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) *Figures to the right indicate full marks.*
- 3) *Draw neat sketches wherever necessary.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) Write a short note on “classification of pumps”. **[5]**

b) Classify Hydraulic Motors. **[5]**

OR

Q2) a) Write a short note on “Pressure switches” **[4]**

b) Explain with neat sketch “spring loaded Accumulator”. **[6]**

Q3) a) Write a short note on “Energy losses in hydraulic systems”. **[4]**

b) Explain with neat sketch working of “External Gear Pump”. **[6]**

OR

Q4) a) Explain with neat sketch working of “Radial Piston Motor”. **[6]**

b) Write a short note on “Cushioning of cylinders”. **[4]**

Q5) a) Explain with neat sketch “Sequencing circuit”. **[8]**

b) Explain with neat sketch “synchronization circuit”. **[8]**

OR

Q6) a) Explain with neat sketch “Fail safe circuit”. **[8]**

b) Explain with neat sketch”Motor Breaking circuit”. **[8]**

P.T.O.

- Q7)** a) Write a short note on “selection of compressors for pneumatic systems”. [6]
b) Write a short note on “Filters & Lubricators used in pneumatic systems”. [10]

OR

- Q8)** a) Write a short note on Direction control valves used in “Pneumatic systems”. [10]
b) Write a short note on “Vacuum pumps & its types”. [6]
- Q9)** a) Write a short note on “Design parameters for Hydraulic system”. [9]
b) Write a short note on “Trouble shooting maintenance procedures for “pumps & pressure Relief valves”. [9]

OR

- Q10)** Two identical cylinders A and B are to be operated simultaneously. The cylinder “A” moves against a load of 25 KN, while the cylinder “B” has a load of 20 KN. Both the cylinders have a stroke of 01 m. The working stroke is to be completed in about 20 seconds time. The return stroke of cylinder ‘B’ is to start only after the cylinder ‘A’ is completely retreated. The return speeds are to be as fast as possible. Draw a circuit which will fulfill these requirement. Select different components you used in the circuit from the data given. Mention the ratings of the components in case it is not available in the given data. [18]

DATA

1. SUCTION STRAINER:

Model	Flow capacity
	(lpm)
S1	38
S2	76
S3	152

2. PRESSURE GAUGE:

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

3. VANE PUMP:

Model	Delivery (lpm)			Model	Max. working pressure (bar)	Flow capacity (lpm)
	at 0 bar	at 35 bar	at 70 bar			
P1	8.5	7.1	5.3	PO1	210	19
P2	12.9	11.4	9.5	PO2	210	38
P3	17.6	16.1	14.3	PO3	210	76
P4	25.1	23.8	22.4			
P5	39	37.5	35.6			

4. RELIEF VALVE:

Model	Flow range (lpm)	Max. working pressure (bar)	Model	Bore Dia. (mm)	Rod Dia. (mm)
			R1	11.4	70
R2	19	210	A2	40	16
R3	30.4	70	A3	50	35
R4	57	105	A4	75	45
			A5	100	50

5. FLOW CONTROL VALVE:

Model	Max. working pressure (bar)	Flow range (lpm)	Model	Capacity (lit)
			F1	70
F2	105	0-4.9	T2	100
F3	105	0-16.3	T3	250
F4	70	0-24.6	T4	400
			T5	600

6. DIRECTION CONTROL VALVE:

Model	Max. working pressure (bar)	Flow capacity
		(lpm)
D1	350	19
D2	210	38
D3	210	76

7. CHECK VALVE

Model	Max. working pressure (bar)	Flow capacity
		(lpm)
C1	210	15.2
C2	210	30.4
C3	210	76

8. SEQUENCE VALVE

9. CYLINDER (Max. working pressure -210)

10. OIL RESERVOIR:



Total No. of Questions : 10]

SEAT No. :

P3584

[Total No. of Pages : 5

[4959]-1054

B.E. (Mechanical Sandwich) (End Semester)

REFRIGERATION AND AIR CONDITIONING

(2012 Pattern) (Elective - I(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 and mention it clearly.*
- 5) *Use of steam table is allowed.*

Q1) a) Explain the basic components of a typical automobile air conditioning system. **[5]**

b) A refrigeration system operating on R-134a refrigerant includes liquid to vapour heat exchanger. The heat exchanger cools saturated liquid coming out of condenser from 32°C to 22°C with the help of vapour coming out of evaporator at -12°C saturated. The compression is isentropic. Draw the cycle of p-h diagram and using p-h diagram determine **[5]**

i) COP of the system

ii) COP of the system without liquid to vapour heat exchanger

OR

Q2) a) Explain the actual VCC with the help of T-s and P-h diagrams. **[5]**

b) With neat diagram explain Cascade refrigeration system. **[5]**

Q3) a) What are zeotropic and azeotrope refrigerants? Explain their advantages with example. **[5]**

b) A Bell-Coleman cycle works between 17 bar and 3.4 bar. The temperature of air after the cooler is 15°C and after the refrigerator is 6°C. For refrigeration capacity of 6TR determine :

P.T.O.

- i) Temperature after compression and expansion
- ii) Air circulation required per minute
- iii) Theoretical COP

Take $C_p = 1.005 \text{ kJ/kgK}$ and $C_v = 0.718 \text{ kJ/kgK}$ [5]

OR

- Q4)** a) List the desirable properties of refrigerant -absorbent pair in vapour absorption refrigeration system. [4]
- b) A R-134a refrigeration system involves two evaporators, E1 operating at -10°C , and E2 at $+10^\circ\text{C}$ respectively. The refrigeration capacities of E1 and E2 are 10 TR and 20 TR respectively. The system uses individual compressors and individual expansion valves. The refrigerant temperature at outlet of condenser is 30°C saturated. Draw the schematic diagram of refrigeration system and plot the cycle on P-h diagram. [6]
- Determine COP of the system if vapour are fully saturated at compressor inlet.

- Q5)** a) Explain the followings : [8]
- Relative humidity,
 - Dew point temperature,
 - Wet bulb temperature,
 - Thermodynamic wet bulb temperature
- b) Air at 38°C and 25% RH passes through an evaporative cooler. If air leaving temperature is 25°C , how much water is added per kg dry air and what is the final relative humidity?
- If relative humidity is to be maintained 55%, what should be the air leaving temperature? [8]

OR

- Q6)** a) What is an effective temperature? Explain the factors which govern optimum effective temperature. [8]
- b) What do you mean by infiltration air and ventilation air? Discuss the methods to calculate infiltration air. [8]
- Q7)** a) With neat diagram explain the working of flooded evaporator. what are the advantages of flooded evaporator over DX evaporator? [8]
- b) Explain VRF systems with neat diagram. [8]

OR

- Q8)** a) Explain VAV air conditioning system. Discuss its advantages and limitations. [7]
b) Classify the refrigerant compressors. What is the selection criteria of refrigerant compressors? Explain with example. [9]

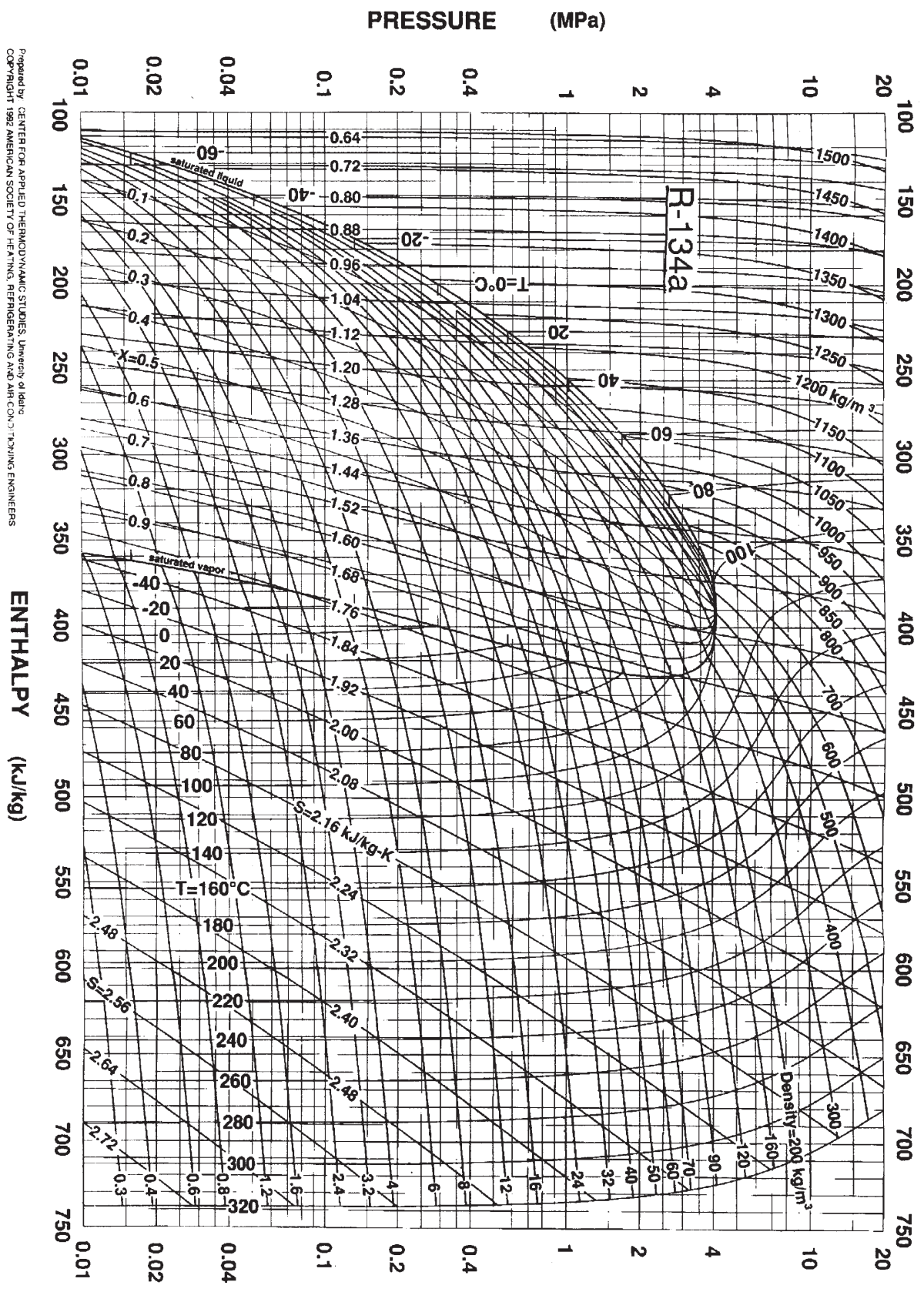
- Q9)** a) With neat diagram explain constructional details and working of air handling unit. [8]
b) A duct AB, 1.5 m × 1m in size, carrying conditioned air runs 50 m from the fan outlet. Then it divides into two parts BC and BD each of 80 m in length and 1.5 m × 1m in cross section. If the air discharge at the outlet of BC is 1600 cmm, determine the quantity discharged at the point BD and fan static pressure.

Calculate duct friction loss using, $\Delta P_f = \frac{4fL}{D} \left(\frac{V^2}{1.66} \right)$

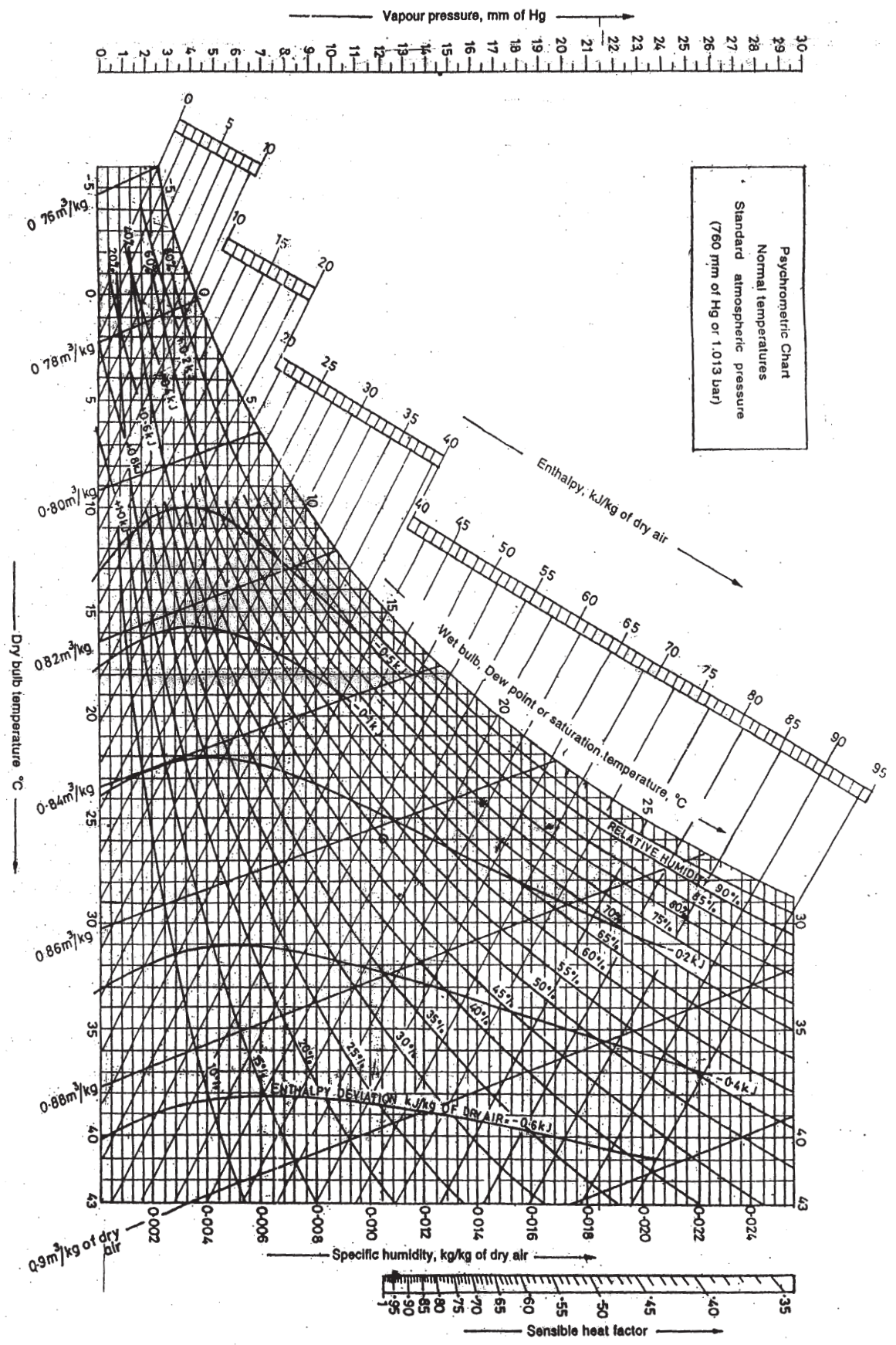
Where D & L are equivalent diameter and length of duct in m, V is velocity in m/s. Take f = 0.005. [10]

OR

- Q10)** a) Explain static regain method of duct design with suitable example. [10]
b) Explain fan laws. Give selection criteria of fan for air conditioning application. [8]



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Total No. of Questions : 10]

SEAT No. :

P4936

[Total No. of Pages :4

[4959]-1055
B.E. (MECHANICAL SAND WICH)
Computational Fluid Dynamics
(2012 Pattern) (Semester - II) (Elective - I)

Time : 2.30 Hours]

[Maximum 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. Figures to the right side indicate full marks.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

Q1) a) Explain in detail the various flow models using an infinitesimal control volume. **[6]**

b) Write three fundamental physical principles upon which fluid dynamics is based on. **[4]**

OR

Q2) a) Explain any two possible errors in CFD analysis with examples. **[4]**

b) Write in detail with neat sketches **[6]**

i) hybrid grid

ii) multiblock grid

iii) body fitted grid

Explain the significance of each grid.

Q3) a) Derive the discretized form of the steady, one-dimensional, heat conduction

equation and show that $k \frac{\partial^2 T}{\partial x^2} = 0$ can be expressed as $\frac{T_{i+1} + T_{i-1} - 2T_i}{(\Delta x)^2} = 0$

Explain the order of accuracy of above equation.

[6]

P.T.O.

- b) Differentiate implicit methods over explicit methods. [4]

OR

- Q4)** a) Explain in detail Dirichlet and Neumann boundary conditions with examples. Draw neat sketches. [4]

- b) Consider one dimensional steady-state heat conduction in rectangular horizontal fin as shown in Fig. 1 The rectangular fin is subjected to the boundary conditions are shown in Fig. 1.

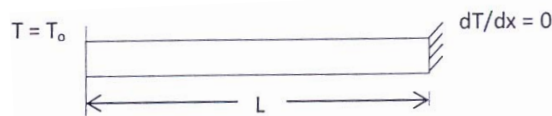


Fig.1 Rectangular fin

Above system results into following set of equations. Find the temperature distribution (temperatures, T_1 to T_4) in the fin using TDMA method. [6]

$$\begin{bmatrix} 2.25 & -1 & & \\ -1 & 2.25 & -1 & \\ & -1 & 2.25 & -1 \\ & & -2 & 2.25 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

- Q5)** a) Show that for two dimensional convective-diffusive equation [10]

$$\frac{\partial \phi}{\partial t} + u \frac{\partial \phi}{\partial x} + v \frac{\partial \phi}{\partial y} = \mathcal{G} \left[\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} \right]$$

the CFL condition should be less than or equal to 0.5 for system to remain stable,

- b) Explain Lax-Wendroff Method? Derive an expression for Lax Wendroff method and comment on the order of accuracy of the method. [8]

OR

- Q6)** a) Write first order wave equation. Discretize the wave equation with suitable numerical technique and find out the numerical solution at next time level. [10]
- b) Derive and explain MacCormack's technique with predictor and corrector step. [8]

- Q7)** a) Explain the CFD simulation process for flow through pipe using SIMPLE numerical technique. Write stepwise algorithm to find out the numerical simulation using SIMPLE technique [10]
- b) Write a short note on finite volume method. Comment on preference of finite volume method over finite difference method. [6]

OR

- Q8)** a) Explain the necessity of the variation of SIMPLER algorithm from SIMPLE algorithm. Explain how the drawbacks encountered in SIMPLE algorithm are overcome in SIMPLER algorithm. Write all the steps in the algorithm. [10]
- b) Explain the need of relaxation techniques in numerical solution process. Write in brief about under-relaxation. [6]

- Q9)** a) In an automobile industry, it is recommended to use CFD tool for analysis of heat dissipation in brake disc as shown in Figure 2. Write in detail, methodology to do the CFD analysis of the brake disc including three distinct processes preprocessing, solver and post-processing. Comment on the [10]
- i) objective of the grooves made on the disc and give suggestion on number of the groove and its pattern.
- ii) method to reduce the computational time.

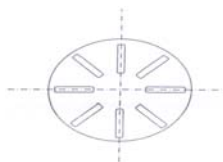


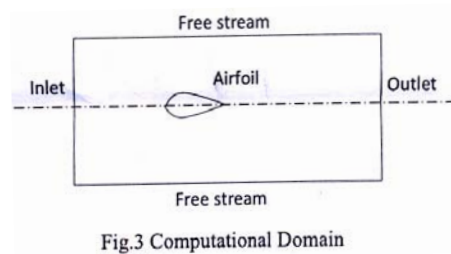
Fig.2 Brake disc

- b) Explain in detail any two physical boundary conditions. Write in detail significance of physical boundary conditions in CFD analysis process. [6]

OR

Q10)a) CFD Post-processing is an important tool to study and analyze the fluid flow and heat transfer behavior. [6]

- i) Write in detail the post-processing and its importance in CFD analysis process.
- ii) Enlist the different tools in post processing in CFD to analyze the fluid flow and heat transfer.
- b) A computational domain with different boundary conditions is shown in Figure 3.



Show with neat sketch where fine mesh is appropriately located. Explain in brief the importance of fine mesh in the domain. [4]

- c) What is turbulence modeling? Explain $k - \epsilon$ model in detail. [6]



Total No. of Questions : 10]

SEAT No. :

P3585

[Total No. of Pages : 4

[4959]-1056

B.E. (Mechanical Sandwich Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

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

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) Explain the basic equation of Energy Transfer between fluid and rotor.[6]

b) Define the following terms : [4]

- i) Pump
- ii) Fan and Blower
- iii) Compressor
- iv) Turbine

OR

Q2) a) Explain performance characteristics of pump, fan, blower and compressor. [6]

b) A small compressor has the following data : [4]

Air flow rate = 1.5778 kg/s

Pressure Ratio = 1.6

Rotational speed = 54,000 rpm

Efficiency = 85%

State of air at entry :

$P_{01} = 1.008$ bar,

$T_{01} = 300$ K,

$C_p = 1.009$ kJ/kg K

Calculate the power required to drive the compressor?

P.T.O.

- Q3)** a) What is slip? Explain the negative slip with neat sketch. [5]
- b) The cylinder bore diameter of a single acting reciprocating pump is 150 mm and its stroke length is 300 mm. The pumps runs at 50 r.p.m. and lifts water through a height of 25m. The delivery pipe is 22 m long and 100 mm in diameter. Find the theoretical discharge and the theoretical power required to run the pump. If the actual discharge is 4.2 liters/s. Find the percentage slip. Also determine the acceleration head at the beginning and middle of the delivery stroke. [5]

OR

- Q4)** a) Explain the Air vessel in Reciprocating Pumps? [5]
- b) A single acting reciprocating pump has piston diameter 12.5 cm and stroke length 30 cm. The center of the pump is 4 m above the water level in the sump. The diameter and length of suction pipe are 7.5 cm and 7 m respectively. The separation occurs if the absolute pressure head in the cylinder during suction stroke falls below 2.5 m of water. Calculate the maximum speed at which the pump can run without separation. Take atmospheric pressure head = 10.3 m of water. [5]

- Q5)** a) Explain the different mechanical losses in fans and blowers? [8]
- b) A centrifugal fan has the following data : [8]

Inner diameter of the impeller	18 cm
Outer diameter of the impeller	20 cm
Speed	1450 rpm

The relative and absolute velocities respectively are

At entry	20 m/s, 21 m/s
At exit	17 m/s, 25 m/s
Flow rate	0.5 kg/s
Motor efficiency	78%

Determine :

- i) Stage pressure rise
- ii) Degree of reaction
- iii) The power to drive the fan

Take density of air as 1.25 kg/m^3

OR

- Q6)** a) Discuss the various applications of fans & blowers. [8]
- b) A centrifugal blower with a radial impeller produces a pressure equivalent to 100 cm column of water. The pressure and temperature at its entry are 0.98 bar and 310 K. The electric motor driving the blower runs at 3000 rpm. The efficiencies of the fan and drive are 82% and 88% respectively. The radial velocity remain constant and has a value of $0.2 u_2$. The velocity at the inlet eye as $0.4u_2$. If the blower handles $200 \text{ m}^3/\text{min}$ of air at the entry condition determine :- [8]
- Power required by the electric motor
 - Impeller diameter
 - Inner diameter of the blade ring
 - Air angle at entry

- Q7)** a) Explain design procedure & selection, optimization of blower. [8]
- b) An axial fan stage consisting of only a rotor has the following data : [8]
- | | |
|-------------------------------|------------|
| Rotor blade air angle at exit | 10° |
| Tip diameter | 60 cm |
| Hub diameter | 30 cm |
| Rotational speed | 960 rpm |
| Power required | 1 kW |
| Flow coefficient | 0.245 |
- (inlet flow conditions $P_1 = 1.02 \text{ bar}$ and $T_1 = 3.16 \text{ K}$)
- Determine the rotor blade angle at the entry, the flow rate, stage pressure rise, overall efficiency, degree of reaction, and specific speed.

OR

- Q8)** a) What are main cause for noise generation? What are methods for reducing the fan noise? [8]
- b) The velocities for upstream and downstream of an open propeller fan ($d = 50 \text{ cm}$) are 5 and 25 m/s respectively. If the ambient conditions are $P = 1.02 \text{ bar}$, $t = 37^\circ\text{C}$ determine : [8]
- Flow rate through the fan
 - Total pressure developed by the fan and
 - The power required to drive the fan assuming the overall efficiency of the fan as 40%

Q9) a) Explain performance characteristics curves of an Axial flow Compressor. **[8]**

b) An Axial compressor stage has the following data : **[10]**

i)	Temperature and Pressure at Entry	300 K, 1.0 bar
ii)	Degree of Reaction	50%
iii)	Mean Blade ring diameter	36 cm
iv)	Rotational speed	18000 rpm
v)	Blade Height at entry	6 cm
vi)	Air angles at rotor and stator exit	25°
vii)	Axial velocity	180 m/s
viii)	Work done factor	0.88
ix)	Stage Efficiency	85%
x)	Mechanical Efficiency	96.7%

Determine :

- 1) Air angles at the stator and rotor entry
- 2) The mass flow rate of air
- 3) The power required to drive the compressor
- 4) The loading coefficient
- 5) The pressure ratio developed by the stage
- 6) Mach number at the rotor entry

OR

Q10) a) Explain performance characteristics curves of a Centrifugal flow Compressor. **[8]**

b) Air enters the inducer of centrifugal compressor at $P_{o1} = 1.02$ bar, $T_{o1} = 335$ K. The hub and tip diameters of the impeller eye are 10 and 25 cm respectively. If the compressor runs at 7200 rpm and delivers 5.0 kg/s of air. Determine the air angle at the inducer blade entry and the relative Mach number. If IGVs are used to obtain a straight inducer section, determine the air angle at IGVs exit and the new value of the relative Mach number. **[10]**



[4959]-1057

B.E. (Mechanical Engineering Sandwich)**CAD/CAM AND AUTOMATION****(2012 Pattern) (Elective - I(d))***Time : 2½ Hours]**[Max. Marks : 70**Instructions to the candidates:*

- 1) Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8, Q.No.9 or Q.No.10.
- 2) Figures to the right indicate full marks.
- 3) Use of Electronic pocket calculator is allowed.
- 4) Assume suitable data, if necessary.

Q1) a) A square PQRS of side 40 mm is having its point P is at origin with PQ parallel to X axis. Find the new vertices if it is rotated about A by 90° in counter-clockwise direction. [6]

b) Compare with neat sketch, Bezier, B spline and Cubic curves. [6]

OR

Q2) a) Write a short note on boundary representation techniques. [4]

b) Figure 1 shows cluster of four springs. Calculate deflections of each spring when a force of 2000 N is applied. Model the springs as 1D element. [8]

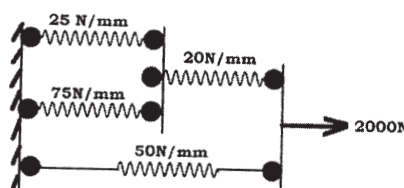


Fig.1

Q3) a) A line AB having vertices A (5, 5) and B (20, 5) is mirrored about Y-axis. Find new vertices. [4]

b) Explain relation between Intrinsic and Global coordinate systems in FEM. [4]

OR

P.T.O.

Q4) a) Explain rotational and translational sweeping of modeling. Give their examples. [4]

b) Write a short note Isoparametric representation in FEM. [4]

Q5) a) Classify CNC machine tools. Explain Open loop and Closed loop systems with neat sketch. [8]

b) Write a CNC program using G and M codes for contouring a component. Also make peck drill of 15 mm diameter hole, as shown in fig 2. Assume suitable data for speed, feed and depth of cut. [10]

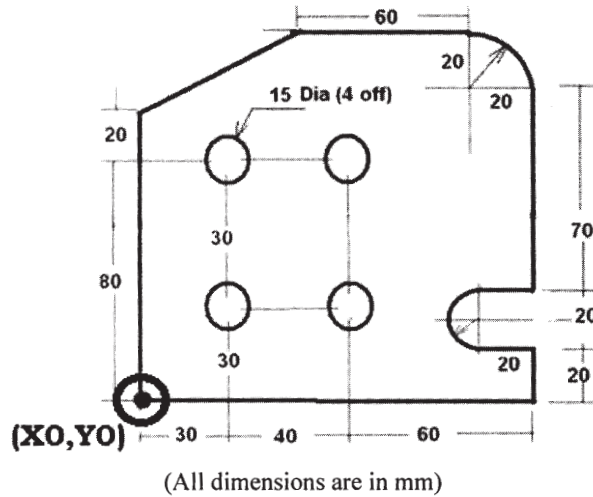


Fig.2

OR

Q6) a) Write a CNC program using G and M codes to turn a component shown in fig.3. Assume suitable data for speed, feed and depth of cut. Use only Canned rough turn and finish cycles. Billet Size: Dia: 35mm L:70 mm. [10]

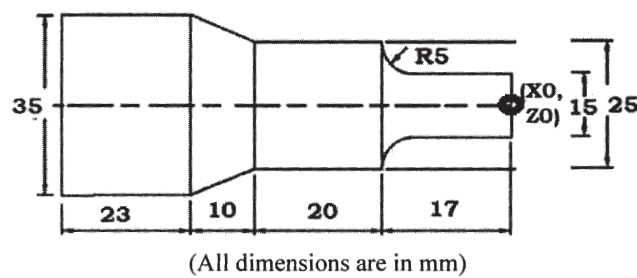


Fig.3

b) Write G codes for : [8]

- i) X-Y plane selection
- ii) Feed Per Minute
- iii) Feed Per Revolution
- iv) Cancel Canned Cycle

Write M codes for :

- i) Coolant on
- ii) End of program
- iii) Tool change
- iv) Spindle stop

- Q7)** a) Explain Laminated Object Manufacturing (LOM) in detail with neat sketch. State its advantages and applications. [8]
b) Explain selective Laser Sintering (SLS) in detail with neat sketch. State its a limitation and applications. [8]

OR

- Q8)** a) Explain Stereo Lithography technique in detail with neat sketch. State its advantages. [8]
b) Explain Rapid Prototyping Systems step-by-step. State challenges in using RP in India and Global. [8]
- Q9)** a) Define Robot as per RIA. State guidelines for selection of grippers. Explain magnetic gripper with neat sketch. [8]
b) Define Automation. State importance of automation. Compare different types of automation systems. [8]

OR

- Q10)** a) Explain the Robot work envelope. List various work volumes. Explain Cartesian configuration. [8]
b) How does FMS give flexibility in Manufacturing? State advantages and disadvantages of FMS. [8]



Total No. of Questions : 12]

SEAT No. :

P3587

[Total No. of Pages : 3

[4959]-1058

B.E. (Mechanical Sandwich Engg.)

ENERGY AUDIT & MANAGEMENT

(2012 Course) (Elective - II) (Semester - 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, Q11 or Q12.*
- 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) Discuss energy scenario in India. **[5]**

b) List down the responsibilities of Energy Auditor. **[5]**

OR

Q2) a) Write short notes on : **[6]**

- i) Ozone layer depletion
- ii) Green House Effect.

b) Write down the responsibilities and functions of BEE. **[4]**

Q3) a) What are different Energy Conservation Opportunities in HVAC System? **[5]**

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

OR

Q4) a) What are different Energy Conservation Opportunities in Heat Exchanger System? **[4]**

b) Explain different instruments and equipments used for energy audit. **[6]**

P.T.O.

- Q5)** a) A sum of Rs. 20,000 is deposited in a bank at the beginning of a year. The bank pays 6% interest annually. How much money is in the bank account at the end of the fifth year, if no money is withdrawn? [5]
- b) Calculate Net present Value of a project at a discount rate of 16% with an Investment of Rs. 50,000 at the beginning of the first year, & saving of Rs. 23,000 & Rs. 36,000 at the end of the first & second year respectively. [5]

OR

- Q6)** Evaluate the financial merit of a proposed project shown in table below. Consider annual discount rate of 8% for each project. Use Net present analysis technique. [10]

	Project-I	Project-II
Capital cost (Rs.)	30,000	30,000
Year	Net Annual saving (Rs.)	Net Annual saving (Rs.)
1	6000	6600
2	6000	6600
3	6000	6300
4	6000	6300
5	6000	6000
6	6000	6000
7	6000	5700
8	6000	5700
9	6000	5400
10	6000	5400

- Q7)** a) List the energy saving opportunities in pumping system. [7]
- b) Find out the efficiency of the boiler by direct method with the data given below : [7]
- Type of boiler : Coal fired
 - Quantity of steam (dry) generated 8 TPH
 - Steam pressure (gauge)/temp: 10 kg/cm²(g)/180°C
 - Quantity of coal consumed: 1.8TPH
 - Feed water temperature: 85°C

- vi) Gross Calorific Value of coal: 3200 kJ/kg
- vii) Enthalpy of saturated steam at 100 kg/cm² pressure: 665 kJ/kg
- viii) Enthalpy of feed water : 85 kJ/kg

OR

- Q8)** a) Explain direct and indirect method to find out boiler efficiency. [8]
- b) Explain the following parameters in the brief : [6]
- i) Excess air ratio
 - ii) Stoichiometric air quantity
 - iii) Balanced draught

- Q9)** a) Explain the terms : [6]
- i) Maximum demand
 - ii) Copper losses
 - iii) Luminous efficiency
- b) Explain the selection and location of transformer for improving power factor. [7]

OR

- Q10)** a) Discuss various factors which constitute the billing amount for a medium scale industry. [7]
- b) Explain different losses occurring in electric motors. [6]

- Q11)** a) Define Waste heat Recovery. Describe its benefits and potentials of savings in industry. [7]
- b) Describe suitable factors influencing selection of cogeneration plant. [6]

OR

- Q12)** a) Explain 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 : 12]

SEAT No. :

P3588

[Total No. of Pages : 6

[4959]-1059

B.E. (Mechanical Engg. S/W) (End Semester)

b: OPERATION RESEARCH

(2012 Pattern) (Elective - II)

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, Q11 or Q12.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of non programmable calculator is permitted.*
- 4) *Assume suitable data, if necessary.*

Q1) The Poona Decorators Company is planning to make up floral arrangements for the forth coming X-mas festival. The company has available the following supply of flowers at the costs shown. **[8]**

Types	Number available	Cost/flower (Rs.)
Red Roses	800	0.2
Gardenias	456	0.25
Carnations	4000	0.15
White Roses	920	0.2
Yellow Roses	422	0.22

These flowers can be used in any of the four popular arrangements whose selling prices are as follows.

Arrangement	Make UP Requirements	Selling Price
Economy	4 Red Roses, 2 Gardenias, 8 Carnations	Rs. 6
May Time	8 White Roses, 5 Cardenias, 10 Carnations, 4 Yellow Roses	Rs. 8
Spring Color	9 Red Roses, 10 Carnations, 9 white roses, 6 Yellow Roses	Rs. 10
Deluxe Rose	12 Red Roses, 12 White Roses, 12 Yellow Roses	Rs. 12

Formulate the L.P. problem which allows the company to determine how many units of each arrangements should be made up in order to Maximum Profit.

P.T.O.

OR

Q2) a) Explain steps in decision making. [4]

b) Explain decision tree with suitable example. [4]

Q3) Solve following problem by VAM to minimize transportation cost. Cell entries are transportation cost per unit. [8]

		Demand				Available
		D1	D2	D3	D4	
SOURCE	S1	3	4	4	5	350
	S2	3	5	4	2	450
	S3	3	3	4	3	200
	Required	200	400	300	200	

OR

Q4) Solve following Assignment Problem to minimize cost. [8]

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	13

Q5) Solve following Problem by Sub-Game Method. [6]

		B's Strategies	
		B1	B2
A's Strategies	A1	4	2
	A2	3	8
	A3	2	12

OR

- Q6)** A ABC Co. Ltd. is considering investments X, Y and Z. Each requires an investment of Rs. 5000 and each has economic life of 3 years and total cash flow over that period of Rs. 6100. The pattern of cash inflow differs as below for each project. **[6]**

YEAR	Annual Cash Inflows in Rs.		
	X	Y	Z
1	1050	2000	3050
2	2000	2050	2050
3	3050	2050	1000

Calculate the Net Present Value (NPV) of each proposal if the required rate of return is 10% and find whose proposal is better.

- Q7)** a) A stockiest has to supply 400 units of a product every Monday to his customers. He gets the product at Rs. 50 per unit from the manufacturer. The cost of ordering and transportation from the manufacturer is Rs. 75 per order. The cost of carrying inventory is 7.5% per year of the cost of the product. Find **[8]**

- i) The Economic Lot Size
- ii) The Total optimal cost including capital cost
- iii) The Total weekly profit if the item is sold for Rs. 55 per unit.

- b) The purchase Price of a machine is Rs. 52,000. The installation charges amount is Rs. 14,400 and its scrap value is Rs. 6,400. The maintenance cost in various years is given below.

Year	1	2	3	4	5	6	7	8
Maintenance cost	1000	3000	4000	6000	8400	11600	16000	19200

After how many years should the machine be replaced? Assume that the machine replacement can be done only at the year end. **[8]**

OR

- Q8)** a) The purchasing manager of a distillery company is considering three sources of supply for oak barrels. The first supplier offers any quantity of barrels at Rs. 150 each. The second supplier offers barrels in lots of 150 or more at Rs. 125 per barrel. The third supplier offers barrels in lots of 250 or more at Rs. 100 each. The distiller uses 1500 barrels a year at a constant rate. Carrying costs are 40% and it costs Rs. 400 to place an order. Calculate the total annual cost for the orders placed to the probable supplier and find out the supplier to whom the order should be placed. [8]

The cost/unit is shown in the table below

Supplier	Quantity of barrels	Cost/unit
First	Any	Rs. 150
Second	150 and above	Rs. 125
Third	250	Rs. 100

- b) Fleet cars have their costs increasing as they continue in service due to increased direct operating cost and increased maintenance. The initial cost is Rs. 3800 and the resale value drops as time passes until it reaches a constant value of Rs. 600. Given the cost of operating, maintaining and year end resale value. Determine the proper length of service years after which cars should be replaced. [8]

Years of service	1	2	3	4	5
Year end resale value	2000	1200	800	700	600
Annual operating cost	1600	1900	2200	2500	2800
Annual Maintenance cost	400	500	700	900	1100

- Q9)** a) Customer arrive at a bank counter manned by a single cashier according to Poisson distribution with mean arrival rate 6 customer/hour. The cashier attends the customer on first come first serve basis at an average rate of 10 customers/hour with the service time exponential distribution. Find [8]
- The probability of the number of arrivals (0 to 5) during 15 minute interval and 30 minute interval.
 - The probability that the queuing system is idle.
 - The time a customer should expect to spend in the queue.

- b) Find the sequence that minimizes the total time required for performing the following jobs on three machines in order ABC. Processing time in minute is given below. [8]

Jobs →	I	II	III	IV	V	VI	VII
Machine A	3	8	7	4	9	8	7
Machine B	4	3	2	5	1	4	3
Machine C	6	7	5	11	5	6	12

OR

- Q10)** a) Assume a single channel service system of a library in a school. On an average 10 students visit per hour and book issue rate is 14 students/hour. [8]

Determine :

- i) Probability of libration being idle.
 - ii) Probability that at least 4 students in the system.
 - iii) Expected time that student is in queue.
- b) There are seven jobs, each of which has to go through the machines A and B in the order AB. Processing times in hours are given as : [8]

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimizes the total elapsed time. Also find Total elapsed time and idle time for machine A and machine B.

- Q11)** a) Discuss Floats. [4]
- b) Information on the activities required for a project is as follows. Find critical path, TF, FF, IF. [12]

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

OR

Q12) a) Write difference between PERT and CPM. [4]

b) A small project is composed of scrap activities whose time estimates are listed below : [12]

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

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



- Q6) a)** A two jointed robot as shown in Fig.1 has length of its arm as 15 cm and 20 cm. The first arm makes an angle of 20° and second arm makes an angle of 35° to be the first arm Compare the co-ordinate position for the end of the arm. **[10]**

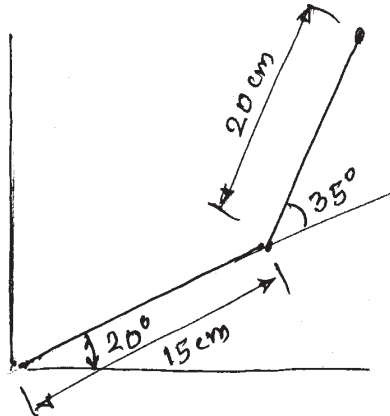


Fig. 1.

- b) Derive kinematic equation for manipulator. **[8]**
- Q7) a)** Explain the factors to be considered during trajectory planning. **[8]**
- b) Explain general block diagram of robot control system. **[8]**

OR

- Q8) a)** Explain modeling and control of a single joint in robot. **[8]**
- b) Explain different types of controllers used in industrial robots. **[8]**
- Q9) a)** Explain the different steps involved in segmentation **[8]**
- b) What is artificial intelligence? Discuss its use in industry. **[8]**

OR

- Q10)a)** Explain necessity and application of artificial intelligence for robotics system. **[8]**
- b) Explain the forward and backward search technique in problem solving for AI. **[8]**



Total No. of Questions : 10]

SEAT No. :

P4541

[Total No. of Pages : 3

[4959] - 1060-A

B.E. (Mechanical S/W) (Semester - II)

TRIBOLOGY (Elective - II(d))

(2012 Pattern)

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

Q1) a) Explain the benefits of recycling of used oils. **[6]**

b) Explain the factor affecting the wear. **[4]**

OR

Q2) a) Discuss the effect of following on coefficient of friction between two surfaces- **[4]**

- i) Surface finish,
- ii) Sliding velocity

b) Explain the use of following additives- **[6]**

- i) Anti-wear additives.
- ii) Anti-friction additives.

Q3) a) Draw and explain the classification of wear measuring machines along with sketches of at least three types. **[6]**

b) Using diagram show the pressure distribution along the axis and circumference in infinitely narrow/short hydrodynamic journal bearing. **[4]**

OR

P.T.O.

Q4) Following data is given for hydrodynamic full journal bearing [10]

- Radial load of = 10kN
 Journal speed = 1440 r.p.m.
 Viscosity of lubricating oil = 30 m Pa s
 Unit bearing pressure = 1000 k Pa
 Clearance ratio (r/c) = 800

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing. Use given data in Table No.- I and calculate:

- i) The dimension of bearing,
- ii) The coefficient of friction,
- iii) The power lost in friction,
- iv) Total oil flow in litre / minutes

Table No. 1 – Dimensionless performance parameters for hydrodynamic full journal bearing [10]

(l/d)	(h _o /c)	S	(r/c)*f	(Q/r.c.n _s .l)
1	0.9	1.33	26.4	3.37
	0.8	0.631	12.8	3.59
	0.6	0.264	5.79	3.99
	0.4	0.121	3.22	4.33
	0.2	0.0446	1.70	4.62
	0.1	0.0188	1.05	4.74
	0.03	0.00474	0.514	4.82

Q5) Following data is given for a hydrostatic thrust bearing [18]

- Thrust load = 450 kN
 Shaft speed = 750 r.p.m.
 Shaft diameter = 400 mm
 Recess diameter = 250 mm
 Viscosity of lubricant = 30 cP
 Specific Gravity of lubricant = 0.86
 Specific heat of lubricant = 2 kJ/kg°C

Draw a neat sketch showing the effect of film thickness on energy losses.

Calculate:

- i) The optimum oil film thickness for minimum power loss,
- ii) The total power loss,
- iii) The temperature rise, assuming the total power loss in bearing is converted into frictional heat.

OR

- Q6)** a) A circular plate is approaching an oily fixed plane surface with velocity 'V' at the instant, the film thickness is h_1 , if both the surfaces are separated by a lubricant of viscosity ' μ '. Derive the expression for the time 't' taken to reduce the film thickness from h_1 to h_2 . [12]
- b) State and explain different types of energy losses in hydrostatic bearing. [6]

Q7) Using modified Reynold's equation for elastohydrodynamic lubrication,

derive Ertel-Grubin equation as-
$$\frac{h_o}{R} = 1.19 \left(\frac{ELR}{W} \right)^{1/11} \left(\frac{\mu_o U \alpha}{R} \right)^{8/11} \quad [16]$$

OR

- Q8)** a) Explain the phenomenon of Elastohydrodynamic lubrication. [6]
- b) Explain requirements of Gas lubrication and its merits, demerits and application. [10]

- Q9)** a) Explain electroplating and also write its advantages and limitations. [6]
- b) Write short note on: lubrication in Rolling and Extrusion with neat sketch. [10]

OR

- Q10)** a) Define the term 'Superficial layers', discuss the development of concept and structure of superficial layers. [10]
- b) What are the different parameters of coating, explain in brief. [6]



Total No. of Questions : 10]

SEAT No. :

P3589

[Total No. of Pages : 3

[4959]-1061

B.E. (Electrical Engineering)

POWER SYSTEM OPERATION & CONTROL

(2012 Pattern) (Semester - 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) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 4) Assume suitable data, if necessary.

- Q1)** a) Find the critical clearing angle for a power system when a three phase fault occurs at the mid point of the transmission line with variation of transfer reactance as given below.
- i) Pre-fault reactance = 0.71 p.u.
 - ii) During fault reactance = 2.424 p.u
 - iii) Post fault reactance = 1.p.u

The generator supplies power under pre-fault condition equal to 1p.u.. with induced emf 1.2p.u. The generator is connected to infinity bus having the voltage of 1p.u. through the transmission network. [7]

- b) What are the various problems in A.C. transmission that resulted into development of FACTS? [3]

OR

- Q2)** a) Explain the advantages of series compensation. Also state the location of capacitors used in the series compensation. [5]
- b) Enlist the reasons for reactive power control. [5]

- Q3)** a) Describe the loading capability curve of generator. [5]
- b) How the steady state stability and transient stability and it's limits can be determined [5]

OR

P.T.O.

- Q4)** a) Explain the effect of excitation of the synchronous generator on reactive power generation. [5]
 b) With neat connection diagram, explain TCR and FC type shunt compensation. [5]
- Q5)** a) Explain the working of speed governor system of turbo generator with schematic diagram. Draw transfer function block diagram of speed governor system. [6]
 b) Explain with block diagram and frequency response, proportional load frequency control of single area case for exact and first order approximated system. [10]

OR

- Q6)** a) With neat block diagram and response, explain two area load frequency control. Draw frequency response and deviation in tie line power for change in load demand of any one area. [10]
 b) Explain with transfer function block, the generator-load model used in load frequency control. [6]
- Q7)** a) Using priority list method, prepare unit commitment table using three thermal generating units, for load values such as 400 MW, 900MW and 1100MW. [6]

The incremental fuel cost of three thermal units and other details are as follows :

$$IC1 = (0.003 \cdot P1 + 7) \cdot 10^3 \text{ k-cal/MW-hr}$$

$$IC2 = (0.002 \cdot P2 + 7.5) \cdot 10^3 \text{ k-cal/MW-hr}$$

$$IC3 = (0.004 \cdot P3 + 8) \cdot 10^3 \text{ k-cal/MW-hr}$$

The minimum and maximum generation limits are

$$50 \text{ MW} \leq P1 \leq 500 \text{ MW}$$

$$40 \text{ MW} \leq P2 \leq 400 \text{ MW}$$

$$20 \text{ MW} \leq P3 \leq 200 \text{ MW}$$

Fuel costs are in Rs/Kcal

$$CP1 = 1.1 \text{ Rs/k-cal}$$

$$CP2 = 1.05 \text{ Rs/k-cal}$$

$$CP3 = 1.2 \text{ Rs/k-cal}$$

- b) Explain constraints on unit commitment task. [4]
- c) Explain with mathematical formulation, Lagrange multiplier method of economic load dispatch without transmission loss and no constraint of generation limit, while meeting load. [8]

OR

- Q8)**
- a) Explain with suitable numerical, the solution to recursive function of dynamic programming of Unit Commitment. [10]
 - b) Explain the concept of cost curve of thermal unit. [4]
 - c) Explain equality and inequality constraints applied to economic load dispatch task. [4]
- Q9)**
- a) What is the Power Pool and Energy Banking? Explain the benefits of each. [8]
 - b) With Mathematical formula, explain the following customer oriented reliability indices. [8]
 - i) SAIFI
 - ii) SAIDI
 - iii) CAIDI
 - iv) AENS

OR

- Q10)a)** Explain following mode of power transaction. [8]
- i) Emergency power interchange
 - ii) Inadvertent power exchange
- b) Explain following models required to evaluate the reliability indices of generation system. [8]
- i) Generator Model
 - ii) Load Model
 - iii) Risk Model



Total No. of Questions : 8]

SEAT No. :

P3590

[Total No. of Pages : 2

[4959]-1062

B.E. (Electrical) (End Semester)
PLC AND SCADA APPLICATIONS
(2012 Course)

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.*

- Q1)** a) Explain overall PLC system with neat block diagram. [7]
b) Explain UP Down counter. [7]
c) What is the effect of change in proportional constant (Kp) on the performance of the system. [6]

OR

- Q2)** a) What is automation? Explain its advantages. [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	0	0	0	1
0	1	0	0	1	0
1	0	0	1	0	0
1	1	1	0	0	0

- c) Explain output analog devices. [6]
- Q3)** a) Explain electromechanical transducers with examples. [8]
b) How temperature of the water in the tank is measured by PLC? [8]

OR

P.T.O.

- Q4)** a) Design traffic light controller using PLC ladder diagram. [8]
b) Explain variable speed (variable frequency) AC motor drive. [8]

- Q5)** a) Define SCADA and give its applications. [2]
b) Draw block diagram of SCADA and explain each block in detail. [8]
c) Explain application of SCADA in chemical plant. [8]

OR

- Q6)** a) Write advantages and disadvantages of SCADA system. [4]
b) Explain generation of SCADA architecture. [6]
c) Explain SCADA systems in operation and control of interconnected power system. [8]

- Q7)** a) Explain transmission control protocol/Internet protocol (TCP/IP) model in detail. [8]
b) Explain layered architecture of IEC61850. [8]

OR

- Q8)** a) Write note on control and information protocol. [8]
b) Explain Profibus (Process Fieldbus). [8]



Total No. of Questions : 8]

SEAT No. :

P3591

[Total No. of Pages : 4

[4959]-1063
B.E. (Electrical)
CONTROL SYSTEMS - II
(2012 Pattern)

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) *Assume suitable data if necessary.*

UNIT I, II & III

- Q1)** a) Design a suitable compensator for a unity feedback system with open loop transfer function $G(s) = K/s^2 (0.2s+1)$ to satisfy the following specifications. **[10]**
- i) Acceleration error constant $k_a=10$;
 - ii) P.M = 35°
- b) State the advantages of state space analysis over transfer function model analysis. **[4]**
- c) Ascertain the condition for controllability & observability for a LTI system described by the state equation. **[6]**

$$\dot{x} = \begin{bmatrix} 3 & 1 & 0 & 0 \\ 0 & 3 & 1 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 4 \end{bmatrix} x(t) + \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \\ b_{31} & b_{32} \\ b_{41} & b_{42} \end{bmatrix} u(t)$$

OR

P.T.O.

Q2) a) For the system, defined by **[10]**

$$\dot{x} = \begin{bmatrix} 1 & 1 & -1 \\ 4 & 3 & 0 \\ -2 & 1 & 10 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = [20 \quad 30 \quad 10]x$$

By using state feedback control $u = -Kx$, it is desired to have the closed loop poles at $s = -2 \pm j2$ & $s = -5$. Determine the state feedback gain matrix K by using similarity transformation method.

b) Realize the lead-lag compensator with active electrical network. **[4]**

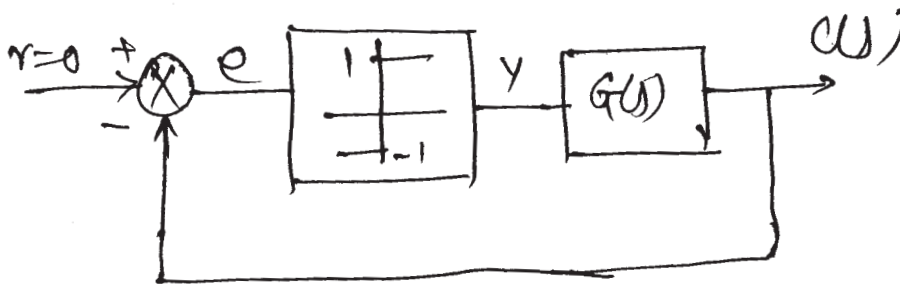
c) Obtain the state model using Phase variables if a system is described by the differential equation. **[6]**

$$\frac{d^3 y(t)}{dt^3} + 8 \frac{d^2 y(t)}{dt^2} + 14 \frac{dy(t)}{dt} + 4y(t) = 10u(t)$$

UNIT IV

Q3) a) Classify basic types of Non-linearities. Explain the common types of non-linearities observed in physical systems. **[6]**

b) A non-linear control system shown below, has Relay as a non linearity with describing function $N(X) = 4/\pi X$. **[10]**



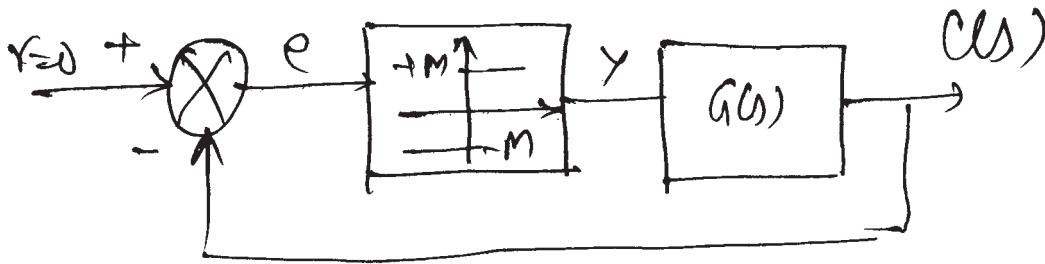
The transfer function of the plant is $G(s) = \frac{10}{s(1+5s)(1+10s)}$

- i) Determine whether limit cycle exist or not.
- ii) If exist then determine frequency & amplitude. Analyze the system using Describing function method.

OR

Q4) a) Explain Jump Resonance phenomenon observed in non-linear control systems. [6]

b) A non linear control system shown below is applied with unit step input. Assuming system is initially at rest & $M = 1$. Draw the phase trajectory using method of isocline. $G(s) = \frac{4}{s(1+s)}$. Comment on the system's stability. [10]



UNIT V

Q5) a) Draw the block diagram of digital control system & explain the function of each block in short. [6]

b) Given the z transform [8]

$$X(z) = \frac{(1 - e^{-aT})z}{(z-1)(z - e^{-aT})}$$

Where a is a constant and T is the sampling period, determine the inverse z transform $x(kT)$ by use of the partial-fraction-expansion method.

OR

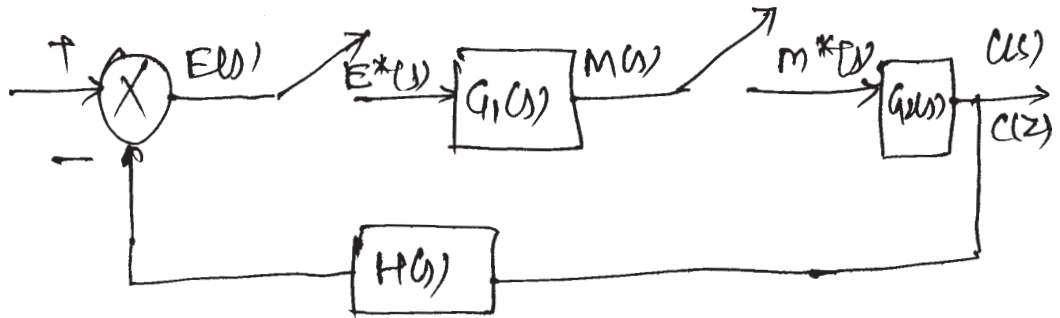
Q6) a) What is Zero order hold (ZOH)? Derive its transfer function. [6]

b) Solve the following difference equation by use of the z transform method.

$$x(k+2) + 3x(k+1) + 2x(k) = 0. \quad x(0) = 0, \quad x(1) = 1 \quad [8]$$

UNIT VI

- Q7)** a) Define Pulse transfer function. State General procedure for obtaining Pulse-transfer function. [8]
- b) Obtain the closed loop pulse transfer function $C(z)/R(z)$ for the system. [12]



OR

- Q8)** a) Explain the role of the characteristic equation in determining the stability of the discrete-time control systems. [8]
- b) A digital filter is defined by [12]

$$G(z) = \frac{Y(z)}{X(z)} = \frac{4(z-1)(z^2 + 1.2z + 1)}{(z+0.1)(z^2 - 0.3z + 0.8)}$$

Obtain the series & parallel block diagram realization.



Total No. of Questions : 11]

SEAT No. :

P3592

[Total No. of Pages : 2

[4959]-1064

B.E. (Electrical)

SPECIAL PURPOSE MACHINES

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve 6 questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 & 11 is compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) Obtain magnetic force and torque from co-energy. **[7]**

OR

Q2) Derive the relationship for energy stored singly excited magnetic system. **[7]**

Q3) What are the differences between sinusoidal PMSM and trapezoidal PMSM? **[7]**

OR

Q4) Explain process of electronic commutation in PMSM. **[7]**

Q5) Explain with block diagram constant torque angle operation of PMSM. **[6]**

OR

Q6) Explain block diagram of field oriented control of PMSM machine. **[6]**

Q7) a) Explain different operational characteristic and constructional features of synchronous reluctance machine. **[8]**

b) With block diagram explain control of reluctance motor. **[8]**

P.T.O.

OR

- Q8)** a) Obtain mathematical expressions for static and dynamic torque production in reluctance machine. [8]
b) Discuss selection of number of poles and pole arc in switched reluctance machine. [8]
- Q9)** a) Explain operation of VRM and PM type stepper motors. [9]
b) Derive equation for mechanical torque produced in VRM stepping motor. [9]

OR

- Q10)** a) With block diagram explain control of stepping motor by using micro stepping method. [9]
b) Explain various applications of stepper motors. [9]
- Q11)** Solve any two of the following : [16]
a) Explain process of torque production in linear induction motor.
b) Explain various important characteristics of linear induction machine.
c) Explain different types of linear Induction motors with their construction.



Total No. of Questions : 10]

SEAT No. :

P3593

[Total No. of Pages : 2

[4959]-1065

B.E. (Electrical)

POWER QUALITY

(2012 Course) (Semester - I) (Elective - 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 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 various grounding practices as per IEEE standard. [5]
b) Explain economic impact of voltage sags. [5]

OR

- Q2)** a) Why are we concerned more about power quality now days? [5]
b) Explain various voltage flicker parameters obtained from flicker measurements. [5]

- Q3)** a) Explain voltage sag characteristics such as magnitude, duration, phase angle jump and missing voltage. [5]
b) Explain various computer tools used for transient's analysis. [5]

OR

- Q4)** a) What are the various sources of transients over voltages? [5]
b) Explain following terms related with voltage flicker (i) Short term (Pst) and (ii) Long term (Plt) voltage flicker. [5]

P.T.O.

- Q5) a)** Explain following terms related with waveform distortion: [9]
i) Harmonics
ii) Interharmonics
iii) Sub-harmonics
iv) Characteristic harmonics
v) Triplen harmonics.

- b) What are the various harmonics indices used? Explain. [9]

OR

- Q6) a)** What are the various sources of harmonics and their effects on the operation of various equipment's? [9]
b) Explain impact of harmonics on active, reactive and apparent power. [9]

- Q7) a)** What is harmonic filtering? Explain active and passive filters. [8]
b) Explain step by step procedure for harmonics analysis. [8]

OR

- Q8) a)** Explain the concept of point of common coupling and its use in harmonic analysis. [8]
b) Explain computer tools used in harmonic analysis. [8]

- Q9) a)** Explain need of power quality monitoring. What is reactive and proactive approach? [8]
b) What are the requirements of power quality monitor to monitor various power quality parameters? [8]

OR

- Q10) a)** Explain various objectives of power quality monitoring equipment's to monitor various power quality parameters? [8]
b) Explain various techniques of data collection and its analysis. [8]



Total No. of Questions : 8]

SEAT No. :

P3594

[Total No. of Pages : 4

[4959]-1066

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

RENEWABLE ENERGY SYSTEMS

(2012 Course) (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) *Draw neat diagram wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

- Q1)** a) Calculate the angle made by beam radiation with the normal to a flat-plate collector on December 1 at 9.00 h (Local Apparent Time). The collector is located in New Delhi (28°35'N, 77°12'E) and is tilted at an angle of 36° with the horizontal and is pointing due south. [8]
- b) List the different types of collectors. Explain any one in detail. [8]
- c) What are the different controls required in operation of wind turbine unit? [4]

OR

- Q2)** a) Calculate the hour angle at sunrise and sunset on June 21 and December 21 for a surface inclined at an angle of 15° and facing due south ($\gamma=0^\circ$). The surface is located in Bombay (19°07'N, 72°51'E). [8]
- b) What are the different components of a solar PV system? Draw a single line diagram of a grid connected solar PV system? [8]
- c) Define any two : [4]
- i) Cut-in speed
 - ii) Cut-out speed
 - iii) Power coefficient of a wind turbine
 - iv) Hub.

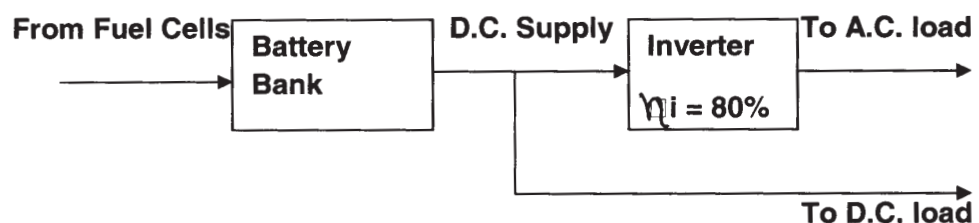
P.T.O.

- Q3)** a) Which are the types and sub types of Biomass conversion processes? Explain any one in detail? [4 + 5 = 9]
- b) 800 kW Biomass Power Plant generates electricity by direct combustion process with daily plant load factor (PLF) of 83.33%. Efficiency of electrical generator is 95%, steam turbine is 30% and of Boiler is 65%. Rice husk is used as a biomass fuel, specific energy of which is 3.926 kWh/kg. Find :
- i) Total weight of Rice Husk required per day as a biomass fuel. [5]
- ii) Weight of the ash per day, if Rice Husk contains 25% ash of its weight. [2]

OR

- Q4)** a) Which factors affect the generation of biogas in a Biogas Plant? How?[5]
- b) What are the advantages of Biogas production? [4]
- c) A Landfill site produces Landfill Gas (LFG) to generate electricity through 3 MW plant with annual load factor of 80%. The LFG produced has energy density of 4.1677 kWh/Nm³ and overall energy conversion efficiency from LFG to electricity is 95%. Each ton of wet Municipal Solid Waste (wet MSW) produces 90 Nm³ of LFG annually. Find :
- i) Total volume of LFG required annually in Nm³. [5]
- ii) Total weight of wet MSW required annually in tons. [2]

- Q5)** a) Define and state the expressions of energy efficiency, voltage efficiency and coulomb efficiency of battery? [1 + 1 + 1 = 3]
- b) What is operating principle of fuel cell? What are fuel cell system characteristics? [3 + 3 = 6]
- c) The different household appliances consume total energy of 4000 Wh/day. The household appliances include A.C. Refrigerator, which uses 1000 Wh/day, 5 A.C. lights of 30 W each are ON for 4 h/day and other A.C. load. The fuel cells are feeding to Battery bank, and Inverter (having 80% efficiency) is used to supply A.C. loads.



Find D.C. energy supplied per day by battery bank. If,

- i) All loads are A.C. load? [3]
- ii) A.C. Refrigerator is replaced by D.C. Refrigerator which consumes energy of 800 Wh/day and A.C. lights are replaced by D.C. lights (i.e. 5 lamps, 20 W each, consumption 4 h/day). Other A.C. load remains unchanged? [4]

OR

- Q6)** a) State and explain (two each) construction and operating factors affecting lead acid battery performance. [3 + 3 = 6]
- b) Explain in detail about compressed air storage system. [3]
- c) A 100 Ah, battery with a rest voltage of 12.5 V is charged (at its current State of Charge) at a C/10 rate by applying charging voltage of 13.5V.
- i) Estimate the internal resistance of the battery. [3]
 - ii) Estimate % energy lost within internal resistance of the battery during charging. [4]

- Q7)** a) Define and state limitations of : [3 + 3 = 6]
- i) Payback Period Method
 - ii) Initial rate of return/ Return on Investment (ROI).
- b) Define and Explain with an example about Life Cycle Costing. [4]
- c) A co-generation system installation is expected to reduce the company's annual energy bill by Rs. 20 Lacs. If the capital cost of new co-generation installation is Rs. 90 Lacs and the annual operating and maintenance cost is Rs. 5 Lacs. [4 + 4 = 8]
- i) What will be the expected payback period for the project?
 - ii) What will be the Initial (Simple) Rate of Return/Return on Investment (ROI)?

OR

- Q8)** a) What is mean by Time Value of money? Why it should be considered? What is Net Present Value (NPV)? [2 + 2 + 2 = 6]
- b) Define and Explain with an example about Internal Rate of Return. [4]

- c) Using NPV analysis technique determine NPV of each proposed project shown in table and find which project shall be chosen for implementation, if the annual discount rate is 10% for each project? [8]

	Project 1	Project 2
Capital cost Rs.	15000	15000
Year	Net Annual saving at the end of the Year Rs.	Net Annual saving at the end of the Year Rs.
1	+ 6000	+ 6400
2	+ 6000	+ 6200
3	+ 6000	+ 6000
4	+ 6000	+ 5800
5	+ 6000	+ 5600
Total Net Saving at end of 5 years	+ 30000	+ 30000



Total No. of Questions : 10]

SEAT No. :

P4542

[Total No. of Pages : 2

[4959] - 1067

B.E. (Electrical)

(Elective - I(d)) DIGITAL SIGNAL PROCESSING

(2012 Pattern) (Semester - I)

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) *Use of calculator is allowed.*
- 5) *Assume suitable data if necessary.*

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

b) Explain following properties of Z-transform : **[5]**

- i) Linearity
- ii) Time shifting

OR

Q2) a) Find the inverse Z-transform of following function using partial fraction

$$X(z) = \frac{z}{(z-1)(z-2)(z-3)} \text{ with ROC } |z| > 3 \quad \text{[5]}$$

b) Explain following properties of DTFT : **[5]**

- i) Linearity
- ii) Time shifting

Q3) a) Determine Fourier transform for the given discrete time signal $x(n) = a^n u(n)$ **[5]**

b) Give the detail classification of discrete time system. **[5]**

OR

Q4) a) Perform linear convolution of $x(n) = \{1,2,3,4\}$ and $h(n) = \{1,1,1,1\}$ **[5]**

b) Determine the Z-transform of the signal $x(n) = a^n u(n) - b^n - (-u - 1)$ with ROC. **[5]**

P.T.O.

- Q5)** a) Explain Radix-2 DIT FFT algorithm with diagram. [8]
b) Explain following properties of DFT. [8]
i) Linearity ii) Time shifting

OR

- Q6)** a) Determine DFT of following sequence $x(n) = \{1,2,1,2\}$ [8]
b) Explain Radix-2 DIF FFT algorithm with diagram [8]

- Q7)** a) Explain ideal selective filters with mathematical expressions. [8]
b) Compare Analog Filter with Digital Filters. [8]

OR

- Q8)** a) Explain cascade form structure of IIR filter. [8]
b) Explain design of Butterworth IIR filter using Bilinear Transformation. [8]

- Q9)** a) Explain design of FIR filter using rectangular window. [9]
b) Compare IIR filter and FIR filter. [9]

OR

- Q10)**a) Explain application of DSP in power measurement. [9]
b) What are the different techniques of measurement of frequency using DSP? Explain any one in detail. [9]



Total No. of Questions : 10]

SEAT No. :

P3595

[Total No. of Pages : 2

[4959]-1068

B.E. (Electrical)

**RESTRUCTURING AND DEREGULATION
(2012 Course) (Semester - I) (Elective - II(a))**

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

- Q1)** a) Explain the challenges before Indian Power Sector. [5]
b) Explain Consumer tariff. [5]

OR

- Q2)** a) Explain the functions of CEA. [5]
b) Explain why Public participation is necessary in regulatory process. [5]

- Q3)** a) Explain role CERC. [5]
b) Explain different performance indices for transmission and distribution. [5]

OR

- Q4)** a) Explain following basic concepts of power sector economics: [5]
i) Debt and Equity
ii) Interest and Finance charges
b) Write a short note on Cost Plus Method of regulation. [5]

- Q5)** a) Explain following structural models. [8]
i) Wholesale competition
ii) Retail competition
b) Write a short note on Californian Energy Crisis. [8]

OR

P.T.O.

- Q6)** a) Write short note on the following electricity trading models based on industrial structure. [8]
i) Pool and Bilateral Trades
ii) Multilateral Trades
- b) Explain Electricity reforms of : [8]
i) Nordic Pool
ii) UK

- Q7)** Write a short note on following electricity trading models : [16]
a) Integrated
b) Wheeling
c) Decentralized

OR

- Q8)** a) Explain the following terms : [9]
i) Marginal Clearing Price
ii) Market Power
iii) Market Efficiency
- b) Explain the rules that govern the electricity markets. [7]

- Q9)** a) Explain the three parts of Availability based tariff and how its implementation has helped in the improvement of the grid operation in Indian power sector. [9]
- b) What are transmission congestion issues, explain in details. Also mention the different congestion management methods. [9]

OR

- Q10)** a) Explain the concept of open access and transmission rights. Also explain transmission pricing. [9]
- b) Explain the concept of firm transmission rights (FTR) and locational marginal pricing (LMP). [9]



Total No. of Questions : 10]

SEAT No. :

P3525

[4959]-1069

[Total No. of Pages : 2

B.E.(Electrical)

ELECTROMAGNETIC FIELDS

(2012 Pattern) (Elective-II)(403144)(End Sem.)(Semester-I)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt Q1 or Q2, Q3 or Q4,Q5 or Q6 , Q7or 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 rules,Mollier Charts, electroinic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) Using Gauss's law obtain the expression for \bar{E} and \bar{D} due to infinite surface charge with uniform surface charge density ρ_s C/m² [6]

b) If $\bar{J} = \frac{1}{r^3} (2 \cos \theta \hat{a}_r + \sin \theta \hat{a}_\theta) A/m^2$, calculate the current passing through a hemispherical shell of radius 20 cm. [4]

OR

Q2) a) Derive the expression for the energy stored per unit volume in an electric field in terms of \bar{D} and \bar{E} . [6]

b) Explain the physical significance of curl. [4]

Q3) a) Obtain the \bar{H} (magnetic field intensity) due to infinitely long straight conductor carrying current I at any point P using Ampere's circuital law. [6]

b) State the integral and point form of Gauss's law. [4]

OR

Q4) a) Using Laplace equation, derive the expression for the capacitance of co-axial cable, which is located along z-axis with inner conductor of radius 'a' and outer conductor of radius 'b'. Assume $V=V_0$ at $r = a$ & $V=0$ at $r = b$. [6]

b) A circular loop located on $x^2 + y^2 = 9, z = 0$ carries a direct current of 10 A along \hat{a}_ϕ . Determine \bar{H} at (0,0,4). [4]

P.T.O.

Q5) a) The XY plane serves as the interface between two different media. Medium 1 ($z < 0$) is filled with a material whose $\mu = 6$ and medium 2 ($z > 0$) whose $\mu = 4$. If the interface carries current $(1/\mu_0)\hat{a}_y$ mA/m and $\bar{B}_2 = 5\hat{a}_x + 8\hat{a}_z$ mWb/m². Find \bar{H}_1 and \bar{B}_1 . [8]

b) Derive an expression for the torque T in a filamentary closed circuit carrying direct current. Explain why the total force is zero in a closed circuit carrying direct current. [8]

OR

Q6) a) Explain the behavior of diamagnetic, paramagnetic and ferromagnetic materials in magnetic field with examples of each. [8]

b) Given a material for which $\chi_m = 3.1$ and within which $\bar{B} = 0.4y\hat{a}_z$ T, find: [8]

- | | | |
|--------------|-----------|--------------|
| i) \bar{H} | ii) μ | iii) μ_r |
| iv) M | v) J | vi) J_b |

Q7) a) Using Faraday's law, explain with help of diagram the concept of transformer emf and motional emf. [8]

b) In free space $\bar{E} = 20\cos(\omega t - 50x)\hat{a}_y$ V/m. Calculate \bar{J}_d, \bar{H} . [8]

OR

Q8) a) State the Maxwell's equation in integral form for static fields. Derive an equation for displacement current density. [8]

b) State the point form and integral form of Maxwell's equation for time varying fields. [8]

Q9) a) What is Poynting vector? What is its significance? Derive the expression of Poynting vector? [10]

b) Derive the wave equations for a lossy dielectric medium. [8]

OR

Q10) a) What is uniform plane wave? State and explain Maxwell's equation in phasor form for time harmonic electromagnetic fields in a linear, isotropic and homogenous medium. [10]

b) Write the properties of plane waves in good conductors. Explain the concept of skin effect. [8]



Total No. of Questions : 8]

SEAT No. :

P3596

[Total No. of Pages : 2

[4959]-1070

B.E. (Electrical)

EXTRA HIGH VOLTAGE AC TRANSMISSION

(2012 Course) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer all questions.
- 2) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 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 the significance of bundled conductor in EHVAC transmission system. [6]

b) Describe measures taken to minimize the damage due to the different types of vibrations of the transmission line. [7]

c) A 345-kV line has an ACSR Bluebird conductor 0.04477 m in diameter with an equivalent radius for inductance calculation of 0.0179 m. The line height is 12 m. Calculate the inductance per km length of conductor and the error caused by neglecting the internal flux linkage. [7]

OR

Q2) a) Explain the factors affecting vibrations of the conductors. [6]

b) Explain the field of a point charge and its properties. [7]

c) A point charge $Q = 10^{-6}$ coulomb is kept on the surface of a conducting sphere of radius $r = 1$ cm, which can be considered as a point charge located at the centre of the sphere. Calculate the field strength and potential at a distance of 0.5 cm from the surface of the sphere. Also find the capacitance of the sphere, $\epsilon_r = 1$. [7]

P.T.O.

- Q3)** a) Explain the terms primary shock current, secondary shock current and let-go current in detail. [8]
b) Derive the expression for voltages induced in the conductors of an energized circuit of double circuit three phase line. [8]

OR

- Q4)** a) Explain the effect of high electrostatic field on humans, animals, and plants. [8]
b) Derive the expression for electrostatic Field of Double-Circuit 3-phase A.C. line. [8]

- Q5)** a) Explain the mechanism of corona formation in detail. [8]
b) Write a note on 'Measurement of Audible Noise'. [8]

OR

- Q6)** a) Draw a charge - voltage diagram and derive an expression
$$P_c = \frac{1}{2} KC(V_m^2 - V_0^2) \text{ for corona loss.} \quad [8]$$

b) Explain attenuation of travelling waves due to corona loss. [8]

- Q7)** a) Explain the design factors under steady state with necessary expressions. [9]
b) Name the materials used for insulation in E.H.V. cables; and state the properties of SF₆ gas as an insulating in cables. [9]

OR

- Q8)** a) Brief, line insulation design based upon transient over voltages. [9]
b) Explain detail classification of cables and mention typical insulation thickness for E.H.V. cables. [9]



Total No. of Questions : 8]

SEAT No. :

P3597

[Total No. of Pages : 2

[4959]-1071

B.E. (Electrical) (End Semester)

**INTRODUCTION TO ELECTRICAL TRANSPORTATION
SYSTEMS**

(2012 Pattern) (Elective - II)

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) Explain Lead Acid battery with neat diagram. **[8]**
b) Define transportation system: Importance and factors affecting transportation system. **[8]**
c) Explain Air way transportation mode in detail. **[4]**

OR

- Q2)** a) Explain different characteristics of battery. **[8]**
b) Explain different types of mechanical drive. **[8]**
c) Why power converter is needed in battery operated vehicle. **[4]**

- Q3)** a) Explain Buck type of DC converter with diagram. **[8]**
b) Differentiate between Hybrid and electric vehicle. **[8]**

OR

- Q4)** a) Explain speed torque characteristics of DC machine in battery operated vehicle with neat diagram. **[10]**
b) Differentiate between mechanical and electrical steering. **[6]**

- Q5)** a) Explain different types of Hydraulic drive used in transportation system. **[10]**
b) Draw typical power train architecture and explain in brief. **[8]**

P.T.O.

OR

- Q6)** a) What is Hybrid car and explain different types of hybrid vehicles? [10]
b) Explain DC traction system in detail. [8]

- Q7)** a) Explain acceleration and speed characteristics of hybrid car. [8]
b) Draw control system diagram used in elevator and explain in brief. [8]

OR

- Q8)** a) Explain Hydraulic type of elevator system. [8]
b) Explain different type of control schemes in special vehicle. [8]



Total No. of Questions : 10]

SEAT No. :

P3598

[Total No. of Pages : 2

[4959]-1072

B.E. (Electrical)

SWITCHGEAR AND PROTECTION

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

- Q1)** a) State the different causes of faults. [4]
b) Derive the expression for restriking voltage and RRRV. [6]

OR

- Q2)** a) A 220 KV, 50 Hz system have the reactance and capacitance upto the location of circuit breaker is $8\Omega/\text{ph}$ and $0.025 \mu\text{F}$ respectively. If magnetizing current of 10A is interrupted (instantaneous). Determine the following :- if the resistance 600Ω is connected across the contacts of circuit breaker. [4]
i) Voltage appearing across the pole of circuit breaker
ii) Damped frequency of oscillation
iii) Critical value of oscillation free resistance.
b) Explain construction and working of ACB. [6]

- Q3)** a) An 11 KV, 500 MVA 3sec circuit breaker suddenly closes on to a fault. Determine : [4]
i) The symmetrical breaking current
ii) The asymmetrical breaking current assuming 50% dc component.
iii) The peak making current as per IEC specification.
iv) The short time current rating.
b) Explain construction and working of induction type directional power relay. [6]

P.T.O.

OR

- Q4)** a) Explain different zones of protection. [4]
b) Explain the working principle of a current differential relay. [6]
- Q5)** a) Draw and explain wave shape of a lightning stroke. [8]
b) Discuss the merits and demerits of a static relay. [8]

OR

- Q6)** a) Draw and explain Rod-Gap Arrester. [8]
b) Explain with block diagram Numerical Relay. [8]
- Q7)** a) Explain restricted earth-fault protection for a transformer. [8]
b) A 6.6 KV, 10 MVA star-connected alternator has a reactance of $2\Omega/\text{ph}$ and negligible resistance. Merz price protection is used for protection of winding. The neutral grounding resistance is 5Ω . If only 10% of the winding is to remain unprotected, determine the setting of the relay. [8]

OR

- Q8)** a) Explain magnetic inrush and overfluxing phenomenon along with its disadvantages. [8]
b) Draw and explain single phasing protection for 3ϕ Induction motor. [8]
- Q9)** a) State the advantages of WAM. [4]
b) Explain the differential protection scheme of busbar using high impedance relay. [6]
c) Explain three stepped distance protection for transmission line with neat diagram. [8]

OR

- Q10)** a) State the algorithm for impedance numerical relay. [4]
b) Mention the types of overcurrent protection for Feeder using directional over current relay. Explain any one method in detail. [6]
c) Explain the effect of arc resistance and power swing on the performance of distance relay. [8]



Total No. of Questions :10]

SEAT No. :

P3985

[4959]-1073

[Total No. of Pages :3

B.E. (Electrical)

POWER ELECTRONICS CONTROLLED DRIVES

(2012 Course) (Semester - II)

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) *use of calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

Q1) a) Explain in brief the following methods of braking of DC motor [6]

- i) Regenerative braking
- ii) Plugging

b) A motor-load has following details: Quadrants I and II, $T = 400 - 0.4N$, N-m where N is the speed in rpm. Motor is coupled to an active load torque ± 200 N-m. When operating in quadrant III and IV, $T = -400 - 0.4N$ N-m. Calculate motor speeds in I, II, III and IV quadrants. [4]

OR

Q2) a) A star connected squirrel cage induction motor fed from inverter has following rating and parameters. 400V, 50 Hz, 4 pole, 1370 rpm, $R_s = 2\Omega$, $R_r' = 3\Omega$, $X_s = X_r' = 3.5\Omega$. Calculate: [6]

- i) Speed for a frequency of 30Hz and 80% of full load torque.
- ii) Frequency for a speed of 1000 rpm, and full load torque.

b) Derive the equivalent moment of inertia and torque for a motor driving rotational load. [4]

P.T.O.

- Q3)** a) A 220 V, 970 rpm, 100 A dc separately excited motor has an armature resistance of 0.05Ω . It is braked by plugging from an initial speed of 900 rpm. Calculate the resistance to be placed in armature circuit to limit braking current to twice the full load value. [6]
- b) Explain the concept of steady state stability of a drive and write condition for steady state stability of motor load combination. [4]

OR

- Q4)** a) A 440V, 50 Hz, 6 pole star connected squirrel cage induction motor has following parameters referred to stator side: $R_s = 0.5\Omega$, $R_r' = 0.6\Omega$, $X_s = X_r' = 1\Omega$. Stator to rotor turns ratio is 2. For regenerative braking, calculate maximum overhauling torque it can hold? [6]
- b) Explain the thyristorised stator voltage control of 3 ph induction motor. What are its demerits? [4]
- Q5)** a) With a neat block diagram, explain the Flux oriented control of Induction motor. [10]
- b) Compare and comment on relative merits and demerits of VSI and CSI for induction motor drives. [6]

OR

- Q6)** a) How speed control is achieved using Vector control of induction motor? Draw vector diagram and explain. [10]
- b) Write in brief about control and applications of AC Servo Drives. [6]
- Q7)** a) Draw neat diagram to explain Permanent Magnet Brushless DC Motor. [8]
- b) Explain unity power factor control of Permanent Magnet Brushless DC Motor. [8]

OR

- Q8)** a) How constant torque angle control is used for Permanent Magnet Brushless DC Motor? [8]
- b) Comment on use of Sensorless control of PM BLDC drives. [8]

Q9) Solve any Three:

- a) What special considerations are needed for inverter duty motors? [6]
- b) What are the requirements of drive for rolling mill operations? [6]
- c) Why controlled torque starting is necessary in Textile machinery drives?
How is it achieved? [6]
- d) What are the requirements of drive in sugar mills? Explain duty cycle of sugar centrifuge. [6]

OR

Q10) Explain the Type of drives used for specific operations in case of following applications. Also specify the type of control achieved (Speed / torque) and advantages of using special drives. (Any Two) [18]

- a) Solar pumps
- b) Centrifuged Pump
- c) Traction drives
- d) Electric and Hybrid Vehicle

EEE

Total No. of Questions : 10]

SEAT No. :

P3599

[Total No. of Pages : 2

[4959]-1074

B.E. (Electrical)

HIGH VOLTAGE ENGINEERING

(2012 Pattern) (Semester - II)

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) *Figures to the right indicate full marks.*
- 3) *Use of non programmable calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

Q1) a) Explain Townsend's breakdown Criterion. **[5]**

b) What do you understand by 'intrinsic strength' of a solid dielectric? How does breakdown occur due to electrons in a solid dielectric? **[5]**

OR

Q2) a) Describe breakdown in non-uniform fields and corona discharge. Explain the concept of positive corona and negative corona. **[5]**

b) Explain suspended particle theory of breakdown in liquid dielectrics. **[5]**

Q3) a) Discuss time-lags for breakdown. Define statistical time lag and formative time lag. **[5]**

b) What are the mechanisms by which lightning strokes develop and induce overvoltages on overhead power lines? **[5]**

OR

Q4) Write short note on following : **[10]**

a) Thermal breakdown of solid insulating material.

b) What is a composite dielectric? Describe the mechanism of short term breakdown of composite insulation.

P.T.O.

- Q5)** a) Draw a neat schematic diagram of three stage cascade transformer. Explain the scheme for producing very high AC voltages. [8]
b) With circuit diagram, explain the series resonant circuit and parallel resonant circuit for generation of high AC voltage. [8]

OR

- Q6)** a) Explain use of Three electrode gap as a tripping control circuit for impulse voltage generation. [8]
b) Answer following with reference to Modified Marx circuit for generation of impulse voltage; [8]
i) Connection and working of Modified Marx circuit.
ii) The purpose of use of sphere gap unit in Max circuit
iii) Connection of capacitors during charging and discharging mode.

- Q7)** a) With neat diagram, write short note on the use of sphere gap unit for measurement of high voltage. State standard diameters of spheres, material of sphere. [8]
b) Draw a neat diagram showing electrostatic voltmeter. Discuss basic principle of operation of electrostatic voltmeter. [8]

OR

- Q8)** a) With neat diagram explain CVT. Explain its advantages also.[8]
b) Explain the use of electro-optical signal converter for measurement of high frequency AC current. [8]

- Q9)** a) Explain the type and routine test performed on following high voltage equipment [12]
i) Power Capacitor
ii) Surge Arrestor
b) Explain the classification of High Voltage laboratory. [6]

OR

- Q10)** a) What are various tests to be performed on bushing. [6]
b) Explain the testing of cables. [6]
c) Explain the safety measures and shielding of high voltage laboratory.[6]



Total No. of Questions : 8]

SEAT No. :

P3600

[Total No. of Pages : 2

[4959]-1075

B.E. (Electrical Engineering)

HVDC AND FACTS

(2012 Pattern) (Elective - III(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) 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 rectifier operation in HVDC systems with ignition delay angle and commutation overlap angle. Derive equations for ΔV_d and V_d . [10]
- b) What is HVDC Light System? What are the characteristics features of HVDC light system? Explain Control and Power transfer characteristics of VSC based HVDC system. [10]

OR

- Q2)** a) Explain inverter operation in HVDC systems with extinction angle and overlap angle. Derive necessary equations. [10]
- b) Explain protection against over voltages in HVDC system. Explain advantages of Single wire ground return (SWGR) system and also state why negative pole is preferred in SWGR systems. [10]

- Q3)** a) With suitable diagram explain DC link converter topologies. [8]
- b) Explain different mechanisms used for controlling harmonic generation in converter used in HVDC systems. [8]

OR

- Q4)** a) Explain AC controller based structures. [8]
- b) i) Explain operation of back to back converters.
ii) Compare current source converter and voltage source converters. [8]

P.T.O.

- Q5)** a) Draw a practical structure of TCSC and explain principle of operation and different operating modes of TCSC. [9]
- b) i) In TCSC, reactance of TCR branch is twice the capacitive reactance. Compute X_{TCSC}/X_C and I_{TCR}/I_L . Also specify whether TCSC operation is Capacitive or inductive with justification. [4]
- ii) Compare STATCOM with SVC. [5]

OR

- Q6)** a) Explain principle of Operation of STATCOM. Draw relevant phasor diagrams. [9]
- b) i) In TCSC, reactance of TCR branch is half the capacitive reactance. Compute X_{TCSC}/X_C and I_{TCR}/I_L . Also specify whether TCSC operation is capacitive or inductive with justification. [4]
- ii) Explain Applications of SVC. [5]

- Q7)** a) With neat structure explain principle of operation of UPFC. [8]
- b) Explain relevant phasor diagrams illustrating transmission control capabilities of UPFC. [8]

OR

- Q8)** a) Explain the overall control structure of UPFC. [8]
- b) Explain Power flow studies in UPFC embedded systems and operational constraints. [8]



Total No. of Questions : 8]

SEAT No. :

P3986

[4959]-1076

[Total No. of Pages : 3

B.E. (Electrical)

c - DIGITAL CONTROL SYSTEMS

(Semester - II) (2012 Course) (Elective - III) (End-Sem.)

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) Figures to the right side indicate full marks.

Q1) a) Check whether the following systems are **[8]**

- i) Static or Dynamic
- ii) Linear or non-Linear
- iii) Time invariant or Time variant

1) $Y(n) = \text{Cos}[x(n)]$

2) $Y(n) = x(2n)$

b) Examine the stability of the following characteristic equation by Jury's test.

$$P(Z) = Z^4 - 0.6Z^3 - 0.81Z^2 + 0.67Z - 0.12 = 0. \quad \text{[8]}$$

c) Derive the solution of a non-Homogeneous state equation of a discrete time system from first Principles. **[4]**

OR

Q2) a) For a given sequence : $x(n) = \{4, 3, 0, 1, 2\}$ **[4]**

↑

- i) Delay the sequence by 3 samples.
- ii) Fold & advance the sequence by 2 samples.
- iii) Downscale the sequence by time 2 samples.
- iv) Up-scale the sequence by amplitude scales.

P.T.O.

- b) Describe design procedure of digital lead compensator using bode plot for discrete time system. [8]
- c) Discuss the various methods used for computation of state transition matrix (STM) $\Phi(k)$ From the given state difference equation $x(k+1) = Gx(k) + Hu(k)$. [8]

Q3) a) Given

$$x(k+1) = \begin{pmatrix} 1 & 1 \\ -2 & -1 \end{pmatrix} x(k) + \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} u(k) \quad \& \quad y(k) = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} x(k) \quad [10]$$

Determine controllability & observability of the system.

- b) What is principle of duality? Explain the effect of pole-zero cancellation on controllability & Observability. [6]

OR

Q4) a) For the system having

$$G = \begin{pmatrix} 0 & 1 \\ -0.16 & -1 \end{pmatrix}; \quad H = \begin{pmatrix} 1 \\ 0 \end{pmatrix}; \quad C = (0 \quad 1)$$

Determine a suitable gain matrix K such that the system will have Eigen values at $Z = 0.5 + j0.5$, $Z = 0.5 - j0.5$. [10]

- b) Explain full order Observer with proper block diagram. [6]

Q5) a) Consider the system defined by

$$\frac{Y(z)}{U(z)} = \frac{3z^2 - 11z}{z^3 - 6z^2 + 11z - 6}$$

Determine State space representation in Controllable canonical form & Observable canonical form. [10]

- b) Consider the pulse transfer function of discrete time system given as

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

Derive its Jordan canonical form. [6]

OR

- Q6)** a) Consider the pulse transfer function of discrete time system given as

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

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

- b) Explain Eulers forward & backward method with suitable example. [6]

- Q7)** a) Explain Hybrid system simulation with block diagram & their application. [10]

- b) Explain Computer program structure for simulation of discrete time control system with algorithm & flow charts. [8]

OR

- Q8)** a) Draw a neat block diagram of digital position control scheme and Explain the function of each block. [10]

- b) Explain Stepper motor control with proper block diagram. [8]



Total No. of Questions : 12]

SEAT No. :

P4937

[Total No. of Pages :2

[4959]-1077

B.E. (Electrical)

**Intelligent Systems and it's Application in Electrical Engineering
(2012 Pattern) (Elective - III (D))**

Time : 2½ Hours]

[Maximum 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.*

Unit - I

Q1) Explain biological neuron model with neat sketch. **[6]**

OR

Q2) Explain Single neuron model with activation function. **[6]**

Unit - II

Q3) What are different supervised methods? Draw perceptron model. **[6]**

OR

Q4) Explain learning rules. **[6]**

Unit - III

Q5) Explain ART-1 network with neat sketch. **[8]**

OR

Q6) Explain Self organizing maps. **[8]**

Unit - IV

Q7) a) Explain various membership functions used in fuzzy logic. **[8]**

b) Discuss various fuzzy operators. **[8]**

P.T.O.

OR

- Q8)** a) Explain properties of fuzzy set. [8]
b) Explain crisp logic Vs fuzzy logic. [8]

Unit - V

- Q9)** a) Explain predicate logic used in fuzzy systems. [8]
b) Explain sugeno inference system. [9]

OR

- Q10)** a) Explain various de-fuzzification methods. [8]
b) Explain Mamdani inference system. [9]

Unit - VI

- Q11)** a) Give introduction of genetic algorithm. [8]
b) Explain software architecture used in expert system. [9]

OR

- Q12)** a) Explain various operators used in genetic algorithm. [8]
b) Explain rule based system in expert system. [9]



Total No. of Questions : 8]

SEAT No. :

P3601

[Total No. of Pages : 2

[4959]-1078

B.E. (Electrical Engineering)

SMART GRID

(2012 Pattern) (Elective - IV(a)) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Define smart grid and give its functions. [6]
b) Explain the concept vehicle to Grid. [6]
c) Highlight on role of geographic information system in smart grid, and also give its function. [8]

OR

- Q2)** a) Give present development and international policies in smart grid. [6]
b) Write a note on, "IED". [6]
c) Explain how Smart Appliances can be the part of Smart Grid. [8]

- Q3)** a) Explain concept of microgrid, and its need and application. [8]
b) Discuss different issues of micro grid when interconnected. [8]

OR

- Q4)** a) Explain about protection and control of microgrid. [8]
b) Describe the concept and formation of Micro Grid. [8]

- Q5)** a) Explain EMC and its importance in smart grid. [8]
b) Describe the concept, power quality conditioners related to smart grid. [8]

OR

P.T.O.

- Q6)** a) Describe the power quality issues of grid connected renewable energy sources. [8]
b) Explain the power quality audit and its importance in smart grid. [8]
- Q7)** a) Explain the concept WAN related to smart grid. [9]
b) Write a note on Wi-Max based communication in smart grid. [9]

OR

- Q8)** a) Explain the importance of Bluetooth in smart grid. [9]
b) Write a note on, Broadband over power line. [9]



Total No. of Questions : 8]

SEAT No. :

P4938

[Total No. of Pages :2

[4959]-1079
B.E. (Electrical)
(b) : Robotic & Automation
(2012 Pattern)

Time : 2.½ Hours]

[Maximum 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) Define Degree of freedom and spatial resolution. [6]
- b) Explain translational transformation with example. [6]
- c) What are the different rules for establishing link coordinate frames. [8]

OR

- Q2)** a) Write the concept of yaw, pitch and roll. [6]
- b) Explain rotational transformation with example. [6]
- c) Show how to add two vectors represented in homogeneous coordinates with different scale factors. What is the scale factor of the result? [8]

- Q3)** a) Derive rotation in the y-z plane and the z-x plane using the geometric approach. [8]
- b) Derive the rotation formula using vector technique. [8]

OR

- Q4)** a) Explain multiple reference frames in space. Draw sketches if necessary. [8]
- b) A point $[1;2;3]^T$ is desired to rotate around z axis by 60° and then around y axis by -90° . Find the resultant point after rotation. [8]

P.T.O.

- Q5)** a) Explain relationship between transformation matrix and angular velocity. [8]
b) Explain joint position controls (JPC) with neat sketch. [9]

OR

- Q6)** a) Explain Jacobian for prismatic and revolute joint for manipulator design. [8]
b) Explain resolved motion position controls (RMPC) with neat sketch. [9]

- Q7)** a) Explain servo-control system in detail. [8]
b) Explain underwater robot design with neat sketch. [9]

OR

- Q8)** a) Explain parts sorting robot with neat sketch. [8]
b) Explain selection criteria for sensors used, drives and actuators used in manipulator design. [9]



Total No. of Questions :10]

SEAT No. :

P3526

[4959]-1080

[Total No. of Pages :3

B.E. (Electrical Engineering)
c - ILLUMINATION ENGINEERING
(2012 Course) (End - Semester) (Semester - II) (Elective -IV) (403150)

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) Explain the hazards caused due to optical radiation. **[5]**

b) Explain with diagram, the D C carbon arc lamp. **[5]**

OR

Q2) a) In connection with visual mechanism and optical system explain-
Accommodation, Adaption. **[5]**

b) With suitable diagrams explain salt water dimmer used for light control.
State its advantages and disadvantages. **[5]**

Q3) a) State the advantages of artificial light over natural light. Also make
comparison between them. **[5]**

b) State the detail classification of dimmers used for light control. Explain
working of triac operated dimmer with suitable diagram. **[5]**

OR

Q4) a) Compare high pressure mercury vapour lamp (HPMV) with mercury
iodide lamp. **[5]**

b) With suitable diagram explain construction and working of sodium vapour
lamp. Also explain the ballast and ignitor used for this lamp. **[5]**

P.T.O.

- Q5) a)** Write short note on following: [8]
- i) Industrial light fittings.
 - ii) Effect of quality of illumination in industry.
- b) Explain how the effective illumination can be provided in the Entrance hall, Reception lobby of hotel. [8]

OR

- Q6) a)** Define following terms: [8]
- i) Space to height ratio
 - ii) Maintenance factor
- b) Estimate the number and wattage of lamps which would be required to illuminate a workshop- 60×15 meters. The lamps are mounted 5 meters above the working plane. The average illumination required is 100 lux. Coefficient of utilization is 0.4, luminous efficiency is 16 lumens per watt. Assume a space to height ratio of unity and maintenance factor 0.8. Show disposition of lamps in the plan. [8]

- Q7) a)** Explain any FOUR of following terms regarding street lighting: [8]
- i) Visual performance
 - ii) Visual comfort
 - iii) Contrast
 - iv) Glare
 - v) Uniformity ratio
 - vi) Field of vision
- b) With diagram, explain any Four arrangements of luminaries on straight roads: [8]
- i) Single sided arrangement
 - ii) Staggered arrangement
 - iii) Opposite arrangement
 - iv) Central verge arrangement
 - v) Catenary suspension

OR

- Q8) a)** State classification of projectors used for flood lighting. With suitable diagrams explain the different locations of flood light projectors. [8]
- b) A building frontage $50\text{m} \times 15\text{m}$ is to be illuminated by flood lighting projectors installed 25 meters away. The illumination is 100 lux, coefficient of utilization is 0.5, depreciation factor is 1.5, waste light factor is 1.2, luminous efficiency is 17 lumen per watt for a 1000watt lamp. Estimate the number of projectors. [8]
- Q9) a)** Explain following ways to transport sun-light. [9]
- i) Reflective conduit light tube
 - ii) Light tube dome
 - iii) Light tube diffuser
- b) Explain the use of lamps for following non-lighting purposes: [9]
- i) Domestic heating
 - ii) Space heating
 - iii) Light for insect -traps

OR

- Q10)a)** What is a fiber optic guide? With suitable diagram explain any one type of fiber optic guide. [9]
- b) Explain working of organic light emitting diode (OLED) with suitable diagram. State the advantages of OLED over flat panel displays. [9]

EEE

Total No. of Questions : 10]

SEAT No. :

P3602

[Total No. of Pages : 2

[4959]-1080A

B.E. (Electrical) (End Semester)

VLSI DESIGN

(2012 Pattern) (Elective - IV)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt 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 rules, Mollier Charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain the EDA tool design flow in VLSI with diagram. [6]
b) Differentiate between synchronous and asynchronous machines in sequential circuit design. [4]

OR

- Q2)** a) Explain the three modeling styles in VHDL, with the help of example.[6]
b) Explain with the help of diagram a serial in serial out 4 bit shift register using D flip flop. [4]

- Q3)** a) Write VHDL code for 4-bit UP counter. [6]
b) List the concurrent statements in VHDL. [4]

OR

- Q4)** a) Explain configurations in VHDL. [6]
b) Draw a Moore FSM (state diagram) to detect sequence 1101. [4]

- Q5)** a) Differentiate CPLD w.r.t. FPGA [8]
b) With neat schematic explain the architectural building blocks of FPGA.[8]

OR

P.T.O.

- Q6)** a) List the features, specifications and applications of FPGA. [8]
b) Explain the need of PLDs. Compare ASIC with DSP processor. [8]

- Q7)** a) Explain CMOS inverter and its transfer characteristics in detail. [8]
b) Draw and explain CMOS NAND and CMOS NOR gate [8]

OR

- Q8)** a) Explain Static and dynamic power dissipation. Derive an expression for power-delay product. [8]
b) Explain the following : [8]
i) Body effect
ii) Hot Electron Effect and
iii) Velocity Saturation

- Q9)** a) Explain in detail the parameters that should be considered in design of memory. [10]
b) Differentiate between carry ripple adder and carry look ahead adder with diagram. [8]

OR

- Q10)** a) Explain with a FSM diagram a vending machine controller. [10]
b) Explain barrel shifter with diagram. [8]

* * *

Total No. of Questions : 8]

SEAT No. :

P3603

[Total No. of Pages : 2

[4959] - 1081
BE (E & TC)
VLSI Design & Technology (End - Sem)
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Use of electronic pocket calculator is allowed.*
- 3) *Assume suitable data, if necessary.*
- 4) *Answer any one questions out of Q.1 or Q.2, Q.3 or Q.4, Q5 or Q6, Q.7 or Q.8.*

- Q1)* a) What is meant by concurrent & sequential statements in VHDL? Explore in detail with two examples of each. [7]
- b) With the help of suitable schematics, compare PROM, PLA & PAL architectures. What is need of CPLD? [7]
- c) What is clock skew? Explain the solutions to it. [6]

OR

- Q2)* a) Write VHDL code for Mod - N counter. Write suitable test bench for it.[7]
- b) Explain PLD targeted design flow in detail. [7]
- c) What is supply & ground bounce? What are remedies to it? [6]

- Q3)* a) Draw ac equivalent ckt of MOSFET & explain various capacitances involved. [9]
- b) What is technology scaling? What are types? Explain each in detail. [9]

OR

- Q4)* a) With the help of mathematical analysis & suitable schematic, explain DC transfer characteristics of CMOS Inverter. [9]
- b) What are merits of transmission gate? Design 4 : 1 mux using transmission gates. [9]

P.T.O.

Q5) a) Draw the ckt diagram for push pull CMOS inverter as an amplifier & explain. Give the expressions for output voltage range, output resistance & bandwidth. [8]

b) With the help of suitable schematic, explain cascode amplifier. What are its merits? Give the expressions for voltage gain and output resistance. [8]

OR

Q6) a) Explain current mirror in detail. Why is it needed? [8]

b) Explain current sink & current source in detail. Give expressions for output voltage range & output resistance. [8]

Q7) a) What are the types of fault? Explain each in brief. [8]

b) What is need of BIST? Explain typical BIST in detail. [8]

OR

Q8) a) With the help of block diagram, explain TAP controller in detail. [8]

b) Explain boundary scan technique. [8]



Total No. of Questions :8]

SEAT No. :

[Total No. of Pages :2

P3987

[4959]-1082

B.E. [E & TC]

Computer Networks

(2012 Course) (404182)

Time : 2½ Minutes

[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 TCP/IP reference model and explain functions of each layer. [7]
- b) State & explain in brief the functions associated with Data Link Layers in OSI model. [7]
- c) Explain the sliding window protocols in brief. [6]

OR

- Q2)** a) Draw the Blue tooth architecture and explain the functions of different layers in Bluetooth. [7]
- b) With an appropriate example, explain character stuffing and bit stuffing in data link layer. [7]
- c) Explain Basic service Set and Extended Service set in WLAN. [6]
- Q3)** a) Draw and explain the header format for IPv6. [6]
- b) List the various protocols giving their significance at transport Layer.[6]
- c) Give general format of ICMP and explain different types of error reporting messages used in ICMP. [6]

OR

P.T.O.

- Q4)** a) Draw and explain IPv6 frame format. [6]
b) Write short notes on. [6]
i) ARP.
ii) RARP.
c) Explain the concept of delivery and its different types used in network. [6]

- Q5)** a) Explain the TCP connection management in Client/Server model. [6]
b) What are the duties of Transport Layer? List the services provided by Transport Layer to upper layers. [6]
c) Write a short note on congestion control. [4]

OR

- Q6)** a) Compare between TCP and UDP. Under what circumstances you will use them. [6]
b) List the typical QoS parameters in the Transport Layer and explain each one. [6]
c) Draw the UDP segment format. Explain its various fields and their use. [4]

- Q7)** a) What is the purpose of FTP? What are the three FTP transmission modes? Explain [6]
b) Write short notes on www & internet. [6]
c) With an appropriate example, explain the Public key algorithm. [4]

OR

- Q8)** a) Explain the security aspects of intranet and internet. [6]
b) Write short note on Firewall. [6]
c) Explain the Transposition cipher with its advantages and disadvantages. [4]



Total No. of Questions : 8]

SEAT No. :

P3604

[Total No. of Pages : 2

[4959] - 1083
B.E. (E & TC)
Microwave Engineering
(2012 Pattern) (Semester - 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).*
- 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) Why waveguides are required at microwave frequencies? Explain the following parameters of a waveguide. [7]
- i) Cut-off frequency
 - ii) Guide wavelength
 - iii) Phase velocity
- b) Explain the properties of Hybrid Tee with the help of a neat diagram. Also state its Scattering matrix. [7]
- c) An isolator has an insertion loss of 0.5 dB and an isolation of 30 dB. Determine the scattering matrix of the isolator if the isolated ports are perfectly matched to the junction. [6]

OR

- Q2)** a) Show that for a TE₁₀ mode a frequency of 6 GHz will pass through the guide if a dielectric with relative permittivity of 4 is inserted into the waveguide. The dimensions are a = 1.5cm and b = 1cm. [7]
- b) Explain the concept of degenerate and dominant mode for a rectangular waveguide. [7]
- c) Explain the properties of Scattering matrix for a multiport network. [6]

P.T.O.

- Q3)** a) Explain the concept of velocity modulation with the help of applegate diagram. How this is used for the construction of microwave sources?[9]
b) What do you mean by linear beam tubes? Explain the construction, operation and advantages of a TWT amplifier. [9]

OR

- Q4)** a) Compare the following microwave devices. [10]
i) Tunnel diode with normal p-n diode
ii) IMPATT with TRAPATT
b) What are the high frequency limitations of transistor? Explain the techniques to minimize this along with the performance parameters of transistor at high frequency. [8]

- Q5)** a) Explain Gunn effect using two valley model. Mention its typical characteristics and applications of Gunn diode. [8]
b) Draw equivalent circuit of varactor diode. Explain in detail its construction and operation. [8]

OR

- Q6)** a) Explain the phase focusing effect in cavity magnetron. [8]
b) Explain how PIN diode acts as a modulator. [4]
c) Write a short note on Schottky Barrier diode. [4]

- Q7)** a) Explain attenuation measurement technique in detail. [8]
b) Enlist methods of measuring the Q of a cavity resonator. Explain any one method in detail. [8]

OR

- Q8)** a) Write explanatory notes on: [12]
i) VSWR meter
ii) Tunable detector
iii) Power meter
b) What is the need of double minimum method? Explain the same thoroughly. [4]



Total No. of Questions : 12]

SEAT No. :

P3605

[Total No. of Pages : 3

[4959] - 1084
B.E. (E & TC)
Digital Image Processing
(2012 Pattern) (Elective - I(a))

Time :2.30 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) *Your are advised to attempt not more than 6 questions.*
- 4) *Your answer will be valued as a whole.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of logarithmic table slide rule, mollier charts electronic pocket calculator is allowed.*

- Q1)** a) Explain scaling, rotation & translation operation of an image. [3]
b) Explain the effect of image sampling & quantization. [4]

OR

- Q2)** a) What is the need of image file format? Explain any one file format in detail. [4]
b) Explain Image formation in Human visual system in detail. [3]

- Q3)** Explain any two in detail. [7]
a) Homomorphic filtering.
b) Median filtering.
c) Log transformation.

OR

- Q4)** a) Explain restoration of images using Inverse filtering. [4]
b) Explain spatial domain image sharpening in detail. [3]

P.T.O.

- Q5)** a) What is loss - less & lossy compression? Explain need & application of each. [3]
b) Explain wavelet based compression in detail. [3]

OR

- Q6)** a) Explain concept of MPEG encoder. [3]
b) Explain Huffman coding algorithm in detail. [3]

- Q7)** a) Explain any two in detail. [10]

i) LOG

ii) DOG

iii) Canny Edge detector

- b) What is skeleton? Explain the algorithm to obtain skeleton of an object in a digital image. [8]

OR

- Q8)** a) Explain basic operations of morphology & hence explain hit or miss transform & its application. [10]

- b) Explain Global & local thresholding in image segmentation. [8]

- Q9)** a) What is chain code? How it is obtained? Obtain the object shape represented by 8 - directional chain code 466001225642. Obtain the circular chain code for the same. [8]

- b) Explain how polygonal approximation and signatures are used for shape representation? [8]

OR

- Q10)** a) What is moments? Explain different statistical moments used for shape representation. [8]

- b) What is Texture & texture primitive? What are the different properties of texture used for region representation? [8]

- Q11)** a) Explain pattern & different types of pattern classes. Explain representation of pattern classes. [8]
- b) Explain the algorithm of character recognition in image processing. [8]

OR

- Q12)** a) Explain Bayes classifier in detail. [8]
- b) Explain biometric authentication using image processing. consider any biometric e.g. finger, face etc. & explain in detail feature extraction & matching process. [8]



Total No. of Questions : 10]

SEAT No. :

P3606

[Total No. of Pages : 2

[4959] - 1085
B.E. (E&TC) (Semester - I)
Embedded Systems & Rtos
(2012 Course) (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 following design metrics : **[4]**
- i) Power
 - ii) Size
- b) With the help of block diagram, explain the architecture of embedded system. **[6]**

OR

- Q2)** a) Explain the spiral model. **[6]**
- b) Explain the Foreground | Back ground systems with reference to RTOS **[4]**

- Q3)** a) Explain any two scheduling algorithms. **[6]**
- b) Explain the context switching. **[4]**

OR

- Q4)** a) Write a program in embedded C to implement mail box. **[7]**
- b) Explain any two task related functions. **[3]**

- Q5)** a) Explain the embedded Linux development environment with a block diagram. **[8]**
- b) Explain the memory storage considerations for embedded Linux system. **[8]**

P.T.O.

OR

Q6) a) Explain the steps to execute any C program on embedded system development board. (ARM 9). [8]

b) Explain the Binary utilities. [8]

Q7) a) Explain various file systems used in Embedded Linux. [8]

b) Explain the device driver concept used in embedded Linux. [8]

OR

Q8) a) What is universal boot loader? Explain. [8]

b) What are boot loader challenges? [8]

Q9) a) Explain the embedded software development tools. [8]

b) Explain mobile phone with suitable block diagram and state its software requirements. [10]

OR

Q10) a) Explain the issues in hardware - software design. [8]

b) Explain the different lab tools required for embedded system design. [10]



Total No. of Questions : 08]

SEAT No. :

P3607

[Total No. of Pages : 2

[4959] - 1086

B.E. (E&TC)

**C : Software Defined Radio (SDR)
(2012 Course) (Elective - I) (Semester - I)**

Time :2.30 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 benefits of SDR. [8]
b) What is intermodulation distortion. Derive the expression for 3rd order intermodulation distortion. [6]
c) Explain decimation process with spectral diagram. [6]

OR

- Q2)** a) Explain the role of Antenna and Low Noise Amplifier used in SDR. [8]
b) Explain the following parameters w.r. to Dynamic range considerations of data converters. [6]
i) Percentage FSR utilization.
ii) Harmonic distortion.
c) Explain the role of Interpolation in SDR. [6]

- Q3)** a) Explain with neat diagram the phased antenna array system. [9]
b) What is MIMO system? State and explain the channel capacity expression of MIMO. [9]

OR

- Q4)** a) Draw & explain the block diagram of Switched Beam Antenna array system. Compare Switched Beam & Adaptive Array System. [9]
b) Explain with neat diagram space - Time Trellis coding for transmit STAP. [9]

P.T.O.

- Q5)** a) Draw neat block diagram of OFDM receiver. Explain the function of FFT block. [8]
b) Explain the Cognitive Radio capabilities. [8]

OR

- Q6)** a) Compare and contrast CR & SDR. [8]
b) Explain the OFDM & its application in CR. [8]

- Q7)** a) Case study on GNV Radio. [8]
b) Explain Network Interoperability. [8]

OR

- Q8)** Write a short note on [16]
a) CR for public safety.
b) Embedded based PSCR.



Total No. of Questions : 8]

SEAT No. :

P4899

[Total No. of Pages : 2

[4959]-1087

**B.E. (E & TC) (Semester - I)
Industrial Drives and Control (IDC)
(2012 Pattern) (Elective - I (a))**

Time :2.5 Hours]

[Maximum 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) Draw the operating torque speed characteristics of separately excited DC motor and explain field weakening operation. [6]
- b) State the expression for torque of an induction motor. Explain voltage control method for variation of speed of induction motor and its limitations. [8]
- c) Explain feedback controlled speed regulation of a motor drive. [6]

OR

- Q2)** a) Explain the motor selection parameters for elevator application. [6]
- b) Explain briefly the starting methods of an induction motor. [6]
- c) Draw complete diagram of V/F controlled induction motor drive with suitable converters. [8]

- Q3)** a) With the help of cross section diagram, explain the advantages of hybrid stepper motor over permanent magnet stepper motor. [8]
- b) State the advantages and limitations of permanent magnet synchronous motor. [8]

OR

P.T.O.

- Q4)** a) What is torque angle of a synchronous motor? Draw torque Vs torque angle characteristics for a cylindrical rotor synchronous motor. [8]
- b) Compare R/L drive and Chopper based drive for bi-polar stepper motor. [8]

- Q5)** a) Draw Bi-directional converter circuit used in wind power application and state its necessity. [8]
- b) Compare different types of battery charging systems used in renewable energy application. [8]

OR

- Q6)** a) Explain the principle of power flow from renewable energy source to utility Grid. [8]
- b) With the help of schematic diagram explain the incremental conductance method for MPPT controller in solar photovoltaic system. [8]

- Q7)** a) Explain fuzzy logic controller based induction motor drive for wind energy application. [9]
- b) What is expert system in an artificial intelligence area? Explain with the example of ANN based power converter. [9]

OR

- Q8)** Write short notes on [18]
- a) Four Quadrant chopper drive for DC motor.
- b) Circuit diagram to operate the switched reluctance motor.
- c) Different methods of MPPT tracking in solar photo voltaic systems.



Total No. of Questions :8]

SEAT No. :

P3527

[4959]-1088

[Total No. of Pages :2

B.E. (E & TC)

**Multirate & Adaptive Signal Processing
(2012 Pattern) (Elective - II) (Semester - I)**

Time : 2½ Hours

[Max. Marks :70]

Instructions to candidates:

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

- Q1)** a) Explain Time Bandwidth product with suitable example. [5]
b) Explain the difference between Fourier basis & Harr basis. [5]
c) Explain filing diagram of STFT. [5]
d) Explain Wigner Ville distribution. [5]

OR

- Q2)** a) Explain in detail methods adopted for interfacing digital systems with different sampling rates. Where do you need it? Explain the concept of up sampling and down sampling with the help of block diagram and waveforms. [10]
b) Give the limitations of Fourier transform. [5]
c) Explain with equation continuous wavelet transform. [5]

- Q3)** Decompose $x(n) = \{1,6,3,8,2,4,6,2\}$ using Harr wavelet packets till V_0 . Assume $x(n) \in V_3$. Reconstruct the decomposed sequence using proper basic. [18]

OR

P.T.O.

Q4) a) Derive perfect reconstruction conditions for Harr two band filter bank structure. [10]

b) Define MRA and explain the various axioms associate with it. [8]

Q5) a) Explain Noise cancellation using adaptive filters. [8]

b) Explain various components of adaptive filters. [8]

OR

Q6) a) Explain RLS algorithm in detail. [8]

b) Explain the basics of Wiener filters. [8]

Q7) a) Explain efficient D/A conversion in Hifi systems. [8]

b) Explain with block diagram adaptive telephone echo cancellation. [8]

OR

Q8) a) Explain use of wavelets in compression. [8]

b) Using Harr Lifting scheme decompose $x(n) = \{9,2,3,4\}$ till V_0 . Assume $x(n) \in V_2$. [8]



Total No. of Questions : 08]

SEAT No. :

P3608

[Total No. of Pages : 2

[4959] - 1089

B.E. (Electronics and Telecommunication)

Electronic Product Design

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

Time :2.30 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 and Q.No. 7 or Q.No. 8.*
- 2) *Figures to the right indicates full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable additional data if necessary.*
- 5) *Use of non programmable calculator is permitted.*

- Q1)** a) Explain five elements of successful design. **[8]**
b) Explain functional design and architectural design. Mention the difference between them. **[8]**
c) What is good programming practice. **[4]**

OR

- Q2)** a) Explain the importance of temperature, vibration and shock tests in electronic Product design. **[6]**
b) How the specifications are formulated. Explain difference between specifications and requirements. **[8]**
c) Explain waterfall model of software development. **[6]**

- Q3)** a) Explain routing topologies. What are the differences between the two Topologies? **[10]**
b) What are the grounding methodologies? Explain with suitable sketches. **[8]**

OR

P.T.O.

- Q4)** a) Write short notes on any two [8]
i) Image planes
ii) Functional Partitioning
iii) Aspect Ratio
b) What is a concept of critical frequency? Explain the concept of decoupling. [6]
c) Explain technique of ESD protection. [4]

- Q5)** a) Compare conducted EMI with Radiated EMI. [8]
b) What are electromechanical components? Explain any one of them. [8]

OR

- Q6)** a) What is debugging? Explain the steps of debugging. [8]
b) Explain Integration, validation and verification. [8]

- Q7)** a) What is need of documentation ? Explain different types of documentation. [8]
b) What is bill of material ? Explain with suitable example. [8]

OR

- Q8)** a) Explain the layout of documentation. [8]
b) How the documents are preserved. What are the methods to preserve? [8]



Total No. of Questions : 12]

SEAT No. :

P3609

[Total No. of Pages : 2

[4959] - 1090
B.E. (E & Tc)
PLC's and Automation
(Elective - II) (2012 Course)

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) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side 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 different process control principles. **[4]**
b) Explain role of automation in modern developments. **[4]**

OR

- Q2)** Explain different approaches to design digital control systems. **[8]**

- Q3)** A sensor output voltage ranging from - 2.4 volts to -1.11 volts. To interface it to an analog to digital converter, this needs to be 0 to 2.5 volts. Develop the signal conditioning circuit. **[6]**

OR

- Q4)** Discuss the typical issues & guidelines for analog signal conditioning design. **[6]**

- Q5)** List and explain different types of switches. **[6]**

OR

- Q6)** Explain programmable automation controller [PAC] **[6]**

- Q7) a)** Draw and explain block diagram for elevator system. Develop the ladder diagram for the same. **[10]**

P.T.O.

- b) Write a short note on : [8]
i) MIS
ii) MES

OR

- Q8)** a) Define the term HMI. Explain its application in automation. [6]
b) Define the term PLC. Explain its typical specifications. [6]
c) Draw the ladder diagram for the following sequence : [6]
i) If push button PB1 is pressed the red light turns ON.
ii) If push button PB 2 is pressed, the green light turns ON.
iii) If both the bush buttons [PB1 & PB2] are pressed at once, neither light turns ON

- Q9)** a) Explain functions of various elements used in SCADA system. [8]
b) Draw and explain block diagram of distributed control system. [8]

OR

- Q10)** a) Define the term SCADA. Explain various features of SCADA system.[8]
b) What factors makes DCS different from other control systems? Justify.[8]

- Q11)** a) List the applications of CNC machines in manufacturing Industry. Explain any one in detail [8]
b) Write a short note on : [8]
i) Ethernet
ii) TCP/IP

OR

- Q12)** a) What are the different media used to input information for NC machines? Discuss the advantages of each medium [8]
b) Write a short note on : [8]
i) control net.
ii) FF - HSE.



Total No. of Questions :8]

SEAT No. :

P3988

[4959]-1092

[Total No. of Pages :2

B.E. (E & TC)

MOBILE COMMUNICATION

(2012 Course) (Semester - II) (End - Semester) (404189)

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) *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 brief message switching, circuit switching and manual switching. **[8]**
- b) Design a grading for connecting 20 trunks to switches having 10 outlets. **[6]**
- c) Derive the approximate formula for S/I using co-channel reuse ratio Q. **[6]**

OR

- Q2)** a) Explain the assumptions used in second Erlang Distribution for queuing systems. **[8]**
- b) Explain Time Space switch. Determine the implementation complexity of the TS switch where the no. of TDM input lines $N=120$. Assume each input line contains DSI signal (24 channels). Assume a one stage matrix is used for the space stage. **[6]**
- c) What is Handoff? Why is it necessary in Mobile Cellular System? Explain Mobile Assisted Handoff. **[6]**
- Q3)** a) In AMPS, explain the call processing of **[8]**
- i) Mobile terminated call
 - ii) Mobile originated call
- b) Draw the format of different GSM burst structures and explain each one detail. **[8]**

OR

P.T.O.

- Q4)** a) With a proper diagram explain the time slot hierarchy of GSM system. [8]
b) Compare between GSM900 and DCS 1800. [8]

- Q5)** a) Draw a neat diagram & explain block scheme of GSM Full Rate encoder. [6]
b) With the necessary diagram, explain the role of TAF and IWF in data transmission chain in GSM? [6]
c) With a neat diagram explain the operation of GMSK Modulator. [4]

OR

- Q6)** a) Draw and explain GPRS architecture. [6]
b) Write short note on HSCSD. [6]
c) State and explain data services in GSM. [4]

- Q7)** a) What are the basic types of Pseudorandom sequence used in spread spectrum CDMA system. Explain any one in detail. [6]
b) Compare between technical parameters of WCDMA & IS-95. [6]
c) A DSSS system has a 15 Mcps code rate and a 4.8 kbps information data rate. If the spreading code generation rate is increased to 50 Mcps, how much improvement in the processing gain of this DSSS system will be achieved? [6]

OR

- Q8)** a) Draw & explain the basic receiver structure for DS-CDMA. [9]
b) Give the classification of logical channels in IS-95 & explain sync channel. [9]

EEE

Total No. of Questions : 10]

SEAT No. :

P3610

[Total No. of Pages : 4

[4959] - 1093
B.E. (E & TC) (Semester - II)
Broadband Communication Systems
(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 and 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 advantages of optical fibers as communication media. Also state its drawbacks if any. **[6]**
- b) Define cut off wavelength of a single mode fiber. Determine the cutoff wavelength for a step index fiber to exhibit single-mode operation when the core refractive index and radius are 1.46 and 4.5 μm , respectively, with the relative index difference being 0.25%. Assume $V_c = 2.405$. **[4]**

OR

- Q2)** a) A multimode step index fiber has a relative refractive index difference of 1% and a core refractive index of 1.5. The number of modes propagating at a wavelength of 1.3 μm is 1100. Estimate the diameter of the fiber core. **[6]**
- b) Describe working principle with the aid of simple ray diagram
- i) Multimode Step Index Fiber
 - ii) Graded Index Fiber

Compare advantages and drawbacks of these fibers.

Draw a diagram indicating major possible fiber refractive index profiles for the profile parameter $\alpha = 1, 2$ and ∞ . **[4]**

P.T.O.

Q3) a) An optical fiber system is to be designed to operate over an 8 km length without repeaters. The rise times of the chosen components are: [6]

Source (LED): 8 ns

Fiber: intermodal 5 ns km^{-1}

(pulse broadening) intra-modal: 1 ns km^{-1}

Detector (*p-i-n* photodiode): 6 ns

From system rise time considerations, estimate the maximum bit rate that may be achieved on the link when using an NRZ format.

b) Compare and contrast *p-i-n* and avalanche photo detectors as optical detector for optical fiber communication. [4]

OR

Q4) a) Compare the following optical amplifiers based on working principle, amplification gain and drawbacks. [6]

i) SOA

ii) EDFA

b) Compare and contrast LED and ILD as optical source for optical fiber communication. [4]

Q5) a) Which orbital parameter completely specify the orbit? Briefly describe each one of these. [6]

b) Verify that geostationary satellite needs to be at a height of about 35780 km above the surface of the Earth. Assume radius of earth to be 6380 km and $\mu = 39.8 \times 10^{13} \text{ Nm}^2/\text{kg}$. [6]

c) Explain briefly various look angles for satellite earth station. [6]

OR

Q6) a) How does solar eclipse affect satellite communication? [6]

b) Determine the maximum possible line of sight distance between two geostationary satellites orbiting the earth at a height of 36000 km above the surface of the Earth. Assume radius of earth to be 6380 km. [6]

c) Describe the launch sequence used to inject satellite. [6]

- Q7) a)** What are the different components of satellite's power supply subsystem? Briefly describe the role of each component. [8]
- b) Explain in detail any two of the following for orbital satellite [8]
- i) Communication Subsystem
 - ii) Antenna Subsystem

OR

- Q8) a)** Explain double conversion transponder for 14/11 GHz band. Support your answer with suitable diagram and specify frequencies of local oscillators and IF amplifiers. [8]
- b) Explain Bath-tub curve for probability of failure with reference to satellite. Hence define MTBF. State relation of MTBF with probability of device failure.
Explain various redundancy connections used to mitigate device failure. [8]

- Q9) a)** A 4 GHz receiver has the following gains and noise temperatures

$$T_{in} = 25 \text{ K}, T_{RF} = 50 \text{ K}, T_{IF} = 1000 \text{ K}, T_m = 500 \text{ K}, G_{RF} = 23 \text{ dB}, G_{IF} = 30 \text{ dB}. \quad [8]$$

- i) Calculate the system noise temperature assuming that the mixer has a gain $G_m = 0 \text{ dB}$.
 - ii) Recalculate the system noise temperature when the mixer has a 10 dB loss.
 - iii) How can the noise temperature of the receiver be minimized when the mixer has a loss of 10 dB?
 - iv) The system has an LNA with a gain of 50 dB. A section of lossy waveguide with an attenuation of 2 dB is inserted between the antenna and the RF amplifier. Find the new system noise temperature for a waveguide temperature of 300° K .
- b) What do you understand by link budget of a satellite communication link? What type of information do you get from such an analysis'? [8]

OR

Q10) a) Explain various losses in downlink analysis. [8]

b) A transponder of a Ku-band satellite has a linear gain of 127 dB and a nominal output power at saturation of 5 W. The satellite's 14 GHz receiving antenna has a gain of 26 dB on axis.

Calculate the power output of an uplink transmitter that gives an output power of 1 W from the satellite transponder at a frequency of 14.45 GHz when the earth station antenna has a gain of 50 dB and there is a 1.5 dB loss in the waveguide run between the transmitter and antenna. Assume that the atmosphere introduces a loss of 0.5 dB under clear sky conditions and that the earth station is located on the -2 dB contour of the satellite's receiving antenna. If the rain in the path causes attenuation of 7 dB for 0.01% of the year, what output power rating is required for the transmitter to guarantee that a 1 W output can be obtained from the satellite transponder for 99.99% of the year if uplink power control is used? [8]



Total No. of Questions : 10]

SEAT No. :

P4940

[Total No. of Pages :3

[4959]-1094
B.E. (E & TC)
SPEECH AND AUDIO SIGNAL PROCESSING
(2012 Pattern)

Time : 2 ½ Hours]

[Maximum Marks : 70

Instructions to the candidates:

- 1) *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) *Right side figures indicate marks*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Explain in detail autocorrelation method for computing Linear Predictor Coefficients **[6]**
- b) What is Pitch of speech signal? Explain any one method for computation of pitch of the speech signal? **[4]**

OR

- Q2)** a) Explain LTI model of speech production. **[5]**
- b) Explain the concept of critical band and auditory systems as a filter bank? **[5]**
- Q3)** a) What is spectrogram? What are their types? Explain its significance and applications in speech processing **[5]**
- b) Explain the concept of **[5]**
- i) Spectral flux.
 - ii) Spectral roll-off

OR

P.T.O.

- Q4)** a) How Short time energy, short time average magnitude short time average zero crossing rate is useful in speech processing? [4]
- b) Explain the concept of [6]
- i) Spectral Centroid
 - ii) Spectral spread
 - iii) spectral entropy

- Q5)** a) Explain basic principal of Linear Predictive Analysis? Explain autocorrelation method for formant analysis [8]
- b) Explain the Covariance method for computing Linear Predictor Coefficients. [8]

OR

- Q6)** a) Explain covariance method for Linear Predictive Analysis? [8]
- b) Explain Durbin algorithm in LPC analysis. [8]

- Q7)** a) What is homomorphic processing? with reference to speech processing. How it is useful for speech analysis.? [8]
- b) Explain in detail estimation of formant and pitch parameters using cepstrum [8]

OR

- Q8)** a) What is cepstrum? Explain in detail computation of Mel Frequency Cepstral Coefficients (MFCC). [8]
- b) What is long term complex cepstrum? What is short term complex cepstrum? Explain the properties of the complex cepstrum. [8]

- Q9)** a) Explain in detail automatic speech recognition system with suitable example (e.g. automatic telephone dialling system) [9]
- b) What is the difference between speaker identification and speaker verification? What are the features used for speaker recognition/verification system and how? [9]

OR

- Q10)**a) What is dynamic time warping? Explain with suitable example. [4]
- b) Explain speech enhancement using comb filter and spectral subtraction method. [10]
- c) What are the various methods used for TTS. [4]



Total No. of Questions : 10]

SEAT No. :

P5077

[Total No. of Pages : 2

[4959]-1095
B.E. (E&TC)
RF: CIRCUIT DESIGN
(2012 Pattern) (Elective - III) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *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) Draw and explain Chip resistor & Chip Capacitor. **[5]**
b) Explain Accuracy of OCτs and accuracy of SCτs. **[5]**

OR

- Q2)** a) Describe with suitable example, relation between Rise time and Bandwidth. **[5]**
b) Describe Neutralization and unilateralization. **[5]**

- Q3)** a) What is the standard recipe for computing bandwidth? **[5]**
b) Discuss the method of open circuit time constants to estimate the bandwidth. **[5]**

OR

- Q4)** a) Explain Bandwidth enhancement techniques. **[5]**
b) Describe in brief stabilization methods. **[5]**

- Q5)** a) Discuss two port noise parameters. **[8]**
b) With suitable diagram explain Single ended LNA and its design parameters. **[8]**

P.T.O.

OR

- Q6)** a) Explain LNA Topologies with suitable diagrams. [8]
b) With suitable diagram describe Differential ended LNA and its design parameters. [8]

- Q7)** a) What are the challenges with purely linear oscillator? [6]
b) How we can use describing functions to analyze oscillators? [6]
c) Differentiate between describing function model and start up model. [6]

OR

- Q8)** a) What is describing function? Explain with suitable examples. [6]
b) Discuss on Resonator technologies. [6]
c) Explain with appropriate diagram basic LC Feedback Oscillator. [6]

- Q9)** a) Explain with respect to Mixer following characteristics. [8]
i) Conversion Gain
ii) Linearity and Isolation
b) Describe with neat diagram single balanced Mixer. [8]

OR

- Q10)** a) Discuss how Nonlinearity systems behaves as Linear Mixer. [8]
b) Explain Single diode mixer and double diode mixer. [8]



Total No. of Questions : 10]

SEAT No. :

P4941

[Total No. of Pages :2

[4959]-1096

**B.E. (Electronics & Telecommunication)
AUDIO VIDEO ENGINEERING
(2012 Pattern) (Semester - II) (Elective - III (c))**

Time : 2½ Hours]

[Maximum Marks : 70

Instructions to the candidates:

- 1) *Answer questions : Q.1. or Q.2, Q.3 or Q.4 , Q.5. or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 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) Draw and explain the composite video signal used in colour TV transmission. **[5]**

- b) Explain the terms: **[5]**
- i) Horizontal and Vertical Resolution,
 - ii) Kell Factor,
 - iii) Interlaced Scanning

OR

Q2) a) Explain PAL Encoder with necessary block diagram. **[5]**

b) Discuss component coding and composite coding in Digital TV. **[5]**

Q3) a) Discuss Digital TV recording techniques. **[5]**

b) Explain various SDTV, EDTV and HDTV formats. **[5]**

OR

Q4) a) Explain the working principle of CATV. **[5]**

b) Discuss briefly, the developments made so far to evolve HDTV and the standards. **[5]**

Q5) a) Discuss in brief IPTV and Internet TV. **[8]**

b) Enlist various video projection technologies. Explain the working principle of DLP projectors with suitable diagram. **[8]**

P.T.O.

OR

- Q6)** a) What is the need for Video Intercom System? Briefly, explain the working of the same along with its important features. [8]
b) Discuss Wi-Fi transmitter and receiver with its applications. [8]

- Q7)** a) Discuss the magnetic, optical and disc recording principles with suitable diagrams. [10]
b) Explain DVD player with necessary block schematic. [8]

OR

- Q8)** a) Explain the playback process of compact disc with suitable diagram. Discuss the different steps involved in the preparation process of CDs with necessary sketches. [10]
b) Explain principle of Dolby sound systems for the noise reduction. [8]

- Q9)** a) State the requirements for a good auditorium for pleasant listening. Discuss salient features of acoustical design for an auditorium. [8]
b) Discuss with block schematic the working of cordless microphone PA system. [8]

OR

- Q10)** a) Define reverberation time? Explain the importance of reverberation. What are the factors on which reverberation time depends? [8]
b) Explain the working of condenser microphone with a neat diagram. List the applications for it. [8]



Total No. of Questions : 8]

SEAT No. :

P3611

[Total No. of Pages : 3

[4959] - 1097
B.E. (E & TC) (Semester- II)
SOFT COMPUTING TECHNIQUES
(2012 Course) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) Answers any four questions out of 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) Draw and explain nonlinear model of neuron. [6]
b) Explain the architecture and training algorithm of learning vector quantization(LVQ). [6]
c) Describe various operations that can be performed for fuzzy sets. [8]

OR

- Q2)** a) Discuss linear separability concept. Explain gradient descent algorithm. [6]
b) Explain cover's theorem. Describe the mapping function like Gaussian and multiquadratic. [6]
c) Explain the concept of composite linguistic variables and the use of concentration and dilation operations [8]

- Q3)** a) Explain block diagram of fuzzy inference system (FIS) in detail. [6]
b) Describe in detail the following process of defuzzification: [6]
i) Centroid method
ii) Weighted average method
c) Implement a simple two input single output FIS employing Mamdani model. [6]

OR

P.T.O.

- Q4)** a) Discuss in detail the process of fuzzification. What are the various methods of fuzzification? [6]
- b) Explain Sugeno fuzzy model of FIS with example. [6]
- c) Given a rule : If x is A, THEN y is B, where $A = \left\{ \frac{0.3}{1}, \frac{0.7}{2}, \frac{0.8}{3} \right\}$ and $B = \left\{ \frac{0.8}{5}, \frac{0.6}{7}, \frac{0.3}{9} \right\}$ Infer B' for another rule : IF x is A' THEN y is B' where A' is $\left\{ \frac{0.2}{1}, \frac{0.9}{2}, \frac{0.4}{3} \right\}$ using Mamdani implication rule and max - min composition. [6]
- Q5)** a) Explain in detail the architecture of fuzzy logic controller. [8]
- b) What are the steps involved in designing fuzzy logic controller. State the applications of FLC. [8]

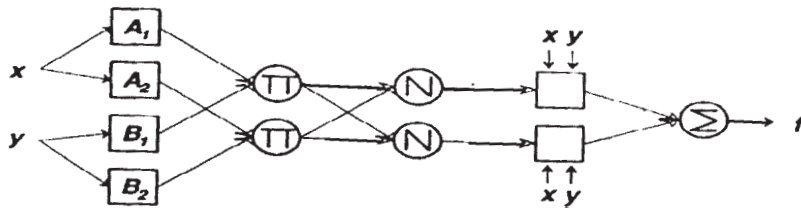
OR

- Q6)** a) Compare fuzzy logic controller with traditional PID controller. Discuss the assumptions in fuzzy control system design. [8]
- b) Discuss the application of FLC in air craft landing control problem in detail. [8]
- Q7)** a) Explain in detail ANFIS with architecture. [8]
- b) Discuss in detail two pass learning in ANFIS. [8]

OR

- Q8)** a) Explain hybrid learning algorithm employed in ANFIS. [6]

- b) Compute output f for ANFIS network shown in fig. Assume A_1, A_2, B_1, B_2 as gbell membership function. [10]



Given : $x = 20, y = 25$

Premise parameters			
A_1	$a = 40$	$b = 2$	$c = 0$
A_2	$a = 40$	$b = 2$	$c = 70$
B_1	$a = 40$	$b = 2$	$c = 0$
B_2	$a = 40$	$b = 2$	$c = 70$
Consequent Parameters			
f_1	$p_1 = 0.6$	$q_1 = 0.9$	$r_1 = 0.3$
f_2	$p_2 = 0.5$	$q_2 = 0.4$	$r_2 = 0.2$



Total No. of Questions : 8]

SEAT No. :

P3612

[Total No. of Pages : 2

[4959] - 1098

**B.E. (Electronics & Telecommunication)
BIOMEDICAL SIGNAL PROCESSING
(2012 Pattern) (End Semester)**

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) What is a function of Electromyography? Enlist the types of EMG and explain the procedure to perform EMG. [8]
- b) Draw and explain unipolar and bipolar arrangement of ECG acquisition. [6]
- c) Write a short note on STFT. [6]

OR

- Q2)** a) Write a note on direct and indirect blood pressure measurement. [8]
- b) Explain PAN TOMPKINS algorithm to detect QRS segment from acquired ECG signal. [6]
- c) Explain various heart sounds generated in the pumping activity of heart. [6]

- Q3)** a) Draw and explain 10-20 electrode placement for acquisition of EEG. [8]
- b) Explain various EEG waveforms with their frequency and significance. [8]

OR

- Q4)** a) Draw and explain structure of brain. [8]
- b) Explain grounding and shielding techniques. [8]
- Q5)** a) Write a note on ECG amplifier and isolation circuit. [8]
- b) Describe basics of low pass filtering and high pass filtering for bio signals. [8]

P.T.O.

OR

- Q6)** a) Explain the technique to cancel out maternal ECG from fetal ECG. [8]
b) Write requirement of basic amplifier and Explain the use of instrumentation amplifier. [8]
- Q7)** a) Describe the significance of Principal component analysis for biosignals analysis. [10]
b) State the differences between FIR and IIR filters for biosignal analysis.[8]

OR

- Q8)** a) Distinguish between stationary and non-stationary bio signals. Also state the edge effects due to sampling a finite length data sequence. [10]
b) For an input represented by $X(z)$ and output given by $Y(z)$, State the generalized transfer function $H(z)$ in terms of $b(k)$ and $a(k)$ as coefficients of numerator and denominator respectively and state a method to find the frequency spectrum of the same. [8]



Total No. of Questions : 8]

SEAT No. :

P3613

[Total No. of Pages : 2

[4959]-1099

B.E. (E & TC)

Nano Electronics and MEMS

(2012 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer any one question out of 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) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain temperature effects in semiconductor. [7]
- b) What is Lithography? Write different methods which are used for IC fabrication. [7]
- c) What is Fin FET? How it is different than normal FET? [6]

OR

- Q2)** a) What are the different technologies which are used for silicon crystal growth? [7]
- b) What is etching? What do you mean by wet etching and dry etching? [7]
- c) Write short notes on : [6]
- i) Dopant diffusion
 - ii) Sputtering

- Q3)** a) Discuss three different approaches for circuits that can be integrated with MEMS. [9]
- b) What is Encapsulation? Explain Importance of it. [9]

OR

- Q4)** a) Explain experimental methods for measuring intrinsic stress. [9]
- b) Write a short note on [9]
- i) Sensor
 - ii) Actuator
 - iii) Transducer

P.T.O.

- Q5)** a) What is direct and inverse effect of piezo electric sensors? [8]
b) Compare electrostatic and thermal actuation methods. [8]

OR

- Q6)** a) What are the aspects, which should be considered for successful design of accelerometer. [8]
b) Write short note on comb drive devices. [8]

- Q7)** a) Write short note on [8]
i) Profilo meter
ii) Reflectometer
b) What are the advantages and disadvantages of Transmission Electron Microscopy (TEM) in comparison to Scanning Electron Microscopy (SEM). [8]

OR

- Q8)** a) What is FTIR? Explain advantages, limitations and applications FTIR. [8]
b) Write short note on Atomic Force Microscope. (AFM) [8]



Total No. of Questions : 10]

SEAT No. :

P3614

[Total No. of Pages : 3

[4959]-1100

B.E. (E & TC)

DETECTION AND ESTIMATION THEORY

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

Time : 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 indicate full marks.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) Write characteristics of Maximum Likelihood Estimator. [5]
b) What is Bayes criteria. Derive the expression for Bayes Decision rule. Under what condition Bayes criteria reduces to LRT and MAP. [5]

OR

- Q2)** a) Explain Recursive Least Square Estimation. [5]
b) Explain how decision rule is framed in case of multiple hypothesis tests. [5]
- Q3)** a) Write a short note on Minimum Variance Unbiased Estimator. [5]
b) State and explain Cramer - Rao inequality for a Random Parameter. [5]

OR

- Q4)** a) A ternary communication system transmits one of the three amplitude signal {1, 2, 3} with equal probabilities. The independent received signal samples under each hypothesis are [5]

$$H_1 : Y_k = 1 + N \quad k = 1, 2, \dots, K$$

$$H_2 : Y_k = 2 + N \quad k = 1, 2, \dots, K$$

$$H_3 : Y_k = 3 + N \quad k = 1, 2, \dots, K$$

P.T.O.

The additive noise N is Gaussian with mean zero and variance σ^2 . The costs are $C_{ii} = 0$ and $C_{ij} = 1$ for $i \neq j$, $i, j = 1, 2, 3$ determine the decision regions.

b) Explain Bayes estimator, least square estimator in detail. [5]

Q5) a) Find maximum likelihood estimator of power of WGN with variance σ^2 unknown with hypothesis H_0 and H_1 with K no. of samples producing zero and m output respectively. [8]

b) Explain Kalman's filter in context of estimation theory. [8]

OR

Q6) a) Write a note on Wiener Filter. [8]

b) Write a note on Best Linear Unbiased Estimator. [8]

Q7) a) Derive the likelihood ratio test (LRT), under the Neyman Pearson (NP) criterion for a binary hypothesis problem. [8]

b) In the received signal under hypothesis H_1 and H_0 was [8]

$$H_1 : Y_k = m + N_k, \quad k = 1, 2, \dots, K$$

$$H_0 : Y_k = N_k \quad k = 1, 2, \dots, K$$

i) Assuming the constant m is unknown. Obtain the Maximum Likelihood estimation of the mean.

ii) Suppose now mean ' m ' is known but the variance is unknown. Obtain the MLE.

OR

Q8) a) For a binary decision problem the PDF are given as $p(y/H_0) = 1/2e^{-|y|}$ and $p(y/H_1) = e^{-2|y|}$. The costs associated with decision are $C_{00} = C_{11} = 0$ and $C_{01} = 1$, $C_{10} = 2$ and $P(H_1) = 0.75$. Determine the Bayes decision rule. [8]

b) Explain best linear unbiased Estimator (BLUE)? [8]

- Q9)** a) Explain the Radar Elementary concepts - Range, Range Resolution, and Unambiguous Range. [9]
- b) Give a Review of Some CFAR Detectors. [9]

OR

- Q10)** a) What is CFAR Detection and state the Principles of Adaptive CFAR Detection. [9]
- b) Write short note on Neyman - Pearson detector. [9]



Total No. of Questions : 8]

SEAT No. :

P4544

[Total No. of Pages : 2

[4959] - 1100A

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

WIRELESS NETWORKS

(2012 Pattern) (Elective - IV (d)) (Theory)

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

- Q1)** a) What are the reasons for adopting All IP architectures in all the advanced wireless technologies? With the help of suitable schematic, describe 3GPP Release 5 All IP network architecture. [7]
- b) What is the importance Virtual Private Network (VPN)? Describe various types of mobile VPNs. [7]
- c) Describe the various types of hand-offs in used 3G networks. [6]

OR

- Q2)** a) What are the advantages of using CDMA air interface in 3G technologies? With the help of suitable diagram, describe 3GPP Release 4 distributed network architecture. [7]
- b) Describe various types of services used in IEEE 802.11 for delivering protocol data units, accessing the network and for maintaining privacy. [7]
- c) Discuss the evolution of 3GPP2 wireless technologies. [6]

- Q3)** a) Enlist the important features of LTE systems. With the help of block schematic, describe various components required in LTE architecture. [9]
- b) How is MIMO used to enhance the performance of LTE? Draw and explain eNodeB 4 × 4 MIMO. [9]

P.T.O.

OR

- Q4)** a) Explain the importance of using HARQ, QCI and ARP in LTE systems. [9]
- b) What are advantages of using TDD in wireless networks? Draw and explain TDD frame structure used in LTE. [9]
- Q5)** a) Why do we use OFDM and its different flavors in WiMAX technology? With the help of suitable diagrams, explain the detailed working of OFDM. [8]
- b) Write short notes on: [8]
- i) Spectrum used for WiMAX Technology
- ii) Frequency Planning in WiMAX Networks

OR

- Q6)** a) With the help of suitable schematic, explain the generic architecture of WiMAX technology. [8]
- b) Describe the evolution of WiMAX. Compare different variations of IEEE 802.16? [8]
- Q7)** a) What is the significance of using SIGTRAN? With the help of suitable diagram, explain in brief various protocols used in its stack. [8]
- b) What are advantages of using SIP in VoIP? Explain the complete functionalities of SIP for VoIP calls. [8]

OR

- Q8)** a) Compare in detail the various protocols such as H.323, SIP and MEGACO used for VoIP. [8]
- b) How do we differentiate QoS requirements for data and audio? Explain various mechanisms used to maintain QoS in VoIP. [8]



Total No. of Questions : 8]

SEAT No. :

P3615

[Total No. of Pages : 2

[4959]-1100B

B.E. (E&TC/Electronics)

Advanced Automotive Electronics

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) What is hybrid technology? Explain various operating models and compare advantages and disadvantages of each. [8]
- b) With suitable block diagram explain automatic cruise control system. List sensors used in such system. [8]
- c) Comment on the various tools and processes involved in automotive electronics. [4]

OR

- Q2)** a) What are selection criteria of sensors for automotive applications? [8]
- b) Explain the necessity of fuel map and ignition map in Engine Management System. [8]
- c) How EGO (Exhaust Gas Oxygen concentration) sensor works? Explain. [4]

- Q3)** a) What is CAN? Explain functionality of Data link layer in CAN? What is bit stuffing in CAN? What is the use of bit stuffing? [8]
- b) What is HIL & SIL testing? State the advantages of HIL over SIL. [6]
- c) Discuss in detail about D2B and DSI communication protocol. [4]

OR

- Q4)** a) Enlist various types of automotive buses. Compare any three types of automotive buses. [8]
- b) How Ethernet protocol is important in automotive systems? Explain the frame structure for the same. [6]

P.T.O.

c) How CAN follow arbitration. Explain with example. [4]

Q5) a) Explain the closed loop ignition control with its waveform. [6]

b) Explain the steps involved for implementation of a model from MATLAB / SIMULINK to Real-Time environment. [6]

c) How does the transient operation of engines cause emission formation?[4]

OR

Q6) a) What is the role of control system strategies in fine tuning of automotive systems? [6]

b) Explain automatic rain operated wiper control. [6]

c) Discuss the significance of PID control in cruise control system. [4]

Q7) a) What is needed to find faults in automotive systems? Explain in brief. [6]

b) List the six-stage diagnostic process. Explain the same with suitable example. [6]

c) Explain active safety and passive safety with suitable example. [4]

OR

Q8) a) Discuss any two applications of Advance driver assistance systems. [6]

b) What is on board diagnostics system? How it indicate various faults? [6]

c) Write a short note on EMC standards. [4]



Total No. of Questions : 10]

SEAT No. :

P3616

[Total No. of Pages : 2

[4959] - 1101
B.E. (Electronics Engineering)
VLSI DESIGN (Theory)
(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) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) Assume suitable data, if necessary.*

Q1) a) Prove that to achieve completely symmetric input output characteristics for a CMOS inverter, the design requires to have $(W/L)_p = 2.5(W/L)_n$. Assume that the gate oxide thickness t_{ox} , and hence the gate oxide capacitance C_{ox} have the same value for both NMOS and PMOS transistors. **[6]**

b) Write short notes on Channel length Modulation. **[4]**

OR

Q2) a) Draw and Explain $I_{ds} - V_{ds}$ characteristics of NMOS. **[5]**

b) Explain noise margin. Give its expressions. **[5]**

Q3) a) Write VHDL code for 4 bit up - down counter. **[5]**

b) Draw the block diagram and explain the architecture of FPGA. **[5]**

OR

Q4) a) Explain data types in VHDL with suitable examples. **[5]**

b) What is metastability? How can it be removed? **[5]**

P.T.O.

- Q5)** a) Draw the schematic of DRAM cell with necessary peripherals and explain read write cycles with the help of timing diagram. [8]
b) Explain memory organization in details. [8]

OR

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

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

OR

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

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

OR

- Q10)** a) What is Test access port? Explain TAP Controller with the help of state machine. [8]
b) With reference to BIST, explain the following terms [6]
• LFSR
• Scan chain for flip flop
c) Explain [4]
• Controllability
• Observability



Total No. of Questions : 8]

SEAT No. :

P3617

[Total No. of Pages : 2

[4959] - 1102
B.E. (Electronics)
Electronics System Design
(2012 Pattern) (End Sem.)

Time :2.30 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) How to increase the reliability of the system? Explain the different soldering techniques used in high reliability product. **[8]**
- b) List different ADC specifications and explain it. **[6]**
- 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) Explain one example of application of instrumentation amplifier. **[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

- Q4)** a) Explain the factors affecting on the choice of assembly language and high level language with example. **[8]**
- b) What are the features of assembler and cross compilers. **[8]**

P.T.O.

- 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 importance. [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) What is need of environmental testing? Explain different types of environmental testing. [8]
b) Write a notes on : [8]
i) Digital storage oscilloscope.
ii) Mixed single oscilloscopes.



Total No. of Questions : 8]

SEAT No. :

P3618

[Total No. of Pages : 2

[4959] - 1103
B.E. (Electronics)
Advanced Power Electronics
(2012 Course) (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).*
- 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 Single phase dual converter with relevant waveforms. [6]
- b) A single phase dual converter is operated from a 120 V, 60 Hz supply and load resistance is $R = 10 \Omega$. The circulating inductance is $L_r = 40$ mH, delay angles are $\alpha_1 = 60^\circ$ and $\alpha_2 = 120^\circ$. Calculate the peak circulating current and the peak current of converter 1. [7]
- c) Explain Pulse Width Modulation Control (PWM) techniques for single phase converters with suitable waveforms and equations. [7]

OR

- Q2)** a) Compare circulating and non circulating type of dual converter. [6]
- b) Explain EMI and line power quality problems of thyristor converter. [7]
- c) What is the concept of multi level inverter? Explain any one type of multi level inverter. [7]

- Q3)** a) Compare separately excited and series excited DC motor. [6]
- b) A DC drive system uses a full converter in armature circuit and second full converter in field circuit in the case of separately excited dc motor. Calculate percentage change in the speed of the motor, if armature converter delay angle is changed from 60° to 50° . Input supply voltage is 220 V, 60 Hz, armature resistance $R_a = 0.27 \Omega$ motor armature current is 15 A, motor voltage constant $K_b = 1.2$ V/A rad /sec. [6]
- c) Draw transfer function block diagram of DC motor. [4]

OR

P.T.O.

- Q4)** a) Explain and draw the curves of torque and power versus speed for separately excited dc motor. [6]
b) Explain with block diagram speed control of DC drive using microprocessor. [6]
c) Compare converter fed and chopper fed drive. [4]

- Q5)** a) Explain variable square wave VSI Drives along with block diagram and application. [8]
b) Explain various control techniques of speed control of induction motor along with suitable torque-speed characteristics (any two in detail) [10]

OR

- Q6)** a) Explain different types of braking of induction motor (Explain any Two). [8]
b) Explain Vector control technique and its types: Direct and Indirect vector control along with block diagram. [10]

- Q7)** a) Compare variable reluctance motor with permanent magnet stepper motor. [8]
b) Explain block diagram of volts/hertz control of synchronous motor drive along with the torque slip characteristics and the applications. [8]

OR

- Q8)** a) Explain the working principle of permanent magnet BLDC motor drive with constructional diagram. [8]
b) Explain the operation of a switched reluctance motor drive. [8]



Total No. of Questions : 10]

SEAT No. :

P4898

[Total No. of Pages : 2

[4959] - 1104

B.E. (Electronics)

IMAGE PROCESSING AND MACHINE VISION

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :-

- 1) *Answer Q1 or Q2, Q3 of Q4, Q5 of Q6, Q7 of 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 is connectivity between the pixels? Explain, following with reference to connectivity between the Pixels. **[6]**

- i) 4-Connectivity
- ii) 8-Connectivity
- iii) Mixed connectivity

b) Explain the following image enhancement methods. **[4]**

- i) Log Transformation
- ii) Power Law Transformation

OR

Q2) a) Compare following image transformation techniques. **[6]**

- i) DFT
- ii) DCT

b) Explain simultaneous contrast and brightness adaptation of an image in detail. **[4]**

Q3) a) What is Histogram equalization? Explain in detail. **[6]**

b) Explain in detail frequency domain smoothening and sharpening filters. **[4]**

OR

P.T.O.

- Q4)** a) Explain Haar Transform in detail. Where do you find the application of Haar Transform. [6]
b) Explain in detail Spatial Resolution and Gray level Resolution. [4]

- Q5)** a) Explain Laplacian and gradient operators for edge detection. Derive the mask for Laplacian edge detector. [8]
b) What is split and merge image segmentation technique? Explain in detail. [8]

OR

- Q6)** a) Explain Hough transform. Explain how it is used to determine the colinearity of points. [8]
b) Explain Edge linking and Boundary Detection by Local processing.[8]

- Q7)** a) Explain Run Length Coding. Derive RLC codes considering 4×4 binary image. [8]
b) With the help of block diagram, explain the process of lossless predictive encoding and decoding. [8]

OR

- Q8)** a) What is Redundancy? Explain different types of Redundancies in the image. [8]
b) Compare JPEG and MPEG standards of compression. [8]

- Q9)** a) Explain with block schematic Medical Imaging using Image Processing. Also write its algorithm. [10]
b) Explain the Image Degradation model with the help of block schematic. [8]

OR

- Q10)** a) What are the different features required for character recognition and finger print Recognition? Explain. [10]
b) How Image processing is used for Acoustic Imaging? Explain with the help of algorithm. [8]



Total No. of Questions : 10]

SEAT No. :

P3619

[Total No. of Pages : 2

[4959] - 1105
B.E. (Electronics Engineering)
Embedded Systems and RTOS (Elective - I)
(2012 Course) (Semester - I)

Time :2½ Hours]

[Max. Marks :70

Instructions to the candidates:-

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

Q1) a) Define the context Switching. What are the steps involved in $\mu\text{cos} - \text{II}$ context switching? **[5]**

b) Explain priority inversion problem and solution for the same. **[5]**

OR

Q2) a) Define embedded systems. Explain Different Categories of Embedded System application areas. **[5]**

b) Define & Explain interrupt, interrupt latency time, interrupt response time, and interrupt recovery time. **[5]**

Q3) a) Explain different stages of the embedded development process in waterfall model. **[5]**

b) Explain various processor technologies in design of embedded processors. **[5]**

OR

Q4) a) Explain & describe TCB data structure in $\mu\text{C}/\text{OS} - \text{II}$. **[5]**

b) Draw and explain the $\mu\text{cos} - \text{II}$ Architecture. **[5]**

Q5) a) What are $\mu\text{C}/\text{OS} - \text{II}$ event flag services? **[8]**

b) Explain the OS services functions of Semaphore management. **[8]**

P.T.O.

OR

- Q6)** a) Draw and explain the ECB of Mutex [8]
b) What is relationship between tasks, ISRs & a semaphore in μ C/OS-II?[8]

- Q7)** a) Draw & Explain the data structure of Memory control Block. [8]
b) Explain the message box and queue kernel objects for interprocess communication in μ cos – II [8]

OR

- Q8)** a) Explain steps involved in Porting μ cos – II [8]
b) Explain Memory management in μ cos – II RTOS [8]

- Q9)** a) Explain the steps to build a Linux system [8]
b) Explain the BIOS and the role of boot loader in embedded Linux [10]

OR

- Q10)** a) Explain the concept of loadable device driver for Linux kernel [8]
b) Explain the tools required to build a Linux system [10]



Total No. of Questions : 8]

SEAT No. :

P3620

[Total No. of Pages : 2

[4959] - 1106
B.E. (Electronics)
Biomedical Instrumentation
(2012 Pattern) (Elective - I(C))

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) *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) Discuss important factors to be considered in design of medical instrument. **[10]**
- b) Write type of electrodes for measurement of EEG, ECG, EMG & PCG. **[4]**
- c) Explain in detail the muscle contraction mechanism. **[6]**

OR

- Q2)** a) With equivalent circuit explain measurement of two biomedical potential. **[8]**
- b) Explain in detail the Einthoven triangle. **[6]**
- c) Write a short note on Electromyography. **[6]**

- Q3)** a) Classify pacemaker on the basis of pacing mode and explain in brief. **[8]**
- b) Discuss DC and AC Defibrillators while explaining the term defibrillation. **[8]**

OR

- Q4)** a) Explain computerized central patient monitoring system. **[8]**
- b) Give salient features of electromagnetic blood flow meter & explain it. **[8]**

- Q5)** a) Describe Conductivity method of electronic blood cell counting. **[8]**
- b) Write short note on electron microscope. **[8]**

P.T.O.

OR

Q6) a) P_{O_2} , P_{CO_2} , PH electrodes are to be used in blood gas analysis. Discuss the complete scheme. [8]

b) Discuss Various issue of noise pollution around hospital. [8]

Q7) a) What is Biotelemetry? Explain the objective & component of Biotelemetry system. [10]

b) Explain CT scanner along with its working principle. What are the advantages of CT scanner over conventional X ray? [8]

OR

Q8) a) Draw block diagram of MRI machine. Describe how MRI scanner work & give its advantages. [10]

b) Explain in detail the application of LASER in medical application. [8]



Total No. of Questions : 8]

SEAT No. :

P3621

[Total No. of Pages : 2

[4959] - 1107
B.E. (Electronics)
Advanced Measurement Systems
(Semester - I) (2012 Pattern) (Elective - I)

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 right indicate full marks.*
- 3) *Assume suitable data if necessary.*

- Q1)** a) State and explain electrical validation and debug with MSO Series Oscilloscope. [8]
- b) Draw & Explain the architecture and operation of Spectrum Analyzer. [6]
- c) What are the signal integrity testing challenges and possible solutions?[6]

OR

- Q2)** a) Draw the architecture and explain in detail logic analyzer. State applications. [6]
- b) What are the different interfacing techniques? Explain interfacing of graphic LCD display. [8]
- c) Explain embedded communication using CAN [6]
- Q3)** a) Draw & Explain direct reading barrater bridges. [8]
- b) Explain single line cavity coupling system for wavelength measurement.[8]

OR

- Q4)** a) Explain measurement of attenuation and free space attenuation. [8]
- b) Explain detection & measurement of microwave power. [8]
- Q5)** a) Explain test system development using virtual instrumentation. [8]
- b) Explain the application of TDM and PSK in instrumentation. [8]

OR

P.T.O.

- Q6)** a) Explain Lab View based Data acquisition system design. [8]
b) Explain fundamental test set up for advanced radar systems. [8]
- Q7)** a) Explain GSM Modem for AT Commands. [6]
b) Explain Analog Multiplexer in detail. [6]
c) Explain automation in digital instruments. [6]

OR

- Q8)** Write short note on any three [18]
a) Microwave Enclosures.
b) Sample and Hold.
c) Measurement of VSWR,
d) Universal Counter.



Total No. of Questions : 10]

SEAT No. :

P3622

[Total No. of Pages : 2

[4959] - 1108
B.E. (Electronics)
DSP Processors
(Semester - I) (Elective - II) (2012 Course)

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) *Figure to the right side indicates full marks.*
- 4) *Assume suitable data if necessary.*
- 5) *Use of logarithmic tables slide rule mollier charts, electronic pocket calculator and steam tables is allowed.*

- Q1)** a) Explain the various sources of error in DSP implementations. [6]
b) Discuss any four common architectural features implemented in Digital Signal Processors. [4]

OR

- Q2)** a) Discuss the important issues considered in implementing a DSP system [6]
b) Explain briefly selection criteria of DSP processors. [4]

- Q3)** a) What is the need of Barrel shifter in DSP architecture? Explain in detail. [6]
b) Explain the dynamic range and precision in context with DSP. [4]

OR

- Q4)** a) What is the use of pipelining in DSP? Explain in detail. [6]
b) What is meant by overflow in an arithmetic computation? How is an overflow condition detected? [4]

- Q5)** a) Explain the implementation of FIR filter in DSP system. [8]
b) Explain the Q-notations used in DSP algorithm implementation? State the difference between floating point and fixed point processing. Suggest suitable application for each fixed and floating point processing. [9]

P.T.O.

OR

- Q6)** a) Explain the 2-D signal processing operation used in DSP implementations. [8]
b) What is multirate digital signal processing? Suggest suitable application of the same. Explain interpolation and decimation filters briefly. [9]
- Q7)** a) Explain the following in context with FFT algorithm: [8]
i) Need of zero padding
ii) Overflow and Scaling
iii) Bit reversed index generation
b) Explain the implementation 8 point DIT FFT algorithm using signal flow graph and number of arithmetical computation involved. [9]

OR

- Q8)** a) What is difference between Fourier Series and Fourier Transform? Explain the computation of Signal spectrum using fourier transform. How will you increase the resolution of the spectrum? [8]
b) A time domain sequence of 15 elements is to be convolved with another time domain sequence of 10 elements using DFT – IDFT method. A radix 2 DIT FFT algorithm is used. Determine the total number of complex multiplications needed to implement the convolution. Assume that each butterfly computation requires one complex multiplication. [9]
- Q9)** a) What is DMA? How does DMA help in increasing the processing speed of a DSP Processor? [8]
b) What is the Hardware interrupt and Software Interrupt? Classify interrupts of TMS320C5416 processor [8]

OR

- Q10)** a) What is the role of CODEC in DSP. Explain McBSP in context with DSP processor? [8]
b) Explain the Memory Interfacing with suitable diagram? How many address lines are required to access all locations of an $16K \times 16$ SRAM. [8]



Total No. of Questions : 10]

SEAT No. :

P4942

[Total No. of Pages :3

[4959]-1109

B.E. (Elex) (Elective - II)
(b) : Robotics and Automation
(2012 Pattern)

Time : 2.½ Hours]

[Maximum 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) Define “Automation”. Draw and explain Automation pyramid. [5]

b) What are CNC Machines, Explain types of CNC machines [5]

OR

Q2) a) Draw and explain architecture of industrial automation systems. [5]

b) Write application of CNC machines. [5]

Q3) a) Write and explain “Three Rules (or Laws) of the Robotics”? [5]

b) How do we classify Robots. Explain any two [5]

OR

Q4) a) Describe Robot drive systems. Explain Hydraulic systems in detail. [5]

b) Explain: (Any two) [5]

i) Accuracy

ii) Repeatability

iii) Robotic Joints

P.T.O.

- Q5) a)** What are different types of grippers? Explain any three in detail. [8]
- b) Write note on (Any Four): [8]
- i) Pressure sensor
 - ii) Force sensor
 - iii) Proximity sensor
 - iv) LASER range finder
 - v) Tactile sensors
 - vi) Range sensor

OR

- Q6) a)** Draw and explain Slider crank mechanism based grippers. [6]
- b) What do you mean by Vision sensors. Draw and explain vision based Inspection systems. [6]
- c) What do you mean by homogeneous coordinate systems. [4]
- Q7) a)** What is Jacobian control ? Discuss the jacobian in terms of DH matrices. [8]
- b) What do you mean by trajectory planning? Explain types of motions used in it. [8]

OR

- Q8) a)** State and explain Newton-Euler dynamics of robots. Explain Newton-Euler formulations for manipulators. [8]
- b) Write notes on (Any two) [8]
- i) Solvability
 - ii) Stiffness
 - iii) Singularities

- Q9)** a) What are different types of Robotic controllers. Explain any two in detail. [8]
b) Draw and explain basic architecture of Fuzzy logic controller. [5]
c) Describe vision based object tracking robot. [5]

OR

- Q10)** a) Discuss advanced strategies for control of aerial vehicles. [8]
b) Write note on direction control of X4-flyer. [5]
c) What are different applications of neural networks in Robotics. [5]



Total No. of Questions : 08]

SEAT No. :

P3623

[Total No. of Pages : 2

[4959] - 1110
B.E. (Electronics)
Electronics in Agriculture
(2012 Pattern) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

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

- Q1)** a) Explain functional block diagram of computer control system for monitoring field parameters in detail. [8]
- b) Compare graphical programming with conventional programming. [8]
- c) Explain the role of virtual instrumentation in the field of Agriculture. [4]

OR

- Q2)** a) Explain in detail direct reading type conductivity meter to measure salt levels in plant roots with necessary diagram. [8]
- b) Compare graphical programming with conventional programming. [8]
- c) Explain the principle of Gas Analyzer based on gas density & ionization of gases. [4]

- Q3)** a) What are the various assisting services of FMIS to support the farmer's decision making? [6]
- b) Explain any two examples of advanced precision agriculture components. [6]
- c) Discuss what the farmers are considering about precision farming & what they want. [6]

OR

P.T.O.

- Q4)** a) Suggest precise & economical soil moisture measuring techniques and explain in detail. [6]
b) What approach is required to be adopted by the policy makers to promote precision farming at farm level. [6]
c) Write a note on Variable Rate Technology. [6]

- Q5)** a) Explain the requirements for the new greenhouse pesticide spraying system. [6]
b) Explain uses of remote sensing in agricultural and water management sector. [6]
c) Explain in brief : Dead Reckoning. [4]

OR

- Q6)** a) Explain the strategy of humidity control in Greenhouse & also state effects of humidity of plant's growth. [6]
b) What do you mean by site - specific spraying? [6]
c) Describe the role of Agricultural GIS system. [4]

- Q7)** a) Explain any two categories of services for better management & implementation of services to the needy farmers. [6]
b) What are the various drying processes for crop preservation? Explain any two in detail. [6]
c) Write a note on agricultural weather monitoring system. [4]

OR

- Q8)** a) Explain modeling & identification of manipulating variables for Greenhouses. [6]
b) Define Governance & state the major challenges in agricultural Governance. [6]
c) Enlist the types of Greenhouses based on shape, utility, construction & covering material. [4]



Total No. of Questions : 10]

SEAT No. :

P3624

[Total No. of Pages : 2

[4959] - 1111
B.E. (Electronics)
MOBILE COMMUNICATION
(2012 Pattern) (Elective - II)

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) *Use of logarithmic tables slide rule, Mollier charts, electronics pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data if necessary.*

Q1) a) With a neat diagram, explain the concept of frequency reuse. **[5]**

b) Describe three basic propagation mechanism. **[5]**

OR

Q2) a) List the factors influencing small scale fading. **[5]**

b) With neat diagram, describe the working of RAKE receiver. **[5]**

Q3) a) Explain in brief the working principles of different types of small scale fading. **[5]**

b) Discuss the details of practical hand off consideration. **[5]**

OR

Q4) a) Describe the evolution of mobile radio communications. **[5]**

b) Explain the techniques to improve the coverage and capacity of cellular system. **[5]**

Q5) a) Explain the following terms to describe characteristics of speech signal. **[10]**

- i) Probability density function.
- ii) Autocorrelation function.
- iii) Power spectral density function.

P.T.O.

- b) Classify and explain with diagram spread spectrum multiple access technique. [8]

OR

- Q6)** a) With neat block diagram explain function of each block of LPC coding system. [8]

- b) Explain packet radio access techniques using ALOHA protocol and compare I persistent, Non persistent and P - persistence CSMA technique. [10]

- Q7)** a) Explain SS7 signalling techniques. [8]

- b) Describe traffic routing algorithm in wireless network with a neat diagram. [8]

OR

- Q8)** a) Describe the network architecture of universal mobile Telecommunication system [8]

- b) Explain the block diagram of ISDN network. [8]

- Q9)** a) Discuss different types of channel in GSM system. [8]

- b) Describe with neat block diagram the architecture of IS - 95 CDMA system. [8]

OR

- Q10)** a) Explain step by step procedure of GSM call setup from mobile to PSTN. [8]

- b) Discuss forward and reverse channels of CDMA. [8]



Total No. of Questions : 08]

SEAT No. :

P3625

[Total No. of Pages : 2

[4959] - 1112
B.E. (Electronics)
Computer Network
(2012 Course) (Semester - II)

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.*
- 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 TCP/IP Reference Model [7]
b) Explain the architecture of 802.11 standard [6]
c) What is flow control? Explain the flow control in Data link layer [7]

OR

- Q2)** a) Explain with suitable diagram internet network [7]
b) What are the factors that affect the maximum data rate limit? Explain the Maximum data rate limit for noiseless and noisy channel [6]
c) Explain the behavior of three persistence methods in CSMA [7]

- Q3)** a) Explain the network layer Designing issues [6]
b) What is congestion control? What are the congestion control categories? Explain back pressure closed loop congestion control [6]
c) Compare IPV4 Vs IPV6 [4]

OR

- Q4)** a) Explain the distance vector routing algorithm [6]
b) What is traffic shaping? Explain leaky bucket algorithm [6]
c) Explain the Address Resolution Protocol [4]

P.T.O.

- Q5)** a) What is symmetric key cryptography? Explain the substitution cipher [6]
b) Explain the RSA algorithm [6]
c) key Compare Symmetric and Asymmetric key cryptography [4]

OR

- Q6)** a) Explain the Protocol Analyzer [6]
b) Explain the Data Encryption Standard with suitable diagram [6]
c) Explain the message confidentiality using asymmetric key cryptography [4]

- Q7)** a) Explain Electronic mail system [6]
b) Explain the architecture of world wide web (WWW) [6]
c) What are the main responsibilities of application layer? Explain in brief [4]

OR

Q8) Write a short notes

- a) HTML [6]
b) FTP [5]
c) P2P File sharing [5]



Total No. of Questions : 10]

SEAT No. :

P3626

[Total No. of Pages : 3

[4959] - 1113
B.E. (Electronics)
PROCESS AUTOMATION
(2012 Course) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No.6, Q. No. 7 or Q. No. 8, and Q. No. 9 or Q. No. 10.
- 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) Draw the following P&ID symbols. **[5]**

- i) Stand alone Instrument
- ii) Shared Display or control
- iii) Computer Function
- iv) Programmable Logic Controller(PLC)
- v) Orifice Plate

b) Explain Ziegler Nichol's tuning procedure. State the formulae for three mode Ziegler Nichol's settings. **[5]**

OR

Q2) a) State the equation for a Proportional Derivative (P+D) controller. Draw a circuit diagram for a Proportional Derivative (P+D) mode controller. **[5]**

b) Draw a neat sketch of control valve characteristics and explain the following terms. **[5]**

- i) Quick Opening
- ii) Linear
- iii) Equal Percentage

P.T.O.

- Q3) a)** Explain the following measures of control system quality. [4]
- i) Quarter Amplitude Criterion
 - ii) Minimum Area Criterion.
- b) A temperature control system inputs the controlled variable as a range from 0 to 4V. The output is a heater requiring 0 to 8V. A PID controller is to be used with $K_p = 2.4 \% / \%$, $K_i = 9\% / (\% - \text{min})$, $K_d = 0.7 \% / (\% / \text{min})$. The period of the fastest expected change is estimated to be 8 seconds. Develop the PID circuit. [6]

OR

- Q4) a)** Explain the following process characteristics. [4]
- i) Process Equation
 - ii) Process Load.
- b) A proportional derivative controller has a 0.4 to 2.0 V input measurement range, a 0 to 5V output, $K_p = 5\% / \%$ and $K_d = 0.08 \% \text{ per } (\% / \text{min})$. The period of the fastest expected signal change is 1.5 sec. Implement this controller with an op-amp circuit. [6]

- Q5) a)** Explain with neat diagram architecture of a PLC? Give important specifications of a PLC. [9]
- b) Develop the physical ladder diagram for a motor with the following. NO START button, NC STOP button, thermal overload limit switch opens on high temperature, green light when running, red light for thermal overload. [8]

OR

- Q6) a)** Explain the PLC operation with respect to [9]
- i) I/O scan mode
 - ii) Execution mode
 - iii) Scan time
- b) Develop physical ladder diagram for the tank system to satisfy following automation sequence. [8]
- i) Fill the tank
 - ii) Heat and stir the liquid for 30 minutes.
 - iii) Empty the tank
 - iv) Repeat from step

- Q7)** a) Explain with neat P&I diagram inferential control scheme for a distillation column. [9]
b) Explain with block diagram the concept of Adaptive Control. [8]

OR

- Q8)** a) Write a short note on Fuzzy Logic Control. [9]
b) Explain with block diagram the concept of Model Predictive Control. [8]

Q9) Write Short notes on

- a) Strip Chart recorder [8]
b) Direct Digital Control [8]

OR

- Q10)** a) Explain with suitable block diagram architecture of a typical Distributed Control System (DCS) [8]
b) State applications of SCADA. Explain the functions of RTU and MTU. [8]



Total No. of Questions : 10]

SEAT No. :

P4944

[Total No. of Pages : 2

[4959]-1114

B.E. (Electronics)

SPEECH AND AUDIO SIGNAL PROCESSING

(2012 Pattern) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) *Attempt Q1 OR Q2, Q3 OR Q4, Q5 OR Q6, Q7 OR Q8, Q9 OR Q10.*
- 2) *Right side figures indicate marks.*
- 4) *Assume suitable data.*

Q1) a) Explain anatomy and physiology of speech production systems. **[5]**

b) Explain LTI model of speech production systems. **[5]**

OR

Q2) a) Explain speech signal characteristics. Explain LTV model of speech production systems. **[5]**

b) What is homomorphic processing of speech signal? Explain its significance. How it is used for pitch detection? **[5]**

Q3) a) What is pitch? Explain how pitch and formant estimation is calculated?**[4]**

b) What is spectrogram? Explain significance of narrow band and broad band Spectrogram. **[6]**

OR

Q4) a) What is speech coding? How to evaluate speech quality? **[5]**

b) Explain any one speech coding techniques. **[5]**

P.T.O.

- Q5)** a) Explain basic principle of Linear Predictive Analysis. Explain autocorrelation method for formant analysis. [8]
- b) Explain the Covariance method for computing Linear Predictor Coefficients. [8]

OR

- Q6)** a) Explain covariance method for Linear Predictive Analysis. [8]
- b) Explain Durbin algorithm in LPC analysis. [8]

- Q7)** a) What are the nature of interfering signals? What is speech enhancement. What are the different types of speech enhancement techniques? [8]
- b) Explain spectral subtraction methods of speech enhancement. [8]

OR

- Q8)** a) Explain adaptive noise cancellation technique for speech enhancement. [8]
- b) Explain harmonic filtering and resynthesis of speech signal. [8]

- Q9)** a) Explain in detail automatic speech recognition system with suitable example (e.g. automatic telephone dialling system). [9]
- b) What is the difference between speaker identification and speaker verification? What are the features used for speaker recognition/verification system and how? [9]

OR

- Q10)** a) What is Dynamic Time Warping (DTW)? Explain with suitable example. [6]
- b) Write a short note on Hidden Markov Model (HMM) in speech processing. [6]
- c) Write a short note on Gaussian Mixture Model (GMM) in speech processing. [6]



Total No. of Questions : 8]

SEAT No. :

P3627

[Total No. of Pages : 2

[4959]-1115

B.E. (Electronics)

AUDIO & VIDEO ENGINEERING

(2012 Pattern) (Elective - III(b))

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

- Q1)** a) Define hue and saturation. Explain additive colour mixing technique. [7]
- b) Draw the generalized color TV receiver block diagram. Describe function of each block. [7]
- c) Define the terms and write their functions : [6]
- i) LNBC
 - ii) FEC
 - iii) Transponder

OR

- Q2)** a) Sketch channel bandwidth details and show locations of Y, C and sound carrier frequencies. Why a guard band is allowed at the higher end of channel width spectrum? [7]
- b) Why do we transmit a color burst in color TV transmission? With the help of suitable example, show that PAL receiver reduces the phase error. [7]
- c) Discuss composite and component video encoding in brief. [6]
- Q3)** a) What is IPTV? Explain its important features. [8]
- b) What is the basic principle of 3DTV? Discuss active and passive 3D.[8]

P.T.O.

OR

- Q4)** a) Discuss the objectives of H.264. Draw and discuss block schematic of H.264. [8]
b) Explain the concept of TV white spaces with suitable diagram. How will it help in 'Digital India Program'? [8]
- Q5)** a) Explain the concept of 'Reverberation' with suitable diagram. Write the equation for reverberation time. [8]
b) Define threshold of hearing. When each of two independent sources in the absence of the other, generates a sound pressure level of 65 dB at a certain point, calculate the resulting sound pressure level. [8]

OR

- Q6)** a) Draw and explain the block schematic of public Address system. Discuss its need. [8]
b) What is audio masking? Explain the different types of masking with neat diagrams. [8]
- Q7)** a) Draw a labelled block diagram of MP3 player. Discuss the compression technique in detail. [7]
b) Compare CD, DVD and Blu - Ray DVD on the basis of [7]
i) Wavelength of laser used.
ii) Storage capacity
iii) Variants & formats of these discs.
c) Discuss Dolby digital sound systems. [4]

OR

- Q8)** a) Explain any, one ITU - G audio compression technique. [7]
b) What are the different sound recording techniques? Give example of each technique. [7]
c) State the advantages and disadvantages of optical recording technique. [4]



Total No. of Questions : 8]

SEAT No. :

P3528

[4959]-1116

[Total No. of Pages :3

B.E.(Electronics)

OPTICAL AND MICROWAVE COMMUNICATION
(2012 Course) (Elective-III) (404211)(Semester-II)(End Sem)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) Define fiber splicing. Explain different types of splicing. [7]
- b) Explain 2× 2 fiber coupler with performance parameters. [7]
- c) State and explain the desirable properties of a source for optical fiber communication links. [6]

OR

- Q2)** a) Explain the construction and working of Silicon reach-through Avalanche Photodiode. [7]
- b) A laboratory demonstration setup has a continuous 12km long optical fiber link that has a loss of 1.5dB/km. [7]
- i) Compute the minimum optical power level in dB that must be launched into fiber to maintain an optical power level of 0.3 W at the receiving end.
 - ii) Calculate the required input power in dB if the fiber has a loss of 2.5dB/km.
- c) Explain the applications of Fiber Bragg Gratings for multiplexing and demultiplexing function. [6]

P.T.O.

- Q3) a)** Explain the following waveguide parameters. **[10]**
- i) Cutoff wavelength
 - ii) Guide wavelength
 - iii) Phase velocity
 - iv) Wave impedance
 - v) Dominant mode
- b) Determine the scattering parameters S_{41} , S_{31} , S_{11} and S_{21} for a 10dB directional coupler having directivity 30dB. Assume that it is lossless and VSWR at each port is 1 under matched conditions. Designate port 1 as input port, port 2 as output port, port 3 as back port and port 4 as coupled port. **[8]**

OR

- Q4) a)** Explain the construction and working of isolator based on Faraday's rotation principle. **[8]**
- b) Determine the S matrix of a 3port circulator with insertion loss of 0.5 dB, isolation of 20dB and VSWR of 2. **[6]**
- c) State and explain the applications of Magic tee. **[4]**
- Q5) a)** Explain the need of slow wave structure in TWT. Draw schematic structure of TWT and explain its working. **[8]**
- b) Explain the construction and working of cavity magnetron. **[8]**

OR

- Q6) a)** What are the limitations of conventional tubes at microwave frequencies? **[8]**
- b) Draw schematic structure of reflex klystron. Explain its working with the help of apple gate diagram. **[8]**

- Q7)** a) Explain power frequency limitations of microwave BJT. [8]
b) Draw and explain the construction of a microwave BJT. Also explain different types of surface geometries used in it. [8]

OR

Q8) Explain the following microwave solid state devices: [16]

- a) PIN diode
- b) Tunnel diode
- c) Varactor diode
- d) Gunn diode



Total No. of Questions : 8]

SEAT No. :

P3628

[4959]-1117

[Total No. of Pages : 3

**B.E.(Electronics)
SOFT COMPUTING**

(2012 Pattern)(End Sem) (Semester-II)(404211D)(Elective-III)

Time :2½Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Answer Q 1 or Q 2, Q 3 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 logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) State the perceptron learning rule. Also explain its limitation and solution for the same. **[8]**

b) Explain the architecture of Radial Basis Function network and explain the learning mechanism. How are the clusters determined? **[6]**

c) Define the terms for a fuzzy set: **[6]**

- i) Normality
- ii) Convexity
- iii) Symmetry

Q2) a) State and explain the popular topologies of neural networks. **[8]**

b) Explain backpropagation algorithm for MLP with a neat signal flow graph. **[6]**

c) Consider two fuzzy sets A and B compute Union, Intersection, Difference for these sets. **[6]**

$$A = \left\{ \frac{0.8}{2}, \frac{0.4}{3}, \frac{0.6}{4}, \frac{0.1}{5}, \frac{0.3}{6} \right\}$$

$$B = \left\{ \frac{0.3}{2}, \frac{0.8}{3}, \frac{0.6}{4}, \frac{0.8}{5}, \frac{0.2}{6} \right\}$$

P.T.O.

Q3) a) Explain the terms: [8]

- i) Premise(Antecedent)
- ii) Consequence(consequence)
- iii) FAM
- iv) Rule-Base

b) Enlist the implication rules used in FIS and explain them in brief. [8]

Q4) a) Consider fuzzy relations: [8]

$$R = \begin{matrix} & y_1 & y_2 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \begin{bmatrix} 0.7 & 0.6 \\ 0.8 & 0.3 \end{bmatrix} \end{matrix}, S = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \begin{bmatrix} 0.8 & 0.5 & 0.4 \\ 0.1 & 0.6 & 0.7 \end{bmatrix} \end{matrix}$$

Find the relation $T = R \circ S$ using max-min and max-product composition.

b) Explain the Tsukamoto fuzzy model used in FIS with a suitable example. [8]

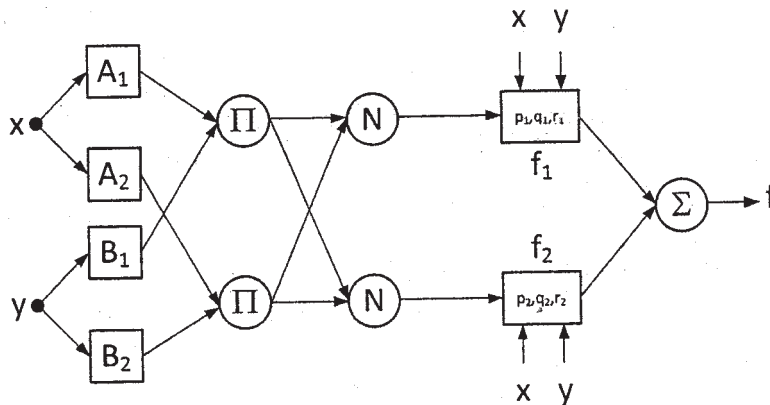
Q5) a) What are the advantages of FLC over conventional PID controller? [8]

b) Enlist the steps in designing a simple fuzzy control system. [8]

Q6) a) Describe the architecture of Mamdani type FLC with a suitable example. [8]

b) Enlist the applications where FLC may be preferred over that of conventional PID controller. [8]

- Q7) a)** Compute the output f for the ANFIS network shown in figure. Assume A_1, A_2, B_1, B_2 as gbell membership functions: **[10]**



Given: $x = 25, y = 30$

Premise parameters			
A_1	$a = 50$	$b = 3$	$c = 0$
A_2	$a = 50$	$b = 3$	$c = 100$
B_1	$a = 50$	$b = 3$	$c = 0$
B_2	$a = 50$	$b = 3$	$c = 100$
Consequent parameters			
f_1	$p_1 = 0.5$	$q_1 = 1$	$r_1 = 0.2$
f_2	$p_2 = 0.8$	$q_2 = 0.7$	$r_2 = 0.5$

- b) Explain in details the Hybrid learning in ANFIS. **[8]**

- Q8) a)** Explain the Architecture of ANFIS. **[10]**

- b) What are the advantages and limitations of ANFIS? **[8]**



Total No. of Questions : 8]

SEAT No. :

P3629

[4959]-1118

[Total No. of Pages : 2

B.E. (Electronics)

BIOMEDICAL SIGNAL PROCESSING

(2012 Pattern) (End Sem.) (Revised)

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 Pan Tomkins algorithm for QRS detection in an acquired ECG signal. **[8]**
- b) Explain the electro conduction system of heart. **[6]**
- c) Draw the structure of a nerve cell and explain synapses. **[6]**

OR

- Q2)** a) Explain Einthoven's triangle? Explain its significance with help of neat sketch. **[8]**
- b) Explain Pan Tomkins algorithm for QRS detection in an acquired ECG signal. **[6]**
- c) Draw the structure of a nerve cell and explain synapses. **[6]**
- Q3)** a) Draw & explain structure of brain. **[8]**
- b) Explain EEG rhythms & waveform. Also explain categorization of EEG activity & its recording techniques. **[8]**

OR

P.T.O.

- Q4)** a) Explain Low Pass and High Pass Integer Filters with their basic design concept in detail. [8]
b) Draw and explain the block diagram for Brain computer interface. [8]

- Q5)** a) Explain how Fourier Transform in EEG Signal Analysis. [8]
b) Explain Adaptive Filters with its basic concept. Also explain principle noise cancellation model of the same. [8]

OR

- Q6)** a) State the Weiner Hopf equation. Explain the with equations the least mean square approach to find the filter coefficients. [8]
b) Explain the concept of Low pass filtering and high pass filtering with respect to biosignals. [8]

- Q7)** a) Explain QRS detection using Multivariate analysis method ICA. [10]
b) Explain how FIR or IIR filters are used specifically for event detection in ECG. [8]

OR

- Q8)** a) State the difference between stationary and non-stationary signals. Support the answer with relevant application to biomedical domain. [10]
b) State the PCA algorithm and its significance. [8]



Total No. of Questions : 8]

SEAT No. :

P3630

[4959]-1119

[Total No. of Pages : 2

B.E. (Electronics)

b-NANO ELECTRONICS AND MEMS

(2012 Course End Sem.) (Elective-IV) (Semester-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 indicates full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain fundamental science behind Nano technology. [7]
b) Differentiate between nanoscale material and macroscale material. [7]
c) Explain applications of Nanoelectronics as a sensor material with suitable example. [6]

OR

- Q2)** a) Justify nanotechnology will change the world. [7]
b) Write electrical and mechanical properties of CNTs. [7]
c) Explain biomedical applications of Nanoelectronics. [6]

- Q3)** a) What are scaling laws of miniaturization? Explain with example scaling law in geometry of a MEMS Device. [9]
b) Explain in detail wet etching process in MEMS fabrication. [9]

OR

- Q4)** a) Write general desirable characteristics of MEMS. [9]
b) Explain following micro machining technique with neat diagram [9]
i) Sputtering.

P.T.O.

- Q5)** a) Explain concept of sliding mode control. [8]
b) What are different material which are used in MEMS. [8]

OR

- Q6)** a) Justify “Silicon-an ideal substrate material for MEMS”. [8]
b) Compare GaAs Vs silicon. [8]

- Q7)** a) What are the benifits of MEMS in medical applications. [8]
b) Write a short note on chemical sensors. [8]

OR

- Q8)** a) What are the applications of a portable blood analyzer? Explain it in brief. [8]
b) Write a short note on gyroscope. [8]



Total No. of Questions : 10]

SEAT No. :

P4943

[Total No. of Pages :2

[4959]-1120

B.E. (Electronics)

C : SYSTEMS ON CHIP

(2012 Pattern) (Semester - II)

Time : 2.30 Hours]

[Maximum 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) *Draw neat diagrams.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) How to avoid data loss using FIFO? What are its limitations? [6]
- b) Which factors acted as barriers to the use of the Microsystems technology? [4]

OR

- Q2)** a) Explain in the TRIMEDIA processor specifications and performance metrics. [6]
- b) Why latches should be avoided in design? What is good practice to avoid latches? [4]

OR

- Q3)** a) What do you mean by loop folding? Explain it in context with constraint propagation and interval analysis. [6]
- b) Why at RTL stage, it is very difficult to know the actual delays? [4]
- Q4)** a) Explain with example constraint propagation. [6]
- b) What is the reason of this pre and post synthesis simulation mismatch?[4]

P.T.O.

- Q5)** a) Which factors plays important role while developing mathematical model for analysis of MEMS? [8]
- b) Explain Structured Design Methods for MEMS? [8]

OR

- Q6)** a) What do you mean by scaling in electromagnetic force? Justify: electromagnetic force is $F \propto l^4$. [8]
- b) Compare GaAs Vs Silicon. [8]

- Q7)** a) Explain pros and cons of behavioral synthesis. [8]
- b) Explain abstraction levels in contact to synthesis tool. [8]

OR

- Q8)** a) Compare of bulk-and surface-micromachining processes for MEMS fabrication. [8]
- b) What are wet-etch selection and development principles? [8]

- Q9)** a) Explain the terms- [9]
- i) Defects and fault method
- ii) Fault simulation
- b) What are the issues in testing of core based systems on chip? [9]

OR

- Q10)**a) Explain features of co-design tool with an example. [9]
- b) What are the requirements of packaging? Which materials are used at this stage? [9]



Total No. of Questions :10]

SEAT No. :

[Total No. of Pages : 2

P3631

[4959]-1120 A

**B.E. (Electronics)
d-MECHATRONICS**

(2012 Course) (Elective - IV) (Semester-II) (404212)

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) List the phases in mechatronics design process. Explain with neat diagram. **[6]**

b) Explain functions of mechatronics system. **[4]**

OR

Q2) Write short note on (Any Two): **[10]**

- a) Brakes.
- b) Autonomous mechatronics system.
- c) Network mechatronics system.

Q3) a) Explain V-model of designing of self optimizing system. **[6]**

b) Differentiate design fetch at system level and module level. **[4]**

OR

Q4) a) Design mobile robot with neat diagram. **[6]**

b) Explain key elements of control mechatronics system. **[4]**

Q5) a) Explain in detail TIA / EIA serial interface standards. **[10]**

b) Write a short note on UART with neat diagram. **[8]**

OR

P.T.O.

Q6) Write short note on following (Any Three): **[18]**

- a) Unbalanced Vs Balanced transmission.
- b) Point to point Vs. multipoint communication system.
- c) Asynchronous serial data format.
- d) Simplex, Half Duplex & full duplex.

Q7) a) Explain in detail functional requirement of data logger. **[10]**

- b) What are the software options available in data logging system. Explain. **[6]**

OR

Q8) a) Explain case study of any one application of data logging system in mechatronics. **[10]**

- b) Write a short note on: **[6]**
 - i) Online analysis.
 - ii) Offline analysis.

Q9) a) Explain in detail X-ray based fabrication of MEMS. **[10]**

- b) What are the mechanical properties of MEMS. **[6]**

OR

Q10) Write short note on (Any Two): **[16]**

- a) Inertial sensors (MEMS).
- b) Micromachine pressure sensors.
- c) Microscale Vacuum Pumps.



Total No. of Questions :10]

SEAT No. :

P3632

[4959]-1121

[Total No. of Pages :2

B.E. (Information Technology)
INFORMATION AND CYBER SECURITY
(2012 Pattern) (End-Sem.) (Semester -I) (414453)

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) Explain the following terms with example. **[5]**
Confusion and diffusion
- b) State the Euclids algorithm with example. **[5]**

OR

- Q2)** a) Draw block diagram of SHA-1 and state the general step in the process. **[5]**
- b) State and prove Fermat's theorem. **[5]**

- Q3)** a) What is Needham Schroeder protocol? Explain with sequence diagram. **[5]**
- b) Explain one way and mutual authentication. **[5]**

OR

- Q4)** a) What is mean by modular arithmetic and exponentiation? **[5]**
- b) What are the possible attacks on DES? **[5]**

P.T.O.

- Q5)** a) Explain SSL hand shake and SSL Record protocol in detail with neat sketch. [8]
- b) Differences between. [8]
- i) HIDS and NIDS.
- ii) IDS and IPS.

OR

- Q6)** a) List the benefits of IPSec. Distinguish between tunnel and transport mode in IPSec [8]
- b) What is the purpose of the SSL record layer protocol and handshake protocol? [8]
- Q7)** a) Describe the Indian and global legal perspective on cyber crime. [8]
- b) Explain the types of cyber crime in detail. [8]

OR

- Q8)** a) What is Cyber stalking? Types of stalkers (online and offline). [8]
- b) Explain what are the different attacks launched with attack vector. [8]

- Q9)** a) What is the difference between proxy servers and an anonymizers? [8]
- b) Explain phishing and password cracking. [10]

OR

- Q10)** Write short note on following. [18]
- a) Key loggers and Spywares.
- b) Indian IT Act and its challenges.
- c) SQL Injection and Digital signatures.



Total No. of Questions :10]

SEAT No. :

P3633

[4959]-1122

[Total No. of Pages :3

B.E. IT

**Software Modeling & Design
(2012 Course) (Semester -I)**

Time : 2 Hours 30 minutes

[Max. Marks :70]

Instructions to candidates:

- 1) *Solve Q1 or Q2 Q3 or Q4 Q5 or Q6 Q7 or Q8 Q9 or Q10.*
- 2) *Use UML2.0 notations to draw the UML diagrams*

- Q1) a)** With the context of class diagram show a qualified association and composition relationship with the help of one example each. **[6]**
- b) With the context of state diagram, Define simple state, entry, do and exit. **[4]**

OR

- Q2) a)** A project has three to five students. A project has a guide a guide can guide one to three projects. For this description draw a class diagram. From the class diagram draw an object diagram to show two projects, seven students and one guide. Do not write any explanation, just draw the diagrams. **[6]**
- b) Diagrammatically show generalization, include and extend relationship in the context of a use case diagram. **[4]**
- Q3) a)** A Draw an activity diagram for a Passport Management System To get a new passport, an applicant has to apply on-line, get the appointment. He has to submit the documents in passport office on the date of appointment. In case of insufficient or incorrect documents, the applicant's has to reapply and get new appointment After submission of documents, applicant's verification is done by the police. On successful verification , passport is issued to the applicant. If verification is unsuccessful, applicant has to reapply for passport. **[6]**
- b) In the context of squence diagram, what is an entity and a controller class? **[4]**

OR

P.T.O.

Q4) a) What is a shallow history state? Elaborate with an example of a display screen of a desktop. [6]

b) State the steps of preparing application interaction model. [4]

Q5) a) Write a note on Making a Reuse Plan from the context of system design. [8]

b) Which are the boundary conditions & how they are handled. [8]

OR

Q6) a) Describe one way of breaking a system into subsystems. [8]

b) Describe allocation of subsystems in System Design. [8]

Q7) a) Write the classification, motivation, class diagram and uses of adapter design pattern. [8]

b) Write the classification, motivation class, diagram and uses of observer design pattern. [8]

OR

Q8) a) Write the classification, motivation, class diagram and uses of strategy design pattern. [8]

b) Write the classification, motivation, class diagram and uses of state design pattern. [8]

Q9) a) Draw a flow chart of test driven development. [8]

b) Features of printer are to be tested & its specification is as follows [10]

It prints the document in black & white, colour. It has an on/off button. It accepts A4 paper one at a time for printing. It has two LED lights. Green light shows normal printing operating & red light show problem with printing it has two cables, one is power cable and other is data cable which is connected to the CPU. Write at least five test cases to check that the Printer machine works properly.

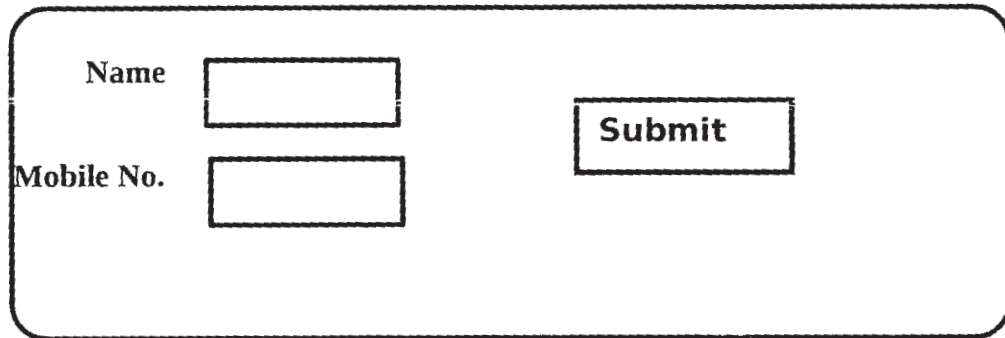
OR

Q10)a) Differentiate Black box testing and white box testing on the basis of definition, levels of testing, basis for test cases responsibility of testing.

[8]

b) Write at least five test cases for following screen.

[10]



The image shows a rectangular form with rounded corners. On the left side, there are two labels: "Name" and "Mobile No.". To the right of "Name" is a rectangular input field. To the right of "Mobile No." is another rectangular input field. On the right side of the form, there is a rectangular button labeled "Submit".



Total No. of Questions :10]

SEAT No. :

P3634

[4959]-1123

[Total No. of Pages :2

B.E. (IT)

Machine Learning

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

Time : 2.5 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 least square method. **[5]**
- b) For a given data having 100 examples, if squared errors SE_1 , SE_2 , and SE_3 are 13.33, 3.33 and 4.00 respectively, calculate Mean Squared Error (MSE). State the formula for MSE. **[5]**

OR

- Q2)** a) What is multivariate regression? How will it be different from univariate regression? **[5]**
- b) Explain feature transformation. **[5]**
- Q3)** a) Explain True Positives, True Negatives False Positives, False Negatives and class ratio. **[5]**
- b) What is a contingency table? What does it represent? **[5]**

OR

- Q4)** a) Write a note on class probability estimation. **[5]**
- b) What are the ingredients of machine learning? **[5]**

P.T.O.

- Q5)** a) What is subgroup discovery? [9]
b) Write k-means algorithm. [9]

OR

- Q6)** a) Write the Grow Tree algorithm to generate feature tree. Explain the role of best split in this algorithm. [9]
b) What are neighbors? Why is it necessary to use nearest neighbor while classifying? [9]

- Q7)** a) Define. [8]
i) Bernoulli's distribution.
ii) Binomial distribution.
iii) MAP decision rule.
iv) Maximum likelihood function.
b) Explain probabilistic models. [8]

OR

- Q8)** a) Explain in brief logistic regression. [8]
b) Define. [8]
i) Frequent itemset.
ii) Support.
iii) Confidence.
iv) Market basket analysis.

- Q9)** a) Write a note on sequence prediction [8]
b) Explain multitask learning. [8]

OR

- Q10)** a) Explain deep learning. [8]
b) Explain active learning. [8]



Total No. of Questions :8]

SEAT No. :

[Total No. of Pages :2

P3635

[4959] - 1124

B.E. (I.T.)

SOFT COMPUTING

(Semester - I) (414456 A) (Elective - I) (2012 Course)

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) What is Boltzman machine? With neat sketch explain its architecture. **[8]**
b) What are the issues related to representation of knowledge? **[6]**
c) List out the strength and weaknesses of Back Propagation algorithm. **[6]**

OR

- Q2)** a) Explain in brief architecture of multilayer feed - forward neural network. **[8]**
b) What is difference between behavior of intelligent system and knowledge based system? **[6]**
c) What is vigilance parameters in ART network? **[6]**

- Q3)** a) What is Extension Principle for fuzzy arithmetic? Perform following operations. **[9]**
i) Multiplication
ii) Division
b) Define and explain classical relations and fuzzy relations. **[8]**

OR

P.T.O.

- Q4)** a) List and explain methods employed for membership value assignment. **[8]**
b) With suitable block diagram, explain construction and working of fuzzy inference system? **[9]**

- Q5)** a) What is difference between genetic algorithm and genetic programming? **[8]**
b) With the neat flowchart explain operation of simple genetic algorithms. **[9]**

OR

- Q6)** a) Is it advisable to apply genetic algorithm for all kinds of optimization problems? Justify. **[8]**
b) What are types of crossover and mutation techniques? **[9]**

- Q7)** a) Describe an application how soft computing can be used in mobile ad-hoc networks. **[8]**
b) Mention the application areas of neuro-fuzzy hybrid soft computing approach. **[8]**

OR

- Q8)** a) Describe an application how soft computing can be used in information retrieval. **[8]**
b) Describe an application of evolutionary computing in image processing. **[8]**



Total No. of Questions :10]

SEAT No. :

P3636

[Total No. of Pages :2

[4959] - 1125

B.E. (Information Technology)

b - USABILITY ENGINEERING

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

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

- Q1)** a) List & explain Disciplines contributing to HCI. [4]
b) How we can minimize user memory load in usability process. Explain in detail. [6]

OR

- Q2)** a) Why we require Short cut keys in user interface. [4]
b) List and explain with example various stages of information design. [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) User Interface design is an important part of usability. Justify the statement with example. [4]
b) What are various criteria's and attributes of system acceptability? [6]

P.T.O.

- Q5)** a) User feedback technique is an integral part of usability evaluation. Explain. Also list criteria's for user feedback techniques. [8]
b) Explain in detail about Focus Group. [10]

OR

- Q6)** a) List various usability inspection methods and explain cognitive walkthrough technique. [8]
b) What is the importance of test goals and test plans in usability testing?[10]

- Q7)** a) Explain Categories of ICON [8]
b) Explain Guidelines for Internationalization. [8]

OR

- Q8)** a) List out various usability standards and explain any three of it. [8]
b) How interactive tutorials are useful to understand user interface? [8]

- Q9)** a) Explain the roles and responsibilities of User & Usability engineer. [8]
b) Write a short note on (Any 2) [8]
i) GOMS Model
ii) Emerging paradigms of user interaction systems
iii) Web analytics

OR

- Q10)**a) Explain simulation & Virtual reality concept with example. [8]
b) Write a short note on (Any 2) [8]
i) Emerging paradigms of user collaborative systems.
ii) Usability issues in organization.
iii) Intelligent user interfaces.



Total No. of Questions :8]

SEAT No. :

P3637

[Total No. of Pages :3

[4959] - 1126

B.E. (Information Technology)

C - MODERN COMPILERS

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

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

- Q1)** a) Explain with a neat diagram the two layers of abstraction with respect to Tiger compiler. **[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) What is incremental garbage collection? Explain Baker's algorithm and comment on its cost of collection. **[8]**

OR

P.T.O.

- 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;
}
```

- b) Define canonical trees. Describe any two identities for transformation on ESEQ. [6]
- c) Explain copying garbage collection with a neat diagram. Write Cheney’s algorithm and comment on its cost. [8]

- Q3) a)** What are the facilities for testing class membership in Java? Explain type coercions and type cases in brief. [6]
- b) What is Closure? How it can be implemented using Heap-allocation? [6]
- c) What is meant by private field in programming language? What are various ways to support it in programming language? [6]

OR

- Q4) a)** Define inline expansion. Explain the rules for inline expansion. [6]
- b) Explain different techniques for optimization of lazy functional programming. [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 program summary graph. Draw program summary 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) Explain incremental dataflow analysis. **[8]**

OR

- Q8) a)** Explain transformations using dataflow analysis using suitable examples. **[8]**

- b) What is reaching definitions? Write in and out definitions for reaching definitions. **[8]**



Total No. of Questions :10]

SEAT No. :

P3638

[Total No. of Pages :3

[4959] - 1127

B.E. (Information Technology)

d: PARALLEL ALGORITHMS AND DESIGN

(Semester - I) (2012 Course) (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, Q9 or 10.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data wherever necessary.*
- 4) *Neat diagrams must be drawn wherever necessary.*

- Q1)** a) What is the difference between data-parallel computation and task-parallel computation? What is parallel efficiency? **[4]**
- b) Consider the example of parallelizing bubble sort. Explain the performance analysis in serial and parallel versions. **[6]**

OR

- Q2)** a) Describe pyramid network processor organization for parallel computers. **[5]**
- b) Write an algorithm to find minimum in parallel model using either CRCW or CREW model. **[5]**

- Q3)** a) Explain the term bitonic sorter, Bitonic sequence and half cleaner. **[6]**
- b) What do you mean by cost optimality? What is cost of parallel algorithm? Explain time optimality. **[4]**

OR

P.T.O.

Q4) a) Explain the Depth first search with suitable example. [4]

b) What do you mean by overhead function or total overhead of a parallel system, how does this effect on the performance of the parallel algorithms? [6]

Q5) a) Explain MESH Transpose. Write algorithm for same. [8]

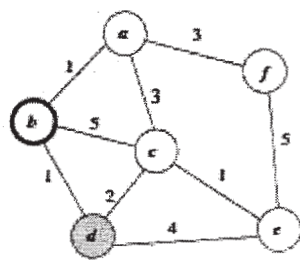
b) Explain Conjugate Gradient Method-Sequential Algorithm. [8]

OR

Q6) a) Explain eigen values. State suitable example and derive algorithm for finding eigen values. [8]

b) Analyse Cube connected Transpose. Check algorithm for optimality.[8]

Q7) a) What is MST? Solve Given problem Using Prims algorithm of parallel computing. [10]



b) Define BFS. Write an algorithm for BFS in parallel computing. [8]

OR

Q8) a) Define DFS. Write an algorithm of DFS in parallel computing. [8]

b) Give the visited node order for each type of graph search, starting with s, given the following adjacency. [10]

$\text{adj}(s) = [a, c, d]$

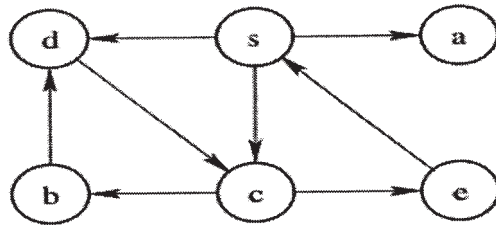
$\text{adj}(a) = []$,

$\text{adj}(c) = [e, b]$,

$\text{adj}(b) = [d]$,

$\text{adj}(d) = [c]$,

$\text{adj}(e) = [s]$.



Q9) a) Explain linear and non-linear pipelines stages in parallel computing? [8]

b) Explain the algebraic method in synthesis of parallel algorithm. [8]

OR

Q10) a) Explain the knapsack problem with branch and bound algorithm? [8]

b) Describe map reduce computation in homomorphism? [8]



Total No. of Questions :10]

SEAT No. :

P3639

[Total No. of Pages :2

[4959] - 1128

B.E. (I.T.)

e: CLOUD COMPUTING

(Semester - I) (2012 Course) (Elective - I)(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 10.*
- 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) Define cloud computing? Explain essential characteristics of cloud computing? [4]
- b) Explain benefits of IaaS. [4]

OR

- Q2)** a) Explain the cloud deployment model. [4]
- b) Write short note on SaaS. [4]

- Q3)** a) State and describe life cycle of SLA. [6]
- b) What is virtualization? Explain different types of virtualization. [6]

OR

- Q4)** a) State and explain different phases of SLA management of applications hosted on cloud platform. [6]
- b) Write short note on KVM. [6]

P.T.O.

- Q5)** a) Discuss two ways of determining Trust. [8]
b) Describe issues related to the run time interaction between DomO and DomU. [8]

OR

- Q6)** a) Discuss the undesirable effects of virtualization. [8]
b) Discuss mandatory OS security elements. [8]

- Q7)** a) Explain Google App Engine with diagram. [10]
b) Write short note on cloud implementation and application. [8]

OR

- Q8)** a) Explain the services offered by Amazon S3. [10]
b) Explain the open source cloud 'open Nebulla'. [8]

- Q9)** a) Describe methods to acquire user input related to Human Centred Design (HCD). [8]
b) Enlist and explain benefits of using wireless networks for UbiCom. [8]

OR

- Q10)**a) Describe challenges in modeling contex. [8]
b) Write short note on Ubiquitous System Challenge and outlook. [8]



Total No. of Questions : 10]

SEAT No. :

P3640

[4959]-1129

[Total No. of Pages : 2

B.E. (Information Technology)

BUSINESS INTELLIGENCE

(2012 Course) (414457A) (Semester - I) (End - Sem.) (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 indicate full marks.*
- 4) *Assume suitable data is necessary.*

Q1) a) What are the various Design and implementation issues of OLTP? [6]

b) Explain any two OLAP operations with the help of examples. [4]

OR

Q2) a) Define Business Intelligence and Explain BI components in detail. [6]

b) Write a short note on the role of data warehouse in Business Intelligence. [4]

Q3) a) Write a short note on multi-valued dimension and dimension attributes. [4]

b) Write short note on:

i) Star Schema

ii) Snowflake Scheme

iii) Fact Constellation Scheme [6]

OR

Q4) a) Describe the three steps of ETL process. [6]

b) What is meant by loading in ETL? Explain incremental loading and full loading. [4]

P.T.O.

- Q5)** a) How does the metadata layer, presentation layer, and Data layer support the Reporting architecture of Data warehouse? [8]
b) What is Materialized view? Explain with example. What are the advantages of it? [8]

OR

- Q6)** a) Write short note on (any 2) [8]
i) Dashboards as Reporting tool
ii) Adhoc Reporting
iii) OLAP Servers
b) What is data aggregation? Explain with the help of example. [8]

- Q7)** a) Explain linear and non-linear regression with examples. [8]
b) Compare and contrast In-DB and In-memory analytics. How google analytics works? [8]

OR

- Q8)** a) Define Data visualization and list its major advantages. List in brief different directions in data visualization. [8]
b) What is decision tree? How is it used for business Analytics? Describe in brief. [8]

- Q9)** Write short notes on any 3 of following: [18]
a) Spotfire
b) Log based change data capture
c) Latency with respect to Real time BI.
d) MyReport

OR

- Q10)**a) What is agile Business intelligence? How does it support and enhance business operations. [8]
b) Explain Cloud Business Intelligence Architecture with the help of neat diagram. [10]

x x x

Total No. of Questions : 10]

SEAT No. :

P3641

[4959]-1130

[Total No. of Pages : 2

B.E. (Information Technology)
SERVICE ORIENTED ARCHITECTURE
(2012 Course) (414457) (Semester - I) (End Semester) (Elective - II) (Theory)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) *Answer Question 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to right indicate full marks.*

- Q1)** a) Explain any 4 common mis perception about SOA. **[4]**
- b) Focusing on application logic, technology, security and administration compare SOA with 2-tier client server architecture. **[6]**

OR

- Q2)** a) Explain SOAP messaging format in detail. **[6]**
- b) Explain the organization of service description document. **[4]**

- Q3)** a) Explain correlation with respect to web service and contemporary SOA. **[5]**
- b) Explain WS metadata exchange specification. **[5]**

OR

- Q4)** a) Explain WS eventing frame work. **[5]**
- b) What is service reusability and service contract? Explain how service reusability interrelates with other service oriented principles. **[5]**

P.T.O.

- Q5)** a) Explain the basic phases of SOA delivery life cycle. [8]
b) What are the benefits of business centric SOA? [4]
c) Differentiate between task centric and entity centric business services. [4]

OR

- Q6)** a) Explain in brief the steps involved in service modeling process. [8]
b) Explain set of guidelines for service modeling. [8]

- Q7)** a) What are overall goals of performing a service oriented design. Explain the steps for service oriented design process. [8]
b) Discuss SOAP language basics. [8]

OR

- Q8)** a) What is meant by service oriented design? Discuss the WSDL language basics. [6]
b) Explain the steps for composing SOA. [10]

- Q9)** a) Distinguish between application business service design and task centric business service design. [6]
b) Explain the steps required to create WS-BPEL process definition. [8]
c) Explain the mapping between SOA and cloud computing. [4]

OR

- Q10)** a) Explain WS - BPEL process definition structure. [6]
b) Write short note on:
i) WS coordination
ii) QOS compliance in SOA governance.
iii) Service design of business services. [12]

x x x

Total No. of Questions : 10]

SEAT No. :

P3642

[4959]-1131

[Total No. of Pages : 2

**B.E. (Information Technology)
E & M GOVERNANCE (Elective - II)
(2012 Course) (414457C) (Semester - I) (End Semester)**

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 do you mean by e-Business? Explain characteristics of e-Business. **[6]**

b) Distinguish between: e-Commerce & e-Business. **[2]**

OR

Q2) a) Define e-Commerce. Explain different types of e-Commerce. **[6]**

What is the importance of World Wide Web for e-Business?

b) What is meant by the terms front-office and back-office systems? **[2]**

Q3) a) Describe the four key elements of the strategic planning process and explain how they are interrelated. **[5]**

b) How would you define Business – IT alignment? Explain why it is important. **[5]**

OR

Q4) a) What is a business process? List the seven characteristics of a business process. **[4]**

b) Explain similarities and differences between the following concepts: business unit value chain, industry value chain, supply chain, logistics. **[6]**

P.T.O.

- Q5)** a) An e-market can either be biased or unbiased. A biased market can be biased towards either the buyers or the sellers. Explain the differences. [8]
b) Which three factors contribute to the success of e-markets? Give one example for each factor. [8]

OR

- Q6)** a) What products are most likely to be traded successfully through an e-market place: commodities or specialty goods. Explain why and give one example of both types of goods. [8]
b) What are the disadvantages of a biased market? [8]

- Q7)** 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. [8]
b) What are various mobile commerce services for business? Explain. [8]

OR

- Q8)** a) Define m-commerce and explain how an e-government could use it to increase its efficiency and effectiveness. [8]
b) Draw and explain m-commerce life cycle. [8]

- Q9)** a) What are the emerging live issues in mobile commerce? [6]
b) Discuss advantages and disadvantages of m-commerce. [6]
c) Explain critical factors responsible for success of M-commerce. [8]

OR

- Q10)** a) Discuss how m-commerce can expand the reach of e-business. [6]
b) Explain framework for m-commerce. What are the implementation challenges in M-commerce? [6]
c) Discuss the five major m-commerce applications, and provide a specific example of how each application can benefit a business. [8]

x x x

Total No. of Questions : 10]

SEAT No. :

P3643

[4959]-1132

[Total No. of Pages : 2

B.E. (Information Technology)
GEO INFORMATICS SYSTEMS (Elective - II)
(2012 Pattern) (414457D) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) a) Explain the components of Geo-Informatics. **[5]**

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

i) Side Looking Airbone Radar system

ii) Synthetic Aperture Radar

OR

Q2) a) Explain Linkage of GIS to Remote sensing. **[5]**

b) Define GIS. What are the four M's of GIS? Explain the term topology. **[5]**

Q3) a) Explain the comparision betⁿ active sensor & passive sensor. **[5]**

b) Explain types of pictoral data products. **[5]**

OR

Q4) a) Explain the process of image registration. **[5]**

b) Explain imaging sensor system. **[5]**

P.T.O.

- Q5)** a) Explain different types of error. [8]
b) Explain the concept of geometric transformation. [8]

OR

- Q6)** a) Explain the accuracy, precision & resolution as quality factors of GIS data. [8]
b) Explain the need of conversion of existing data. [8]

- Q7)** a) What is raster data representation. Explain it with suitable example. [8]
b) Explain the types of data queries. [8]

OR

- Q8)** a) Explain the basic elements of GIS modeling. [8]
b) What is vector data representation. Explain it with suitable example. [8]

- Q9)** a) Explain different applications of GIS. [9]
b) Describe the software scenario in GIS focusing on functionalities, product and developers. [9]

OR

- Q10)**a) Explain issues & trends in GIS development. [9]
b) Explain Intelligent Transport system with components. [9]

x x x

Total No. of Questions : 10]

SEAT No. :

P3644

[4959]-1133

[Total No. of Pages : 3

B.E. (I.T.)

NATURAL LANGUAGE PROCESSING

(2012 Pattern) (Semester - I) (Elective -II) (414457E)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Draw neat diagrams and assume suitable data whenever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) a) Define syntactic and semantic level of language understanding in natural language processing. Give example for each level. **[5]**

b) State and explain applications of Natural Language Processing. **[5]**

OR

Q2) a) Write a short note on Standford parser. **[5]**

b) Explain unification grammar in natural language. **[5]**

Q3) a) What is augmented grammar? How is it useful in natural language processing? **[5]**

b) Explain some basic feature systems for English with an example. **[5]**

OR

P.T.O.

Q4) a) Write note on augmented transition networks. **[6]**

b) Consider the following context-free grammar.

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 recognised by this grammar, and why?

i) the dog sneezes the cat

ii) the mouse hates

iii) the cat the mouse hates

iv) the mouse hates the mouse **[4]**

Q5) a) Analyze the Human Preferences in Encoding Uncertainty during parsing with an example. **[8]**

b) Estimate Lexical Probabilities using n-gram model using an example. **[8]**

OR

Q6) a) Estimate the Probabilities for Part-of-Speech Tagging using the chain rule with an example. **[8]**

b) Draw and explain shift-reduce parsing in natural language processing. **[8]**

Q7) a) Explain language encoding in logical form case relations. **[8]**

b) Why is word sense disambiguation a challenging problem in natural language processing? **[8]**

OR

Q8) a) What is probabilistic context-free grammar? State the benefits of probabilistic parsing [8]

b) Define semantic web ontology. What is the advantage of semantic web ontology? [8]

Q9) a) What is semantic web search? Explain with an example. [9]

b) How is natural language processing useful in an automatic text clustering problem? [9]

OR

Q10)a) How is automatic text summarization performed using natural language processing techniques. [9]

b) Explain the problem of machine translation. Define the BLEU score metric used for evaluating machine translation system. [9]

x x x

Total No. of Questions :10]

SEAT No. :

P3989

[4959]-1134

[Total No. of Pages :4

B.E. (Information Technology)

DISTRIBUTED SYSTEM

(2012 Course) (Semester - II) (End - Semester) (414461)

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

Q1) a) Distinguish between:

[6]

i) Buffering and Caching

ii) RMI and RPC

b) Consider two communication services for use in asynchronous distributed systems. In service A, messages may be lost, duplicated or delayed and checksums apply only to headers. In service B, messages may be lost. Delayed or delivered too fast for the recipient to handle them, but those that are delivered arrive order and with the correct contents. **[4]**

i) Describe the classes of failure exhibited by service A and service B. Classify their failures according to their effect on the properties of validity and integrity. Can service B be described as a reliable communication service?

ii) Consider a pair of processes X and Y that use the communication service B from above to communicate with one another. Suppose that X is a client and Y a server and that an invocation consists of a request message from X to Y (that carries out the request) followed by a reply message from Y to X. Describe the classes of failure that may be exhibited by an invocation.

OR

P.T.O.

- Q2) a)** Explain Distributed Object Model with respect to: **[6]**
- i) Actions and
 - ii) Garbage collection
 - iii) Exceptions
- b) Explain in nutshell, the different techniques for failure handling in a Distributed system. **[4]**

- Q3) a)** Explain Remote object reference and Remote interface in Distributed Object Model with suitable example. **[5]**
- b) What is marshaling? How marshaling and serialization is used in communication between a client and a server? **[5]**

OR

- Q4) a)** Explain three communication primitives of Request-reply protocol along with message structure used in information transmission. **[4]**
- b) Describe general organization of CORBA system with the help of suitable diagram. Why there is no explicit data-typing in CORBA CDR? **[6]**

- Q5) a)** What are the Network Time Protocol's aims and features? Explain the modes through which NTP servers synchronize with one another. **[8]**
- b) Explain following points related to fault tolerance issues in Distributed Systems: **[8]**
- i) Availability
 - ii) Reliability
 - iii) Failure Models
 - iv) Tripple modular redundancy

OR

- Q6) a)** A client attempts to synchronize with a time server. It records the round-trip times and timestamps returned by the server in the table below. [8]

<i>Round-trip (ms)</i>	<i>Time (hr:min:sec)</i>
22	10:54:23.674
25	10:54:25.450
20	10:54:28.342

Which of these times should it use to set its clock? To what time should it set it? Estimate the accuracy of the setting with respect to the server's clock. If it is known that the time between sending and receiving a message in the system concerned is at least 8 ms, do your answers change?

- b) Describe implementation of ordered multicast in a non-overlapping group. [8]

- Q7) a)** Explain the objectives and architecture of Hadoop Distributed File System in details. [8]

- b) How is the X.500 directory service implemented? [8]

OR

- Q8) a)** List the different Distributed File System Requirements? Explain the abstract File Service architectural model with neat diagram. [8]

- b) Write a detailed note on Domain Name System. [8]

- Q9) a)** Write short note on the following (Any 2): [10]

- i) Cloud Computing
- ii) Secure Channel
- iii) Cryptographic Algorithms.

- b) State and explain various security mechanisms for achieving security in distributed systems. [8]

OR

Q10)a) Write short note on the following: [10]

- i) Applications of cryptography and political obstacles.
 - ii) Symmetric and Asymmetric Algorithms.
- b) Explain the Secure Mobile Code in brief with reference to JAVA sandbox. [8]

EEE

Total No. of Questions :10]

SEAT No. :

P3645

[4959]-1135

[Total No. of Pages :3

B.E. (Information Technology)

ADVANCED DATABASES

(2012 Pattern) (End Semester) (Semester - II) (414462)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q3 or Q4, Q5 or Q6 Q7 or Q8, Q9 or Q10.*
- 2) *Figures to right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain difference between homogeneous and heterogeneous databases. **[4]**
- b) Describe query optimization with respective parallel database system. **[6]**

OR

- Q2)** a) Comparison between object relational and object oriented database system. **[4]**
- b) Write the following queries in XQuery, assuming the below DTD. **[6]**

```
<!DOCTYPE db [  
<!ELEMENT emp (ename, children*, skills*)>  
<!ELEMENT children (name ,birthday)>  
<!ELEMENT birthday (day, month, year)>  
<!ELEMENT skills (type, exams+)>  
<!ELEMENT exams (year, city)>  
<!ELEMENT ename( #PCDATA)>  
<!ELEMENT name( #PCDATA)>  
<!ELEMENT day( #PCDATA)>  
<!ELEMENT month( #PCDATA)>  
<!ELEMENT year( #PCDATA)>  
<!ELEMENT type( #PCDATA)>  
<!ELEMENT city( #PCDATA)>]>
```

P.T.O.

- i) Find the names of all employees who have a child who has a birthday in March.
- ii) Find those employees who took an examination for the skill type “typing” in the city “Dayton.”
- iii) List all skill types in Emp.

- Q3)** a) Explain Cassandra architecture in detail. [5]
b) Explain CAP Theorem in detail. [5]

OR

- Q4)** a) Explain LDAP. (Light Weight Directory Access Protocol) [5]
b) How to improve data access with secondary indexes in dynamodb. [5]

- Q5)** a) What is a stream data management system explain its issue and solutions. [10]
b) Explain Social Network Analysis. [6]

OR

- Q6)** a) Explain the algorithm for apriori-based frequent substructure mining?[8]
b) What is a graph database? Why it is important? State the application of graph mining? [8]

- Q7)** a) What is web mining? Explain taxonomy of web mining? [8]
b) Explain Text categorization methods in detail. [8]

OR

- Q8)** a) Describe collaborative filtering: Matrix Factorization in detail. [8]
b) Describe k-nearest neighbour (KNN) method in detail. [8]

- Q9)** a) Explain cloud database in detail? Also explain advantages and limitations of cloud databases? [8]
b) Explain safe data log programmers in deductive database in detail. [6]
c) Explain Query Evolution in Deductive Database in detail. [4]

OR

- Q10)**a) Write a short note on (any two). [16]
i) Multimedia databases.
ii) Cloud databases.
iii) Spatial databases.
iv) Temporal databases.
- b) What is a deductive database system? [2]



Total No. of Questions : 10]

SEAT No. :

P3646

[4959]-1136

[Total No. of Pages : 2

B.E.(Information Technology)

MOBILE COMPUTING

(2012 Course) (Elective-III)(Semester-II) (End Sem.)(414463A)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 or Q 8, Q 9 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 the forward and backward handoff mechanism. [4]

b) List and explain strategies of mobile handoff detection. [5]

OR

Q2) a) Explain mobility management concept? Define Handoff and Roaming. [4]

b) What is personal communications systems? Draw and explain basic PCS architecture. [5]

Q3) a) Draw neatly GSM SMS architecture and explain role of SM-SC. [5]

b) What are the HLR and VLR? Describe HLR and VLR in Call Routing Roaming? [5]

OR

Q4) a) Write a short note on: VLR Database Overflow. [4]

b) What are different cases of handovers? Draw the signal and response diagram for all the cases and show their differences clearly. [6]

Q5) a) List and explain benefits of GPRS. What is the role of SGSN and GGSN in GPRS network? [9]

b) Draw and explain WAP architecture. [8]

OR

Q6) a) What are the design guidelines for WAP? What are disadvantages of implementing TCP/IP directly over mobile network? [9]

P.T.O.

- b) Explain how GSM is modified to support GPRS services? Which elements of the network perform the data transfer? Explain. [8]

Q7) a) Specify advantages, disadvantages of application to application messaging architecture. [9]

- b) Draw and explain implementation and design phase of mobile application development. [8]

OR

Q8) a) What is major difference between wireless internet, smart client, and messaging mobile application architectures? [9]

- b) What do we mean smart client? What is the defining factor of smart client applications versus thin client applications? On which devices can we deploy smart client applications? [8]

Q9) a) Write down core and additional features of Android OS. [9]

- b) Describe role of Application framework and Dalvik VM in Android OS architecture. [8]

OR

Q10) a) List and describe application components of android. [9]

- b) Draw flowchart for application life cycle of android. [8]



Total No. of Questions : 10]

SEAT No. :

P3529

[4959]-1137

[Total No. of Pages :2

B.E.(Information Technology)

ADVANCED GRAPHICS AND ANIMATION

(2012 Pattern)(Elective-III)(End Sem) (Semester-II) (414463B)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 or Q10.*
- 2) *Figures to right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*

Q1) a) What is the importance of representing a curve in a parametric form?[5]

b) Explain zero order, first order, and second order parametric continuity in detail. [5]

OR

Q2) a) Explain following quadratic surfaces. [5]

i) Sphere

ii) Torus

b) What are sweep surfaces? Discuss different methods of generating sweep Surfaces. [5]

Q3) a) Explain in detail Spatial-partitioning representation along with its decomposition. [5]

b) Write short note on “Constructive solid geometry” [5]

OR

Q4) a) Derive the simple illumination model. Include the contribution of Diffuse, ambient and specular reflection. [5]

b) What are the various methods of retracing? [5]

P.T.O.

- Q5)** a) Explain pBuffer rendering with respect to Open GL. [8]
b) How Fog stage is implemented in Open GL pipeline? [8]

OR

- Q6)** a) Which are the Shadowing Techniques with respect to OpenGL? Explain in brief. [8]
b) Write a short note on “GLUT” [8]

- Q7)** a) What is meant by Animation Language? Explain the types of animation languages with appropriate examples. [8]
b) What is meant by key-framing, tweening and morphing? [8]

OR

- Q8)** a) Explain various animation techniques. [8]
b) Which are the different animation software’s? Explain any one animation software in detail. [8]

- Q9)** a) Which are the different languages used in Virtual Reality? Explain in brief. [8]
b) What is the need of virtual reality? Explain with suitable example. [10]

OR

- Q10)** a) Explain Flight simulation application and different virtual reality devices used in it. [8]
b) What is virtual reality? Explain in detail forms of virtual reality. [10]



Total No. of Questions : 10]

SEAT No. :

P3647

[4959]-1138

[Total No. of Pages :2

B.E.(Information Technology)

c: INFORMATION STORAGE AND RETRIEVAL

(2012 Course) (Semester-II)(Elective-III) (414463)

Time :2½Hours]

[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) *Assume suitable data if necessary.*

Q1) a) Explain Luhn's idea in details. **[5]**

b) What is clustering? Explain the use of clustering in IR. **[5]**

OR

Q2) Clusters the documents using single pass clustering algorithm for the following example. Threshold value is 10 **[10]**

	Terms in document				
	T1	T2	T3	T4	T5
Doc 1	1	2	0	0	1
Doc 2	3	1	2	3	0
Doc 3	3	0	0	0	1
Doc 4	2	1	0	3	0
Doc 5	2	2	1	5	1

Q3) a) Explain Boolean model in detail **[5]**

b) Give the difference between suffix array and suffix tree. **[5]**

OR

P.T.O.

Q4) a) Explain the term precision and recall and calculate the same for the following example [5]

A set of relevant documents for query

$q = \{d3, d7, d8, d11, d14, d19, d23, d25\}$

A new retrieval algorithm returns following answer set

$= \{d1, d2, d3, d7, d9, d10, d14, d20, d23, d24, d25\}$

b) Explain the terms Harmonic mean, E measure, R precision, Precision histogram [5]

Q5) a) Explain GEMINI approach for multimedia IR. [9]

b) How are queries processed in distributed IR. [9]

OR

Q6) a) Write a note on MULTOS [9]

b) Describe multimedia data support in commercial DBMS. [9]

Q7) a) Discuss challenges involved in web searching. [8]

b) Explain crawler indexer architecture in details. [8]

OR

Q8) a) Write a note on characterizing the web [8]

b) What are meta crawlers? Explain with suitable example [8]

Q9) a) What is collaborative filtering? Discuss its advantages and disadvantages [8]

b) Explain semantic web in details [8]

OR

Q10) a) Explain the method for extracting data from text [8]

b) Explain Collecting and Integrating Specialized Information on the web. [8]



Total No. of Questions : 10]

SEAT No. :

P3648

[4959]-1139

[Total No. of Pages : 2

**B.E.(Information Technology)
d- IT ENABLED SERVICES
(2012 Pattern) (Semester-II)(Elective-III)**

Time :2½Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Answer Q 1 or Q 2, Q 3 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 calculator is allowed.*
- 5) *Assume suitable data if necessary.*

- Q1)** a) What is Business Strategy? Enlist & explain in brief Mintzberg's five P's to define Business Strategy. [6]
- b) Enlist Characteristics of Business Strategy. [2]

OR

- Q2)** a) What are challenges and opportunities in globalized, interconnected, convergent world using the power of IT? [6]
- b) Describe in brief IT Application strategy'. [2]
- Q3)** a) Describe 'IBM' Business System Planning Approach' of SITP. [6]
- b) Draw and explain Technology management strategic framework based on the available technology, past successes and experiences. [6]

OR

- Q4)** a) Describe the following prevalent planning approaches of SITP Process: [6]
- i) Top-down analytical approach
 - ii) Bottom-up evaluative approach
- b) Discuss any six advantages of defining EITA. [6]

P.T.O.

- Q5)** a) Enlist ITIL versions and their coverage. Explain service delivery process in detail. [8]
- b) Enlist ITIL service support processes. Explain Incident management process in detail. [8]

OR

- Q6)** a) What are the reasons for outsourcing? [4]
- b) Explain variants of outsourcing with suitable diagram. [8]
- c) What are the IT management layers and considerations for outsourcing? [4]

- Q7)** a) Write and explain function for creating a cookie. Write a simple session management program in PHP. [8]
- b) Explain Following file handling functions with suitable PHP code. [8]
- i) readfile()
 - ii) fgets ()
 - iii) fgetc ()
 - iv) die ()

OR

- Q8)** a) Write a program in OOPHP to set and display book information such as Book Title, Price and publication [8]
- b) Explain in brief WSDL document architecture. [8]
- Q9)** a) Describe Technology strategy of call center. [9]
- b) Write short note on ERP. [9]

OR

- Q10)**a) Describe different strategies of Google. [9]
- b) Discuss current employment in IT/ITES industry. [9]



Total No. of Questions : 10]

SEAT No. :

P3649

[4959]-1140

[Total No. of Pages :2

B.E.(Information Technology)

ADVANCED COMPUTER NETWORKS

(2012 Pattern)(Elective-III) (Semester-II)(End Sem) (414463E)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) What is the importance of latency in wired and wireless network? [6]
b) Define RTT.State its example. [4]

OR

- Q2)** a) What are the functions of ISDN? [4]
b) How to control traffic in ATM networks? [6]
- Q3)** a) Describe fragmentation in ATM networks. [6]
b) Enlist various multicast routing techniques. [4]

OR

- Q4)** a) How inter-domain and intra-domain integrated routing is performed?[6]
b) Define auto-configuration in IPv6 [4]

- Q5)** a) What is Multi-Protocol Label Switching(MPLS)? Explain in detail. [10]
b) Explain L2 and L3 w.r.t Virtual Private Networks. [8]

OR

- Q6)** a) What is Traffic Engineering? Explain it with MPLS? [10]
b) Describe address blocks and bit masks of CIDR. [8]

P.T.O.

- Q7)** a) Explain characteristics and operations of Mobile IP. [10]
b) Differentiate between IPv4 and IPv6. [6]

OR

- Q8)** a) How neighbors are discovered in routing? [8]
b) Is IPv6 suitable for existing infrastructure? Justify your answer. [8]

- Q9)** a) Write characteristics of Mobile Ad Hoc Networks. [8]
b) Explain with example DSDV protocol for Ad Hoc Wireless Networks. [8]

OR

- Q10)** a) State various issues related to wireless Ad Hoc Networks. [6]
b) Describe Dynamic source Routing Protocol for Multihop Ad Hoc wireless Networks. [10]



Total No. of Questions : 10]

SEAT No. :

P3650

[Total No. of Pages : 2

[4959]-1141

B.E. (Information Technology)

BIOINFORMATICS

(2012 Course) (Elective-IV) (414464 A) (Semester-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) *Figures to the right side indicate full marks.*
- 3) *Assume suitable data if necessary.*

Q1) a) What is scope of Bioinformatics? Explain protein structure databases. **[6]**

b) Explain any two rendering tools used in visualization. **[4]**

OR

Q2) a) Define Bioinformatics. Explain Bioinformatics application related to the following areas. **[6]**

i) Phylogenetic Analysis.

ii) Genome Annotation.

b) Explain sources of variability in microarray preparation & reading. **[4]**

Q3) a) Explain major steps in pattern recognition & discovery process with diagram. **[8]**

b) Difference between clustering & classification. **[2]**

OR

Q4) a) What is meant by sensitivity & specificity of statistical analysis tool. **[2]**

b) Explain knowledge discovery process or datamining methods with neat diagram. **[8]**

P.T.O.

- Q5)** a) Explain similarities & differences between BLAST & FASTA tools for sequence alignment. [8]
b) Write short note on: [8]
i) Heuristic methods for sequence alignment.
ii) Prediction algorithm for phylogenetic.

OR

- Q6)** a) Explain FASTA algorithm with recommended steps for similarity searching in detail. [8]
b) Explain different prediction algorithm for genes. [8]
- Q7)** a) Explain comparative modeling process with neat diagram. [8]
b) Explain process of drug discovery in detail. [8]

OR

- Q8)** a) Discuss the components of modeling & simulation system alongwith process. [8]
b) Write short note on: [8]
i) Methods for protein modeling.
ii) Model refinement & evaluation.

- Q9)** a) Write short note on: [12]
i) Tools for modeling & simulation.
ii) Hidden Markov model.
b) Explain recent trends in Bioinformatics. [6]

OR

- Q10)** a) What are Future trends in Bioinformatics? [6]
b) Write short note on: [12]
i) Structural Bioinformatics in drug discovered.
ii) System Biology in human health & disease.



Total No. of Questions : 10]

SEAT No. :

P3990

[4959]-1142

[Total No. of Pages :2

B.E.(I T)

REAL TIME & EMBEDDED SYSTEMS

(2012 Course) (Semester-II)(End Sem)(Elective-IV)(414464B)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 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) Discuss the advantages and disadvantages of top-down and bottom-up design process in embedded system design. **[6]**

b) Explain Myrinet with suitable Myrinet network diagram. **[4]**

OR

Q2) a) Draw & explain general architecture of embedded system & explain components in it. **[6]**

b) What are main features of CAN2.0 bus standards **[4]**

Q3) a) List the key features of SHARC processor and discuss the targeted application areas for this processor. **[6]**

b) Explain the structure of 12C bus, Draw state transition diagram for 12C bus master. **[4]**

OR

Q4) a) Discuss various modes of operation of ARM processor with respect to their operational usability. **[6]**

b) Calculate a message delay for 12C bus operating at 400 kilobits per second. The data size of the message is 14 bytes. **[4]**

Q5) a) Use RMS scheduler for scheduling a periodic task set of T1(2, 4)& T2(4, 8). Perform schedulability check & comment on whether given task set is schedulable & schedule produced is feasible. **[10]**

b) Give the classification of the scheduling algorithms, compare and contrast static vs.dynamic algorithms with examples. **[8]**

OR

P.T.O.

- Q6)** a) Use EDF scheduler for scheduling a periodic task set of T1(1, 3, 3)&T2 (4,6,6). Perform schedulability check & comment on whether given task set is schedulable & schedule produced is feasible. [10]
- b) Give the structure of cyclic scheduler. Discuss the advantages and disadvantages of cyclic scheduler. [8]

- Q7)** a) State & explain priority inversion problem with appropriate example & name protocols used to remove this problem. [8]
- b) What is resource reclaiming? State needs of resource reclaiming algorithm. [8]

OR

- Q8)** a) With appropriate example prove that priority ceiling protocol avoids deadlock. [8]
- b) State algorithms for combined scheduling of periodic & aperiodic tasks & Compare them. [8]

- Q9)** a) State & explain features & characteristics of Real time operating system (RTOS). [8]
- b) Explain in detail any one commercial RTOS. [8]

OR

- Q10)** a) State & explain, features & characteristics of Real Time Databases. [8]
- b) Explain in detail any one commercial Real Time Database. [8]



Total No. of Questions : 10]

SEAT No. :

P3651

[Total No. of Pages : 2

[4959]-1143

B.E. (Information Technology)

c-GREEN IT - PRINCIPLES AND PRACTICES

(2012 Course) (Elective-IV) (End Semester) (Semester-II) (414464)

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) How software's impact the environment and the energy consumption of computing systems? [7]
- b) How server farm and server virtualization helps in saving energy. [7]

OR

- Q2)** a) What are P and C states of processor? How does processor C-states save energy? [7]
- b) What are the quality attributes used for developing sustainable software. [7]

- Q3)** a) How energy-efficient networking is related to objectives of Green IT. [6]
- b) What are sustainable information technology systems (SITS)? How SITS can help in improving and leveraging environmental sustainability. [8]

OR

- Q4)** a) Why energy-efficient networking important in light of the increased number of renewable power plants? [6]
- b) How Green IT strategies adopted by an organization evolve over time. [8]

P.T.O.

- Q5)** a) Explain sustainability from perspective of multilevel information problem. [7]
b) How green IT strategy is developed by an organization. [7]

OR

- Q6)** a) Explain the source of greenhouse gas emissions within the organizations. [7]
b) Discuss the organizational considerations in formulating enterprise green IT strategy. [7]

- Q7)** a) What are the sustainability dimensions of information technology. [7]
b) What is enterprise resource planning (ERP) system? Explain an architecture of typical ERP system with respect to functional activities of an organization. [7]

OR

- Q8)** a) What factors will motivate an organization to green their IT activities in absence of any external pressure. [7]
b) Which key technologies are to be considered for developing sustainable IT strategic plan? [7]

- Q9)** a) What are the steps involved in risk assessment of an information system. [7]
b) What are the enabling effects of green IT-based software application. [7]

OR

- Q10)**a) How an organization can formulate, implement and manage its green practices. [7]
b) What is enterprise architecture planning and how it is different from strategic planning. [7]



Total No. of Questions : 10]

SEAT No. :

P4545

[Total No. of Pages : 2

[4959] - 1144

B.E. (Information Technology) (Elective - IV(d))

INTERNET OF THINGS

(2012 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :-

- 1) *Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 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 Key technologies for Internet of Things? [6]

b) What types of things get connected in IoT? [4]

OR

Q2) a) Explain the working principle of RFID tag. [5]

b) Write in detail applications of Internet of Things. [5]

Q3) a) Explain security and QoS for WSN. [6]

b) What are basic components of sensor network? [4]

OR

Q4) a) Explain in detail WSN specific IoT applications. [5]

b) Explain in detail challenges for WSN. [5]

Q5) a) Explain in detail clustering principal in Internet of Things. [9]

b) Explain in detail data synchronization techniques in Internet of Things. [9]

OR

P.T.O.

- Q6)** a) Explain in detail design guidelines for Internet of Things. [8]
b) What is Identity management in Internet of Things? Explain any 2 Identity management techniques of Internet of Things. [10]

- Q7)** a) What is Internet of Things security tomography? Explain in detail layered attacker model. [10]
b) Explain in detail security requirement of Internet of Things. [8]

OR

- Q8)** a) Why security required in IoT? Explain in detail various security model in Internet of Things. [10]
b) Write Non repudiation and availability in Internet of Things. [8]

- Q9)** a) Write applications of Internet of Things for e-health body area network. [6]
b) Explain in detail application of Internet of Things in smart metering and advanced metering infrastructure. [8]

OR

- Q10)**a) Write in detail business model scenario for Internet of Things. [6]
b) Explain in detail application of Internet of Things in city automation and home automation. [8]



Total No. of Questions : 10]

SEAT No. :

P3652

[Total No. of Pages : 2

[4959]-1145

**B.E. (Information Technology, Computer Engineering &
Electronics and Telecommunications)**

**UNIFIED COMMUNICATIONS AND CONTACT CENTER
APPLICATIONS**

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

Subject Code

414464 E : Open Elective (Information Technology)

410452 : Elective-IV (Computer Engineering)

404192 : Elective-IV (Electronics and Telecommunications)

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) *Assume suitable data, if necessary.*

- Q1)** a) What is ACD? Explain role of an ACD in a Contact Center. [8]
b) What are agent states? Explain typical states of a Contact Center Agent. [8]

OR

- Q2)** a) What is CTI? What are types of CTI? What are the server and agent side CTI functionalities? [8]
b) Explain the functionalities of PABX, ACD, Self Service and CTI in an Inbound Call Center. [8]

- Q3)** a) Explain the core components of Workforce Optimization with a brief description and advantage of each. [8]
b) What are campaigns? Explain briefly different phases of campaign management and execution. [8]

OR

- Q4)** a) What is outbound CPA and call classification? Explain how call classification is done at a high level and how it helps outbound contact centers. [8]
b) What is blending? How does it work? [8]

P.T.O.

- Q5)** a) What is WebSocket and how it differs from other communication protocols over HTTP? [8]
b) What are UCaaS and CCaaS and list five key advantages of this? [8]

OR

- Q6)** a) What is NAT and how STUN protocol help NAT traversal in case of WebRTC? [8]
b) What is virtualization and explain the role of hypervisor in the same context? [8]

- Q7)** a) What are the mandatory information elements in an ISDN Setup message? Why are these mandatory in a setup message? [8]
b) What is the difference between SIP dialog, transaction and session? Why do you need to increment cSeq number for subsequent request in a dialog? [8]

OR

- Q8)** a) What do you mean by stateless proxy servers? Why they are useful? What are drawbacks? [8]
b) Explain the call flow for a basic ISDN call flow. [8]

- Q9)** Write notes on: [6]
a) BYOD.
b) Wink start signaling.

OR

- Q10)** Write notes on: [6]
a) Real Time Speech Analytics.
b) Difference between CAPEX and OPEX in cloud computing paradigm.



Total No. of Questions : 8]

SEAT No. :

P3552

[Total No. of Pages : 3

[4959] - 1151

B.E. (Computer Engineering)
Design & Analysis of Algorithms
(2012 Pattern)

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., 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) State which algorithmic strategy is used by Quick sort and Merge sort algorithm? Though they follow same algorithmic strategy their worst case complexities are different? Why (Justify your answer with example). **[8]**

b) What are the general characteristics of branch and bound approach? **[4]**

c) Find an optimal solution for the following knapsack instance using greedy method: **[8]**

Number of objects $n = 5$, capacity of knapsack $m = 100$, profits = (10, 20, 30, 40, 50), weights = (20, 30, 66, 40, 60).

OR

Q2) a) Write a short note on use of dynamic programming for Optimal Binary search tree (OBST) for the instance of following example. **[8]**

Example for OBST:

Consider 5 keys with these search probabilities:

$$p_1 = 0.25, p_2 = 0.2, p_3 = 0.05, p_4 = 0.2, p_5 = 0.3.$$

P.T.O.

- b) Write control abstraction for Greedy approach. [4]
- c) Solve the following recurrence equations using Master theorem. [8]
- i) $T(n) = 4T(n/2) + n$.
- ii) $T(n) = 4T(n/2) + n^2$.

- Q3)** a) Explain the concept of Randomized algorithm and Approximation algorithm in brief with example. [8]
- b) What is SAT and 3-SAT problem? Prove that the 3-SAT problem is NP complete. [8]

OR

- Q4)** a) Write one example each of deterministic and nondeterministic algorithm for searching. [8]
- b) What are P and NP classes? What is their relationship? Give examples of each class. [8]

- Q5)** a) Explain parallel computing models in brief. [8]
- b) Write an odd-even merge sort algorithm and explain with the following example: [8]
- 11, 4, 30, 11, 20, 5, 8, 2.

OR

- Q6)** a) How parallel algorithms can be used to solve graph problems? [8]
- b) Use Amdahl's Law : Recent advances in process technology have quadrupled the number transistors you can fit on your die. [8]
- Currently, your key customer can use up to 4 processors for 40% of their application.
 - You have two choices:
 - i) Increase the number of processors from 1 to 4.
 - ii) Use 2 processors but add features that will allow the applications to use them for 80% of execution.

- Q7)** a) Define Internet of Things (IoT). Explain elements of IoT. [9]
- b) Discuss and analyze Bully algorithm for dynamically selecting a coordinator in distributed system along with its complexity of execution. [9]

OR

- Q8)** a) State different software engineering algorithms and explain in brief. [9]
- b) Compare KMP and Boycc-Moore algorithm for their complexities and explain any one of the algorithm and analyze it. [9]



Total No. of Questions : 8]

SEAT No. :

P3991

[4959]-1152

[Total No. of Pages : 3

B.E. (Computer Engineering)
PRINCIPLES OF MODERN COMPILER DESIGN
(2012 Course) (Semester - I) (410442)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

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

Q1) a) Explain in detail the front end-Back end arrangement of compiler design. **[6]**

b) Check whether following grammer is LL (1). Also depict the moves by parser for input string "ab". **[6]**

S->aABb

A->c | ε

B->d | ε

c) Explain following terms with suitable examples:

i) S- Attributed Grammar

ii) L- Attributed Grammar

iii) Type Expression

iv) Back Patching **[8]**

OR

Q2) a) Explain the Role of Lexical Analyzer. Explain Interaction between Lexical Analyzer and parser. Define Lexeme, Token and Pattern with suitable example. **[6]**

P.T.O.

- b) Construct Predictive Parser for following grammar. [6]

$$S \rightarrow a B D h$$

$$B \rightarrow B b \mid c$$

$$D \rightarrow E F$$

$$E \rightarrow g \mid \epsilon$$

$$F \rightarrow f \mid \epsilon$$

- c) What is mean by ‘Syntax Directed Definitions’? Give syntax directed translation scheme for “if E then S”. [8]

- Q3)** a) What are different issues in code generation? [6]

- b) What is DAG? Explain its use in code generation. Generate DAG for following: [6]

$$T1 = b + c$$

$$T2 = d * e$$

$$T3 = d + c$$

$$T4 = T2 * T3$$

$$T5 = T4 * f$$

$$X = T1 - T5$$

- c) Explain in brief following techniques: [6]

- i) Constant folding
- ii) Loop unrolling
- iii) Strength reduction

OR

- Q4)** a) What is need for next-use information? Explain how to compute next-use information. [6]
- b) Generate quadruples for the following: $\text{if}(a>b)$ then $x=p*q$. [4]
- c) What is Register Allocation and Assignment Problem? [4]
- d) Write short note: Peephole Optimization. [4]

- Q5)** a) Write a note on importance of source language data representation. [6]
- b) Explain the row major and column major representation of arrays. [6]
- c) Explain type checking with respect to context handling. [4]

OR

- Q6)** a) Explain structure of a functional compiler. Discuss various issues related to compilation of functional languages . [6]
- b) Write short note on Java CC. [6]
- c) What is meant by desugaring? Why is this required? [4]

- Q7)** a) Write short note on NVidia CUDA compiler. [6]
- b) What is interpreter? Explain JVM as an example of interpreter. [4]
- c) How tuple space can be implemented on distributed memory systems.[6]

OR

- Q8)** a) Explain following points for parallel Object Oriented languages: Object location, object migration, object replication. [6]
- b) How cross compilation is achieved using XMLVM tool? [6]
- c) Write short note on nmake & cmake. [4]

x x x

Total No. of Questions : 10]

SEAT No. :

P3553

[Total No. of Pages : 3

[4959] - 1153

B.E. (Computer Engineering)
Smart System Design and Applications
(2012 Pattern) (End-Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Define artificial Intelligence and role of intelligent systems in smart applications. [6]
- b) Explain various types of intelligent agents, state limitations of each and how to overcome it. [6]
- c) Convert the following sentences into first-order logic and then to conjunctive Normal Form: [8]
- i) There is a girl who is beautiful.
 - ii) Elder people do not like rap music.
 - iii) Sister-in-law (Your spouse's sister).
 - iv) There is only one Rajnikant.

OR

- Q2)** a) Write the algorithm for hill climbing search problem. [6]
- b) Give steps to formulate a search problem for 2 player games. [6]
- c) What is Knowledge Engineering? Explain the steps. [8]

P.T.O.

- Q3)** a) What is the basic inference task that must be solved in a generic temporal model? [6]
b) Explain in details any one approach used in uncertain reasoning. [6]

OR

- Q4)** a) What are axioms of probability? Explain how to derive the useful facts from the basic axioms with suitable example. [6]
b) Write note on decision trees with suitable example. [6]

- Q5)** a) Explain Support Vector Machine with issues and applications. [6]
b) Explain components of designing an expert system. [6]

OR

- Q6)** a) Write a short note on: [6]
i) Active learning.
ii) Reinforcement learning.
b) What are Artificial Neural Networks? Explain their types. [6]

- Q7)** a) In a County, 51% of the adults are males. One adult is randomly selected for a survey involving credit card usage. [8]
i) Find the prior probability that the selected person is a male.
ii) It is later learned that the selected survey subject was Wearing spectacle, Also 9.5% of males wear spectacles, whereas 1.7% of females wear spectacles.

Use this additional information to find the probability that the selected subject is a male.

- b) Write a detailed note on Bayesian Networks. [4]

OR

- Q8)** a) What are methods of handling uncertain knowledge? Write down major challenges in handling uncertain knowledge. [6]

- b) Define : Bayesian probability, Joint Probability, Posterior probability, Conditional probability. [6]

- Q9)** a) What is Machine Learning? What are different paradigms of machine learning? [6]
- b) What is Artificial Neural Network (ANN)? List and explain applications of ANN. [8]

OR

- Q10)** a) What is Natural Language processing (NLP)? List and explain any 2 applications of NLP. [6]
- b) Explain the importance of robots in healthcare and medicine. [8]



Total No. of Questions : 8]

SEAT No. :

P3554

[Total No. of Pages : 2

[4959] - 1154

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

Image Processing

(2012 Pattern) (Elective - I)

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

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Que. 1 or Que. 2, Que. 3 or Que. 4, Que.5 or Que. 6, Que.7 or Que. 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) Explain Nyquist rate, aliasing effect and fold over frequencies in case of two dimensional sampling. [6]
- b) Explain frequency domain techniques used in image enhancement. [8]
- c) What is Fourier descriptor? Explain how Fourier descriptor help in object recognition? [6]

OR

- Q2)** a) Explain elements of image processing in detail. [6]
- b) Define histogram. Discuss how histogram equalization helps in image enhancement. [8]
- c) Explain watershed segmentation method in image processing. [6]
- Q3)** a) Explain the methods used for lossless image compression. [8]
- b) Define feature and pattern. Explain in brief relationship between image processing and object recognition. [8]

OR

P.T.O.

- Q4)** a) Explain different approaches for object recognition. [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) Write a short note on any two: [10]
 i) Images from X-rays and its application.
 ii) Images from r-rays.
 iii) Does and risk.
 b) Explain picture archives and communication systems (PACS). [8]

OR

- Q6)** a) What are the medical imaging modalities? Explain in brief. [10]
 b) How could the contrast of a displayed X-ray computed to mammography image be increased? Explain. [8]

- Q7)** a) Discuss workflow of digital photogrammetric process. [8]
 b) Explain coordinate system for photogrammetry. [8]

OR

- Q8)** a) Explain remote sensing process and state advantages and limitation of remote sensing. [8]
 b) Explain different stereo imaging concepts from satellites. [8]



Total No. of Questions : 12]

SEAT No. :

P3555

[Total No. of Pages : 3

[4959] - 1155

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

Computer Network Design and Modeling

(2013 Pattern) (Elective - I)

Time : 2 1/2 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) *Assume suitable data, if necessary.*

Q1) a) Explain different performance characteristics of network. **[4]**

b) Why it is important to explore traffic behavior when designing a network?
[4]

OR

Q2) a) What are the different challenges of network design? **[4]**

b) List and explain the different skill of network manager. **[4]**

Q3) Explain "Requirement gathering and Analysis while designing a network".
[6]

OR

Q4) Write a note on:

a) Developing RMA. **[3]**

b) Threshold and limit. **[3]**

P.T.O.

Q5) If “Flows of type 1 involve the frequent passing of 1-2 MB sync files with delays on the order of HRT, 10-100 MB update files on the order of 1 second, and final data sets of 500 MB-1 GB on the order of minutes to hours, with up to two tasks running concurrently”. Then **Estimate a range for capacity performance** for these flows. Each of these flows is multiplied by 2 for concurrency. [6]

OR

Q6) Explain Flow Models in detail. [6]

Q7) a) What is In-Band and Out-of-Band Management of the network? Explain in detail. [8]

b) Explain the detail about Address Strategies. [8]

OR

Q8) a) Explain how address mechanism plays a vital role during network design. [8]

b) What are the different routing strategies? Explain any two in detail. [8]

Q9) a) What are the different Architectural Considerations of network design? [8]

b) Explain Network Management Mechanisms. [6]

c) What are various parameters of network back bone designs? How these parameters can influence the network design? [4]

OR

Q10) a) List four types of problems that the performance architecture addresses. Give examples of each type of problem. [8]

b) Which of the requirements indicates single-tier performance? Multitier performance. [6]

c) Describe Augmented MENTOR design. [4]

- Q11)** a) What are network blueprints, network diagrams, and component plans?
Why would a network design have sets of each of these? [8]
- b) Explain concept of smart pointer in network design. [4]
- c) List out the different simulation tools and explain any one of that. [4]

OR

Q12) Write a short note on:

- a) i) Prioritization.
ii) Scheduling.
iii) Queuing.

[8]

- b) Write a note on “compiling and running the simulation”.

[8]



Total No. of Questions : 10]

SEAT No. :

P3556

[Total No. of Pages : 3

[4959] - 1156

B.E. (Computer Engg.) (Semester - I)
C : Advanced Computer Programming
(2012Pattern) (Elective - I)

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., Q.9 or Q.10.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

Q1) a) What are Locks? Explain Distributed Lock services using Timestamps. **[5]**

b) What is JAVA RMI? How do we create Java RMI? What is the similarity between JAVA RMI and web service? **[5]**

OR

Q2) a) Explain with examples a single-copy and Multi-copy distributed shared memory. **[5]**

b) Define Service oriented architecture. List any four SOA characteristics. **[5]**

Q3) a) What is reflections in JAVA? Is JAVA reflection slow and/or expensive? What are some drawbacks of reflection in JAVA? **[5]**

b) What is the difference between Collection and Collections? Which collection classes are synchronized or thread-safe? Name the core collection interfaces. **[5]**

OR

Q4) a) How does SOA address the issues that arise in Client-Server architecture? **[5]**

P.T.O.

- b) Explain the following with servlet. [5]
- i) How can we create deadlock condition on our servlet?
 - ii) For initializing a servlet can we use constructor in place of init ()? Why?
 - iii) How can you get the information about one servlet context in another servlet?

- Q5)** a) Write short notes on: [9]
- i) JSP Architecture.
 - ii) MVC architecture Model.
 - iii) JDBC.
- b) Write and odd-even merge sort algorithm. Explain with a suitable example. [8]

OR

- Q6)** a) Explain Web architecture models. What are the advantages of JSP over Servlets? [9]
- b) Explain the following JDBC API components. [8]
- Driver Manager, SQL Exception, Connection, Statement, ResultSet.

- Q7)** a) What are the best features of Hadoop? What are the advantages of Hadoop over traditional RDBMS? [8]
- b) Write short notes on: [8]
- i) MongoDB.
 - ii) AJAX.

OR

Q8) a) What do you mean by Hadoop YARN? What are the failure handlings in YARN? [8]

b) What is Hadoop Ecosystem? How HDFS differs with NFS? [8]

Q9) a) What is the use of Combiner and Partitioner in the Hadoop framework? [8]

b) Explain the following execution modes of Pig: [9]

i) Local mode.

ii) MapReduce mode.

OR

Q10) a) What is pig? When should pig used? Explain pig and MapReduce in detail. [9]

b) Explain word-count implementation via Hadoop framework. [8]



Total No. of Questions : 8]

SEAT No. :

P3557

[Total No. of Pages : 4

[4959] - 1157

B.E. (Computer Engineering) (Semester - I)
Data Mining Techniques and Applications
(2012Pattern)

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

Q1) a) Discuss whether or not each of the following activities is a data mining task. **[6]**

- i) Computing the total sales of a company.
- ii) Predicting the future stock price of a company using historical records.
- iii) Predicting the outcomes of tossing a pair of dice.

b) Explain the following terms: **[6]**

- i) Closed and maximal frequent itemsets.
- ii) Multilevel association rules.

c) Consider the following set of frequent 3-itemsets: **[8]**

{1, 2, 3}, {1, 2, 4}, {1, 2, 5}, {1, 3, 4}, {1, 3, 5}, {2, 3, 4}, {2, 3, 5}, {3, 4, 5}. Assume that there are only five items in the data set.

- i) List all candidate 4-itemsets obtained by the candidate generation procedure in Apriori algorithm.
- ii) List all candidate 4-itemsets that survive the candidate pruning step of the Apriori algorithm.

OR

P.T.O.

Q2) a) Describe the various methods for handling the missing values. [6]

b) Consider the market basket transactions shown below: [6]

Transaction ID	Items-bought
T1	{Mango, Apple, Banana, Dates}
T2	{Apple, Dates, Coconut, Banana, Fig}
T3	{Apple, Coconut, Banana, Fig}
T4	{Apple, Banana, Dates}

Assuming the minimum support of 50% and minimum confidence of 80%

i) Find all frequent itemsets using Apriori algorithm.

ii) Find all association rules using Apriori algorithm.

c) Explain with suitable example. [8]

i) Confusion matrix.

ii) K-Nearest-Neighbor Classifier.

Q3) a) Perform the single and complete link hierarchical clustering using the similarity matrix given below: [6]

	P1	P2	P3	P4	P5
P1	1.00	0.10	0.41	0.55	0.35
P2	0.10	1.00	0.64	0.47	0.98
P3	0.41	0.64	1.00	0.44	0.85
P4	0.55	0.47	0.44	1.00	0.76
P5	0.35	0.98	0.85	0.76	1.00

Show your results by drawing a dendrogram.

- b) Explain with suitable example the k-means algorithm. [7]
- c) Differentiate between Hierarchical and Partitional clustering. [4]

OR

Q4) a) Given two objects represented by the tuples (22, 1, 42, 10) and (20, 0, 36, 8): [4]

- i) Compute the Euclidean distance between the two objects.
- ii) Compute the Manhattan distance between the two objects.

b) What are the requirements of clustering in data mining? [5]

c) Explain the following terms: [8]

- i) Density based clustering.
- ii) Agglomerative hierarchical clustering.
- iii) Grid based clustering.
- iv) Minkowski distance.

Q5) a) Explain the following terms: [6]

- i) Term frequency.
- ii) Stop list.
- iii) Inverse document frequency.

b) Enlist the dimensionality reduction techniques for text. Explain any one of them in brief. [6]

c) What is Weblog records? How it is used in Web usage mining? [5]

OR

- Q6)** a) Explain the following terms: [6]
- i) Precision.
 - ii) Recall.
 - iii) F-Score
- b) Differentiate between Web content and Web usage mining. [6]
- c) Explain Hyperlink-Induced Topic Search (HITS) algorithm. [5]

- Q7)** a) “Reinforcement learning is different from supervised learning”. Justify the above statement. [5]
- b) How different perspectives are represented in multi-perspective learning? [5]
- c) Explain with suitable diagram influence diagram. [6]

OR

- Q8)** a) What are the similarities and differences between reinforcement learning and systematic machine learning? [5]
- b) What are the issues and challenges in big data mining? [5]
- c) Write short note on multi-perspective decision making. [6]



Total No. of Questions : 8]

SEAT No. :

P3558

[Total No. of Pages : 2

[4959] - 1158

B.E. (Computer)

A : Problem Solving With Gamification

(2012 Pattern) (Elective - II)

Time : 2 1/2 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1, Q.2, Q.3 & Q.4 are compulsory.*
- 2) *Solve Q.5 or Q.6, Q.7 or Q.8.*
- 3) *Assume suitable data if required.*

Q1) a) Explain gaming foundations. **[5]**

b) Write any four advantages of Gamification. **[5]**

Q2) a) Explain motivation with its types. **[5]**

b) Explain gamification metrics. **[5]**

Q3) a) Mention and explain different gamed Agencies of Gamification. **[8]**

b) What is Game dynamics? What are building blocks of Gamification. **[8]**

Q4) a) Explain the concept of Gamification.

b) Explain examples of Gamification in Education.

[10]

P.T.O.

- Q5)** a) Explain social Gamification examples. [6]
b) List Gamification companies and their role. [8]

OR

- Q6)** a) List and explain the installation and use of Gamification tools. [8]
b) Explain effective gamification strategies for corporate gaming. [6]

- Q7)** Explain concept of coding basic game mechanics. [10]

OR

- Q8)** Explain 8 Queen problems in Gamification. [10]



Total No. of Questions : 10]

SEAT No. :

P3559

[Total No. of Pages : 2

[4959] - 1159

B.E. (Computer Engineering)

Pervasive Computing

(2012 Pattern) (Elective - II (b))

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., 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) What is Mobile computing? And Pervasive computing. **[6]**

b) Discuss following technologies related to Pervasive Computing: **[4]**

i) Processors.

ii) Displays.

OR

Q2) a) Explain UbiCom systems model and smart DEI. **[6]**

b) Discuss data synchronization principles in Mobile network. **[4]**

Q3) a) Explain WAP for pervasive computing. **[6]**

b) Comment on Natural language interfaces. **[4]**

OR

Q4) a) Explain Human centered Design Life cycle. **[6]**

b) Explain caching in mobility management. **[4]**

P.T.O.

- Q5)** a) What is context aware computing? Explain different building blocks present in context aware middleware. [10]
b) Explain different services that should be provided by middleware in pervasive applications. [8]

OR

- Q6)** a) What is Adaptive Middleware? Explain application aware adaption in detail. [10]
b) Explain advantages and disadvantages of mobile agents. [8]

- Q7)** a) Explain the traditional security issues in pervasive applications. [10]
b) Explain the Distributed Denial of Service attack in detail. [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 Human Intelligence Versus Machine Intelligence. [10]
b) List all and explain any one issues related to Smart Human-Device interactions. [6]

OR

- Q10)** Write Notes on: [16]
a) Wearable computer.
b) Cyber Physical Systems.



Total No. of Questions : 10]

SEAT No. :

P3560

[Total No. of Pages : 2

[4959] - 1160

B.E. (Computer Engineering) (Semester - I) (End Sem.)

Embedded Security

(2012Pattern) (Elective - II)

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. Q.9 or Q.10.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Assume suitable data if necessary.*

Q1) a) Explain any two data breach incident case studies. [6]

b) Define Boot Integrity. [2]

c) Define data breach with an example. [2]

OR

Q2) a) Explain CVSS with it's advantages and limitations. [5]

b) Comment on : open source software best practice as a counter measures to Heartbleed attack. [5]

Q3) a) What is rootkits and explain their types? [4]

b) Explain in detail EPID signature generation & verification algorithm. [6]

OR

Q4) a) Explain working of SIGMA protocol in detail. [6]

b) Explain in brief Intel X86 protection rings with neat diagram. [4]

P.T.O.

- Q5)** a) Explain in detail Architecture for Embedded IPT (Intel Platform Trust Technology). [8]
b) Explain Rooting/Jailbreaking attacks with its type. [8]

OR

- Q6)** a) Explain in detail flow of field programmable fuse task. [8]
b) Explain in brief BIOS and UEFI and attacks on BIOS. [8]

- Q7)** a) Explain in detail Digital Rights Management (DRM). [8]
b) Write a short note on: [8]
i) Intel Wireless Display.
ii) DAL Security Considerations.

OR

- Q8)** a) Explain in detail HDCP (high bandwidth digital content protection). [8]
b) Write a short note on PAVP (protected audio and video path). [8]

- Q9)** a) Explain how embedded security is provided for IOT (Internet of Things). [9]
b) Write a short note on: [9]
Anonymous Authentication and Secure Session Establishment.

OR

- Q10)** a) Explain in detail IOT reference architecture. [9]
b) Write a short note on: [9]
i) Protected Input and Output.
ii) Software guard extension.



Total No. of Questions : 9]

SEAT No. :

P3561

[Total No. of Pages : 3

[4959] - 1161
B.E. (Computer)
Multidisciplinary NLP
(2012Pattern) (Elective - II)

Time : 2 1/2 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.9 is compulsory.*
- 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) *Assume suitable data, if necessary.*

- Q1)** a) With example explain probabilistic parsing. **[4]**
- b) What is rule based parsing? Explain in brief. **[3]**
- c) Define HMM. Explain in brief. **[3]**

OR

- Q2)** a) Draw FST for the words. **[4]**
happy, happier, happiest.
- b) Explain linear regression for maximum entropy models. **[4]**
- c) What is ambiguity in NLP? **[2]**

- Q3)** a) For the following grammar & lexicon **[4]**
- S → NP VP|Aux NP VP | VP
- NP → Det Nominal | proper - noun
- Nominal → Noun | Noun Nominal
- VP → Verb | Verb NP

P.T.O.

Det → that | this | a

Noun → book | flight | meal | money

Verb → book | include

Aux → does

Prop - noun → Houston

Show correct parse tree for the sentence “book that flight” using top down approach.

- b) Enlist various graphical models for sequence labeling. Explain any one in short. [3]
- c) Explain stochastic tagging. [3]

OR

- Q4)**
- a) Enlist & explain any two parsing methods. [4]
 - b) What is finite state transducer (FST) & what is the difference between finite state automation & FST. [3]
 - c) Explain in brief segmentation is discourse processing. [3]

- Q5)**
- a) Explain Acoustic processing of speech. [8]
 - b) Write a note on speech synthesis. [8]

OR

- Q6)**
- a) Write note on physiology of speech production. [8]
 - b) Explain classification of speech sounds. [4]
 - c) Explain applications of speech processing. [4]

Q7) a) Explain what are different Indian language wordnets. What is a Multilingual Dictionary. [10]

b) Explain selectional restriction based disambiguation. [6]

OR

Q8) a) Explain approaches for robust word sense disambiguation. [10]

b) Write note on metaphores. [6]

Q9) Write short notes on (any 3): [18]

a) Sentiment analysis.

b) Machine translation.

c) Cross lingual information retrieval.

d) Question answering system.

e) Text entailment.



Total No. of Questions : 8]

SEAT No. :

P3562

[Total No. of Pages : 3

[4959] - 1162

B.E. (Computer Engineering)

SOFTWARE DESIGN METHODOLOGIES & TESTING

(2012Pattern)

Time : 2 1/2 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 and Q.2 are compulsory. Solve Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.*
- 2) *Assume suitable data if required.*
- 3) *Figures to the right indicate full marks.*

Q1) a) Why is a class diagram important in static modeling? How is it different from an object diagram? **[5]**

b) Draw a sequence diagram for ATM system. **[5]**

Q2) a) Explain synchronous communication pattern in client-server architecture with help of a diagram. **[5]**

b) Explain intent, motivation, structure and consequence of observer pattern. **[5]**

Q3) a) Explain different software testing strategies. **[6]**

b) Is complete testing possible. When to stop testing? What are the test resumption criteria? **[6]**

c) Explain the difference between software verification & validation with an example. **[6]**

OR

P.T.O.

- Q4)** a) What is defect severity? How is it different from defect priority? Explain with an example. [6]
 b) Explain different stages of V test model with neat diagram. [6]
 c) State and explain different software testing principles. [6]

- Q5)** a) Why system testing is required? Explain its type & significance of each. [8]
 b) State and explain different phases of testing. [8]

OR

- Q6)** a) Consider the following program segment. [10]

```

Main()
{
    Int number, index;
        Printf("Enter a number");
        Scanf("%d",&number);
        Index=2;
    While (index<=number-1)
    {
        If(number%index==0)
        {
            Printf("Not a prime number");
            Break;
        }
        Index++;
    }
    If (index==number)
    Printf("prime number");
}

```

- i) Draw the control flow graph for the program.
 ii) Calculate the cyclomatic complexity of the program.
 iii) List all the independent paths.
 iv) Design the test cases for the independent path.
- b) Explain the Equivalence class method of testing with one suitable example. [6]

- Q7)** a) Differentiate between Manual Testing & Automated testing. [8]
b) Explain the features of Selenium & Junit. [8]

OR

- Q8)** a) Explain GUI and Web based application testing. [8]
b) Write a short note on Monkey Talk and highlight its features. [8]



Total No. of Questions : 8]

SEAT No. :

P3563

[Total No. of Pages : 2

[4959] - 1163
B.E. (Computer Engineering)
High Performance Computing
(2012 Pattern)

Time : 2 1/2 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) First Two Questions are Compulsory. Answer three questions. (Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.)*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Assume suitable data if necessary.*

Q1) a) Explain SIMD, MIMD and SIMT architecture. **[4]**

b) Explain basic working principal of VLIW processor. **[6]**

Q2) a) Write a note on IBM Cell Broadband Engine (CBE). **[6]**

b) Write a short note on Dataflow Model. **[4]**

Q3) a) Differentiate between Thread and Process. For Multi threading implementation there is implicit support of architecture. Justify. **[7]**

b) Explain how 'pthread_mutex_trylock' reduce locking overhead? **[8]**

OR

Q4) a) Implement Producer Consumer problem using Mutex synchronization primitives in Pthreads. **[7]**

b) Describe Barrier Synchronization for Shared address space Model. **[8]**

P.T.O.

- Q5)** a) Write a pseudo-code for Parallel Quick Sort. [7]
b) How pivot selection is crucial factor for algorithm performance? [8]

OR

- Q6)** a) Explain sorting network with suitable diagram. [7]
b) Explain single source shortest path algorithm with suitable example. [8]

- Q7)** a) Write a short note on (Any Two): [15]
i) Discrete optimization problems.
ii) Parallel Best-First-Search.
iii) Quantum Computers.
b) Share your thoughts about how HPC will help to promote “MAKE IN INDIA” initiative. [5]

OR

- Q8)** a) Write a short note on (Any Two): [15]
i) Parallel Depth-First-Search.
ii) Search Overhead Factor.
iii) Power Aware Processing.
b) Define term HPC and Elaborate its use to Indian Society. [5]



Total No. of Questions : 10]

SEAT No. :

P4945

[Total No. of Pages : 3

[4959]-1164

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

MOBILE COMPUTING

(2012 Pattern) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

- Q1)** a) What are different technical challenges and limitations of wireless communication? [5]
- b) Why do you think the ciphering key K_c must differ from one call to another? [5]

OR

- Q2)** a) What is Handover? Explain various types of it. [5]
- b) Explain functioning of Cellular network. How the given set of frequencies are used to increase capacity of a network? [5]

- Q3)** a) Describe mobility management with suitable diagram. [5]
- b) Explain the multiple access efficiency of FDMA system. [5]

OR

- Q4)** a) Explain Wireless Communication System with Block Diagram. [5]
- b) Explain HSPA communication standard with its features and Architecture. [5]

- Q5)** a) What is mobile IP explain in detail. [5]
- b) What do you mean by tunneling, encapsulation and de capsulation? [5]
- c) Describe Indirect TCP. Explain the modifications of Indirect TCP as the selective repeat protocol and mobile-end transport protocol. [8]

OR

P.T.O.

- Q6)** a) Explain Mobile TCP. How does a supervisory host send TCP packets to the mobile node and to a fixed TCP connection? Give the advantages and disadvantages of Mobile TCP. [8]
- b) What is Reactive Routing Protocol in MANET? Describe DSR Routing Protocols. [5]
- c) Explain in detail the security threats to a MANET? [5]
- Q7)** a) Show architecture for data dissemination and broadcast. Explain the reason for communication asymmetry in mobile network. [8]
- b) What are the different types of data synchronizations in mobile computing systems? Describe synchronization usage models in mobile applications [8]

OR

- Q8)** a) Describe pull-based data-delivery mechanism. What are the advantages and disadvantages of pull-based data-delivery? [8]
- b) Explain in detail the classification of data delivery mechanism in Mobile Computing. [8]
- Q9)** a) Write short note on the following : [8]
- i) Mobile agent
- ii) Android OS
- b) Explain the role of a gateway in connecting networks using different protocols. Describe a transcoding gateway and its applications in mobile computing systems [8]

OR

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

i) Characteristics of Mobile OS

ii) Mobile File System

b) Describe the functions of a mobile agent. Why does an agent move from tier to tier during an application? Distinguish between an agent and a server. **[8]**



Total No. of Questions : 10]

SEAT No. :

P3565

[Total No. of Pages : 2

[4959] - 1165

B.E. (Computer Engineering)

Web Technology

(2012Pattern) (Elective - III (b)) (Semester - 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) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*

Q1) a) How Home Management can be done using IOT. **[4]**

b) Explain security concern of IOT. **[4]**

c) Write a short note on: Vision of IOT. **[2]**

OR

Q2) a) How IOT helps in Future Industry Development. **[4]**

b) Explain privacy policies in IOT. **[4]**

c) Write short Note on : IOT Standardization. **[2]**

Q3) a) Write IOT Applications. **[4]**

b) Defend : Smart cities via Data Aggregation. **[6]**

OR

Q4) a) Explain Data Management in IOT. **[6]**

b) Short note : Value Creation from Big Data and Serialization. **[4]**

P.T.O.

- Q5)** a) Justify importance of Standardization in IOT. [6]
b) Explain Research Roadmap for IOT Testing Methodologies. [6]
c) Lists the IOT semantic interoperability challenges. [6]

OR

- Q6)** a) Why is the OGC involved in Sensor Webs for IOT? [6]
b) Explain the need of common architectural ground for IOT. [6]
c) Write short note on: M2M service layer standardization. [6]

- Q7)** a) Identity management in IOT. [6]
b) Differentiate user-centric identity management and device-centric identity management. [6]
c) Explain high level view of Local Identity Management model. [4]

OR

- Q8)** a) Write short note on: Federated Identity and Global Web Identity. [6]
b) Elaborate identity portrayal in IOT. [6]
c) With diagram explain Identifier format for things. [4]

- Q9)** a) Explain the challenges of authentication in IOT. [8]
b) Explain different web of trust model with respect to : Web services security, SAML approach and Fuzzy approach for Trust. [8]

OR

- Q10)** a) Explain the trust management life cycle. [8]
b) Explain the relationship between trust and access control. [6]
c) Write short note on : SAML components. [2]



Total No. of Questions : 10]

SEAT No. :

P3566

[Total No. of Pages : 2

[4959] - 1166

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

CLOUD COMPUTING

(2012Pattern) (Elective - III (c))

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

Q1) a) Write a short note on open nimbus architecture. **[4]**

b) Explain role of networking in cloud computing. **[6]**

OR

Q2) a) Explain service models of cloud computing in detail. **[6]**

b) Write a short note on Vmware architecture. **[4]**

Q3) a) Write a short note on: **[6]**

i) OS level virtualization.

ii) Application level virtualization.

b) Differentiate between SAN and NAS. **[4]**

OR

Q4) a) Elaborate HDFS architecture in detail. **[6]**

b) Write a short note on HBase. **[4]**

P.T.O.

- Q5)** a) Explain virtual machine life cycle in detail. [6]
b) Explain virtual machine provisioning process in detail. [6]
c) Elaborate benefits of converged infrastructure. [4]

OR

- Q6)** a) Explain anatomy of cloud infrastructure. [8]
b) Explain virtual machine migration techniques in detail. [8]

- Q7)** a) Differentiate between “Classical” HPC and HPC in cloud environments. [6]
b) Compare performance of HPC system and HPC on clouds. [6]
c) Explain key components of SLA. [6]

OR

- Q8)** a) Elaborate cloud service life cycle phases in detail. [6]
b) Explain the phases of SLA management of application hosted on cloud platform. [6]
c) Write a short note on SOAP versus REST. [6]

- Q9)** a) Explain virtualization software security in detail. [8]
b) Explain threads in cloud computing. [8]

OR

- Q10)** a) Explain IaaS Host security in detail. [8]
b) Explain identity life cycle management phases in detail. [8]



Total No. of Questions : 10]

SEAT No. :

P3567

[Total No. of Pages : 2

[4959] - 1167

B.E. (Computer Engineering)

Cyber Security (d)

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

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, Q.9 or Q.10.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) Explain the Operational Model of Network Security in detail. [5]
- b) Using hill cipher encrypt plain text "COE" use key "ANOTHERBZ". [5]

OR

- Q2)** a) Describe linear and differential cryptanalysis with suitable example. [5]
- b) What is Transposition Cipher? Use Transposition Cipher to encrypt the plain text "WE ARE THE BEST" use key "HEAVEN". [5]
- Q3)** a) Explain 3 DES algorithm in detail. [5]
- b) Explain the operation of Kerberos. [5]

OR

- Q4)** a) Explain various public key distribution approaches. [5]
- b) Explain Digital Signature Standard. [5]

P.T.O.

- Q5)** a) What is Backdoors and Key Escrow in PGP? [9]
b) Describe IPsec protocol with its components and security services. [8]

OR

- Q6)** a) Explain OAKLEY key determination protocol. [6]
b) What is secure Electronic Transaction? [6]
c) Explain Secure Socket Layer handshake protocol in brief. [5]

- Q7)** a) What are the challenges of intrusion detection? [6]
b) List and explain any two password management practices. [6]
c) What are the various characteristics of firewall. [5]

OR

- Q8)** a) Explain Architecture of firewall. [6]
b) Explain Anomaly-based Intrusion Detection System. [6]
c) What is Trusted System? [5]

- Q9)** a) What is SIP scanning in VoIP attack? State its counter measure. [7]
b) Identifying wireless network defenses and countermeasures. [7]
c) What is hacking? Explain mobile hacking. [2]

OR

- Q10)** a) How various wireless devices targeted by hackers in hacking the wireless network. [7]
b) What is USB U3 hacking. [7]
c) What is input validation attack. [2]



Total No. of Questions : 10]

SEAT No. :

P3568

[Total No. of Pages : 3

[4959] - 1168

B.E. (Computer Engineering)
BUSINESS ANALYTIC & INTELLIGENCE
(2012Pattern) (Elective - IV (A)) (Semester-II)

Time : $2\frac{1}{2}$ 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) What are the challenges to make Business Intelligence system successful in an Organization? **[5]**

b) What is the role of mathematical model in Business Intelligence? **[5]**

OR

Q2) a) Explain various data mining techniques in Decision Support System. **[5]**

b) What is ad-hoc query analysis? Explain how Business Intelligence can help in solving ad-hoc queries. **[5]**

Q3) a) Explain “Descriptive Business Analytics” in detail. **[5]**

b) Explain how concept hierarchy can be built and used in OLAP operations, for a dimension “location of customers” database in a data warehouse. **[5]**

OR

Q4) a) Write a short note on Distributed Data Warehouse. **[5]**

b) Explain “Snowflake schema” with suitable example. **[5]**

P.T.O.

- Q5)** a) What is the need of data pre-processing? Explain various data reduction techniques. [5]
- b) Explain the methods of measuring dispersion of data with examples. [6]
- c) What is data normalization in data pre-processing? Explain following data normalization methods with example. [6]
- i) Min-Max normalization.
- ii) Decimal Scaling normalization.

OR

- Q6)** a) What are outliers? Explain various outlier detection methods with suitable example. [8]
- b) Explain Drill Down, Dice and Pivot operations with example. [6]
- c) Define and differentiate between ROLAP and MOLAP. [3]
- Q7)** a) Explain various requirements to set up Business Intelligence infrastructure. [6]
- b) Explain the need of “Availability” in Business Intelligence infrastructure. [6]
- c) Write a short note on “Business Continuity”. [5]

OR

- Q8)** a) Describe various steps in designing Business Intelligence System. [6]
- b) Explain the concept and importance of managing Business Intelligence systems. [6]
- c) How to handle challenges involved in implementing BI infrastructure for an organization? [5]

- Q9) a)** Write a short note on: **[8]**
- i) Data Analytics.
 - ii) ERP.
- b) Explain the application of Business Intelligence for Retail Shop Management. **[8]**

OR

- Q10) a)** Explain the application of Business Intelligence for Finance management in an organization. **[8]**
- b) Assume the appropriate database about physical fitness of university students. Name which business intelligence technique(s) can be used to detect physically “very strong” and “very weak” players. Explain the technique (s) in detail. **[8]**



Total No. of Questions : 10]

SEAT No. :

P4546

[Total No. of Pages : 4

[4959] - 1169

B.E. (Computer)

**OPERATION RESEARCH FOR ALGORITHMS IN SCIENTIFIC
APPLICATIONS (Elective - IV(b))
(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) a) State and Explain stages of Development of Operations Research. [5]

b) Solve following LP Problem graphically.

Maximize $Z = 3x_1 + 5x_2$ subject to restrictions

$x_1 + 2x_2 \leq 2000, x_1 + x_2 \leq 1500, x_2 \leq 600$ and $x_1, x_2 \geq 0$ [5]

OR

Q2) a) Formulate the following problem as linear programming problem. A company produces two types of Hats. Each hat of first type requires twice as much labour time as the second type. If all hats are of second type only, the company can produce a total of 500 hats a day. The market limits daily sales of first and second type to 150 and 200 hats. Assume that profits per hat are Rs. 8 for first type and Rs. 5 for second type. [5]

b) State and Explain North-West Corner rule to obtain initial basic feasible solution of a transportation problem. [5]

Q3) a) Solve following LP Problem using Simplex Method

Maximize $Z = x_1 + 2x_2 + x_3$ subject to the constraints

$2x_1 + x_2 - x_3 \leq 2, -2x_1 + x_2 - 5x_3 \geq -6, 4x_1 + x_2 + x_3 \leq 6$ and $x_1, x_2, x_3 \geq 0$ [5]

b) Explain step by step procedure of Hungarian method to solve Assignment problem. [5]

P.T.O.

OR

Q4) a) What are the characteristics of Standard form of Linear Programming Problem? [5]

b) Obtain an initial basic feasible solution, using the north-west corner rule for the following transportation problem. [5]

	Demand 1	Demand 2	Demand 3	Demand 4	Availability
Source 1	6	8	8	5	30
Source 2	5	11	9	7	40
Source 3	8	9	7	13	50
Demand	35	28	32	25	120

Q5) a) Explain relevance of Queuing system for computer programming. Explain the terms pure Birth and Pure Death Models. What is Kendall notation? [8]

b) Visitors' parking at a college is limited to five spaces only. Cars making use of this space arrive according to Poisson distribution at the rate of six cars per hour. Parking time is exponentially distributed with a mean of 30 minutes. Visitors who cannot find an empty space on arrival may temporarily wait inside the lot until a parked car leaves. That temporary space can hold only three cars. Other cars that cannot park or find a temporary waiting must go elsewhere. Determine the following. [10]

- i) The probability, p_n , of n cars in the system.
- ii) The Effective arrival rate for cars that actually use the lot.
- iii) The average number of cars in the lot.
- iv) The average time a car waits for a parking space inside the lot.
- v) The average number of occupied parking spaces.
- vi) The average utilization of the parking lot.

OR

Q6) a) Define following terms with respect to game theory [6]

- i) Pure strategy
- ii) Mixed strategy
- iii) Payoff matrix

- b) Find the range of values of 'P' and 'Q' with the entry (2,2) as a saddle point for given matrix representation of a game. [6]

	Player B		
Player A	2	4	5
	10	7	Q
	4	P	6

- c) Consider the following pay-off table [6]

Acts	Events			
	E1	E2	E3	E4
A1	40	200	-200	100
A2	200	0	200	0
A3	0	100	0	150
A4	-50	400	100	0

Probabilities of events are $P(E1) = 0.2$, $P(E2) = 0.15$, $P(E3) = 0.4$, $P(E4) = 0.25$. Calculate expected pay-off and the expected loss of each action.

- Q7) a) Draw the network diagram and determine the critical path for the following project activities specifications. [10]

Activity	Time Estimate (Weeks)
1 - 2	5
1 - 3	6
1 - 4	3
2 - 5	5
3 - 6	7
3 - 7	10
4 - 7	4
5 - 8	2
6 - 8	5
7 - 9	6
8 - 9	4

- b) What are major assumptions for Programme Evaluation and Review Technique (PERT)? How those are useful for measure of certainty?[6]

OR

- Q8)** a) Explain how time of an activity is estimated in PERT. Explain the measure of certainty in PERT. [8]
b) Explain the terms with reference to CPM [8]
i) Event ii) Predecessor event iii) Successor event
iv) Activity v) Dummy activity vi) Network

- Q9)** a) Explain mathematical model of Bellman's Principle. [8]
b) Write a note on Applications of Dynamic Programming. [8]

OR

- Q10)**a) Explain following concepts with respect to Dynamic Programming[8]
i) Principle of Optimality ii) State iii) Stage
b) Describe applications of Operations Research in Bio-technology field.[8]



Total No. of Questions : 10]

SEAT No. :

P3569

[Total No. of Pages : 3

[4959] - 1170

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

MOBILE APPLICATIONS

(2012 Pattern)

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, 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 following mobile platform in detail. **[6]**

- i) Android.
- ii) iOS.

b) Describe in detail XML and JSON. **[4]**

OR

Q2) a) Explain the benefits of using mobile applications. **[4]**

b) What is WML? Explain WML Commands used in FORM. **[6]**

Q3) a) Explain Fragmentation display with respect to the following parameters **[6]**

- i) Resolution.
- ii) Aspect Ratio.
- iii) Device pixel ratio.

b) Differentiate between Emulators and Simulators. Any four points. **[4]**

OR

P.T.O.

- Q4)** a) What strategy you will apply while designing and developing a Mobile App? [6]
b) Explain WCSS marquee extension with the help of attributes. [4]

- Q5)** a) Which are the predefined shapes supported by Scalar Vector Graphics (SVG)? [6]
b) Write a short note on: [6]
i) User agent spoofing.
ii) HTTP Sniffing.
c) Write a short note on Wireless Universal Resource File (WURFL). [4]

OR

- Q6)** a) Explain in detail the Architecture of Web App development with suitable diagram. [6]
b) Explain in detail problems and solutions associated with Mobile Device Detection. [6]
c) Differentiate between SVG and Canvas. [4]

- Q7)** a) Write a short note on J2ME and tools for J2ME programming. [6]
b) Which JAVA SCRIPT Framework is used in Mobile Application Development? Explain any one. [6]
c) What is DOM? Explain with suitable examples. [4]

OR

- Q8)** a) Explain the following Java Script Debugging types [6]
i) Server Side Debugging.
ii) Client Side Debugging.
b) Explain any two Java Script Libraries. [6]
c) List out Java Script UI Patterns. [4]

- Q9)** a) Explain Web Sockets in detail. Write the code for Web Socket constructor Web Socket connection. [9]
- b) Write a short note on: [9]
- i) Global Positioning System (GPS).
 - ii) Assisted Global Positioning System (AGPS).
 - iii) WiFi Positioning System.

OR

- Q10)** a) Explain the following: [9]
- i) AJAX.
 - ii) Server Sent Events.
 - iii) Web Sockets.
- b) Write a short note on: [9]
- i) W3C Geolocation API.
 - ii) GSMA one API.
 - iii) Web Storage.



Total No. of Questions : 10]

SEAT No. :

P3570

[Total No. of Pages : 4

[4959] - 1170B

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

**Programming Paradigms for Complex Problems - Case Studies in Python
(Open Elective) (2012 Pattern)**

Time : 2 $\frac{1}{2}$ 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.*
- 3) *Neat diagrams must be drawn whenever necessary.*

Q1) a) Describe the following approaches of expression evaluation with respect to functional programming languages. **[6]**

- i) Innermost evaluation.
- ii) Selective evaluation.
- iii) Outermost evaluation.

b) Create a dictionary named `member_table` that contains user's email address as keys, and their current password as values. Write a function that generates a temporary new password for a given user and updates it in the table. **[4]**

OR

Q2) a) Explain the following list functions with suitable examples: **[4]**

- i) `append`.
- ii) `count`.
- iii) `insert`.
- iv) `pop`.

P.T.O.

b) Find output of following GOFER statements and comment on feature of functional programming covered in the statement. [6]

i) $\text{add}(x,y)=x+y$

$\text{inc}(y)=\text{add}(1,y)$

? $\text{inc}.2$

ii) ? $\text{len}.[1/0,4,5]$

iii) $f = \lambda x \rightarrow x + 1$

$g = \lambda x \rightarrow x - 1$

? $f.3$

? $g.3$

? $f.(g.3)$

Q3) a) Differentiate between following programming paradigm [6]

i) Functional and Declarative.

ii) Functional and Object oriented.

iii) Imperative and Declarative.

b) Write a python program to arrange string in alphabetical order. [4]

OR

Q4) a) Differentiate between essential state and incidental state of object. [4]

b) What do you mean by type inference? Consider functional composition, defined by the equation $(.) f g x = f (g x)$ [6]

describe the process of type inference with the help of

i) Application rule.

ii) Equality rule.

iii) Functional rule.

- Q5)** a) Give a recursive definition of binomial coefficients. Write a python program for selecting 'p' players from 'n' players. [6]
- b) What is recursive data structure? Explain any three recursive data structure. [8]
- c) Write a recursive python program for Reversing a list. [4]

OR

- Q6)** a) Write a python program for generating and traversing a binary tree. [8]
- b) Write a program to find length of a string. [4]
- c) With suitable example, Explain the concept of recursion at TAIL. [6]

- Q7)** a) Write a Python program to maintain reservations for vehicle rental agency. The Agency rents out three types of vehicles namely cars, vans and moving trucks. The program should allow user to check for available vehicle, request rental charges by vehicle type, get the cost, of renting a particular type vehicle for specified period of time, and make reservations. [8]
- b) With the help of suitable example, Explain the concept of Decorator and Generator of python. [8]

OR

- Q8)** a) Write a python class named 'FRACTION' consisting of two private variable namely numerator and denominator. Write a program using operator overloading for following operations on fraction numbers. [8]
- i) Addition.
- ii) Subtraction.
- iii) Multiplication.
- iv) Negation.
- b) With suitable examples, write short notes on following object oriented concepts using python. [8]
- i) Adding attributes dynamically.
- ii) Data hiding.
- iii) Constructor.
- iv) Inheritance.

Q9) a) Explain following statement with respect to importing packages to application programs. [6]

- i) `from package import item.`
- ii) `import item.subitem.subitem.`
- iii) `from package.subpackage import*.`

b) Write short note on Virtual environment and version control in python. [6]

c) How is the reload function related to import works? [4]

OR

Q10) a) Where does python look for files to import? [8]

b) Write equivalent statements of “from module import name1, name2”. [4]

c) What is use of packages? [4]



Total No. of Questions :10]

SEAT No. :

P3530

[4959]-1170C

[Total No. of Pages :2

B.E. (Computer Engg.)

CONCURRENCY ON OPEN SOURCE SYSTEMS

(Elective - IV) (Open Elective)

(2012 Pattern) (Semester -II) (End Semester) (410452D)

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, or Q.7 or Q.8, and 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 concurrency in sequential and distributed computing. **[5]**

b) Explain Android approach to program expression. **[5]**

OR

Q2) a) Explain system software support for converting program expressions to realize program execution model. **[5]**

b) Explain clocking problem in distributed systems. **[5]**

Q3) a) Explain Android architecture. **[4]**

b) Explain deadlocks and starvation of resources in concurrent system. **[6]**

OR

Q4) a) Explain Cigarette Smokers problem. How it is solved using semaphores? **[5]**

b) Explain how RPC is used in concurrent systems. **[5]**

P.T.O.

- Q5)** a) Explain shared memory architectures with example. [10]
b) Compare shared memory programming with distributed memory programming. [8]

OR

- Q6)** a) Explain communicating processes in concurrent system. [6]
b) Explain how client server systems are implemented using RMI. [6]
c) Explain message passing in client server systems. [6]

- Q7)** a) Explain sequential computing. State its drawbacks. [8]
b) Explain graph theoretic models of deadlock. [8]

OR

- Q8)** a) Explain distributed computing. List its advantages. [8]
b) Explain operational semantics of the calculus of communicating systems. [8]

- Q9)** a) Explain CSP primitives and algebraic operators. [6]
b) Model bully algorithm for election using CSP. [10]

OR

- Q10)** a) Explain CSP model of clock synchronization problem. [10]
b) What are the advantages of using CSP model? [6]



Total No. of Questions : 10]

SEAT No. :

P4514

[Total No. of Pages : 2

[4959]-1171

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

PROCESS DYNAMICS & CONTROL

(2012 Pattern) (End Semester)

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) Derive transfer function of single tank liquid level system and obtain time-domain equation for the process if input is given a step change. [6]
b) Develop the transfer functions of two non-interacting tanks placed in series. [4]

OR

- Q2)** a) What are the relative advantages and disadvantages of the proportional, integral and derivative control action? [5]
b) Discuss the effect of Proportional controller on the response of a controlled process given $G_m(S) = 1$, $G_f(S) = 1$, $G_p(S) = 1/(\tau_p S - 1)$. [5]

- Q3)** a) Explain Cohen-Coon technique of controller tuning using process reaction curve. [5]
b) The characteristics equation for a control system is [5]
$$s^4 + 4s^3 - 6s^2 + 4s + (1 + K) = 0$$

Using Routh test (i) Determine the value of K above which the system is unstable. (ii) Determine the value of K for which two of the roots are on the imaginary axis and determine the values of these imaginary roots.

- Q4)** Sketch the root locus for the following transfer function. [10]

$$G(s) = \frac{K}{s^2(s^2 + 2s + 2)}$$

P.T.O.

- Q5) a)** Sketch the Nyquist diagram for P1 controller. [8]
 b) Sketch the Bode plot for an open loop transfer function with the following dynamic components. [10]

$$G_p(s) = \frac{1}{s+1} \quad G_m(s) = \frac{0.95}{0.01s+1} \quad G_c(s) = 10 \quad G_f(s) = 1$$

OR

- Q6) a)** Explain Ziegler - Nichols tuning technique. [6]
 b) Using Bode stability criterion, find whether the following open loop transfer function is stable. [12]

$$G_{OL} = \frac{10e^{-3s}}{4s+1}$$

- Q7) a)** What are the relative advantages and disadvantages of feed forward and feedback control action? [8]
 b) Explain ratio control with a neat sketch. [8]

OR

- Q8)** Discuss in detail with a neat sketch of the following : [16]
 a) Cascade control system for distillation columns.
 b) Split range control of the pressure in steam header.

- Q9) a)** Write a short note on [8]
 i) PLC & DCS
 ii) Role of digital computers in process control
 b) Explain sampling of continuous signals to discrete time signals. [8]

OR

- Q10)** What is plant wide control? Explain with suitable example. [16]



Total No. of Questions : 10]

SEAT No. :

P3571

[Total No. of Pages : 2

[4959] - 1172
B.E. (Chemical)
Chemical Reaction Engineering - II
(2012Pattern) (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, 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) Explain kinetic regimes for mass transfer and reaction for fluid-fluid reaction in detail. **[10]**

OR

Q2) a) Explain unreacted core model for spherical particles of unchanging in size in detail. **[5]**

b) Explain 'Film Conversion Parameter'. **[5]**

Q3) a) Give the characteristics of the catalysis. **[5]**

b) Explain pore volume and solid density. **[5]**

OR

Q4) Explain the 'pore volume distribution' in the catalyst in detail. **[10]**

Q5) Explain the following term: **[18]**

- a) Surface diffusion.
- b) Gaseous diffusion.
- c) Mass transfer with reaction in porous catalyst.

OR

P.T.O.

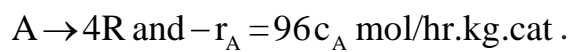
Q6) Derive the effectiveness factor of cylindrical pore catalyst. Also explain the testing method of pore resistance in the porous catalyst. [18]

Q7) a) Explain the experimental methods for finding the rates of solid-catalysed reaction. [8]

b) Explain the mechanism of fluid-solid catalytic reaction. [8]

OR

Q8) Determine the amount of catalyst needed in a packed bed reactor for 35% conversion of A to R for a feed rate of 2000 mol/hr of pure A at 3.2 atm and 117°C temperature for the reaction.



The amount of catalyst needed can be calculated for the following conditions:

a) Reactor with very large recycle rate, and

b) Reactor with no recycle rate.

[16]

Q9) a) Derive the M-M kinetic equation. [8]

b) Explain the fluidized bed reactor in detail. [8]

OR

Q10) a) Explain the procedure for determining the M-M kinetic constants in a batch or plug flow reactor. [8]

b) Explain slurry reactor in detail. [8]



Total No. of Questions : 10]

SEAT No. :

P3572

[Total No. of Pages : 3

[4959] - 1173
B.E. (Chemical)
CHEMICAL ENGINEERING DESIGN - II
(2012 Pattern) (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, 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 the column diameter of a plate column for the following specifications
Feed stream : 10% w/w acetone in aqueous stream, 20°C, 13000 kg/h. No. of theoretical stages 16, slope of bottom operating line = 5, slope of top operating line = 0.57, $X_D = 0.94$ (98% w/w), $X_W = 50$ ppm, $R = 1.35$, plate efficiency = 60%, plate pressure drop = 100 mm, Vapor density at bottom = 0.72 kg/m³, liquid density at bottom = 954 kg/m³, surface tension at bottom = 57×10^{-3} N/m, Vapor density at top = 2.05 kg/m³, liquid density at bottom = 753 kg/m³, surface tension at top = 23×10^{-3} N/m, surface tension at bottom = 57×10^{-3} N/m, $K_{1\text{top}} = 0.09$ and $K_{1\text{Bottom}} = 0.075$. **[10]**

OR

- Q2)** a) Explain in detail Cornell's method. Give the necessary equations. **[8]**
b) What is the function of weir on a plate and what is effect of weir height on column performance? **[2]**

Q3) a) The following data are obtained for a packed column used for absorption: **[8]**

mG_m/L_m	0.5	0.6	0.7	0.8	0.9	1.0
N_{OG}	4.8	5.2	6.5	8.0	10.8	19.0

Select the optimum value of mG_m/L_m and give reasons.

- b) What are the various areas on a plate? **[2]**

P.T.O.

OR

- Q4) a)** 30 kg/sec of water is to be transported through a steel pipeline to a location 2km away. The frictional pressure drop across the pipeline is 50,000 N/m². Find the diameter of the pipeline. Roughness of pipeline is 4.1×10^{-5} . Density = 995 kg/m³, viscosity of water 0.8×10^{-3} N.s/m² [4]
- b) What are the different types of pipe supports? [6]

- 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 the desirable properties of a piping material? [8]

OR

- Q6) a)** What are the major considerations in pipeline design for transportation of crude oil? [8]
- b) Water is to flow through a pipeline with 25mm I.D. for a distance of 2km. The pressure drop = 10m of water. Density of water = 1000 kg/m³, viscosity of water = 1mNs/m². Estimate the flow rate of water through the pipeline. [8]

- Q7) a)** What is Dowtherm? Explain its uses. [6]
- b) What is the need for treating water for use in a boiler? [6]
- c) Explain the functioning of a tube type boiler. [6]

OR

- Q8)** a) What is process air and instrument air? [6]
b) What are the various instruments required for boilers? [6]
c) What is the importance of dryness of steam? [6]

- Q9)** a) What are start up and shut down procedures in a plant? Explain in detail. [8]
b) Write about pump maintenance. [8]

OR

- Q10)** a) Write in detail about HAZAN studies. [8]
b) Write a note on safety measures in process industries. [8]



Total No. of Questions : 10]

SEAT No. :

P3992

[4959]-1174

[Total No. of Pages : 2

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(2012 Course) (Semester - I) (Elective - I) (409344A)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) Answer any 5 questions.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Assume suitable data, if necessary.*
- 4) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.*

Q1) Define air pollution standards and discuss effect of particulate matter on vegetation. **[10]**

OR

Q2) Discuss the environmental impact of thermal energy. **[10]**

Q3) Explain the MPCB standards for PM. **[10]**

OR

Q4) Explain sampling train. **[10]**

Q5) Explain the Spray Tower with neat figure. **[16]**

OR

Q6) Explain the removal of Nox by dry method with neat labeled figure. **[16]**

Q7) Explain the effect of water pollutants. **[18]**

OR

P.T.O.

Q8) Discuss Oxygen Sag curve and derive Streeter Phelps Equation. [18]

Q9) What is Photo catalytic reactor? Explain the industrial use of it. [16]

OR

Q10) How to recover materials from waste? Explain with suitable example. [16]

x x x

Total No. of Questions : 10]

SEAT No. :

P3573

[Total No. of Pages : 2

[4959] - 1175

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

Membrane Technology

(2012Pattern) (Elective - I)

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, 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) State advantages and limitations of membrane separation process over conventional separation process. **[5]**

b) State industrial applications of membrane technology. **[5]**

OR

Q2) Explain the following methods of preparation of membrane: **[10]**

a) Sintering.

b) Stretching.

Q3) Explain construction and working of the following membrane modules used in membrane separation processes: **[10]**

a) Tubular module.

b) Hollow fiber module.

OR

Q4) Explain the following phase inversion techniques used for preparation of membranes: **[10]**

a) Precipitation by solvent evaporation.

b) Precipitation by controlled evaporation.

P.T.O.

Q5) a) Explain Boundary layer film model used for concentration polarization of membrane. [8]

b) Explain concentration polymerization in Gas separation process. [10]

OR

Q6) a) What is membrane fouling? State the source of fouling and methods to reduce fouling. [8]

b) Derive the expression for polarization modules (m) in the form [10]

$$M = \frac{\exp(Jvf \cdot \delta / Di)}{1 + Eo [\exp(Jvf \cdot \delta / Di) - 1]}$$

Q7) Explain application of reverse osmosis in following: [16]

a) Desalination of brackish and sea water.

b) Getting ultrapure water.

OR

Q8) Explain application of micro filtration in following: [16]

a) Sterile filtration of pharmaceutical.

b) Sterilization of wine and beer.

Q9) Explain application of gas separation in following: [16]

a) Natural gas separation.

b) Vapor gas separation.

OR

Q10) Explain application electrodyalisis in following: [16]

a) Salt recovery from sea water.

b) Electrode ionization.



Total No. of Questions : 10]

SEAT No. :

P3993

[4959]-1176

[Total No. of Pages : 2

B.E. (Chemical)

CORROSION ENGINEERING

(2012 Course) (Elective - I) (409344C)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

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

- Q1)** a) Define the term corrosion and differentiate it from erosion. [5]
- b) How much rust ($\text{Fe}_2\text{O}_3, \text{H}_2\text{O}$) will be formed when 100 kg iron completely rusted. [5]

OR

- Q2)** a) Discuss the different types of corrosion that we commonly come across. [5]
- b) Explain conditions required for electrochemical corrosion. [5]
- Q3)** a) Explain the two important factors that influence the corrosion of metals? [5]
- b) Mention the theories of corrosion and explain any one of them. [5]

OR

- Q4)** a) Distinguish between wet and dry corrosion. [5]
- b) What are the differences between EMF and Galvanic Series. [5]

P.T.O.

- Q5)** a) How does the corrosion product influence further corrosion. [8]
b) What are the factors that influence corrosion. [8]

OR

- Q6)** a) Explain electrochemical theory of corrosion with suitable example. [8]
b) Explain the control of corrosion by the use of sacrificial anode. [8]

- Q7)** Write note on [16]
a) pilling –Bedworth rule
b) galvanic corrosion
c) concentration cell corrosion

OR

- Q8)** Write note on [16]
a) pitting corrosion
b) passivity
c) inter-granular corrosion

- Q9)** a) Discuss about the use of inhibitors in corrosion control. [9]
b) Explain the process of electroplating with a suitable example. Mention the uses of electroplating. [9]

OR

- Q10)** a) Discuss various methods of corrosion control. [9]
b) Give difference between galvanizing and tinning. [9]

x x x

Total No. of Questions : 10]

SEAT No. :

P4547

[Total No. of Pages : 2

[4959] - 1177

B.E. (Chemical Engineering)

d : PETROLEUM REFINING (Elective - I)

(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) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

Q1) a) Explain specifications of various petroleum products? **[6]**

b) Why is it necessary to refine crude oil? **[4]**

OR

Q2) Explain various pre-refining operations? **[10]**

Q3) What is cracking operation? Differentiate between thermal cracking and catalytic cracking? **[10]**

OR

Q4) a) Describe reforming process with schematic diagram? **[6]**

b) Explain heating through exchanger and pipe still heaters? **[4]**

Q5) Explain manufacturing of Bitumen in detail. **[16]**

OR

Q6) a) Explain properties of lube oil? **[6]**

b) Explain solvent extraction process in lube oil? **[10]**

P.T.O.

Q7) Describe HDM process with neat schematic diagram. Discuss merits and demerits of process in detail? [16]

OR

Q8) a) Explain environmental pollution aspects in refinery? [8]

b) Explain sulfur recovery in refinery? [8]

Q9) What is importance of blending and additives in the petroleum products? Discuss in brief about the additives for gasoline and diesel. [18]

OR

Q10)a) Explain marketing of petroleum products? [10]

b) How safety is prime concern in any refinery? [8]



Total No. of Questions : 10]

SEAT No. :

P3994

[4959]-1178

[Total No. of Pages : 2

B.E. (Chemical)

**a-CHEMICAL PROCESS SYNTHESIS
(2012 Course) (End Sem) (Semester - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

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

SECTION - I

Q1) a) Explain two approaches to chemical process design. **[5]**

b) Explain in short overall process design. **[5]**

OR

Q2) Explain the effect of reactor pressure on the reactor volume and selectivity. **[10]**

Q3) Explain the role of reactor concentration on equilibrium conversion with suitable example. **[10]**

OR

Q4) Discuss three stage evaporator. **[10]**

Q5) a) Discuss thermal coupling for direct and indirect distillation sequencing. **[8]**

b) Explain heat integration in sequencing of simple distillation column. **[8]**

OR

P.T.O.

Q6) a) Explain direct and indirect sequences of simple distillation columns for a three component separation. [8]

b) Discuss thermal coupling of the prefractionator arrangement. [8]

Q7) a) Explain integration of refrigeration cycles. [8]

b) Explain heat recovery problem with one hot stream and one cold stream with appropriate example. [8]

OR

Q8) a) Discuss overall heat exchanger network and utilities. [8]

b) Discuss integration of heat pump. [8]

Q9) a) Explain the serveso reaction system. [9]

b) What is vapor cloud explosion. [9]

OR

Q10) Write short note on

a) Quantitative measures of inherent safety. [9]

b) Toxic release. [9]

x x x

Total No. of Questions : 10]

SEAT No. :

P4946

[Total No. of Pages : 2

[4959]-1179

B.E. (Chemical Engineering)

(B) INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

(2012 Pattern) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

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

Q1) Write short notes on : **[10]**

- a) Intrapreneur
- b) Manager

OR

Q2) Role of Entrepreneur in Indian economy. **[10]**

- Q3)** a) Explain Business planning process. **[6]**
- b) Explain various commercial schemes offered for Entrepreneurial Venture. **[4]**

OR

Q4) Explain in details : **[10]**

- a) District Industries Centres (DIC)
- b) National Entrepreneurship Development Board (NEDB)

Q5) Explain the five stages of team development described by Tuckman. **[16]**

OR

P.T.O.

- Q6)** a) Explain Business communication and communication process. [8]
b) Explain the Hierarchy of needs given by Abraham Maslow. [8]

Q7) Elaborate on computer based project management. [16]

OR

- Q8)** a) Explain the following : [8]
i) Adding resources to the model
ii) Resource management & crashing
b) Elaborate a case study of a project involving various resources, timeline & costs. [8]

Q9) Explain in detail marketing and marketing management. What is the various marketing research for new product marketing. [18]

OR

- Q10)** Explain the following (Any three) : [18]
a) Channel of Distribution
b) Promotion and pricing
c) Integrated marketing communications
d) Product and brand management



Total No. of Questions : 10]

SEAT No. :

P3995

[4959]-1180

[Total No. of Pages : 3

B.E. (Chemical)

**c-PIPING DESIGN AND ENGINEERING (Elective - II)
(2012 Course) (Semester - I) (409345) (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 indicate full marks.*
- 4) *Assume suitable data if necessary.*

Q1) a) Explain the role of piping engineer in Construction and Commissioning phase of a chemical process? **[5]**

b) Discuss the three methods used for sizing of Rupture Disk as per ASME code? **[5]**

OR

Q2) a) Explain the pipe sizing procedures based on the different criteria? **[7]**

b) Discuss the economic pipe sizing with least annual cost approach? **[3]**

Q3) a) Which are the different elements alloyed in carbon steel for modifying its chemical composition to obtain the desired mechanical and physical properties? **[6]**

b) Discuss in detail with working principle and types of Balance bellows PRV? **[4]**

OR

Q4) a) What are the selection criteria for gaskets? **[4]**

b) Discuss the different guidelines in selecting a suitable valve for any application? **[6]**

P.T.O.

- Q5) a)** Discuss the significance of Churchill and Swamee-Jain equation for calculation of friction factor in Compressed-Air Piping Systems? A pipe is to be designed to carry 150 CFM free air at 100 psig and 80°F. If the pressure loss must be limited to 5 psi per 100 ft of pipe, what is the minimum pipe diameter required? [8]
- b) Explain the types of two phase flow and their characteristics linear velocity? [8]

OR

- Q6) a)** Calculate the friction factor and transmission factor using the Colebrook-White equation for a 16-in (0.250-in wall thickness) gas pipeline at a flow rate of 100 MMSCFD. Flowing temperature = 80°F, gas gravity = 0.6, viscosity = 0.000008 lb/(ft.s), base pressure = 14.73 psia, and base temperature = 60°F. Assume a pipe internal roughness of 600 microinches. [8]
- b) Discuss the concept of Deposition Velocity? Calculate the deposition velocity of a heterogeneous slurry with a solid specific gravity of 3.0 in water, for a pipeline with an 8-in internal diameter. The particle size = 1 mm, and volume concentration = 15 percent.
Data: Froude number $F_L = 1.45?$ [8]

- Q7) a)** Write down the different insulation material classifications mostly used in the industrial and commercial piping industry? [8]
- b) Explain the design procedures for insulation of piping based on the different criteria's? [8]

OR

- Q8) a)** Calculate the heat loss per square foot of surface area for steam pipe insulated with calcium silicate. Following data is available: [8]
Pipe size: NPS 6 (DN 150), 6.625 in (168 mm) actual OD
Operating temperature: 400 F (204°C), Ambient temperature: 75 F (24°C)
Insulation thickness: 2 in (51 mm) nominal & 2.11 in (54 mm) actual
Insulation type: Calcium silicate, Length of pipe: 75 linear ft (22.8 m)
- 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 piping isometrics and bill of material? [9]

OR

- Q10)**a) Discuss in detail the typical piping layout considerations for the equipments [9]
i) Reactors
ii) Storage tanks
b) Explain the concept of PFD, P & ID and utility diagram? [9]

x x x

Total No. of Questions : 10]

SEAT No. :

P3574

[Total No. of Pages : 2

[4959] - 1181
B.E. (Chemical) (End Sem.)
ADVANCED SEPARATION PROCESSES
(2012Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Give tray to tray calculations of multicomponent distillation column. [10]

OR

Q2) Explain residue curve maps in detail. [10]

Q3) Explain reactive extraction process with applications. [10]

OR

Q4) Give the solute characteristics of reversible chemical complexation. [10]

Q5) a) Explain 'liquid emulsion membrane'. [8]

b) Explain mechanism of MF and UF. [8]

OR

P.T.O.

Q6) Explain dialysis and electro-dialysis with neat sketches and its applications. [16]

- Q7)** a) Give the characteristics of solid adsorbents and liquid chromatography. [8]
b) Describe the types of chromatography. [8]

OR

- Q8)** a) Explain the concept and general principles of adsorption. [8]
b) Explain the application of chromatography in separation of enzymes and proteins. [8]

- Q9)** a) Give the industrial applications of molecular series. [9]
b) Explain the principle and applications of froth flotation with neat diagram. [9]

OR

- Q10)** a) Explain the collapse and drainage phenomena in detail. [9]
b) Explain zone electrophoresis and its industrial applications in detail. [9]



Total No. of Questions :10]

SEAT No. :

P3996

[4959]-1182

[Total No. of Pages :2

B.E. (Chemical)

PROCESS MODELING & SIMULATION

(2012 Course) (Semester - II) (End - Semester) (409349)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Answer any 5 questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*
- 4) *use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.*

Q1) Draw the flowchart of a systematic approach to process modeling, showing the interrelations between the flowchart stages. Alongside each major step, list in brief point form the key issues for each major modeling task. **[10]**

OR

Q2) Discuss the classification of models with proper examples. **[10]**

Q3) Develop a model for Triple effect evaporator. **[10]**

OR

Q4) Discuss the assumption for mixing process and develop a model for it. **[10]**

Q5) Develop a mathematical model for ideal binary distillation column. Use notations as usual. Write assumptions. Draw neat figure. **[16]**

OR

Q6) Develop a mathematical model for absorption column. Use notations as usual. Write assumptions. Draw neat figure. **[16]**

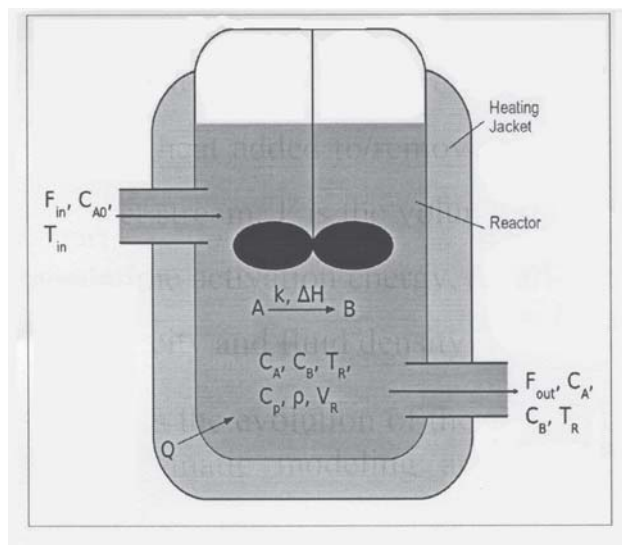
Q7) Develop a mathematical model for Bioreactor. **[18]**

OR

P.T.O.

Q8) Consider a CSTR where an irreversible first-order endothermic reaction of the form $A \xrightarrow{k} B$ takes place. Let C_A denote the concentration of the species A in the reactor, T_R and T_{in} denote the temperatures of the reactor and of the inlet stream, respectively, Q , is the heat added to/removed from the reactor, C_{A0} is the concentration of A in the inlet stream, V is the volume of the reactor, k_0 , E , ΔH are the pre-exponential constant, the activation energy, and the enthalpy of the reaction and C_p and ρ are the heat capacity and fluid density in the reactor. [18]

Develop a model that describes the evolution of the concentration and temperature in the reactor, using a systematic modeling approach that also outlines all assumptions made.



Q9) Discuss the general “Newton - Raphson” algorithm to determine the bubble point temperature for a binary system of components 1 and 2. Assume the system is ideal, Raoult’s and Dalton’s laws are applicable. [16]

OR

Q10) What is Process Simulation? What are the approaches of simulation? Explain it with proper example. [16]

EEE

Total No. of Questions :10]

SEAT No. :

P3997

[4959]-1183

[Total No. of Pages :5

B.E. (Chemical)

PROCESS ENGINEERING COSTING AND PLANT DESIGN

(2012 Course) (Semester - II)

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, 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 project engineer wants to confirm the process of phenol for commissioning purpose. The target is to produce phenol efficiently with high purity and the by-product sale. The literature says, phenol can be produced by five different routes, say Route -1 to Route - 5. How will you select a specific route achieving target comparing the different routes or processes? **[10]**

OR

Q2) A reactor, which will contain corrosive liquids, has been designed. The two alternatives are Reactor A & Reactor B given below: **[10]**

Data Type	Reactor - A	Reactor - B
Material	Mild steel	Stainless steel
Installation cost	Rs. 5,000	Rs. 15,000
Service Life	3 years	-
Scrap value	0	0

On the basis of equal capitalized costs for both types of reactors, what should be the useful life period for the stainless steel reactor if money is worth 6% compounded annually?

P.T.O.

Q3) The total capital investment for a conventional chemical plant is Rs. 15,00,000 and the plant produces 3 million kg of product annually. The selling price of the product is Rs. 0.4 /kg. The working capital amounts to 15% of total capital investment. The investment is from company funds and no interest is charged. The different costs such as raw material cost are Rs. 0.045/kg, labour Rs. 0.04/kg, utilities Rs. 0.25/kg and packing Rs. 0.04/kg. The distribution cost is 5% of total product cost. **[10]**

OR

Q4) a) Draw & explain tree diagram showing cash flow for industrial operations. **[5]**

b) Explain the graph of cumulative cash position showing effects of cash flow with time for industrial operation neglecting time value of money. **[5]**

Q5) a) A plant produces refrigerators at the rate of 'P' units per day. The variable costs per refrigerator have been found to be Rs. $47.73 + 0.1 P^{1.2}$. The total daily fixed charges are Rs. 1750, and all other expenses are constant at Rs. 7325 per day. The profit is selling price per refrigerator minus total cost per refrigerator. Total cost per refrigerator is given as, **[8]**

$$C_T = 47.73 + 0.1 P^{1.2} + (1750 + 7325) / P$$

If the selling price per refrigerator is Rs. 173, determine:

i) The daily profit at a production schedule giving the minimum cost per refrigerator.

ii) The daily profit at a production schedule giving the maximum daily profit.

iii) The production schedule at break-even point.

b) Explain with neat sketch the break-even chart for production schedule and its significance for optimum analysis. **[8]**

OR

- Q6) a)** The annual direct production costs for a plant operating at 70% capacity are Rs. 2,80,000 while the sum of annual fixed charges, overhead costs, and general expenses is Rs. 2,00,000. What is the break-even point in units of production per year if total annual sales are Rs. 5,60,000 and the product sales at Rs. 40 per unit? What were the annual gross earnings and net profit for this plant at 100% capacity in 1988 when corporate income taxes required a 15% tax on the first Rs. 50,000 of annual gross earnings, 25% on annual gross earnings of Rs. 50,000 to Rs. 75,000, 34% on annual gross earnings above Rs. 75,000 and 5% on gross earning from Rs. 1,00,000 to Rs. 3,35,000? **[8]**
- b) Explain the graphical and analytical general procedure for determining optimum conditions. **[8]**
- Q7) a)** Explain the composite curves for following heat recovery system. **[8]**

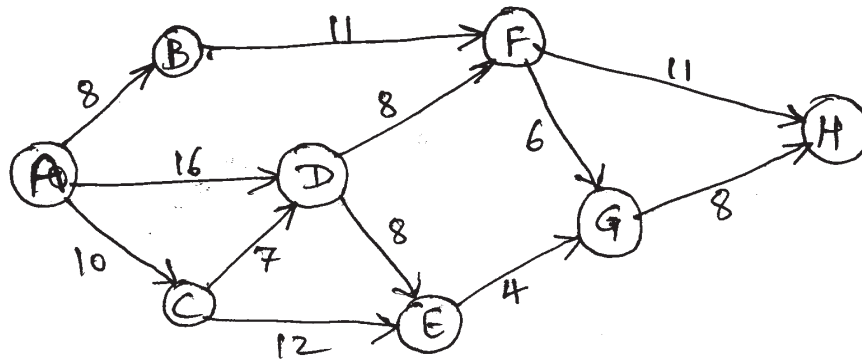
Stream	Type	Supply temperature $T_s, ^\circ\text{C}$	Target temperature $T_t, ^\circ\text{C}$	ΔH MW	Heat Capacity C_p MW. K^{-1}
R_1	Cold	20	180	32	0.2
R_2	Hot	250	40	-31.5	0.15
R_3	Cold	140	230	27	0.3
R_4	Hot	200	80	-30	0.25

- b) Explain in detail the main factors considered while making the techno-economic feasibility study? **[8]**

OR

- Q8) a)** Write a note on optimum flow rate of cooling water in condenser. **[8]**
- b) Write an explanatory note on Pinch technology. **[8]**

Q9) a) Consider the network shown below. Determine the critical path. [9]



The values mentioned are the time values in 'days' and A, B, C, D,... are the events here.

b) A chemical manufacturing company wants to estimate the time for the project. Various activities are identified as 10, 20, 30, etc. The sequence is given below in the data. [9]

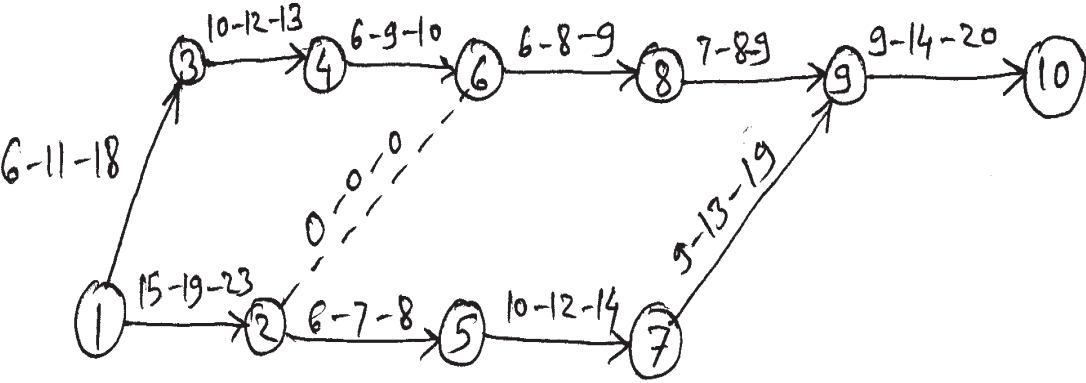
Draw the network for these activity and estimate the time for critical path.

Data:

Activity Sequence	Estimated time in week
(10, 20)	12
(10, 30)	13
(10, 40)	12
(20, 50)	10
(30, 70)	19
(40, 60)	11
(50, 70)	10
(50, 80)	12
(60, 90)	09
(70, 100)	20
(80, 100)	15
(90, 100)	20

OR

Q10)a) Determine the expected time and variance for each activity in the network shown below- [9]



b) Write the steps necessary to draw CPM and differentiate between PERT and CPM. [9]

EEE

Total No. of Questions : 12]

SEAT No. :

P3575

[Total No. of Pages : 2

[4959] - 1184

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

**Energy Conservation in Chemical Process Industries
(2012 Pattern) (Elective - III (a))**

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

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer any six questions.*
- 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) Explain the different conventional and non conventional sources of energy and give their advantages and disadvantages. **[8]**

OR

Q2) Explain the scope of energy conservation and its importance in process industries. **[8]**

Q3) Discuss the importance of Insulation in details. **[6]**

OR

Q4) Discuss the importance of nuclear option for power generation in India. **[6]**

Q5) Draw the sketch of heat pump and explain its principle and working. **[6]**

OR

Q6) Enlist the ideas for improvement of a Boiler Efficiency. **[6]**

P.T.O.

Q7) a) Enlist the checklist for the energy conservation opportunities in Furnaces and Boilers. [9]

b) Explain the concept of process synthesis. What are the guidelines and recommendations for the improving the process conditions? [9]

OR

Q8) a) Enlist the checklist for energy conservation in lighting system. [9]

b) Explain the advantages of Pinch Technology in a Chemical Process Industries. [9]

Q9) a) Distinguish between batch and continuous process with suitable example. [8]

b) Write Short note on Waste heat utilisation for energy conservation in process industries. [8]

OR

Q10) a) Explain the importance of automation in process industries. Explain how it plays a important role in energy conservation. [8]

b) Write short notes on: [8]

i) Thermodynamic aspects of separation process.

ii) Energy Savings in good house keeping.

Q11) Enlist the energy consuming units in Sugar Industry and discuss how energy can be conserved? [16]

OR

Q12) What are the energy consuming units in Petro chemical Industries and give the important conservation steps? [16]



Total No. of Questions : 10]

SEAT No. :

P4548

[Total No. of Pages : 2

[4959] - 1185

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

CHEMICAL PROCESS SAFETY

(2012 Pattern) (Elective - III)

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.*

Q1) a) Define Threshold Limit Values. [4]

b) Explain safety program with a neat diagram. [6]

OR

Q2) a) Explain evaluation phase in Industrial hygiene. [4]

b) Estimate in detail worker exposures to toxic vapors. [6]

Q3) a) Explain in short Dose versus Response curves. [3]

b) Discuss in short various legislations on safety control in chemical process plants. [7]

OR

Q4) Explain in detail about Unconfined Vapor Cloud Explosion (UVCE) [10]

Q5) a) Explain pressure versus time curves for Runaway reactions. [8]

b) Describe the ventilation and sprinkler systems to prevent fires and explosions. [8]

OR

P.T.O.

- Q6)** a) Discuss in detail storage and handling of toxic and flammable materials. [8]
b) Describe in brief Relief systems those are using in Chemical industry.[8]

- Q7)** a) Describe hazards Identification and state process hazards checklists.[10]
b) Describe Review of probability theory for Risk Assessment. [8]

OR

- Q8)** a) Write a short note on Event trees and fault trees. [8]
b) Discuss in detail the concept for preventing the fire and explosion.[10]

- Q9)** Write a short notes on : [16]
a) Tackling of Disaster
b) Plan for Emergency
c) Role of a Computer in safety
d) Hazard models and risk data

- Q10)**a) Describe in detail Safety vs Production. [8]
b) Describe the objective and benefits of safety audits. [8]



Total No. of Questions :10]

SEAT No. :

P3998

[4959]-1186

[Total No. of Pages :3

B.E. (Chemical Engineering)

FOOD TECHNOLOGY

(2012 Pattern) (Elective - III) (409351)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) *Assume suitable data, if necessary.*
- 2) *Neat figures to the right indicate full marks.*
- 3) *Use of scientific calculator is allowed.*
- 4) *Attempt Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8 and Q.9 or 10.*

Q1) a) Explain the theory of evaporation alongwith its equipment used in food processing. Also explain how it affects on food. **[5]**

b) Explain how following techniques are used in food preservation with suitable examples. **[5]**

i) Frying.

ii) Extrusion.

OR

Q2) a) Enlist and differentiate between dairy and non dairy products with suitable examples. **[5]**

b) Write short note on. **[5]**

i) Free Drying.

ii) Microwave heating.

Q3) a) Enlist and explain various fruit and vegetable storage techniques. Explain any two of them in detail. **[5]**

b) Enlist various chemical, physical and biological properties of fruit and vegetable. Explain any two of them. **[5]**

OR

P.T.O.

- Q4)** a) What are various tests to be performed on raw milk before its approval for further processing? [3]
b) Enlist various fruit and vegetable products. [2]
c) Explain theory and process of chakka and shrikhand making. [5]

- Q5)** a) Define and explain in short following size reduction laws. [10]
i) Bonds law.
ii) Rittingers law.
iii) Kick's law.
b) Explain construction and working of [8]
i) Ball mill.
ii) Hammer mill.

OR

- Q6)** a) Enlist various size reduction equipment alongwith type of forces acting in them. Also mention at least three examples of each. [8]
b) Write short note on [10]
i) Baking.
ii) Roasting.

- Q7)** a) Enlist and explain in short various functions of packaging. [6]
b) What are various factors that influence the success of packaging in advertising the food products? [5]
c) Differentiate between shipping and retail containers. [5]

OR

- Q8)** a) Explain how following factors cause deterioration in food products during its storage. [8]
i) Light.
ii) Heat.
iii) Moisture and gasses.

- b) Write short note on following food packaging materials. [8]
- i) Textiles and wood.
 - ii) Metal.

- Q9)** a) Explain importance and objectives of quality control in food processing. [6]
- b) Write short note on. [10]
- i) HACCP in food processing.
 - ii) Importance of Safety, good manufacturing practice and quality assurance in food processing.

OR

- Q10)**a) Explain Hurdle technology in detail with suitable examples. [8]
- b) Enlist and explain various physical and physico - chemical hurdles in food processing. [8]



Total No. of Questions :10]

SEAT No. :

P3999

[4959]-1187

[Total No. of Pages :2

B.E. (Chemical)

d : Advanced Materials

(2012 Course) (Elective - III) (409351)

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) Recommend suitable materials for high temperature applications and explain the possible high temperature problems. **[5]**
- b) Write about various methods used to improve the fatigue strength of the materials. **[5]**

OR

- Q2)** a) List its important properties of stainless steel and compare austenitic and martensitic stainless steels. **[5]**
- b) What is Maraging steel? Explain the heat treatment cycle for it. Also give properties and applications. **[5]**

- Q3)** a) Discuss the polymer structure and its properties. **[5]**
- b) Write a short note on processing and applications of Austempered Ductile Iron. **[5]**

OR

- Q4)** a) Discuss important characteristic of Aluminum that makes it attractive for engineering application. **[5]**
- b) Write the properties and applications of Kevlar and Nomex. **[5]**

P.T.O.

- Q5) a)** What are composite materials? Classify composite materials and explain PMC. [7]
- b) Define metallic glasses. Describe the properties of metallic glasses and Compare it with crystalline alloys. Write their applications. [10]

OR

- Q6) a)** Compare semiconducting and superconducting materials. [7]
- b) Define and classify the composites. Discuss properties & applications of ceramic matrix composites. [10]
- Q7) a)** What are shape memory alloys? Write properties and applications. [7]
- b) Differentiate cold work working and hot working. Discuss the annealing behavior of cold worked alloys with respect to strengthening. [10]

OR

- Q8) a)** Give the classification, properties and applications of Fe-based super-alloys. [7]
- b) What are smart materials? How they differ from conventional engineering materials? Discuss shape memory alloys. [10]
- Q9) a)** List the different refractory metals and their specific applications. [8]
- b) Aluminum and Magnesium alloys are preferred in aerospace applications- Justify. [8]

OR

- Q10)a)** Classify the Nanomaterials? Write a note on carbon nanomcomposites. [8]
- b) Recommend materials, processes and desired properties for aerospace applications, in particular aero-engine. [8]



Total No. of Questions : 10]

SEAT No. :

P4000

[4959]-1188

[Total No. of Pages :2

B.E.(Chemical)

CATALYSIS

(2012 Course) (Semester-II) (Elective-IV)(End Sem)(409352)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

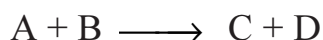
- 1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 or Q10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

Q1) Explain the types of catalysis **[10]**

OR

Q2) Explain the qualitative nature and concept of catalysis and catalyst. **[10]**

Q3) For the dual functional catalyst, following gas phase reaction: **[10]**



Derive the rate expression considering. Eley Radiel mechanism in terms of partial pressure of the respective components.

OR

Q4) For the reaction, $A \longrightarrow 3R$, (gaseous reaction) run at 3.5 atm and 110°C. The rate at this temperature is measure as a $-r_A^l = 93.25C_A$, mol/kgcat.hr. Determine the amount of catalyst needed in a packed bed reactor with a very large recycle rate(assume mixed flow) for 31% conversion of A to R for a feed rate of 2100 mol/h of pure A. **[10]**

Q5) 8.01 gm of glucosil is studied with N_2 adsorption at -195.8 °C is 1 atm. The following data are obtained

Pressure,(mmHg) 6 25 140 230 285 320 430 505

Volume adsorbed(cm³) 61 127 170 197 215 230 277 335

The volume is measured at 0°C and 1 atm. Estimate the surface area of the catalyst. Data: Density of liquid N_2 at -195.8 °C is 0.808 gm/cm³ **[16]**

OR

P.T.O.

Q6) a) Explain the helium-mercury method for determining the void volume and so did density of the catalyst. [8]

b) Explain the BET method for determination of surface area of the catalyst. [8]

Q7) a) Highlight important characteristics of Zeolites. Discuss the shape selectivity of zeolites and their industrial application [12]

b) What are zeolites? Explain? [4]

OR

Q8) Write a short note on: [16]

a) Applications of zeolite

b) Modifications of zeolite

Q9) a) Write a note on M-M Kinetics [9]

b) Explain the role of enzymes, lipase and microbes as catalyst [9]

OR

Q10)a) Give the kinetics of uncompetitive inhibition [9]

b) Give the kinetics of non competitive inhibition [9]



Total No. of Questions : 10]

SEAT No. :

P4001

[4959]-1189

[Total No. of Pages :2

B.E.(Chemical)

b-NANOTECHNOLOGY

(2012 Course)(Elective-IV) (409352)

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 or Q10.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*

Q1) a) Explain the classification of nanomaterials and special nanomaterials?
Also discuss the significance of nanoscale size effect? [5]

b) Discuss the synthesis procedure for fullerenes? [5]

OR

Q2) a) Explain any two synthesis methods used for carbon nanotubes? [6]

b) How nanomaterials are synthesized by Laser ablation of solid Targets?[4]

Q3) a) “Bottom-up technique is more convenient for nano fabrication”-Explain. [5]

b) Differentiate between electric arc discharge method and chemical vapor deposition? [5]

OR

Q4) a) Write short notes on characterization techniques based on electron microscopy? [5]

b) With neat sketch explain principle and operation of Atomic force microscopy? [5]

Q5) a) Explain how quantum cryptography is used for secure data communication? [8]

b) What are excitons? Why are excitonic effects more important in nanostructures than in bulk materials? [8]

OR

P.T.O.

Q6) a) What is doping? Explain types of dopants used in extrinsic semiconductor? [8]

b) Explain How Pauli's exclusion principle is applied in quantum mechanics? [8]

Q7) a) Explain experimental procedure for finding out contact angles. Explain with neat sketch? [8]

b) What are the factors affecting contact angle and wetting? [8]

OR

Q8) a) Explain various methods for measuring surface tension? [8]

b) Write short note on van der waal forces in colloidal particles? [8]

Q9) a) What are self cleaning materials? Explain its application? [9]

b) Explain how drug-delivery helps for treatment of various diseases? [9]

OR

Q10) a) Explain in brief the applications of different types of nanomaterials in various fields? [9]

b) Discuss the health and environmental impacts of nanotechnology? [9]



Total No. of Questions : 10]

SEAT No. :

P4549

[Total No. of Pages : 2

[4959] - 1190

B.E. (Chemical Engineering)

FUEL CELL TECHNOLOGY

(2012 Pattern) (Elective - IV(c)) (End Semester)

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) Compare briefly between electrolytic cells and galvanic cells. [5]

b) What is the EMF of a cell? By taking an example demonstrate how to calculate it from the electrode potentials. [5]

OR

Q2) What are Helmholtz planes? Describe how the concept is used to understand the mechanism of ionic transport at the surface of the electrode? [10]

Q3) Derive Tafel Equation from the first principles. [10]

OR

Q4) Describe the construction and working of a hydrogen fuel cell. [10]

Q5) a) Describe the construction and working of a Proton Exchange Membrane Fuel Cell. [8]

b) Obtain expression for volumetric transfer current for a PEMFC, from general formulation of a Butler Volmer function. [8]

OR

P.T.O.

Q6) Write short notes on any three: [16]

- a) Anodic Materials of PEMFCs
- b) Cathodic Materials of PEMFCs
- c) Electrode Support Materials
- d) Membrane Electrolyte Materials

Q7) a) Describe the construction and working of a Solid Oxide Fuel Cell. [8]

- b) Describe with model equations to estimate the account for adsorption, desorption and diffusion at the three phase regions. [8]

OR

Q8) What is an overpotential? What difficulties and ill effects associated because of them are taken care at the time of design of a fuel cell? Describe various types of overpotentials. Write model equations for any one of them. [16]

Q9) a) Describe a complete fuel cell system. [9]

- b) What types of various treatments need to be given to a fuel before it is fed to the fuel cell and why? [9]

OR

Q10)a) Describe any one heat recovery system in details used in the fuel cell system consisting SOFC. [9]

- b) What are hybrid fuel systems? Describe their advantages and disadvantages over a single type fuel system. Describe any one arrangement of a hybrid fuel system. [9]



Total No. of Questions : 10]

SEAT No. :

P4002

[4959]-1190-A

[Total No. of Pages :2

B.E.(Chemical)

**d:PETROCHEMICAL ENGINEERING
(2012 Course) (Semester-II)(Elective-IV) (409352)**

Time :2½Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Discuss the importance of Petrochemicals and the status of Petrochemical industries in India **[10]**

OR

Q2) What are the main basic building blocks of petrochemical industry explain with suitable examples? Give the details of petrochemical products that are produced from benzene? **[10]**

Q3) What are basic principle sources of aromatics? Describe the BTX aromatic separation by suitable diagram. **[10]**

OR

Q4) Write in details about the various separation and purification techniques used in petrochemical industry? **[10]**

Q5) a) With neat sketches explain in detail about production ethylene glycol as a second generation intermediates. **[12]**

b) Discuss the various types and uses of second generation intermediates in petrochemicals. **[6]**

OR

Q6) With neat schematic diagram describe about the production of maleic anhydride from benzene? And also discuss the major engineering problems? **[18]**

P.T.O.

- Q7)** a) What is addition polymerization. Describe the steps and mechanisms of addition polymerization [10]
- b) Explain classification of different polymerization process along with its advantages and disadvantages. [6]

OR

- Q8)** a) With neat sketches explain in detail about production of PVC along with its engineering problems [10]
- b) What are various polymeric products? Differentiate between different polymerization processes. [6]

- Q9)** a) Discuss about recent advances in petrochemical plants & refineries in India. [10]
- b) Major petrochemical plants in India as well as in world. [6]

OR

- Q10)** Write a note on following. [16]
- a) Pollution control aspects in Petrochemical industries
- b) Safety consideration in petrochemical plants



Total No. of Questions : 10]

SEAT No. :

P4515

[Total No. of Pages :2

[4959]-1191
B.E. (Instru.)
PROCESS INSTRUMENTATION
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of Logarithmic tables. electronic pocket calculator and steam table is allowed.*
- 5) *Your answer will be valued as a whole.*
- 6) *Assume suitable data if necessary.*

- Q1)** a) Explain Steady State gain. [5]
b) Explain effect of integral controller on pure dead time system. [5]

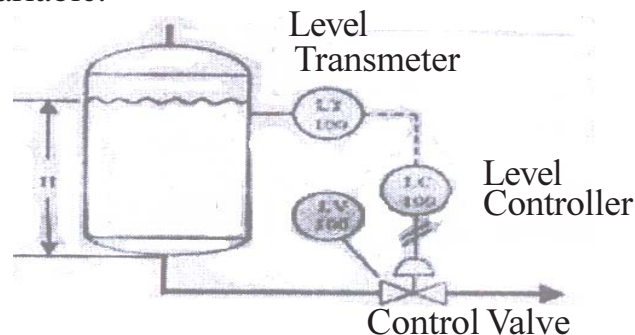
OR

- Q2)** a) List performance criteria for feedback control loop and explain any one. [6]
b) Explain process time constant. [4]

- Q3)** a) Explain equipment specification. [6]
b) Explain self regulating capacity with example. [4]

OR

- Q4)** a) Identify various process variable associated with process shown in figure below and classify them as controlled variable, manipulated variable, and load variable. [4]



- b) Discuss gas pressure control loop. [6]

P.T.O.

- Q5)** a) Explain ratio control with proper example. [9]
b) Explain cascade control with proper example. [9]

OR

- Q6)** a) Explain implementation issues in feed-forward control. [9]
b) Explain
i) Dead Band [4]
ii) Negative Resistance [5]

- Q7)** a) What is effect interaction on feedback control. [8]
b) How multiloop performance can be improved by using loop paring. [8]

OR

- Q8)** a) What is relative gain array? How it can be used for analysis of interaction. [8]
b) Calculate relative gain array matrix and choose suitable manipulated and controlled variable pair for a system who's gain matrix is given below. [8]

$$\begin{bmatrix} \frac{4}{s+1} & \frac{10}{(s+2)} \\ \frac{1}{2s+1} & \frac{2}{3s+4} \end{bmatrix}$$

- Q9)** a) Explain Process operability window. [8]
b) Explain safety and equipment protection. [8]

OR

- Q10)** a) Explain control for safety [8]
b) How control design method is integrated in designing of process control. [8]



Total No. of Questions : 12]

SEAT No. :

P3576

[Total No. of Pages : 2

[4959] - 1192

B.E. (Instrumentation and Control) (Semester - I)

Project Engineering and Management

(2012Pattern)

Time : 3 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, Q.11 or Q.12.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

Q1) What is project organization? Explain any one type of it. **[6]**

OR

Q2) Write a short note on the stages of project management. **[6]**

Q3) Write the differences in PERT and CPM. **[8]**

OR

Q4) What are the time estimation methods? Explain. **[8]**

Q5) Draw P & I diagram for three element drum level control. **[6]**

OR

Q6) Write importance of specification sheet. Draw specification sheet for differential pressure instruments. **[6]**

P.T.O.

- Q7) a)** What are the various types of cables? Explain in brief. [8]
- b) What is loop wiring diagram? Draw a loop wiring diagram for level control loop. [8]

OR

- Q8) a)** Draw installation sketch for differential pressure sensing flow transmitter. [8]
- b) What is loop wiring diagram? Draw a loop wiring diagram of pressure control loop. [8]

- Q9) a)** Explain the procurement activities in the project. [8]
- b) What are the documents required during the procurement activities. [10]

OR

- Q10) a)** Explain the construction activities in the project. [9]
- b) Explain the tendering and bidding processes. [9]

- Q11) a)** What are SAT, FAT and CAT? Explain the FAT for control panel. [8]
- b) What are the types of control panel? Explain one in detail. [8]

OR

- Q12) a)** Explain cold commissioning and hot commissioning for control panel. [8]
- b) Write a short note on breakfront control panel. [8]



Total No. of Questions : 10]

SEAT No. :

P3577

[Total No. of Pages : 3

[4959]-1193

B.E. (Instrumentation and Control)

DIGITAL CONTROL

(2012 Course) (Semester - I)

Time : 2.30 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) Use of Calculator is allowed.
- 4) Assume suitable data if necessary.

Q1) a) Obtain mathematical model of zero order Hold. [6]

b) Obtain the final value of for the sequence whose Z transform is [4]

$$F(z) = \frac{z^2(z-a)}{(z-1)(z-b)(z-c)}$$

What can you conclude concerning the constants b and c if it is known that the limit exists?

OR

Q2) a) Find the equivalent sampled impulse response sequence and the equivalent z-transfer Function for the cascade of the two analog systems with sampled input. [6]

$$H_1(s) = \frac{1}{s+2} \text{ and } H_2(s) = \frac{2}{s+4}$$

- i) If the systems are directly connected.
- ii) If the systems are separated by a sampler.

b) Explain the term impulse sampling. [4]

P.T.O.

- Q3)** a) Determine the stability of closed loop system given in figure 2. [6]
(T = 1 sec)

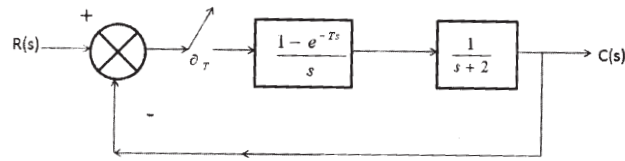


Figure. 2

- b) Explain stability regions in S-plane, Z-plane & W-plane with neat sketches. [4]

OR

- Q4)** a) Characteristic equation of system is $z^3 + 0.5z^2 - 1.34z + 0.24 = 0$, Test the stability of system using bilinear transformation & routh array method. [6]

- b) Explain concept of ringing of poles. [4]

- Q5)** a) Obtain state transition matrix $\psi(k)$ for following discrete time system using Cayley-Hamilton theorem. [8]

$$x(k+1) = \begin{bmatrix} 0 & 1 \\ -3 & 4 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix}$$

- b) Determine Pulse transfer function of system for following system. [10]

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \\ x_3(k+1) \end{bmatrix} = \begin{bmatrix} -1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -3 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \\ x_3(k) \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} u(k) \text{ and } y(k) = \begin{bmatrix} -1 & 2 & 1 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \\ x_3(k) \end{bmatrix} + u(k)$$

OR

- Q6)** a) Obtain discrete time state model of system for given continuous time system model using sample time T = 1 sec. [10]

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \text{ and } y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

- b) Obtain state space representation of following pulse transfer function of system in canonical forms. [8]

$$\frac{Y(z)}{U(z)} = \frac{3 - z^{-1} - 3z^{-2}}{1 + \frac{1}{3}z^{-1} - \frac{2}{3}z^{-2}}$$

- Q7)** a) Find state feedback gain matrix for system such that desired closed loop system exhibit the deadbeat response to any initial condition, [12]

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \\ x_3(k+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -0.16 & 0.84 & 0 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \\ x_3(k) \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} u(k)$$

- b) Explain different types of state estimators. [4]

OR

- Q8)** a) Find state feedback gain matrix for system such that desired closed loop system exhibit deadbeat response. [12]

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \\ x_3(k+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -0.5 & 0.2 & 1.1 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \\ x_3(k) \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} u(k)$$

- b) State the mathematical equations of different methods to compute state feedback gain matrix. [4]

- Q9)** a) Explain the terms : [4]

- i) Optimal Control
- ii) Performance Index

- b) Consider the discrete time control system defined by [12]

$$x(k+1) = 0.1354x(k) + 0.8646u(k), \quad x(0) = 1, \quad Q = R = 1, \quad S = 1$$

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]

$$x(k+1) = \begin{bmatrix} 0 & 1 \\ -1 & 1 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(k) \text{ and } x(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}.$$

Determine the optimal control sequence $u(k)$ that will minimize the following performance index.

$$J_8 = \frac{1}{2} \sum_{k=0}^7 [x^2(k) + u^2(k)] \text{ and } Q = \begin{bmatrix} 2 & 0 \\ 0 & 0 \end{bmatrix} \& S = \begin{bmatrix} 0 & 0 \\ 0 & 0.5 \end{bmatrix}, R = 2.$$



Total No. of Questions : 10]

SEAT No. :

P4550

[Total No. of Pages :2

[4959]-1194

B.E. (Instrumentation & Control)

ADVANCED BIOMEDICAL INSTRUMENTATION

(2012 Pattern) (Semester - I)

Time : 2.30 Hours]

[Maximum Marks : 70

Instructions to the candidates:

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

Q1) a) What is Biotelemetry? Brief out various biotetometry applications in medical field. [6]

b) Explain the Properties of X rays. [4]

OR

Q2) a) Explain the Principle of the finger tip pulse Oximetry [6]

b) What is an auto analyzer? Enlist various subsystems of auto analyzer.[4]

Q3) a) Draw and explain the rotating anode X-ray Generation method. [6]

b) Enlist the frequency ranges used in Ultrasound medical imaging for various applications. Specify the relationship between image resolution and frequency in ultrasound imaging. [4]

OR

Q4) a) What are the draw back of X-ray imaging. Explain the principle of method that overcomes these drawbacks. [5]

b) Explain the operating principle of PET scans. [5]

Q5) a) What is a pacemaker? Explain, briefly the various waveforms used for pacing. [10]

b) What is electrosurgical diathermy? What do you mean by bipolar and unipolar modes of ESU? Explain, why patient plate is having more area active electrode is pointed tip type in ESU. [8]

P.T.O.

OR

- Q6)** a) Draw and explain the Heart-Lung Machine. State the type of Pump that is used in HLM. [10]
b) Define the term fibrillation? What is defibrillator? Draw and explain DC defibrillator. [8]

- Q7)** a) Explain thermal and non thermal interaction of tissue with LASER. [8]
b) Explain the following term with respect to LASER: [8]
i) Monochromacity
ii) Directionality
iii) Power
iv) Coherenace

OR

- Q8)** a) Brief out characteristics of endoscopes. [8]
b) Explain applications of LASER for diabetic retinopathy treatment. [8]

- Q9)** a) Explain the following terms in context of wheel chair: [8]
i) Flutter
ii) Float
iii) Alignment
iv) Tracking
b) Define arthrosis and prosthesis in rehabilitation engineering. Enlist atleast two applications of arthrosis and prosthesis. [8]

OR

- Q10)**a) Explain in brief various types of dialysers used for hemodialysis. [8]
b) Explain with suitable diagram the process of Urine formation in kidney. [8]



Total No. of Questions : 10]

SEAT No. :

P3578

[Total No. of Pages : 2

[4959]-1195

B.E. (Instrumentation & Control)
BUILDING AUTOMATION - I
(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 side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

Q1) a) What is BAS? Explain importance of BAS in Security system with neat sketch. [6]

- b) Write a short notes on : [4]
- i) Specific Humidity
 - ii) Relative Humidity

OR

Q2) a) Explain role of Architect in Process BAS Design. [6]

- b) Write a short notes on intelligent Building. [4]

Q3) a) Define and explain : [6]

- i) Static Pressure
- ii) Velocity Pressure
- iii) Absolute Pressure

- b) Write a short notes on Psychrometer. [4]

OR

Q4) a) Explain with neat sketch Air handling unit. [6]

- b) Write a short notes on importance of Co2 in BAS system. [4]

P.T.O.

- Q5)** a) Explain single duct variable air volume system with neat sketch. [10]
b) Difference between series fan powered, parallel fan powered. [8]

OR

- Q6)** a) What is CRAC? Explain CRAC System with neat sketch. [10]
b) Explain Radiation Coil with neat sketch. [8]

- Q7)** a) List various types of heat pump. Explain any one with neat sketch. [8]
b) Explain Vapour Compression cycle with neat sketch. [8]

OR

- Q8)** a) List different types of Boiler. Explain fire tube type of boiler with neat sketch. [8]
b) Explain Expansion device used in vapour compression cycle with neat sketch. [8]

- Q9)** a) What is BAS System? Explain Field level components in BAS System with neat sketch. [8]
b) What is MODBUS? Explain MODBUS ASCII and MODBUS RTU with neat sketch. [8]

OR

- Q10)** a) Explain Architecture of DDC with neat sketch. [8]
b) Explain in LON protocol with neat sketch. [8]



Total No. of Questions : 10]

SEAT No. :

P4551

[Total No. of Pages :3

[4959]-1196

B.E. (Instrumentation & Control Engineering)
ADVANCED CONTROL SYSTEMS
(2012 Pattern) (Semester - I) (Elective - I (C))

Time : 2.30 Hours]

[Maximum 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 phase plane method. [3]
- b) Define describing function: obtain the describing function for saturation Nonlinearity. [7]

OR

- Q2)** a) Explain in brief the concepts of singular points. [3]
- b) A second order system represented by $\dot{x}=Ax$ where $A = \begin{bmatrix} -1 & -2 \\ 1 & -4 \end{bmatrix}$ by using Liapunov's direct method, determine the stability of the system. [7]

- Q3)** a) Explain in brief of Frequency domain stability criteria. [4]
- b) Explain with neat diagram of MIT rule for continues time MRAC system [6]

OR

- Q4)** a) Explain in brief the concepts of stability. [4]
- b) Explain with neat diagram of different configurations of MRAC. [6]

- Q5)** a) Explain in detail LQG self-tuning regulator. [6]

P.T.O.

- 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	0.1
2	3.0	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 different approaches to self - tuning regulator. [8]
 b) Explain minimum variance and pole assignment approaches to multivariable self tuning regulators. [8]

- Q7)** a) Explain in detail robustness studies of multivariable system. [8]
 b) Explain adaptive control technique for control of rolling mill. [8]

OR

- Q8)** a) Explain in detail the General-purpose adaptive regulator. [8]
 b) Explain in detail adaptive control technique for temperature control in CSTR system. [8]

- Q9)** a) Explain the necessary conditions of 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:
$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

OR

Q10)a) Explain in detail matrix riccati equations [6]

b) The first order system is described by the differential equation [12]

$$\dot{x}(t) = 3x(t) + u(t)$$

It is desired to find the control law that minimizes the performance index

$$J = \frac{1}{2} \int_0^{t_f} \left(3x^2 + \frac{1}{4}u^2 \right) dt, \quad t_f = 1 \text{ sec}$$



Total No. of Questions : 10]

SEAT No. :

P3579

[Total No. of Pages : 2

[4959]-1197

B.E. (Instrumentation)

D: ADVANCED SENSORS

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



Total No. of Questions : 10]

SEAT No. :

P4003

[4959]-1198

[Total No. of Pages : 2

B.E. (Instrumentation and Control)
ADVANCED DIGITAL SIGNAL PROCESSING
(Elective - I) (2012 Course) (406264E) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) Assume suitable data if necessary.*
- 2) Use of Calculators, log tables, charts is allowed.*
- 3) Figures to the right indicate full marks.*

Q1) a) Explain the need of TFD with suitable application. **[5]**

b) Explain STFT with its properties. **[5]**

OR

Q2) Explain polyphase decomposition with suitable example. **[10]**

Q3) a) Discuss sampling rate conversion by non integer factor. **[5]**

b) Compare decimation and interpolation. **[5]**

OR

Q4) Decimate the sinusoidal signal of frequency 100 Hz by factor 3 for the $n > 0$. **[10]**

Q5) a) Explain Welch's method of PSD estimation. **[10]**

b) Compare WSS and SSS signals. **[6]**

OR

Q6) a) Explain Yule Walker equation and its solution. **[12]**

b) Discuss the need of PSD estimation. **[4]**

P.T.O.

- Q7)** a) Explain RLS adaptive filtering algorithm with suitable block diagram. [10]
b) State the applications of adaptive filtering. Explain any one. [8]

OR

- Q8)** a) Explain principle of adaptive filtering with suitable block diagram. [10]
b) Explain homomorphic system for convolution. [8]

- Q9)** a) Compare fixed and floating point DSP processor. [8]
b) State and explain the features of DSP processor. [8]

OR

- Q10)** a) Explain Address Generation Unit in DSP processor. [8]
b) Explain interrupts in DSP processor. [8]

x x x

Total No. of Questions : 10]

SEAT No. :

P4004

[4959]-1199

[Total No. of Pages : 2

B.E. (Instrumentation & Control)
OPTO-ELECTRONICS INSTRUMENTATION
(2012 Course) (Elective - II) (Semeter - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to 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) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

Q1) a) Explain the process of generation of Laser radiation. **[5]**

- b) Determine the numerical aperture and critical angle for a step index fiber with core and cladding refractive indices as 1.49 and 1.45 respectively. **[5]**

OR

Q2) a) List out the properties of Laser. **[5]**

- b) Explain any one application of Laser system. **[5]**

Q3) a) Explain the intrinsic and extrinsic absorption losses in optical fiber. **[4]**

- b) Explain the design considerations and characteristics of optical fiber system. **[6]**

OR

Q4) a) Compare the PIN diode and avalanche photodiode. **[4]**

- b) Describe the structure of LED as light source in optical fiber with the help of neat diagram. **[6]**

P.T.O.

Q5) Write short notes on:

- a) Optical fiber amplifier. [8]
- b) Integrated optics. [8]

OR

Q6) Explain following with neat diagram:

- a) Beam splitter. [4]
- b) Directional coupler. [4]
- c) Optical modulators. [4]
- d) Optical switches. [4]

Q7) a) What are the advantages and disadvantages of fiber optic sensing system? [8]

- b) Explain the principle, working and construction of a fiber optic-displacement sensor. [8]

OR

Q8) a) Explain the principle and working of fiber-optics based position sensors. [8]

- b) Explain the principle, working and construction of a fiber optic-displacement sensor. [8]

Q9) Explain following applications of lasers with its neat schematic:

- a) Laser interferometer. [9]
- b) Speckle pattern instrument. [9]

OR

Q10) Write short notes on:

- a) Distributed optical fiber sensing. [9]
- b) Fiber grating sensors. [9]

x x x

Total No. of Questions : 10]

SEAT No. :

P3580

[Total No. of Pages : 2

[4959]-1200

B.E. (Instrumentation & Control)

ENVIRONMENTAL INSTRUMENTATION

(2012 Pattern) (Elective - II) (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 side indicate full marks.
- 4) Assume suitable data, if necessary.

- Q1) a) Explain the need of Instrumentation & control for environment. [5]
b) Explain the role of gas chromatography in environmental analysis. [5]

OR

- Q2) a) Explain working of total hydrocarbon analyzer using flame ionization detector. [6]
b) Explain in short : pH analyzers [4]

- Q3) a) Explain opacity Monitors. [5]
b) Discuss water quality standards for raw and treated water. [5]

OR

- Q4) a) Explain thermal conductivity detectors used in water treatments. Discuss their advantages. [6]
b) Explain the design criteria of settling tank. [4]

- Q5) a) Explain in short : Coagulation. [8]
b) What is floating? Explain its types. [8]

OR

P.T.O.

- Q6)** a) Explain the instrumentation in assessment of soil & ground water pollution. [8]
b) Explain the Ground water monitoring system. [8]

- Q7)** a) Define air pollution. Explain air pollution from thermal power plant and their characteristics. [10]
b) Discuss the waste water measurement techniques. [8]

OR

- Q8)** a) Draw and explain the Instrumentation set up for waste water treatment plant and list out the latest methods of waste water treatment plants. [10]
b) Discuss the Air sampling methods & equipments. [8]

- Q9)** a) Explain the necessity of Rain water harvesting. List the methods of same. [8]
b) Define Sound pollution. Explain its effect to environment. [8]

OR

- Q10)** Write short notes on : [2 × 8 = 16]
a) Virtual Instruments Environmental Engineering Laboratory.
b) Rover Environmental Monitoring Station (REMS)



Total No. of Questions : 10]

SEAT No. :

P3532

[Total No. of Pages : 2

[4959] - 1202

B.E. (Instrumentation and Control)
Sensor Networks (Elective II)
(2012 Pattern) (Semester-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) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary*

Q1) a) With suitable diagram explain wireless sensor networks. **[4]**

b) Write a short note on:

i) Wireless networking **[3]**

ii) Decentralized management **[3]**

OR

Q2) a) Explain Inductive loop in traffic control . **[5]**

b) Explain a sensing and sensors in detail. **[5]**

Q3) a) Explain single damage detection and multiple damage detection using natural frequencies. **[5]**

b) Explain XYZ node architecture in detail. **[5]**

OR

Q4) a) Explain IMote Node Architecture in detail **[5]**

b) Explain global and local inspection techniques in structural health monitoring system in detail. **[5]**

P.T.O.

- Q5)** a) Explain digital communication system in detail with basic components. [7]
b) Explain pulse code modulation and delta modulation with suitable diagrams. [8]

OR

- Q6)** a) Explain quadratic amplitude modulation in detail. [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 Zebra MAC in detail of hybrid MAC protocols. [8]

OR

- Q8)** a) Explain the five characteristics of MAC protocols in sensor networks. [7]
b) Write a short note on mobility adaptive hybrid MAC. [8]

- Q9)** a) Explain flooding and Gossiping in detail in network layer. [10]
b) Write a short note on SPIN-PP of data centric Routing. [10]

OR

- Q10)** a) Explain optimized link state routing of proactive routing. [10]
b) Explain destination sequenced distanced vector. [10]



Total No. of Questions : 10]

SEAT No. :

P3533

[Total No. of Pages : 2

[4959] - 1204

B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION-II
(2012 Pattern) (Semester-II)

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.*
- 5) *Use of calculator is allowed.*

Q1) a) With suitable example, develop a mathematical model of stirred tank heater. **[8]**

b) Draw the block schematic showing sensor gain, process gain, valve gain and controller gain for a heat exchanger. **[2]**

OR

Q2) a) Explain Feed Forward control of Heat Exchanger with dynamic compensation. **[6]**

b) Explain Shrink and Swell effect in case of boiler drum. **[4]**

Q3) a) With a neat sketch, explain burner management system used in boilers. **[5]**

b) Explain air-fuel ratio control system used in boilers. **[5]**

OR

Q4) a) Explain three element drum level control in boilers. **[6]**

b) Explain dynamic behavior of second order system. **[4]**

P.T.O.

- Q5)** a) Explain recipe management of batch reactors. [10]
b) Explain typical cascade control system used in continuous reactors.[8]

OR

- Q6)** a) Explain End point control in batch reactors. Enlist parameters for indication of end of reaction. [10]
b) Explain sequencing logic control used in batch stirred tank reactors.[8]

- Q7)** a) How reflux is important in continuous fractionation. With neat sketch explain composition control of distillate stream in distillation operation.[8]
b) State objectives of distillation column control. Why it is difficult to control? State any two reasons. [8]

OR

- Q8)** a) Explain mathematically steady state material and energy balance equations for distillation column. [8]
b) Explain in brief control strategy for distillation column temperature control. [8]

- Q9)** a) Discuss on pressure and flow controls used in compressors considering the protection of the equipment. [8]
b) Explain use of anti-surge control system used in compressors. [8]

OR

- Q10)** a) What is surge in compressor? Draw Instrumentation diagram for ON-OFF control for reciprocating compressor. [8]
b) Draw two control strategies for controlling flow from gear pump. [8]



Total No. of Questions : 12]

SEAT No. :

P3534

[Total No. of Pages : 2

[4959] - 1205

B.E. (Instrumentation & Control)

INDUSTRIAL AUTOMATION

(2012 Pattern) (Semester-II)

Time : 2 1/2 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, Q.11 or Q.12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary*

Q1) Explain hybrid DCS with reference to automation pyramid. [7]

OR

Q2) Explain the general objectives of automation. [7]

Q3) Explain the role of LAS in foundation fieldbus network. [6]

OR

Q4) With respect to OSI model explain HART protocol. [6]

Q5) Develop ladder diagram for mixing of two liquids as per given sequence : [7]

When the start push button is pressed, the inlet valve A switches ON till the middle level sensor has not sensed the liquid. When middle level is sensed inlet valve B switches ON till the high level sensor has not sensed the liquid. Then the motor spins the stirrer for 10 seconds for mixing of both the liquids. After this drain valve switches ON and remains on till the low level is not reached.

OR

Q6) Explain the PID block used in PLC system. [7]

P.T.O.

- Q7)** a) Explain the PLC programming methods as per IEC 61131. [8]
b) Write the procedure for selection of analog I/O module for PLC [8]

OR

- Q8)** a) With some suitable example explain the “Sequential function chart”. [8]
b) Explain the procedure for interfacing a PLC with SCADA system using different communication protocols. [8]

- Q9)** a) Explain the hierarchical structure of DCS in detail. [10]
b) Explain in brief alarm management system used in DCS. [8]

OR

- Q10)** a) Explain the hierarchical structure of DCS in detail. [10]
b) List and explain at least four different function blocks available in DCS System. [8]

- Q11)** a) With the help of block diagram explain “Safety life cycle”. [8]
b) What is HaZOP? Also explain the procedure of it. [8]

OR

- Q12)** a) Write short note on “Safety Instrumented System”. [8]
b) What is Process Hazard Analysis (PHA)? How it is carried out? [8]



Total No. of Questions : 10]

SEAT No. :

P3535

[Total No. of Pages : 2

[4959] - 1206

B.E. (Instrumentation & Control)

A : Digital Image Processing

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

- Q1)** a) Explain statistical parameters mean, standard deviation, variance, SNR [6]
b) Explain short time fourier transform. [4]

OR

- Q2)** a) With reference to relation between pixels explain [6]
i) 4 connectivity
ii) 8 connectivity
iii) mixed connectivity
b) Explain RGB image models [4]

- Q3)** a) What is Histogram? Explain with example [4]
b) Differentiate between median & average smoothing? [6]

OR

- Q4)** a) Perform the histogram equalization of the following image.

Gray level	0	1	2	3	4	5	6	7
No. of pixel	44	40	88	105	96	141	197	313

Comment on the nature of the input image and the equalized image. [6]

- b) Explain sharpening filters. [4]

P.T.O.

- Q5)** a) Explain different methods for segmentation. Explain one in detail.[10]
b) Explain pattern and pattern classes with examples [8]

OR

- Q6)** a) Explain various regional descriptors. [10]
b) Explain 4 point and 8 point chain code with example. [8]

- Q7)** a) Explain huffman coding for image compression [8]
b) Explain JPEG, JPEG-2000 standards. [8]

OR

- Q8)** a) Explain LZW and arithmetic coding. [8]
b) Explain transform based image compression. [8]

- Q9)** a) Explain DIP application in Biometrics. [8]
b) Explain DIP application in Agricultural. [8]

OR

- Q10)** Short notes on (any two) [16]
a) Biomedical application in DIP
b) Explain DIP application in military and space
c) Explain how to detect face recognition using DIP



Total No. of Questions : 10]

SEAT No. :

P3536

[Total No. of Pages : 2

[4959] - 1207

B.E. (Instrumentation & Control)
BUILDING AUTOMATION-II
(2012 Pattern) (Semester-II) (Elective-III(b))

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, Q.9 or Q.10.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary.*

Q1) a) What is IDC? Explain class A and class B IDC. [6]

b) Explain different stages of fire? [4]

OR

Q2) a) How the detection of fire is carried out in both conventional and addressable system? [6]

b) Define fire according to NFPA72 ? Explain fire modes. [4]

Q3) a) Discuss linear heat detector with suitable applications. [6]

b) Explain FAS power supply requirements and its designing parameters. [4]

OR

Q4) a) Discuss analog intelligent technology of FAS. [6]

b) Discuss fire signatures. [4]

P.T.O.

- Q5) a)** Explain different components of sprinkler system. [10]
b) Explain wet pipe sprinkler system. [8]

OR

- Q6) a)** Explain basics of fire suppression system. Explain fire hydrants. [10]
b) What is necessity of flow switch and tamper switch in fire suppression system. [8]

- Q7) a)** What is importance of access control system. What are the components of access control systems? [8]
b) Explain LON and Modbus protocols for access control system. [8]

OR

- Q8) a)** What are various categories of access control system . Explain benefits of access control. [8]
b) Explain biometric access control. [8]

- Q9) a)** Explain system architecture of CCTV System. What are terminology for cameras. [8]
b) List types of camera used in CCTV. Explain PTZ type in detail. [8]

OR

- Q10) a)** What is intrusion system ? Explain the importance along with one application. [8]
b) Explain DVR, DVM, NVR video management systems. [8]



Total No. of Questions :10]

SEAT No. :

P4005

[4959]-1208

[Total No. of Pages :3

B.E. (Instrumentation and Control)
C - Process Modelling and Optimization
(2012 Pattern) (Semester - II) (Elective - III) (406269)

Time : 2½ Hours

[Max. Marks :70]

Instructions to candidates:

- 1) *Solve Que.1 or 2, Que.3 or 4, Que.5 or 6, Que.7 or 8, Que.9 or 10.*
- 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) With an example explain Lagrange Interpolation formula **[5]**

b) Derive a mathematical model of any second order electrical system in differential equations form. **[5]**

OR

Q2) Derive mathematical model of any electromechanical system. **[10]**

Q3) Derive transfer function of Gravity flow tank. **[10]**

OR

Q4) a) Explain advantages and limitations of sine wave testing. **[5]**

b) Write the difference between on-line and off-line identification. **[5]**

P.T.O.

Q5) a) Calculate the Niederlinski index for the system. **[10]**

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} \frac{4e^{-3.2s}}{7.5s+1} & \frac{-1.51e^{-2.3s}}{17s+1} & \frac{-0.019e^{-s}}{19.8s+1} \\ \frac{10.17e^{-5.5s}}{47.5s+1} & \frac{-6.5e^{-3.5s}}{16s+1} & \frac{-0.118e^{-2.2s}}{18.9s+1} \\ \frac{44.18e^{-19.6s}}{9.5s+1} & \frac{46.6e^{-18.5s}}{11.6s+1} & \frac{1.87e^{-2.5s}}{8.8s+1} \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$$

b) Write an advantages and limitation of Niederlinski index. **[8]**

OR

Q6) a) Calculate the RAG for the system represented by transfer function matrix. **[10]**

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} \frac{4e^{-3.2s}}{7.5s+1} & \frac{-1.51e^{-2.3s}}{17s+1} & \frac{-0.019e^{-s}}{19.8s+1} \\ \frac{10.17e^{-5.5s}}{47.5s+1} & \frac{-6.5e^{-3.5s}}{16s+1} & \frac{-0.118e^{-2.2s}}{18.9s+1} \\ \frac{44.18e^{-19.6s}}{9.5s+1} & \frac{46.6e^{-18.5s}}{11.6s+1} & \frac{1.87e^{-2.5s}}{8.8s+1} \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$$

b) With an example explain Morari Resiliency Index. **[8]**

Q7) a) With an example explain the measures of profitability. **[8]**

b) With an example explain classification of optimization problem based on existence of constrains. **[8]**

OR

Q8) a) Explain advantages and limitations of payback period. Net present value and Internal rate of returns. **[8]**

- b) With an example explain classification of optimization problem based on physical structure of the problem. [8]

Q9) A company manufactures two types of chocolates. Using three different ingredients say A,B and C. Type 1 chocolate of 1 kg requires 4 gms A,5 gms B and 3 gms C ingredients respectively. Type 2 chocolate of 1 kg requires 5 gms A, 2 gms B and 8 gms C ingredients. The ingredients available for manufacture is 1000 gms of A,1000 gms of B and 1200 gms of C. The manufacturer can make profit of Rs. 50 on 1 kg of type 1 and Rs. 30 on 1 kg of type 2. Find the best combination of quantities of type 1 and type 2 chocolates which gives him/her maximum profit using Linear programming problem. [16]

OR

Q10)a) Solve the Linear programming problem using graphical method. [8]

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

$$\text{Subject to } 4x_1 + 2x_2 \leq 80$$

$$2x_1 + 5x_2 \geq 180$$

$$x_1, x_2 \geq 0$$

- b) With an example the algorithm of Steepest Descent method. [8]



Total No. of Questions : 10]

SEAT No. :

P4006

[4959]-1209

[Total No. of Pages : 2

B.E. (Instrumentation and Control)

VIRTUAL INSTRUMENTATION

(2012 Course) (Elective - III D) (406269) (Semester - 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) *Use of non-programmable calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) With an example explain limitations of conventional Instruments vs Virtual Instruments. **[5]**
- b) With an example explain the working of sequence structures. **[5]**

OR

- Q2)** a) With an example explain advantages of graphical programming over conventional programming. **[5]**
- b) With an example explain the functions of formula nodes. **[5]**
- Q3)** a) With an example explain the various data types available in Lab VIEW. **[5]**
- b) With an example explain what are the different colours represents different data type in Lab VIEW. **[5]**

OR

- Q4)** a) With an example explain data acquisition with serial communication using Lab-VIEW. **[5]**
- b) What are advantage of PXI over PCI. **[5]**

P.T.O.

- Q5) a)** List and explain various blocks used in developing VI for Fourier transform. [8]
- b) List and explain various blocks used in developing VI for digital multimeter. [8]

OR

- Q6) a)** With an example explain the application of Control and Simulation Toolkit. [8]
- b) List and explain various blocks used in developing VI for Fourier transform. [8]

- Q7) a)** With an example explain the use of math script node. [8]
- b) Write a VI code to interface with matlab Program. [8]

OR

- Q8) a)** With an example explain the use of differential equation block. [8]
- b) Write a VI code to interface with matlab Program. [8]

- Q9) a)** With an example explain the use of OPC. [9]
- b) Write a VI code to interface with any third party SCADA system. [9]

OR

- Q10)a)** With an example explain the various communication protocols used in process automation. [9]
- b) Explain the advantages and limitations of active x programming. [9]



Total No. of Questions : 10]

SEAT No. :

P4552

[Total No. of Pages :2

[4959]-1210

B.E. (Instrumentation & Control)
COMPUTER TECHNIQUES AND APPLICATIONS
(2012 Pattern) (End Semester)

Time : 2½ Hours]

[Maximum 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 circuit diagrams should be drawn whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

Q1) Write short notes on: **[10]**

- a) Services of Operating Systems
- b) Parallel computers

OR

Q2) Explain five CPU scheduling criteria. **[10]**

Q3) What is paging? Why is it needed for memory management? Explain hardware required for paging? **[10]**

OR

Q4) Explain various file access methods. **[10]**

Q5) Explain the following with respect to Networks: **[17]**

- a) WAN
- b) LAN
- c) Tree Topology
- d) Star Topology
- e) Ring Topology

P.T.O.

OR

Q6) Differentiate between Circuit switching and Packet switching networks. [17]

Q7) Write short notes on: [16]

- a) Operating modes of ARM processors
- b) ARM 9

OR

Q8) Explain in detail the architecture of ARM 7 processor. [16]

Q9) Explain Integration testing and explain the following three Integration test approaches: [17]

- a) Big-Bang Integration Testing
- b) Bottom - Up Integration Testing
- c) Top - Down Integration Testing

OR

Q10) Write short notes: [17]

- a) CASE Tools
- b) Validation testing



Total No. of Questions : 10]

SEAT No. :

P3537

[Total No. of Pages : 2

[4959] - 1211

B.E. Instrumentation & Control
Smart Materials and System
(2012 Pattern) (Semester-II)

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 whenever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary*

Q1) a) Compare advantages of smart sensor over Conventional sensor. **[5]**

b) Explain in detail what smart system is. **[5]**

OR

Q2) a) list out different types of smart materials & its property. **[5]**

b) Explain in detail Ferro electricity of material. **[5]**

Q3) a) Explain in detail piezoelectricity property .list out the piezoelectric material **[5]**

b) Explain in detail wide scope of shape Memory alloy **[5]**

OR

Q4) a) Explain in detail wide scope of self-healing material **[5]**

b) Explain in detail about superconductor and list out its application **[5]**

P.T.O.

- Q5)** a) Explain with neat sketch working of Piezoresistive pressure sensor. [8]
b) Explain with neat sketch working of capacitive sensor. [8]

OR

- Q6)** a) Explain with neat sketch principle of Electro thermal Actuator. [8]
b) Explain with neat sketch Magnetostrictive actuator [8]

- Q7)** a) Explain with neat sketch different steps of lithography process. [8]
b) Explain with neat sketch etching process. [8]

OR

- Q8)** a) Explain with neat sketch physical vapor deposition technique. [8]
b) Explain with neat sketch Sputtering process used for material deposition. [8]

- Q9)** a) Explain with neat sketch the working of different elements of Lab on chip. [9]
b) Explain with neat sketch the working of Air bag control used in automotive. [9]

OR

- Q10)** a) Explain with neat sketch the working dosing system in health care. [9]
b) What are the advantages of Lab on chip. Also mention the applications of lab on chip. [9]



Total No. of Questions : 10]

SEAT No. :

P4007

[4959]-1212

[Total No. of Pages : 2

B.E. (Instrumentation)

**b:INSTRUMENTATION IN AGRICULTURE AND FOOD PROCESSING
(2012 Course) (Semester - II) (Elective -IV)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) *Answers 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) Explain the Role of Instrumentation in Agriculture engineering. **[5]**

b) Discuss the Index properties of Soil. **[5]**

OR

Q2) a) Write a note on Hygrometer. **[5]**

b) Write a note on Bio sensor. **[5]**

Q3) a) Explain the instrumentation for Sugar plant. **[7]**

b) Draw flow diagram of Dairy Industry. **[3]**

OR

Q4) a) Explain concept of irrigation scheduling and Irrigation efficiencies. **[6]**

b) Explain Micro Irrigation system. List out the applications. **[4]**

Q5) a) Write a note on: Agrometrological instrumentaion weather stations. **[8]**

b) Write a note on: soil water content measurement using time-domain reflectrometry (TDR). **[8]**

OR

P.T.O.

- Q6)** a) Explain selection criteria for pump in detail. Explain installation of pump. [8]
b) Explain implementation of hydraulic control circuit use in harvesters cotton pickers. [8]

- Q7)** a) Explain different standards in Food processing. [8]
b) Define the recommended international code of hygiene for various products in food processing. [8]

OR

- Q8)** a) Design considerations for cold storage system. [8]
b) Define Food quality measurement? Explain in short norms in food safety. [8]

- Q9)** a) Explain in detail Application of PLC in food packing industry. [10]
b) Write a note on: Equipments for creating and maintaining controlled atmosphere. [8]

OR

- Q10)** a) Explain in detail Application of SCADA in food packing industry. [10]
b) Discuss the Trends in modern food processing. [8]

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Total No. of Questions : 10]

SEAT No. :

P4948

[Total No. of Pages : 2

[4959]-1214

B. E. (Instrumentation and Control Engineering)

AUTOMOBILE INSTRUMENTATION

(2012 Pattern) (End Semester)

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 circuit diagrams should be drawn whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

Q1) Write short notes on : **[10]**

- a) Automotive electronic engine management system.
- b) Security and warning system in automobile.

OR

Q2) Draw and explain construction and principle of operation of Rotary Pump and injector. **[10]**

Q3) What is rating capacity of battery? Explain various rating tests carried on batteries. **[10]**

OR

Q4) Explain care and maintenances of starter motor and starter switches. **[10]**

Q5) Explain the following with respect to automobile : **[17]**

- a) Crank angle position sensor
- b) Sensors for speed
- c) Coolant temperature measurement
- d) Manifold pressure measurement

OR

P.T.O.

Q6) Write short note electronic system for activating air bags in automobile. [17]

Q7) Write short notes on : [16]

- a) LED lighting system
- b) Compensated voltage regulator

OR

Q8) Explain in detail the principle of operation of emission measuring instruments. [16]

Q9) Explain tiltable steering wheel and explain the following : [17]

- a) Steering and mirror adjustment
- b) Central locking system

OR

Q10) Write short notes : [17]

- a) Euro and Bharat norms
- b) Horn and wiper system



Total No. of Questions : 10]

SEAT No. :

P3538

[Total No. of Pages : 4

[4959] - 1221

B.E. Automotive Refrigeration and Air Conditioning

AUTOMOBILE

(2012 Pattern) (Semester-I)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Neat diagrams must be drawn whenever necessary.*
- 2) *Use of logarithmic tables slide rule, Mollier charts, Psychometric chart electronic pocket calculator and steam tables is allowed.*
- 3) *Assume Suitable data, if necessary.*
- 4) *All questions are compulsory*

- Q1)** a) Write a short note on 'Refrigerating effect' and derive its units. [4]
- b) A dense air refrigerating system operating between pressure of 17.5 bar and 3.5 bar to produce 10 TR. Air leaves the refrigerating coil at -7°C and it leaves the air cooler at 15.5°C . Neglecting losses and clearance. Calculate net work done per minute and coefficient of performance. For Air $C_p=1.005\text{kJ/kg K}$ and $\gamma = 1.4$. [6]

OR

- Q2)** a) Write a short note on refrigerant piping by considering following points: [4]
- i) Location and arrangement of piping
 - ii) Vibration and noise in piping
 - iii) Flow rate
 - iv) Pressure drop in refrigerant piping
- b) A capacity of refrigerator is 200 TR when working between -6°C and 25°C . Determine the mass of ice produced per day from water at 25°C . Also find the power required to drive unit. Assume that cycle operates on reversed Carnot cycle and latent heat of ice is 335kJ/Kg . [6]

P.T.O.

Q3) Explain in brief which refrigerant/s would you choose for each of the following applications and why? [10]

- i) Air conditioning plants, automobile air conditioning
- ii) Air conditioning of hospitals, theatres, hotels and marine service
- iii) Industrial applications where reciprocating compressor is used
- iv) Industrial ice plants, cold storage, skating rinks

OR

Q4) Write a short note on [10]

- i) Vehicle operation modes & Cool-down Performance.
- ii) Air management and heater system

Q5) a) What is fog? Show on chart how two air streams on mixing would produce fog? Why does fog occur in winter night and not in summer night? [8]

b) Air at 10°C DBT & 90% RH is to be heated & humidified to 35°C DBT & 22.5°C WBT. The air is preheated sensibly before passing to the air washer in which water is recirculated. The RH of air coming out of the air washer is 90%. This air is again reheated sensibly to obtain the final desired condition. Find: [8]

- i) The temp. to which air should preheated.
- ii) The total heating required
- iii) The make-up water required in the air washer
- iv) The humidifying efficiency of the air washer.

OR

Q6) a) What is the process used for low relative humidity requirement in room? Describe it with neat sketch. [8]

b) On a particular day, the atmospheric air was found to have a DBT of 30°C and WBT 18°C. The barometric pressure was observed to be 756 mm of Hg. Obtain following properties without using psychrometric chart. [8]

- i) RH
 - ii) Specific humidity
 - iii) Dew point temperature
 - iv) Enthalpy of air per Kg of dry air
 - v) Volume of moisture per kg of dry air
- (Use steam table)

Q7) a) Define following with neat sketch: [9]

- i) OASH
- ii) ERSHF
- iii) GSHP

b) The following are design data for an air conditioning system proposed for vehicle: [9]

Outside design conditions= 34°C DBT, 28°C WBT

Inside design condition= 24°C DBT, 50% RH

Solar heat gain through vehicle body= 4.7 kW

Solar heat gain through glass area= 4.7 kW

Occupants= 0.5

Sensible heat gain per person= 85W

Latent heat gain per person= 105W

Internal lighting load= 4 fluorescent fixture of 20 W each

sensible heat gain from other sources= 11.6kW

infiltration air= $14\text{m}^3/\text{min}$

By pass factor of the cooling coil used= 0.15

If return and outdoor air are adiabatically mixed in ratio of 3:2 (by mass) and then passed through the conditioner, Determine

- i) DBT and WBT of supply air
- ii) ADP
- iii) capacity of air conditioning plant

OR

Q8) The following data supply to an air conditioning system. **[18]**

Room sensible Heat=5.8kw

Room latent Heat=5.8kW

Outside design conditions=35°c DBT, 28°c WBT

Inside design condition=25°c DBT,50% RH

An air within the vehicle is mixed with outside air before entering the cooling coil in the ratio 4:1. The coil by pass factor is 0.1 and ADP is 10°c. The vehicle inside air is again mixed with the air leaving cooling coil in the ratio 1:4 and the mixture is then allowed to enter the reheater before being supplied into the vehicle. Determine:

- i) Supply air condition to the vehicle cabin
- ii) Reheater capacity
- iii) Refrigeration capacity of cooling coil
- iv) Quality of fresh air supplied

Q9) a) Explain Any 2 from the following **[8]**

- i) Initial vehicle inspection
- ii) Temperature measurement
- iii) Odour removal
- iv) Retrofitting

b) Write a short note on refrigerant recovery, recycle and charging. **[8]**

OR

Q10)a) Explain pressure gauge readings and its cycle testing. **[8]**

- b) Write a short note on **[8]**
- i) Sight glass
 - ii) Refrigerant handling



Total No. of Questions : 09]

SEAT No. :

P3539

[Total No. of Pages : 2

[4959] - 1222

B.E. Automobile
Automotive Chassis & Systems
(2012 Pattern) (Semester-I)

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 and Q9 is compulsory.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*

- Q1)* a) Explain ackerman steering & davis steering linkages with neat sketch. [6]
b) What are the types of suspension systems. Discuss any one. [4]

OR

- Q2)* a) Define following with neat sketch. [6]
i) Roll centre
ii) Sprung and unsprung mass
iii) King pin inclination.
b) Explain basic requirements of wheels and tyres. [4]

- Q3)* a) Discuss cross ply and radial ply tyre with constructional details. [6]
b) What do you mean by hydro elastic suspension system. [4]

OR

- Q4)* a) What is need of shock absorber. Explain operating principle. [6]
b) Compare tube tyre and tubeless tyre with advantages. [4]

P.T.O.

- Q5)** a) What are the requirements of braking system and function of braking system. [8]
b) Explain disk brake with the help of neat sketch. Also give advantages. [10]

OR

- Q6)** a) Explain engine exhaust brake in details. [8]
b) Draw layout of hydraulic brake system and explain all components of hydraulic system. [10]

- Q7)** a) Explain electronics stability program and draw simple layout. [8]
b) Compare active safety and passive system with examples. [8]

OR

- Q8)** a) What do you mean by safety glass and requirement of safety glass. [8]
b) Why rollover mitigation system comes in picture? Explain in details. [8]

Q9) Write a short note.

- a) Causes of chassis failure [6]
b) Draw lay out of heavy vehicle with nomenclature. [6]
c) Manufacturing process for chassis. [4]



Total No. of Questions :10]

SEAT No. :

P4008

[4959]-1223

[Total No. of Pages :3

B.E. (Automobile)

Machine and Vehicle Dynamics

(2012 Pattern) (Semester - I) (End Semester)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

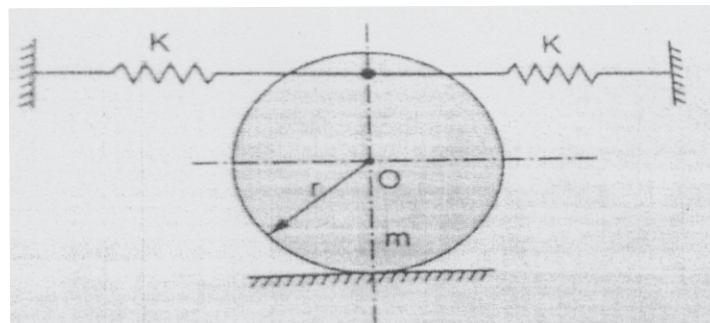
- 1) Answers all questions.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of logarithmic tables, slide rule, electronic pockets calculator is allowed.
- 5) Assume suitable data if necessary.

Q1) A single cylinder reciprocating engine has speed 250 rpm, stroke 350 mm, mass of reciprocating parts 40 kg, mass of revolving part at 175 mm radius 25 kg. If two-third of the reciprocating parts and all revolving parts are to be balanced. Find: [10]

- a) Balancing mass required at radius of 400 mm.
- b) The residual unbalanced force when crank has rotated 60° from TDC.

OR

- Q2)** a) What is the concept of direct and reverse cranks method? [5]
b) Explain in brief about excitation due to reciprocating unbalance. [5]
- Q3)** Assuming that the cylinder shown in fig, rolls on support without slippage , determine the equation of motion of system, in terms of k , r , a and m . [10]



OR

P.T.O.

- Q4)** a) Define magnification factor in brief. [5]
b) Explain the term phase difference. [5]

- Q5)** a) Write a short note on Net driving power available. [9]
b) Write a short note on, [9]
i) Maximum tractive effort.
ii) Drawbar pull.
iii) Sprung mass and unsprung mass.

OR

- Q6)** a) Write a short note on Nature of the forces and factors affecting the forces. [9]
b) Write a short note on, [9]
i) Earth fixed coordinate system.
ii) Grad ability.
iii) Gyroscopic Effects.

- Q7)** a) What is the impact of Automatic Transmission on Acceleration? [8]
b) Explain in brief about Traction Limited Acceleration. [8]

OR

- Q8)** a) What is the impact of Braking Applied To Rear Wheels, Front wheels And All Four Wheels? [8]
b) Explain following terms in brief. [8]
i) Constant Deceleration.
ii) Brake Factor.

- Q9)** a) Draw and explain Mathematical modeling of vehicle ride. [8]
b) Explain following terms in brief. [8]
i) Neutral steer, under steer and over steering.
ii) Various excitation sources of vehicle vibration.

OR

- Q10** a) Explain Steady State Handling with the help of Slip angle, cornering power. [8]
- b) Explain the procedure of constant speed test, constant steer angle test. [8]



Total No. of Questions : 10]

SEAT No. :

P4902

[Total No. of Pages : 2

[4959]-1224

B.E. (Automobile)

**FUNDAMENTALS OF COMPUTATIONAL FLUID DYNAMICS
(2012 Course) (Semester - I)**

Time : 2.5 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) Explain Navier Stoke's model used in CFD solvers. **[6]**

b) Write in brief about steps used in CFD solution procedure. **[4]**

OR

Q2) a) What is the grid types used in CFD solution? **[6]**

b) Write four strengths and weakness of CFD? **[4]**

Q3) Explain in brief Couette flow equation $\left(\frac{\partial p}{\partial x} = 0\right)$ using FTCS and Crank - Nicholson's method. **[10]**

OR

Q4) How to obtain 2D solution by Explicit and Alternating Direction Implicit method (ADI Method)? **[10]**

Q5) a) Consider long slab (2L*2L) in which heat is generated at a uniform rate of q_m W/m³ All the four sides are maintain at $T = T_\infty$ temperature of surrounding fluid. Sketch the domain with 4*4 grids. **[12]**

i) Write down governing equation and boundary conditions.

ii) Apply finite difference (central) and discuss the method of solution.

b) What is Peclet number? Explain its significance. **[6]**

P.T.O.

OR

- Q6)** a) Derive the differential equation for first order wave equation with upwind method and Mac Cormac scheme. [12]
b) Write in brief about Lax Wendroff method and its stability criteria. [6]

- Q7)** a) Explain the difference between SIMPLE, SIMPLER, SIMPLEC algorithm with the help of Navier stroke equation. [10]
b) Write a note on finite volume method. [6]

OR

- Q8)** a) Consider a viscous flow over a flat plate. Variation in velocity with respect to y is given as $U = 1582(1 - e^{-y/L})$. Where $L = 1$ unit and $\mu = 3.37 \times 10^{-7}$ units. Y is from 0 to 0.3 in the step of 0.1.
Find the percentage error in shear stress involved in 1st and 2nd order difference compared with exact solution. [10]
b) How CFD is applicable for problems related to fluid flow through pipes? [6]

- Q9)** a) Explain following boundary conditions in brief (any 3) [9]
i) no slip
ii) free slip
iii) rotating wall
iv) symmetry
b) Enlist four CFD tools used for solving CFD problems and preprocessor settings for any one of them. [7]

OR

- Q10)** a) Explain following solver models [9]
i) SA model
ii) K- ϵ
iii) K- ω
b) Explain how to control residual in any CFD tool and how to setup solver for obtaining plots for analysis? [7]



Total No. of Questions : 8]

SEAT No. :

P3540

[Total No. of Pages : 4

[4959]-1225

B.E. (Automobile Engineering)

B : FUNDAMENTALS OF FINITE ELEMENT ANALYSIS

(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.*
- 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) Describe in detail the steps involved in solving structural problem. [6]

- b) Determine the nodal displacement and support reactions of the axially loaded bar as shown in Figure 1.1. Take $E = 200 \text{ GPa}$ and $P = 30 \text{ kN}$, $A_1 = 250 \text{ mm}^2$, $A_2 = 400 \text{ mm}^2$. [8]

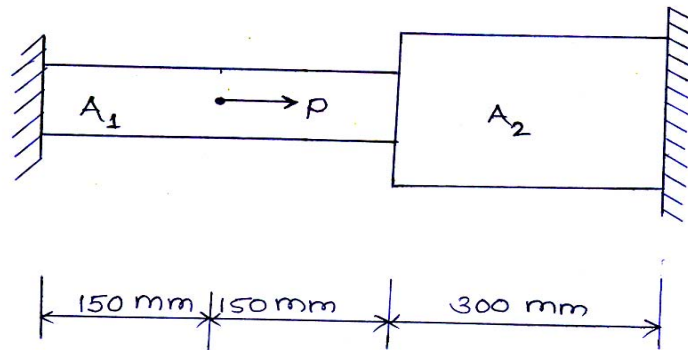


Figure 1.1

- c) Explain the term shape function and write a shape function for CST & LST elements. [6]

OR

Q2) a) Explain the Reyleigh-Ritz & Galerkin Methods. [6]

P.T.O.

- b) Determine the displacement of nodes 1 and 2 in the spring system shown in Figure 2.1. Use minimum potential energy principle to assemble equation of equilibrium. [8]

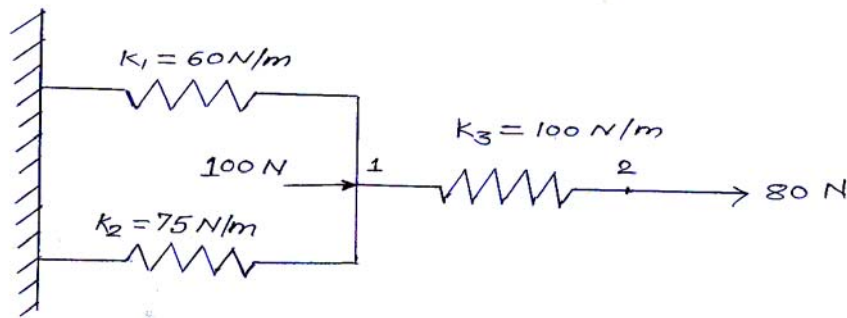


Figure 2.1

- c) Evaluate the shape function N_1 , N_2 and N_3 at the interior point P for the triangular element shown in Figure 2.2 [6]

Table 2.1

Point	X-coordinate	Y-Coordinate
1	1.5	2
2	7	3.5
3	4	7
P	3.85	4.8

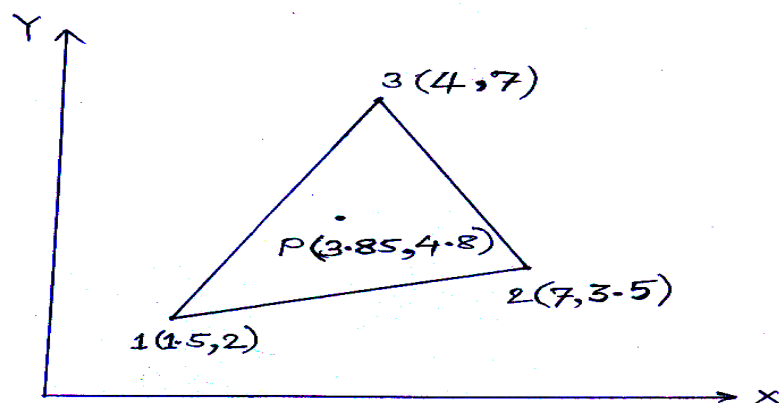


Figure 2.2

- Q3) a) Explain the terms iso-parametric, sub-parametric & super-parametric, Jacobian matrix. [8]

- b) Evaluate the integrals using three point Gaussian quadrature (5 marks each). [10]

i) $I = \int_{-1}^1 [x^2 + \cos(x/2)] dx$

ii) $I = \int_{-1}^1 [3^x - x] dx$

OR

- Q4) a) Explain Newton-Cotes and Gauss quadrature in brief. [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]

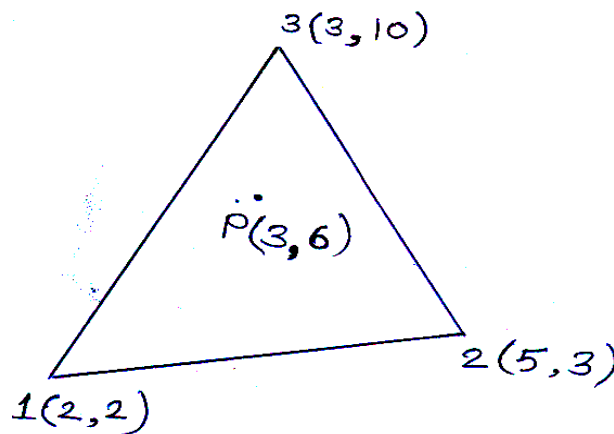


Figure 4.1

- Q5) a) Formulate the one - dimensional heat transfer equations using a variational method. [8]
- b) The thermal conductivity of a stainless steel rod of 0.1 m length and area of cross- section of 1 cm^2 is $20 \text{ W/m}^\circ\text{C}$. The rate of heat generation in the rod is 10^5 W/m^3 . One end of the rod is kept at 0°C and the other end at 100°C . The rod is insulated except at the ends. Using finite element with two elements, find out the temperature at the mid-point of the rod. [8]

OR

- Q6)** Determine the temperature distribution along the length of rod shown in Figure 6.1 with an insulated perimeter. The temperature at the left end is constant 40°C and free stream temperature is -10°C . Let $h = 55\text{W/m}^2\text{ }^{\circ}\text{C}$ and $k = 35\text{W/m }^{\circ}\text{C}$. Consider four element [16]

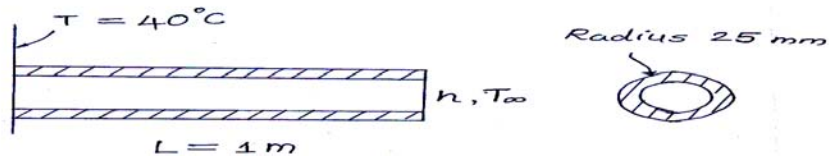


Figure 6.1

- Q7)** a) Explain the difference between lumped mass matrix and consistent mass matrix. [8]
 b) For the bar shown in Figure 7.1 with length L , modulus of elasticity E , mass density ρ , and cross sectional area A , determine the first two natural frequencies using lumped mass matrix. [8]

Given: $L = 2.5\text{ m}$, $\rho = 7850\text{ kg/m}^3$, $E = 210\text{ GPa}$.

$$[m^e] = \frac{\rho AL}{2} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

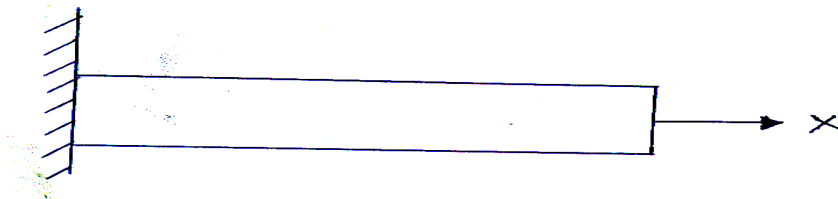


figure 7.1

OR

- Q8)** a) Explain in brief the Priors error estimates & Posteriori error estimates [8]
 b) Obtain the expression for the first non-zero natural frequency of vibration for a uniform free-free (both ends free) rod by FEM with two elements & consistent mass matrix. [8]



Total No. of Questions : 10]

SEAT No. :

P3541

[Total No. of Pages : 4

[4959]-1226

B.E. (Automobile)

CAE & AUTOMATION

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

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

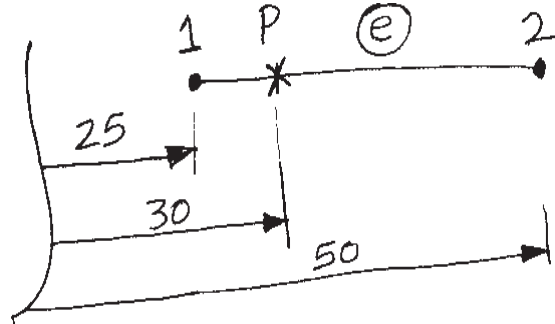
- Q1)** a) An ellipse is defined by the centre point (8, 12) and has a major radius of 10 and minor radius of 4. Determine the various points on the ellipse in the first quadrant, if the increment between each point is 30°. Assume that the ellipse is oriented such that the major axis and minor axis are parallel to X and Y axes respectively. [6]
- b) Explain with the help of example concatenated transformation matrix. [4]

OR

- Q2)** a) With example, clearly define the term topology as used in modeling. [4]
- b) A line had coordinates A(5, 4, 5) and B (8, 7, 9). The line is to be uniformly scaled by a factor 2 about point A. Determine the new coordinates of the line. [6]
- Q3)** a) Giving example, formulate a transformation for translating a given entity. [4]

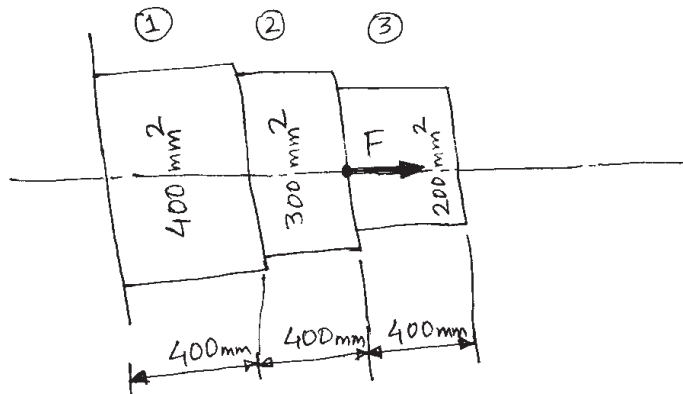
P.T.O.

- b) A 1D spar element having a linear shape function as shown in figure. If the temperature at node 1 is 50°C , and at node 2 is -20°C , find the temperature at point P. [6]

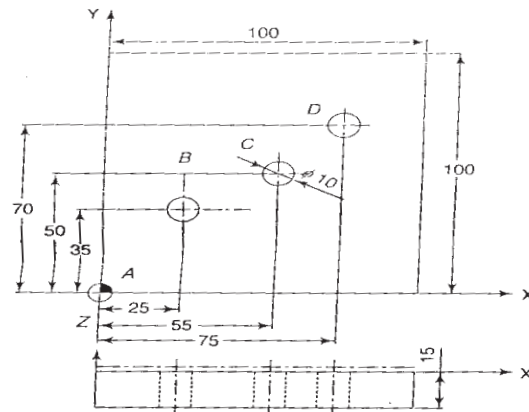


OR

- Q4) A stepped shaft is shown in figure. Determine the stresses and deflections in each of the sections. Assume uniform material for the complete shaft having a modulus of elasticity as 200 GPa and the axial force F as 35 kN . [10]



- Q5) a)



Write down the NC program for drilling three holes as shown in figure

- i) NC program without using canned cycles. [12]
 - ii) NC program using canned cycles. [12]
- b) Describe with neat sketch Generative Approach to CAPP. [6]

OR

Q6) a)

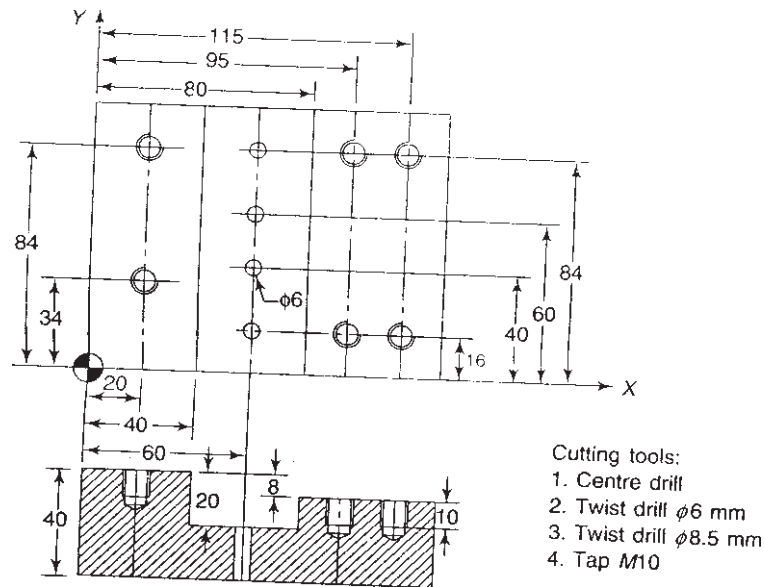


Figure shows the component to be machined. All the hole making operations are to be machined using the tools specified. In the above component the top surface is at three different levels and as such the clearance plane will be different for each of these planes. Write down the part program for machining the component completely (using appropriate canned cycle.). [12]

- b) Describe with neat sketch selective laser sintering process. [6]

Q7) a) What do you mean by Flexible Manufacturing Cell? Describe with neat sketch. State its applications. [8]

b) Following table shows the machines required for machining the respective parts.

Part	1	2	3	4	5	6	7	8	9
Machines Required	1, 4	2,3,5	1,4	1,4,6	2,3	2,3	7,8	1,4	7,8

Prepare the Part - Machine incidence matrix and group the parts with respect to machines required (using clustering method). [8]

OR

Q8) a) The various guiding principles used in AGV control are wire guided, infrared and Laser. Describe these three guiding principles. [8]

b) Describe with neat sketch Geneva Mechanism. State its application. [8]

Q9) a) What are the various types of motion control possible in robots? [8]

b) Describe with neat sketch the typical motions of the following types of Robots. [8]

i) Cartesian or Rectilinear Robot.

ii) Spherical Robot

OR

Q10) a) Describe the following methods of development of Robot Programs or teaching a robot, [8]

i) Lead by Noise

ii) Teach Pendant

ii) Off line Programming

b) The Robot system generally has four basic components : manipulator, controller, power source and the end effector . Describe these components in brief. [8]



Total No. of Questions : 10]

SEAT No. :

P3542

[Total No. of Pages : 2

[4959]-1227

B.E. (Automobile) (Semester-I)
HYBRID AND FUEL CELL VEHICLE (Elective II(a))
(2012 Pattern)

Time : 2 1/2 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) *Figures to the right side indicate full marks.*
- 3) *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 DC motor and its types with neat circuit diagrams. [5]

OR

Q2) a) Discuss the construction and working of BLDC motors with neat sketch. [5]

b) Explain the configuration and operating modes of parallel mild hybrid electric drive train. [5]

Q3) a) Define road load force and illustrate the forces acting on a vehicle. [5]

b) Give the advantages and limitations of series hybrid vehicles. [5]

OR

Q4) a) Draw typical performance characteristics of electric motors for traction and explain briefly. [5]

b) What is the mild hybrid technology? Explain the energy recuperation in mild hybrid. [5]

P.T.O.

- Q5)** a) What are the different battery parameters? Describe nickel-cadmium battery with neat sketch. [8]
b) Explain the sizing of an electric motor. [8]

OR

- Q6)** a) What are the types of batteries? Explain the construction and working of lead-acid battery. [8]
b) Describe and explain I. C. engine force-velocity characteristics and road-load characteristics. [8]

- Q7)** a) Explain construction and working of molten carbonate fuel cell with neat sketch. [8]
b) Explain fuel cell electric vehicle with neat sketch. [8]

OR

- Q8)** a) What are the characteristics of fuel cell. Explain direct methanol fuel cell with neat sketch. [8]
b) Explain supercapacitors and ultracapacitors. [8]

- Q9)** a) Explain hydraulic accumulators and pumps. [8]
b) Explain continuously variable transmission briefly. [10]

OR

- Q10)** a) Explain ultra high speed flywheel with neat sketch. [8]
b) Explain pneumatic hybrid engine system operation modes. [10]



Total No. of Questions : 10]

SEAT No. :

P3543

[Total No. of Pages : 2

[4959] - 1228

B.E. Automobile (Elective-II)
Automotive Material
(2012 Pattern) (Semester-I)

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) Explain the strength density char with neat sketch? [5]

b) Explain the P & N type semiconductor material? [5]

OR

Q2) a) What are the application of composite material and polymer in industry? [5]

b) Difference between bending and twisting? [5]

Q3) a) Give five areas of application of ceramics in industries. Gives specific name of ceramic being used and appropriate property which makes its suitable? [5]

b) What do you mean by term polymer? Explain with type, properties and application? [5]

OR

Q4) a) Difference between soft and hard magnetic material? [5]

b) Explain the material limit and shape factor? [5]

P.T.O.

- Q5) a)** Explain the ceramic and organic coating? [8]
b) Explain the vapor deposition and diffusion coating? [8]

OR

- Q6) a)** Write down the name of different methods of mechanical surface treatment and explain any one in details? [8]
b) Explain the case hardening and hard facing? [8]

- Q7) a)** Explain in details shape memory alloy with properties and application? [9]
b) Write a short note on nano-crystalline material? [9]

OR

- Q8) a)** Write a short note on trip steel and merging steel? [9]
b) Explain the smart material and write down the application of smart material in automobile? [9]

- Q9) a)** What is the criteria of selecting material for automotive component?[8]
b) Which steel would you select for following automotive component and justify them [8]
i) Gear
ii) Crank-shaft
iii) Ball bearing
iv) clutch plate

OR

- Q10) a)** What is selection criteria chassis material and brake-lining material?[8]
b) What are the application of ceramic material for automotive purpose?[8]



Total No. of Questions : 8]

SEAT No. :

P3544

[Total No. of Pages : 2

[4959] - 1229

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

AUTOMOTIVE HYDRAULIC AND PNEUMATICS

(2012 Pattern) (Elective-II(c))

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 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 different additives used in hydraulic fluids. [8]

b) Explain [12]

- i) Pascals law
- ii) Force-Power relation
- iii) Force-displacement relation

OR

Q2) a) Classify DCV's [6]

b) Explain construction and working of gear pump. [8]

c) Explain the sources of contamination and different contamination control methods. [6]

Q3) a) List the methods used for locked cylinder circuit explain any one in detail. [8]

b) Explain cylinder sequencing circuit with a commercial application. [8]

OR

Q4) a) List the methods used for speed control of a hydraulic cylinder and explain any one in detail. [8]

b) Explain cylinder synchronization circuit and it's benefits. [8]

P.T.O.

- Q5)** a) Compare Pneumatics with hydraulic power transmission. [8]
b) Explain DCV's in Pneumatics. [8]

OR

- Q6)** a) Explain the FRL Unit. [8]
b) List different types of compressors explain any one in detail. [8]

- Q7)** a) Explain the working of air brake system. [8]
b) Explain hydraulic tipping mechanism. [6]
c) Explain application areas of Pneumatics. [4]

OR

- Q8)** a) Explain the working of power steering. [8]
b) Explain accumulator as hydraulic shock absorber [6]
c) Explain the effects of replacing hydraulic system with pneumatic in an application with different parameters. [4]



Total No. of Questions : 10]

SEAT No. :

P3545

[Total No. of Pages : 2

[4959] - 1230

B.E. (Automobile Engineering)
Vehicle Performance & Testing
(2012 Course) (Semester-II)

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) *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 construction & working of close loop λ ambda control system. **[6]**

b) Write a short note an 'gear box noise'. **[4]**

OR

Q2) a) Write a note on 'wheels & tyre testing'. **[6]**

b) Differentiate two way & three way catalytic convertor with sketch & chemical reactions. **[4]**

Q3) a) Write in brief about several testings of vehicle on chassies dynamometer. **[6]**

b) Explain procedure for testing of clutch. **[4]**

OR

Q4) a) Write a brief note on virtual testing. **[6]**

b) What is the purpose to carry endurance test? **[4]**

P.T.O.

- Q5)** a) With the help of detailing of drivers seat explain driving controls accessibility. [8]
- b) Explain in brief, how energy absorption system helps to reduce fatalities in road accident. [8]

OR

- Q6)** a) Write a brief note on steering system enhancement regarding safety. [8]
- b) Explain in brief about 'Adaptive cruise control'. [8]

- Q7)** a) Explain working & construction of any two types of crash sensors. [8]
- b) How dummies helps to improve crash worthiness in vehicles. [8]

OR

- Q8)** a) Write a short note on: [8]
- i) Pole crash test
- ii) Vehicle to vehicle front impact.
- b) Explain in brief 'Hybrid III family dummies'. [8]

- Q9)** a) Write a short note on model test & full scale test. [6]
- b) How to overcome road shocks [6]
- c) What is the causes & remedies on engine noise? [6]

OR

- Q10)** a) Explain in brief about wind noise. [6]
- b) How sensors are selected for data acquisition. [6]
- c) Draw mathematical model of vehicle suspension for vibration & explain. [6]



Total No. of Questions : 10]

SEAT No. :

P3546

[Total No. of Pages : 4

[4959] - 1231

B.E. (Automobile Engineering)

Automotive System Design

(2012 Pattern) (Semester-II)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve questions 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 electronic pocket calculator.*
- 5) *Assume Suitable data if necessary*

Q1) a) Answer the following: **[6]**

- i) What causes the clutch to slip?
 - ii) What are the drawbacks with metallic lining?
 - iii) Why centrifugal clutch is more suitable for heavy duty applications.
- b) What are the advantages of increasing the number of gear ratio steps in automobile gearbox? **[4]**

OR

Q2) a) a motor car engine develop 5.9KW at 2100RPM.find the suitable size of clutch plate having frictional lining riveted on both side to transmit the power, under the following conditions; **[6]**

- i) Intensity of pressure on the surface not to exceed 6.87×10^4 Pa
 - ii) Slip torque and losses due to wear etc.is 35% of engine torque
 - iii) Coefficient of friction on contacting surface is 0.3
 - iv) Inside diameter of the friction plate is 0.55 times the outside diameter.
- b) Explain the selection of bearing in gear box. **[4]**

P.T.O.

- Q3)** a) Write note on gear train types. [2]
b) Two shaft are connected by a universal joint. The driving shaft rotates with at a uniform speed of 1200rpm. determine the greatest permissible angle between the shaft axes so that the total fluctuation of speed does not exceed 100rpm. also calculate the maximum and minimum speed of the driven shaft. [8]

OR

- Q4)** a) When is maximum vehicle speed attained? [2]
b) An automobile engine develops 28KW at 1500rpm and its bottom gear ratio is 3.06. if a propeller shaft of 40mm outside diameter is to be used, determine the inside diameter of mild steel to be used, assuming a safe shear stress of $55 \times 10^3 \text{Kpa}$ for the MS. [8]

- Q5)** a) In shoe-brake with leading and trailing shoe, the total actuating force of 471N acts a distance of 0.15m from the pivot of the shoe which is 0.075m from the axis of the drum of radius 0.09m. the shoe have symmetrical lining with coefficient of friction 0.45. if the effective radius of the friction force is 0.1 m, calculate the total braking torque, when [12]
i) The actuating mechanism gives equal force to the shoe, and
ii) When the actuating mechanism gives the shoe equal displacement
b) Why is disc brake preferred for front wheel and the drum brake for rear wheel. [6]

OR

- Q6)** a) In a hydraulic single line braking system the force on foot pedal is 100N, pedal leverage ratio is 4, cross sectional area of master cylinder is 4 cm^2 , cross sectional area of front piston 20 cm^2 . Cross sectional area of the rear piston is 5 cm^2 . Distance moved by effort is 1 cm. Calculate [12]
i) front to rear brake ratio
ii) percentage of front and rear braking,
iii) total force ratio,
iv) distance moved by output,
v) cylinder movement ratio, and
vi) Total movement ratio.
b) Explain: [3x2=6]
i) Brake Fade
ii) Brake Torque
iii) Properties of friction lining

- Q7) a)** A vehicle spring of semi elliptic type has leaves of 75 mm width and 10 mm thickness and effective length is 900 mm. If the stress is not to exceed 220725 kPa when the spring is loaded to 4905 N, estimate the required number of leaves and the deflection under this condition. If the spring is just flat under load, what is the initial radius? Take $E=196.2 \times 10^6$ kPa. **[12]**
- b) State and explain any one steering gear Mechanism. **[4]**

OR

Q8) Solve any four. **[4x4=16]**

- a) What is nipping in leaf spring?
- b) What are the characteristics of over-steer?
- c) Define
- i) camber angle.
 - ii) Scrub radius.
- d) Write a note on air spring.
- e) Discuss general design considerations of suspension system.

- Q9) a)** it is observed from a sample of 300 forgings that the lengths are normally distributed with mean of 150.5 mm and a standard deviation of 0.02 mm. if 15 forgings are rejected, determine the tolerance specified by the designer. **[12]**

Use following table for the areas under the standard normal distribution curve.

z	0	1	2	3	4	5	6	7	8	9
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817

- b) Define Mechanical reliability. **[4]**

OR

- Q10)** a) A tensile bar of length 200mm is subjected to the constant tensile force of 5000N. Design the bar with the objective of minimizing the material cost, out of the following materials: **[12]**

Consider factor of safety is 1

Material	Mass density ρ kg/m ³	Material cost per unit mass C, Rs/kg	Yield strength S_{yt} N/mm ²
Plain carbon steel	7500	16	130
Aluminum Alloy	3000	32	50
Titanium Alloy	4800	480	90
Magnesium Alloy	2100	32	20

- b) Solve any One: **[4]**

- i) Discuss 'Adequate and optimum Design.
- ii) Explain aspects of Aesthetic Design.



Total No. of Questions : 10]

SEAT No. :

P3547

[Total No. of Pages : 2

[4959] - 1232

B.E. (Automobile Engineering)

Automotive NVH

(2012 Pattern) (Elective III) (End Sem)

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) Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.
- 5) Assume Suitable data if necessary

Q1) Define the following **[10]**

- a) Periodic Motion & Time Period
- b) Frequency & Amplitude
- c) Natural Frequency
- d) Fundamental mode of vibration
- e) Degree of Freedom

OR

Q2) Enlist the different types of vibrations. Explain each one in short **[10]**

Q3) An unknown mass M is attached to one end of a spring of stiffness K having natural frequency of 6Hz . when 1Kg mass is attached with M , the natural frequency of the system is lowered by 20% . Determine the value of unknown mass M and stiffness K . **[10]**

OR

- Q4)** a) Describe in detail untuned dry friction damper & draw its frequency response curve. **[5]**
- b) How to control torsional oscillations amplitude in engine crank shaft? Describe its procedure in detail? **[5]**

P.T.O.

- Q5) a)** What are the adverse effect of noise caused to machine, structure and human being. [8]
- b) List down the different methods of vibration control. Explain any one of them in short. [8]

OR

- Q6) a)** Enlist the different steps involved in the vibration control. [4]
- b) Discuss the characteristics of sound wave in brief. [12]

- Q7) a)** Enlist the types of the noise measuring instruments. Explain microphone as noise measurement device in detail. [10]
- b) Discuss in brief Ambient Emission Noise standards in India. [8]

OR

- Q8) a)** The worker is exposed to noise according to the following schedule:[10]

Exposure Level DB	92	95	97	102
Period of Exposure	3	2	2	1

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

- b) Explain in detail Interior Noise in a vehicle. [8]
- Q9) a)** Explain in detail Vehicular Noise Measurement Techniques? [8]
- b) What do you mean by Noise Control along the path? Discuss it in brief.[8]

OR

- Q10) a)** Write a note on Engine Noise Control. [8]
- b) Discuss the following [8]
- i) Brake Noise
 - ii) Noise Control at Source.



Total No. of Questions : 10]

SEAT No. :

P3548

[Total No. of Pages : 2

[4959]-1233

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

**B) OFF ROAD VEHICLES (Elective-III)
(2012 Pattern)**

Time : 2 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, electronic pocket calculator is allowed.*

- Q1)** a) Explain introduction and classification of Off Road Vehicle? [5]
b) List the different types of Earth Moving Equipment with applications.[5]

OR

- Q2)** a) Determine the HP required to pull the 30 cm bottom plough with working depth 15 cm. Number of ploughs are 4, traction speed 6 kmph and soil resistance 0.7 kg/cm² [5]
b) Compare Revolving shovel with Stripper shovel. [5]

- Q3)** a) Describe the construction and working of Motor Grader. [5]
b) Explain the construction & working of wheeled Tractor with neat sketch. [5]

OR

- Q4)** a) Explain the working of Bulldozer with neat sketch and attachment application. [5]
b) Explain the working of Drag-line with sketch. [5]

P.T.O.

- Q5)** Explain following: [16]
- a) Tankers
 - b) Gun Carriers
 - c) Combat Vehicle
 - d) Pulverizers & Rollers

OR

- Q6)** a) Explain any 5 tractor attachments used in farm machinery. [8]
- b) Distinguish between transmission drive P.T.O. and independent drive P.T.O. [8]

- Q7)** a) Explain OCDB and dry disc calliper brake system of the vehicle. [8]
- b) Explain the Hydraulic system of off Road Vehicle with neat sketch. [8]

OR

- Q8)** a) Explain the design aspects of the dumper body. [8]
- b) Write a note on safety features and safe warning system for dumper. [8]

- Q9)** a) Explain briefly considering soil vehicle mechanics (any 3): [12]
- i) VCI
 - ii) RCI
 - iii) MI
 - iv) Nominal ground pressure
- b) Explain characteristics of soil. [6]

OR

- Q10)** a) Explain the different soil horizons with neat sketch. [12]
- b) What are the factors affecting traction performance? [6]



Total No. of Questions : 10]

SEAT No. :

P3549

[Total No. of Pages : 2

[4959] - 1234

B.E. (Automobile)

ALTERNATIVE FUELS AND EMISSION CONTROL

(2012 Pattern) (Semester-II)

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, Q.9 or Q.10.*
- 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.*

Q1) a) How are SI and CI engine fuels rated? **[4]**

b) Discuss important qualities of SI and CI engine fuel. **[6]**

OR

Q2) a) Write the calorific value & general chemical formula of following fuels. (any 3) **[6]**

i) Petrol

ii) Diesel

iii) LPG

iv) CNG

v) BIO GAS

b) Write a note on biogas as a fuel for IC engine. **[4]**

Q3) a) Explain the properties of hydrogen fuel & give its advantages over conventional fuels. **[4]**

b) Explain any two synthetic fuels with its properties, advantages, disadvantages & handling. **[6]**

OR

Q4) a) Write note on alcohol as fuel for IC engine. **[4]**

b) What are the different synthetic fuels used in IC engines? Explain its effect on engine performance. **[6]**

P.T.O.

- Q5)** a) What is the effect of compression ratio on SI engine emission? [8]
b) What is positive crankcase ventilation? Explain. [8]

OR

- Q6)** a) How will you reduce the NO_x emission in IC engine? [6]
b) Explain effect of design and operating parameters on SI engine emission. [10]

Q7) Explain effect of design and operating parameters on CI engine emission. [16]

OR

- Q8)** a) Why turbocharger is used in automobile engines, explain effects of turbocharging on emission? [8]
b) Describe the sources and causes of soot and particulet formation? [8]

Q9) Write a note on.

- a) Effect of NO_x emission on human as well as on environment. [6]
b) Indian emission norms. [6]
c) Ambient air quality monitoring. [6]

OR

- Q10)** a) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? [9]
b) Explain the remedies for engine emission. [9]



Total No. of Questions : 10]

SEAT No. :

P3550

[Total No. of Pages : 2

[4959] - 1235

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

**TRANSPORT MANAGEMENT AND MOTOR INDUSTRY
(2012 Course) (Elective-IV)**

Time : 2 1/2 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer any five questions from each section.*
- 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) *Assume suitable data, if necessary.*

Q1) a) Explain the rules regarding construction of motor vehicle? [5]

b) What is the motor vehicle act and its use? [5]

OR

Q2) a) Explain the structure and methods of laying taxation. [5]

b) Explain different types of taxation. [5]

Q3) a) What is insurance and what it required for vehicle? [5]

b) Explain importance of warranty system. [5]

OR

Q4) a) Explain different types of form and its application? [5]

b) Explain zero depth insurance? [5]

Q5) a) Explain standard 100 vehicles bus depot layout? [10]

b) Explain theory of basic principle of pure changing and its types? [6]

OR

Q6) a) Explain typical depot layout with organization structure? [10]

b) What is bus & crew scheduling? Explain the necessary of scheduling operation? [6]

P.T.O.

- Q7)** a) Explain the structure of goods transport organization? [10]
b) Explain method of storage & transportation of petroleum products?[8]

OR

- Q8)** a) Explain management information system for goods transport operation. [10]
b) Explain importance of scheduling for goods transport operation.[8]

- Q9)** a) Explain GPS with its application for traffic management system? [10]
b) Explain importance role of CIRT [6]

OR

- Q10)** a) Explain advance techniques for traffic management? [10]
b) Explain importance of ARAI and its role in automobile industry? [6]



Total No. of Questions : 10]

SEAT No. :

P3551

[Total No. of Pages : 4

[4959] - 1236

B.E. Automobile Engineering
(b) Operation Research
(2012 Pattern) (Elective-IV)

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, 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, Electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) Solve the following LPP by Simplex Method

[10]

Max $Z=5X_1+8X_2$ subjected to the following constraints.

$$2X_1+X_2 \leq 400$$

$$4X_1+X_2 \leq 600 \quad X_1, X_2 \geq 0$$

OR

Q2) Solve the following assignment problem to minimize the total cost of production.

[10]

Jobs	Machines			
	A	B	C	D
I	5	7	11	6
II	8	5	9	6
III	4	7	10	7
IV	10	4	8	3

P.T.O.

Q3) Determine an initial basic feasible solution to the following transportation problem using [10]

- a) Vogel's Approximation Method
- b) North-West Corner Method

	X	Y	Z	Availability
A	1	4	6	60
B	9	7	10	70
C	4	5	11	80
Demand	50	80	80	

Also state which method gives the better solution.

OR

Q4) a) Define Operation Research? Also discuss the scope of OR [6]

b) Why Transportation Model is used in industries? [4]

Q5) a) A small maintenance project consist of following 12 jobs. Draw the network of the project. Summarize CPM calculations in tabular form calculating the three types of floats for jobs and hence determine the critical path. [12]

Activity	Duration	Activity	Duration
1-2	2	5-8	5
2-3	7	6-7	8
3-4	3	6-10	4
2-4	3	7-9	4
3-5	5	8-9	1
4-6	3	9-10	7

b) Enlist the different types of the floats. Explain each one in short. [4]

OR

- Q6) a)** There are six jobs each of which must go through two machines A and B in the order AB. Processing times are given below. Determine a sequence for six jobs that will minimize the elapsed time and also calculate ideal time. **[10]**

Job	I	II	III	IV	V	VI
Time for A (Min)	7	4	2	5	9	8
Time for B (Min)	3	8	6	6	4	1

- b) Explain the graphical procedure for processing of two jobs through M machines. **[6]**

- Q7) a)** Explain the general structure of the following Queuing service system. **[6]**

- i) Single service facility
- ii) Multiple parallel facilities with single queue
- iii) Multiple parallel facilities with multiple queues

- b) Find the sequence that minimizes the total idle time of machine B. **[10]**

Job	I	II	III	IV	V	VI
Time for A (Hrs)	4	8	3	5	9	6
Time for B (Hrs)	7	6	4	3	2	5

OR

- Q8) a)** What are the various Game Theory methods? Explain any two methods in detail. **[10]**

- b) Define the following: **[16]**

- i) Player
- ii) Strategy
- iii) Saddle Point
- iv) Maximin & Minimax

- Q9) a)** A firm is thinking of replacing a particular machine whose cost price is Rs.6,100. The scrap value of the machine is Rs.100. The maintenance costs are found to be as follows. **[10]**

Year	1	2	3	4	5	6	7	8
Maintenance cost	100	250	400	600	900	1,200	1,600	2,000

Determine when machine should get replaced?

- b)** Explain how the theory of replacement is used in following problems. **[8]**
- i) Replacement of items that fail completely
 - ii) Replacement of items whose maintenance cost varies with time.

OR

- Q10)** Machine A costs Rs.45,000 and the operating costs are estimated as Rs. 1,000 for the first year increasing by Rs.10,000 per year in second and subsequent years. Machine B costs Rs.50,000 and operating costs are Rs.2,000 for the first year increasing by Rs.4,000 in the second year and subsequent years. If we now have a machine of type A, should we replace it by B. If so when? Assume both machines have no resale value and future costs are not discounted. **[18]**

