

Total No. of Questions : 10]

SEAT No. :

P3015

[Total No. of Pages : 4

[5354]-501
B.E. (Civil)
ENVIRONMENTAL ENGINEERING - II
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) *Solve Q.No. 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat diagram wherever necessary.*
- 4) *Use of logarithmic table, slide rule and electronic pocket calculator are allowed.*
- 5) *Assume suitable data if necessary, stating it clearly.*

- Q1)** a) Explain the method of estimating quantity of domestic sewage flow. Hence determine the quantity of maximum sewage flow generated from a town having population of 40000 and water supply rate of 150 lpcd. Take peak factor of 3. **[6]**
- b) State various formulae used for computing velocity of flow in sewer, explain any one. **[4]**

OR

- Q2)** a) Explain the principle and working of following appurtenances. **[6]**
- i) Oil and grease trap
 - ii) Automatic flushing tank.
- b) During BOD measurement, 20 ml of sample was diluted to 1000ml. If Initial DO of the sample = 9.2mg/L and DO after 5 days = 4mg/L, determine 5day BOD of the sample. The experiment was conducted at 20° C. **[4]**
- Q3)** a) Enlist different methods used for secondary treatment of sewage and hence explain any one method with flow chart. **[6]**
- b) What is self purification of a river? Hence explain the factors responsible for self purification of a polluted river. **[4]**

P.T.O.

OR

Q4) a) Differentiate between completely mixed activated sludge process and extended aeration process. [6]

b) What is DO deficit? How DO deficit can indicate pollution status of a river? [4]

Q5) a) Differentiate between aerated lagoon and oxidation pond. [4]

b) Write short note on rotating biological contactors (RBC). [4]

c) Design an oxidation pond for following data. [8]

i) Raw sewage flow = 10 MLD

ii) Raw sewage $BOD_5 = 200\text{mg/L}$

iii) Desired BOD_5 of treated effluent = 20 mg/L

iv) BOD removal rate constant = 0.1/d

v) BOD loading rate for the given latitude of the place = 250Kg/Ha/d.

vi) Elevation of the place = 550m above MSL

Determine,

A) Area of the oxidation pond

B) Detention time required

C) Dimensions of the pond

OR

Q6) a) Differentiate between aerated lagoon and facultative aerated lagoon. [4]

b) Write short note on root zone treatment system for sewage treatment. [4]

c) Design an aerated lagoon for following data. [8]

i) Raw sewage flow = 10 MLD

ii) Raw sewage $BOD_5 = 200\text{mg/L}$

iii) Desired BOD_5 of treated effluent = 20 mg/L

iv) kinetic constants:

$Y = 0.6$, $K_d = 0.06/d$, BOD removal rate constant(K_d)
at $20^\circ\text{C} = 0.1/d$

v) $\text{SRT} = 06$ days

Determine,

- A) Volume and dimensions of aerated lagoon
- B) Biological solids produced during treatment
- C) Oxygen requirement

Q7) a) What is sludge thickening? Hence write short note on gravity thickener. **[4]**

b) Differentiate between standard rate and high rate digester. **[4]**

c) Design a standard rate digester for treatment of sludge produced from a sewage treatment consisting activated sludge process using following data. **[10]**

i) Sewage flow = 6MLD,

ii) Raw sewage BOD = 200 mg/L,

iii) Suspended solids in raw sewage = 420 mg/L,

iv) Solid content in primary sludge = 4% and specific gravity of solids = 1.10

v) Efficiency of primary clarifier = 70%,

vi) $\text{MLSS} = 3000\text{mg/L}$, $\text{VSS/SS} = 0.8$, $\text{MCRT} = 10\text{days}$, $Y = 0.6$ and $K_d = 0.06$

vii) Solid content in secondary sludge = 1.5% and specific gravity of solids = 1.02

viii) Percentage of volatile matter in raw mixed sludge = 70% and fixed matter = 30%

OR

- Q8)** a) Explain the principle and working of UASB reactor. [4]
- b) Explain the principle and working of septic tank and comment on the quality of treated effluent. [4]
- c) Draw a flow chart of sewage treatment plant consisting of activated sludge process as method of secondary treatment. Show all important flow lines. Write principal of working of each unit and the impurities removed in each stage of the treatment plant. [10]

- Q9)** a) Explain the principle of working and need of following treatment units [8]
- i) Equalization and
- ii) Neutralization
- b) State the sources and characteristics of dairy wastewater and draw suitable treatment flow sheet. [8]

OR

Q10) State the sources and characteristics of following wastewater. Hence draw suitable flow diagram for treatment of these wastewater. [16]

- a) Distillery wastewater
- b) Sugar factory wastewater



Total No. of Questions : 10]

SEAT No. :

P3016

[Total No. of Pages : 3

[5354]-502
B.E. (Civil)
TRANSPORTATION ENGINEERING
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

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

- Q1)** a) Discuss briefly the contribution of Jaykar Committee in the development of roads of India. **[5]**
- b) State with reasons the various traffic studies necessary to be conducted for widening of existing roads. **[5]**

OR

- Q2)** a) Explain in brief on-street parking and off-street parking. **[5]**
- b) Explain in brief how the super elevation is provided in the field. **[5]**

- Q3)** a) Determine the extra widening required for a vehicle negotiating a curve of radius 300 m, moving with a design speed of 60 Km/h on a two lane road. Take length of wheel base is equal to 7.0 m. **[6]**
- b) Explain in brief Flash and Fire Test on Bitumen. **[4]**

OR

- Q4)** a) A vertical summit curve is formed at the intersection of two gradients, +4% and – 6%. Design the length of the summit curve to provide a stopping sight distance for a design speed of 80 Km/h. Assume any other data suitably. **[6]**

P.T.O.

- b) Write short notes on : [4]
- i) Cutbacks
 - ii) Camber

- Q5)** a) The length of the runway under standard conditions is 1200 m. The airport has an elevation of 250 m above mean sea level. Its reference temperature is 32° C. If the runway is to be constructed with an effective gradient of 0.20% Determine the corrected runway length. [10]
- b) Explain how orientation of runway is done using the Wind Rose Type I diagram. [6]

OR

- Q6)** a) Draw a neat sketch of an aircraft showing all the component parts. [6]
- b) Explain in brief the following: [2 × 3 = 6]
- i) Holding Apron
 - ii) Tricycle undercarriage
 - iii) Instrument runway
- c) What are the factors which influence the location of an airport. [4]

- Q7)** a) A bridge is proposed to be constructed across an alluvium stream carrying a discharge of 300 m³/s. Assume silt factor, $f = 1.10$, determine the maximum scour depth when the bridge consists of 5 spans of 20 m each. [6]
- b) What is Afflux? How it is estimated [5]
- c) Describe with the help of an illustrative sketch. [5]
- i) Splayed wing wall
 - ii) Column Bent pier

OR

- Q8)** a) The normal velocity of flow in a river is 2 m/s. The normal and artificial waterway under the bridge is 9000 m² and 7000 m² respectively. Determine the height of afflux using Molesworth formula. [5]
- b) Derive the equation for economical span of the bridge. [5]
- c) Write short notes on: [6]
- i) Forces due to water current
 - ii) IRC class A Loading

- Q9)** a) From the following data, calculate the linear waterway required for a bridge to be constructed across the river. [6]

Catchment area = 1000 ha

Maximum intensity of rainfall = 1 cm/hr

Runoff coefficient = 0.6

Average depth of flow = 1.5 m

Permissible velocity of flow = 1.2 m/s

- b) Differentiate between temporary and permanent bridges with the help of an example. [6]
- c) Describe with the help of neat sketches: [3+3=6]
- i) Bascule Bridge
 - ii) Pontoon Bridge

OR

- Q10)** a) Differentiate between Cable Stayed Bridge and Suspension Bridge. [3+3=6]
- b) State the purposes of providing bearing in bridges. Describe any one type of bearings. [4+2=6]
- c) Explain in brief the procedure for erection of Steel bridges. [6]



Total No. of Questions : 10]

SEAT No. :

P3017

[Total No. of Pages : 3

[5354]-503

B.E. (Civil)

STRUCTURAL DESIGN AND DRAWING - III
(2012 Pattern)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) *Answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6; Q.7 or Q.8; and Q.9 or Q.10*
- 2) *Figures in bold to the right, indicate full marks.*
- 3) *IS 456, IS 1893, IS 1343, IS 3370 (Part II and Part IV) 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) Write short note on any four post-tensioning anchorages systems. [4]
b) Determine the pre-stressing loss due to friction for the post tensioned beam of 20 m span with cross section of 0.4 m x 1.2 m if pre-stressing force is applied at left end only. [6]

Data given is $A_p = 1200 \text{ mm}^2$, $\mu = 0.35$, $k = 0.0015/\text{m}$, $E_s = 210 \text{ GPa}$, $f_{pi} = 1300 \text{ N/mm}^2$. The cable profile is parabolic with zero eccentricity at support and dip of 0.52 m at center.

OR

- Q2)** a) Explain the concept of concordant cable profile with neat sketches. [4]
b) An I section post tensioned beam has 400 mm x 100 mm top flange; 200 mm x 100 mm bottom flange; 100 mm thick web and 500 mm overall depth. The pre-stressing force is 1200 kN with the tendon placed centrally at the ends. Design the end bearing plate. Strength of concrete at transfer is 40 N/mm². [6]

- Q3)** a) Explain with proper sketches load balancing concept. [4]
b) For a symmetrical small telephone exchange office building of size 8m x 8m having two equal bays has a height of 10.5 m with each storey having height 3.5 m. The building is located in zone V. Soil conditions is medium stiff. SMRF is adopted. DL = 10 kN /m² and IL = 3 kN /m².

P.T.O.

Determine the design seismic forces for the building using seismic coefficient method as per IS 1893 and show the distribution of lateral forces with the building height. [6]

OR

Q4) a) Explain the Indian standard code provisions for design of shear reinforcement in pre-stressed beam. [4]

b) Details of a substitute frame having continuous beam ABCD is as follows. [6]

Thickness of floor = 100 mm, LL = 2 kN/m², Floor finish=0.6 kN/m², size of beams – 200 mm × 400 mm, size of column – 200 mm × 400 mm. The height of top as well as bottom columns of the substitute frame is 4 m. AB=CD=6 m c/c; and BC=3 m c/c. Find the maximum positive bending moment and maximum negative bending moment at B; the inner support section.

Q5) a) Explain with proper sketches, how the various components of cantilever RCC retaining wall can fail. [4]

b) 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 with sloping surface

ii) Backfill is horizontal with uniform surcharge W_s /unit run.

c) The stem of a cantilever retaining wall is 5m tall. The wall retains soil horizontally levelled with the top of stem. The density of soil is 19 kN/m³. Angle of repose=30°. SBC of soil = 200 kN/m². Design the stem of the retaining wall. Adopt curtailment of reinforcement and sketch the detailing. [8]

OR

Q6) Design a L-shaped retaining wall to retain a backfill of 3 m. The backfill is horizontal. 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) Two columns spaced 4 m apart carry a service load of 650 kN and 1000 kN each. Design a **slab-beam type combined footing** to support them. The columns are 230 mm × 400 mm and 230 mm × 600 mm respectively. The SBC of soil is 190 kN/m². Use M25 grade of concrete and steel of grade Fe 500. Sketch the reinforcement details. [16]

OR

Q8) Two columns spaced 4 m apart carry a service load of 650 kN and 1000 kN each. Design a **slab type combined footing** to support them. The columns are 230 mm × 400 mm and 230 mm × 600 mm respectively. The SBC of soil is 190 kN/m². Use M25 grade of concrete and steel of grade Fe 500. Sketch the reinforcement details. [16]

Q9) a) A circular water tank is 12 m in diameter and 4 m high. Thickness of wall is 170 mm. The tank rests on firm ground and walls of the tank are restrained at the base. Determine the maximum hoop tension and maximum cantilever moment using appropriate coefficients given the IS code. [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 300 kN. Use Fe₅₀₀ grade of steel and M₃₅ grade of concrete. The limiting design surface crack width may be taken as 0.2 mm. [12]

OR

Q10) Design the short wall for a rectangular water tank open at top resting on ground having a size of 8.0 m × 3.6 m × 2.5 m high. Use M₃₀ and Fe₅₀₀ grade material. Sketch details of reinforcement for the wall. [18]



Total No. of Questions : 10]

SEAT No. :

P3018

[Total No. of Pages : 3

[5354]-504

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES
(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) *Answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6; Q.7 or Q.8; 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 where ever necessary.*
- 5) *If necessary, assume suitable data and indicate clearly.*
- 6) *Use of electronic pocket calculator is allowed.*

Q1) Write a note IRC Loading standards and explain any one in detail with suitable sketches. **[10]**

OR

Q2) What is dynamic effect in railway steel bridges. Explain how it is calculated. **[10]**

Q3) Write a note on Courbons method. **[10]**

OR

Q4) An interior panel of a T beam deck slab bridge is 3.5 m × 2.5 m. Calculate the maximum bending moment developed due to placing of IRC class A loading. Assume $m_1 = 0.038$ and $m_2 = 0.030$ **[10]**

Q5) Design the members L_0-U_1 , L_0-L_1 and U_1-L_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 = 0.45 kN/m
- c) timber sleepers of size = (0.25 × 0.25 × 2.5) m @ 0.40 m c/c

P.T.O.

- d) unit weight of timber = 7.5 kN/m^3
- e) spacing of truss = 5.0 m c/c
- f) Equivalent uniformly distributed load for BM and SF are 5831 kN and 6254 kN respectively
- g) $CDA = 0.255$

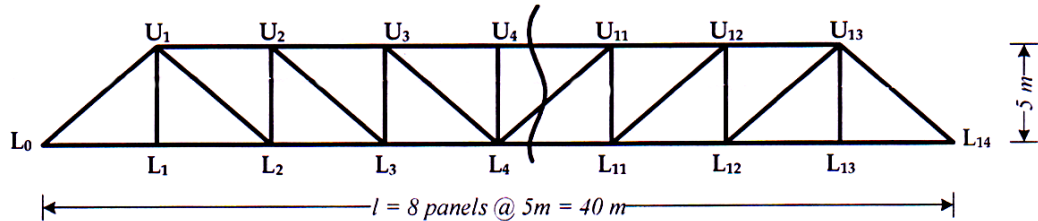


Fig.1

OR

Q6) For the Problem given in Q.5 design the members L_2-L_3 and L_2-U_2 and L_2-U_1 . **[18]**

Q7) Design a rocker bearing for the following data: **[16]**

- i) Dead load, live load and impact load = 1500 kN
- ii) Vertical reaction due to overturning effect of wind = 100 kN
- iii) Lateral wind due to wind at each bearing = 50 kN
- iv) Span of bridge = 35 m

Also sketch the details of the bearing.

OR

Q8) a) Design the Elastomeric bearing for following data and sketch the details **[18]**

- i) Maximum normal load - 1500 kN
- ii) Minimum normal load - 400 kN
- iii) Lateral load - 40 kN
- iv) Longitudinal load - 95 kN
- v) Total longitudinal translation - 15 mm
- vi) Rotation at support - 0.001

- vii) Shear modulus of elastomer - 1 N/mm^2
- viii) Allowable compressive stress of concrete - 8 N/mm^2
- ix) Allowable compressive stress of elastomer - 9 N/mm^2

- Q9)** a) Explain Various loads acting on Abutments and Piers. [8]
b) Explain Various types of Piers and Abutments with suitable sketches. [8]

OR

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

- a) Span = 30 m
- b) Width of carriageway = 7.5 m
- c) Live load on the deck slab = 1000 kN
- d) Dead weight of span = 6500 kN
- e) Longitudinal force = 220 kN
- f) RL of formation = 640.150 m; RL of cg of girder = 638.100 m; RL of center of bearing pin = 637.000 m; RL of bed level = 629.800 m
- g) Unit weight of backfill soil = 17 kN/m^3
- h) Allowable bearing pressure = 220 kN/m^2
- i) $\mu = 0.32$, $\Phi = 30^\circ$, Ground acceleration = 0.11 g,
- j) Top and Bottom width of Abutment- 4.5m and 7.0 m respectively
- k) Materials = M 30 grade concrete and steel of grade Fe500



Total No. of Questions : 10]

SEAT No. :

P3019

[Total No. of Pages : 4

[5354]-505

B.E. (Civil)

**SYSTEMS APPROACH IN CIVIL ENGINEERING
(2012 Pattern) (Elective - I) (Semester - I)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) *Answer any three questions.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Use of calculator is allowed.*
- 4) *Assume suitable data if necessary.*

Q1) a) State whether following functions are convex or concave **[6]**

i) $x_1^2 x_2$

ii) $x_1^2 + x_2$

b) Give any two applications of Systems Approach in Civil Engineering. **[4]**

OR

Q2) a) Explain global, local maxima and minima. **[4]**

b) A firm manufactures two products X, Y. The profits per unit product are Rs 30 and Rs 20 respectively. The firm has two machines A & B and the required processing time in minutes for each machine is given below. **[6]**

	Product	
	X	Y
Machine A	8	6
B	4	5

Machines A & B have 2000 and 1500 machine units respectively. The firm must manufacture 110 Xs and 100Ys but no more than 250 Xs and 300 Ys. Set up an LP model to maximize profit and solve the problem graphically.

P.T.O.

- Q3)** a) Differentiate between Dichotomous and Golden section method. [4]
 b) Give applications of Newton's method. Also explain its algorithm. [6]

OR

- Q4)** a) State the sequence and total time elapsed for the following jobs with operating times (in minutes) on two machines. Also, give the idle time for both the machines [6]

Job	1	2	3	4	5
Machine A	12	6	10	14	8
Machine B	15	5	12	14	7

- b) Explain steps used in Lagrangian Multiplier technique. [4]

- Q5)** a) Explain Bellman's principle of optimality. [8]
 b) Maximise the profit by allocating five salesman to three different areas with following data [8]

no of salesman	Area 1	Area2	Area 3
0	62	65	48
1	70	72	54
2	76	80	60
3	83	85	65
4	90	90	70
5	95	85	70

OR

- Q6)** a) What is Dynamic Programming? Write step by step procedure to solve a general problem by DP approach. [6]
 b) Find the shortest path between A and I with following distances (in km) between different nodes. [10]

node	distance	node	distance	node	distance	node	distance
A-B	10	C-F	9	D-G	7	E-H	8
B-C	6	C-G	6	D-H	5	F-I	8
B-D	8	C-H	8	E-F	9	G-I	9
B-E	7	D-F	4	E-G	6	H-I	7

Q7) a) solve the following problem using simplex method, [10]

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

subject to

$$x_1 + x_2 + 2x_3 \geq 30$$

$$2x_1 + x_2 + x_3 \geq 35$$

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

b) Define following terms w.r.t. Linear Programming Simplex method [6]

i) key column

ii) key row

iii) slack variable

iv) surplus variable

v) artificial variable

vi) degeneracy

OR

Q8) a) Solve the following problem Using Big M method [8]

$$\text{maximize } Z = 6x_1 - 3x_2 + 2x_3$$

Subject to

$$2x_1 + x_2 + x_3 \leq 16$$

$$3x_1 + 2x_2 + x_3 \leq 18$$

$$x_2 - 2x_3 \geq 8$$

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

b) Give application of two phase method and duality in LPP. [8]

- Q9) a)** Solve following transportation problem using least cost method and row minima method [8]

Origin	Destination				Supply
	1	2	3	4	
A	8	6	5	9	40
B	4	9	6	7	20
C	1	2	4	2	10
D	7	9	1	5	30
Demand	10	25	30	35	

- b) Give application of assignment method. [4]
 c) Solve following assignment problem. [6]

	1	2	3	4	5
A	12	16	18	10	11
B	20	21	18	24	9
C	17	16	26	22	14
D	11	23	15	13	25
E	15	19	10	24	12

OR

- Q10)a)** Write a short note on transportation model and its applications. [4]
 b) Solve the transportation problem given in Q. 9 a) above using Vogel's Approximation method. [8]
 c) State whether the above example is degenerate or not. If yes. give the steps to solve this type of problems. [6]



Total No. of Questions : 10]

SEAT No. :

P3020

[Total No. of Pages : 3

[5354]-506
B.E. (Civil Engineering)
ADVANCED CONCRETE TECHNOLOGY
(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 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 structural light weight concrete. **[4]**
- b) Explain alkali aggregate reaction. State factors promoting and control of the reactions. **[6]**

OR

- Q2)** a) Explain how high performance concrete differs from high strength concrete. **[4]**
- b) Write a short note related to the properties of concrete on **[6]**
- i) Aggregate cement bond strength
 - ii) Effect of admixtures

- Q3)** a) Write a short note on Gap graded concrete. **[4]**
- b) Explain the step by step procedure involved in the design of high performance concrete. **[6]**

OR

P.T.O.

- Q4)** a) Write a short note on Self curing concrete. [4]
b) Write a short note on non destructive testing methods [6]
i) Ground penetration radar
ii) Stress wave propagation method

- Q5)** a) What are the factors affecting the fiber interaction with matrix? [4]
b) Define fiber reinforced concrete composite. What are the different types of fibers used in the construction industry? Write the properties and application. [6]
c) Explain the historical development of fiber reinforced concrete composite. Explain the role of fibers improving the properties of concrete. [6]

OR

- Q6)** a) What is aspect ratio? How it can influence the properties of composites?[4]
b) Enlist different metallic fibers. Explain their any two properties in brief.[6]
c) Explain in detail interaction between fiber matrix composite under cracked and uncracked condition. [6]

- Q7)** a) What are the different properties of hardened FRC? Explain any two properties. [4]
b) Which are the quality control tests conducted for steel fiber reinforced concrete composites? Explain any one in detail. [6]
c) Which are the constituent materials used in the SIFCON? Explain the physical properties of each material? [6]

OR

- Q8)** a) Write a short note on polymer fiber reinforced concrete composite. [4]
b) Explain the behavior of SFRC under compression, tension and flexure?[6]
c) What precautions should be taken during mixing and casting of fiber reinforced concrete composite? [6]

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

OR

- Q10)**a) What are the advantages Ferrocement? [6]
- b) What are the different tests conducted on cement mortar as a ferrocement material? Explain any one in detail. [6]
- c) Explain closed mould technique for ferrocement with merits and demerits. [6]



Total No. of Questions : 8]

SEAT No. :

P3021

[Total No. of Pages : 2

[5354]-507

B.E. (Civil)

ARCHITECTURE & TOWN PLANNING
(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 the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*

- Q1)** a) Explain the Principles of Architecture and Elements of Design. [6]
b) Write a note on Neighbourhood Planning by giving examples. [7]
c) Write note on Urban Renewal Scheme with a case study. [7]

OR

- Q2)** a) What are the roles of 'Urban Planner' and 'Architect' in planning and designing of a town. [6]
b) Write a note on 'Quality of life' and 'Livability'. [7]
c) Explain various levels of Town Planning with their importance. [7]

- Q3)** a) Write a note on 'Civic Surveys' and their importance. [9]
b) Explain the organization of CIDCO and its role in developing Navi Mumbai. [8]

OR

- Q4)** a) Explain the hierarchy of Urban Roads with examples. [9]
b) Explain the organization of MHADA and its role in housing sector. [8]

P.T.O.

Q5) a) Explain the statutory procedure for preparation of D. P. under MRTTP Act. [9]

b) Write a note on Smart City Guidelines with a case study. [8]

OR

Q6) a) What are the Objectives and Principle Components of D.P. [9]

b) Write a short note on SEZ and its socio-economic impact. [8]

Q7) a) Elaborate salient features of ‘Special Township Policy’ and discuss its effect on urban development in Maharashtra. [8]

b) Write a note on LARR Act of 2013. [8]

OR

Q8) a) Write a note on ‘Applications of RS- GIS’ in Urban Planning. [8]

b) Compare LARR Act of 2013 with LA Act of 1894. [8]



Total No. of Questions : 6]

SEAT No. :

P3022

[Total No. of Pages : 3

[5354]-508

B.E. (Civil)

**ADVANCED ENGINEERING GEOLOGY WITH ROCK
MECHANICS**

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

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

Q1) a) Write short note on Geology of Maharashtra. **[6]**

OR

b) Describe the regional distribution of Deccan trap basalt. **[6]**

Q2) a) Explain in detail any two case histories of dam sites in Maharashtra, where tail channel erosion is occurring. **[7]**

OR

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

Q3) a) Enlist various parameters of morphometric analysis of a river basin. **[7]**

OR

b) Explain process of decomposition in soil formation. **[7]**

P.T.O.

Q4) a) Explain in brief RMR classification. [8]

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

Run in m	Piece No.	Length in cm.	Nature of fracture
0 - 3 m	1	07	J
	2	15	J
	3	13	J
	4	08	J
	5	60	J
	6	13	J
	7	40	J
	8	08	J
	9	17	J
3 - 6 m	10	80	M
	11	90	M
	12	08	M
	13	110	J

OR

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

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

Sr.No.	R	a	$2\pi aR$
1	1.48	1	
2	1.55	2	
3	1.38	3	
4	1.50	4	
5	1.20	5	
6	1.67	10	

Q5) a) Whether the compact basalt suitable/unsuitable for tunnel excavation?
Give reasons. [10]

b) Can we locate a pier of bridge partly on weathered rock and on dyke. [7]

OR

a) Explain in detail engineering geological investigations for tunneling. [10]

b) Significance of fractures from tunneling point of view. [7]

Q6) a) Describe various seismic zones of India. [10]

b) Describe the types of faults and recognition of them during civil engineering project works. [7]

OR

a) Explain suitability of DTB as construction material. [10]

b) Define R.I.S. and explain how the dam building activity cause a major earthquake. [7]



[5354]-509

B.E. (Civil Engineering)

MATRIX METHODS OF STRUCTURAL ANALYSIS**(2012 Pattern) (Elective - II)***Time : 2½ Hours]**[Max. Marks : 70**Instructions to the candidates:-*

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

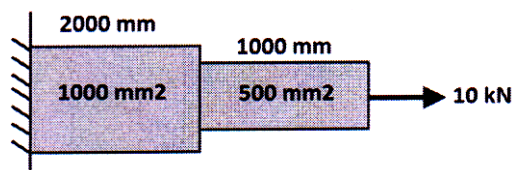
Q1) a) Solve the following system by Gauss-Jordan Method. [6]

$$2x + 2y + 2z = 10$$

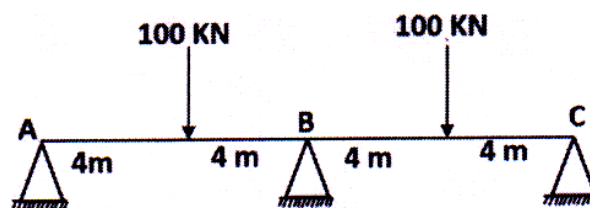
$$4x + 6y + 10z = 16$$

$$8x + 10z = 4$$

- b) Determine maximum joint displacement of the bar structure as shown in figure using stiffness matrix method. Take Young's modulus $E = 210$ GPa. [6]



- c) Determine support reactions of continuous beam ABC using flexibility matrix method. Take EI constant. [8]



OR

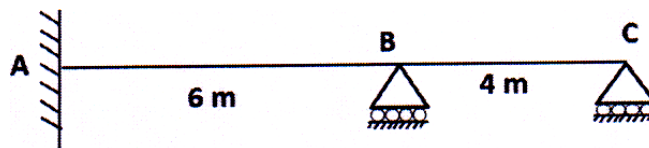
Q2) a) Solve the following system by Gauss-Elimination Method. [6]

$$2x + 2y + 2z = 10$$

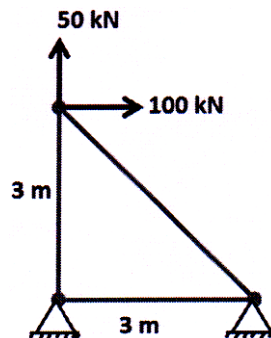
$$4x + 6y + 10z = 16$$

$$8x + 10z = 4$$

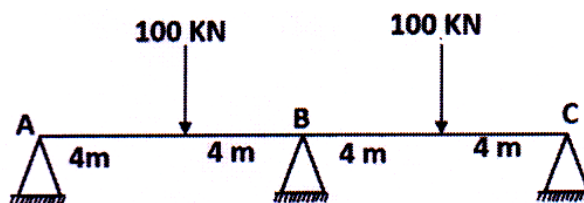
b) Determine support reactions of the continuous beam ABC as shown in figure if support B sink by 25 mm and support C sink by 10 mm. Use flexibility matrix method. Take EI constant. [6]



c) Determine deflections of loaded joint of the truss as shown in Figure using stiffness matrix method. Take c/s area of each member 1000 mm² and E = 200 GPa. [8]

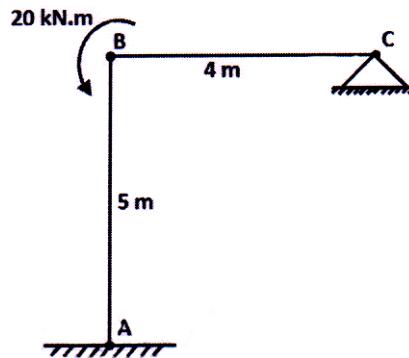


Q3) Analyze the continuous beam ABC as shown in figure using stiffness matrix method. Take EI constant. Draw BMD. [18]

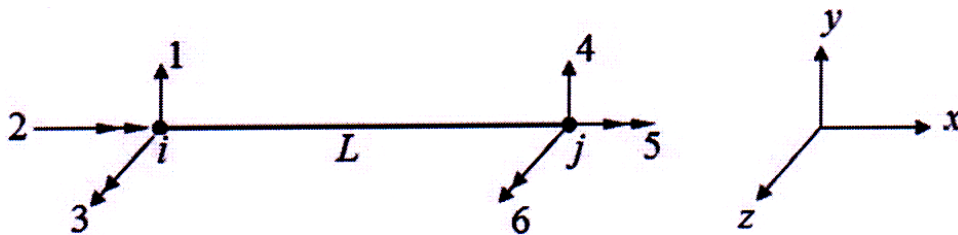


OR

Q4) Analyze the rigid jointed portal frame as shown in figure using stiffness matrix method Take $EI = \text{constant}$. Draw BMD. [18]



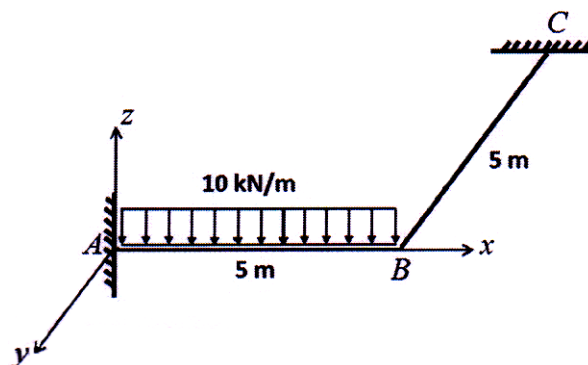
Q5) a) Derive the stiffness matrix of two noded grid element with 06 D.O.F as shown in figure. Take length L , flexural rigidity EI and torsional rigidity GJ . [8]



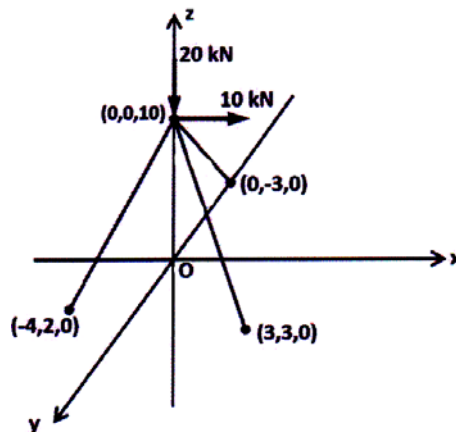
b) Derive the transformation matrix of two noded grid element. [8]

OR

Q6) Determine unknown joint displacements at node B of the orthogonal grid as shown in figure using stiffness matrix method. Take $EI = 1500 \text{ kN.m}^2$ and $GJ = 700 \text{ kN.m}^2$ [16]

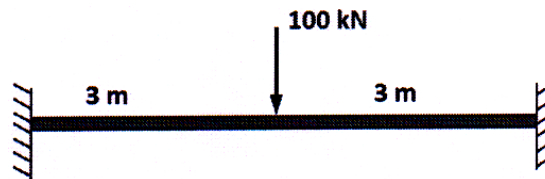


- Q7)** The tripod shown in figure is subjected to horizontal and vertical loads. Determine the deflections at the loaded joint using stiffness matrix method. Take $E = 200 \text{ GPa}$ and c/s area of all members 1000 mm^2 . [16]

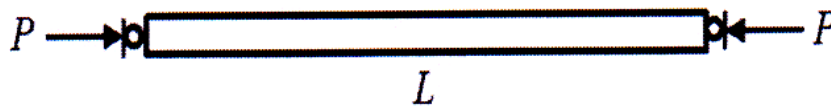


OR

- Q8) a)** A beam of span 6 m is fixed at both ends and carries central load of 100 kN. Estimate the deflections at quarter span intervals using finite difference method. Take EI constant. [8]



- b)** Estimate the critical buckling load 'P' of a uniform pin ended column of length $L = 5 \text{ m}$ and flexural rigidity $EI = 1000 \text{ kN.m}^2$ using three sub intervals. Apply finite difference method. [8]



Total No. of Questions : 12]

SEAT No. :

P3024

[Total No. of Pages : 2

[5354]-510

B.E. (Civil)

**INTEGRATED WATER RESOURCES PLANNING AND
MANAGEMENT**

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

Time : 2½ Hours]

[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) Write a note on: Water resources in India. [3]

b) How the use of rights for water is made? [3]

OR

Q2) a) Which are the water infrastructure-problems? [3]

b) What is meant by Ground water owner ship? [3]

Q3) a) Write a note on: Water as economic good. [3]

b) Write a note on: Concepts of 'Virtual Water'. [3]

OR

Q4) a) Write a note on: Opportunity Cost. [3]

b) What are the Global perspectives of water crisis? [3]

Q5) a) Write a note on: Estimation of ground water draft. [4]

b) Write a note on: Different methods of drought forecasting. [4]

OR

Q6) a) How the Recycling and reuse of water can be done? [4]

b) Write a note on: Causes of floods and its mitigation plan. [4]

P.T.O.

- Q7)** a) What are consumptive and nonconsumptive demands? Explain in detail. **[8]**
b) Write a note on Estimation & forecasting of water demands of domestic & industrial sector. **[8]**

OR

- Q8)** a) How the irrigation water utilization is done? **[8]**
b) What are navigation & recreational water demands. **[8]**

- Q9)** a) How to protect the vital ecosystem by Environmental Management? **[8]**
b) Social impact of water resources development on Education & health. **[8]**

OR

- Q10)** a) Write a note on water quality management for various uses. **[8]**
b) Social impact of water resources development on agro-industry to enhance living standards. **[8]**

- Q11)** a) How the management of (IWRM) by use of data driven techniques like Artificial Neural networks is done? **[8]**
b) Define Watershed. How the watersheds are classified? Explain integrated approach for watershed management. **[10]**

OR

- Q12)** a) How the management of (IWRM) by use of data driven techniques like Genetic programming is done? **[8]**
b) Write a note on: **[10]**
i) Contour Bunding
ii) Strip Cropping
iii) Bench Terracing
iv) Check Dams



Total No. of Questions : 10]

SEAT No. :

P3025

[Total No. of Pages : 2

[5354]-511

B.E. (Civil)

TQM & MIS IN CIVIL ENGINEERING
(2012 Pattern) (Elective - II) (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, 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) "Quality increases Profit". Comment on this sentence by giving suitable example. **[4]**

b) Explain DMADV cycle in detail. **[6]**

OR

Q2) a) Define data and information. What is the data and information required for construction of a tunnel? **[6]**

b) What is meant by Defects"? Explain by giving suitable example in construction. **[4]**

Q3) a) What are the benefits of applying TQM on construction site? **[5]**

b) State the definition of Six Sigma. Explain each sigma level. **[5]**

OR

Q4) a) What is MIS? How is it useful for construction industry'? **[6]**

b) What are the sources of information? **[4]**

Q5) a) What are the disadvantages of ISO? **[4]**

b) Differentiate between internal and external failure cost by giving suitable example. **[8]**

c) Prepare checklist of formwork activity on site. **[6]**

P.T.O.

OR

- Q6)** a) What are the advantages of having checklist on construction sites? [5]
b) Differentiate between Quality Control and Quality Assurance principles as applied for RMC plant. [8]
c) Write short note on ISO 9001. [5]
- Q7)** a) Explain 1-10-100 rule as applied for Cost of Quality. [8]
b) How does Supply Chain Management help to improve Quality of a product? [8]

OR

- Q8)** a) Explain the steps to be followed in 'Benchmarking Process'. [8]
b) Explain in detail Kaizen' system in TQM. [8]
- Q9)** a) Explain in detail, how the smart phones are used for monitoring and controlling sites. [8]
b) What is meant by Enterprise Resource Planning system? What are its application areas in construction field? [8]

OR

- Q10)**a) How the latest technologies have helped in documentations of construction details? Explain with suitable examples. [8]
b) What are the various modules of ERP that are commonly used by construction sector? [8]



Total No. of Questions : 12]

SEAT No. :

P3026

[Total No. of Pages : 3

[5354]-512

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

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

- Q1)** a) Explain MMS measurement of earthquake in brief. [4]
b) What are the learning from past earthquakes? [6]

OR

- Q2)** a) Classify' and describe with suitable sketches different types of waves generated by an earthquake? [6]
b) Explain the elastic rebound theory? [4]

- Q3)** A vibrating system consists of a mass 7kg, spring of stiffness 100N/m and a damper with damping coefficient of 6 N.s/m. Determine [6]
a) the damping factor
b) natural frequency of damped vibrations
c) Damping factor
d) Natural Damped frequency

OR

P.T.O.

Q4) Draw the mathematical model for the structure shown in Fig. 4.1 and obtain governing equation of motion. Assume $m = 1000\text{kg}$ [6]

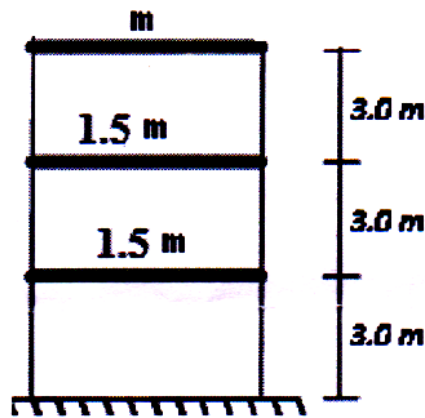


Fig.4.1

Q5) Explain R.C.C. shear walls and their behavior with neat sketches. [6]

OR

Q6) Explain with neat sketches the ductile detailing of beam column joint. [6]

Q7) A symmetrical three storey RC school building located in Zone V with following data- [16]

- Plan Dimensions = $6\text{m} \times 6\text{m}$
- Storey Height = 3.5m
- Total weight of beams/storey = 130kN
- Total weight of columns/storey = 50kN
- Total weight of walls/storey = 530kN
- Live load = 130kN
- Weight of terrace floor = 655kN . Assuming Hard Rock, determine total base shear for 5% damping using seismic coefficient method.

OR

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

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

Q9) What is Seismic Isolation? Discuss in details with the sketches, the concept of Isolators and Dampers? [16]

OR

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

Q11) A (230×500) mm column is reinforced with 8-16#. It is supported on an isolated footing. The load coming on the footing is 2500 kN and a moment of 25 kNm. The SBC of the soil is $164 \text{ kN} / \text{m}^2$. Use M20 grade of concrete and steel of grade Fe 415 and design the footing. [16]

OR

Q12)a) What is disaster management? Explain its various phases? [8]

b) What are the basic precaution to be followed in rescue operations? [8]



Total No. of Questions : 10]

SEAT No. :

P3027

[Total No. of Pages : 2

[5354]-513

B.E. (Civil)

ADVANCED GEOTECHNICAL ENGINEERING
(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) *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) *Neat diagrams must be drawn wherever necessary.*

- Q1)** a) Discuss earth pressure at rest, active and passive. [4]
b) State different classification of soil system and explain any one in detail. [6]

OR

- Q2)** a) What are assumptions made in Rankine's and Coulomb's earth pressure theories. [4]
b) State different types of clay mineral and explain any one in detail. [6]

- Q3)** a) Explain the different types of Geosynthetics with their functions. [5]
b) A smooth vertical wall retains a level backfill with $\gamma = 18.5 \text{ kN/m}^3$, $\phi = 30^\circ$ and cohesion = 0 to a depth of 10 m. Draw the lateral pressure diagram and compute the total thrust on the retaining wall. What will be the active pressure if water stands at a depth of 4m? [5]

OR

- Q4)** a) Write a note on [5]
i) Reinforced earth wall
ii) Soil nailing and its application
b) A retaining wall with a smooth vertical back retains a purely cohesive fill. Height of wall is 12 m. $\gamma = 20 \text{ kN/M}^3$. $C = 10 \text{ kN/M}^2$. What is the total active Rankine thrust on the wall? At what depth is the intensity of pressure zero and where does the resultant thrust act? [5]

P.T.O.

Q5) Explain the following: [16]

- a) Free and Forced vibrations
- b) Elastic half space method
- c) Braken's method
- d) Pauw's Analysis

OR

Q6) a) Discuss the different types of machine foundations. [8]

b) State the design procedure for a block foundation for cyclic loading. [8]

Q7) a) Explain the following: [8]

- i) Stone columns
- ii) Sand drains

b) Write a note on in-situ ground improvement by compactions piles. [9]

OR

Q8) a) Describe the procedure of Vibro-flotation technique for ground improvement. [8]

b) Discuss the different methods for 'Grouting'. [9]

Q9) a) What do you mean 'Rheology and Rheological models' in respect of soil? [8]

b) Write a note on 'Reissner's model' with spring and dashpot. [9]

OR

Q10)a) Explain secondary consolidation with the help of Rheological model. [8]

b) Discuss the basic and composite Rheological models. [9]



Total No. of Questions : 12]

SEAT No. :

P3028

[Total No. of Pages : 3

[5354]-514
B.E. (Civil)
DAMS AND HYDRAULIC STRUCTURES
(2012 Pattern) (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, Q.11 or Q.12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic non-programmable calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

UNIT - I

Q1) Briefly explain any case of dam failure you have studied. What type of failure it is? Also suggest the instrument which would have given the sign of alert in that case. **[3+1+2]**

OR

Q2) Explain in detail different investigations required to be carried out while planning a water resource project. **[6]**

UNIT - II

- Q3)** a) What is a gallery? Briefly explain various types of galleries and their functions used in gravity dams. **[1+5]**
- b) Briefly explain variable radius arch dam. **[2]**

OR

- Q4)** a) What is middle third rule? **[2]**
- b) State various types of joints and keys provided in gravity dams. Also explain how the joints are sealed? **[4+2]**

P.T.O.

UNIT - III

- Q5)** a) Give classifications of spillways. [4]
b) Write a brief note on hydropower potential. [2]

OR

- Q6)** a) Write a note on emergency spillway. [3]
b) Briefly explain run-of-river hydropower plant. [3]

UNIT - IV

- Q7)** a) What is sudden drawdown condition? [2]
b) Determine the factor of safety of downstream slope of homogenous earthen dam (during steady seepage) drawn to a scale of 1 cm = 4m, for the following data: [8]
i) Area of N-rectangles = 14.4 cm².
ii) Area of T-rectangles = 6.4cm².
iii) Area of U-rectangles = 4.9 cm².
iv) Length of slip circle arc = 12.6 cm.
v) Angle of internal friction = 26°
vi) Cohesion C = 19.5 kN/m²
vii) Specific weight of soil = 19kN/m³
c) Write a note on Khosla's theory of independent variables. [8]

OR

- Q8)** a) Write a note on measures adopted for safe drainage of seepage water in earthen dam. [4]
b) With the help of expression explain '*Exit Gradient*'. Also give permissible values of it for various soils. [6]
c) With the help of appropriate sketches explain Swedish slip circle method of stability analysis of earthen dam. [8]

UNIT - V

- Q9) a)** Design an irrigation canal in alluvial soil according to Lacey's theory. [8]
- i) Full supply discharge = $12 \text{ m}^3/\text{s}$
 - ii) Lacey's silt factor = 1
 - iii) Canal side slope = $\frac{1}{2} \text{ H} : 1 \text{ V}$
- b) State the merits and demerits of canal lining. [8]

OR

- Q10) a)** State various types of canal falls. Explain any one of them in detail with the help of neat sketch. [8]
- b) Design a trapezoidal irrigation canal to carry a discharge of $40 \text{ m}^3/\text{s}$ using Kennedy's theory. Assume ratio of base width (B) to depth (D) as 2.5, critical velocity ratio = 1, Kutter's rugosity coefficient $n = 0.023$ and side slope 1H : 2V. [8]

UNIT - VI

- Q11) a)** What is meant by Cross Drainage work? Explain level crossing with neat sketch. [8]
- b) State and explain classification of rivers based on topography. [8]

OR

- Q12) a)** Write short notes on: [8]
- i) Guide banks
 - ii) Pitched island
- b) With the help of neat sketches explain: [8]
- i) Syphon aqueduct
 - ii) Canal syphon



Total No. of Questions : 12]

SEAT No. :

P3029

[Total No. of Pages : 6

[5354]-515
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 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) *Draw neat diagram wherever necessary.*
- 4) *Use of logarithmic table, slide rule and electronic pocket calculator are allowed.*
- 5) *Assume suitable data if necessary, stating it clearly.*

- Q1) a)** Define Estimating and costing with respect to Civil Engineering works. State the purpose of estimation. **[3]**
- b) Explain the conditions under which approximate estimate is prepared. Explain any one method of approximate estimate. **[3]**

OR

- Q2) a)** Determine approximate estimated cost of a residential building, using following data. **[4]**
- i) Built up area of the proposed building = 350 Sq.m.
 - ii) Cost of construction for a building of built up area 300 Sq.m and with same specification as proposed building constructed 3 years before = Rs 16,00,000/-.
 - iii) Assume 24 % rise in construction cost over rates before three years.
 - iv) Assume a provision of 15% of construction cost for water supply, drainage and electrification
- b) State the following sentences as true or false for any two of the following with appropriate reasons. **[2]**
- i) Generally construction rate for ground floor and first floor remains same.

P.T.O.

- ii) Rate for excavation in a given soil for foundation trenches is higher than rate for open excavation.
- iii) The rate for item of RCC in footing, beam, slab, chajja and staircase for given grade of concrete remains same.

Q3) Refer figure 1, the schedule for openings and other details are as given below.

- i) Doors, $D = 1.2\text{m} \times 2.1\text{m}$; windows, $W = 1.5\text{m} \times 1.2\text{m}$.
- ii) Lintel size: $0.23\text{m} \times 0.23\text{m}$ for main wall and lintel of size: $0.115\text{m} \times 0.115\text{m}$ for partition walls.
- iii) Assume 15cm bearing on both sides for lintels.
- iv) Ground beam (GB) and plinth beams (PB) are provided at same level.
- v) Floor to floor height = 3.0 m.

Determine quantities of following items

- a) Brick Masonry in C.M (1:6) in superstructure for main walls and half brick thick brick masonry in C.M (1:4) in partition wall. [4]
- b) 20 mm thick sand faced cement plaster for external surface of the walls. [2]
- c) 12 mm thick cement plaster for internal surface of the walls. [2]

OR

Q4) Figure 1 shows plan and section of a residential building. Determine quantities of following items.

- a) RCC M20 in footing [2]
- b) RCC M20 in columns [2]
- c) RCCM20 in beam (ground beams and plinth beams) [2]
- d) Steel reinforcement if percentage of steel in footing is 0.80 %, for column is 2 % and for beam is 1.5%. [2]

Q5) a) Differentiate between the following [4]

- i) Scrap value and salvage value
- ii) Cost, price and value
- b) What is depreciation and explain the difference between depreciation and obsolescence? [2]

OR

Q6) Figure 2 shows the plan of a piece of land fronting 60m wide national highway. The land is suitable for developing commercial activities like hotels, commercial complex etc. Determine value of the land by belting method. Use following data. [6]

- a) Depth of front belt: 100m
- b) Present market rate for front belt: Rs 1000/m².

Q7) a) Explain the factors to be considered while determining rate per unit of an item. [4]

b) The quantity of stone masonry in C.M.(1:6) for plinth and foundation is 115 Cu.m. Determine the quantities of basic materials required to complete the work. [8]

c) Draft detailed specification for the item of providing and laying brick masonry (1:6) in superstructure with reference to [6]

- i) Different materials, quality and testing,
- ii) Method of execution and workmanship and
- iii) Mode of measurement and payment.

OR

Q8) a) What is task work? Explain how the task work is useful in rate analysis of an item. [4]

b) The quantity of R.C.C (1:1.5:3) work for a residential building is 36 Cu.M. Determine the quantities of basic materials required to execute the RCC work. [6]

c) Draft a detailed specification for the item of providing and laying U.C.R.masonry (1:6) in plinth and foundation with reference to [8]

- i) Different materials, quality and testing,
- ii) Method of execution and workmanship and
- iii) Mode of measurement and payment.

Q9) a) Explain the P.W.D.procedure for execution of minor works. [4]

b) Explain the purpose of administrative approval and technical sanction during execution of civil engineering works. [6]

c) Explain various forms of B.O.T. tenders. [6]

OR

Q10)a) Explain the unbalanced tender with suitable example. [4]

b) Write short note on [12]

- i) Security Deposit
- ii) Earnest Money Deposit
- iii) Prebid conference
- iv) Liquidated damages

Q11)a) Compare Lump Sum Contracts and Item Rate Contracts with reference to [4]

- i) nature of agreement,
- ii) contract documents and
- iii) advantages

b) Explain the followings with suitable examples, [12]

- i) Valid contract
- ii) Null or void contract
- iii) Lump sum contract
- iv) Termination of contract

OR

Q12)a) State the different types of civil engineering contract and hence explain any one. [6]

b) Explain Arbitration and its need. [4]

c) What are the different types of Arbitration and explain any one type? What are the advantages of Arbitration over court decision. [6]

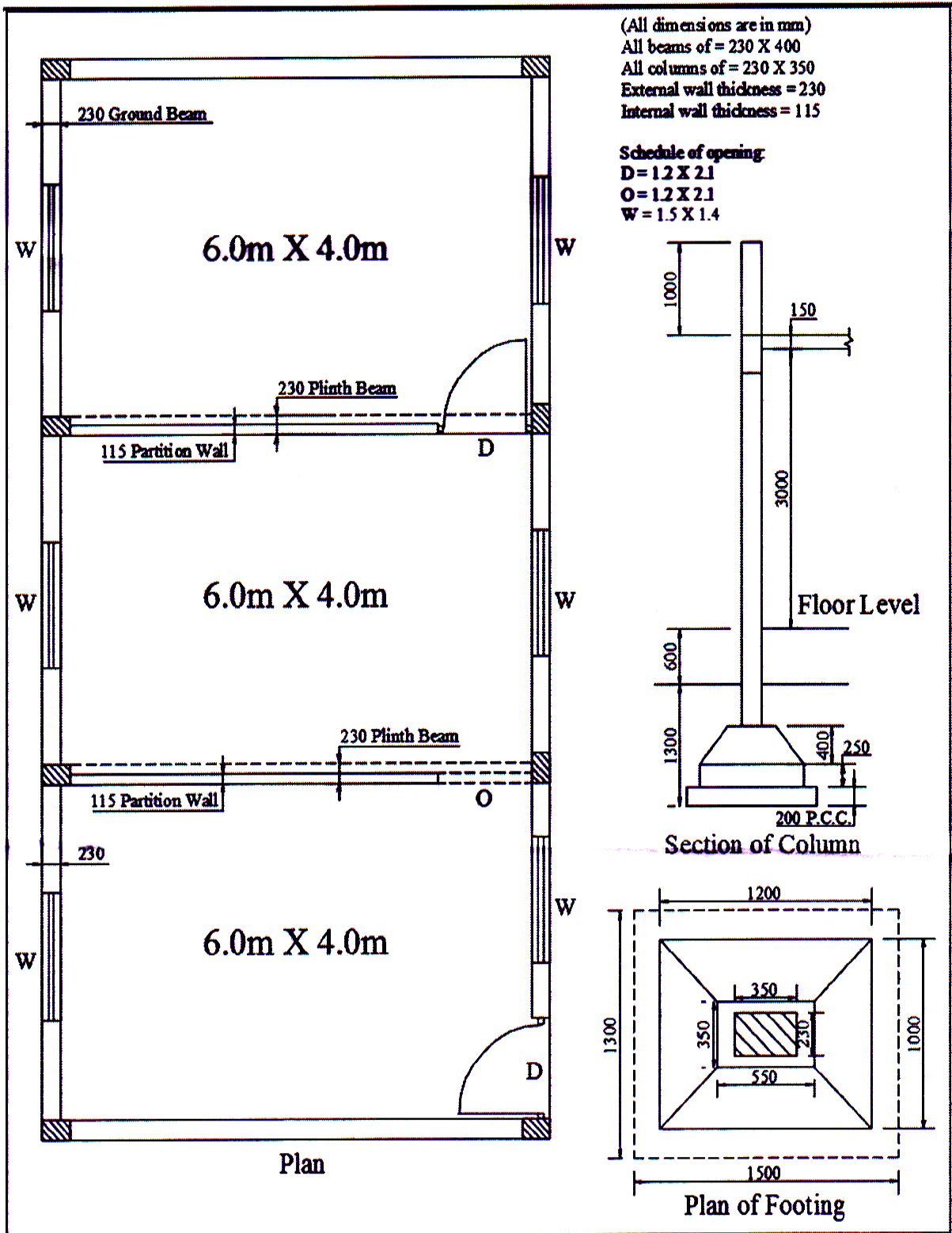


Figure 1 (All dimensions are in meters)

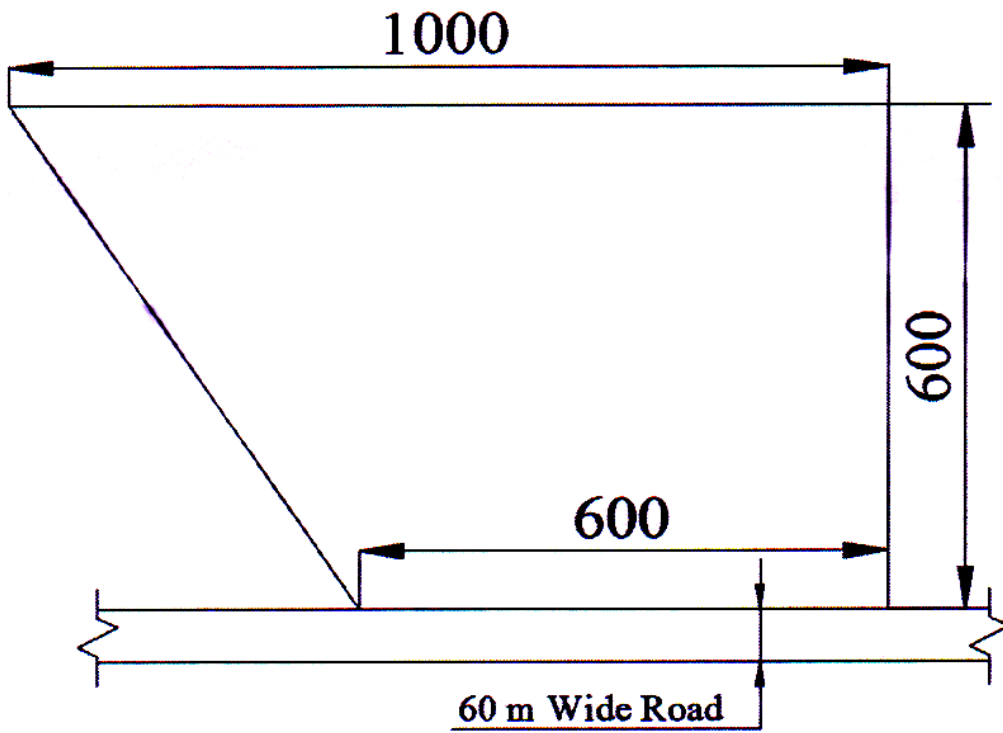


Figure 2 (All dimensions are in meters)



Total No. of Questions : 10]

SEAT No. :

P3030

[Total No. of Pages : 3

[5354]-516

B.E. (Civil)

**ADVANCED STRUCTURAL DESIGN
(2012 Pattern) (Elective - III) (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 and Q.9 or Q.10*
- 2) *Figures in bold 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) Explain how the form factors are calculated for **[10]**

- i) members composed entirely of stiffened elements
- ii) members composed entirely of unstiffened elements and
- iii) members composed both of stiffened and unstiffened elements.

OR

Q2) Explain the design procedure for cold form light gauge tension members. **[10]**

Q3) Explain joint mechanism in a frame with a suitable example. **[10]**

OR

Q4) What are the different load combinations considered in the analysis of a steel chimney? Also explain how the stresses due to self-weight and lining are calculated. **[10]**

Q5) Fig.1(a) shows the yield line patterns for a rectangular slab simply supported at two opposite edges and free at the other two edges. The slab is isotropically reinforced in the top and the bottom with ultimate positive and negative moments per unit width m_u and m_u^l respectively. Determine the ultimate concentrated load P that the slab can carry. Neglect the self-weight of the slab. **[16]**

P.T.O.

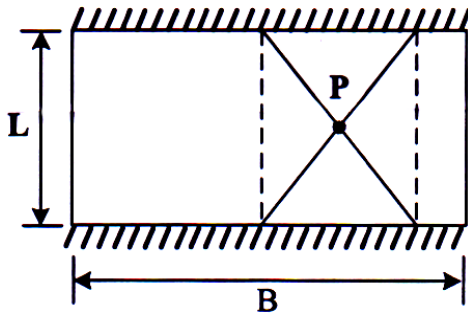


Fig. 1(a)

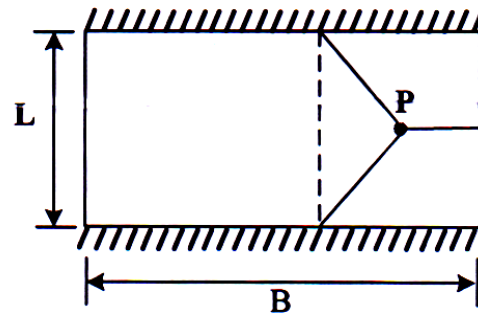


Fig. 1(b)

OR

Q6) For Q.5, if the yield line patterns are as shown in Fig.1(b), Determine the ultimate concentrated load P that the slab can carry. Neglect the self-weight of the slab. [16]

Q7) For the elevated water tank shown in Fig. 2, analyze the staging for tank-full condition and calculate the resultant moment at the base of the staging. The tank is located on soft soil in seismic zone III. The staging conforms to the ductile detailing of IS 13920. The weights of various components are given below. [18]

Roof slab = 120 kN; wall = 275 kN; floor slab = 200 kN; floor beam = 85 kN; gallery = 100 kN; columns = 250 kN; braces = 300 kN.

The total stiffness of the columns may be taken as 7,000 kN/m.

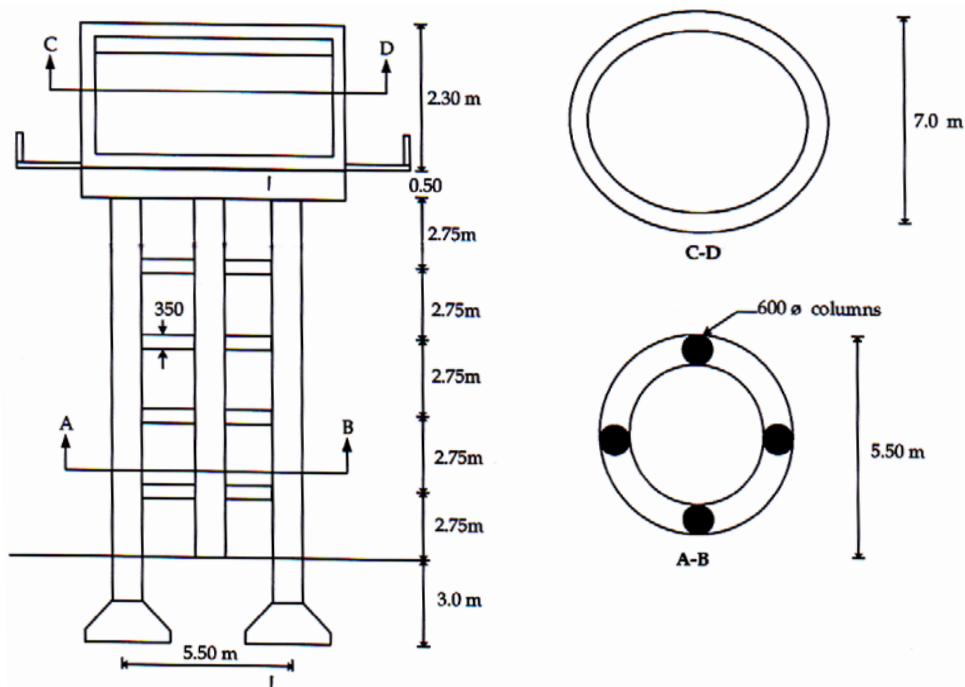


Fig. 2

OR

Q8) For the elevated water tank in Q.7, analyze the staging for tank empty condition. [18]

Q9) A 3.4 m wide RC shear wall is subjected to the following loadings. Shear force = 500 kN; axial force = 8,200 kN; axial force on boundary element = 1,500 kN and moment = 5,500 kN. Design the shear wall using M30 grade concrete and Fe 500 grade steel. [16]

OR

Q10) Write short notes on the following: [16]

- a) Layout of shear walls
- b) Modes of failure of shear walls
- c) Boundary elements in a shear wall
- d) Coupled shear walls



Total No. of Questions : 10]

SEAT No. :

P3031

[Total No. of Pages : 3

[5354]-517

B.E. (Civil)

**ADVANCED FOUNDATION ENGINEERING
(2012 Pattern) (Elective - III) (w.e.f.-June 2015)**

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) *Figures to the right indicate full marks.*
- 3) *If necessary, assume suitable data and indicate clearly.*
- 4) *Use of electronic pocket calculator is allowed.*

- Q1)** a) What are I.S. code provisions for subsoil exploration of offshore structures with respect to preliminary and detail investigations. [5]
- b) Explain any one case study of failure of bridge foundation with all technical details. [5]

OR

- Q2)** a) Explain in detail the IRC provisions for subsoil exploration of National highways. [5]
- b) Explain any one case study of failure of Multistorey building foundation with all technical details. [5]

- Q3)** a) Explain cyclic pile load test with a suitable sketch and interpretation of skin friction and point bearing resistance from the test data. [6]
- b) What are different types of deep foundations. Also, explain I.S. code provisions with respect to minimum depth. [4]

OR

- Q4)** a) Draw a neat sketch of sand drains and explain functions of each component parts. Also, explain typical design guidelines for construction of sand drains. [6]
- b) Write a short note on "Design of piles subjected tensile loads". [4]

P.T.O.

- Q5) a)** What are the various components of total settlement? Also, Explain how immediate settlement and settlement due to consolidation is evaluated for shallow foundations. [8]
- b) What is raft foundation? Explain conventional method for design of raft foundation with basic assumptions made in the method. [8]

OR

- Q6) a)** Explain any one field method used for design of combined footing. Also, explain the data obtained from field test and its interpretation in design of combined footing. [8]
- b) Explain the concept of 'useful width' is used to counter balance the effect of inclined loading in design of shallow foundations. [8]

- Q7) a)** Explain the various components of a well foundation with a suitable sketch. [8]
- b) Draw a neat sketch of rockfill dam. Explain the functions of each component parts. Also, explain typical situations where rockfill dam is used. [8]

OR

- Q8) a)** Explain the depth of foundation wells and Grip depth as per IRC with suitable sketches. [8]
- b) What are various types of coffer dams? Explain [8]
- i) Sheet pile wall and
- ii) Cellular coffer dam with suitable sketches.

- Q9) a)** Explain the estimation of [9]
- i) Vertical stress
- ii) Horizontal radial stress and
- iii) Horizontal circumferential stress in the vicinity of shafts at a particular depth below ground surface

- b) Explain the terms [9]
- i) Ditch conduit
 - ii) Positive projecting conduit and
 - iii) Negative projecting conduit with suitable sketches.

OR

- Q10)a)** Explain the stress distribution around tunnel situated at a great depth below ground surface for [9]
- i) Elastic case and
 - ii) Plastic case
- b) What is imperfect ditch conduit. Explain with suitable sketch. [5]
- c) Write a short note on "Estimation of load on conduit due to live loads.[4]



Total No. of Questions : 12]

SEAT No. :

P3032

[Total No. of Pages : 3

[5354]-518
B.E. (Civil Engineering)
HYDROPOWER ENGINEERING
(2012 Pattern) (Elective - III) (Semester - II)

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 meant by Hydro-power? Discuss the relative merits and demerits of hydropower as compared to other powers. **[3]**
- b) Is the hydropower generation affects with the present trends in 'energy use' patterns? If yes, then elaborate it in detail with suitable examples. **[4]**

OR

- Q2) a)** What are the effects of global environmental issues like climate change, green house effects on hydropower need and its development? **[4]**
- b) Discuss the significance of national power grid. **[3]**

OR

- Q3) a)** Explain in detail the basic features of a pumped storage plant. **[3]**
- b) Discuss the advantages and disadvantages of base load plant. **[4]**
- Q4) a)** What is run off river plants? Explain in short. **[3]**
- b) Differentiate between mini and micro hydropower plants? Enlist suitable examples. **[4]**

- Q5) a)** Define capacity factor, load factor and utilization factor. **[3]**
- b) What are the load curve and load duration curves? **[3]**

P.T.O.

OR

- Q6)** a) Write the significance of diversity factor on the cost of hydropower generation. [3]
b) Write a note on “Prediction of load”. [3]

- Q7)** a) Write the expressions (formulae) for following losses at intakes. [6]
i) Entrance loss,
ii) Rack loss,
iii) Head gate loss.

Write the meaning of each parameter used in respective formulae.

- b) Write down the design criteria for non embedded and embedded penstocks. [5]
c) Draw a typical layout of powerhouse and explain its components in short. [5]

OR

- Q8)** a) Give the classification of penstocks based on [6]
i) material of fabrication,
ii) method of their support,
iii) rigidity of connections and support.
b) Write note on pressure shafts and trash racks. [6]
c) A penstock with an internal diameter of 1.20, supplies water at a head equivalent to 17.6 kg/cm². There is a possibility of 20% increase in the pressure due to transient conditions. The design stress and efficiency of the joint may be assumed to be 1020 kg/cm² and 85%, respectively. Calculate the required wall thickness of the penstock approximately. [4]

- Q9)** a) A turbine is to operate under a head of 20 m at 225 rpm. The discharge is 10m³/s. If overall efficiency is 90%, calculate specific speed, power, type of turbine and performance of turbine under a head of 25m. [6]
b) Define specific speed of turbine. Derive expression for specific speed of turbine. [5]
c) Write a detailed note on ‘selection of Turbines’. [5]

OR

- Q10)a)** Explain the classification of turbines based on [6]
- i) discharge
 - ii) flow direction and
 - iii) speed
- b) Explain governing of reaction type turbine (Francis Turbine). [5]
- c) A turbine is to operate under 30m head at 250rpm. The discharge is $9\text{m}^3/\text{s}$. If the efficiency of the turbine is 85%, determine [5]
- i) power generated,
 - ii) specific speed,
 - iii) type of turbine,
 - iv) output under head of 25m

- Q11)a)** Prove the necessary conditions for - [6]
- i) determination of optimum load on power plant,
 - ii) sharing of loads between two power plants.
- 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)** Write the equations for calculations of depreciation of plants in terms of initial plant cost, salvage value, amount of depression, life of plant years and annual interest rate in the following cases - [6]
- i) straight line method,
 - ii) sinking fund method.
- b) What is the necessity of different laws and policies in economics of hydroelectric power? Explain any one policy in detail. [6]
- c) Write a note on 'Participation of private sector' in the hydropower development. Also explain the same with suitable example. [6]



Total No. of Questions : 10]

SEAT No. :

P3033

[Total No. of Pages : 2

[5354]-519
B.E. (Civil)
AIR POLLUTION AND CONTROL
(2012 Pattern) (Elective - III)

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 logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables are allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) Explain the following secondary meteorological factors influencing air pollution: **[2+2+2]**

- i) Precipitation
- ii) Humidity and
- iii) Visibility

b) Explain the purpose of ambient air sampling and stack gas sampling. **[2+2]**

OR

Q2) a) Draw schematically a sampling train for stack sampling indicating the equipment required. **[6]**

b) Explain stable and unstable atmosphere. **[2+2]**

Q3) a) What is iso kinetic sampling? Explain with a neat sketch. Why it is required? **[2+2+2]**

b) Explain method of measurement of odour. **[4]**

OR

Q4) a) Explain Troposphere and Ionosphere. **[3+3]**

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

P.T.O.

- Q5)** a) Explain with a sketch principle of bag filter. State factors required considering while selecting filter media for fabric filter. [3+2+3]
b) Write a short note on control of air pollution from automobiles. [8]

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? [3+2+3]
b) Explain principle of Spray tower with a neat sketch. [4+4]

- Q7)** a) Explain the important provision made in “THE AIR (Prevention and Control of Pollution) ACT 1981”. [8]
b) What is the purpose of environmental (protection) ACT 1986? Explain Objectives and the powers of central pollution control board. [3+2+3]

OR

- Q8)** a) Explain with a neat sketch an importance of land use planning in controlling air pollution. [4+4]
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 Project Proponent and Environment Consultant in the EIA Process. [4.5+4.5]
b) Explain the EIA cycle and procedures. [4.5+4.5]

OR

- Q10)** a) What is a need of Environmental Impact Assessment (EIA)? Also write difference between environmental audit and EIA. [5+4]
b) Write a short note on the following EIA methodologies: [4.5+4.5]
i) Network and
ii) Overlays



[5354]-520

B.E. (Civil Engineering)

**FINITE ELEMENT METHOD IN CIVIL ENGINEERING
(2012 Pattern) (Elective-III) (Semester-II)**

Time : 2½ Hours]

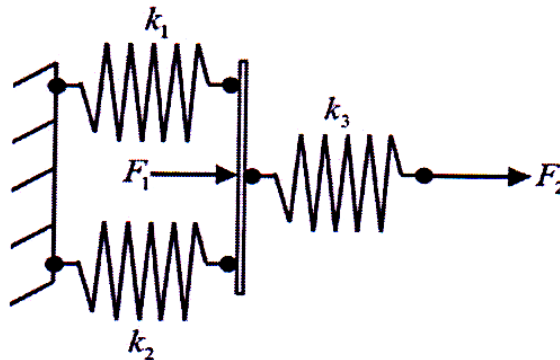
[Max. Marks : 70

Instructions to the candidates:-

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

Q1) a) Derive strain-displacement relations for 3D elasticity problem. [6]

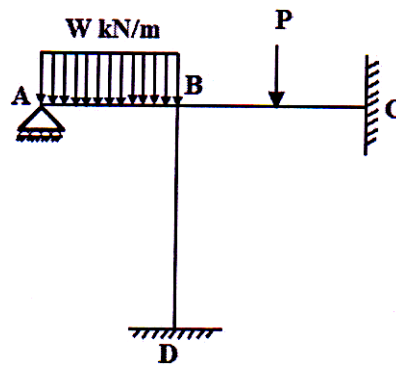
- b) A three spring system shown in figure has stiffnesses $k_1 = 40$ N/mm, $k_2 = 50$ N/mm and $k_3 = 80$ N/mm. The loads applied are $F_1 = 100$ N and $F_2 = 50$ N. Calculate displacements at nodal points. [8]



- c) For the portal frame as shown in figure, answer the following questions. Consider axial deformation [6]

- i) What are the total degrees of freedom?
- ii) What is the size of global stiffness matrix?
- iii) What are the boundary conditions?

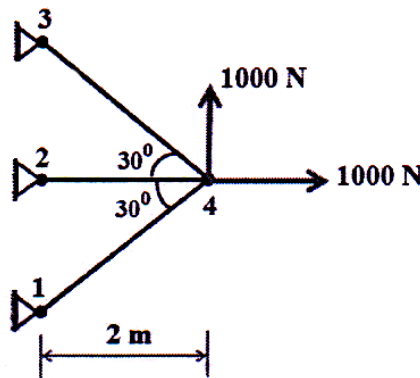
iv) What is size of reduced stiffness matrix?



OR

Q2) a) Derive stress compatibility condition for 2D plane stress elasticity problem. [6]

b) For the plane truss shown in figure, determine the x and y components of displacements at node 4 using finite element method. Take $E = 110$ GPa and $A = 500 \text{ mm}^2$ for all elements. [8]



c) Derive the stiffness matrix for the grid element considering six degrees of freedom. [6]

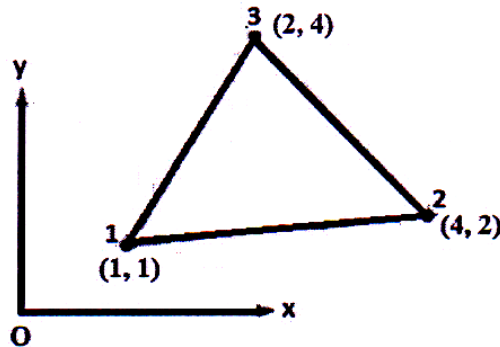
Q3) a) Write short note on: [8]

- i) Convergence criteria of displacement function?
- ii) Difference between CST and LST elements.

b) Derive natural coordinates of 1D bar element in x-y coordinate system. [8]

OR

Q4) Derive necessary matrices required for the stiffness matrix formulation of three noded CST element as shown in figure in Cartesian coordinate system using finite element formulation. [16]



Q5) Derive shape functions of four noded rectangular element using polynomial in x-y coordinate system. Hence show that sum of shape functions is unity. [18]

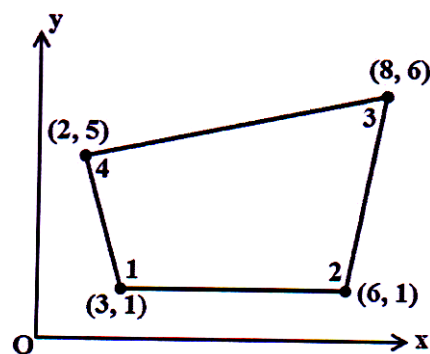
OR

Q6) a) What are Serendipity elements explain with examples? Derive shape functions of four noded serendipity element. [9]

b) Derive shape functions for nine noded rectangular element in natural coordinate (ξ, η) system using Lagrange's interpolation function. [9]

Q7) a) Explain isoparametric, sub-parametric and super-parametric elements with suitable example. [8]

b) For the isoparametric quadrilateral element shown in figure, determine natural coordinates of the point 'Q' which has Cartesian coordinates (7,4). [8]



OR

Q8) Derive the Jacobian matrix for the four noded quadrilateral isoparametric element having Cartesian coordinates at node 1 (3, 1), node 2 (6, 1), node 3 (8, 6) and node 4 (2, 5). [16]



Total No. of Questions : 10]

SEAT No. :

P3035

[Total No. of Pages : 2

[5354]-521

B.E. (Civil)

CONSTRUCTION MANAGEMENT
(2012 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or 10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data if necessary.*

- Q1)** a) Draw work break down structure of residential building. [4]
b) Discuss various reasons for project cost overrun and suggest few remedies to overcome. [6]

OR

- Q2)** a) How the infrastructure development plays in important role in economic development of nation. [5]
b) Explain the role of Project management consultant on any infrastructure project. [5]

- Q3)** a) Write need and importance of labour laws in construction industry. [5]
b) What are the role and responsibility of project manager on Infrastructure project. [5]

OR

- Q4)** a) Explain the concept of Project Balance sheet. [5]
b) Write as short note on Workman's compensation act 1923. [5]

- Q5)** a) Write short note on any one of following [4]
i) Decision tree analysis.
ii) Simulation analysis.

P.T.O.

- b) What is Risk Mitigation? What are the various methods for mitigation of risks? [6]
- c) What is meaning of value? Explain the concept of value management. [6]

OR

- Q6)** a) Explain the importance of value engineering in value analysis. [6]
- b) What is risk? Enlist various types of risks involved in Tunneling project. [6]
- c) Explain the concept of value engineering. [4]

- Q7)** a) Explain the role of ERP in Material Management. [6]
- b) Write short note on : [6]
- i) Buyer-seller relationship
- ii) Supply chain management
- c) Explain in detail Codification and Classification of material. [6]

OR

- Q8)** a) Enlist various types of training on construction site and explain any two in detail. [6]
- b) Explain the concept of performance appraisal. Give suitable example. [6]
- c) A construction company purchases 10000 bags of cement annually. Each bag of cement costing Rs. 325/- and cost of incurred in procuring each lot is Rs. 105/-. The cost of carrying 18%. Find EOQ and its numbers of orders. [6]

- Q9)** a) Explain with example fuzzy logic applications in civil engineering. [6]
- b) Explain Biological neural network. [6]
- c) Explain the various applications of ANN in civil engineering. [4]

OR

- Q10)** a) Write short note on Genetic algorithm. [6]
- b) What are the applications of Fuzzy logic? [6]
- c) Differentiate between Biological neuron and artificial neuron. [4]



Total No. of Questions : 10]

SEAT No. :

P3036

[Total No. of Pages : 6

[5354]-522

B.E. (Civil Engg.) (End Semester) (Theory)
ADVANCED TRANSPORTATION ENGG.
(2012 Pattern) (Elective - IV)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or 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) With reference to the origin and destination surveys, explain the following terms. **[5]**

- i) Cordon Line
- ii) Sampling size

b) Write a note on Modal Split. **[5]**

OR

Q2) a) Estimate the total number of trips using Modesto Model based on the following data. **[5]**

- i) No. of dwelling unit = 5000
- ii) No of cars owned per dwelling unit = 2
- iii) Average number of persons per house = 4
- iv) Social Rank Index = 2.5
- v) Urbanization Index = 4

b) How has the National Highway Development Projects (NHDP) contributed to the overall growth of the country? **[5]**

Q3) Enhancing mobility while at the same time reducing congestion, accidents and pollution is a common challenge especially in India. What are the initiatives that you as transportation planner propose to achieve the balance between both? **[10]**

P.T.O.

OR

- Q4)** a) Explain the Benefit Cost Method of economic evaluation. What are the criteria for deciding the priority of projects based on B/C ratio? [5]
b) Write a note on the importance of Pavement Management System. [5]

- Q5)** a) With reference to moving vehicle survey, explain the objective, procedure, data obtained and advantage of the survey. [10]
b) State the advantages of mechanical methods of conducting traffic surveys over the manual methods. Give any two examples of mechanical counters or sensors used for surveys. [6]

OR

Q6) Write notes on the following

- a) Level of Service (LOS) of a road. [6]
b) Passenger Car Unit [5]
c) Automated Signals [5]

- Q7)** a) Design a flexible pavement as per IRC 37-2001 using the following data. Also draw a typical cross section showing all the basic layers. [10]
i) Type of road = Four lane single carriageway
ii) CVPD in the year 2012 = 1000 (sum of both direction)
iii) Expected year of completion = 2016
iv) Traffic growth rate = 7.5%
v) Design Life = 10 years
vi) Vehicle Damage factor = 3.5
vii) Design CBR = 5%
b) With neat sketches explain any 3 types of distresses on flexible pavements. [6]

OR

- Q8)** a) The rebound deflection values for 5 spots on a stretch of National Highway with heavy traffic are given below. Find the mean, standard and characteristic deflection. [5]
Rebound deflection in mm: 1.5, 2.0, 1.25, 1.36, 1.45
b) State the differences between IRC 37, 2001 and the revised IRC 37-2011. [5]

- c) With reference to Benkelman Beam Survey, explain the following: [6]
- i) Correction for temperature
 - ii) Correction for seasonal variation in subgrade moisture content.

- Q9) a)** The design traffic for a major road with heavy traffic is found to be 77 msa. From the BBD survey, the mean value of deflection (D_m) = 1.28 mm and the standard deviation of deflection = 0.26 mm. The temperature of the pavement during study is 45°C. and the correction factor for seasonal variation in subgrade moisture content = 1.3. Determine the thickness of the overlay if DBM binder course and BC surface course is to be adopted. [8]
- b) Explain the concept behind the design of rigid pavement in comparison to that of a flexible pavement. [6]
- c) What are the critical combinations of stresses for a cement concrete pavement? [4]

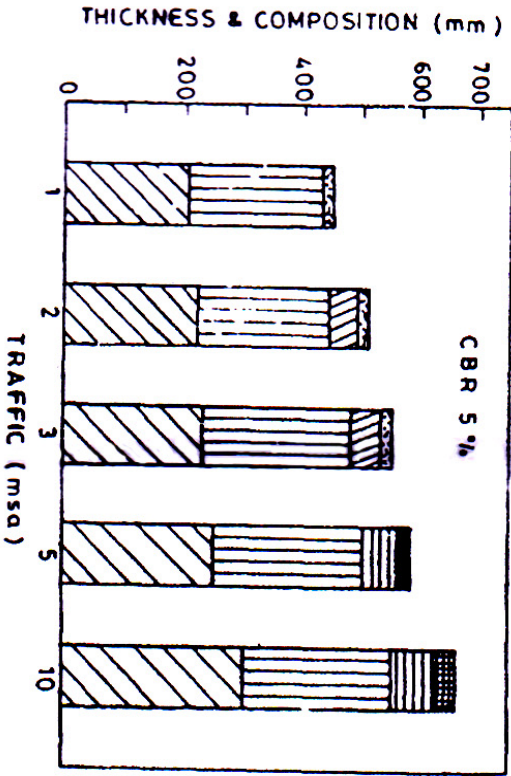
OR

- Q10)a)** Design the tie bars considering plain bars for the following data: [8]
- i) Slab thickness = 32 cm
 - ii) Lane width = 3.5 m
 - iii) Coefficient of friction = 1.5
 - iv) Density of concrete = 2500 kg/m³
 - v) Allowable tensile stress in plain bars = 1200 kg/cm²
 - vi) Allowable bond stress = 17 kg/cm²
 - vii) Diameter of tie bar = 12 mm
- b) What are the objectives of providing tie bars and dowel bars? Illustrate with the help of a neat sketch. [4]
- c) Explain the construction procedure of cement concrete pavement. [6]

PAVEMENT DESIGN CATALOGUE

PLATE 1 - RECOMMENDED DESIGNS FOR TRAFFIC RANGE 1-10 msa

CBR 5%						
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION			Granular Base (mm)	Granular Sub-base (mm)
		Wearing Course (mm)	Bituminous Surfacing Binder Course (mm)	Granular Base (mm)		
1	430	20 PC		225	205	
2	490	20 PC	50 BM	225	215	
3	530	20 PC	50 BM	250	230	
5	580	25 SDBC	55 DBM	250	250	
10	660	40 BC	70 DBM	250	300	

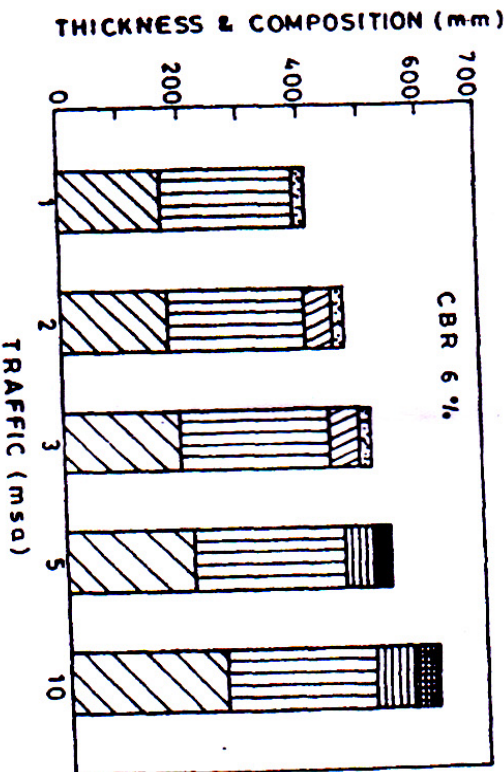


GSB GB DBM BM BC SDBC PC

PAVEMENT DESIGN CATALOGUE

PLATE 1 - RECOMMENDED DESIGNS FOR TRAFFIC RANGE 1-10 msa

CBR 6%						
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION			Granular Base (mm)	Granular Sub-base (mm)
		Wearing Course (mm)	Bituminous Surfacing Binder Course (mm)	Granular Base (mm)		
1	390	20 PC		225	165	
2	450	20 PC	50 BM	225	175	
3	490	20 PC	50 BM	250	190	
5	535	25 SDBC	50 DBM	250	210	
10	615	40 BC	65 DBM	250	260	

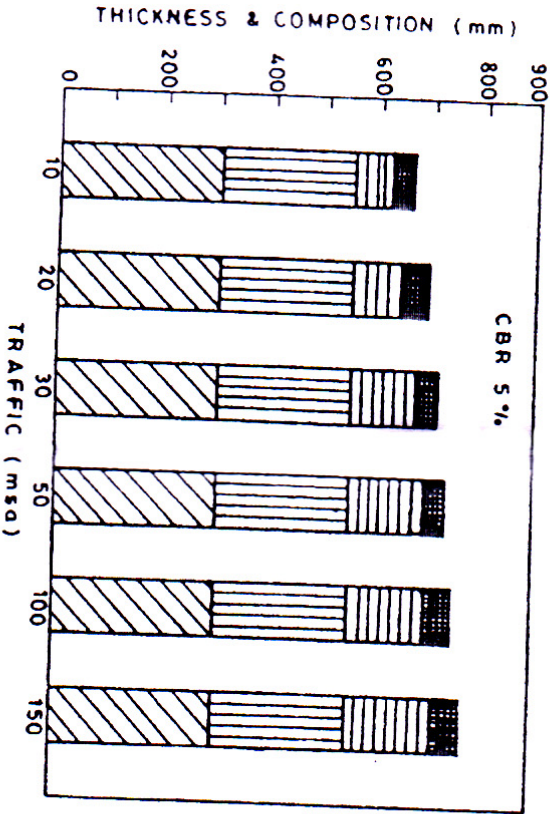


GSB GB DBM BM BC SDBC PC

PAVEMENT DESIGN CATALOGUE

PLATE 2 - RECOMMENDED DESIGNS FOR TRAFFIC RANGE 10-150 msa

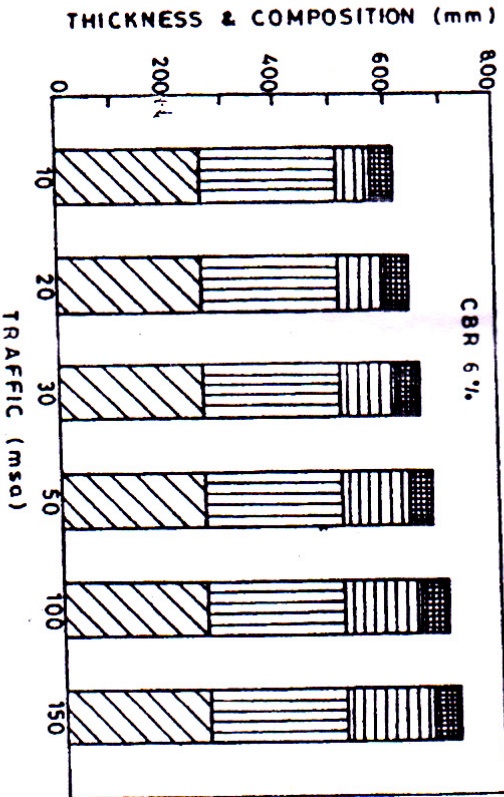
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION		
		Bituminous Surfacing		Granular Base & Sub-base (mm)
		BC (mm)	DBM (mm)	
10	660	40	70	Base = 250 Sub-base = 300
20	690	40	100	
30	710	40	120	
50	730	40	140	
100	750	50	150	
150	770	50	170	



PAVEMENT DESIGN CATALOGUE

PLATE 2 - RECOMMENDED DESIGNS FOR TRAFFIC RANGE 10-150 msa

Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION		
		Bituminous Surfacing		Granular Base & Sub-base (mm)
		BC (mm)	DBM (mm)	
10	615	40	65	Base = 250 Sub-base = 260
20	640	40	90	
30	655	40	105	
50	675	40	125	
100	700	50	140	
150	720	50	160	



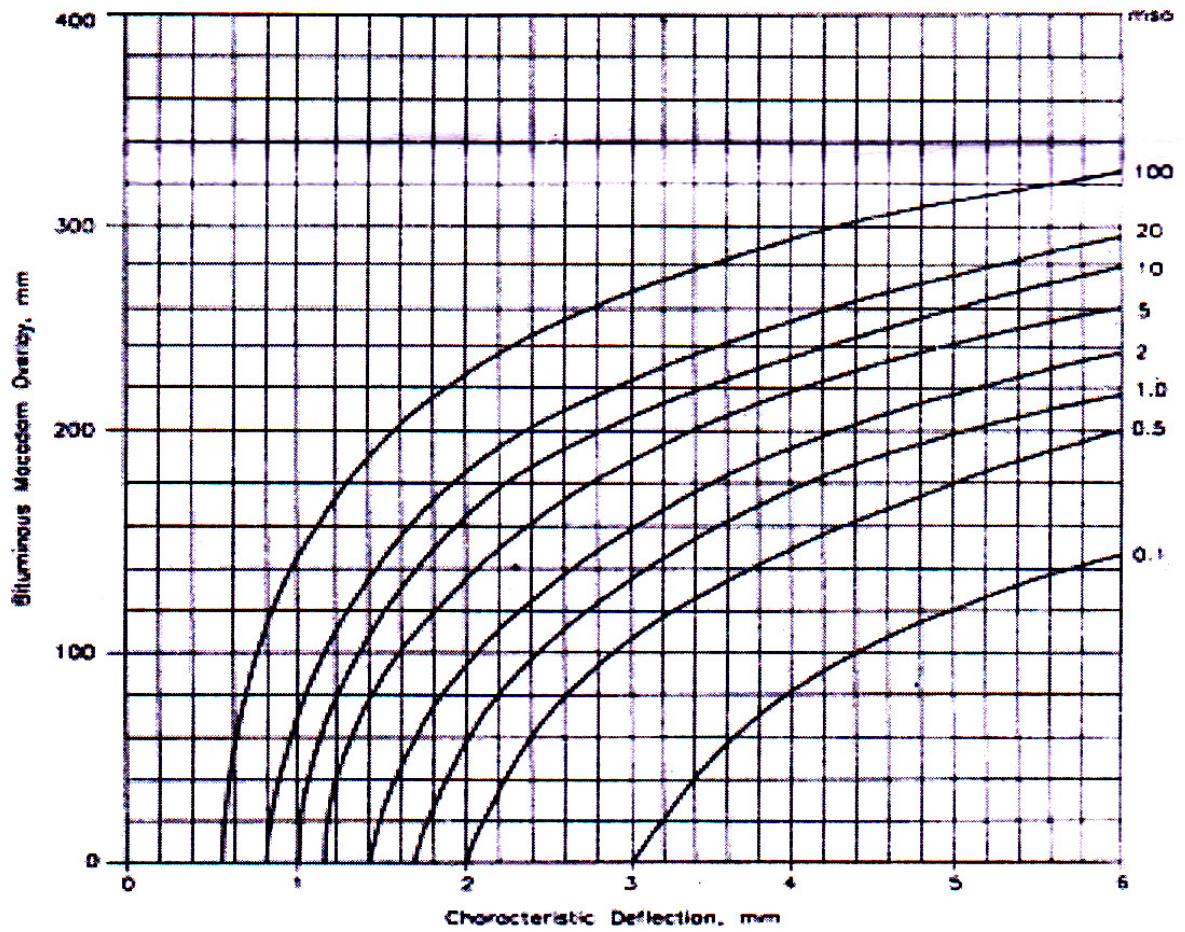


Fig. 9. Overlay Thickness Design Curves



Total No. of Questions : 10]

SEAT No. :

P3037

[Total No. of Pages : 4

[5354]-523

B.E. (Civil)

**STATISTICAL ANALYSIS AND COMPUTATIONAL
METHODS IN CIVIL ENGINEERING
(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, 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 Secant method with an example. [4]
b) Evaluate $1/31$ using Newton Raphson Method correct up to 4 decimal places. [6]

OR

- Q2)** a) Explain Gauss Legendre and Gauss 3 point formula with suitable example and process of change of limits to $(-1$ to $+1)$. [4]
b) Evaluate using [6]
i) trapezoidal rule and
ii) simpson's $1/3$ and simpson's $3/8$ rule

$$\int_0^1 \frac{dx}{1+x^2} \text{ taking } h=1.$$

- Q3)** a) Explain and distinguish between Gauss Elimination and Gauss Jordan Methods with suitable examples. [4]
b) Solve using Gauss Siedel Method: [6]
 $10x + 2y + z=9$; $2x + 20y - 2z = -44$; $-2x + 3y + 10z=22$

P.T.O.

OR

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

b) Solve using Gauss Elimination Method [6]

$$5x_1 + x_2 + x_3 + x_4 = 4; \quad x_1 + 7x_2 + x_3 + x_4 = 12;$$

$$x_1 + x_2 + 6x_3 + x_4 = -5; \quad x_1 + x_2 + x_3 + 4x_4 = -6$$

Q5) a) Explain applications of statistics in civil engineering and types of data under statistics. [3]

b) From following data calculate Mean, Median and Mode [6]

Size	0-5	5-10	10-15	15-20	20-25	25-30
Frequency	5	7	10	8	6	4

c) Output of 230 excavators on volumetric basis per hour and respective frequencies is given in the following table [7]

Output	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	12	18	35	42	50	45	20	8

Calculate:

i) Average output of an excavator

ii) Standard deviation of output of excavator

iii) % number of excavators where output falls within $\bar{X} \pm 3\sigma$.

OR

Q6) a) Explain various methods for measures of dispersion with suitable examples. [3]

b) Prepare frequency distribution table with suitable class interval, find out all measures of dispersion from following data set of numbers: [6]

72, 74, 40, 60, 82, 115, 41, 61, 65, 83, 53, 110, 46, 84, 50, 67, 78, 79, 56, 65, 68, 69, 104, 80, 79, 79, 52, 73, 59, 81, 66, 49, 77, 90, 84, 76, 42, 64, 64, 70, 72, 50, 79, 52, 103, 96, 51, 86, 78, 94.

- c) Following table gives per hour wages of skilled labours on 2 different construction sites A and B [7]

Hourly Wages (Rs)	Number of Skilled Labours	
	Site A	Site B
120-130	15	25
130-140	30	40
140-150	44	60
150-160	60	35
160-170	30	12
170-180	14	15
180-190	7	5

Using appropriate measures, answer the following:

- Which site pays higher average wages
- Which factory has a more consistent wage structure

- Q7)** a) A construction company A completes 90% of its projects on time and company B completes 70% projects on time. What is the probability that at least one of them will complete the project on time at random? [4]
- b) A project yields an average cash flow of Rs 500 lakhs with a standard deviation of Rs 60 lakhs. Calculate the following probabilities using the concept of normal distribution: [6]
- Cash flow will be more than Rs 560 Lakhs
 - Cash flow will be less than Rs 420 Lakhs
 - Cash flow will be between 460 lakhs - 540 lakhs
 - Cash flow will more than 680 lakhs
- c) A set of 5 coins is tossed 3200 times and the number of heads appearing each time is noted. The results are given below: [7]
- | | | | | | | |
|----------------|----|-----|------|-----|-----|----|
| No. of heads : | 0 | 1 | 2 | 3 | 4 | 5 |
| Frequency : | 80 | 570 | 1100 | 900 | 500 | 50 |
- Test the hypothesis that the coins are unbiased.

OR

- Q8)** a) Explain Chi Square Distribution with suitable example. [4]
- b) In a distribution exactly normal, 7% of the items are under 35 and 79% are under 63. What is the mean and standard deviation of the distribution. [6]

- c) "A" can solve 90% of problems given in a book and "B" can solve 70%. What is the probability that at least one of them will solve a problem selected at random? [7]

Q9) a) Explain correlation analysis, its importance and types with suitable examples. [4]

- b) Calculate Karl Pearson's coefficient of correlation between X and Y from the following data and calculate probable error. Assume 69 and 112 as mean values for X and Y respectively. [6]

X	78	88	99	60	59	79	68	69
Y	125	137	156	112	107	136	123	108

- c) From the following data obtain the 2 regression equations and calculate the correlation coefficient [7]

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

Estimate the value of Y which should correspond on an average of X=6.2

OR

Q10)a) Explain regression analysis, its types and applications with suitable examples. [4]

- b) The following data gives the working in hours of some equipments and respective performance ratings. Calculate the regression lines of performance ratings on time in ('100 hrs) and estimate the probable performance if an equipment works for 7('100 hrs) [6]

Operator	1	2	3	4	5	6	7	8
Working hours	16	12	18	4	3	10	5	12
Rating	87	88	89	68	78	80	75	83

- c) Following data pertaining to 2 construction companies A and B and number of projects complete on time is given below: [7]

	Number of projects completed on time									
A	25	28	35	32	31	36	29	38	34	32
B	43	46	49	41	36	32	31	30	33	39

Find:

- The two regression equations
- The coefficient of correlation between number of projects of A and B
- The most likely number of completed projects when number of projects completed by A is 30.



Total No. of Questions : 10]

SEAT No. :

P3038

[Total No. of Pages : 2

[5354]-524

B.E. (Civil)

PLUMBING ENGINEERING
(2012 Pattern) (Elective - IV)

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

Q1) a) Explain UPC-I and GPCS-I. **[5]**

b) How Plumbing engineering is related with Swachha Bharat Abhiyan. **[5]**

OR

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

b) State components of plumbing required for rain water harvesting. **[4]**

Q3) a) Draw a neat sketch (section and elevation) of female public urinals with standards dimensions. **[5]**

b) Explain plumbing necessary for solar water heating. **[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]**

P.T.O.

OR

- Q6)** a) Explain drainage system for three star hotel building (G+4), Include explanation of drainage from kitchen. [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 Indian pattern water closets & European type 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. Also explain ancient stone ware drainage of Mohenjo-Daro. [10]
- b) Explain with neat sketch requirements for brick built inspection chamber and Gully trap for drainage line of G+1 structure. [6]

OR

- Q10)** a) Explain design of plumbing systems for multi-storey buildings. [8]
- b) How does faulty plumbing system for multi-storey building affected many people in CHINA, (SARS, severe acute respiratory syndrome). [8]



Total No. of Questions : 8]

SEAT No. :

P3039

[Total No. of Pages : 2

[5354]-525

B.E. (Civil) (End Semester)

GREEN BUILDING TECHNOLOGY

(2012 Pattern) (Elective - IV : Open Elective)

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

- Q1)** a) Why and How ecofriendly materials benefit the users? [6]
b) What do you mean by climate responsive architecture? Mention the importance of it for. [7]
c) Elaborate importance of "life cycle assessment" and its need. [7]

OR

- Q2)** a) Why today low VOC materials are preferred? [7]
b) What is the importance of site planning in relation with sun path and wind path? [6]
c) What is Embodied energy? Elaborate the importance of the same in relation with construction materials. [7]

- Q3)** a) Explain in depth : Biogas generation methods. [8]
b) Explain various methods of composting. [8]

OR

- Q4)** a) Write a short note on LED. [8]
b) Write a short note on photovoltaic cell. [8]

- Q5)** a) Write a short note on KYOTO Protocol. [8]
b) Write a short note on ECBC. [9]

P.T.O.

OR

- Q6)** a) Write a short note on CDM. [8]
b) Why the codes on energy conservation are important these days? Explain with example. [9]

- Q7)** a) Write a short note on importance of different rating systems. [9]
b) Elaborate in detail “LEED”. [8]

OR

- Q8)** a) Elaborate in detail ‘BREEAM’. [9]
b) Elaborate the benefits offered to any one rated building. [8]



Total No. of Questions : 8]

SEAT No. :

P3040

[Total No. of Pages : 2

[5354]-526

B.E. (Civil) (End Semester)
FERROCEMENT TECHNOLOGY
(2012 Pattern) (Elective - IV)

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.*

- Q1)** a) Explain the special types of ferrocretes? [7]
b) Explain in detail the three stage behaviour of ferrocrete in tension and flexure? [7]
c) Explain the natural forms of ferrocrete like Leaf of a banana tree, Folded paper and Flexible trunks & branches of a tree? [6]

OR

- Q2)** a) Explain steel fine wire mesh as a reinforcement in Ferrocrete structure?[7]
b) Discuss curing and maintenance for ferrocement structures? [7]
c) What are the different guidelines for good construction of ferrocrete structure? [6]

- Q3)** a) Explain in detail the various factors governing the cost of a ferrocement structure? [8]
b) Explain in detail the use of ferrocrete as under-reamed piles, encased columns and raft foundation? [9]

OR

- Q4)** a) Write in detail the specifications for ferrocrete water tank, ferrocrete double wall? [8]
b) Explain in detail the various earthquake resistant properties of ferrocrete? [9]

P.T.O.

- Q5) a)** Write a short note on fabrication and casting of cylindrical water storage tanks along with the special hints of construction? [8]
- b) Explain in detail the different types of retaining walls? [9]

OR

- Q6) a)** Discuss the following applications of ferrocement : [8]
- i) Swimming pool
 - ii) As water proofing material
 - iii) Septic tank
- b) Explain in detail with a neat sketch arch shaped ferrocement counterfort retaining wall? [9]

- Q7) a)** Explain the special applications of ferrocement such as for ferrocement boats, catamarines and large size digesters? [8]
- b) What are the benefits of ferrocement for precasting ? Explain with a neat sketch various ferrocement precast elements? [8]

OR

- Q8) a)** Write notes on : [8]
- i) Pyramid
 - ii) Shells
 - iii) Transmission poles
- b) Discuss factors which affect the choice of casting between precast and cast in-situ construction? [8]



Total No. of Questions : 10]

SEAT No. :

P3041

[Total No. of Pages : 2

[5354]-527

B.E. (Civil) (Semester - II)
SUB SEA ENGINEERING
(2012 Pattern) (Elective - IV)

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 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) Explain oil exploration at subsea level and typical set up showing important components. [4]

b) State the intricacies of global oil and gas industry. [6]

OR

Q2) a) Draw neat sketch showing all important components of engineering at subsea establishment for oil exploration. [4]

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

Q3) a) Explain role of Civil Engineer in sub sea oil exploration project. [6]

b) Distinguish between shallow and deep water oil exploration. [6]

OR

Q4) a) Explain working of subsea oil production system. [6]

b) State how shallow water and deep water oil exploration influences subsea production system. [6]

Q5) a) Explain Vertical and Horizontal Tie- In system. [8]

b) Explain suitable foundation systems for subsea installations. [7]

P.T.O.

OR

- Q6)** a) Explain the design considerations for subsea pipe line system. [7]
b) Explain intervention methods AUV's, ROV's and Divers. [8]

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

OR

- Q8)** a) Explain types of corrosion in subsea oil field. [8]
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) Explain Limit state based strength design methods for riser Pipe. [8]

OR

- Q10)** a) Water pipe of 70mm diameter contains oil pressure head 110mm. 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) How the geotechnical parameters affect the design of Pipe line at sub sea level. [8]



Total No. of Questions : 12]

SEAT No. :

P3042

[Total No. of Pages : 2

[5354]-528
B.E. (Civil)
WAVE MECHANICS
(2012 Pattern) (Open Elective - IV(E))

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Figure to the right indicate full marks.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) Discuss classification of waves. [3]
b) Discuss the process of wave measurement by using wave rider buoy. [4]

OR

- Q2)** a) Discuss any one numerical model for wave forecasting in detail. [4]
b) Define fully developed sea, partially developed sea, swell. [3]

- Q3)** a) Prove that water particle displacement follows the elliptical profile. [4]
b) What are non-linear wave theories? Name various non-linear wave theories. [3]

OR

- Q4)** a) A wave with a period of 10 sec in a deep water depth of 17 m and significant wave height of 5.5 m. Find the local horizontal and vertical velocities at an elevation of $Z = -4$ m below the SWL when $\theta = 60^\circ$. [4]
b) Write a note on choice of wave theory. [3]

- Q5)** a) Write short notes on wave reflection. [3]
b) A wave of significant height 2.5 m and period 8 sec in deep water travels towards shore parallel to bed contours. If its crest makes an angle of 30 with bed contour of 8 m before refraction calculate wave height after crossing the contour. [3]

OR

- Q6)** a) Write a short note on shoaling. [3]
b) Write a short note on wave diffraction. [3]

P.T.O.

- Q7)** a) Write steps of Log-Pearson's extreme value distribution method. [6]
 b) What is wave spectrum analysis? What is its significance? [4]
 c) Prove that $s(f) = 4 \int_0^{\infty} R(\tau) \cos 2\pi f \tau d\tau$ where $s(f)$ is spectral density function, $R(\tau)$ auto correlation. [6]

OR

- Q8)** a) What is Short term wave statistics and Long term wave statistics. [5]
 b) Write short note on Weibull distribution and log-normal distribution. [5]
 c) The annual maximum wave heights observed at Ratnagiri in m are as follows; [6]
 6, 2.23, 3.77, 4.88, 4.53, 2.59, 3.94, 3.12, 5.42, 6.96, 6.24, 4.43, 2.05, 5.23, 2.34, 1.25, 1.67, 3.45, 4.67, 4.35.

Find wave height of 50 year return period. For $N = 15$, $\bar{y}_n = 0.6285$, $S_n = 1.230$

- Q9)** a) Elaborate in detail the dynamic beach response to the storms with neat figures. [6]
 b) Define the terms sea, currents, surges, tides and Tsunamis. [4]
 c) What are the man induced causes of coastal erosion? [6]

OR

- Q10)** a) Draw a typical beach profile and explain surf zone. [5]
 b) What are the natural causes of shore line erosion. [5]
 c) Enlist the coastal protection methods and elaborate any one in detail. [6]

- Q11)** a) Explain the effect of extreme events on littoral processes. [6]
 b) Explain the effect of offshore wave climate on littoral transport. [6]
 c) Explain all the consolidated rock materials in littoral processes. [6]

OR

- Q12)** a) Enlist different factors affecting the littoral process and explain any one in detail. [6]
 b) Explain the changes in the littoral zones with respect to time and space. [6]
 c) Write a note on classification of littoral materials. [6]



Total No. of Questions : 8]

SEAT No. :

P4281

[Total No. of Pages : 2

[5354]-529

B.E. (Civil)

(Elective - IV) (Open Elective)

**Repairs and Rehabilitation of Concrete Structures
(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.*
- 2) *Assume Suitable data if necessary.*
- 3) *Figures to the right indicate full marks.*

- Q1)** a) Discuss chemical attacks and physical actions causing damages in concrete. [7]
- b) Explain non-destructive techniques for determination of concrete properties [6]
- c) Discuss solar reflective coatings and insulation systems. [7]

OR

- Q2)** a) Explain corrosion of reinforcement induced by carbonation of concrete. [7]
- b) Discuss in brief [6]
- i) Concrete endoscopy
 - ii) Thermal imaging
- c) Write note on protective materials and their properties. [7]

- Q3)** a) Discuss the methodologies of crack patch repair in detail. [8]
- b) Explain in brief, seismic retrofitting of existing RC structures. [9]

OR

P.T.O.

- Q4)** a) Discuss following in detail. [8]
i) Polymer modified mortar
ii) Polymer concrete
b) Write in detail repair and restoration of heritage structures. [9]

- Q5)** a) What is mechanism of corrosion and protective measures of it. [9]
b) Write note on repair of damaged water retaining structures. [8]

OR

- Q6)** a) Discuss repair methods and materials for corrosion of reinforcement. [9]
b) Write note on repair of hydraulic structures. [8]

- Q7)** a) Explain retrofitting of damaged structures. [8]
b) Discuss FRP w.r.t. their development and tensile behavior. [8]

OR

- Q8)** a) Discuss various methods and procedures of retrofitting. [8]
b) Write note on axial and tensile behavior of FRP. [8]



Total No. of Questions : 10]

SEAT No. :

P3043

[Total No. of Pages : 5

[5354]-531

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

REFRIGERATION AND AIR CONDITIONING

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) Neat diagram must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary and mention it clearly.
- 4) Use of steam table is allowed.

- Q1)** a) Write thermodynamic and chemical properties of refrigerant (min. two of each) [4]
- b) An air refrigeration used for food storage provides 25 TR. The temperature of air entering the compressor is 7°C and the temperature at exit of cooler is 27°C. The quantity of air circulated in the system is 50kg/min. The compression and expansion both follows the law $pv^{1.3} = \text{constant}$ and take $\gamma = 1.4$ and $C_p = 1\text{kJ/kg K}$ for air. Find [6]
- i) C.O.P. of the cycle and
 - ii) power per tonne of refrigeration required by compressor.

OR

- Q2)** a) Derive an expression for COP of Bell-Coleman cycle. [6]
- b) The temperature limits of ammonia refrigeration system are 25°C and -10°C. If the gas is dry at the end of compression, calculate C.O.P. of cycle assuming no undercooling of liquid ammonia use table for the properties of ammonia: [4]

Temperature (°C)	Liquid enthalpy (kJ/kg)	Latent enthalpy (kJ/kg)	Liquid entropy (kJ/kg K)
25	298.9	1166.94	1.1242
-10	135.37	1297.68	0.5443

P.T.O.

Q3) a) Why flash gas removal is always desirable? Explain in detailed using Schematic diagram. [6]

b) A vapour absorber cycle has generator temperature $120\text{ }^{\circ}\text{C}$ evaporator temperature of $-10\text{ }^{\circ}\text{C}$ and the ambient temperature of $30\text{ }^{\circ}\text{C}$. Estimate the maximum possible C.O.P. The actual C.O.P. is 0.5 of maximum C.O.P. If the capacity of the plant is 100TR calculate the heat supplied in kJ per second. [4]

OR

Q4) a) Draw a neat diagram of Electrolux refrigeration system and explain its working. [6]

b) Why air conditioning is needed in Hospital. [4]

Q5) a) An atmospheric air at 30°C dry bulb temperature and 75% relative humidity enters a cooling coil at the rate of $200\text{ m}^3/\text{min}$. The coil dew point temperature is 14°C and the bypass factor of coil is 0.1. Determine: [6]

i) The temperature of air leaving the cooling coil

ii) The capacity of the cooling coil in tonnes of refrigeration

iii) Amount of water vapour removed per minute and

iv) Sensible heat factor of the process.

b) The humidity ratio of atmospheric air $28\text{ }^{\circ}\text{C}$ DBT and 760 mm of mercury is 0.016 kg/kg of dry air. [10]

Determine:

i) Partial pressure of water vapour

ii) Relative humidity

iii) Dew point temperature

iv) Specific enthalpy and

v) Vapour density

OR

Q6) a) Define and explain the following [8]

- i) Dew point Temperature
- ii) Specific humidity
- iii) Pressure of water vapour
- iv) Wet bulb temperature

b) An air handling unit in an air conditioner plant supplies total load of 4500m³/min of dry air which comprises by mass 20% of fresh air at 40°C DBT and 27°C WBT and 80% of recirculated air at 25°C DBT and 50% RH. The air leaves the cooling coil at 13°C saturated state. Calculate the cooling load and room heat gain. Also show the various process involved on skeleton psychrometric chart. The following data can be used. Specific volume of air entering the cooling coil is 0.869 m³/kg of dry air. [8]

Condition	DBT °C	WBT °C	RH %	Sp. Humidity (g of water vapour /kg of dry air)	Enthalpy kJ/kg of dry air
Outside	40	27	----	17.2	85
Inside	25	----	50	10	51
ADP	13	----	100	9.4	36.8

Q7) a) Explain scroll compressor and state its advantages over reciprocating compressor. [8]

b) Explain constructional diagram of Thermostatic Expansion valve and explain its working. State the limitations of TXV. [8]

OR

Q8) a) With the neat sketch explain the working of DX and flooded evaporators. [8]

b) Explain VAV air conditioning system. What are the advantages over constant volume system? [8]

Q9) a) Explain pressure losses in ducts and derive expression for pressure loss due to friction. [6]

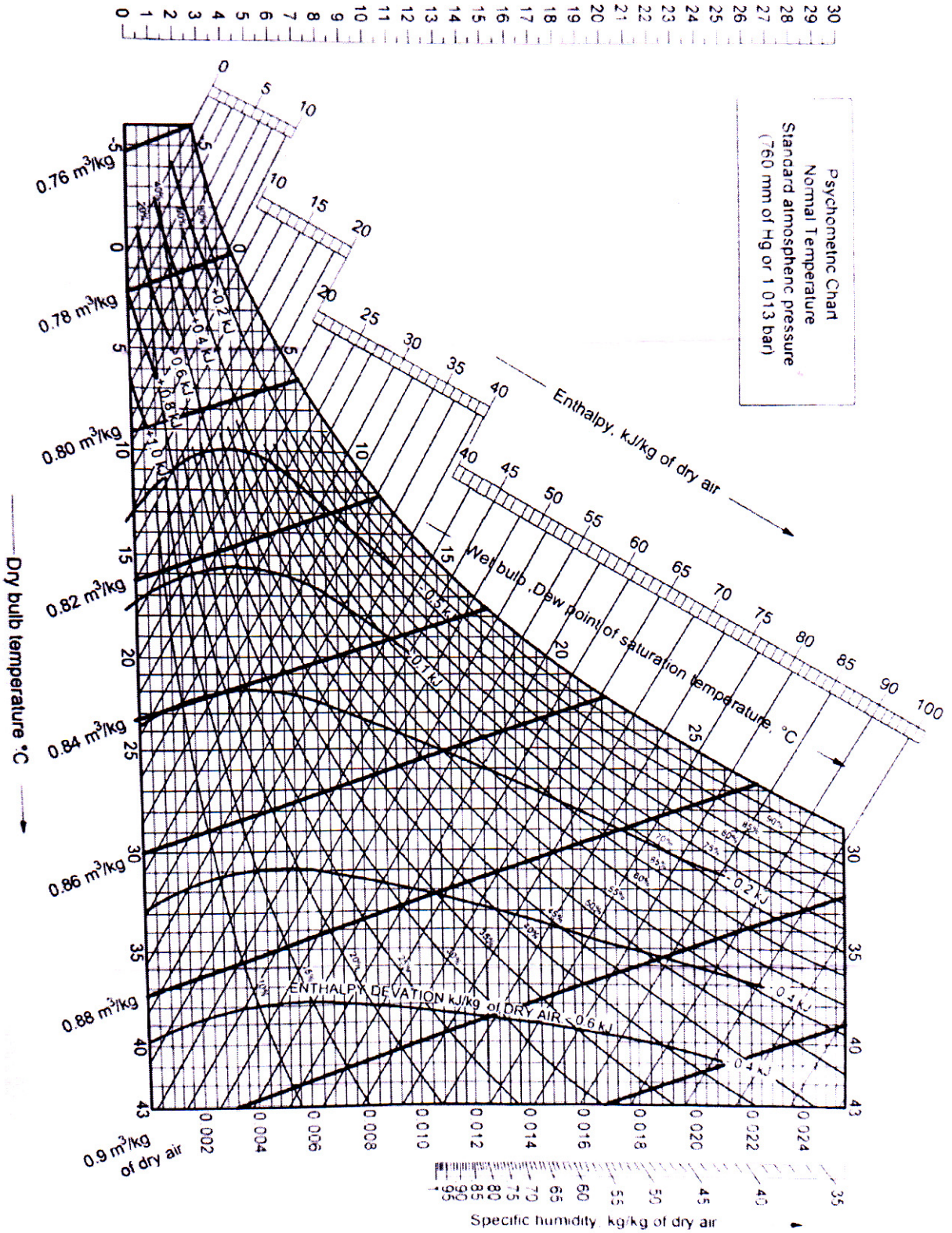
- b) A length of main circular duct has three branch ducts taking equal air volume at equal intervals. Each interval duct has a friction loss of 1.2 mm of water and the static pressure of 4 mm of water is necessary at each branch to cope with its friction loss. If the initial velocity in the main duct of 1.3 m diameter is 9 m/s, calculate velocities and diameter of second and third lengths, whereby static pressure regain is sufficient to overcome the friction loss in succeeding length of main duct up to next branch. The static pressure regain factor is 0.58. Draw the simple sketch of the duct system. [12]

OR

- Q10)** a) What is the meaning of static regain and derive an expression for pressure loss due to sudden enlargement. [6]
- b) An air conditioning duct runs straight from the fan over 60 m length. It has four equally spaced outlet diffusers mounted on the duct, the last one being at the end of the duct. The volume flow rate through each diffuser is 1 m³/s. The velocity at the duct inlet is 15 m/s. Carryout the duct design by static regain method if static regain factor is 0.75 at each transition and frictional pressure drop is given by and [12]

$$\frac{\Delta P_f}{L} = \frac{0.002268Q^{1.852}}{D^{4.973}}$$

$$\Delta P_v = \left(\frac{C}{4.04} \right)^2$$



[5354]-532

B.E. (Mechanical Engineering)
CAD / CAM & AUTOMATION
(2012 Pattern) (End Semester)

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, and 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 indicate full marks.
- 4) Use of Electronic pocket Calculator is allowed.
- 5) Assume Suitable data, if necessary and mention it clearly.

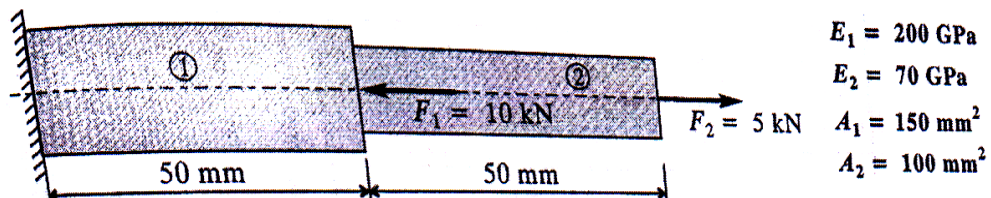
Q1) a) Explain various stages of Computer Aided Design. [6]

- b) A triangle ABCD has vertices A (1, 1), B (3, 1), C (3, 3) and D (1, 3). Is to be transformed to half of its size ,still retaining the square size at same position if the corners of the coordinates of the square are (2, 2). Find the composite transformation matrix and new coordinate points of the square. [6]

OR

Q2) a) Write short notes on Synthetic Curves. [6]

- b) Determine the nodal displacements for the stepped bar shown in Figure1 [6]



P.T.O.

Q3) For the two bar truss shown in Figure 2 determine the nodal displacement, stresses in each element and reaction at support take $E = 2 \times 10^5 \text{ N/mm}^2$ and $A = 200 \text{ mm}^2$. [8]

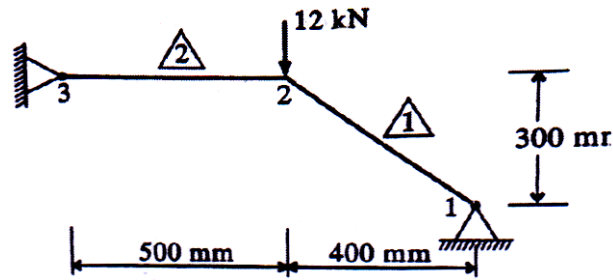


Fig. 2

OR

Q4) Determine stresses in stepped bar problem shown in Figure 3 by considering thermal effects. [8]

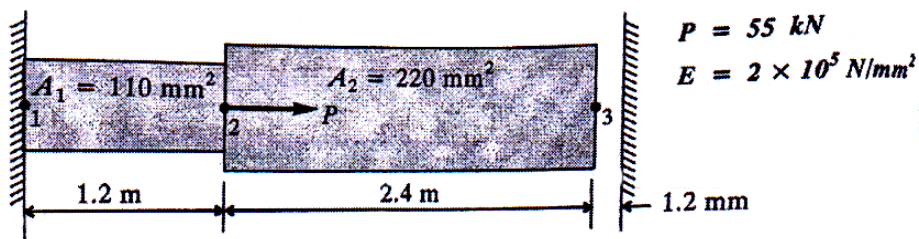


Fig. 3

- Q5)** a) Explain the tool length and tool radius compensation with suitable example. [6]
- b) Write NC Part program shown in Fig. 4 and Assume suitable data [12]

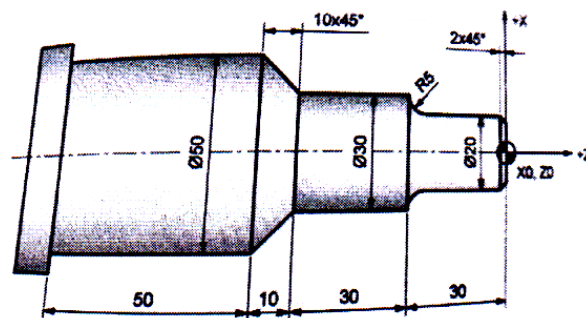


Fig. 4 Q. No.5 (b)

OR

- Q6)** a) Explain NC procedure [6]
b) Develop a part program for the part shown in Fig. 5. The part is 1.5 mm thick use end mill cutter diameter 10 mm cutting speed 700RPM and feed 100 mm/min [12]

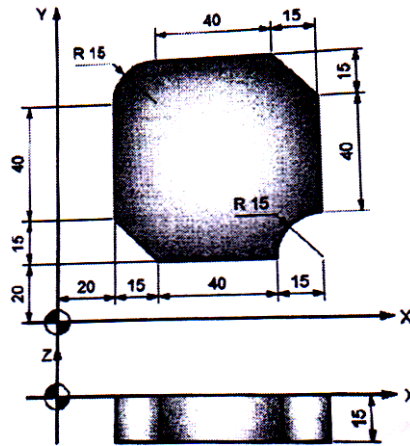


Fig.5 Q. No. 6 (b)

- Q7)** a) Explain the stereolithography RP process in detail with neat sketch. State its limitations [8]
b) Explain Rapid Tooling and its advantages. [8]

OR

- Q8)** a) Explain the 3D printing process in detail with neat sketch. State its advantages. [8]
b) Explain Fused deposition Modeling and state its applications in industry. [8]

- Q9)** a) Enlist different types of Robot grippers and Explain any one in detail. [8]
b) Explain automation strategies in detail. [8]

OR

- Q10)** a) Explain the basic robot configuration in detail. [8]
b) Write short notes in MRP and CIM. [8]



Total No. of Questions : 10]

SEAT No. :

P3045

[Total No. of Pages : 4

[5354]-533

B.E. (Mechanical - Sandwich)
MECHANICAL VIBRATIONS
(2012 Pattern) (End Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

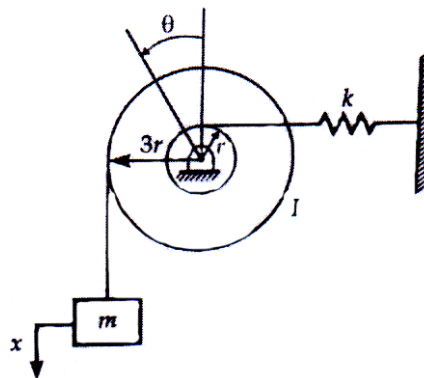
- 1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 2) *Draw Neat diagrams wherever necessary.*
- 3) *Use of scientific calculator is allowed.*
- 4) *Assume suitable data where ever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) A six cylinder inline reciprocating engine has a firing order 1-4-5-2-3-6. The mass of reciprocating part per cylinder is 3kg. The length of cranks and connecting rods are 50mm and 200mm respectively. The cylinders are spaced at 300mm pitch. If the engine runs at 1000 rpm Determine **[10]**

- a) Primary and secondary unbalance force if any
- b) Primary unbalance couple with reference to central plane

OR

Q2) a) Find natural frequency for the system given below. **[5]**



- b) What is whirling speed of shaft? State any two causes of it. Find out the expression for deflection of the shaft carrying a single rotor without damping. **[5]**

P.T.O.

Q3) a) Define following terms **[4]**

- i) Magnification factor
- ii) Logarithmic Decrement
- iii) Damping Factor
- iv) Quality Factor

b) In a vibratory system vehicle is to be designed with following parameters
 $K=100 \text{ N/m}$, $C=2\text{Nsec/m}$, $m=1\text{kg}$

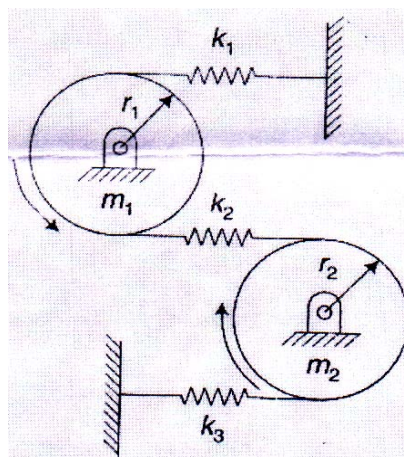
Calculate decrease in amplitude from its starting value after 3 complete oscillations and damped frequency of oscillation.. **[6]**

OR

Q4) a) The static deflection of an automobile on its springs is 10 cm. Find the critical speed when the automobile is travelling on the road which is approximated by a sine curve of amplitude 8 cm and a wavelength of 16 m. Assume the damping to be given by 0.05. Also determine the amplitude of vibration at 75 km/hr. **[5]**

b) A body of 5kg is supported on a spring of stiffness 200N/m and has dashpot connected to it which produces resistance of 0.002 N at a velocity of 1 cm/sec. In what ratio will be the amplitude of vibration be reduced after 5 cycles. **[5]**

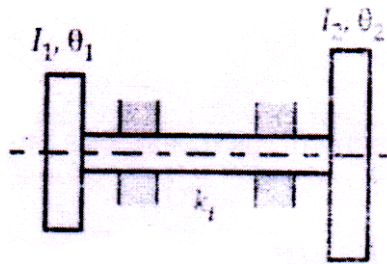
Q5) a) Determine natural frequencies for the system as shown in figure if $k_1=k_2=k_3=8\text{N/m}$ and mass $m_1=m_2=2\text{kg}$ and $r_1=r_2=r$. **[12]**



b) Explain with neat diagram mathematical model of a motorbike. **[4]**

OR

- Q6) a)** An electrical motor-generator set is shown in following fig. Find the natural frequencies and amplitude ratios of the Principal modes. [10]



- b) Explain the followings with respect to 2 DOF free vibration. [6]
- Principal modes of vibration.
 - Torsionally equivalent shaft.

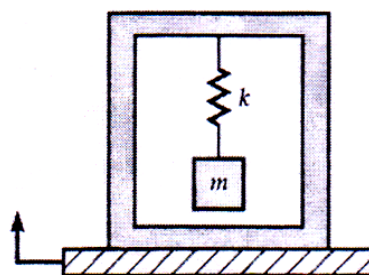
- Q7) a)** Draw and explain transmissibility versus frequency ratio curves. [6]

- b) Name any instrument to determine the natural frequency of badminton racket. Explain detail working of that instrument with block diagram. [6]
- c) An electric motor weighs 25 kg and is mounted on rubber pad which deflects by 1 mm to motor weight. The rotor weighs 5 kg, has an eccentricity of 0.1 mm and rotates at 1500rpm. Find the force transmitted to the foundation under the following conditions: [6]
- There is no damping
 - Damping factor is 0.1

OR

- Q8) a)** What is vibration absorber? Name different types of absorbers used and explain any one in detail. [6]

- b) A 3 kg mass is suspended in a box by a spring as shown in following fig. The box is put on a platform having vibration $y = 0.8\sin 6t$ cm. Determine the absolute amplitude of the mass. Take $k = 6000$ N/m. [6]



- c) Explain following vibration Exciters: [6]
- i) Mechanical Exciter
 - ii) Electrodynamics Exciter

- Q9)** a) Explain the working of sound meter with neat diagram. [6]
- b) Determine the sound pressure level for a sound with rms sound pressure of 2 N/m^2 and 0.4 N/m^2 . [4]
- c) Explain Reverberation chamber and Anechoic Chamber. [6]

OR

- Q10)** a) What is sound enclosure? Describe any one type of sound enclosure?[6]
- b) Define following terms
- i) Sound power level
 - ii) Sound pressure level
 - iii) Sound intensity
 - iv) Decibel scale
- c) An operator in textile mill is operating five machines. The sound pressure levels of the machines at his position are 95 dB, 90 dB, 92 dB, 88 dB and 82dB respectively. What is the total SPL at his position due to all the five machines? What is the SPL if the Machine 1 is turned off? Also find the SPL if machine 2 and 3 is turned off.



Total No. of Questions : 12]

SEAT No. :

P3046

[Total No. of Pages : 3

[5354]-534

B.E. (Mechanical)

ENERGY AUDIT & MANAGEMENT

(2012 Pattern) (Elective - I) (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, Q.11 or Q.12.
- 2) Draw Neat diagrams wherever necessary.
- 3) Figure to the right indicate full marks.
- 4) Use of scientific calculator is allowed.
- 5) Assume suitable data wherever necessary.

SECTION - I

- Q1)** a) Explain current energy scenario in India. [5]
- b) Write short note on [5]
- i) Greenhouse Effect
 - ii) Energy Security

OR

- Q2)** a) Explain the need of renewable energy. [5]
- b) Explain the principles of energy management. [5]
- Q3)** a) What is energy audit? Explain the need of energy audit. [5]
- b) Explain the different instruments used for energy audit. [5]

OR

- Q4)** a) Explain detailed energy audit with 10 step methodology. [6]
- b) What are the different energy conservation opportunities in furnace? [4]

P.T.O.

- Q5) a)** Explain in short with advantages [5]
- i) Time value of money
 - ii) Sensitivity analysis
- b) Cost of a heat exchanger is Rs. 1.00 lakh. Calculate simple payback period and ROI by considering annual saving potential of Rs. 60,000/- and annual operating cost of Rs. 15,000/-. [5]

OR

- Q6) a)** Annual saving after replacement of a boiler for 1st year is Rs. 6.5 lakhs, for 2nd year is Rs. 6.0 lakhs and for 3rd year is 5.25 lakhs respectively. Total Project cost is Rs. 12 lakhs considering cost of capital as 12%, if boiler requires Rs. 1.2 lakhs for maintenance per year, what is the NPV of proposal. Is proposal attractive? [5]
- b) Calculate the internal rate of return for an economizer that will cost Rs. 500,000, will last 10 years and will result in fuel saving of Rs. 150,000 each year. [5]

SECTION - II

- Q7) a)** Enlist and discuss the energy saving methods for pumping system. [7]
- b) Find out the efficiency of the boiler by direct method with the data given below: [6]
- i) Type of boiler: Coal fired
 - ii) Quantity of steam (dry) generated: 8 TPH
 - iii) Steam pressure (gauge) / temp: 10 kg/cm²(g)/ 180 °C
 - iv) Quantity of coal consumed: 1.8 TPH
 - v) Feed water temperature: 85 °C
 - vi) GCV of coal: 12000 kJ/kg
 - vii) Enthalpy of steam at 10 kg/cm² pressure: 1785 kJ/kg (saturated)
 - viii) Enthalpy of feed water: 320 kJ/kg

OR

- Q8) a)** Explain with neat sketch the steam distribution system. [6]
- b) A centrifugal pump is pumping $60 \text{ m}^3/\text{hr}$ of water and pressure rise in pump is 7 kg/cm^2 (gauge). If power drawn by motor is 25 kW. Find out the pump efficiency. Assume motor efficiency 90 % and water density as 1000 kg/m^3 . [7]

- Q9) a)** What is power factor? What are the benefits of improving power factor? [7]
- b) Explain electrical tariff structure for an industrial consumer. [6]

OR

- Q10) a)** What are the types of lamps used in lighting system? Write down their features with typical applications. [7]
- b) The connected loads for shop are as below. [6]
- 15 bulbs of 60W each
 - 10 Fluorescent tubes of 40W each
 - An old fan of 250W

It is decided to replace the bulbs and tubes with 30 CFL of 20W each and an old refrigerator by energy efficient refrigerator of 150W. Considering usages of 10 hours per day and an electrical tariff of Rs. 4.00 per kWh. Calculate an annual electrical energy saving and cost.

- Q11) a)** What is cogeneration? Write down principles of cogeneration and its advantages. [8]
- b) Explain in brief [6]
- CDM project
 - Carbon credit calculation

OR

- Q12) a)** Explain with neat diagrams the cogeneration systems using the back-pressure turbine, extraction-condensing turbine and double extraction back pressure turbine. [8]
- b) Explain the concept of waste heat recovery? Explain Convective Radiative Recuperator with neat sketch. [6]



Total No. of Questions : 10]

SEAT No. :

P3047

[Total No. of Pages : 4

[5354]-535

B.E. (Mechanical) (End Semester)

TRIBOLOGY

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

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

- Q1)** a) What are the different parameters which affect the viscosity of lubricating oil? Explain. [6]
- b) List the different factors affecting the wear rates. [4]

OR

- Q2)** a) Explain the following terms in short: [6]
- i) Extreme Pressure Additives
 - ii) Abrasive wear
 - iii) Recycling of used oil
- b) Explain any two friction measuring methods [4]

- Q3)** a) What is hydrodynamic lubrication? State advantages, limitations and applications of hydrodynamic bearings. [6]
- b) Write the two dimensional Reynold's equation for hydrodynamic lubrication with usual notations. State the meaning of each term in equation. [4]

OR

P.T.O.

Q4) a) The following data is given for a 360° hydrodynamic bearing: (Refer Table 1)

- Radial load = 3.2kN
- Journal diameter = 50 mm
- Bearing length = 50mm
- Journal speed = 1490 r.p.m.
- Radial clearance = 50 microns
- Viscosity of lubricant = 25cP
- Density of lubricant = 860kg/m³

Calculate: [6]

- i) the minimum oil film thickness;
- ii) the coefficient of friction;
- iii) the power lost in friction.

Table 1:

$\frac{l}{d}$	$\frac{h_0}{c}$	ϵ	S	$\left(\frac{r}{c}\right)_f$	$\frac{Q}{rcn_s l}$	$\frac{Q_s}{Q}$	$\frac{P_{max}}{P}$
1.0000	0.0000	1.0000	0.0000	0.0000	0.0000	1.0000	0.0000
	0.0300	0.9700	0.00474	0.5140	4.8200	0.973	6.579
	0.1000	0.9000	0.0188	1.0500	4.7400	0.919	4.048
	0.2000	0.8000	0.0466	1.7000	4.6200	0.842	3.195
	0.4000	0.6000	0.1210	3.2200	4.3300	0.680	2.409
	0.6000	0.4000	0.2640	5.7900	3.9900	0.497	2.066
	0.8000	0.2000	0.6310	12.8000	3.5900	0.280	1.890
	0.9000	0.1000	1.3300	26.4000	3.3700	0.150	1.852
	1.0000	0.0000	∞	∞	3.1420	0.0000	0.0000

b) What is tilting pad thrust bearing? Why tilting-pad bearings are preferred over fixed pad bearings? [4]

Q5) a) Derive an expression for flow rate of fluid through rectangular slot. State the assumptions made while deriving the equation. [8]

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

Shaft speed = 730rpm

Supply pressure = 5 MPa

Shaft diameter = 400 mm

Recess diameter = 250mm

Film thickness = 0.18 mm

Viscosity of the lubricant = 30 cP

Specific heat of lubricant = 1.76 kJ/kg°C

Specific gravity of the lubricant = 0.86

Calculate:

i) the load carrying capacity of the bearing;

ii) the flow requirement in l/min.;

iii) the frictional power loss;

iv) the pumping power loss and

v) temperature rise, assuming the total power loss in bearing is converted into the frictional heat.

OR

Q6) a) A circular plate of 80mm radius is approaching the base plane at a velocity of 140mm/s at the instant when the oil-film thickness is 0.2mm. if the absolute viscosity of the oil is 0.025 Pa-s, [8]

Calculate:

i) the load carrying capacity of the oil film at the given instant;

ii) the maximum pressure;

iii) the average pressure and also

iv) the average pressure by approximating square plate of the dimensions $[D \times D]$ based on the parameters of this problem. where D is side of the square plate and is equal to diameter of the circular plate.

b) Derive an expression for the pressure distribution and load carrying capacity for given instantaneous velocity of approach and film thickness in case of rectangular plate approaching a plane. [8]

Q7) a) How elastohydrodynamic lubrication differs from hydrodynamic lubrication? State the application where elastohydrodynamic lubrication is observed. [8]

b) What are the essential operating conditions for the gas lubricated bearings? Also state the advantages and four applications of gas lubricated bearings. [8]

OR

Q8) a) Explain in brief working principle of hydrostatic gas lubricated bearing. Compare the gas lubricated bearings with oil lubricated bearings based on the following parameters: [8]

- i) load carrying capacity
- ii) Overall coefficient of friction
- iii) viscosity of lubricant
- iv) operating Speed
- v) film thickness
- vi) frictional power loss

b) Explain in brief about the active and passive magnetic bearings. What are its advantages over conventional bearings? [8]

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

- a) Lobe bearings.
- b) Mechanics of tyre road interaction.
- c) Selection of coatings.
- d) Lubrication in rolling and lubrication in extrusion.

OR

Q10)a) Explain in detail the tribological behavior of wheel on rail road. [6]

b) Why surface engineering process are required? Also state the parameters used for specifying the coatings. [6]

c) Write a note in brief about porous bearing and hybrid bearing. [6]



Total No. of Questions : 10]

SEAT No. :

P3048

[Total No. of Pages : 4

[5354]-536

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

RELIABILITY ENGINEERING

(2012 Pattern) (Elective - I)

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) Compare weibull and exponential probability distributions. **[4]**

- b) Following table shows test results for 1050 bearings tested for 480 hours under severe conditions. The following data was obtained for number of bearings failed out of 1050. Calculate the failure density and hazard rate and tabulate the results. **[6]**

Time interval (hrs.)	0-80	80-160	160-240	240-320	320-400	400-480
Number of bearings failed	377	292	175	103	65	38

OR

Q2) a) Define **[4]**

- i) Warranty management and
- ii) Life cycle cost.

P.T.O.

- b) Find the reliability of the system shown by the block diagram in Fig. 1, using tie-set method. All the elements are independent and the reliability of each element is as given in the figure. Draw an equivalent block diagram for the minimal tie-sets. [6]

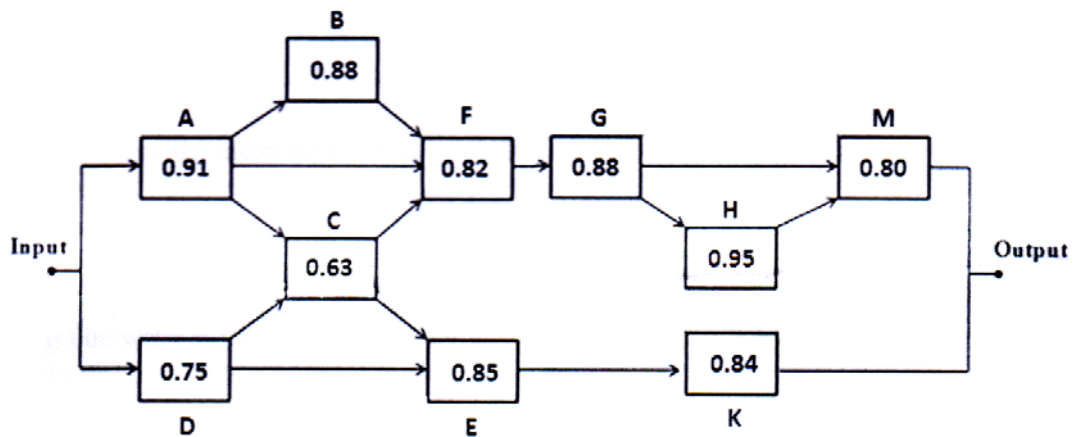


Fig. 1

- Q3) a) Explain with illustration reliability analysis of series, parallel and mixed configuration systems. [4]
- b) A system of four elements 1, 2, 3 and 4 are having failure rates $\lambda_1=0.005$, $\lambda_2=0.008$, $\lambda_3=0.006$ and $\lambda_4=0.004$ per hour respectively. Find failure rates as well as reliability of each sub system for the entire mission period using ARINC apportionment technique assuming mission time of 60 hours and desired system reliability of 0.88. [6]

OR

- Q4) a) Explain central limit theorem with suitable example. [4]
- b) A Pump assembly consists of four critical components having reliabilities of 0.72, 0.65, 0.78, 0.84 connected in series. The reliability of a pump is desired as 0.63. Find for which critical components the reliability values are to be improved and also find the values of individual reliabilities of the critical components by using minimum effort method. [6]
- Q5) a) A refrigeration system has to be designed with a reliability value of 0.93 for 600 hours. Find the operational and inherent availability if maintainability of the refrigeration system over the same period of time is 0.85. Administrative and logistic time is 120 hrs. Assume that the repair time follows an exponential distribution and a constant hazard rate for failure of refrigeration system. [8]
- b) State the objectives and types of maintenance. State the relationship between the availability, reliability and maintainability. [8]

OR

- Q6) a)** Operational availability of the heat treatment furnace over 1200 hours is 0.93. If failure of the heat treatment furnace follows an exponential distribution with the probability of failure within 1200 hours is 0.06. find mean time to repair (MTTR). mean down time (MDT) and inherent availability of the heat treatment furnace ignoring the preventive maintenance downtime. Consider mean administrative and logistic time as 30% of MTTR. [8]
- b) Successful implementation of reliability centered maintenance (RCM) will lead to increase in cost effectiveness, machine uptime, and a greater understanding of the level of risk that the organization is managing. Comment on the statement in brief. [8]

- Q7) a)** Fire water system supplies continuous water at its output. The flow of the water at output is controlled by a Valve (V). Fire water system receives water at its input from two supply pipe lines A and B held parallel with each other. A fire water pump (FP1) lifts the water from the tank and supplies to system by pipe line A. Similarly, a fire water pump (FP2) lifts the water from the tank and supplies to system through pipe line B. Each of the pump run by a common engine (E) shaft. To have a continuous water supply, it is necessary that engine, valve and at least one of the fire water pump functions satisfactorily. Draw the block diagram for the complete system and also, construct the fault tree for the condition no water from the system. Calculate the reliability of the system if the reliabilities of fire water pumps, valve and engine are as given below. [10]

Component	Fire water pump		Engine	Valve
	FP1	FP2	E	V
Reliability	0.965	0.932	0.889	0.965

- b) State the basic concepts of FMEA and FMECA and explain in what way FMECA is different than FMEA. Also, state the basic analysis procedure for FMEA/FMECA. [8]

OR

- Q8) a)** A lubrication system is used to lubricate the machine using two parallel supply lines. A supply line 1 is fitted with valve A and oil pump P_1 . A supply line 2 is fitted with valve B and oil pump P_2 . Both pumps P_1 and P_2 are run by a common prime mover (PM). To have lubrication at least from one supply line, it is necessary that prime mover, valve and pump from one of the supply line, function satisfactorily. Draw the block diagram for the lubrication system. Construct the fault tree for the condition 'no

lubrication at all'. Calculate the reliability of the lubrication system. The probability of failure of the prime mover, valves and pumps is as given below. [10]

Component	Valve		Pump		Prime mover
	A	B	P ₁	P ₂	PM
Failure Probability	0.002	0.007	0.004	0.003	0.005

- b) State the basic concept and assumptions of Taguchi method. Also state the properties of orthogonal array. Explain its application with an example. [8]

Q9) a) The following data refers to a certain test of equipment:

Failure number	1	2	3	4	5	6	7	8
MTTF (hrs.)	12	24	34	27	31	23	16	25

Find out the reliability of the equipment and plot the variation of reliability against time using: [8]

- i) Mean ranking method and
 - ii) Median ranking method
- b) State and explain seven steps for implementation of an effective FRACAS. [8]

OR

Q10)a) The stress developed in a rotor shaft is known to be normally distributed with a mean value of stress is 320 N/mm² and standard deviation of 27 N/mm². The mean material strength of rotor shaft is 438 N/mm² and standard deviation is 39 N/mm². Assuming that the material strength of rotor shaft and induced stresses are independent, determine the probability of survival of rotor shaft, average, minimum and maximum values of factor of safety. Extract the data from the following table which shows the normal variant (Z) and $\phi(Z)$. [8]

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

- b) State and explain accelerated life testing (ALT) and highly accelerated stress screening (HASS) techniques. [8]



Total No. of Questions : 10]

SEAT No. :

P3049

[Total No. of Pages : 2

[5354]-537

B.E. (Mechanical Engg.)
MACHINE TOOL DESIGN
(2012 Pattern) (End Semester) (Elective -I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

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

Q1) A 120 mm diameter workpiece is being turned on a lathe at 400 rpm and a feed of 0.3 mm/rev. The tangential, radial and axial components of the cutting force were measured on a dynamometer and found to be 325, 120 and 130 N respectively. Calculate the power rating of the motor assuming a coefficient of efficiency of 0.85 for the drive and permissible overloading coefficient is 0.8. **[10]**

OR

Q2) A six speed gear box is to be designed for the minimum speed of 180 r.p.m. and maximum speed of 1000 r.p.m. It is to be driven by an induction motor rotating at 1440 r.p.m. Draw the structural diagrams (minimum three) and select an optimum ray diagram. Also, draw the layout of gear box. **[10]**

Q3) State the requirements that machine tool structures must satisfy. Also state the common features which are fundamental to the satisfactory fulfilment of requirements for all structures. **[10]**

OR

Q4) From amongst the slideways combination flat-flat, flat-V, and V-V of a lathe, which one would provide for the least radial deflection? Substantiate your conclusion with, mathematical proof. **[10]**

P.T.O.

- Q5)** a) Derive the equation for total error in pitch of lead screw. [8]
b) What are the requirements of machine tool spindles? [8]

OR

- Q6)** a) Discuss in detail how optimization of spacing between spindle supports is achieved. [8]
b) State the factors that are to be considered while selecting the sliding bearing material. [8]

- Q7)** a) Define dynamic rigidity of machine tools. Also explain the effect of damping factor, the ratio of exciting and natural frequencies on displacement ratio (Magnification factor). [8]
b) State the various mechanical and electrical automatic control systems. State the various factors that govern the selection of appropriate automatic control system. [8]

OR

- Q8)** a) Explain various methods for vibration control of machine tools. [8]
b) State the design parameters for continuous function knobs, cranks, toggles and levers. [8]

- Q9)** a) State and explain the techniques that can be applied in design of machine tool structures for micro machining. [10]
b) Explain with block diagram the principles of operation of a CNC machining center. [8]

OR

- Q10)**a) State the merits and demerits of recent trends in machine tools with respect to conventional design process. [10]
b) With the help of a block diagram explain a closed-loop N.C. system for simple turning. [8]



Total No. of Questions : 10]

SEAT No. :

P3050

[Total No. of Pages : 3

[5354]-538
B.E. (Mechanical)
GAS TURBINE PROPULSION
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:-

- 1) *Answer Q. 1 or 2, 3 or 4, 5 or 6, 7 or 8 and 9 or 10.*
- 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) State the principle of rocket propulsion. [2]
- b) Define isentropic efficiency of compressor and turbine. [2]
- c) A gas turbine cycle has a perfect heat exchanger. The air enters a compressor at a temperature of 300 K and 1 bar and discharges at 475 K and 5 bar. After passing through the heat exchanger, the air temperature increases to 655 K. Air is then heated to 870°C. It leaves the turbine at 450°C. Assuming ideal conditions, calculate [6]
- i) Work out put per kg of air,
 - ii) Thermal efficiency of the cycle.

OR

- Q2)** a) What are advantages of co-generation cycle? State minimum four criteria. [2]
- b) Draw a neat sketch of closed cycle gas turbine cycle with regenerator. Explain its working and advantages. [6]
- c) State any four assumption of Brayton Cycle. [2]
- Q3)** a) State minimum four deviations of actual gas turbine cycle from ideal one. [2]

P.T.O.

- b) Prove that diffuser efficiency with constant efficiency of air is given by

$$\eta_{diffuser} = \frac{T_{2s} - T_1}{T_2 - T_1} \quad [4]$$

- c) Explain water methanol injection method of thrust augmentation with a neat diagram. [4]

OR

- Q4)** a) Define thrust and its mathematical equation. Why pressure thrust is not considered, when object is moving with subsonic velocity? [2+2]

- b) A turbojet power plant uses aviation kerosene having calorific value of 43 MJ/kg. The fuel consumption is 0.18 kg per hour per N of thrust, when thrust is 9 kN. The air craft velocity is 500 m/s, the mass of air passing the compressor is 27 kg/s. Calculate air fuel ratio and overall thermal efficiency. [2+4]

- Q5)** a) Define degree of reaction of a turbine stage. Draw inlet and outlet velocity triangles for a 50% reaction stage of a turbine. [2+4]

- b) Prove that for a single stage impulse turbine the maximum utilization factor is given by $\varepsilon_{max} = \sin^2 \alpha_2$ [10]

OR

- Q6)** a) Show the variation of pressure and velocity through a two stage pressure compounded impulse turbine. [3]

- b) List atleast six factors that must be considering while selecting blade material. [3]

- c) A single stage impulse turbine the nozzle discharges the fluid on to the blade at an angle of 65° to the axial direction. The fluid leaves the blade with an absolute velocity of 300 m/s at an angle of 30° to the axial direction. If the blade have equal inlet and outlet angles and there is no axial thrust, estimate [4+4+2]

i) blade angle,

ii) power produced per kg of fluid and

iii) the blade efficiency.

- Q7)** a) Draw combined velocity triangles for axial flow compressor and explain its construction. [2+4]
- b) Explain profile losses, annulus losses and secondary losses in an axial flow compressor. [4]
- c) An axial flow compressor draws air at 20°C and delivers it at 50°C. assume 50% reaction, calculate velocity flow, if blade velocity is 100 m/s, work factor is 0.85. Take $C_p = 1$ kJ/kg.K. Assume $\alpha = 10^\circ$ and $\beta = 40^\circ$. [6]

OR

- Q8)** a) Define and obtain mathematical expression for flow coefficient, work coefficient and pressure coefficient. [6]
- b) Explain the physical phenomenon of surging and choking of axial flow compressor. [4]
- c) An axial flow compressor has a constant axial velocity of 150 m/s and 50% reaction. The mean diameter of blade ring is 35 cm and speed is 15000 rpm. The exit angle of blade is 27° . Draw velocity triangles diagram and calculate blade angle at inlet and workdone per kg of air. [6]
- Q9)** a) What are requirements of a good Combustion chamber? State minimum six parameters. [6]
- b) Illustrate the physical and chemical phenomenon of combustion in a gas turbine plant. [6]
- c) Establish equilibrium points between compressor and turbine performance, when [6]
- i) Speed of turbine and compressor is same,
 - ii) Mass flow rate through turbine and compressor is same and
 - iii) Power output of turbine is equal to power required to run the compressor.

OR

- Q10)**a) What do you understand by term matching of components? Explain general matching procedure. [2+8]
- b) Elaborate the effect of pressure loss and combustion intensity on performance of combustion chamber of a gas turbine plant. [8]



Total No. of Questions : 10]

SEAT No. :

P3051

[Total No. of Pages : 2

[5354]-539

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

**PRODUCT DESIGN AND DEVELOPMENT(Theory)
(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) *Figure to the right indicate full marks.*

Q1) Discuss in detail various factors affecting the product design? Enlist various basic planning and scheduling Tools? **[10]**

OR

Q2) a) Discuss various criterion to define Market Segments? **[4]**

b) What is Customer? Explain concept of Average Customer & 3-Sigma Customer. **[6]**

Q3) Explain Product Function analysis with FAST method. Elaborate with suitable product example. **[10]**

OR

Q4) What is Technology Forecasting? Explain the concept with any one tool? State Importance. **[10]**

Q5) a) Explain following tools used in Benchmarking Process: **[8]**

i) Intended Assembly Cost Analysis

ii) Trend Analysis

b) Discuss Step wise procedure of Product Teardown Process in Detail?[8]

P.T.O.

OR

Q6) a) Apply Subtract and Operate procedure for paper punching machine. Analyse & Explain Force flow in machine with suitable diagram. [8]

b) Explain in detail the process of Setting Product Specifications with suitable Example? [8]

Q7) a) Explain Manufacturing Cost Analysis. Explain stepwise procedure for estimation of cost. [8]

b) Discuss Guidelines of Design for Casting & Forging. [8]

OR

Q8) a) Discuss Guidelines for Design for Environment and Materials in detail. [8]

b) Explain Guide lines of Design for Robustness and Safety. [8]

Q9) a) Explain Product Workflow and Product Data Management System in detail. [9]

b) Explain the role of customers and vendors in implementation of Product Life Cycle Management. [9]

OR

Q10)a) Discuss Product, Processes, People and methods as components of Product Life Cycle Management. [9]

b) Draw typical Product Life Cycle and Explain Phases? [9]



Total No. of Questions : 12]

SEAT No. :

P3989

[Total No. of Pages : 6

[5354]-540

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

OPERATION RESEARCH

(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, 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 calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

Q1) Define Operations Research. Describe briefly its function. **[8]**

OR

Q2) a) Write dual of the following Problem : **[5]**

Minimize $z = 25 \times 1 + 10 \times 2$

Subjected to condition:

$$x_1 + x_2 \geq 50$$

$$x_1 \geq 20$$

$$x_2 \leq 40$$

$$x_1, x_2 \geq 0$$

b) Write short note on formulation of linear programming problem. **[3]**

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

	D1	D2	D3	D4	Supply
Plant I	2	3	11	7	6
Plant II	1	0	6	1	1
Plant III	5	8	15	9	10
Requirement	7	5	3	2	

P.T.O

OR

Q4) Five different machines can do any of five required components with different profit resulting from each assignment as shown in following table. Find out maximum profit possible through optimum assignment. **[8]**

		1	2	3	4	5
Component	A	30	37	40	28	40
	B	40	24	27	21	36
	C	40	32	33	30	35
	D	25	38	40	36	36
	E	29	62	41	34	39

Q5) In a game of matching coins with two players A and B, suppose A wins one unit of value when there are two heads, wins nothing when there are two tails and losses half unit of the value when there is one head and one tail. Determine the payoff matrix and value of the game to A. **[6]**

OR

Q6) Following figures are related to toy manufacturing company. **[6]**

Variable cost per unit = Rs 8/-

Selling price per unit = Rs. 14/-

Total units sold = Rs. 50,000/-

Fixed cost = Rs. 12,000/-

Calculate

- P/v ratio,
- BEP in units,
- Margin of safety

Q7) a) The demand for an item in a company is 18000 units per year, and the company can produce the item at a rate of 3000 per month. The cost of one set up is Rs 500 and the holding cost of 1 unit per month. The shortage cost of one unit is Rs 240/ year. Determine optimum manufacturing quantity and number of shortage. Also determine the manufacturing time and time between set ups. **[8]**

b) Determine EOQ for a product whose average consumption rate is 50 units per day. The use of each unit is Rs 20 per year. The cost of planning and receiving an order is Rs 20. Assuming 300 total working days in a year, obtain the annual inventory capital if carrying cost is Rs 10 per order. **[8]**

OR

Q8) a) The annual demand for a product is 3600 units, with an average 12 units per ay. The lead time is 10 days. The order processing cost is Rs 200 per order and annual inventory cost is 20% of value of money in form of material. The unit price of product is Rs 250.

What will be EOQ? Find purchase cycle time and annual cost including material cost. **[8]**

b) The shop is about to order some heaters for the forecast spell of cold weather. The shop pays Rs 1000 for each heater, and during the cold spell they sell for Rs 2000 each. The demand for the heater declines after the cold spell is over, and any unsold units are sold at Rs 500. Previous experience suggests the likely demand for the heater is as follows: **[8]**

Demand	10	20	30	40	50
Probability	0.20	0.30	0.30	0.10	0.10

How many heaters should the shop buy?

Q9) a) The rate of arrival of customers at a public telephone follows poisson distribution, with an average time of ten minutes between one customer and the next. The duration of a phone call is assumed to follow exponential distribution with a mean time of three minutes. **[8]**

- i) What is the probability that a person arriving at the booth will have to wait?
- ii) What is average length of the queue?
- iii) When another booth is to be installed when the customer has to wait for at least three minutes for their turn to make a call. How much should be the flow of customers in order to justify second booth?
- b) There are five task jobs each of which must go through two machines A and B in the order AB. Processing times are given below. Determine the sequence for five jobs that will minimize the elapsed time and also calculate the total idle time. **[8]**

Job (task)	I	II	III	IV	V
Time for A (min)	5	1	9	3	10
Time for B (min)	2	6	7	8	4

OR

- Q10)a)** There is a congestion of the platform of a railway station. The trains arrive at the rate of 30 trains per day. The waiting time for any train to hump is exponentially distributed with an average of 36 minutes. **[8]**

Calculate:

- i) The mean queue size
- ii) The probability that the queue size exceeds 9.
- b) There are five jobs each of which is to be processed through machines A,B and C in order ABC. The processing time (in hrs) are given below.**[8]**

Job (task)	1	2	3	4	5
Machine A	3	8	7	5	4
Machine B	4	5	1	2	3
Machine C	7	9	5	6	10

Q11)a) Write a short note on Goal Programming. **[4]**

b) A small project is composed of 7 activities whose time estimates are listed in the table below. Activities are identified by their beginning (i) and ending (j) node numbers. **[12]**

Activity	Estimated duration (weeks)		
(i-j)	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

- i) Draw the network diagram of activities in the project.
- ii) Find expected duration and variance for each activity. What is the expected project length.

OR

Q12)a) Write difference between PERT and CPM **[4]**

b) The following table lists the jobs of a network along with their time estimate **[12]**

- i) Draw the project network
- ii) Calculate the length and variance of the critical path.
- iii) What is approximate probability that the job as per critical path will be completed in 24 hrs.

Activity	To	Tm	Tp
1-2	1	3	5
2-3	2	5	6
2-4	4	6	7
2-5	8	10	12
3-5	0	0	0
3-6	4	8	9
4-7	5	7	14
5-7	7	10	16
6-7	0	0	0
6-8	6	9	12
7-9	1	3	7
8-9	3	5	7



Total No. of Questions : 10]

SEAT No. :

P3052

[Total No. of Pages : 2

[5354]-541

B.E. (Mechanical Engineering) (Semester - I)
ADVANCED MANUFACTURING PROCESSES
(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) *Neat diagrams must be drawn wherever necessary.*

Q1) a) State the parameters that are necessary to control for the soundness and quality of the squeeze casted products. [4]

b) Flow forming has emerged as the most advanced metal forming technique in comparison to extrusion and tube drawing. Comment on the statement. [6]

OR

Q2) a) Differentiate between conventional spinning and metal spinning processes. [4]

b) Name with sketch four commonly used tool (pin) profiles in FSW. [6]

Q3) a) Differentiate the isotropic and anisotropic chemical etching processes. [4]

b) State the principle of laser-based heat treatment. Also, state the factors which affect the heat treatment. [6]

OR

Q4) a) State why friction stir welding is considered as 'Green technology'. [4]

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

Q5) a) With a schematic of diamond turn machine (DTM) name the various components of DTM based on their functionality. [8]

b) Differentiate the Ultrasonic machining process with Ultrasonic micromachining process in terms of abrasive particle size, tool or feature size, static load, vibration frequency and amplitude. [8]

P.T.O.

OR

- Q6)** a) Explain the effects of process parameters of μ -EDM on oversize and aspect ratio. Also, State the variants of μ -EDM process. [8]
- b) Using cause and effect diagram state the various process parameters of the ultrasonic micromachining (USMM) process that affects the process performance. [8]
- Q7)** a) Explain how additive manufacturing technique will lead to direct digital manufacturing? Explain the step wise generic process of Additive Manufacturing technique. [8]
- b) With a schematic state the working principle of sheet lamination process. Also, state various methods to manufacture a component using this technique. [8]

OR

- Q8)** a) What are the advantages of additive manufacturing processes in comparison to subtractive manufacturing processes? Also, categorize the additive manufacturing processes as specified by ASTM standard. [8]
- b) With a schematic state the principle of powder bed fusion (PBF) additive manufacturing process. Also, state the different fusion mechanisms used in PBF process. [8]
- Q9)** a) With a schematic explain the working principle and applications of Interference comparators. [6]
- b) With a schematic describe the functions of various components of Atomic Force Microscope (AFM). [6]
- c) Comment on importance of measuring techniques in micromachining. Also, classify measuring systems used for dimensional measurements and topographic inspection in micromachining. [6]

OR

- Q10)** Write Short notes on: [18]
- a) Surface Profilers
- b) Scanning electron microscope
- c) Optical microscopes



Total No. of Questions : 10]

SEAT No. :

P3053

[Total No. of Pages : 3

[5354]-542

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

POWER PLANT ENGINEERING

(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) *Draw a neat diagram wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator, steam tables is allowed.*
- 5) *Assume suitable data if necessary.*

Q1) a) Write a short note on: **[4]**

- i) Load Shedding
- ii) Carbon credit

b) What is a load curve? What is its use in distribution of electrical energy?[6]

OR

Q2) a) Explain in details load curve and load distribution curve with sketch. **[4]**

b) The peak load on a power plant is 60 MW. The loads having maximum demand of 30MW, 20 MW, 10 MW and 14 MW are connected to the power plant. The capacity of the power plant is 80 MW and the annual load factor is 0.50 estimate: **[6]**

- i) average load on the power plant
- ii) the energy supplied per year
- iii) demand factor
- iv) the diversity factor

Q3) a) Describe the four major circuits in a thermal power plant. **[4]**

b) Define condenser efficiency and vacuum efficiency. **[6]**

OR

Q4) a) With neat sketch explain different types of wet dust collectors. **[4]**

b) What are the functions of moderators. control rods and coolant in a nuclear power plant. **[6]**

P.T.O.

- Q5) a)** Derive the equation of thermal efficiency of Brayton Cycle. [8]
- 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 10 kg/s. Determine: [10]
- Thermal efficiency and capacity of the plant in MW.
 - Exhaust pressure of the gases leaving the plant is 1 bar. Assume compression and expansion is isentropic. Take $\gamma = 1.4$ (air and gas), $C_p = 1$ kJ/kgK (air and gas), CV of the fuel 40000 kJ/kg. Neglect pressure losses in the system. Do not neglect the mass of the fuel.

OR

- Q6) a)** Draw the schematic diagram for complete diesel power plant showing all the systems used and explain the working. [8]
- b) A gas turbine takes in air at 101 kN/m² and 150° C. The air is compressed to a pressure of 606 kN/m² and then passed through a regenerative heat exchanger of effectiveness 0.65. The air is then passed through the combustion chamber where its temperature is increased to 8700° C by the combustion of fuel. The gases enter a turbine and are expanded to 101 kN/m² pressure. Assuming a compressor efficiency of 85% and a turbine efficiency of 80%, determine the following for air flow rate of 4 kg/s: [10]
- The power output of the plant.
 - Exhaust temperature from heat exchanger.
 - The thermal efficiency of the plant and
 - The thermal efficiency without the heat exchanger.
- Q7) a)** Describe the basic principle of photovoltaic power. List out its merits over the other system. What are the main hurdles in the development of this mode of power generation? [8]
- b) What are the basic requirements for locating a wind power plant? Which factor affect the size of wind power plant? [8]

OR

Q8) a) What is OTEC? What is the minimum requirement to operate the OTEC? Explain Close cycle OTEC with typical layout. [8]

b) How is electricity generated from geothermal energy what are advantages and disadvantages. [8]

Q9) a) Enlist the protective equipment and explain the working of circuit breaker in power plant. [8]

b) Explain the cause and effect of various pollutants from a thermal power plant. [8]

OR

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

i) Switch Gear

ii) Power Transformer

b) What do you understand by noise pollution? Explain the methods adopted to reduce the noise pollution. [8]



Total No. of Questions : 10]

SEAT No. :

P3054

[Total No. of Pages : 4

[5354]-543

B.E. (Mechanical) (End Semester)
MECHANICAL SYSTEM DESIGN
(2012 Pattern)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Give significance of 'Node Method' of optimization to explain why structure diagram with minimum nodal sum is optimum. [4]
- b) Tensile strengths of population of 1000 tie rods are normally distributed with mean of 500MPa and std. deviation of 50MPa. Find number of connecting rods with strengths less than 450MPa. Use table 1 for values of area from $z = 0$ to z . TABLE 1 [6]

OR

- Q2)** a) Prove that the difference between number of teeth of successive gears in change gearbox must be more than four. [4]
- b) Give formulae for calculating Mean and Standard deviation of resultant population if two individual populations are to be added, multiplied and divided. [6]
- Q3)** a) What is the need of tension take up device in a belt conveyor? Name any four take up devices. [4]

P.T.O.

- b) Find required width of a flat belt conveyor if it is designed to transfer powdered material with density 2 tons/m³ at rate of 1.33 tons/hr, with speed of 1.75m/s. (Assume surcharge factor as 2.35×10^{-4}) [6]

OR

- Q4)** a) Explain advantages and limitations of troughed conveyors over flat belt conveyors. [4]
- b) Mr. X is required to transmit the coal from coal storage to boiler house by conveyor so suggest him suitable type of conveyor and explain different resistive forces for estimating power requirement of conveyor. [6]

- Q5)** a) Seam less cylinder with storage capacity 0.025m³ is made of 40C8 with permissible strength of 500MPa. It is to be used for storing liquid at 15MPa Pressure. Its length is twice of ID. If factor of safety required is 2, determine dimensions of cylinder. [9]
- b) Derive the expressions to find principal stresses at the inner surface of a thick cylinder. [9]

OR

- Q6)** a) A pressure vessel of 2m ID and 12mm shell thickness is designed for 0.825MPa pressure. It has nozzle of 300mm ID, 12mm thickness and 200mm length, out of which 15mm is inside the shell. S_y is 225 MPa. Corrosion allowance is 4mm and weld efficiency is 0.85 Assuming FOS as 1.5, decide dimensions of reinforcing pad. [9]
- b) What is the need of Autofrettage? Explain any one method of autofrettage in detail along with the supporting sketch. [9]

- Q7)** a) Four stroke diesel engine has following specifications: B Power = 5 kW, Speed = 1200 RPM, IMEP = 0.35 N/mm², efficiency = 80%, Gas pressure 3.15MPa, Permissible stress for cylinder = 42 N/mm². Determine cylinder dimensions & cylinder head thickness. [8]
- b) Explain the procedure of designing connecting rod. [8]

OR

- Q8) a)** Four stroke diesel engine has following specifications: Cylinder bore=85mm, Gas pressure 3MPa, Allowable bearing pressure for skirt=0.4MPa, ratio of side thrust to gas load=0.1, Width of top land=20mm, width of grooves=2.75mm, piston rings=4, thickness of rings=3mm. Calculate length of skirt and piston length. [8]
- b) Explain the procedure of designing crank shaft and crank pin. [8]

- Q9) a)** A tensile bar of length 400mm is subjected to constant tensile force of 4000N. If the factor of safety is 2, design the bar diameter, using Johnson's method, with the objective of minimizing material cost by using optimum material from the list given in Table 2. What will be the cost of the component? [8]

Material	Density (ρ) Kg/m ³	Cost (c) Rs/Kg	Syt N/mm ²
Steel	7800	28	400
Aluminum Alloy	2800	140	150
Titanium Alloy	4500	2200	800

Table : 02

- b) What are the principals of design of castings and forgings? [8]

OR

- Q10)a)** How to identify whether an optimum design problem is based on normal specifications or redundant specifications? What is the difference in the design procedure of problems based on these two specifications? [8]
- b) Explain the concepts of design for assembly and design for safety. [8]

z	0	1	2	3	4	5	6	7	8	9
0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

Table 01: Areas below Normal Distribution Curve for 0 to Z.



[5354]-544
B.E. (Mechanical Engg.)
REFRIGERATION AND AIR CONDITIONING
EQUIPMENT DESIGN
(2012 Pattern) (Elective - III) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.No. 1 or 2, Q.No. 3 or 4, Q.No. 5 or 6, Q.No. 7 or 8, Q.No. 9 or 10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, Electronic pocket calculator, Steam tables and p - h chart is allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *Use of steam table is permitted.*

- Q1)** a) Represent systematic diagram of multi-evaporator system with individual compressor and multiple expansion valves. Also provide the equation for COP. **[5]**
- b) A single compressor using R-12 as refrigerant has three evaporators capacity 10 TR, 20 TR and 30 TR. All the evaporators operate at -10°C and the vapours leaving the evaporators are dry and saturated. The condenser temperature is 40°C . The liquid refrigerant leaving the condenser is subcooled to 30°C . **[5]**

Assuming isentropic compression, find:

- i) The mass of refrigerant flowing through each evaporator.
- ii) The power required to drive the compressor.
- iii) COP of the system.

OR

- Q2)** a) A refrigeration system using R-12 as refrigerant consists of three evaporators of capacities 20 TR at -5°C , 30 TR at 0°C and 10 TR at 5°C . The vapour leaving the three evaporators are dry saturated. The system is provided with individual compressors and multiple expansion valves. The condenser temperature is 40°C and the liquid leaving the condenser is saturated. Assuming isentropic compression in each compressor, find: **[5]**

P.T.O.

- i) Mass of refrigerant flowing through each evaporator.
 - ii) Power required to drive the system.
 - iii) COP of the system.
- b) Write a note on operating control valves used for safety controls. [5]

- Q3)** a) Describe Linde and Claude system with systematic diagram. [5]
- b) Explain the characteristic curves & capacity controls for reciprocating compressor. [5]

OR

- Q4)** a) Explain in details about NH₃-CO₂ cascade system and represent the process on p-h diagram. [5]
- b) Which are the different methods for defrosting. Explain any one in detail. [5]

- Q5)** a) A water condenser takes 15 tons load of an air conditioning plant which uses F-12 as refrigerant. The evaporating temperature of the system is 5°C and condensing temperature is 35°C. The refrigerant is superheated to 10°C in the evaporator and liquid is sub cooled by 10°C in the condenser. The water is available at 20°C and rise of water is limited to 6°C. Assume the compression follows the law $pV^{1.1} = C$. Neglect the heat and pressure losses.

The number of tubes are arranged in two passes and their inside and outside diameter are 1.2 and 1.5 cm respectively. Take the following properties of F-12 and water. [10]

Properties	Water at 23.8°C	Liquid F-12 at 35°C
Density [kg/m ³]	1242	998
Viscosity [kg/m sec]	0.85	0.891×10^{-3}
Specific heat [kJ/kg°C]	----	4.2
Conductivity [W/m K]	0.0715	0.60
Latent heat [kJ/kg]	136.5	----

Assume suitable arrangement for the tubes and neglect the tube resistance. For tube the ratio of outside surface area with fins to inside surface area is 1.6. Take inside and outside fouling factor as 0.0001 m² K/Watt.

Find the total condensing area and length of each tube.

- b) Write a note on selection, rating and design considerations for different types of evaporators. [6]

OR

- Q6) a)** An air-cooled condenser is designed to transfer 22.2 kW of heat from R-12 condensing inside a tube of 11.2 mm ID and 12.7 mm OD at 50°C. The refrigerant flow rate is 9.5 kg/mm. The air which is used as condensing medium is circulated at the rate of 120 m³/min. The refrigerant side and air- side average heat transfer coefficients are given by, [10]

$$Nu_{ref} = 0.026 (Re)^{0.8} (Pr)^{0.33}$$

$$Nu_a = 0.193 (Re)^{0.618} (Pr)^{0.33} \text{ respectively.}$$

The air enters the heat exchanger at 35°C. To enhance the heat transfer, air-side is provided with fins so that the finned surface to outside bare tube surface area ratio becomes 10. The face velocity of the air is limited to 6 m/sec. Neglect the resistance of metal wall. Find out the total fin surface area required.

Properties of R-12 at 50°C are as follows:

Viscosity = 2.36×10^{-4} kg/m-sec; Specific heat = 800 J/kg K;

Density = 1220 kg/m³; Conductivity = 0.078 W/m K

- b) Write in details about thermal design of shell and tube condenser. [6]

- Q7) a)** A cooling tower is to be designed to take the heat load of 200 tons refrigerating plant using F-12 as refrigerant. The heat rejection ratio of the system is 1.2. The raise in temperature allowed in the condenser is 5°C. The atmosphere air condition is 35°C DBT and 25°C WBT. The air leaves the tower at 30°C and 90% relative humidity. The temperature of water coming out of the tower is 30°C. Enthalpies and absolute humidities of the air at the inlet and exit of the tower are 76.4 kJ/kg, 95 kJ/kg, 16 gm/kg and 24.4 gm/kg respectively. Whereas the specific volume of air at the inlet of the tower is 0.895 m³/kg. Neglecting the heat losses in the system and carry over loss through the cooling tower, find [10]

- i) Quantity of air required to pass through the cooling tower per minute
ii) Quantity of make-up water

- b) What do you mean by capacity control of cooling tower? Describe it in detail. [7]

OR

- Q8) a)** An evaporative condenser is used in a refrigeration system to take heat load of refrigeration plant of 60 tons capacity. The heat rejection factor of the system is 1.4. The water enters the condenser at 21°C and leaves at 28°C. Air enters the condenser at 28°C DBT and 21°C WBT and

leaves the condenser at 26°C and saturated condition. Neglect the heat losses and carry-over losses of the system, find: [10]

- i) The quantity of air passed through the condenser in m³/min
- ii) Make-up water supplied per minute

Enthalpies and absolute humidities of the air at the inlet and exit of the tower are 61 kJ/kg, 80.85 kJ/kg, 12.8 gm/kg and 22.50 gm/kg respectively. Whereas the specific volume of air at the inlet of the tower is 0.872 m³/kg.

- b) Describe detail process for design of cooling tower. [7]

Q9) a) A steam ejector water vapour system is supplied with motive steam at 7 bar and in saturated condition when the water in the flash chamber is at 5°C. Make-up water is supplied to the cooling system at 17°C and condenser is operated at 5 cm of mercury absolute. The nozzle efficiency is 88%, the entrainment efficiency is 65% and thermos-compressor efficiency is 80%. The quantity of the motive steam and flashed vapour mixed together at the beginning of compression is 92% dry. Determine: [10]

- i) Mass of motive steam required per kg of flashed vapour
- ii) Refrigeration effect per kg of flash vapour
- iii) Mass of motive steam required per ton of refrigeration per hour
- iv) Quantity of flashed vapour from flash chamber

- b) With a neat sketch explain the working of vortex tube. [7]

OR

Q10)a) The steam at 7 bar saturated to a steam-ejector water-vapour refrigeration system. The temperature of the water in flash chamber is 45°C. Make-up water is supplied at 18°C. The pressure in the condenser is 0.68 bar. The nozzle efficiency is 88%, the entrainment efficiency is 65% and the compression efficiency is 92%. Determine: [10]

- i) Mass of motive steam required per kg of flashed vapour
- ii) Quantity of flashed vapour from flash chamber
- iii) Refrigeration effect per kg of flash vapour
- iv) Mass of motive steam required per hour per ton of refrigeration
- v) Volume of vapour removed from flash chamber per hour-per ton of refrigeration.

Assume quality of mixture of motive steam and flashed vapour at the beginning of compression is 92% dry.

- b) What is the use magnetic refrigeration, explain with neat figure. [7]



Total No. of Questions : 10]

SEAT No. :

P3056

[Total No. of Pages : 3

[5354] - 545

B.E. Mechanical

ROBOTICS (ELECTIVE - III)

(2012 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

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

Q1) a) State three laws of Robotics. **[4]**

b) What is D-H parameter? Obtain an expression for D-H parameter matrix. **[6]**

OR

Q2) a) What are Homogeneous Transformation & Homogeneous Transformation Matrix? **[4]**

b) Write a short note on **[6]**

i) Algebraic Approach

ii) Geometric Approach

Q3) a) Describe the four basic parameters used in DH notation algorithm **[4]**

b) Explain with neat sketch static forces in manipulator. **[6]**

OR

Q4) a) Explain properties of Jacobian matrix of a manipulator. **[4]**

b) Explain with neat sketch linear and rotational velocities of rigid bodies. **[6]**

P.T.O.

Q5) a) Derive an equations of motion for serial manipulators using Lagrangian formulation [8]

b) Derive an equations of motion for parallel manipulators using Lagrangian formulation [8]

OR

Q6) a) A rotary arm of a manipulator is to rotate from 20° to 80° in 6 seconds. Determine coefficients of cubic polynomial to interpolate a smooth trajectory. Plot the position, velocity and acceleration variation against time [10]

b) What are the different tools used in simulations of robot? [6]

Q7) a) Explain independent joint of PID control. [8]

b) Explain in detail Trajectory planning of robot with its advantages? [8]

OR

Q8) a) Explain in detail force control of manipulators [8]

b) Fig. shows as error time graph. Sketch the PD controller o/p w.r.t. time. Assume $k_p=5$, $K_d=0.5$ & $P_o=30\%$ i.e. controller o/p is 30% when error is zero. [8]

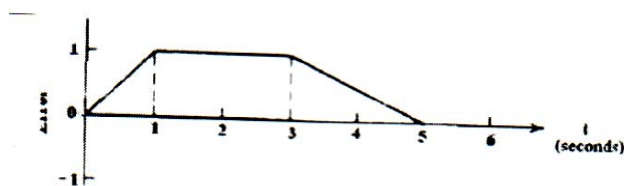


Figure 3

Q9) a) Explain Necessity & application of Artificial Intelligence for Robotics System. [8]

b) Explain the forward & backward search technique in problem solving for AI [10]

OR

- Q10)a)** Explain in detail Image Processing Techniques and Image Segmentation? **[12]**
- b) Write short note on linear Kalman Filter? **[6]**



Total No. of Questions : 12]

SEAT No. :

P3057

[Total No. of Pages : 3

[5354] - 546

B.E. (Mechanical)

INDUSTRIAL ENGINEERING (Elective - III)

(2012 Pattern) (End-Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) Answer any six questions with Internal choice.*
- 2) Answers should be written in one books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Use of logarithmic tables slide rule, mollier charts, electronic pocket, calculator and steam tables is allowed.*
- 5) Assume suitable data, if necessary.*

Q1) Define productivity and explain different Productivity measures. **[6]**

OR

Q2) Explain contribution of Taylor and Gilbreth to Industrial Engineering **[6]**

Q3) Explain objective and scope of work-study, Also explain Human factors in work-study. **[7]**

OR

Q4) Describe concept two handed chart **[7]**

Q5) Write short notes on : (Any One) **[7]**

- a) MTM
- b) PMTS

P.T.O.

OR

Q6) What is allowance? Explain any two types of allowance. [7]

Q7) a) Estimate the sales forecast for the year 2000, using exponential smoothing forecaster. Take $\alpha=0.5$ and the forecast for the year 1995 as 160×10^5 units. Compare the forecast with least square method [10]

Year	1995	1996	1997	1998	1999
Sales Rs.($\times 10^5$)	180	168	159	170	188

b) Explain ABC analysis and VED analysis. [6]

OR

Q8) a) Write short note on MRP and MRP-II [8]

b) What is demand forecasting ? Explain Moving Average Method for Demand forecasting. [8]

Q9) a) Write short note on [9]

i) Functional Layout

ii) Line Layout

iii) Travel Chart

b) State Material Handling Principles and Explain types of material handling Devices. [8]

OR

Q10) a) Define plant location and plant layout. What are various factors involved in selection of site for good plant. [9]

b) Write short note on [8]

i) Material flow patterns

ii) Line balancing

Q11)a) Write short note on Techniques for Evaluation of capital Investments [8]

b) An analysis of the company reveals the following information

Cost Element	Variable Cost	Fixed cost
Direct Material	32.8	-
Direct Labour	28.4	-
Factory Overheads	12.6	189900
Distribution Overheads	4.1	58400
General Administrative Overheads	1.1	66700
Budgeted sales are		1850000

Determine:

- i) P/V ratio
- ii) B.E.P
- iii) The profit at the budgeted sales volume. [9]

OR

Q12)a) Explain Industrial Safety programme, and General Safety Rules [8]

b) ABC company plans to sell an article at a local market. The articles are purchased at Rs.5 on the condition that all unsold articles shall be returned. The rent for the space is Rs.2000. The articles will be sold at Rs.9.

Determine the number of articles which must be sold-

- i) To break even
- ii) To earn Rs.400 as profit
- iii) If the company sells 700 articles. Calculate margin of safety and profit. [9]



Total No. of Questions : 10]

SEAT No. :

P3058

[Total No. of Pages : 2

[5354] - 547

B.E. (Mechanical)

PRODUCT LIFE CYCLE MANAGEMENT

(2012 Pattern) (Open Elective)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) What are Internal Drivers in PLM implementation? Explain their significance. **[10]**

OR

Q2) Discuss in detail the concept of Digital Manufacturing. List Advantages. **[10]**

Q3) a) Discuss in brief Singularity, Cohesion and Traceability. **[6]**

b) What is Digital Mock Up? Discuss in brief. **[4]**

OR

Q4) a) Explain the transition of Engineering Data Management to Product Data Management. **[6]**

b) What is Product Reuse in Digital Life Cycle? Explain. **[4]**

Q5) Discuss in detail working of Product Life Cycle Management System. What are requirements of ideal system. List various issues related to design of system. **[16]**

OR

Q6) Explain the System Architecture of PLM System. Explain Product Model and Product Information Data Model. **[16]**

Q7) a) What is PLM Vision of Company? Discuss relationship of PLM Vision and PLM Strategy. **[9]**

b) Discuss Product Data and Product Workflow in detail. **[9]**

OR

Q8) Discuss in detail various data issues as Authenticity, Access, Change, Traceability, Confidentiality and Security in PLM. **[18]**

Q9) Explain in detail concepts of Visualization, Collaboration and Enterprise Application Integration in PLM. Emphasize their relationship. **[16]**

OR

Q10)a) Discuss the role of Human Resources at various stages and levels in PLM Implementation. **[8]**

b) Discuss the convergence of Traditional Engineering to Concurrent Engineering and then to Collaborative Engineering for Product Design. **[8]**



Total No. of Questions : 10]

SEAT No. :

P3059

[Total No. of Pages :3

[5354]-548

B.E. Mechanical (Semester - II)

AUTOMOBILE ENGINEERING (Elective - III, Open Elective)

(2012 Pattern)

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) *All questions carry equal marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*
- 6) *All questions are compulsory.*

- Q1)** a) Explain with neat sketches 'FERWD'. State its advantages and limitations. [5]
- b) Discuss main frame and sub frame. [5]

OR

- Q2)** a) Discuss various materials used in Chassis frame. [5]
- b) Explain with neat sketch 'Cone clutch' used in automobiles. [5]

- Q3)** a) Write short note on 'Constant Mesh Gear Box'. [5]
- b) Explain with neat sketch 'Rack & Pinion Type of Steering Gear Box'. [5]

OR

- Q4)** a) Describe with neat sketches, Under steering and Over steering Phenomenon. [5]
- b) Differentiate between Fluid flywheel and Torque Convertor. [5]

P.T.O.

- Q5)** a) Explain with neat sketch 'Drum brakes' .Also list advantages and limitations of Drum brakes. [8]
- b) Explain with neat sketch Telescopic type hydraulic shock absorber'. [8]

OR

- Q6)** a) Explain with neat sketch the working principle of Anti-lock Braking System. [8]
- b) Explain with neat sketches Self Levelling Suspension. [8]

- Q7)** a) A passenger weight car weight 1430 Kg (14028.30 N). The rolling resistance may be assumed as 5.6 Kg (54.936 N) per 565.90 Kg (5551.51 N) of vehicle weight. The air resistance is given by $0.0017 AV^2$. Where ,A= Frontal Area and V is car speed. The frontal area of the vehicle is 2.411 m² and car speed is 50.38 Km/hr.

- i) Determine the power required to propel the vehicle on the road. [5]
- ii) If the tractive effort available at the wheels is 185.50 Kg (1819.755 N).Find the maximum gradient which the vehicle can climb. [3]
- b) Write short notes on the following (any two) [10]
- i) Traction and Tractive Effort
- ii) Road performance curves.
- iii) Air bag systems

OR

- Q8)** a) Write short notes on the following (any three) [12]
- i) NVH in automobiles.
- ii) Automatic seat belts.
- iii) Dashboard Instruments
- iv) Tachometer
- b) Explain with schematic diagram 'Solar Operated vehicle'. [6]

Q9) a) Explain any three complaints of Gear Box along with three causes and remedies of each complaint. **[8]**

b) Explain the following .(any two) **[8]**

i) Traction Control Devices.

ii) Electrical Horn

iii) Electric Wind Screen Wiper

OR

Q10)a) Write short notes on following.(Any three) **[12]**

i) Trafficator

ii) Electronic Control Unit

iii) Electrical Car Layout

iv) Battery Maintenance and care

b) Explain any two complaints of Propeller shaft with two causes and remedies of each complaint. **[4]**



Total No. of Questions : 10]

SEAT No. :

P3060

[Total No. of Pages : 4

[5354] - 549

B.E. (Mechanical)

STEAM ENGINEERING & ENERGY CONSERVATION

(Elective - III - Open Elective) (Semester - II)

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

- 1) *Answer Q.1 or Q.2, Q.3or 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.*
- 5) *Use of scientific calculators, steam tables, mollies charts, Data book is allowed.*

- Q1)** a) Steam is generated and distributed at high pressure and the pressure is reduced at the point of usage in process industries Explain. **[5]**
- b) What are the effects of over-sizing and under-sizing of steam pipelines. Explain why Steam tapping to process equipment should always be taken from side of the steam header? **[5]**

OR

- Q2)** a) Explain various stages involved in the manufacturing of Smoke tube Boiler. Also elaborate the role of IBR in the process. **[5]**
- b) 400 kg/hr of condensate at 10 bar gauge passes through a steam trap to atmospheric pressure. How much flash steam will be released? How Much condensate will be available to return to the boiler? **[5]**
- Q3)** a) With the help of suitable sketches/drawings, explain why segmental baffles are used in shell-and-tube heat exchangers. **[4]**

P.T.O.

- b) What are the good engineering practices in steam distribution system in process industry? [6]

OR

- Q4)** a) Can gate valve be used for throttling applications? Justify your answer. [4]
- b) Steam requirement for a plant is as follows- Steam flow required = 4800 kg/hr, Inlet pressure = 7 bar saturated. Piping equivalent length = i) 90 m ii) 420 m, Using Engineering Data books determine pipe size based on velocity/pressure drop methods for each length with acceptable pressure drops less than 10% of inlet pressure. Indicate pipe size selected for each length and corresponding pressure drop [6]

- Q5)** a) List down the common types of flow meters. Explain variable area meter with neat diagram. [5]
- b) Explain various types of thermocouples with their applications. [5]
- c) Write one major reason for the selection of the following [6]
- i) Pressure balance trim Bellow sealed valve
 - ii) Extended bonnet with cooling fins
 - iii) Double guided parabolic plug

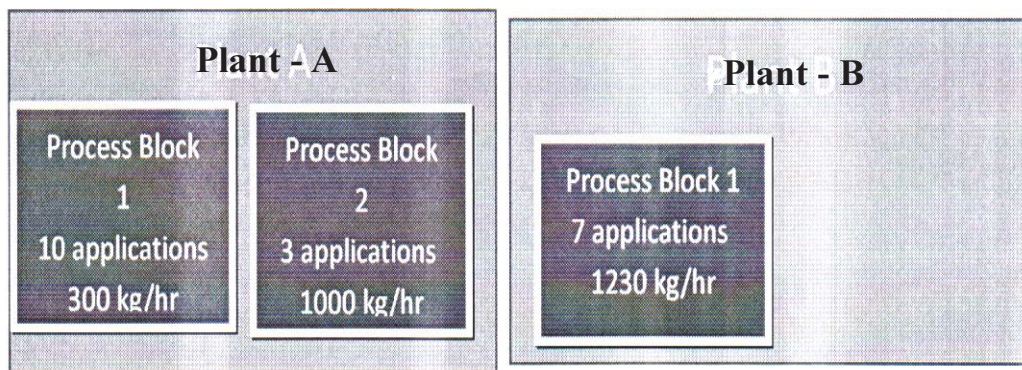
OR

- Q6)** a) Why pressure reduction station is important? Where should it be installed in process industry? [5]
- b) Explain ultrasonic flow meter with neat diagram. Write advantages and drawbacks. [5]
- c) What are three common characteristics of control valve trim? Explain each. [6]
- Q7)** a) Write the detailed classification of steam traps and explain Inverted Bucket Trap with neat sketch. Write the advantages and drawbacks. [6]

- b) Explain the effects on the steam system of a process plant if steam traps are not used. [6]
- c) What are different ways to handle/Recover condensate? Merits and demerits of individual methods. [6]

OR

- Q8)** a) Write the detailed classification of steam traps and explain Balanced pressure thermostatic trap with neat sketch. Write the advantages and drawbacks. [6]
- b) Based on the information given below do the heat and mass balance and calculate the temperature of feed water and also comment on the feed water TDS before & after condensate recovery. [8]



Plant A has two process blocks. Process block one has 10 applications and uses 300 kg/hr of steam at the pressure of 3.5 barg and condensate recovery factor is about 70 %. Process block 2 has 3 steam users using 1000 kg/hr of steam at 8 barg and condensate recovery factor is 50 %. Plant B has two also has two blocks. Process block one has 7 applications and uses 1230 kg/hr of steam at a pressure of 3.5 barg and condensate recovery factor is about 20 %. Process block 2 has 6 steam users using 2000 kg/hr of steam at 1.5 barg and condensate recovery factor is 55 %. Feed water TDS is 150 PPM.

- c) What is CRF (condensate recovery factor)? What are various benefits of condensate recovery? [4]

Q9) a) During a survey of a plant it was observed that the boiler was working with following parameters Boiler capacity = 10000 kg/hr F & A 100 °C. Rated pressure = 12 kg/cm² abs FW inlet temp = 30°C. TDS Boiler inlet water = 200 TDS max recommended for boiler water = 3500, Actual TDS maintained by Boiler operator = 3000. Fuel - Furnace oil (F.O.) GCV 10000 kcal/kg, F.O. Specific gravity = 0.92, Boiler efficiency based on GCV = 84%. FO cost = Rs 50/lit, No of working hours = 7500 / annum, Calculate following for these parameters **[10]**

- i) Actual steam evaporation in kg/hr at rated pressure of 12 kg/cm² abs and FW temp as above
- ii) The fuel cost saving in Rs/annum if 5 TPH condensate is recovered at 90°C

b) Write short note on application of steam in textile industry. **[6]**

OR

Q10)a) During a survey of a plant it was observed that the boiler was working with following parameters Boiler capacity = 8000 kg/hr F & A 100°C, Rated pressure = 12 kg/cm² abs FW inlet temp = 40° C, TDS of feed water=120 ppm, TDS max recommended for boiler water=3200 ppm, Actual TDS maintained by Boiler operator = 2600 ppm, Fuel — Furnace oil (F.O.) GCV 10200 kcal/kg, F.O. Specific gravity=0.94 Boiler efficiency based on GCV=84%, FO cost = Rs 45/lit, No of working hours = 7200 /year. Calculate following for these parameters **[10]**

- i) Actual steam evaporation in kg/hr at rated pressure of 12 kg/cm² abs and FW temp as above
- ii) Monitory loss/year due to actual TDS maintained by Boiler operator- without condensate recovery

b) Write short note on application of steam in hospitality industry **[6]**



Total No. of Questions : 10]

SEAT No. :

P3061

[Total No. of Pages : 3

[5354] - 550

B.E. Mechanical (Engg.)

COMPUTATIONAL FLUID DYNAMICS (Elective - IV)

(2012 Pattern) (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, Q7 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 electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Give examples of any two types of grid used in CFD simulations. Explain any two with neat sketches. [6]
- b) Explain any two possible errors in numerical analysis with examples. [4]

OR

- Q2)** a) Consider a large uranium plate of thickness L cm, thermal conductivity k W/m °C, and thermal diffusivity α m²/s. Heat is generated uniformly in the plate at a constant rate of q W/m³. At time $t=0$, one side of the plate is insulated and is maintained at 0 °C at all times, while the other side is subjected to convection to an environment at $T = 30$ °C with a heat transfer coefficient of h W/m² °C. Write a solution methodology to find the temperature distribution of the plate after 2 minutes using suitable method. [8]
- b) Write any two weaknesses of the CFD with suitable example. [2]
- Q3)** a) Explain the central difference approach in numerical method. Write any two difference equations citing examples. [4]
- b) Given the function $f(x) = 0.55 x^2$; find the first derivative of f at $x = 3$ using forward, backward and central differencing of order (Δx) . Use a step size of $\Delta x = 0.15$. [6]

OR

Q4) Explain the significance of the boundary conditions in any numerical simulations. Explain in detail the Dirichlet, Neumann & Robbins boundary conditions with neat sketches and suitable examples. [10]

Q5) a) Develop an algorithm to find the numerical solution of one dimensional steady- state heat conduction in rectangular horizontal fin subjected to the boundary conditions as shown in Fig. I. Assume suitable data wherever needed. [10]

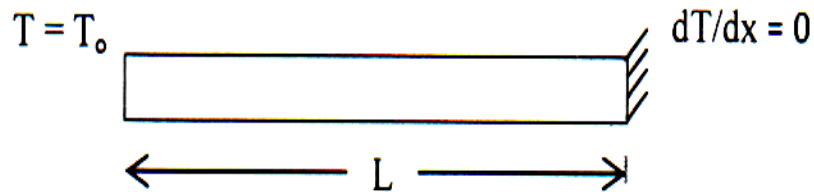


Fig.1 Rectangular fin

b) What is stability of a numerical scheme? Explain in detail for any one explicit method. [8]

OR

Q6) a) Write a note on upwind difference method. Derive an expression for numerical solution of one-dimensional convection — diffusion system using upwind approach. [10]

b) Derive an expression for Mac-Cormack method used to solve one dimensional wave equation. [8]

Q7) a) Write stepwise algorithm to find out the numerical simulation of flow through convergent divergent nozzle using any suitable pressure based numerical method. [10]

b) What are the different variations of the SIMPLE algorithm? Explain the need of having different variations. [6]

OR

Q8) a) Explain why finite volume method is most preferred method over finite difference method. Explain in detail the finite volume method. [10]

b) Write Navier-Stokes equation for incompressible flow and explain each term. [6]

Q9) a) Write $k - \epsilon$ model in detail. Give suitable example where the $k - \epsilon$ turbulence model is applicable. [6]

b) What is post processing in CFD analysis? Explain how various tools used in post processing to explain the physics of the flow. [10]

OR

Q10)a) Assume any commercial CFD software and explain its utility in complete product development cycle with suitable example. Draw neat sketches wherever necessary. [10]

b) What is turbulence modeling? Write a short note on any advance development in turbulence modeling. [6]



Total No. of Questions : 10]

SEAT No. :

P3062

[Total No. of Pages : 4

[5354] - 550-A

B.E. Mechanical (Semester - II)

FINITE ELEMENT ANALYSIS (Elective - IV)

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Figures to the right indicate full marks.*
- 2) *Use of electronic pocket calculator is allowed.*
- 3) *Assume suitable data, if necessary.*

Q1) a) Write down different applications of FEA and explain procedure for FEA analysis of stress analysis [6]

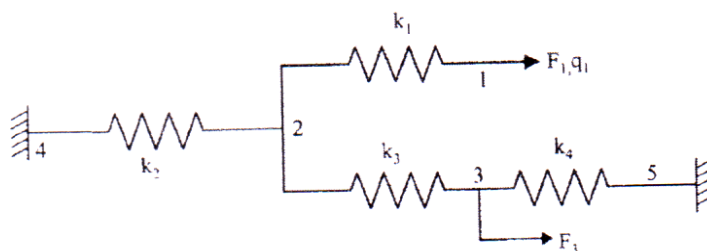
b) Write down difference between penalty and elimination approach for FEA solution [4]

OR

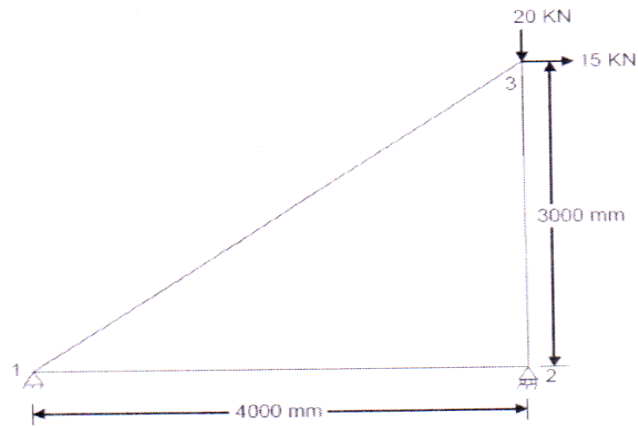
Q2) a) Explain "Releigh Ritz Method" to formulate FEM equations. [6]

b) Explain Plane stress and Plane Strain [4]

Q3) a) Calculate Nodal displacement of spring system shown in figure [4]

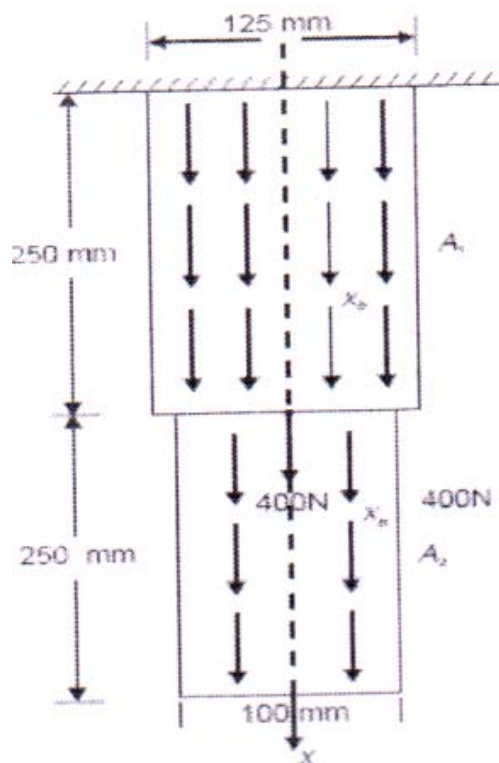


b) Obtain the forces in the plane truss shown in Fig. and determine the support reactions also. Use finite element method. Take $E = 200$ GPa and $A = 2000$ mm² [6]

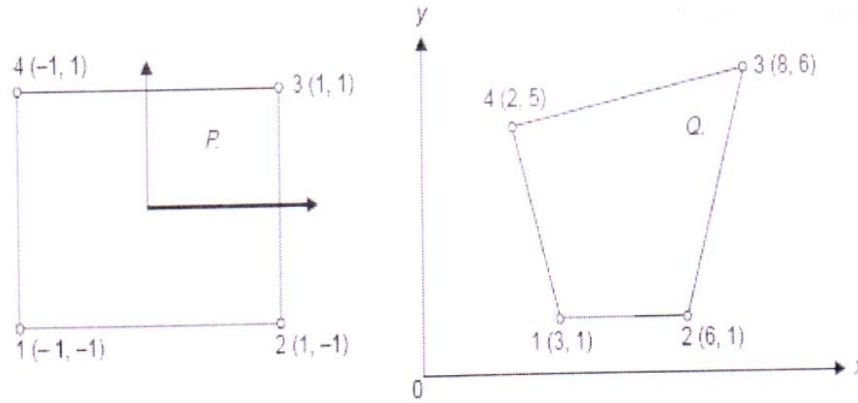


OR

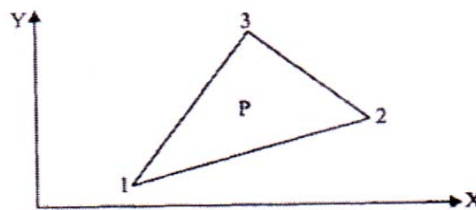
- Q4)** The thin plate of uniform thickness 20 mm, is as shown in Fig. In addition to the self-weight, the plate is subjected to a point load of 400N at mid- depth. The Young's modulus $E = 2 \times 10^5 \text{ N/mm}^2$ and unit weight $\rho = 0.8 \times 10^{-4} \text{ N/mm}^2$. Analyse the plate after modelling it with two elements and find the stresses in each element. Determine the support reactions also. [10]



- Q5) a)** For the iso-parametric quadrilateral elements shown in Fig., determine Local coordinates of the point Q which has Cartesian coordinates (7, 4) [8]



- b) For a point P located inside the triangle shown in figure, the shape functions N_1 and N_2 are 0.15 and 0.25 respectively. Determine the x and y coordinates of point P. [10]



OR

- Q6)** a) What is full and reduced integration in Finite Element Analysis? [4]
 b) Write a short note on Patch Test [4]
 c) Evaluate $I = \left(\int_{y=-2}^{y=2} \int_{x=-1}^{x=1} (x^2 + 2xy + y^2) dx dy \right)$ using Gauss Quadrature method [10]

- Q7)** a) Derive elemental stiffness matrix (conduction + convection) formulations for 1 D steady state heat transfer problems. [8]
 b) Consider a brick wall of thickness 0.3 m, $k = 0.7 \text{ W/m } ^\circ\text{K}$. The inner surface is at 28°C and the outer surface is exposed to cold air at -15°C . The heat transfer coefficient associated with the outside surface is $40 \text{ W/m}^2 \text{ } ^\circ\text{K}$. Determine the steady state temperature distribution within the wall and also the heat flux through the wall. Use two elements and obtain the solution. [8]

OR

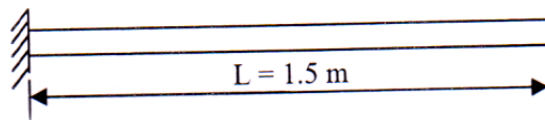
- Q8) a)** Heat is generated in a large plate ($K = 0.4 \text{ W/m}^2 \text{ }^\circ\text{C}$) at the rate of 5000 W/m^3 . The plate is 20 cm thick. Outside surface of the plate is exposed to ambient air at 30°C with a convective heat transfer coefficient of $20 \text{ W/m}^2 \text{ }^\circ\text{C}$. Determine the temperature distribution in the wall. [6]
- b)** A metallic fin, with thermal conductivity $360 \text{ W/m} \text{ }^\circ\text{K}$, 0.1 cm thick and 10 cm long extends from a plane wall whose temperature is 235°C . Determine the temperature distribution along the fin if heat is transferred to ambient air at 20°C with heat transfer coefficient of $9 \text{ W/m}^2 \text{ }^\circ\text{K}$. Take width of the fin as 1 m . [6]

- Q9) a)** Determine a three Natural frequencies of bar having following specifications Length of bar = 1 m Diameter of bar = 10 mm $E = 2 \times 10^5 \text{ N/mm}^2$ density $\rho = 7800 \text{ kg/m}^3$ and also validate the first natural frequency of FEA results with theoretical frequency which can be determined by

$$\omega_n = \sqrt{\frac{K}{M}} \text{ rad / s} \quad [16]$$

OR

- Q10)a)** Write a Lumped & Consistent Mass and stiffness matrix for [4]
- Bar Element
 - Truss Element
- b)** Estimate natural frequencies of axial vibrations of bar shown in figure below, using both consistent and lumped mass matrices and compare the results. Bar is having uniform cross-section with cross-sectional area $A = 50 \times 10^{-6} \text{ m}^2$, length $L = 1.5 \text{ m}$, modulus of elasticity $E = 2 \times 10^{11} \text{ N/m}^2$ and density $\rho = 7800 \text{ kg/m}^3$. Model the bar by using two elements. [8]



- c)** Explain the significance of lumped mass matrix and consistent mass matrix. Write lumped mass matrix for bar and beam element. [4]



Total No. of Questions : 10]

SEAT No. :

P3063

[Total No. of Pages : 3

[5354] - 550-B

B.E. Mechanical

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(Elective - IV)

(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) *Use of calculator, steam table is allowed.*
- 5) *Assume suitable data if necessary.*

- Q1)** a) Explain dimensionless parameters used in compressible flow machines. **[6]**
b) Explain performance characteristics of fan, blower and compressors. **[4]**

OR

- Q2)** a) Write a short note on stage velocity triangles. **[4]**
b) A double acting reciprocating pump running at 40 rpm. is discharging 1.0 m³ of water per minute. The pump has a stroke of 400 mm. The diameter of the piston is 200 mm. The delivery and suction head are 20 m and 5 m respectively. Find the slip of the pump and power required to drive the pump **[6]**
- Q3)** a) Explain Indicator diagram in Reciprocating Pumps. **[4]**
b) A single acting reciprocating pump has a plunger diameter 250 mm and stroke of 450 mm and it is driven with S.H.M. at 60 r.p.m. The length and diameter of delivery pipe are 60 m and 100 mm respectively. Determine the power saved in overcoming friction in the delivery pipe by fitting an air vessel on the delivery side of the pump. Assume friction factor = 0.01 **[6]**

P.T.O.

OR

- Q4)** a) Explain various forms of corrosion occurring in hydraulic machines [5]
b) Explain general design consideration of Pump Casing [5]

- Q5)** a) What are main causes for noise generation? What are methods for reducing the fan noise? [8]
b) Explain the different losses in fans , blowers and compressors. [8]

OR

- Q6)** a) Explain the different fan stage parameters with usual notations. [8]
b) Explain in detail the design procedure, selection and optimization of blower. [8]

- Q7)** a) What is surging and stalling ? What are its effect ? How it is developed?[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
- Power required by the electric motor
 - impeller diameter
 - Inner diameter of the blade ring
 - air angle at entry
 - impeller widths at entry and exit
 - number of impeller blades
 - The Specific speed. [10]

OR

- Q8)** a) Explain function of an aerofoil and discuss characteristics curve of airfoil. [8]
b) An axial fan stage consisting of only a rotor has the following data :-

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 $P_1 = 1.02$ bar and $T_1 = 316$ K). Determine the rotor blade angle at the entry, the flow rate, stage pressure rise, overall efficiency, degree of reaction, and specific speed. [10]

- Q9)** a) Explain Enthalpy-Entropy diagram of a compressor in detail. [8]
b) Explain the following terms
i) degree of reaction
ii) slip factor
iii) choking [8]

OR

- Q10)** a) Explain the performance characteristics curves of Centrifugal Compressor. [8]
b) What is work done factor for an axial flow compressor stage? How does it vary with no of stages? [8]



Total No. of Questions : 12]

SEAT No. :

P3064

[Total No. of Pages : 3

[5354] - 551

B.E. (Mechanical Sandwich)

AUTOMOBILE ENGINEERING SELF STUDY - III

(2012 Pattern) (End Semester)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

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

SECTION - I

- Q1)** a) Define the following terms: **[4]**
- i) Rolling resistance
 - ii) Air resistance
- b) Define Chassis and Compare conventional chassis frame with frameless type chassis frame. **[12]**

OR

- Q2)** a) Explain merits and demerits of frameless body construction. **[8]**
- b) What are the types of Front engine drive and Rear engine drive? Explain any one with neat sketch. **[8]**
- Q3)** a) How do you classify clutches? Explain operation of electromagnetic clutch with sketch. **[8]**
- b) Explain with neat sketch the function of a differential in rear axle. **[8]**

P.T.O.

OR

Q4) a) What are the type of spring used in clutches? Explain any one with neat sketch. [8]

b) Describe the synchronization mechanism used in synchromesh gear box with a neat sketch. [8]

Q5) a) Explain with neat sketch construction and working of collapsible steering. [6]

b) Explain with neat sketch hydro gas suspension system. [6]

c) Explain with neat sketch power steering. [6]

OR

Q6) a) Explain with neat sketch air brake system in detail. [6]

b) Explain with neat sketch interconnected suspension. [6]

c) Explain ABS brake system in detail .Also state its advantages over other Braking system. [6]

SECTION - II

Q7) a) Explain vehicle safety in detail. [8]

b) Write short note on: Seat belts. [8]

OR

Q8) a) Explain with neat sketch function of head restraint used to seat. [8]

b) Explain with neat sketch head lamp assembly. [8]

Q9) a) Explain with neat sketch vehicle performance curves. [8]

b) Describe with neat sketch free acceleration test. [8]

OR

Q10)a) Explain with neat sketch road performance curves. [8]

b) Explain with neat sketch crack test. [8]

- Q11)**a) Write short note on: hydraulic dozers. [6]
b) Describe with neat sketch 'tractor vehicle'. [6]
c) Write applications of multi- axle vehicles. [6]

OR

- Q12)**a) Write application s off-road machine. [6]
b) Describe with neat sketch 'heavy wheeled tractor'. [6]
c) Describe with neat sketch 'Dumpers' [6]



Total No. of Questions : 12]

SEAT No. :

P3065

[Total No. of Pages : 3

[5354]-552

B.E. (Mechanical Sandwich)
POWER PLANT ENGINEERING
(2012 Pattern) (Self Study - IV)

Time : 3 Hours]

[Max. Marks : 100

Instructions to candidates:

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

SECTION - I

- Q1)** a) Explain with neat sketch Bomb calorimeter. [8]
- b) The percentage composition by mass of sample of fuel as found by analysis is given as C- 90 %, H₂ — 3.3 % , S — 0.9 % . Calculate the minimum mass of air required for complete combustion of 1 kg of fuel. If 50 % excess air is supplied ,find the total mass of flue gases and percentage composition of dry flue gases. [8]

OR

- Q2)** a) Explain reheat cycle with neat sketch. What are the advantages of reheating of steam? [8]
- b) Dry saturated steam at 10 bar is supplied to steam turbine and exhaust takes place at 0.2 bar . Determine rankine efficiency, work ratio and specific steam consumption. [8]
- Q3)** a) Explain with neat sketch Lamont boiler. What are the advantages and disadvantages of Lamont boiler. [8]
- b) What are the different ways to feed the coal on to the grate, explain with sketch. [8]

P.T.O.

OR

Q4) a) Explain various methods of treatment of feed water. [8]

b) Give the classification of flue gas cleaning devices and explain electrostatic precipitator. [8]

Q5) a) Give classification of hydropower plant. [6]

b) Explain what do you mean by storage and pondage. Why are they required? [6]

c) Explain with neat sketch the principle of operation of a Pelton turbine. [6]

OR

Q6) a) Give classification of hydraulic turbines under different headings. [6]

b) What do you mean by spillway ? What are various types? [6]

c) What do you mean by [6]

i) Hydrograph

ii) Flow duration curve.

SECTION - II

Q7) a) Explain the working of CANDU type reactor. [6]

b) Discuss the futuristic fusion power plant. [5]

c) Discuss the functions of moderator and reflector. [5]

OR

Q8) a) Explain the working of heavy water reactor(HWR). [6]

b) Enlist advantages and disadvantages of diesel power plant. [5]

c) Explain heat rate and incremental heat rate. [5]

- Q9)** a) Explain simple open cycle gas turbine cycle with neat sketch. [6]
b) Explain bio mass energy power plant. [5]
c) Write note on fuels used in gas turbine plants. [5]

OR

- Q10)** a) What are the different methods of increasing the performance of gas turbine plant. [6]
b) Give advantages and disadvantages of solar power plant over conventional power plant. [5]
c) Give list of all types of non conventional power plants. [5]

- Q11)** a) How load duration curve is constructed? [6]
b) How does fuel cost relate to load and cost of power generation. [6]
c) Discuss the effect of variable load on plant operation. [6]

OR

- Q12)** a) What do you understand by load factor and capacity factor? [6]
b) Define reserve factor. How does it fix the maximum unit size? [6]
c) A power plant has following annual factors. Load factor = 0.75, capacity factor = 0.60, Use factor = 0.65, maximum demand is 60 MW.
Estimate
i) Annual energy production.
ii) Reserve capacity over and above peak load. [6]



Total No. of Questions : 10]

SEAT No. :

P3066

[Total No. of Pages : 4

[5354]-553

B.E. (Mechanical Sandwich)
MECHANICAL VIBRATIONS
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to candidates:

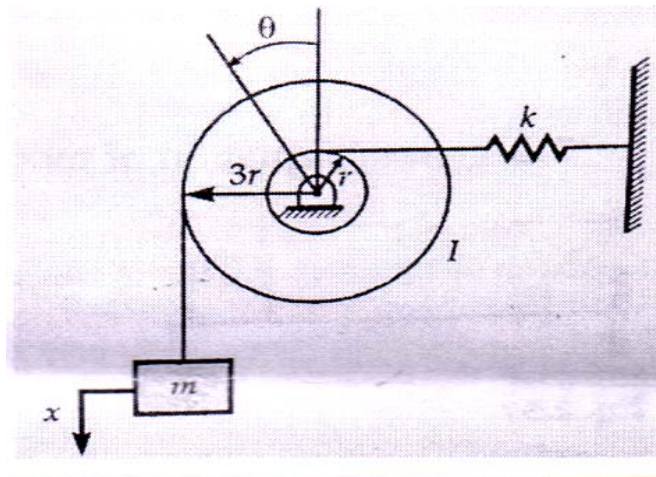
- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Use of scientific calculator is allowed.*
- 4) *Assume suitable data wherever necessary.*
- 5) *Figures to the right indicate full marks.*

Q1) A six cylinder inline reciprocating engine has a firing order 1-4-5-2-3-6. The mass of reciprocating part per cylinder is 3 kg. The length of cranks and connecting rods are 50 mm and 200 mm respectively. The cylinders are spaced at 300 mm pitch. If the engine runs at 1000 rpm Determine **[10]**

- i) Primary and secondary unbalance force if any
- ii) Primary unbalance couple with reference to central plane

OR

Q2) a) Find natural frequency for the system given below. **[5]**



P.T.O.

- b) What are different methods to determine equation of motion for vibratory system? Explain any one [5]

Q3) a) Define following terms [4]

- i) Magnification factor
- ii) Logarithmic Decrement
- iii) Damping Factor
- iv) Quality Factor

- b) In a vibratory system vehicle is to be designed with following parameters

$$K=100 \text{ N/m}, C=2 \text{ Nsec/m}, m=1 \text{ kg}$$

Calculate decrease in amplitude from its starting value after 3 complete oscillations and damped frequency of oscillation. [6]

OR

Q4) a) The static deflection of an automobile on its springs is 10 cm. Find the critical speed when the automobile is travelling on the road which is approximated by sine curve of amplitude 8 cm and a wavelength of 16 m. Assume the damping to be given by 0.05. Also determine the amplitude of vibration at 75 km/hr. [5]

- b) A body of 5 kg is supported on a spring of stiffness 200 N/m and has dashpot connected to it which produces resistance of 0.002 N at a velocity of 1 cm/sec. In what ratio will be the amplitude of vibration be reduced after 5 cycles. [5]

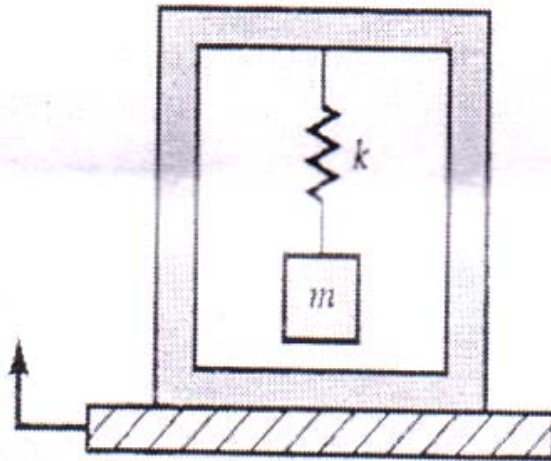
Q5) a) An electric motor weight 25 kg and is mounted on rubber pad which deflects by 1 mm to motor weight. The rotor weight 5 kg, has an eccentricity of 0.1 mm and rotates at 1500 rpm. Find the force transmitted to the foundation under the following conditions: [8]

- i) There is no damping
- ii) Damping factor is 0.1

- b) Derive the expression to determine the dynamic amplitude of vibration for a system having rotating unbalance. [8]

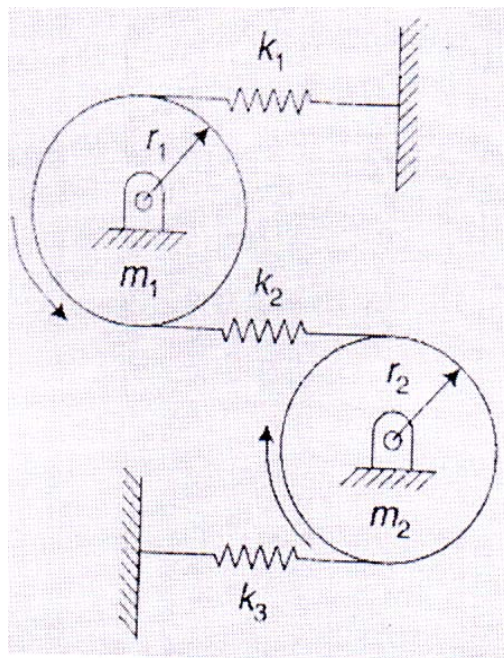
OR

- Q6) a) A 3 kg mass is suspended in a box by a spring as shown in following fig. The box is put on a platform having vibration $y = 0.8\sin 6t$ cm. Determine the absolute amplitude of the mass. Take $k = 6000$ N/m. [8]



- b) Draw and explain transmissibility versus frequency ratio curves. [8]

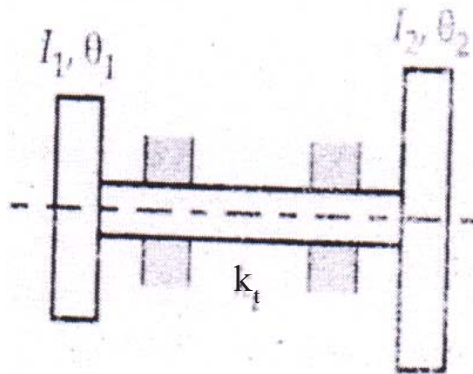
- Q7) a) determine natural frequencies for the system as shown in figure if $k_1=k_2=k_3=8$ N/m and mass $m_1=m_2=2$ kg and $r_1, r_2=r$. [14]



- b) Derive the equation for equivalent length of torsionally equivalent shaft. [4]

OR

- Q8) a)** An electrical motor-generator set is shown in following fig. Find the natural frequencies and amplitude ratios of the Principal modes. [12]



- b) Explain Principal modes of vibrations with respect to 2 DOF free vibration. [6]

- Q9) a)** What do you mean by vibration isolation?

Explain any 4 isolating materials along with their industrial applications. [8]

- b) Name any instrument to determine the natural frequency of badminton racket. Explain detail working of that instrument with block diagram. [8]

OR

- Q10) a)** What is vibration absorber? Name different types of absorbers used and explain any one in detail. [8]

- b) Explain following vibration Exciters : [8]

- i) Mechanical Exciter
- ii) Electrodynamics Exciter



Total No. of Questions : 10]

SEAT No. :

P3067

[Total No. of Pages : 3

[5354]-554

B.E. (Mechanical Sandwich)

INDUSTRIAL HYDRAULICS AND PNEUMATICS

(2012 Pattern) (End Semester) (Theory)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to 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) *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) Explain working of Vane type Pump with neat sketch. [5]
b) Compare Hydraulics and Pneumatics System. [5]

OR

- Q2)** a) State types of Accumulators and Explain Spring type accumulator. [6]
b) State the functions of hydraulic oil. [4]

- Q3)** a) Write a short note on different mountings for hydraulic actuators. [4]
b) A 10 cm diameter hydraulic cylinder has 5 cm rod diameter. If cylinder receives flow at 100 lpm and 15 MPa. Find speed and load carrying capacity of cylinder in both the strokes. [6]

OR

- Q4)** a) Draw the symbols for the following: [4]
i) Variable displacement air motor
ii) Pressure relief valve
iii) 3/2 roller type direction control valve
iv) 5/3 pneumatic direction control valve
b) Explain with symbols different centre positions of direction control valve. [6]

P.T.O.

- Q5)** a) Explain with neat sketch Regenerative circuit .State its Application. [8]
b) What is fail safe circuit? Explain with neat diagram. [8]

OR

- Q6)** a) Draw neat sketch and explain working of Automatic reciprocating pneumatic circuit.. [8]
b) Explain pneumatic Sequence Circuit. [8]
- Q7)** a) Explain working of Quick exhaust and shut off valve with help of circuit diagram. [8]
b) Write selection criteria and troubleshooting for compressors. [8]

OR

- Q8)** a) Explain different mountings of hydraulic actuator with neat diagram. [8]
b) Explain Actuator locking circuit. [8]

Q9) A machine slide is moved by means of hydraulic cylinder.

- a) Initially moves through distance of 150 mm against a load of 15 KN in 4 seconds.
b) It is followed by working stroke of 150 mm against load of 25 KN with feed rate of 1m/min.
c) The return stroke is to be as fast as possible. A load during return stroke is 15 KN.

A Meter Out circuit is used. Draw the required circuit and select the required components for circuit from the given data as per the design calculations.[18]

OR

- Q10)**a) Explain different methods of vacuum measurement with neat diagram.[9]
b) Explain trouble shooting for pump, Control valves and FRL unit. [9]

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.	Rod Dia.
				(mm)	(mm)
R1	11.4	70	A1	25	12.5
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	0-4.1	T1	40
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)

Model	Bore Dia. (mm)	Rod Dia. (mm)
A1	25	12.5
A2	40	16
A3	50	35
A4	75	45
A5	100	50

10. OIL RESERVOIR:

Model	Max. working pressure (bar)	Flow range (lpm)	Model	Capacity (lit)
F1	70	0-4.1	T1	40
F2	105	0-4.9	T2	100
F3	105	0-16.3	T3	250
F4	70	0-24.6	T4	400
			T5	600



Total No. of Questions : 10]

SEAT No. :

P3068

[Total No. of Pages : 4

[5354]-555

B.E. (Mechanical Sandwich)

REFRIGERATION AND AIRCONDITIONING

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1) a)** Explain the effect of following on COP of vapour compression refrigeration system with schematic Ph diagram - **[4]**
- i) Liquid sub-cooling in the condenser
 - ii) Suction gas superheat in the evaporator
- b) A refrigerator working on Carnot cycle has refrigerating COP of 4. **[6]**
- i) Determine the ratio of T_1/T_2
 - ii) If the work done is 10 kW, determine the maximum refrigeration effect in TR.
 - iii) If this cycle is used as heat pump, determine the COP and heat delivered.

OR

- Q2) a)** A fishing vessel uses ice refrigeration for preserving its catch. 100 kg of ice at -5°C is used for preserving 500 kg of fresh fish caught at 26°C . When the vessel reaches shore in the morning, the ice is completely melted and both the fish and water are at the same temperature of 5°C . Find the specific heat of fish. Assume no losses or gain to the insulated ice box. h_{fg} of ice is 335 kJ/kg. **[4]**
- b) A Bell-Coleman refrigerator of 10 TR capacity operates between 1 bar & 7 bar. Air temperature at the inlet of compressor and expander are 15°C and 37°C respectively. Both compression and expansion indices are 1.3. Find - **[6]**
- i) Mass of air circulation per minute.
 - ii) Power required
 - iii) COP.

P.T.O.

- Q3) a)** Explain designation of Halocarbon refrigerants with an example of R 134a. **[4]**
- b) An ice plant 'working on ammonia vapour compression refrigeration cycle operates between - 16°C and 36°C. The liquid refrigerant is sub cooled to 30°C. The vapour leaving evaporator is dry saturated. Assuming isentropic compression calculate: **[6]**
- Refrigeration effect in kJ/kg.
 - Work of Compression in kJ/kg
 - COP Properties of ammonia R717

Temperature °C	Specific Enthalpy kJ/kg		Specific Entropy KJ/kg		Specific Heat kJ/KgK	
	Liquid	Vapour	Liquid	Vapour	Liquid	Vapour
-16	126.67	1443.06	0.7246	5.8437	4.534	2.469
30	341.76	1486.17	1.4881	5.2631	4.828	3.250
36	370.96	1488.70	1.5822	5.1978	4.888	3.401

OR

- Q4) a)** Explain working of Simple LiBr Vapour absorption system with schematic arrangement diagram. **[6]**
- b) Why multi staging or compound compression is required? **[4]**
- Q5) a)** In a cooling application, moist air enters a refrigeration coil at a rate of 100 kg da/min at 35°C DBT and 50% RH. The ADP of the coil is 5°C and bypass factor is 0.15. Determine: **[8]**
- Outlet state of the moist air (DBT & W)
 - Rate of water removal from the air kg/min
 - SHF of the process.
 - Refrigeration capacity in TR
- b) What are the problems associated with closed air conditioned spaces? How Indoor Air Quality can be improved? **[6]**
- c) Explain following terms **[4]**
- Relative humidity
 - Degree of saturation

OR

- Q6)** a) Obtain the following properties of moist air at 36°C DBT and 20°C WBT without using psychrometric chart. [8]
- Partial pressure of water vapour
 - RH
 - Specific humidity
 - Air density
 - vapour density
 - enthalpy of moist air
- Assume barometric pressure 1.01325 bar. Steam properties - P_{sat} at 36 °C : 5.9398 kPa and P_{sat} at 20 °C : 2.3376 kPa
- b) What is total heat of the moist air? Derive mathematical expression for total heat of moist air. Explain humid specific heat. [6]
- c) Explain following terms : [4]
- Humidity ratio
 - Wet bulb temperature

- Q7)** a) Explain all air system, all water system & air-water system. Draw schematic diagrams of the three types and discuss the merits and demerits of the systems. [8]
- b) What are the different ways of classifying refrigeration condensers? Explain any one type with neat sketch. [8]

OR

- Q8)** a) What different type of expansion devices are used In refrigeration system? Explain working of Thermostatic Expansion Valve with neat sketch. What are the advantages of Thermostatic expansion valve. [8]
- b) Explain working of scroll compressor with neat sketch. [4]
- c) Compare unitary air conditioning system with central plant. [4]
- Q9)** a) What are the different ways of classifying ducts? [4]
- b) What materials are commonly used for duct fabrication? What are the IS standards for guage of GI sheets. [4]
- c) What are the different types of pressure losses in duct systems? [4]
- d) List different types of fans used in AHU. Why forward curved blowers are preferred for domestic and commercial air conditioning applications?[4]

OR

- Q10)**a) Derive equation for circular equivalence of rectangular duct for the two alternatives- [8]
- Same air Velocity
 - Same Quantity of air flow
- b) What is the empirical relation used for determining frictional pressure loss in GI ducts? Write a short note on duct friction chart. [8]

PSYCHROMETRIC CHART

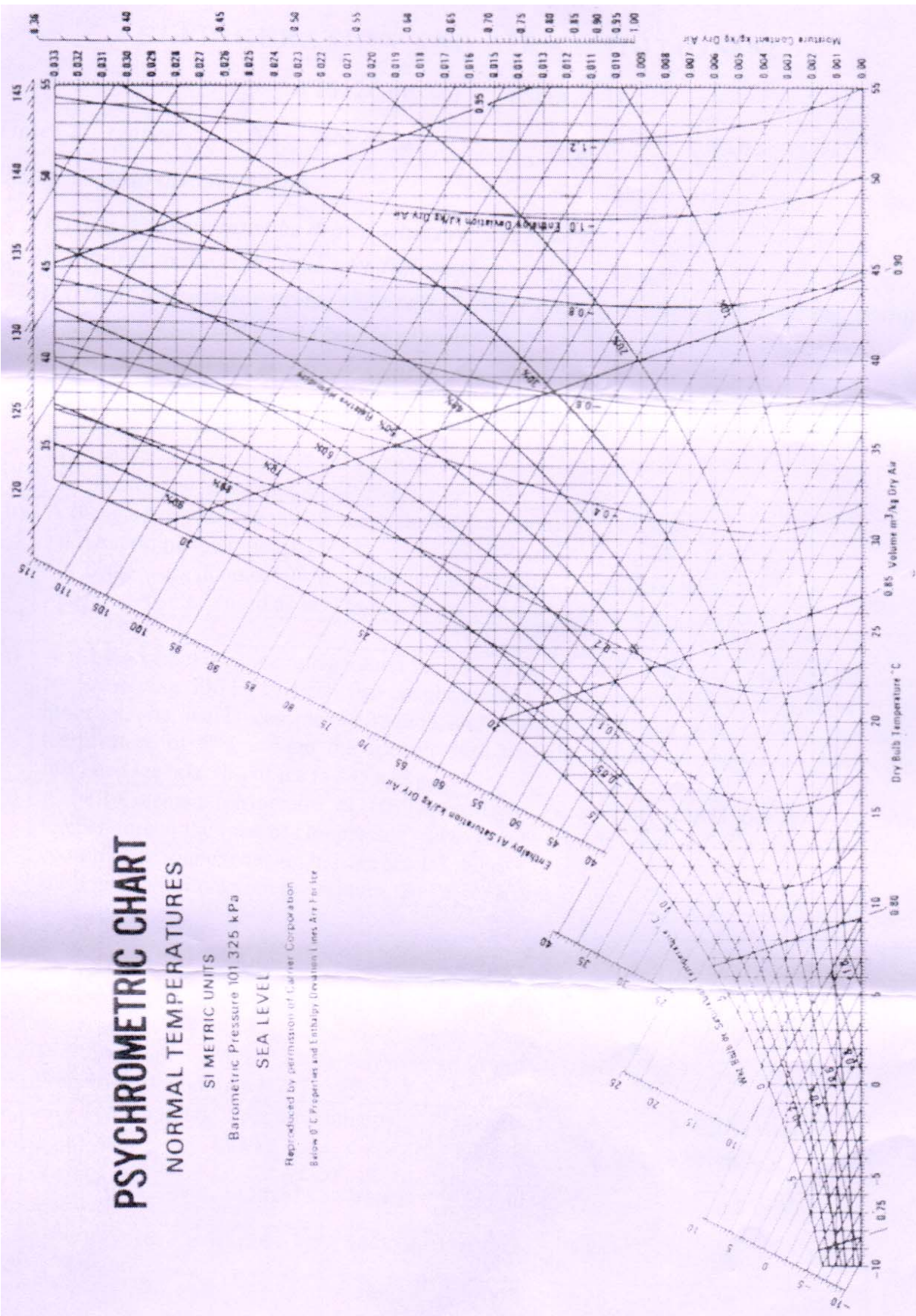
NORMAL TEMPERATURES

SI METRIC UNITS

Barometric Pressure 101.325 kPa

SEA LEVEL

Reproduced by permission of Carrier Corporation
 Below 0°C Properties and Entropy Deviation Lines Are For Ice



Total No. of Questions : 10]

SEAT No. :

P3069

[Total No. of Pages : 4

[5354]-557

B.E. (Mechanical Sandwich Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10*
- 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: $P_{o1} = 1.008$ bar, $T_{o1} = 300$ 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 25 m. 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 30cm. 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 resp. 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	18cm
Outer diameter of the impeller	20cm
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 100cm 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	60cm
Hub diameter	30cm
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	36cm
iv) Rotational Speed	18000 rpm
v) Blade Height at entry	6cm
vi) Air angles at rotor and stator exit	25°
vii) Axial velocity	180 m/s
viii) Work done factor	0.88
ix) Stage Efficiency	85 %
x) Mechanical Efficiency	96.7 %

Determine:- a) Air angles at the stator and rotor entry b) The mass flow rate of air c) The power required to drive the compressor d) The loading coefficient e) The pressure ratio developed by the stage f) Mach number at the rotor entry.

OR

Q10)a) Explain performance characteristics curves of a Centrifugal flow Compressor? [8]

b) Air enters the inducer of centrifugal compressor at $P_{01} = 1.02$ bar, $T_{01} = 335$ K. The hub and tip diameters of the impeller eye are 10 and 25cm 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]



[5354]-558

**B.E. (Mechanical Sandwich Engineering)
CAD/CAM AUTOMATION (Elective - I)
(2012 Pattern) (Semester - II)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer five questions.
- 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 procedure & matrices for reflecting an entity about a line $y = x$ and $y = -x$. A triangle ABC with A (8,0) B (12,0) and C (12,3) is to be reflected about a line $y = x$ Evaluate new coordinates of ΔABC using the concatenated transformation matrix. [5]

b) Compare Hermite cubic Spline, Bezier curve and B-spline curve. [5]

OR

Q2) a) Explain an importance of Homogenous coordinates in 2D geometric Transformations. [5]

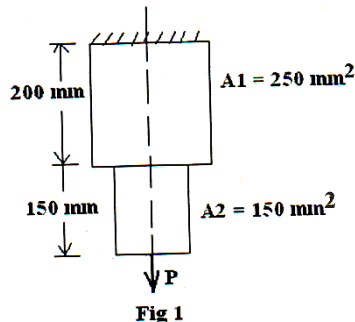
b) Enlist methods of solid modeling. Discuss feature Based modeline. [5]

Q3) a) Explain various continuity conditions to ensure smoothness of a synthetic curve. [5]

b) Explain the term 'discretization' of a body. Enlist 1D, 2D and 3D elements used in FEA. [5]

OR

Q4) An axial step bar is shown in figure. It is subjected to axial pull P of 15 kN. If material of bar is uniform and having a modulus of elasticity as 100 GPa. Determine deflection and stresses in each element and reaction force. [10]

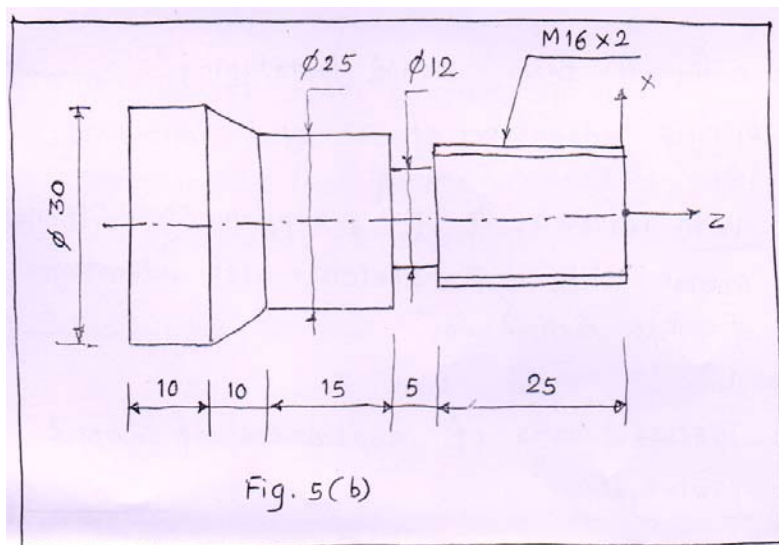


Q5) a) What is 'Adaptive control system'. Discuss advantages in brief. [4]

b) Enlist commonly used M-codes in CNC lathe write a CNC program using suitable G-codes, M-codes and canned cycle to machine the component as shown in fig 5 (b).

- Material : mild steel (For workpiece)
HSS (for cutting tool)
- Cutting speed : 30 m/min
- Feed : 0.05 mm/rev

[14]

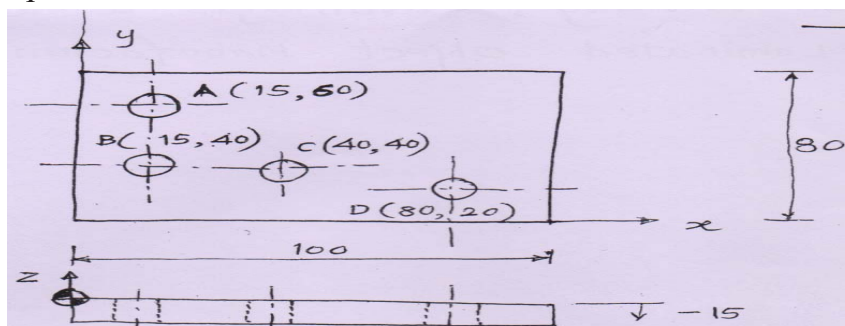


OR

Q6) a) Discuss in brief with an example [6]

- i) Tool length compensation
- ii) Cutter Radius compensation

b) Write a CNC program using G and M codes for drilling four holes in a part as shown in Fig 6 (b) below. Comment on each block. Assume thickness of plate as 15 mm. Cutting tool is of HSS with cutting speed of 60 m/min and feed of 0.5 mm/tooth. Drill tool is twisted drill with one complete helix teeth. [12]



- Q7)** a) Define the term 'Rapid prototyping'. Discuss advantages of RP and limitations. [6]
- b) With reference to RP, Explain stereolithography process with neat sketch. List advantages of this method. [6]
- c) Discuss areas of applications of Rapid prototyping. [4]

OR

- Q8)** a) Explain in brief [4]
- i) Rapid Tooling
- ii) STL format
- b) Compare FDM and SLS based on following points [6]
- i) Material used
- ii) Dimensional accuracy
- iii) Surface finish
- iv) Stability
- v) Strength
- vi) Speed
- c) Explain working, advantages & applications of laminated object manufacturing (LOM) [6]
- Q9)** a) Discuss robot anatomy in brief. [6]
- b) Explain the parameters used in robot specifications & selection [4]
- c) Define the term 'machining centres'. Explain with neat sketch it's advantages & limitations. [6]

OR

- Q10)**a) Explain 6 - Degrees of Freedom of a Robot [4]
- b) Enlist desirable features of robot sensors and explain basic robot configurations [6]
- c) Discuss types of automation with suitable examples. [6]



Total No. of Questions : 10]

SEAT No. :

P3071

[Total No. of Pages :3

[5354]-559

B.E. (Mechanical Sandwich Engineering)

ENERGY AUDIT AND MANAGEMENT (End Semester)

(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) *Draw a neat diagram wherever necessary.*
- 3) *figures to the right indicate full marks.*
- 4) *Use of calculator, steam tables is allowed.*
- 5) *Assume suitable data if necessary.*

Q1) a) Define: [4]

- i) Primary and Secondary Energy,
 - ii) Commercial and non-commercial energy.
- b) Explain what are India's short term, medium term and long term plans in dealing with energy security. [6]

OR

Q2) a) What is energy policy? What are its key contents? [4]

- b) How do an industry, nation and globe would benefit from energy efficiency programs? [6]

Q3) a) Briefly explain the five energy conservation opportunities that are available to an Energy Manager in any organization. [5]

- b) Briefly explain with examples on fuel and energy substitution? [5]

OR

Q4) a) What is the need for walk in audit? How can walk in audit help obtain a need for detailed audit? [5]

- b) Briefly explain the ten steps involved in a detailed audit of an engineering workshop. [5]

P.T.O.

- Q5) a)** Calculate the net present value for an investment of Rupees 1500/- toward changing ten compact fluorescent lamp (CFL). The following table gives investment and cash flow. Assume discount rate as 10% and life of the CFL as 2 years. **[8]**

Cash Flow:	1 Year	2 Year
Savings in (Rupees)	1000/-	1000/-

- b) What are important guidelines to achieve energy efficiency in steam systems? **[8]**

OR

- Q6) a)** Calculate the internal rate of return for the following cash flow in an energy conservation project. **[8]**

Year:	0	1	2	3	4
Cash flow (Rupees):	(200000/-)	60000/-	60000/-	80000/-	90000/-

- b) Briefly explain any four options for financing an energy management program in any organization? **[8]**

- Q7) a)** Explain any four instruments used by an Energy manager or Auditor during an audit of a coal fired boiler in an industry. **[8]**

- b) Find the efficiency of a boiler using direct method given the following data for a coal fired boiler: **[8]**

Dry Steam generated - 8 TPH

Steam pressure (guage)/temp - 10kg/cm² at 180° C

Coal Consumed - 1.8 TPH

Feed water temperature - 85° C

GCV or Coal - 3200 kCal/Kg

Enthalpy of Steam at 10 kg/cm² pressure is 665 kCal/Kg

Enthalpy of feed water - 85 kCal/Kg.

OR

- Q8) a)** Explain as to how do you assess the performance of fans. **[8]**

- b) What is cogeneration? Explain how cogeneration helps to improve an energy efficiency program? **[8]**

- Q9)** a) What are the different losses in a furnace? [6]
- b) Explain different types of instruments used during an energy audit. [6]
- c) What are the different energy saving opportunities in any residential electrical lighting system? [6]

OR

- Q10)**a) What are the different effects of acid rain? [6]
- b) Write a note on Kyoto Protocol and Treaty. [6]
- c) Why cogeneration systems play an important role in any industry? [6]



Total No. of Questions : 10]

SEAT No. :

P3072

[Total No. of Pages : 6

[5354]-560

B.E. (Mechanical Sandwich Engineering)

OPERATIONS RESEARCH

(2012 Pattern) (Semester - II) (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 Q 10.*
- 2) *Answers in One answer Books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

Q1) a) Discuss the various phases in solving an OR problem. **[4]**

- b) Two players P and Q play a game. Each of them has choose one of the three colours, White (W), Black (B) and the Red (R) independently of the other. Thereafter the colours are compared. If both P & Q have chosen White (W,W), neither wins anything. If players P select White and player Q selects Black (W, B), player P loses Rs. 2 or player Q wins the same amount and so on. The complete payoff matrix is as shown below. Find the optimum strategies for P and Q and the value of the game. **[6]**

		Player Q		
		W	B	R
Player P	W	2	-2	7
	B	2	5	6
	R	3	-3	8

OR

- Q2)** A company has four territories open and four salesmen available for an assignment. The territories are not equally rich in their sales potential. It is estimated that a typical salesman operating in each territory would bring in the following annual sales:

Territory	I	II	III	IV
Annual sales (Rs.)	1,26,000	1,05,000	84,000	63,000

P.T.O.

The four salesmen also differ in their ability. It is estimated that working under the same conditions, their yearly sales would be proportionality as follows

Salesmen	A	B	C	D
Propositional	7	5	5	4

If the criterion is maximum expected total sales, the intuitive answer is to assign the best salesmen to the richest territory, the next best salesmen to the second richest and so on verify this answer by the assignment technique. [10]

- Q3)** a) Discuss the generalised model of linear programming (LPP) in OR. [4]
 b) Find out the initial feasible solution by Vogel's Approximation Method (VAM)

Plants or Origins	Destinations				Supply
	1	2	3	4	
1	2	3	11	7	6
2	1	0	6	1	1
3	5	8	15	9	10
Requirement	7	5	3	2	Total = 17

[6]

OR

- Q4)** Under an employment promotion program, it is proposed to allow sale of newspapers on the buses during off-peak hours. The vendor can purchase the newspapers at a special concessional rate of 25 paise per copy against the selling price of 40 paise. Any unsold copies are, however a dead loss. The vendor has estimated the following probability distribution for the number of copies demanded as follows: [10]

Weekly Sales	15	16	17	18	19	20
Probability	0.04	0.19	0.33	0.26	0.11	0.07

- a) How many copies should be order so that his expected profit will be maximum?
 b) Compute EPPI.
 c) The vendor is thinking of spending on a small market survey to obtain additional information regarding the demands level. How much should he be willing to spend on such a survey?

- Q5) a)** Discuss in brief any two Inventory control Techniques. **[4]**
- b) An engineering is offered two types of material handling equipments A and B. A is priced at Rs. 5,00,000 including the cost of installation and the cost for the operation and maintenance are estimated as Rs. 60,000 for each of the first 5 years and increasing every year by Rs. 20,000 in the sixth and the subsequent year. Equipment B the same rated capacity is priced at Rs. 2,50,000 including the cost of installation and the cost for the operation and maintenance are estimated as Rs. 1,20,000 for each of the first 5 years and increasing every year by Rs. 20,000 in the fifth year onwards. The company expected the return of 10% on all its investment. Neglect the scrap value of the equipment at the end of its economic life, determine which equipment the company should buy?**[12]**

OR

- Q6) a)** A manufacturer has to supply his customers with 600 units of his product per year. Shortage are not allowed and storage amount of 60 paise per unit per year. The set up cost per run is Rs. 80.00. Find out the
- Economic ordering quantity
 - Minimum yearly average cost
 - Minimum yearly total inventory cost. When the cost per unit item is 2/- per unit
 - Optimum number of orders per year
 - The optimum period of supply per optimum order.

The increase in the order cost associated with ordering (i)20% more than the EOQ **[8]**

- b) The following mortality rates have been observed for a certain types of fuse.

Week	1	2	3	4	5
% failing by the End of Week	5	15	35	75	100

There are 1000 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 per fuse. It is proposed to replace all fuses at fixed intervals of time, whether or not they have burnt out and to continue replacing burnt our fuses as they fail. At what intervals the group replacement should be made? Also prove that this optimal policy is superior to the straight forward policy of replacing each fuse only when it fails. **[8]**

- Q7) a)** Six jobs are to be process on three machines. The processing time is as follows, Find the optimal schedule so that the total elapsed time is minimized.

Job	J ₁	J ₂	J ₃	J ₄	J ₅	J ₆
Machine M ₁ [Turning]	10	3	5	4	2	1
Machine M ₂ [Threading]	2	4	6	3	1	2
Machine M ₃ [Knurling]	8	6	7	9	7	7

[10]

- b) Explain with the help of neat sketch a generalised queuing model. Also explain the Kendall's notation for representing queuing models? [6]

OR

- Q8) a)** A repair shop attended by a single mechanic has an average of four customers an hour who bring small appliances for repair. The mechanic inspects them for defects and takes six minutes an average. Arrivals are Poisson and service rate has the exponential distribution. You are required to

- Find the proportion of time during which there is no customer in the shop.
- Find the probability of finding at least one customer in the shop.
- What is the average number of customers in the system?
- Find the average time spent by a customer in the shop including service. [8]

- b) Use graphical method to minimize the time needed to process the following jobs on the machine shown i.e. each machine find the job which should be done first . Also calculate the total elapsed time to complete both jobs. [8]

Job (J ₁)	Sequence	Machine				
		A	B	C	D	E
	Time (hrs.)	3	4	2	6	2

Job (J ₂)	Sequence	Machine				
		B	C	A	D	E
	Time (hrs.)	5	4	3	2	6

Q9) a) Differentiate between CPM and PERT.

[6]

b) A bank has decided to modernize its office .The major elements of the project are as follows.

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

i) Draw an arrow diagram for this project.

ii) Find out the critical path.

iii) For each non-critical activity find out the total, free and independent float or slacks.

[12]

OR

Q10)a) A project has the following data.

Task	1-2	1-3	1-4	2-5	2-6	3-6	4-7	5-7	6-7
Optimistic Time	5	18	26	16	15	6	7	7	3
Pessimistic time	10	22	40	20	25	12	12	9	5
Most likely time	8	20	33	18	20	9	10	8	4

Determine the following:

- i) Construct the network and find out the Expected task time and their variance.
- ii) The earliest and the latest expected completion times of each event.
- iii) The critical path.
- iv) The probability of an event occurring at the expected completion date if the original scheduled time of completing the project is 41.5 weeks.
- v) The duration of the project that will have 95% chance of being completed. Use following table

Probability	0.3085	0.3050	0.3015	0.2981	0.95
Normal distribution constant (Z)	-0.50	-0.51	-0.52	-0.53	1.64

[12]

b) Discuss in brief (Any Two) :

[6]

- i) Monto - Carlo Simulation
- ii) Common Errors/Flaws in Network
- iii) Goal Programming
- iv) Crashing in the network.



Total No. of Questions : 10]

SEAT No. :

P3073

[Total No. of Pages :2

[5354]-560-A

B.E. (Mechanical-Sandwich)

ROBOTICS (Elective - II)

(2012 Pattern)

Time : 2.30 Hours]

[Max. Marks : 70

Instruction to the candidates:

- 1) *Attempt all questions.*
- 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 pocket non programmable electronic calculator is allowed.*

- Q1)** a) What is D-H parameter and obtain an expression for D-H parameter [5]
b) Explain the working principle of vision sensor with neat sketch. [5]

OR

- Q2)** a) Explain structure of the robot in detail with neat sketch. [5]
b) Explain the geometric approach. [5]

- Q3)** a) Explain the following notations used to describe robot system. [5]
i) LRR
ii) RLR
b) What is the physical significance of angular velocity vector. [5]

OR

- Q4)** a) Discuss various problems occurred in inverse kinematics. [5]
b) Explain the significance of Singularities [5]

- Q5)** a) With the help of illustration, explain the differentiate between forward and inverse kinematics. [10]
b) Rotate the vector, $V = i + 4j + 3k$ by an angle of 80° about X-axis. [8]

P.T.O.

OR

- Q6)** a) Determine the position and orientation of the cup with respect to the gripper. If the position and orientation of the gripper with respect to base co-ordinate frame is given by T_3 such that [10]

$$T_3 = \begin{bmatrix} 25 & 43 & 86 & 5 \\ 87 & 50 & 0 & -4 \\ 43 & 75 & -50 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

- b) Explain microprocessor based robotic controllers in robots. [8]

- Q7)** a) Explain general block diagram of robot control system. [8]

- b) Explain control law of positioning. [8]

OR

- Q8)** a) A two jointed robot as has length of its arm as 12 cm and 15 cm. The first arm makes an angle of 30° and second arm makes an angle of 15° to the first arm. Compare the coordinate position for the end of the arm. [8]

- b) Explain PID controllers used in industrial robots. [8]

- Q9)** a) Explain the different steps involved in Segmentation. [8]

- b) Explain, why is machine vision system is a part of artificial intelligence. [8]

OR

- Q10)** a) Explain Necessity & application of Artificial Intelligence For Robotics System. [8]

- b) Explain with block diagram of Machine vision system for Robots. [8]



Total No. of Questions : 10]

SEAT No. :

P3074

[Total No. of Pages :3

[5354]-560-B

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

TRIBOLOGY (Elective - II)

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer any three questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *The 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) What is friction? Explain the laws of dry friction. **[4]**

b) Explain the modes of hydrodynamic lubrication. **[6]**

OR

Q2) Using the Bowden and tabor's theory of simple adhesion prove that coefficient friction due to adhesion is- **[10]**

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

Q3) a) Discuss the effect of following on coefficient of friction between two surfaces- **[4]**

- i) Surface finish,
- ii) Sliding velocity

b) State and explain applications and the importance of Tribology in industries. **[6]**

OR

Q4) a) State assumptions made in Reynolds equation. **[4]**

P.T.O.

- b) Differentiate between long journal bearing and short journal bearing. [6]
- Q5)** a) Explain squeeze film lubrication with example. [6]
- b) 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 . [10]

OR

- Q6)** The following data is given for a hydrostatic thrust bearing [16]

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:

- The optimum oil film thickness for minimum power loss,
 - The total power loss,
 - The temperature rise, assuming the total power loss in bearing is converted into frictional heat.
- Q7)** a) Explain the phenomenon of Elastohydrodynamic lubrication [EHL] and how it differs from hydrodynamic lubrication. State the applications of EHL. [8]
- b) Explain the working principle of active and passive magnetic bearing. Also mention its types. [8]

OR

- Q8)** a) Explain the significance of the Hertz theory in Elastohydrodynamic Lubrication. Write Ertel-grubin equation with all specific terms and also write the limitations of this equation. [8]
- b) Explain gas lubricated bearings and state advantages and disadvantages

or limitations of gas bearings. [8]

Q9) a) Explain the mechanics of tyre-road interactions. [8]

b) How surface engineering processes are specified? Classify in detail the surface engineering processes and Explain any one process. [10]

OR

Q10) Write a note on following. [Any Three] [18]

i) Hybrid bearing.

ii) Cladded Coating.

iii) Porous bearing.

iv) Lubrication requirements in case of Extrusion operation.



Total No. of Questions : 9]

SEAT No. :

P3075

[Total No. of Pages : 3

[5354]-561

B.E. (Auto Mobile) (Semester - I)

**Automotive Refrigeration and Air Conditioning
(2012 Pattern)**

Time : 2.5 Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Use steam table, pchychrometric chart. Calculator is allowed.*
- 2) *Assume suitable data if necessary.*
- 3) *Figures to the right side indicater full marks.*
- 4) *Solve Q. 1 or Q.2, Q3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q. 9 is compulsory.*

Q1) a) A refrigerating effect machine working R - 12 refrigerant has working temperature limits of 40°C and - 15°C and uses dry compression using p-h chart find. **[6]**

- i) Theoretical piston displacement/ton of refrigeration
- ii) Compressor power per tonne of refrigeration
- iii) Cop.

b) Explain vapour compression cycle with detail & its applications. **[4]**

OR

Q2) a) Explain Bell Coleman cycle with help of diagram. **[4]**

b) Using p-h chart calculate cop mass flow rate of refrigerant & compressor input in kw for following system parameters. **[6]**

- i) R22 refrigerant condensing temp 40°C & evaporating is 0°C.
- ii) Temp of refrigerant entering the compressor is 5°C leaving the condensor is 30°C resp.
- iii) Heat Ryechon in condensor is 200 kw.

P.T.O.

Q3) Condensor & Evaporator explain in detail & it design guideline. [10]

OR

Q4) Explain GWP & ODP. [10]

Q5) a) Explain on ppsychrometric chart in details with application. [8]

i) Cooling with dehumidification

ii) Cooling with humidification.

b) 40 cmm of air at 31°C DBT & 19°C HBT is passed over the cooling coil whose s/f temp is 5°C. The cooling coil capacity is 4TR Under the given conditions of air. Determine DBT & WBT of air leaving the cooling coil. Also calculate BF of cooling coil. [10]

OR

Q6) a) Atm air at 10°C WBT & 15°C DBT enters a heating coil whose temp is 40°C DBT The by pass factor is 0.4 of heating coil. Determine DBT, WBT RH of the air leaving the coil & the amount of Sensible heat added per kg of air. [8]

b) Define DBT, WBT, RH, absolute humidity sensible heating & cooling. [10]

Q7) The Sensible heat & latent heat load for air conditioned space are 25 Kw & 5 Kw resp. The room condition is 25°C DB & 50% RH The outdoor condition is 40°C DB & 50% RH the ventilation requirement is such that on mass flow rate basis 20% fresh air is introduced & 80% of supply air is recirculated the by pass factor of cooling coil is 0.15. Determine. [16]

a) Supply air flow

b) Outside air sensible heat

c) Outside air latent heat

d) Grand total heat

e) ERSHE

OR

Q8) A hall maintained at 24°C DB & 60% RH under following conditions outside condition 38°C DB & 28°C WB

Room SH Load ∴ 46.4kw.

Room LH Load ∴ 11.6 kw.

Quantity of infiltration = 1200 m³/hr Adp = 10°C

Quantity of air recirculated = 60%

If the conditioned air mixed with Qty of recirculated air after the cooling coil find. **[16]**

- a) Condition of air leaving coil.
- b) Condition of air entering in a hall.
- c) Mass flow rate entering the cooler
- d) Mass flow rate of total air passing through the hall
- e) By pass factor
- f) The refrigeration load

Q9) Write note on (any 3)

[16]

- a) Refrigerant recovery & retrofitting
- b) Air conditioning electrical & electronic control
- c) Effect of AC on engine load performance
- d) Leak detection test
- e) Temperature measurement in A/c

▽▽▽▽

Total No. of Questions : 7]

SEAT No. :

P3076

[Total No. of Pages : 2

[5354]-562
B.E. (Automobile) (Semester - I)
AUTOMOTIVE CHASSIS & SYSTEMS
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Neat diagrams must be drawn whenever necessary.*
- 2) Figures to the write indicate full marks.*
- 3) Assume Suitable data if necessary.*

Q1) a) Describe Ackerman steering geometry. **[8]**

b) Describe Hydro-Elastic suspension. **[7]**

c) Write brief note on wheel balancing. **[5]**

OR

Q2) a) Draw detailed layout of steering system and explain it in detail. **[7]**

b) What is Active suspension? Explain it with advantages and limitations. **[8]**

c) Describe different tire tread patterns. **[5]**

Q3) a) Describe Disc brake arrangement with neat diagram. **[6]**

b) Write a note on hydraulic brake fluids. **[6]**

c) Describe in detail Vacuum servo to assist brakes. **[8]**

OR

Q4) a) Describe Drum brake arrangement with neat diagram. **[6]**

b) What are functions and requirements of brake system. **[6]**

c) Describe Air braking system in detail. **[8]**

P.T.O.

- Q5)** a) Describe principle of operation and working layout of ESP. [8]
b) Explain head restraint and its importance. [7]

OR

- Q6)** a) Explain active safety and passive safety along with examples. [8]
b) Explain different types of mirrors and their location. [7]

Q7) Attempt all three questions below.

- a) Explain various types of automotive chassis. [5]
b) Explain causes of chassis failure. [5]
c) Explain manufacturing process of chassis. [5]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3077

[Total No. of Pages : 2

[5354]-563

B.E. (Automobile Engineering)
MACHINE & VEHICLE DYNAMICS
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

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

Q1) A four cylinder in-line engine has cranks at interval of 90° . The speed of engine is 200 rpm. Each crank is 600 mm long & mass of reciprocating part of each cylinder is 200 kg. The outer cylinders are 4 m apart and inner cylinders are 2m apart & are placed symmetrically between the outer crank.

Determine the firing order of the cylinders for the best balancing of the reciprocating masses. What would then be the magnitude of unbalanced primary couple? **[10]**

OR

- Q2)** a) Explain Damping & its types in brief. **[6]**
b) Differentiate Static & Dynamic balancing. **[4]**

Q3) A system having rotating unbalance has total mass 25kg. The unbalanced mass of 1 kg rotates with a radius of 0.04 m. It has been observed that a speed of 1000 rpm, the system & eccentric mass have a phase difference of 90° & the corresponding amplitude is 0.015 m. Find out, **[10]**

- a) Natural frequency
- b) Damping factor
- c) Amplitude at 1500 rpm
- d) Phase angle at 1500 rpm

P.T.O.

OR

- Q4)** a) Find out generalize equation for logarithmic decrement. (δ). [6]
b) Write a short note on vibration isolator. [4]

- Q5)** a) Explain effect of engine flywheel on acceleration. [6]
b) Write a short note on vehicle performance & draw bar pull. [6]
c) Derive net driving power available at the road surface. [6]

OR

- Q6)** a) Write a short note on focus & moments acting vehicle. [6]
b) Explain the terms "gradiability" & "tractive effort". [6]
c) Write a short note on "gyroscopic effort". [6]

- Q7)** a) Derive the equation of "traction limited acceleration". [8]
b) Write a short note on "Braking force" & "Declaration". [8]

OR

- Q8)** a) Explain impact of power train component on fraction & acceleration. [8]
b) Enlist components of Antilock Braking system & explain in brief. [8]

- Q9)** a) Derive mathematical model of handling. [8]
b) Differentiate active and semi active suspension. [8]

OR

- Q10)**a) Derive mathematical model of ride. [8]
b) Write a short note on Neutral steer, Under steer & Over steer. [8]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3078

[Total No. of Pages : 3

[5354]-564

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

FUNDAMENTALS OF COMPUTATIONAL FLUID DYNAMICS

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) Figures to the right indicate full marks.*
- 3) Assume Suitable data if necessary.*
- 4) Use of scientific calculator is allowed.*

Q1) a) Explain Navier Stoke's model used in CFD solvers. **[6]**

b) Explain preprocessor in CFD. **[4]**

OR

Q2) a) What is the grid types used in CFD solution? **[6]**

b) Explain in short flow modeling using control volumes. **[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) $X_1 + 2 X_2 = 4$

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

$$X_2 + 3X_3 + X_4 = 7$$

$$2X_3 + 2X_4 = 8$$

Solve by Thomas Algorithm.

[10]

P.T.O.

Q5) a) Consider long slab ($2L \times 2L$) 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) Explain first order wave equation solution with Lax Wendroff scheme. [6]

OR

Q6) a) Derive the differential equation for first order wave equation with upwind method and Mac Cormac scheme. [12]

b) Explain the amplification factor modulus for upstream differencing scheme. [6]

Q7) a) Explain the difference between SIMPLE, SIMPLER, SIMPLEC algorithm with the help of Navier stroke equation. [10]

b) How CFD is applicable for problems related to fluid flow through pipes? [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. [10]

Find the percentage error in shear stress involved in 1st and 2nd order difference compared with exact solution.

b) Explain the numerical procedure using SIMPLE algorithm. [6]

- Q9)** a) Explain following boundary conditions in brief (any 3). [9]
- i) no slip
 - ii) free slip
 - iii) rotating wall
 - iv) symmetry
- b) How convergence is monitored in CFD. [7]

OR

- Q10)**a) Explain following solver models, [9]
- i) SA model
 - ii) K - ϵ
 - iii) K - ω
- b) Explain the solver settings in CFD. [7]

▽▽▽▽

[5354]-565

B.E. (Automobile Engineering)

FUNDAMENTALS OF FINITE ELEMENT ANALYSIS

(2012 Pattern) (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.
- 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. Explain in brief Finite element Application. [6]

b) Determine the nodal displacement and support reactions of the axially loaded bar as shown in Figure 1.1. Force $P = 200$ kN. [8]

Given: 1 : Aluminium : $A_1 = 2400$ mm², $E_1 = 70$ GPa

2 : Steel : $A_2 = 600$ mm², $E_2 = 200$ GPa

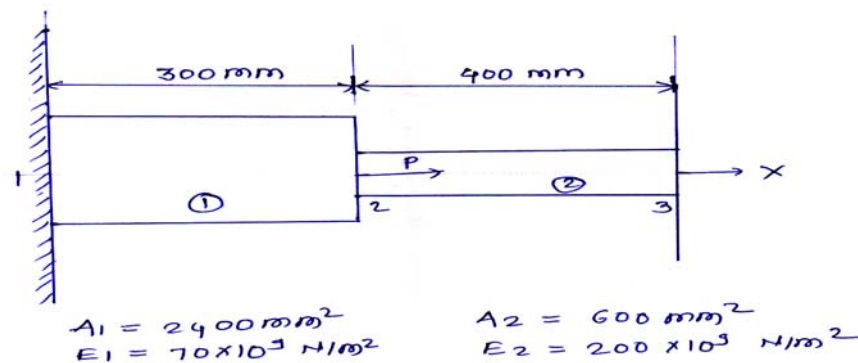


Figure 1.1

c) Explain the term shape function and write a shape function for CST & LST elements. [6]

OR

P.T.O.

- Q2)** a) Explain the Reyleigh-Ritz & Galerkin Methods. [6]
 b) For the two bar truss shown in Figure 2.1 determine the nodal displacements & forces. Assume $E = 200 \text{ GPa}$, $A = 6 \times 10^{-4} \text{ m}^2$, $\delta y = 50 \text{ mm}$. [8]

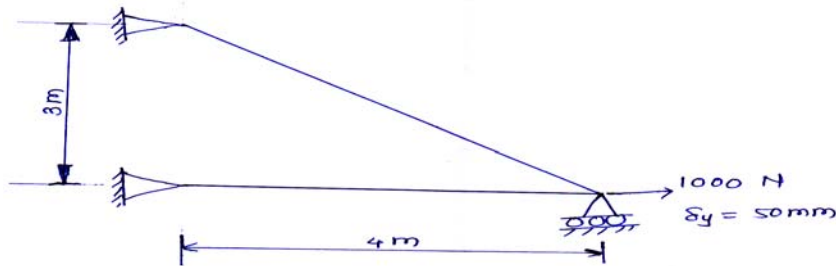


Figure 2.1

- c) Write a short note on axi-symmetric element with an example. [6]

- Q3)** a) Explain the terms iso-parametric, sub-parametric & super-parametric, uniqueness of mapping of isoparametric elements. [8]
 b) Evaluate the integrals using three point Gaussian quadrature (5 marks each). [10]

i) $I = \int_{-1}^1 [x^2 + \cos(\frac{y}{2})] dx$

ii) $I = \int_{-1}^1 [3^x - x] dx$

OR

- Q4)** a) Explain Newton-Cotes and Gauss quadrature in brief & find out the weights & sampling point for two point gauss quadrature. [8]
 b) Determine the element stresses, assume the plane stress condition. Let $E = 210 \text{ GPa}$, $\nu = 0.25$. Assume the element nodal displacements have been determined to be $u_1 = 0$, $v_1 = 0.05 \text{ mm}$, $u_2 = 0.025$, $v_2 = 0$, $u_3 = 0$ and $v_3 = 0.05$. [10]

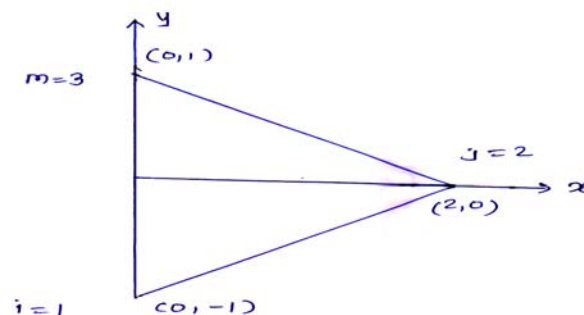


Figure 4.1

- 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 cm² is 20 W/m-°C. The rate of heat generation in the rod is 10⁵ W/m³. One end of the rod is kept at 0 °C and the other end at 100 °C. The rod is insulated except at the ends. Using finite element with two elements, find out the temperature at the mid-point of the rod.[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]

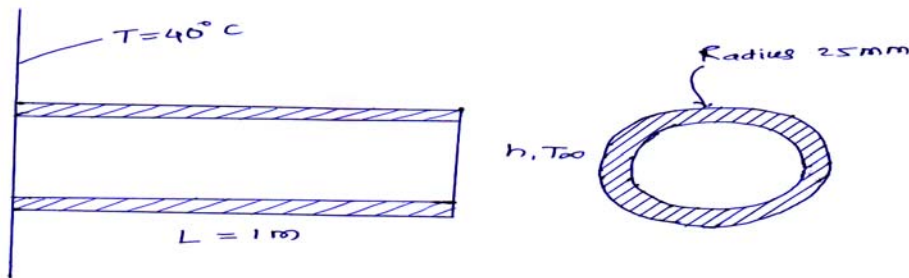


Figure 6.1

- Q7) a)** Explain the lumped mass matrix and consistent mass matrix. Why combination of mass matrices is more advantageous than lumped mass matrix & consistent mass matrix individually. [8]
- b) For the bar 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: $L = 2.5\text{ m}$, $\rho = 7850\text{ kg/m}^3$, $E = 210\text{ GPa}$.

$$[m^e] = \frac{\rho AL}{2} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

OR

- Q8)** a) What are the different types of errors in FEA? Explain in brief the Priori 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]**

$$[m^e] = \frac{\rho AL}{6} \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3081

[Total No. of Pages : 2

[5354]-567

B.E. (Automobile) (Semester - I)
HYBRID AND FUEL CELL VEHICLE
(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, Q9 or Q10.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right side indicate full marks.*
- 4) Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.*
- 5) Assume Suitable data if necessary.*

Q1) a) What are the components of an electric vehicle? Give advantages and disadvantages of electric vehicles. **[5]**

b) Explain the construction and working of AC synchronous motor. **[5]**

OR

Q2) a) Explain the construction and working of AC induction motor with neat sketch. **[5]**

b) Explain the configuration and operating modes of parallel mild hybrid electric drive train with their layout. **[5]**

Q3) a) Explain combined hybrid configuration with neat sketch. **[5]**

b) Draw and explain ideal performance characteristics for a vehicle traction power plant and typical performance characteristics of electric motors for traction. **[5]**

OR

Q4) a) Explain grid connected hybrid vehicles. **[5]**

b) Differentiate between series hybrid and parallel hybrid configurations. **[5]**

P.T.O.

- Q5)** a) Explain charging and discharging of Lead Acid Battery with its chemical reaction. [8]
- b) Write a short note on :- [8]
- i) Battery Ratings
 - ii) Battery Capacities

OR

- Q6)** a) Enlist the different types of battery failures. Explain each one in detail. [8]
- b) Write a short note on :- [8]
- i) Battery Performance
 - ii) Battery Efficiency

- Q7)** a) With neat sketch explain Proton Exchange Membrane (PEM) fuel cell. [9]
- b) Explain Solid Oxide fuel cell with neat sketch. [9]

OR

- Q8)** a) With neat sketch explain molten carbonate fuel cell. [9]
- b) Explain fuel cell electric vehicle with neat layout? Also give the advantages of the same. [9]

- Q9)** a) With the help of neat sketch explain the ultra high speed flywheel as an energy storage device. [8]
- b) Enlist the types of accumulators? Explain gas loaded accumulator with neat sketch. [8]

OR

- Q10)**a) With neat sketch explain the working of vane pump. [8]
- b) A hydraulic motor operating at 75 bar pressure, has a volumetric displacement of $175 \text{ cm}^3/\text{rev}$. The motor runs at 2000rpm to deliver a torque of 175 N.m, while using a flow rate of 375 lpm. Determine the volumetric, mechanical and overall efficiencies. Also determine the actual power delivered by the motor. [8]

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P3082

[Total No. of Pages : 2

[5354]-568

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

AUTOMOTIVE MATERIALS

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Figures to the right side indicate full marks.*
- 2) *Use of sliderule, electronic calculator is allowed.*
- 3) *Assume Suitable data if necessary.*
- 4) *Solve 6 questions 1 or 2,3 or 4, 5 or 6, 7 or 8, 9 or 10, & 11 or 12.*

SECTION - I

- Q1)** a) Explain the Selection Criteria- Shape factor, elastic extrusion in detail with application. [3]
- b) Draw material property chart for modulus fracture and explain in detail.[3]

OR

- Q2)** a) Explain significance of material property chart and its application for material selection. [3]
- b) Explain selection criteria bending and twisting with application in automobiles. [3]

- Q3)** a) Explain the significance of Electrical and Magnetic materials in automobile. [3]
- b) What are the applications of superconductors and justify the answer.[3]

OR

- Q4)** a) Explain with composition Nano crystalline materials with applications.[3]
- b) Explain in brief about MEMS materials. [3]

P.T.O.

- Q5)** a) What are characteristics of Composite materials? Explain in brief. [4]
b) Explain the different types of plastics and with their application. [4]

OR

- Q6)** a) What are characteristics of ceramic materials? Explain in brief. [4]
b) Give application of ceramics in automobile. [4]

SECTION - II

- Q7)** a) Explain thermal facing with help of neat sketch and also write the advantages and disadvantages. [8]
b) Write down the names of different methods of mechanical surface treatment and explain any one in detail. [8]

OR

- Q8)** a) Explain diamond coating with neat sketch. [8]
b) Explain in detail conversion coating with example. [8]

- Q9)** a) Write the applications of Dual phase steel in detail. [8]
b) Explain the applications of smart materials in automobiles. [8]

OR

- Q10)**a) Explain the modern material metallic glass with its advantages and application for automotive purpose. [8]
b) Explain composition of Nano crystalline material. [8]

- Q11)**a) Explain the material selection criteria for cylinder block and justify the answer. [9]
b) Write the application of non-metallic material Polymer for automotive purpose. [9]

OR

- Q12)**a) What is the selection criteria for the automotive materials give example for Cylinder head. [9]
b) Write the application of non-metallic material composite for automotive purpose. [9]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3083

[Total No. of Pages : 2

[5354]-569

B.E. (Automobile) (Elective - II) (Semester - I)
AUTOMOTIVE HYDRAULICS AND PNEUMATICS
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

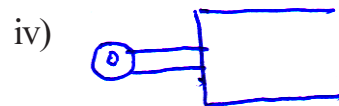
- 1) *Answer five questions.*
- 2) *Figures to right indicate full marks.*
- 3) *Assume Suitable data, if necessary.*

- Q1)** a) Classify the types of Hydraulic fluids. [6]
b) What is the difference between Static and dynamic Seal. [4]

OR

- Q2)** a) Explain the effect of temperature and pressure on Hydraulic fluid. [6]
b) Discuss the factors Influencing the Selection of type of Pump. [4]

- Q3)** a) Sketch and Explain vane Pump in detail. [6]
b) Indentify the following. [4]



OR

- Q4)** a) Sketch and Explain Tele scopic cylinder. [6]
b) What are the Advantages & Disadvantages of Poppet Valve. [4]

P.T.O.

- Q5)** a) Explain Regeative cylinder circuit with Neat circuit diagram. [8]
b) Draw and Explain the meter-in-circuit and meter-out circuit. [8]

OR

- Q6)** a) Explain cylinder synchronizing circuit with neat circuit diagram. [8]
b) Explain the Pump-unloading circuit With neat circuit diagram. [8]

- Q7)** a) Explain the mufflers used in pneumatic system. [8]
b) Explain in detail Radial piston air motors. [8]

OR

- Q8)** a) Explain with diagram solenoid operated valve. [8]
b) Explain the FRL unit with Neat diagram and function. [8]

- Q9)** a) Explain construction and working of Power steering with sketch. [10]
b) Explain Air brake system used in vehicle with sketches. [8]

OR

- Q10)**a) Explain Accumulator & Hydraulic shock absorber. [8]
b) Explain with neat sketch Pneumatic circuit to control the door of vehicle. [10]

▽▽▽▽

Total No. of Questions : 9]

SEAT No. :

P3084

[Total No. of Pages : 2

[5354]-570

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

VEHICLE PERFORMANCE AND TESTING

(2008 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) Figures to the right side indicate full marks.*
- 3) Assume Suitable data if necessary.*
- 4) Use of scientific calculator is allowed.*

Q1) a) Explain any one Braking system used in modern vehicles. [4]

b) With the neat sketch explain EGR systems. [6]

OR

Q2) a) Write a short note comparison of automotive clutches. [4]

b) What is “epicyclic transmission”? [6]

Q3) Write the importance of free acceleration test and coast down test. [10]

OR

Q4) How to conduct testing on chassis dynamometer? [10]

Q5) Write a brief note on any three of following topics, (6Mx3) [18]

- a) Driving controls accessibility
- b) Collapsible steering
- c) Active safety & passive safety
- d) Ergonomic Consideration In Safety

P.T.O.

- Q6)** a) Explain the procedure to carry braking distance test. [8]
b) Enlist crash test sensors and explain working of any one. [8]

OR

- Q7)** a) Write a short note on dummies. [8]
b) What are the prime locations for different sensor mountings? [8]

- Q8)** a) What are the different types of sensors used in vehicle? and write selection criteria for the same. [8]
b) How to carry instrumentation for functional tests? [8]

OR

- Q9)** a) Write a short note on engine noise and vibration. [8]
b) Differentiate “wind tunnel test and full scale testing”. [8]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3085

[Total No. of Pages : 4

[5354]-571

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

AUTOMOTIVE SYSTEM DESIGN

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Solve question 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10.*
- 2) *Neat diagram must be drawn wherever necessary .*
- 3) *Figure to the right indicate full marks.*
- 4) *Use electronic pocket calculator.*
- 5) *Assume suitable data if necessary.*

Q1) a) Answer the followings : [6]

- i) Why multi - plate clutch is preferred in two - wheeler?
 - ii) What are the design requirements of clutch?
- b) What are the advantages of increasing the number of gear ratio steps in automobile gearbox? [4]

OR

Q2) a) A centrifugal clutch is to transmit 14.72 KW at 900 rpm.the shoe are four in number the speed at which engagement begins is 3/4th of running speed. the inside diameter of the pulley rim is 140 mm and the center of gravity of the shoe lives at 120 mm from the center of spider. The shoes are lined with the friction material for which the coefficient of friction taken as 0.25. The angle sustained by the shoes at center of the spider is 60° and the pressure exerted on the shoes is 9.81×10^4 N/m².determine. [6]

- i) Weight of shoe.
 - ii) Size of each shoe.
- b) Write note on gear train with types. [4]

P.T.O.

- Q3)** a) In a gear box the clutch shaft pinion has 14 teeth and low gear main shaft pinion 32 teeth. The corresponding lay shaft pinions have 36 and 18 teeth. The rear axel ratio is 3.7:1 and the effective radius of the rear tyre is 0.355 m. Calculate the car speed for the above system at an engine speed of 2500 mm. [6]
- b) What are the merits of cross type joint? [4]

OR

Q4) Any two. [10]

- a) What should be the characteristics of a propeller shaft?
- b) Why centrifugal clutch is more suitable for heavy duty applications.
- c) Explain the general design procedure of front axle

Q5) 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 4cm^2 , cross sectional area of front piston 20cm^2 . Cross sectional area of the rear piston is 5cm^2 . And distance moved by effort is 1cm. Calculate the followings : [10]

- i) Front to rear brake ratio
- ii) Total force ratio
- iii) Distance moved by output
- iv) Cylinder movement ratio
- v) Total movement ratio
- b) What are the components of hydraulic braking system? Explain their functions. [6]

OR

Q6) a) Two disc brake pads operate at a mean radius of 0.14m. the force applied to each pad is 4450N and the coefficient of friction between each pad and disc is 0.35. when the disc rotates at 500rpm, calculate. [10]

- i) the frictional torque acting on the disc,
- ii) the work done per minute by this torque, and
- iii) the heat energy generated per second.

- b) Solve Any two [6]
- i) Properties of friction lining.
 - ii) What is the braking efficiency? Explain
 - iii) Explain braking of a vehicle on a curved path

Q7) a) A typical coil suspension spring has 10 effective coils if a mean diameter 125mm and made out of wires of diameter 15mm. The spring is designed to carry a maximum static load of 3531.6 N. Calculate the shear stress and the deflection under the above loading.

If a maximum shear stress of 637650 KPa is allowable in the material, then what is the possible clearance in the spring? Take the value of $G = 73575 \times 10^3$ Kpa. [12]

- b) State and explain any one steering gear Mechanism. [6]

OR

Q8) a) Solve Any three. [12]

- i) Write a note on air spring.
- ii) Discuss general design considerations of suspension system.
- iii) What is nipping in leaf spring?
- iv) What are the functions of steering system?

- b) A rack-and pinion steering has a pinion of 16mm pitch circle diameter. What effort must be applied on the 320mm diameter steering-wheel to overcome a resistance of 500N experienced transversely on the rack? [6]

Q9) 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 : [16]

Consider factor of safety is 2.

Material	Mass Density ρ Kg/m ³	Material cost per Unit Mass C, Rs/kg	Yield strength S_{vt} N/mm ²
Plain Carbon Steel	7500	16	130
Aluminium Alloy	3000	32	50
Titanium Alloy	4800	480	90
Magnesium Alloy	2100	32	20

OR

Q10) Solve any Four :

[16]

- a) What is Ergonomics?
- b) How does ergonomics work?
- c) Explain the Johnson method of optimum design.
- d) Define Mechanical reliability.
- e) Write note on statistical considerations in design.



Total No. of Questions : 10]

SEAT No. :

P3086

[Total No. of Pages : 2

[5354]-572

B.E. (Automobile Engineering)

AUTOMOTIVE NVH

(2012 Pattern) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Logarithmic tables, Sliderule, 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 6 Hz. when 1 Kg 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 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. :

P3087

[Total No. of Pages : 2

[5354]-573

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

OFF-ROAD VEHICLE

(2012 Pattern) (Elective - III)

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.*

Q1) a) Explain the construction and working of power plant used in road construction. **[8]**

b) What is an off road vehicle? State the applications and constructions layout of an off Road vehicle. **[8]**

OR

Q2) a) Differentiate between crawler mounted tractor and wheel mounted tractor. **[6]**

b) Explain the construction and working of Grader with neat sketch. **[10]**

Q3) Explain the constructional layout of scraper with neat sketch. **[4]**

OR

Q4) Explain the construction layout of Dragline with neat sketch. **[4]**

Q5) a) Describe the constructional details of a tanker. **[10]**

b) Compare transmission drive P.T.O. and Independent drive P.T.O. **[8]**

OR

Q6) Write a short note on. **[18]**

- a) Gun Carriers
- b) Transport Vehicles
- c) Pulverizes & Rollers

P.T.O.

- Q7)** a) Explain about power steering system of the vehicle. [8]
b) Explain OCDB and dry disc caliper brake system of the vehicle. [8]

OR

- Q8)** a) Explain the design aspects of the dumper body. [8]
b) Describe the safe warning system for a dumper. [8]

- Q9)** a) What are the factors affecting traction performance? Explain. [8]
b) Write down the types of soil and list the different properties. [8]

OR

Q10) Write a short note on [16]

- a) Soil-Vehicle Mechanics
- b) Mobility Index (MI) (4)
- c) Vehicle Cone Index (VCI)
- d) Rated Cone Index (RCI)

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3088

[Total No. of Pages : 2

[5354]-574

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

ALTERNATIVE FUELS AND EMISSION CONTROL

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer any three questions from each section.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right side indicate full marks.*
- 4) Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.*

Q1) a) Write a note on biogas as a fuel for IC engine. **[4]**

b) Write the calorific value & general chemical formula of following fuels.
(any 3). **[6]**

- i) petrol
- ii) diesel
- iii) LPG
- iv) CNG
- v) BIO GAS

OR

Q2) a) Differentiate LPG & Petrol by its properties, advantages, disadvantages and applications. **[4]**

b) How are SI and CI engine fuels rated? **[6]**

Q3) a) Explain CNG as fuels? **[2]**

b) Explain any two synthetic fuels with its properties, advantages, disadvantages & handling. **[8]**

OR

Q4) a) Explain LPG as fuels? **[2]**

b) Write note on air vehicle. **[8]**

P.T.O.

- Q5)** a) Explain emission formation in SI engine? [8]
b) What is positive crankcase ventilation? Explain. [8]

OR

Q6) Explain effect of design and operating parameters on SI engine emission. [16]

- Q7)** a) Why turbocharger is used in automobile explain effects of turbocharging on emission? [8]
b) Describe the sources and causes of soot and particulate formation? [8]

OR

Q8) Explain effect of design and operating parameters on CI engine emission. [16]

- Q9)** a) Explain the remedies for engine emission. [9]
b) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? [9]

OR

Q10) 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]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3089

[Total No. of Pages : 2

[5354]-575

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

**TRANSPORT MANAGEMENT AND MOTOR INDUSTRY
(2012 Pattern)**

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.*

Q1) a) Explain the rules of motor vehicle ACT? [5]

b) What is the process of transfer of ownership of vehicle? [5]

OR

Q2) a) Explain the structure and method of Taxation. [5]

b) Explain OTT of Transport and non transport vehicle. [5]

Q3) a) What is insurance clamed procedure? [5]

b) Explain importance insurance. [5]

OR

Q4) a) Explain different types Traffic Sign? [5]

b) Explain zero depth insurance? [5]

Q5) a) Explain standard bus depot layout in brief? [10]

b) Explain EURO norms? [6]

OR

Q6) a) Explain Goods Transport organization structure? [10]

b) Explain the necessary of scheduling operation? [6]

Q7) a) Explain the structure of goods transport organization? [10]

b) Explain importance role of CIRT. [8]

P.T.O.

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 different elements of marketing in motor industry. [8]

b) Explain PCRA. [8]

OR

Q10)a) Explain the GPS. [8]

b) Advance technique in traffic management. [8]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3090

[Total No. of Pages : 4

[5354]-576

B.E. (Automobile Engineering)

OPERATION RESEARCH

(2012 Pattern) (Elective - IV)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Logarithmic tables, Sliderule, Electronic pocket calculator is allowed.*
- 5) *Assume suitable data if necessary.*

Q1) Solve the following LPP by Simplex Method

Max $Z = 5X_1 + 8X_2$ Subjected to the following constraints

$$2X_1 + X_2 \leq 400$$

$$4X_1 + X_2 \leq 600$$

$$X_1, X_2 \geq 0$$

[10]

OR

Q2) a) Solve the following linear programming problem by graphical method. **[6]**

Maximize $Z = 3X_1 + 2X_2$ Subjected to the following constraints

$$X_1 + X_2 \leq 4$$

$$X_1 - X_2 \leq 2$$

$$X_1, X_2 \geq 0$$

b) Enlist the different applications of linear programming problem. **[4]**

P.T.O.

Q3) Determine an initial basic feasible solution to the following transportation problem using **[10]**

- i) Vogel's Approximation Method
- ii) 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	

OR

Q4) a) The assignment cost of assigning any one operator to any one machine is given in the following table. **[7]**

Machines	Operators			
	I	II	III	IV
A	10	5	13	15
B	3	9	18	3
C	10	7	3	2
D	5	11	9	7

b) Why Assignment Model is used in industries? **[3]**

Q5) a) A project Schedule has the following characteristics. **[14]**

Activity	T_o	T_m	T_p
1 - 2	1	3	5
2 - 3	2	5	6
2 - 4	4	6	7
2 - 5	8	10	12
3 - 5	0	0	0
3 - 6	4	8	9
4 - 7	5	7	14
5 - 7	7	10	16
6 - 7	0	0	0
6 - 8	6	9	12
7 - 9	1	3	7
8 - 9	3	5	7

- i) Compute the Network
 - ii) Calculate the length and variance of the Critical Path
 - iii) What is the probability that the job as per critical path will be completed in 24 days.
- b) Differentiate in-between CPM and PERT. [4]

OR

- Q6)** a) There are five jobs each of which must go through two machines A, B and C in the order ABC. Processing times in hours are given below. Determine a sequence for five jobs that will minimize the elapsed time and also calculate ideal time. [12]

Job	I	II	III	IV	V
Time for A	3	8	7	5	4
Time for B	4	5	1	2	3
Time for C	7	9	5	6	10

- b) Explain the procedure for processing of N jobs through Two machines. [6]

- Q7)** a) Discuss the general structure of the following Queuing system. [8]

- i) FCFS
- ii) LCFS
- iii) SIRO
- iv) PS

- b) Trains arrive at the yard every 20 minutes and the service time is 40 minutes. If the line capacity of the yard is limited to 6 find : [8]

- i) The probability of the yard is empty
- ii) The average number of trains in the system.

OR

- Q8)** a) Solve the following Game by Dominance rule. [8]

		Player B		
		I	II	III
Player A	I	12	-8	-2
	II	6	7	3
	III	-10	-6	2

- b) What are the various Game Theory methods? Explain any one method in detail. [8]

- Q9) a)** The maintenance cost and resale value per year of a machine whose purchase price is Rs. 7000 is given below : **[8]**

Year	1	2	3	4	5	6	7	8
Maintenance Cost	900	1200	1600	2100	2800	3700	4700	5900
Resale Value	4000	2000	1200	600	500	400	400	400

- b) What is replacement? Explain by means of real world examples. **[8]**

OR

- Q10)a)** A fleet owner finds from his past records that the cost per year of running a truck and resale values whose purchase price is Rs. 6000 are given as under. At what stage the replacement is due? **[8]**

Year	1	2	3	4	5	6	7	8
Maintenance Cost	1000	1200	1400	1800	2300	2800	3400	4000
Resale Value	3000	1500	750	375	200	200	200	200

- b) Explain the different types of replacement problems with an examples. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3091

[Total No. of Pages : 2

[5354]-581

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

VLSI DESIGN

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Attempt from : Q.1 or Q.2 , Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 , Q.9 or Q.10.
- 2) Draw neat diagrams.
- 3) Assume suitable data if necessary.

Q1) a) Draw CMOS inverter circuit and explain Voltage transfer characteristics. [6]

b) Explain Power Consumption in CMOS? A CMOS circuit operate with VDD = 2.5 V operating at frequency of 2.4 GHz and load capacitance of 0.1 pf. Calculate dynamic power consumption. [4]

OR

Q2) a) Draw FSM diagram & write VHDL code for 1011 Mealy sequence detector. [6]

b) What is the role of Configurable Logic Block in FPGA? Explain in detail. [4]

Q3) a) Realize 2 input EXOR gate functionality using a 2:1 mux. Write VHDL code for same design Comment on logic optimization : if same design is carried out using 4:1 mux. [6]

b) Compare CPLD with FPGA? [4]

OR

Q4) a) Explain need of PLD technologies? Enlist important limitations of CPLD? [6]

b) Explain function with one example. [4]

P.T.O.

Q5) a) Explain working of SRAM cells in detail. Why it is not preferred though it is faster? [8]

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

OR

Q6) a) What is the role of memories in PLDs? Explain it in detail. [8]

b) Explain current mode sense amplifier. What are its advantages? [8]

Q7) a) Explain global routing What are its limitations? [8]

b) Explain with an example typical metal rule used in detail routing. [8]

OR

Q8) a) What is important difference between path and net when Global router minimizes delay? [8]

b) Explain timing driven Floorplanning and placement design flow. [8]

Q9) a) Explain TAP controller with FSM and its instructions. [9]

b) Explain boundary scan check in detail. [9]

OR

Q10)a) Why model faults? Explain different fault modeling. [9]

b) Explain IEEE 1149.1 architecture in detail. [9]

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3092

[Total No. of Pages : 2

[5354]-582

B.E. (Electronics) (Semester - I)
ELECTRONIC SYSTEM DESIGN
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q4, Q.5 or Q6, Q.7 or Q.8.*
- 2) Figures to the right indicate full marks.*
- 3) Use of electronic pocket calculator is allowed.*
- 4) Assume Suitable data if necessary*

- Q1)** a) Explain the bath tub curve for reliability indicating all its regions. Also explain how failure rate can be reduced in different regions of bathtub curve. [7]
- b) Interpretation of DAC specifications from design view point. [7]
- c) Explain R&D and Engineering Prototypes in details. [6]

OR

- Q2)** a) Explain instrumentation amplifier with it's different specifications. [7]
- b) Factors affecting choice of Microcontroller for Any One application with Case study of that application. [7]
- c) What are the different LED configurations? Give suitable example for the same? [6]

- Q3)** a) What are the different approaches to development of application software for Electronic Product. [8]
- b) What are the different factors affecting on the choice between Assembly & High Level language? [8]

P.T.O.

OR

Q4) Explain following approaches in development of application software for electronic product. **[16]**

- a) Top-Down approach
- b) Bottom-Up approach
- c) Modular Programming
- d) Water fall Model

Q5) a) Explain different design consideration while designing PCB for high speed digital circuits? **[8]**

b) Define crosstalk? What should be the remedy to minimize crosstalk? **[8]**

OR

Q6) a) What are the testing standards for EMI/EMC? **[8]**

b) What is the signal integrity? Justify the significance of SI. How can it be ensure in high-speed circuits? **[8]**

Q7) a) What are the features & limitations of analog CRO, DSO, Logic Analyzer & Mixed signal Oscilloscopes in finding hardware/software faults? **[12]**

b) What are the EMI/EMC testing standards? **[6]**

OR

Q8) a) Explain environmental testing? What is the need of environmental testing? What are the different factors needed to be test while environmental testing. **[12]**

b) What are the compliances for the EMI/EMC? **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3093

[Total No. of Pages : 3

[5354]-583

B.E. (Electronics)

ADVANCED POWER ELECTRONICS

(2012 Pattern) (Theory)

Time : 2 ½ 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 in detail with waveforms the effect of source impedance on performance of LCC. **[6]**

b) Explain following power factor improvement (any one) techniques for single phase converters with suitable waveforms and equations

- i) Extinction Angle Control (EAC)
- ii) Symmetrical Angle Control (SAC)
- iii) Pulse Width Modulation Control (PWM)

[7]

c) The input voltage of a cycloconverter is 120 V (rms) 60 Hz. The load resistance is 5Ω and the load inductance is L is 40mH. The frequency of the output voltage is 20 Hz. If the converters are operated as semi converters such that $0 \leq \alpha \leq \pi$ and the delay angle is $\alpha_p = 2\pi/3$. Calculate **[7]**

- i) The rms value of the output voltage V_o
- ii) The rms current of each of the thyristor I_g and the input power factor (PF).

P.T.O.

OR

- Q2)** a) Compare Circulating and non-Circulating current type dual converters. [6]
- b) A 3 phase dual converter is operated from a delta star connected transformer of 220 Volts, 50Hz supply, If the load resistance is 10Ω , the circulating inductance is 7.5mH and $\alpha_1 = 50^\circ$, Calculate Peak circulating current and current of converter - I [7]
- c) With the help of neat circuit diagram and waveforms explain the operation of single phase bridge Diode Clamped Multilevel inverter. State its features, advantages and disadvantages. [7]

Q3) What is braking? Explain Regenerative braking of DC machine. Mention its advantages and disadvantages. [6]

- a) A 15 HP 220 V, 2000 rpm separately excited DC motor controls load requiring a torque $T_L = 45 \text{ N-m}$ at a speed of 1200 rpm. Field resistance $R_f = 147 \Omega$, armature resistance $R_a = 0.25 \Omega$ and the voltage constant of the motor is $K_v = 0.7302 \text{ V/A-rad/S}$. The field voltage is 220V. The viscous friction and no load losses are negligible. Armature current can be assumed to be continuous and ripple free. Calculate back emf E_g , required armature voltage E_a and the rated armature current of the motor. [6]
- b) Calculate transfer function block diagram of DC motor. [4]

OR

- Q4)** a) Explain and draw the curve torque and power versus speed separately excited dc motor. [6]
- b) Draw and explain the power circuit of single phase semi-converter feeding a separately excited DC motor. Explain with typical waveforms, the operation in continuous and discontinuous armature current modes. [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) What is the need of vector control in Induction Motors? Briefly explain Vector control of induction motors. [10]

OR

- Q6)** a) Compare various speed control techniques of Induction motor on the basis of performance parameters. [8]
- b) With the help of suitable circuit diagram and waveforms explain the working of Variable frequency PWM VSI Drives. [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 with a diagram the construction, working and typical applications of Universal motor. [8]
- b) Explain the operation of a switched reluctance motor drive. [8]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3095

[Total No. of Pages : 2

[5354]-585

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

EMBEDDED SYSTEM AND RTOS

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 and Q9 or Q10.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data, if necessary.

- Q1)** a) Explain different IC technology used in embedded system. [6]
b) Define critical section of macros. Explain critical section methods in μ COS - II. [4]

OR

- Q2)** a) State and explain the different service functions supported for time management in μ C/OS - II. [6]
b) Explain preemptive and non-preemptive kernel. [4]

- Q3)** a) With the help of neat diagram explain the priority inversion in RTOS. [6]
b) Explain the following services/functions in μ COS - II. [4]
i) OSTaskChangePrio()
ii) OSTaskDel()

OR

- Q4)** a) With the help of neat diagram explain the different stages of Rapid Prototype model. [6]
b) Explain optimization of design metrics. [4]
i) NRE cost
ii) Time to market

P.T.O.

- Q5)** a) What is the difference between Task, ISR and functions? With the help neat diagram explain different task states. [8]
- b) Explain the Mutex. Compare Mutex and Semaphore. How does the Semaphore solve the shared resource problem? [8]

OR

- Q6)** a) Explain the different Mutex management functions in μ COS - II. [8]
- b) Explain structure of Event Control Block. Show how task and ISR interact with each other through ECB. [8]

- Q7)** a) Explain the services/functions supported by Mailbox in μ COS - II. [8]
- b) What is Message queue? What is difference between Message queue and Message Mailbox? Explain alternate use of message queue. [8]

OR

- Q8)** a) Define porting of μ COS - II on any microcontroller. Explain development tools used for porting μ COS - II. [8]
- b) What is the inter task communication? Explain different kernel objects used for inter task communication in μ COS - II. [8]

- Q9)** a) Explain building of file system in Linux. [6]
- b) Explain Boot loader and role of Boot loader in Embedded Linux. [6]
- c) What is Linux kernel configuration? Explain the steps in Linux kernel configuration. [6]

OR

- Q10)** a) Draw and explain Linux kernel architecture. [6]
- b) Explain the features of Embedded Linux. [6]
- c) Explain loadable kernel module in Linux. [6]

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3096

[Total No. of Pages : 2

[5354]-586

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

BIOMEDICAL INSTRUMENTATION

(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 side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

- Q1)** a) Explain different specification of Bio medical instrumentation system. **[8]**
- b) Draw the diagram of ECG amplifier and explain. **[6]**
- c) Name different type of EMG. Explain procedure to perform EMG with help of neat block diagram. **[6]**

OR

- Q2)** a) Draw and explain block diagram of EEG. Also sketch the different EEG waveforms with their frequency. **[8]**
- b) Explain fiber optic sensor for temperature measurement and give advantages. **[6]**
- c) Find the CO for : **[6]**
- i) A patient whose heart rate is 60 beat/min if the stroke volume is 50 mL/beat
 - ii) A patient whose heart rate is 90 beat/min if the stroke volume is 80 mL/beat.

P.T.O.

- Q3)** a) What are the objectives of patient monitoring system? Explain central monitoring system with block diagram. [8]
b) Explain with block diagram Automatic B.P. Machine. [8]

OR

- Q4)** a) Write a short note on indirect & direct blood pressure measurement method. [8]
b) Write brief note on finger plethysmography. [8]

- Q5)** a) Write Short note on blood cell counter. [8]
b) Explain different grounding technique used in medical instruments. [8]

OR

- Q6)** a) With block schematic, explain complete blood gas analyzer. [8]
b) Explain the necessity of blood cell counting and explain Coulter method of electronics blood cell counting. [8]

- Q7)** a) With the help of neat block schematic describe the working of X ray machine & gives the properties of X ray machine. [10]
b) Explain how LASER is used in Vision correction. [8]

OR

- Q8)** a) What are the advantages of CT scan over conventional x-ray imaging? Explain the principle of working of CT scan machine. [10]
b) State and explain different applications of telemetry in biomedical field. [8]

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3097

[Total No. of Pages : 2

[5354]-587

B.E. (Electronics) (Semester - I)
ADVANCED MEASUREMENT SYSTEMS
(2012 Pattern) (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.*
- 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 Electrical Validation and debug with MSO series. [8]
oscilloscopes.
- b) Explain with necessary diagram working of logic analyzer. [6]
- c) Explain embedded communication using CAN. [6]

OR

- Q2) a)** Explain Arbitrary Waveform generator and its typical applications. [8]
- b) Define the terms with respect to spectrum analyzer : [6]
- i) Resolution Bandwidth
 - ii) Span
 - iii) Sensitivity
- c) Explain the interfacing techniques for touch screen and thermal printer.[6]

- Q3) a)** What are microwave enclosures and electromagnetics compatibility?
Explain EMI and EMC measurements. [8]
- b) Write short notes on [8]
- i) Operation of barraters
 - ii) Transmission cavity wave meter

P.T.O.

OR

Q4) a) Explain different attenuation measurement techniques in microwave network. [8]

b) Explain single line cavity coupling system for wavelength measurement. [8]

Q5) a) Discuss in details of Virtual instruments and its components. [8]

b) Explain Lab View based data acquisition system design. [8]

OR

Q6) a) List and explain the features of LABVIEW. [8]

b) Explain modulation techniques FDM and ASK with their application in instrumentation. [8]

Q7) a) Explain the concept of ADC. List various types and explain any two types of ADC in detail. [10]

b) Explain the following terms : [8]

i) Measurement errors in counter

ii) Data logger

OR

Q8) Write short note on any three. [18]

a) Automation in digital instruments

b) V to F converter

c) Sample and hold

d) Analog Multiplexer

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3098

[Total No. of Pages : 3

[5354]-588

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

DSP PROCESSORS

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Answer Q.1 or Q.2, Q.3 or Q4, Q.5 or Q6, Q.7 or Q.8.*
- 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 an equation for a three-tap averaging filter. Obtain and plot the :

- i) magnitude
- ii) dB magnitude
- iii) phase &
- iv) group delay frequency response, for the above filter.

Comment on type of filtering. **[12]**

b) Investigate the basic features that should be provided in the DSP architecture to be used to implement the following Nth order FIR filter,

$$y(n) = \sum_{i=0}^{N-1} h(i) \cdot x(n-i), n = 0, 1, 2, \dots$$

where $x(n)$ denotes the i/p sample, $y(n)$, the o/p sample and $h(i)$, the ith filter coefficient. $x(n-i)$ is the i/p sample 'i' samples earlier than $x(n)$. **[8]**

OR

Q2) a) Discuss the functions served by following DSP computational building blocks : **[12]**

- i) Multiplier
- ii) Shifter
- iii) MAC
- iv) ALU

b) Draw and discuss the functional diagram of the barrel shifter of the TMS 320 C 54XX processors. **[8]**

P.T.O.

- Q3)** a) What is PID?
 Illustrate the concept of PID controller with suitable diagram.
 Explain the implementation process of PID controller using processors with neat diagram. [8]
- b) Discuss the digital interpolation using five polyphase subfilters where interpolation factor = 5 i.e $m = 5n$. [8]

OR

- Q4)** a) Show the organization of signal samples and filter coefficients in circular buffers for an FIR filter implementations with the help of block schematic diagram.
 Also write standard equations for
 i) FIR
 ii) IIR [8]
- b) Represent an IIR filter with standard $H(z)$. Draw the block schematic of second-order IIR filter.
 Discuss how it is implemented using TMS 320 C54XX? [8]

- Q5)** a) What do you mean by bit - reversed index generation? How it is generated in TMS320 C54XX DSP assembly language? [8]
- b) Determine the following for a 256- point FFT computation : [8]
- Number of stages
 - Number of butterflies in each stage
 - Number of butterflies needed for the entire computation
 - Number of butterflies that require complex twiddle factors.

OR

- Q6)** a) Define :
 i) Overflow
 ii) Scaling
 What are the effects on overflow and scaling on computations?
 How to overcome these effects? [8]
- b) Draw the signal flow graph for 8 - point DFT computation. Show the computation formulae for all the stages. [8]

Q7) a) Design a data memory system with address range 000800h - 000FFFh for a C5416 processor. Use $2k \times 8$ SRAM memory chips.

Draw the block schematic. **[10]**

b) Discuss the I/O interface timing diagram for read-write-read sequence of operations. **[8]**

OR

Q8) a) Determine the timing parameters for a 16 - bit data communication in a DSK configured for a clock divisor of 6. The oscillator clock (CODEC-CLK) is at 12.288 MHz. i)

CPLD i/p clock

ii) CPLD o/p clock for PCM 3002

iii) Sampling frequency, fs.

iv) Sampling interval

v) Bit clock frequency (BCLKIN)

vi) Bit clock period

vii) Time to communicate 16 bits of data.

[10]

b) Draw and explain the Receive operation timing for the synchronous serial interface. (SSI). **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3099

[Total No. of Pages : 2

[5354]-589

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

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

Q1) a) What are CNC machines. Write advantages and limitations of NC and DNC machines. **[5]**

b) What are the specification of robot? Write any 2 specifications in detail?**[5]**

OR

Q2) a) What are the different actuators are used in robotics system. **[5]**

b) What are the various components in robot drive system Hydraulic/Pneumatic system. **[5]**

Q3) a) Explain the terms. **[4]**

- i) Workspace
- ii) Manipulator

b) Differentiate the following. **[6]**

- i) Reach & Stroke
- ii) Hard and Soft Automation

OR

Q4) a) Write a note on. **[6]**

- i) Proximity sensor
- ii) Vision Sensor

b) What is difference between Robot and manipulator. **[4]**

P.T.O.

- Q5)** a) Write a transformation matrix for cylindrical coordinate systems robot. [6]
b) A joint of six robot go from initial angle of 30° to a final angle of 50° in 3 second. Using third degree polynomial calculates the joint angles at interval of 0.5 second. [8]
c) Define forward and inverse kinematics. [4]

OR

- Q6)** a) Discuss the steps for obtaining forward solution of a robotic manipulator and explain. [8]
b) What is D-H representation? Discuss D-H algorithm. Write table for this representation. [10]
- Q7)** a) Explain the term - Robot arm dynamics. Discuss the E-L formulation used for a robotic manipulator. [10]
b) Explain path planning? What is trajectory? Differentiate path and trajectory. [6]

OR

- Q8)** a) What are different parameters involved in Trajectory Planning problem? Explain different steps in Trajectory planning. [10]
b) What is dynamics of robot? How dynamics is different than kinematics? [6]
- Q9)** a) Draw neat block diagram neural controller. Explain function of each block. What is challenge in neural controller? [8]
b) Explain with neat block diagram how vision system is used in complex control system. [8]

OR

- Q10)** Write short note on any three : [16]
a) Control strategies for Aerial vehicle
b) Control strategies for bidirectional X4 flyer
c) Architecture for human robot interface

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3100

[Total No. of Pages : 2

[5354]-590

B.E. (Electronics)

ELECTRONICS IN AGRICULTURE

(2012 Pattern) (End Semester)

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 jf necessary.*

Q1) a) State various ways of gas analysis. Draw & explain principle of gas analysis based on gas density. **[8]**

b) Explain the principle of chemical reaction gas sensors and NDIR gas sensors. **[8]**

c) What is Psychomotor? Explain its principle of operation. **[4]**

OR

Q2) a) Draw & explain PC based data acquisition system in detail. **[8]**

b) With the help of neat sketch explain basic bridge circuit for capacitance method of moisture content measurement. **[8]**

c) Explain the concept of SCADA irrigation system. **[4]**

Q3) a) What is the utility of soil moisture measurement for crop productivity improvement? **[6]**

b) Write a notes on **[6]**

i) Crop production forecasting

ii) Use of remote sensing data.

c) What are the applications of using satellite data in the field of agriculture? **[4]**

OR

P.T.O.

- Q4)** a) Draw & explain framework of GIS for agriculture land development. [6]
b) Enlist the issues & benefits of using farm machinery in precision farming. [6]
c) Comment on Precision agriculture status in india. [4]

- Q5)** a) State the features of following crop monitoring instruments. [6]
i) Plant moisture vessel
ii) Watchdog wireless system
iii) Leaf wetness sensor
b) State the parameters needed to be detected for protected cultivation. Explain any one instrument technology used for protected cultivation. [6]
c) Draw a schematic diagram of a few of the instruments which may be used to continuously monitor growth of the crop. [4]

OR

- Q6)** a) Describe various strategies of land & soil resource management. [6]
b) Draw & explain software flow chart for safe grain storage monitoring system. [6]
c) Make a list of the most common weather instruments that you can think of. [4]

- Q7)** a) Explain various initiatives taken by the government for agricultural resource management. [6]
b) Draw & explain weather monitoring system. Enlist the types of information shared by weather monitoring system to Farmers. [6]
c) Compare the process of natural drying and field drying. [6]

OR

- Q8)** a) Discuss the role of modern automatic controllers in Greenhouse automation. State the benefits of Greenhouse automation. [6]
b) Explain in detail roles of various elements of grape drying process. [6]
c) Write a notes on [6]
i) batch dryers
ii) Continues flow dryer



Total No. of Questions : 8]

SEAT No. :

P3101

[Total No. of Pages : 2

[5354]-591

**B.E. (Electronics) (Elective - II)
MOBILE COMMUNICATION
(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 indicate full marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

- Q1)** a) Derive the Impulse response of multipath channel. [7]
b) Describe factors influencing small scale fading. [7]
c) Explain the techniques to improve the coverage and capacity of the cellular system. [6]

OR

- Q2)** a) Explain Co-channel interference and adjacent channel interference and how to reduce it. [7]
b) Write a note on. [7]
i) RAKE receiver
ii) Diversity technique
c) Explain the types & Small scale fading. [6]
- Q3)** a) Explain the schemes FDMA & TDMA with examples. [8]
b) Write a note on. [10]
i) GSM codec
ii) USDC codec

P.T.O.

OR

- Q4)** a) Explain the significance of channel coders in Mobile communication and write a note on Block coder's. [8]
b) Define Vocoder's & explain linear predictive coder's & Decoder's. [10]

- Q5)** a) Explain fixed network transmission Hierarchy. [8]
b) Explain traffic roating in wireless networks. [8]

OR

- Q6)** a) Explain the architecture of ISDN. [8]
b) Write a note on. [8]
i) Common channel signaling.
ii) SS7 signaling protocol.

- Q7)** a) Draw the Block diagram & GSM architecture with its function. [8]
b) Describe the evolution & CDMA 2000 from IS 95 and explain the CDMA hand off parameters. [8]

OR

- Q8)** a) Explain Step's involved in call setup in GSM. [8]
b) Draw and explain the forward channel modulation process in CDMA. [8]

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3102

[Total No. of Pages : 2

[5354]-592

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

COMPUTER NETWORK

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

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

- Q1)** a) Explain ISO-OSI reference model in detail. [8]
b) Explain and compare LEO/MEO/GEO in details. [6]
c) What is the function of data link layer? Also explain types of framing. [6]

OR

- Q2)** a) Explain TCP/IP reference model in detail. [7]
b) Explain term switching? Compare datagram switching & virtual circuit switching. [7]
c) Explain sliding window protocol in brief. [6]

- Q3)** a) Explain the class full and classless addressing system. [6]
b) What is link state routing? Explain dijkstra's algorithm with example. [6]
c) Explain TCP & UDP protocol in detail. [4]

OR

- Q4)** a) What are the duties of transport layer? List the services provided by transport layer to upper layer. [6]
b) What is congestion? Explain any one congestion control technique. [6]
c) Explain in short ARP & RARP. [4]

P.T.O.

- Q5)** a) Explain data encryption standard. [6]
b) Explain RSA algorithm in brief. [6]
c) Explain Cable Tester. [4]

OR

- Q6)** a) Explain straight through & crossover cable with its applications? [8]
b) What is use of P-Box & S-Box in secret key algorithm? [4]
c) Explain Hash function in detail. [4]

- Q7)** a) What is DNS? Explain need of DNS system. [6]
b) What is FTP? Explain how to access remote file. [6]
c) Explain HTML programming & related tags in brief. [6]

OR

Q8) Write short note on

- a) www. [6]
b) Socket address [6]
c) Ping & Trace route [6]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3103

[Total No. of Pages : 4

[5354]-593

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

PROCESS AUTOMATION

(2012 Pattern)

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 instrument line symbols. **[5]**

- i) Pneumatic Signal
- ii) Electric Signal
- iii) Hydraulic Signal
- iv) Electromagnetic or sonic signal (guided)
- v) Electric binary signal

b) State the significance of process control with respect to safety, quality and profits? **[5]**

OR

Q2) a) Explain with suitable example process control block diagram. **[5]**

b) State various control system objectives and control system evaluation criteria. **[5]**

Q3) a) State the equation for a proportional integral controller. Draw a circuit diagram for a proportional integral (PI) mode controller. **[4]**

b) What do you mean by process loop tuning? Enlist different tuning methods and explain any one method in detail. **[6]**

OR

P.T.O.

- Q4)** a) Define and state the formulae for the following terms. [4]
- i) Valve sizing coefficient (C_v)
 - ii) Rangeability
- b) Explain two position (ON-OFF) control action with neutral zone. State applications of two position control. [6]

- Q5)** a) Explain with neat diagram architecture of a PLC? Give important specifications of a PLC. [9]
- b) Prepare the physical ladder diagram for the control problem shown in figure.

‘The elevator shown in Figure employs a platform to move objects up and down. The global objective is that when the UP button is pushed, the platform carries something to the up position, and when the DOWN button is pushed, the platform carries something to the down position. The following hardware specifications define the equipment used in the elevator :

Output Elements

M1 = Motor to drive the platform up

M2 = Motor to drive the platform down

Input Elements

START = NO push button for START

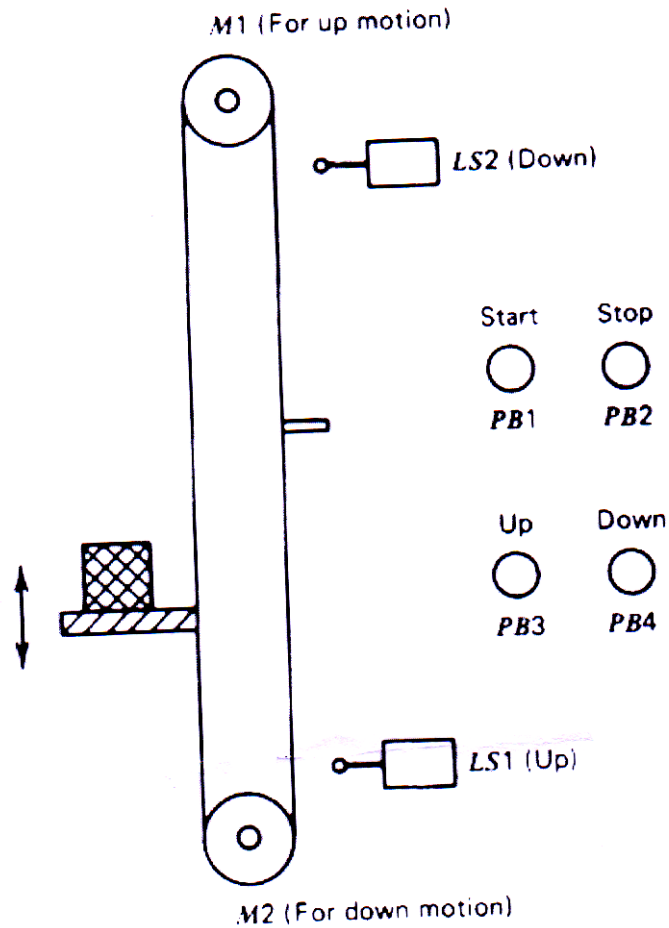
STOP = NO push button for STOP

UP = NO push button for UP command

DOWN = No push button for DOWN command

LS1 = NC limit switch to indicate UP position

LS2 = NC limit switch to indicate DOWN position [8]



OR

- Q6)** a) Explain the PLC operation with respect to
- i) I/O scan mode
 - ii) Execution mode
 - iii) Scan time
- [9]
- b) Develop physical ladder diagram for a bottle filling plant.
- [8]
- Q7)** a) Explain feed forward control scheme for a heat exchanger.
- [9]
- b) Write a short note on Statistical Process Control (SPC)
- [8]

OR

Q8) a) Explain with neat P & I diagram instrumentation scheme for a multiple effect evaporator. [9]

b) Explain with block diagram the concept fuzzy logic control. [8]

Q9) a) Explain architecture of a typical Distributed Control System (DCS). State important features and advantages of DCS. [8]

b) Explain the functions of RTU and MTU in a SCADA. State applications of SCADA. [8]

OR

Q10) Write Short notes on

a) Strip Chart recorder [8]

b) Direct Digital Control system [8]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3104

[Total No. of Pages : 2

[5354]-594

B.E. (E & TC Engineering) (Semester - II)

SPEECH AND AUDIO SIGNAL PROCESSING

(2012 Pattern)

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) *Right side figures indicate marks.*
- 3) *Assume suitable data if necessary.*

- Q1)** a) Explain the role of articulatory organ of speech production. [5]
b) Explain characteristics & nature of speech signal. [5]

OR

- Q2)** a) Explain simplified model of cochlea with neat diagram. [5]
b) Describe LTV model for speech production. Write assumptions clearly. [5]

- Q3)** a) What is AMDF? Write expression for AMDF. How pitch frequency can be calculated from AMDF? [5]
b) How can the V/UV decision can be taken using parameter such as energy of segment, ZCR and pitch period? [5]

OR

- Q4)** a) How audio features are extracted ? Explain different spectral features. [5]
b) Differentiate between narrow band and broad band spectrogram. [5]

- Q5)** a) Explain relation between LPC and formant. [8]
b) Explain Levinson-Durbin recursive algorithm for calculation of predictor coefficients. [8]

OR

- Q6)** a) Explain Frequency domain interpretation of LPC analysis. [8]
b) Explain the method of finding LPC coefficients using covariance method. [8]

P.T.O.

- Q7)** a) What is long term complex cepstrum? What is short term complex cepstrum? Explain the properties of complex cepstrum. [8]
- b) Explain the method to calculate MFCC using block diagram. [8]

OR

- Q8)** a) Explain the method to evaluate the formants of speech signal using cepstrum Analysis. What is importance of formants in speech processing? [8]
- b) With the help of block diagram explain homomorphic speech processing. [8]

- Q9)** a) Explain different issues and challenges for speaker recognition system? What will be the probable solutions to resolve issues, Explain. [10]
- b) Explain Text to Speech conversion system with block schematic? State different applications of TTS. [8]

OR

- Q10)**a) State different distortion measures used for Automatic Speech Recognition System. [8]
- b) Explain speaker identification system used for Automatic speech recognition system. Also explain different performance measurement parameters used for speaker recognition. [10]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3105

[Total No. of Pages : 2

[5354]-595

B.E. (Electronics) (Elective - III B) (Semester - II)

AUDIO VIDEO ENGINEERING

(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) What do you understand by persistence of vision and flicker? How flicker is reduced in television. [5]
- b) Explain AM-VSB technique in brief with neat diagram. [5]

OR

- Q2)** a) Compare PAL, NTSC and SECAM systems on the following basis. [5]
- i) Modulation technique
 - ii) Principle of working
- b) Explain progressive & interlaced scanning. [5]

- Q3)** a) Explain merits and demerits of DTH system. [5]
- b) What are the different digital video formats? Explain any one of them. [5]

OR

- Q4)** a) Explain with respect to MPEG - 2 [5]
- i) GOP
 - ii) I, PB
 - iii) Intra frame coding
- b) Draw a simple block diagram of SECAM decoder & explain How colour signals are recovered. [5]

P.T.O.

- Q5)** a) How is 3-D TV different from the present day 2-D system? Why it is necessary to wear special glasses for viewing 3-D content. [8]
- b) Explain the working of IPTV with its architecture. [8]

OR

- Q6)** a) Write short note on Camcorder & Webcam. [8]
- b) Explain H.264 technique with its features. [8]

- Q7)** a) What is reverberation time. On which factors it depends? What are the requirements for a good auditorium for pleasant listening. [8]
- b) Explain working of PA system with its block diagram. [8]

OR

- Q8)** a) Discuss in brief various types of special microphones & speakers. [8]
- b) Explain masking and digital representation of sound wave. [8]

- Q9)** a) Explain DVD player with its block diagram. Compare CD and DVD. [10]
- b) Explain ITU - T (G) compression standards. [8]

OR

Q10) Write short note on any three. [18]

- a) MP3 Player
- b) Blue Ray DVD
- c) Dolby 5.1 Sound system
- d) Digital sound Recording system

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3106

[Total No. of Pages : 3

[5354]-596

B.E. (Electronics Engg.)

OPTICAL AND MICROWAVE COMMUNICATION

(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 whenever necessary.
- 3) Figures to right side indicate full marks.
- 4) Assume suitable data, if necessary.

- Q1)** a) Define fiber splicing. Explain different types of splicing. [6]
- b) Compare the following terms. [8]
- i) Step Index fiber and Graded Index fiber
 - ii) Pin Photodiode and Avalanche Photo Diode.
- 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 LASER diode. Compare LED with LASER. [6]
- b) An installed fiber has following specifications :- Core diameter = 62.5 μm ; refractive index of core = 1.48 and of cladding = 1.46. Its operating wavelength is 1310 nm. Calculate. [8]
- i) Critical angle
 - ii) NA
 - iii) Acceptance angle in air
 - iv) Normalised frequency
 - v) No. of modes of fiber
- c) Explain the applications of Fiber Bragg gratings for multiplexing and Demultiplexing function. [6]

P.T.O.

- Q3)** a) Explain the terms with respect to wave guide. [6]
- i) Dominant mode
 - ii) Cut off frequency
 - iii) Guide wavelength
- b) Explain any two applications of circulator. [6]
- c) The collinear ports 1 and 2 of a Magic Tee are terminated by impedances of reflection coefficients $\rho_1 = 0.5$ and $\rho_2 = 0.6$. The difference port 4 is terminated by an impedance with reflection coefficient of 0.8. If 1W power is fed at sumport 3, calculate the power reflected at port 3 and the power divisions at the other ports. [6]

OR

- Q4)** a) Explain construction and working of Isolator based on Faradays rotation principle. [8]
- b) Determine the S matrix of a 3port circulator with insertion loss of 0.5 dB, isolation of 20dB and vsw R of 2. [6]
- c) State and explain applications of Magic tee. [4]
- Q5)** a) Explain the construction and working of TWT (Travelling Wave Tube) in detail. [8]
- b) What are the limitations of conventional tubes at microwave frequencies. [8]

OR

- Q6)** a) Explain the construction and working of multicavity klystrone Amplifier. [8]
- b) Explain construction and working of cavity magnetron. [8]
- Q7)** a) Explain power frequency limitations of microwave BJT. [8]
- b) Explain the principle of operation, Iv characteristics of microwave tunnel diode. [8]

OR

- Q8)** a) Write short notes on the following along with applications. [8]
- i) Schottky diode
 - ii) Gunn diode
- b) Explain the equivalent circuit of Varactor diode. Explain in detail its construction and operation. [8]

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3990

[Total No. of Pages : 2

[5354]-597

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

SOFT COMPUTING

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

- Q1)** a) Discuss in detail various activation functions. **[8]**
b) Explain the architecture and training algorithm of Radial Basis Function. **[6]**
c) What is Membership Function? Discuss the features of Membership Function. **[6]**

OR

- Q2)** a) Explain Perceptron leaning rule in detail. **[8]**
b) Explain K-means clustering approach. **[6]**
c) Explain different operations to be performed on the fuzzy set. **[6]**

- Q3)** a) Implement a simple two input single output FIS employing Mamdani model. **[8]**
b) Explain the following terms: **[8]**
i) Premises
ii) Conclusion
iii) Rule-base
iv) Fuzzy relation

OR

P.T.O

Q4) a) Discuss in detail the process of defuzzification and explain weighted average method. [8]

b) Given two rules: [8]

RULE 1: if height is “TALL”, then speed is “HIGH”.

RULE 2: if height is “MEDIUM”, then speed is “MODERATE”.

The fuzzy set for height in feet and speed in m/s are:

H1 = “TALL” = {0.5/5, 0.8/6, 1/7),

S1 = “HIGH” = {0.4/5, 0.7/7, 0.9/9),

H2 = “MEDIUM” = {0.6/5, 0.7/6, 0.6/7),

S2 = “MODERATE” = {0.6/5, 0.8/7, 0.7/9)

For a given H' = “ABOVE AVERAGE” = {0.5/5, 0.9/6, 0.8/7}.

Compute S' = “ABOVE NORMAL”.

Q5) a) State the applications of FLC & explain any one in detail. [9]

b) Explain the block diagram of Fuzzy Logic Controller. [9]

OR

Q6) a) Write short notes on: [10]

i) Synthesis of FLC

ii) Validation of FLC

b) Discuss the assumptions in Fuzzy Control System design. [8]

Q7) a) What are the advantages and applications of ANFIS? [8]

b) Explain two pass learning in ANFIS. [8]

OR

Q8) a) Explain Hybrid Learning algorithm in ANFIS. [8]

b) Discuss the learning methods that cross fertilize ANFIS and RBFN. [8]



Total No. of Questions : 8]

SEAT No. :

P3107

[Total No. of Pages : 2

[5354]-598
B.E. (Electronics Engineering)
BIOMEDICAL SIGNAL PROCESSING
(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 side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

- Q1)** a) Explain the function of central nervous system. [6]
b) Draw a schematic representation of Einthoven's triangle showing the directions of leads I, II, and III of the ECG signal. Derive the relationship between the three leads I, II, and III using vectorial arithmetic. [8]
c) Explain the structure and function of neuron. [6]

OR

- Q2)** a) Write brief notes on Bio-Potential Electrode? What happens if electrodes are either placed dry or loose? [8]
b) Write short note on active and passive transducers used in biomedical system. [6]
c) Lead I amplitude is 5mm, Lead II = 9mm with calibration of 10mm/mV. Speed is 50mm/mV find Lead III, aVR, aVL and aVF value. [6]

- Q3)** a) Draw block diagram of EEG machine. Explain in detail. [8]
b) List out the applications of EEG and explain in brief sleep disorder. [8]

OR

- Q4)** a) Draw and explain 10-20 electrodes system for EEG Recording. [8]
b) Explain with block EEG data acquisition system. [8]

P.T.O.

- Q5)** a) Explain different grounding technique used in medical instruments. [8]
b) Write requirement of basic amplifier and Explain the use of Instrumentation amplifier. [8]

OR

- Q6)** a) Explain the concept for design of LPF and HPF and its application in Biomedical Field. [8]
b) What is adaptive filter? Explain the principle noise cancellation model. [8]

- Q7)** a) Design a frequency domain filter to remove high frequency noise with minimal loss of signal component in specified pass-band. [10]
b) Explain the selection criteria of filter for biomedical application. [8]

OR

- Q8)** a) State sampling theorem and how it is used in data acquisition of ECG. [10]
b) Write brief notes on characterization of non-stationary signal. [8]



Total No. of Questions : 8]

SEAT No. :

P3108

[Total No. of Pages : 2

[5354]-599

B.E. (Electronics) (Semester - II)
NANO ELECTRONICS & MEMS
(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.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume Suitable data if necessary.*

- Q1)** a) Differentiate and describe the operation, applications and advantages of Stereo lithography & selective Laser sintering. [7]
- b) Why nanoelectronics? Describe the Nanotechnology potential. [7]
- c) Write a note on. [6]
- i) Applications of nanotechnology
 - ii) Why energy discreteness occurs in nano materials.

OR

- Q2)** a) Explain various tools used for measuring nanostructures. [7]
- b) Differentiate metal nanostructures & semiconducting nanostructures. [7]
- c) Briefly explain effect of size on electronic properties of nano materials. [6]
- Q3)** a) With neat labeled figures illustrate the steps involved in photolithography. [9]
- b) Enlist & explain relevant points of comparison between dry & wet etching techniques. [9]

OR

- Q4)** a) Explain the steps involved in surface micromachining with relevant figures. [9]
- b) Explain relevance of trimmer force scaling factor with regard to MEMS design & fabrication. [9]

P.T.O.

- Q5)** a) Draw & explain sliding mode control of MEMS. Compare analog control & digital control of MEMS. [8]
b) Write notes on silicon piezoresistive & polymers. State applications of silicon piezoresistive. [8]

OR

- Q6)** a) Explain fabrication of microstructures using polymeric compounds. [8]
b) Compare between silicon & GaAs as materials for MEMS device fabrication. [8]

- Q7)** a) Explain in detail performance response of MEMS microphones & microactuators. [8]
b) Describe in detail the principle, working and applications of Chemical and Bio Sensors. [8]

OR

- Q8)** a) What is principle involved in an electrochemical sensor for the sensing of biological samples? [8]
b) Explain constructional features of micro accelerometers with figures and describe its working. [8]

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3109

[Total No. of Pages : 2

[5354]-600-A
B.E. (Electronics)
MECHATRONICS
(2012 Pattern) (Elective - IV)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*
- 4) Use of electronic pocket calculator is allowed.*
- 5) Assume suitable data, if necessary.*

- Q1)** a) Explain in detail with neat block diagram design process for Mechatronics system. **[8]**
- b) Explain V-model of design of self optimizing system. **[6]**
- c) What is integrated modeling and simulation in Mechatronics. **[6]**

OR

- Q2)** a) Write short notes on solenoids and chain and sprocket. **[8]**
- b) Explain in detail autonomous mechatronics system. **[6]**
- c) What is role of controls in Mechatronics system, explain in detail. **[6]**

- Q3)** a) Explain in detail GPIB interface. **[8]**
- b) With suitable example explain use of PLC in Mechatronics system. **[8]**

OR

- Q4)** a) Explain universal asynchronous receiver transmitter (UART) with suitable diagram. **[8]**
- b) Explain with neat diagram asynchronous serial data format used communication. **[8]**

P.T.O.

- Q5)** a) List common types of signal conditioning circuits with functions. [8]
b) What are different hardware options available for data-logging system. Explain one in detail. [8]

OR

- Q6)** a) Explain logging and storage component of data logging system. [8]
b) Explain in detail offline-analysis in data logging systems. [8]

- Q7)** a) Explain with basic principle and operation of inertial sensors. [10]
b) Explain in detail LIGA process of fabrication of MEMs. [8]

OR

- Q8)** Write short notes on any three. [18]
a) Mechanical properties of MEMs.
b) Micro channel heat sink.
c) Micro machined pressure sensor.
d) X-ray masks.

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3110

[Total No. of Pages : 2

[5354]-600-B

B.E. (E&TC/Electronics) (Semester - II)

ADVANCED AUTOMOTIVE ELECTRONICS

(2012 Pattern) (Open Elective)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

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

- Q1)** a) Briefly explain the working of spark plug & disk braking system with suitable diagram. [8]
- b) What is hall effect? Explain a position sensor using principle of hall effect? Compare it with magnetic reluctance position sensor. [8]
- c) Give brief description of why electronics is so widely used on today's vehicles. [4]

OR

- Q2)** a) What is lambda Sensor? Explain the construction and working of Lambda Sensor with a neat sketch. [8]
- b) What is hybrid technology? Explain various operating models and compare advantages and disadvantages of each. [8]
- c) What is catalytic converter and explain the desired functions of catalytic converter? [4]

- Q3)** a) Draw a neat sketch of [6]
- i) FlexRay frame format
 - ii) FlexRay communication cycle
- b) Explain connection schematic of CANcentrate & ReCANcentrate. [6]
- c) State the objectives of FlexRay. [4]

P.T.O.

OR

- Q4)** a) With suitable example explain any two applications of telematics in Automotive domain. [6]
b) Explain Protocol wakeup & startup with respect to FlexRay protocol. [6]
c) Compare GPS & GPRS with respect to automotive applications. [4]

- Q5)** a) Write a short note on Raspberry Pi and explain how it assists in real-time simulations of automotive systems. [6]
b) Discuss the significance of system response in terms of tuning the automotive control system. [6]
c) Draw & explain digital cruise control system. [4]

OR

- Q6)** a) In what way the transient operations of engines cause emission formation? [6]
b) Write a short note on automotive control systems through various analog and digital control methods involved. [6]
c) Comment on need of model based development in automotive sector. [4]

- Q7)** a) State the meaning of terms 'fault' and 'symptom'. State the two main pieces of knowledge necessary to diagnose the fault. [6]
b) What are the sources of engine noise? State their possible cause and required action. [6]
c) Draw & explain electrical diagnosis procedure in detail. [6]

OR

- Q8)** a) Describe how scanner is connected to a vehicle and what information it can provide. [6]
b) Write notes on. [6]
i) Vehicle emission & environmental health.
ii) Emission control strategies.
c) Compare active safety & passive safety with suitable examples. [6]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P4282

[Total No. of Pages : 2

[5354]-600-C

B.E. (E&TC/Electronics)

Open Elective : Data Science & Analytics

(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) Explain Database System Structure with Block Diagram [6]
b) Explain different types of Cursors [4]

OR

- Q2)** a) Explain Big Data Characteristics and Data Repositories [6]
b) Explain PL/SQL Stored Procedure with suitable example [4]

- Q3)** a) Explain Document based and Graph based Model of NoSQL Database [6]
b) Describe Role of data scientist in Big data ecosystem [4]

OR

- Q4)** a) Explain Typical analytical architecture for Big Data [6]
b) Describe roles and privileges in PL/SQL [4]

- Q5)** a) Design and Build a data analytical model for Quality Power Monitoring in Smart Power Grid [9]
b) Describe Data Analytical Model Planning phase [8]

OR

P.T.O.

Q6) a) Explain Operationalization phase in Data analytic lifecycle with suitable application [9]

b) Explain need of Data analytic lifecycle [8]

Q7) a) Explain different methods of Data imports in R [9]

b) Explain Data Visualization methods in R [8]

OR

Q8) a) Explain model evaluation using statistics in R [9]

b) Explain basic operations in R [8]

Q9) a) Define Clustering. Explain any Clustering Algorithm with suitable Example [8]

b) Explain Logistics Regression with suitable example [8]

OR

Q10) Write a short Note on [16]

a) Naïve Bayes Classifier

b) Time series analysis



Total No. of Questions : 8]

SEAT No. :

P3991

[Total No. of Pages : 2

[5354]-600-D

B.E. (E & TC) (Open Elective) (Semester - II)

INDUSTRIAL INTERNET OF THINGS

(2012 Pattern)

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 Electronic Calculator is allowed.*

- Q1)** a) The ITU produced a comprehensive report on IoT from technical, economical and ethical views. It introduced a new axis in the ubiquitous networking path to complete the existing “anywhere” and “anytime” connectivity. Explain this new axis introduced by ITU. [7]
- b) Write the difference between IoT and M2M with reference to any three of following points: Communication Protocols, Machines & Things, Hardware and Software Emphasis, Data Collection and Analysis and Applications. [7]
- c) Industrial Internet Architecture Framework (IIAF) is described with reference to concerns, stakeholders and related viewpoints. Explain any two such viewpoints. [6]

OR

- Q2)** a) Draw the functional schematic of RFID reader and explain its working. Write about the role of antenna in the RFID reader. [7]
- b) What are the various enabling technologies of IoT/IIoT? Explain role of any one technology in IoT/IIoT [7]
- c) Explain the MODBUS protocol in brief. [6]
- Q3)** a) Write various features of Zigbee. Why it is suitable to use in IoT/IIoT?[8]
- b) Explain the MQTT protocol and its role in IIoT [8]

P.T.O

OR

- Q4)** a) Write various features of BLE. Why it is suitable to use in IoT/IIoT? [8]
b) Explain the CoAP protocol and its role in IIoT [8]

- Q5)** a) Comment on how security in manufacturing is affected by introduction of IIoT [8]
b) Elaborate the Potential Security issues at Network level in IIoT. [8]

OR

- Q6)** a) Elaborate the Potential Security issues at system level in IIoT, [8]
b) Comment on “Security is the biggest inhibitors to adoption of Industrial Internet” [8]

- Q7)** a) What is Big Data? How Big Data is applicable to IoT or IIoT? What are the tools available for Big Data Analytics? [9]
b) Explain in detail any one application of IoT/IIoT application in the area of Healthcare [9]

OR

- Q8)** a) There are four important characteristics of Big Data which are called four Vs. What are they? Explain any two of them in detail. [9]
b) Explain in detail any one application of IoT/IIoT application in the area of Automotive Industry. [9]



Total No. of Questions : 8]

SEAT No. :

P3111

[Total No. of Pages : 2

[5354]-601
B.E. (Semester - I)
ELECTRONICS & TELECOMMUNICATION
VLSI Design & Technology
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

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

- Q1)** a) Write VHDL code for 1011 Moore sequence detector with test bench. **[8]**
- b) What are the limitations of PLD Architectures? **[6]**
- c) Explain Interconnect Routing Techniques. **[6]**

OR

- Q2)** a) What are attributes? Explain various types of attributes used in VHDL. **[8]**
- b) Draw and explain the detail architecture of FPGA. **[6]**
- c) Write short note on I/O Architecture. **[6]**

- Q3)** a) Explain the static and dynamic power dissipation. **[4]**
- b) Explain power delay product and state its significance. **[4]**
- c) Design CMOS logic for $Y=ABC+D$. Calculate W/L ratio for N_{mos} and P_{mos} area needed on chip. **[10]**

P.T.O.

OR

Q4) a) Explain CMOS inverter and its transfer characteristics in detail. How to achieve Symmetry in the characteristics. [8]

b) Draw NAND, NOR, AND, OR, EX-OR gates using CMOS. [10]

Q5) a) Explain MOS device as resistor and diode, with the help of equivalent diagram. [8]

b) Draw and explain of CMOS difference amplifier circuit? [8]

OR

Q6) a) Draw and explain push pull CMOS inverter. Also draw its small signal model. [8]

b) Write short note on cascade amplifier. [8]

Q7) a) Explain controllability and observability. [8]

b) What is JTAG? List the different signals involved. [8]

OR

Q8) a) Compare Testability and Verification. [8]

b) Explain Built In Self Test (BIST). [8]

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3112

[Total No. of Pages : 2

[5354]-602
B.E. (E & TC) (End Semester)
COMPUTER NETWORKS
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) *Answer Q.1 or Q.2, Q.3 or Q4, Q.5 or Q6, 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) State the names of different layers in OSI Model and explain functions of each layer. [7]
- b) State & explain Stop-and-Wait ARQ Protocol. [7]
- c) Draw the neat diagrams & explain Bus Backbone network & Star Backbone networks. [6]

OR

- Q2)** a) Draw TCP/IP protocol suite. List with example, addresses present at each layer. [7]
- b) What are the common standard fast Ethernet implementations? Explain. [7]
- c) Explain Bluetooth frame format. [6]

- Q3)** a) Explain IPv4 classful addressing and state its disadvantages. [6]
- b) Write short notes on [6]
- i) ARP
 - ii) RARP
- c) Explain different multicast routing protocols. [6]

OR

- Q4)** a) Draw and explain the header format for IPv6. [6]
- b) Give general format of ICMP and explain different types of error reporting messages used in ICMP. [6]
- c) Write short notes on DHCP. [6]

P.T.O.

- Q5)** a) Compare between TCP and UDP. Under what circumstances you will use them. [8]
- b) What are four general techniques used to improve quality of service in network? Explain. [8]

OR

- Q6)** a) Explain the TCP Connection management in Client/Server model. [6]
- b) Write a short note on congestion control. [6]
- c) Draw and explain UDP frame format. [4]

- Q7)** a) List various Application layer protocols in TCP/IP and state significance of each. [6]
- b) State & explain different domains in DNS. [6]
- c) Explain the RSA algorithm. Also brief its limitations. [4]

OR

- Q8)** a) What are the main responsibilities of Application Layer? Explain in brief. [6]
- b) Describe the functions of the FTP connections. Explain what kinds of file types FTP can transfer? [6]
- c) What is entity authentication? What are different authentication methods? Explain. [4]

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P3113

[Total No. of Pages : 3

[5354]-603

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

MICROWAVE ENGINEERING

(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 side indicate full marks.
- 4) Use of Calculator is allowed.
- 5) Assume Suitable data if necessary

Q1) a) Explain the terms with respect to waveguide : [7]

- i) Cut off Wavelength
- ii) Wave Impedance

A cavity resonator with dimensions $a = 3$ cm, $b = 2$ cm is excited by mode of 90 MHz. Calculate the length of the cavity.

- b) Explain the properties of Hybrid Tee with the help of a neat diagram. Also state its Scattering matrix. [7]
- c) Explain Stripline in detail. [6]

OR

Q2) a) Define dominant mode and describe rectangular waveguide in detail. [7]

- b) A directional coupler has the scattering matrix given below. Find the directivity, coupling and isolation. [7]

$$[s] = \begin{bmatrix} 0.05\angle 30 & 0.96\angle 0 & 0.1\angle 90 & 0.05\angle 90 \\ 0.96\angle 0 & 0.05\angle 30 & 0.05\angle 90 & 0.1\angle 90 \\ 0.1\angle 90 & 0.05\angle 90 & 0.04\angle 30 & 0.96\angle 0 \\ 0.05\angle 90 & 0.1\angle 90 & 0.96\angle 0 & 0.05\angle 30 \end{bmatrix}$$

- c) Why network analysis is preferred over Maxwell's equation? [6]

P.T.O.

- Q3)** a) With the help of applegate diagram explain the operation of two cavity Klystron. [6]
- b) Explain construction and principal of operation of Cylindrical Magnetron. [6]
- c) A helical TWT has diameter of 2 mm with 50 turns per cm. Calculate axial phase velocity and anode voltage at which TWT can be operated for useful gain. [6]

OR

- Q4)** a) Explain the different types of slow wave structures. Brief the operation of Travelling Wave Tube with the help of neat diagram. [9]
- b) A reflex Klystron operates under the following conditions. [9]

$$\begin{aligned}
 V_0 &= 600 \text{ V} \\
 R_{sh} &= 15 \text{ k}\Omega \\
 e/m &= 1.759 \times 10^{11} \\
 f_r &= 9 \text{ GHz} \\
 L &= 1 \text{ mm}
 \end{aligned}$$

L is the spacing between repeller and cavity. The tube is oscillating at f_r at the peak on $n = 2$ mode or $\frac{3}{4}$ mode. Assume that the transit time through the gap and through beam loading can be neglected.

- i) Find the value of repeller voltage V_R
- ii) Find the dc necessary to give microwave gap of voltage of 200 V
- iii) Calculate the electronic efficiency.

- Q5)** a) Explain the four modes of operation of Gunn Diode. [8]
- b) What are avalanche transit time devices? Explain construction, working and applications of IMPATT diode. [8]

OR

Q6) a) Explain working principal of varactor diode. Enlist the advantages and applications for the same. [8]

b) Write a short note on the following : [8]

i) Schottky Barrier diode

ii) PIN diode

Q7) a) Describe the set up for the measurement of Q of a cavity resonator. [8]

b) Explain attenuation measurement technique in detail. [8]

OR

Q8) a) Describe the techniques used to measure Voltage Standing Wave Ratio. [8]

b) Describe the technique of measuring phase shift introduced by network. [8]



Total No. of Questions : 12]

SEAT No. :

P3114

[Total No. of Pages : 3

[5354]-604

B.E. (E & TC)

DIGITAL IMAGE PROCESSING

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data if necessary.
- 4) Use of electronic pocket calculator is allowed.

Q1) Explain a typical image processing system using an appropriate block diagram. Briefly describe various elements of an image processing system. [6]

OR

Q2) Consider the following two images of size 3×3 and data type of unit 8 (8-bit integer type).

$$f_1 = \begin{bmatrix} 1 & 3 & 7 \\ 5 & 15 & 75 \\ 200 & 50 & 150 \end{bmatrix}$$

$$f_2 = \begin{bmatrix} 50 & 150 & 125 \\ 45 & 55 & 155 \\ 200 & 50 & 75 \end{bmatrix}$$

Perform addition ($f_1 + f_2$), multiplication ($f_1 \times f_2$) and subtraction ($f_1 - f_2$) operations on the images and write the resultant image matrix. [6]

Q3) Explain the following image enhancement approaches with their applications. [7]

- a) Power law transform
- b) Unsharp masking

P.T.O.

OR

Q4) A skilled medical technician is charged with a job of examining medical images of human nucleus. However, technician observes of the following problems in the images : [7]

- a) Presence of bright isolated dot which is not of interest.
- b) Poor contrast.

Suggest and briefly explain suitable image preprocessing steps that technician may use to overcome the problems.

Q5) With reference to image compression, explain the following in detail. [7]

- a) Fidelity criteria.
- b) Arithmetic coding.

OR

Q6) Compare and contrast lossy and lossless Image compression w.r.t. its necessity, implementation approaches, advantages, limitations and applications. [7]

- Q7)** a) Explain Gradient and Laplacian operators for edge detection. Derive the mask for Laplacian edge detector. [10]
- b) Discuss the meaning of “Morphology” with reference to an image. Describe the effects and applications of the following morphological operations. [8]
- i) Dilation Process
 - ii) Erosion Process

OR

- Q8)** a) Considering appropriate test cases, list the limitations of global thresholding segmentation approach. How does adaptive thresholding approach overcome these limitations? Describe in detail the algorithm of adaptive thresholding technique. [10]
- b) Describe edge linking using Hough Transform. Also state the difference between an ‘Edge’ and a ‘Boundary’ of an image. [8]

- Q9)** a) Write a short note on the following regional descriptors. [8]
- i) Topological
 - ii) Texture
- b) “Chain codes are invariant to translation”. Justify this statement considering an appropriate example. Does the use of chain code compress the description information of an object? [8]

OR

- Q10)**a) Explain various statistical moments used for shape representation. [8]
- b) Describe the basic concept of Fourier descriptor for representation of a boundary. List its properties and advantages. [8]
- Q11)**a) How is the process of image retrieval different from image enhancement? Explain content based image retrieval in detail. [8]
- b) Write a short note on [8]
- i) Minimum distance classifier
 - ii) Correlation based classifier

OR

- Q12)**a) Discuss in detail application of image processing for Biometric Authentication. [8]
- b) Explain the following terms w.r.t. IP. [8]
- i) Pattern
 - ii) Pattern classes
 - iii) Representation of pattern classes.



Total No. of Questions : 10]

SEAT No. :

P3115

[Total No. of Pages : 2

[5354]-605
B.E. (E & TC)
EMBEDDED SYSTEM AND RTOS
(2012 Pattern) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer any one question out of 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 right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain the characteristics of embedded system. [5]
b) With example explain how design metrics are depend on each other. [5]

OR

- Q2)** a) Explain the waterfall model in detail. [5]
b) Explain the processor technology in detail. [5]

- Q3)** a) Explain important characteristics of $\mu\text{c/os-II}$. [5]
b) Write a program in embedded C to implement message mailbox. [5]

OR

- Q4)** a) What is the need of semaphore? Explain types of semaphores with example. [5]
b) Explain Kernel architecture & configuration. [5]

- Q5)** a) Explain different types of file system used in Linux. [8]
b) Explain the Linux Kernel construction in detail. [8]

OR

P.T.O.

- Q6)** a) Explain the various binary utilities in tool chain of Linux. [8]
b) Explain cross development tools for Embedded Linux target. [8]

- Q7)** a) What is Boot loader? Explain the various Boot loader challenges? [8]
b) What is device driver? Explain the types of device driver in detail. [8]

OR

- Q8)** a) Explain features of universal Boot loader and the steps in detail to configure Uboot? [8]
b) Explain the memory storage considerations for embedded Linux system. [8]

- Q9)** a) Explain the various Embedded software development tools. [8]
b) Explain the various hardware and software components required for the design of automatic chocolate vending machine. [10]

OR

- Q10)** a) Explain porting issues of operating system in an embedded plat form. [8]
b) Explain the various hardware and software components required for the design of mobile phone. [10]



Total No. of Questions : 8]

SEAT No. :

P3116

[Total No. of Pages : 2

[5354]-606

B.E. (E & TC)

SOFTWARE DEFINED RADIO

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Draw Model of a software radio. Explain the role of channelization & sample rate conversion. [7]
- b) Explain the following terms w.r.to RF stage. [7]
- i) Noise figure
 - ii) Noise floor
 - iii) Sensitivity
- c) Draw & explain the block diagram of digital UP conversion used in SDR. [6]

OR

- Q2)** a) Explain the following sources of noise in data converters. [7]
- i) Quantization noise.
 - ii) Internal thermal noise.
- b) Give comparison between SDR & conventional radio. [7]
- c) State the need & advantages of multi-rate signal processing. [6]

- Q3)** a) Explain the following terms w.r.to smart Antenna [9]
- i) Time difference of arrival.
 - ii) Array steering vector
 - iii) Array calibration
- b) What is a MIMO antenna? State & explain its types. [9]

P.T.O.

OR

- Q4)** a) Draw & explain the block diagram of switched beam antenna array system. [9]
b) Explain the MIMO-OFDM (case study). [9]

- Q5)** a) What is a cognitive radio? State its need & advantages over SDR. [8]
b) What is a OFDM? List its advantages & disadvantages. [8]

OR

- Q6)** a) Explain the capabilities of a CR. [8]
b) Draw neat block diagram of OFDM transmitter. Explain the function of UP converter. [8]

- Q7)** a) Explain the role of SDR & CR in advanced wireless communication system. [8]
b) Explain Horizontal & vertical hand off. [8]

OR

- Q8)** Write a short note on (any 3) : [16]
a) Operating modes of PSCR.
b) Network interoperability.
c) Beagle board based SDR
d) GNU Radio.



Total No. of Questions : 8]

SEAT No. :

P3117

[Total No. of Pages : 2

[5354]-607

B.E. (E & TC)

INDUSTRIAL DRIVES AND CONTROL

(2012 Pattern) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Draw and explain the working of single phase full-converter fed separately excited DC motor drive. Explain with typical waveforms, the operation in continuous and discontinuous armature current modes. [8]
- b) With the help of suitable circuit diagram and waveforms explain the working of PWM VSI Drive. [6]
- c) With the neat circuit diagram explain working of Switched Reluctance motor drive. Why is it preferred as adjustable speed drive? [6]

OR

- Q2)** a) The speed of a 20HP, 300 V, 1800 rpm separately excited dc motor is controlled by a three phase full converter drive. The field current is also controlled by a 3 phase full converter fed from 3 phase, Y-connected, 208V, 50Hz supply and is set to the maximum possible value. The AC input to the 3 phase full converter on armature side is three phase, Y-connected, 208V, 50Hz supply. The armature resistance is 0.25Ω and field resistance is 245Ω , and the motor voltage constant $K_v = 1.2V/A$ rad/s. The armature and field currents are assumed to be continuous and ripple free. [8]

Determine :

- i) The delay angle of the armature converter, if motor supplies rated power at the rated speed.
- ii) The no load speed if delay angles are the same as in case (i) and the armature current at no load is 10% of the rated value.
- iii) The speed regulation.

P.T.O.

- b) Enlist different methods for speed control of induction motor. Explain why variable frequency control method by constant V/f is popular and widely used. [6]
- c) Explain the operation of salient pole synchronous motor drive. [6]

- Q3)** a) Mention various types of stepper motors. Explain the operation of any one stepper motor driver circuit. Enlist the applications of Stepper motors. [8]
- b) With the help of a neat circuit diagram and waveforms explain the operation of 3 phase brushless dc motor drive. State the applications of 3 phase brushless dc motor drive. [10]

OR

- Q4)** Write Short notes : [18]
- a) Permanent magnet AC synchronous motor drive
 - b) Servo motor Drives
 - c) Difference between half step and full step control of stepper motor

- Q5)** a) What is the need of charge controller in Photovoltaic Power Systems? Explain the working of any one type of charge controller in PV power system. [8]
- b) Explain the fixed speed and variable speed control of wind turbines. [8]

OR

- Q6)** a) With the help of neat block diagram explain stand alone, hybrid and grid connected PV power system. [8]
- b) Explain the working of solar power system in water pumping application. [8]

- Q7)** a) What is Neuro fuzzy system? Explain Adaptive network based Fuzzy Interface System. [8]
- b) Explain the operation of neural network based PWM controller. [8]

OR

- Q8)** a) Explain the operation of neural network based control system. Explain general design methodology of neural network based system. [8]
- b) Enlist different applications of neural network in drives and control. Explain the operation of Fuzzy logic based Induction motor drive. [8]



Total No. of Questions : 8]

SEAT No. :

P3118

[Total No. of Pages : 2

[5354]-608

B.E. (E & TC)

MULTIRATE AND ADAPTIVE SIGNAL PROCESSING

(2012 Pattern) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Neat diagram 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) Verify Parsevals theorem for [10]

$$x(t) = e^{-12t} \cdot u(t).$$

b) Calculate the Instantaneous frequency for. [10]

$$x(t) = 2e^{j100t} + 3e^{j200t}.$$

OR

Q2) Derive and sketch the magnitude spectrum of

a) Harr scaling function. [10]

b) Harr wavelet function. [10]

Q3) Decompose $x(n) = \{2,8,6,2,5,8,9,7\}$ using Harr wavelet packets till V_0 .

Assume $x(n) \in V_3$. Reconstruct the decomposed sequence using proper basis function. Sketch the basis functions used. [18]

OR

Q4) Signal $y(t) = 2\phi(2t) + 3\phi(2t - 1) + 5\phi(2t - 2)$

$$+ 6\phi(2t - 3) + 5\phi(2t - 4) + 3\phi(2t - 5)$$

a) State with reasons, which V subspace $y(t)$ belongs to and why. [2]

P.T.O.

- b) Decompose $y(t)$ down the ladder i.e. into V_{j-1} & W_{j-1} , if the original subspace of $y(t)$ is V_j . [6]
- c) Plot projections of $y(t)$ on V_{j-1} and W_{j-1} using Harr scaling & wavelet function. [4]
- d) Reconstruct the original signal. Show that $V_j = V_{j-1} \oplus W_{j-1}$. [6]

Q5) For an adaptive filter, inputs $X_1 = \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}$ and $X_2 = \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix}$ have target values

$Y_1 = 1$ & $Y_2 = -1$ respectively. The convergence factor $\mu = 0.5$. The initial weights are $W = [0.5 \ 0.5 \ 0.5]$. The filter is trained using LMS algorithm, for four iterations.

Find :

- a) The weight vector at the end of each iteration. [8]
- b) Error at the end of each iteration. [4]
- c) Mean square error at the end of 2nd and 4th iteration. [4]

OR

- Q6)** a) Draw various configurations of adaptive filter. [8]
- b) Explain any one application of adaptive filter in detail. [8]

Q7) For a signal

$$x[n] = \{20, 4, 38, 12, 50, 3, 17, 0\} \in V_3$$

- a) Decompose the signal using Harr filters till V_0 and W_0 subspace. [8]
- b) Show smoothening effect by suppressing coefficients in W_j subspaces. [8]

OR

- Q8)** a) Decompose $x(n) = \{8, 2, 3, 1\} \in V_2$ using Lifting scheme. [6]
- b) Reconstruct decomposed sequence $x(n)$ using inverse lifting scheme. [6]
- c) Clearly show the split, predict & update stages in reconstruction & decomposition. [4]



Total No. of Questions : 8]

SEAT No. :

P3119

[Total No. of Pages : 2

[5354]-609

B.E. (E & TC) (End Semester)

ELECTRONIC PRODUCT DESIGN

(2012 Pattern) (Elective - II)

Time : 2 ½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer all questions.
- 2) Figures to the right side indicate full marks.

- Q1)** a) Explain five elements of successful design in detail. [10]
b) What is need of prototyping? [5]
c) Write in brief about risk management in software testing. [5]

OR

- Q2)** Write short notes on any four : [20]
i) Vibration & shock testing.
ii) Importance of energy coupling & grounding.
iii) Need of filtering & shielding.
iv) Ergonomics & Aesthetics of the product.
v) IP standards in packaging.

- Q3)** a) Explain different types of termination methods in PCB designing. [8]
b) Explain the need of ESD protection in PCB designing. [5]
c) Explain the need of multilayer PCB design in detail. [5]

OR

- Q4)** a) Explain microstrip & stripline geometry for PCB design with neat diagrams & derive the equations for characteristic impedance. [10]

P.T.O.

- b) Write short note on any two of the following : [8]
- i) Image plane
 - ii) Aspect Ratio
 - iii) Functional Partitioning.

- Q5)** a) Explain the significance of EMI & EMC in product testing. [8]
- b) Compare active and passive components with example. [4]
- c) What are different testing methods to ensure quality of product? [4]

OR

- Q6)** a) What are the parameters in designing & selection of D to A converter?[8]
- b) What is significance of testing & debugging in product design. [8]

- Q7)** a) What is role of documentation in quality product design. [8]
- b) What are the methods of documentation? [8]

OR

- Q8)** a) Explain bill of material for digital counter. [8]
- b) Write short note on any two of the following : [8]
- i) Presentation of documents.
 - ii) Accountability & Liability in documentation.
 - iii) Vishal Techniques of documentation.



Total No. of Questions : 12]

SEAT No. :

P3120

[Total No. of Pages : 3

[5354]-610

B.E. (E & TC)

PLC'S AND AUTOMATION

(2012 Pattern) (404185 - C) (Elective - II)

Time : 2 ½Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 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 logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 5) Assume suitable data, if necessary.

Q1) Draw and explain block diagram of process control system. [8]

OR

Q2) With suitable example explain following terms : [8]

- a) Human aided control
- b) Servo mechanism.

Q3) Explain 2-wire & 3-wire transmission in detail. [6]

OR

Q4) A temperature sensor has a span of 30°C to 260°C. A measurement results in a value of 60°C for the temperature. Specify the error if the accuracy is (a) $\pm 0.5\%$ FS (b) $\pm 0.75\%$ of span & (c) $\pm 0.8\%$ of reading. What is the possible value of temperature in each case. [6]

Q5) Explain microprocessor based flow control system. [6]

OR

Q6) Explain Programmable Automation Controller (PAC). [6]

P.T.O.

Q7) a) Define the term PLC. with suitable block diagram explain construction & working of PLC. List the different types of PLC. [8]

b) Construct the block and ladder diagram for the control problem mentioned below. The global objective is to heat a liquid to a specified temperature & keep it there with stirring for 30 mint. [10]

The hardware has following characteristics :

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

The event sequence is

- A) Fill the tank
- B) Heat & stir the liquid for 30 mins
- C) Empty the tank
- D) Repeat from step No.1

OR

Q8) a) What is HMJ? Explain different types of HMJ used in PLC? [8]

b) Explain the following : [10]

- i) MES
- ii) Vision system.

Q9) a) Draw & explain block diagram of SCADA system. [8]

b) Write the differences between DCS & SCADA. [8]

OR

Q10)a) Write the functions of RTU & MTU in SCADA. [8]

b) Draw & Explain architecture of DCS. [8]

Q11)a) Explain the meaning of Numerical control. What are the different media used to input the information for NC machines. **[8]**

b) Explain the following : **[8]**

i) Profibus - DP

ii) TCP / IP

OR

Q12)a) What are the different types of CNC systems? Discuss the merits & demerits of NC & CNC systems. **[8]**

b) Explain the following : **[8]**

i) CAN

ii) Ethernet



Total No. of Questions : 8]

SEAT No. :

P3121

[Total No. of Pages : 2

[5354]-611
B.E. (E & TC)
ARTIFICIAL INTELLIGENCE
(2012 Pattern) (Elective - II) (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) *Figure to the right indicates full marks.*
- 3) *Assume suitable data if necessary.*

- Q1)** a) Explain the significance of PEAS in AI. [6]
- b) Write Min-Max Search Algorithm for two players. How use of alpha and beta cut-offs will improve performance? [7]
- c) Use the Predicate Logic for the following : [7]
- i) Marcus was a man
 - ii) Marcus was a Pompeian
 - iii) All Pompeians were Roman
 - iv) Caesar was a ruler
 - v) All Pompeins were either loyal to Caesar or hated him.

OR

- Q2)** a) Enlist types of Agent program Explain 'Simple Reflex Agents' in detail. [6]
- b) What is CSP? Solve for the following : [7]
- You are given two jugs, a 4-gallon one and 3-gallon one. Neither has any measuring marks on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2-gallons of water into the 4-gallon jug?
- c) Explain the following terms : [7]
- i) Issues in Knowledge Representation
 - ii) Unification Algorithm

P.T.O.

- Q3)** Write short note on : **[18]**
- a) Reinforcement learning
 - b) Supervised learning
 - c) Unsupervised learning

OR

- Q4)** a) Define ANN. Enlist the applications of ANN. Explain the basics of Neural Network in detail. **[9]**
- b) What is Learning? Explain Inductive and Ensemble Learning with example. **[9]**
- Q5)** a) Give detailed architecture of an expert system and explain its components. **[8]**
- b) Explain Waltz's algorithm with example. **[8]**

OR

- Q6)** a) What is Perception? Give typical structure of it. Write down the advantages and disadvantages of Expert system. **[8]**
- b) Explain the process of image understanding in detail. **[8]**
- Q7)** a) What is Natural Language Processing (NLP)? Explain the different steps of it. **[8]**
- b) Parse the sentence with Top-down and Bottom-up Parse : **[8]**
'John ate the cat'.

OR

- Q8)** a) Explain in detail ambiguity and disambiguation in NLP. **[8]**
- b) Explain the concept of Semantic Analysis with suitable examples. **[8]**



Total No. of Questions : 10]

SEAT No. :

P3122

[Total No. of Pages : 3

[5354]-612
B.E. (E & TC)
MOBILE COMMUNICATION
(2012 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of scientific calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain the assumptions used in second Erlang distribution for queuing systems. **[5]**
- b) During busy hour, 1200 calls were offered to a group of trunks and 6 calls were lost. The average call duration was 3 minutes. Find. **[5]**
- i) Traffic offered
 - ii) Traffic carried
 - iii) Traffic lost
 - iv) Grade of service
 - v) Total duration of period of congestion.

OR

- Q2)** a) Draw general trunking diagram for a switching system. Explain various functional entities. **[5]**
- b) Define and explain **[5]**
- i) Grade of service
 - ii) Blocking probability
 - iii) Traffic intensity

P.T.O.

- Q3)** a) Derive and calculate availability for dual processor systems with MTBF = 2000 hours & MTTR = 4 hours in 15 years. [5]
- b) With the help of framing diagram explain 8 bit 16 channels PCM signalling shared between 30 channels. [5]

OR

- Q4)** a) With the help of signal exchange diagram and timing diagram explain signal exchange for a local call system. [5]
- b) Derive the equation for total number of cross points required for two stage network with N incoming and N outgoing trunks. [5]

- Q5)** a) Explain AMPS spectrum allocation and the types of voice and control channels used in AMPS. [8]
- b) Write short note on :
- i) GSM Time Hierarchy [4]
- ii) GSM Burst Structure [5]

OR

- Q6)** a) In AMPS explain call processing of
- i) Mobile Terminated Call [4]
- ii) Mobile originated Call [4]
- b) Explain the function of following with respect to GSM architecture.
- i) BSC [5]
- ii) MSC [4]

- Q7)** a) Draw and explain in detail the block schematic of a typical mobile station. [6]
- b) With the help of neat diagram. Explain the operation of a GMSK modulator. [6]
- c) Write short note on GPRS services. [5]

OR

- Q8)** a) With the help of neat diagram explain block scheme of GSM half rate encoder. [6]
- b) Write a short note on EDGE. [6]
- c) Draw and explain GSM network architecture for SMS service. [5]

OR

- Q9)** a) Compare basic types of pseudorandom sequences used in spread spectrum CDMA systems. [8]
- b) Draw the block diagram of Rake Receiver and explain its operation. [8]

OR

- Q10)** a) Draw and explain basic receiver structure of DS-SS-SSMA. [8]
- b) Compare between WCDMA and IS-95. [8]



Total No. of Questions : 8]

SEAT No. :

P3123

[Total No. of Pages : 2

[5354]-613
B.E. (E & TC)
BROADBAND COMMUNICATION
(2012 Pattern)

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.*
- 4) *All questions carry equal marks.*
- 5) *Your answers will be valued as a whole.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

- Q1)** a) What are Optical Transmitters? Explain with diagram working of LED with its characteristics. State its specifications & limitations over LASER. **[8]**
- b) What are the key requirements of point to point link in FOC? Explain link design with respect to choice of components & its characteristics. **[6]**
- c) Explain Rise time budget in OFC systems. **[6]**

OR

- Q2)** a) What is Multichannel Transmission System? Explain with diagram Multi-channel Amplitude Modulation technique. **[8]**
- b) What is EDFA? Explain the principle & operation of EDFA. **[6]**
- c) Compare PIN photo diode with APD. **[6]**
- Q3)** a) What is the need of satellite communication? Explain with diagram basic structure of satellite communication. **[8]**
- b) What are the various orbital effects in communication system performance? Explain. **[8]**

P.T.O.

OR

Q4) a) Explain with relevant details, satellite communication link design. Comment on important issues in Link design. [8]

b) What is link budget? Explain performance objective for Digital Link. Derive the equation for Received power ' P_r '. [8]

Q5) a) What is Reliability & Space qualification? Explain with bath tub curve. [8]

b) What is TTC? Explain in brief. [6]

c) What is look angle determination? Explain. [4]

OR

Q6) a) Explain with diagram Uplink design of satellite communication. [6]

b) Compare LEO, MEO, GEO satellite orbits. [6]

c) What LNA? Explain. [6]

Q7) a) What is system noise temperature & $\frac{G}{T}$ Ratio? Explain in detail. [8]

b) State & explain the design considerations for downlink design of satellite communication. [8]

OR

Q8) a) Write short notes [10]

i) Satellite Antennas.

ii) Synchronous satellites.

b) What is equivalent Isotropic Radiated Power? (EIRP) explain in brief. [6]



Total No. of Questions : 10]

SEAT No. :

P3124

[Total No. of Pages : 3

[5354]-614

B.E. (E & TC)

SPEECH AND AUDIO SIGNAL PROCESSING

(2012 Pattern) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1. 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.

Q1) a) Explain Acoustic theory of speech production? LTV model of speech Production mechanism signal? [5]

b) What is coarticulation in speech production? Explain role of articulatory organs? [5]

OR

Q2) a) What is Critical band? Explain its Significance with human hearing mechanism. [5]

b) Uniform and Non Uniform filter bank in human auditory mechanism? [5]

Q3) Explain following features of time domain processing of speech signal [10]

- a) Short- time average magnitude
- b) Short time Energy
- c) Average Zero Crossing rate
- d) Short-time autocorrelation function
- e) Short-time average magnitude difference function.

OR

P.T.O.

Q4) Explain following terms in audio feature extraction **[10]**

- a) Spectral Centroid,
- b) Spectral Spread,
- c) Spectral Entropy,
- d) Spectral Flux,
- e) Spectral Roll-off

Q5) a) Explain Basic principles of linear predictive analysis using **[10]**

- i) Autocorrelation method
- ii) Covariance method.

b) Explain Frequency domain interpretation of LP analysis. **[6]**

OR

Q6) a) What are the applications of LPC parameters as pitch detection and formant analysis explain. **[8]**

b) Explain Levison Durbin algorithm in LP 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 computation of Mel Frequency Cepstral Coefficients (MFCC). **[8]**

OR

Q8) a) Explain in detail estimation of formant and pitch parameters using cepstrum. **[6]**

b) Explain Homomorphic speech processing? What is **[10]**

- i) Real Cestrum: Long-term real cepstrum?,
- ii) Short-term real cepstrum?

- Q9) a)** Explain speech recognition for isolated word speech recognition systems? [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)** Write Musical instrument classification?
Explain Musical Information retrieval. [9]
- b) Explain speech enhancement? Explain spectral subtraction method. [9]



Total No. of Questions : 10]

SEAT No. :

P3125

[Total No. of Pages : 2

[5354]-615

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

RF CIRCUIT DESIGN

(2012 Pattern) (Elective - III)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q1. 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) Describe RF behavior of passive Components. [5]

b) Correlate Bandwidth and Rise time. [5]

OR

Q2) a) Comment on Unilaterlization. [5]

b) Design RF amplifier for voltage gain of 60 dB and bandwidth of 400 MHz. Use source followers at input and output to improve bandwidth.[5]

Q3) a) Describe in brief stabilization methods. [5]

b) Discuss the method of short circuit time constants to estimate the bandwidth. [5]

OR

Q4) a) Explain MOSFET's two port noise parameters? [5]

b) What is the standard recipe for computing bandwidth? [5]

Q5) a) Explain LNA Topologies with suitable diagrams. [8]

b) With suitable diagram explain Differential LNA and its design parameters. [8]

P.T.O.

OR

- Q6)** a) Explain with suitable example Spurious free dynamic range? [8]
b) Design LNA to operate at 300 MHz. Design suitable bias. Compute device width degenerating inductance, noise figure & Lg. Assume suitable data. [8]

- Q7)** a) Explain negative resistance oscillator? [6]
b) Describe basic LC Feedback Oscillator? [6]
c) Describe function model of Colpitts Oscillator? [6]

OR

- Q8)** a) Discuss challenges faced by purely linear oscillator. [6]
b) Explain Quartz Crystal resonator in detail. [6]
c) Describe start up model of Colpitts Oscillator. [6]

- Q9)** a) Explain with respect to Mixer following Characteristics. [8]
i) Spur
ii) Isolation
b) Describe with neat diagram Active Double Balanced Mixer. [8]

OR

- Q10)**a) Discuss fundamentals of Mixer. [8]
b) Linear Mixer is based upon Nonlinearity, Discuss. [8]



Total No. of Questions : 10]

SEAT No. :

P3126

[Total No. of Pages : 2

[5354]-616

B.E. (Electronics & Telecommunication)

AUDIO VIDEO ENGINEERING

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8 and Q9 or 10.*
- 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) Draw Block diagram of IF modulated TV transmitter. Enlist the disadvantages of high level TV transmitter over IF modulated TV transmitter. **[6]**

b) Explain Filterplexer in detail. **[4]**

OR

Q2) a) Draw and explain PAL Encoder & Decoder. **[6]**

b) What is significance of weighted signals in television? Explain these signals with equations for i) PAL ii) NTSC. **[4]**

Q3) a) What is MAC Signal? What are various types of MAC? Draw D 2 MAC signal. **[6]**

b) Explain any one CCTV application in detail. **[4]**

OR

Q4) a) With the help of block diagram explain HDTV. **[6]**

b) Enlist and explain the functional blocks used in Digital Television. **[4]**

P.T.O.

- Q5) a)** What is IPTV? Explain IPTV in detail with suitable block schematic. [8]
b) Explain the application of Video door phone in detail. [8]

OR

- Q6) a)** Explain Wi-Fi TV with relevant block diagram in detail. [8]
b) Write short notes on Mobile TV. [8]

- Q7) a)** Explain with neat block diagram, working of DVD player. What are the various output connectors available for DVD? Enlist the capacities of DVD available in market. [10]
b) Compare VCD, DVD and Blu-ray Disc. [6]

OR

- Q8) a)** Explain the basic principle of optical recording and reproduction with suitable sketches. [10]
b) In brief discuss the MPEG standard for compression of signal. [6]

- Q9) a)** State the various types of microphones. Explain any one microphone showing construction details, working, specifications and applications in detail. [10]
b) What are the requirements of a good auditorium for pleasant listening? Give the features of acoustical design to have good auditorium. [8]

OR

- Q10) a)** Define the following terms with respect to sound acoustics. [8]
i) Reverberation
ii) Acoustics chamber
iii) Absorption coefficient
iv) Studio acoustics
b) Enlist the basic requirements of PA system. Draw Block diagram of typical cordless PA system. Explain it in detail. [10]



Total No. of Questions : 10]

SEAT No. :

P3127

[Total No. of Pages : 3

[5354]-617

B.E. (E & TC)

SOFT COMPUTING TECHNIQUES

(2012 Pattern) (Elective - III) (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 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) Discuss Gradient Descent algorithm in short. [5]
b) Discuss following learning paradigms with one example each : [5]
i) Unsupervised
ii) Reinforcement.

OR

- Q2)** a) A single input, single output neuron has a weight of 5 and a bias of -3. What is the net input to the transfer function if given input is 1? What will be the output if the transfer f^n is bipolar sigmoid with slope $S = 0.5$? [6]
b) Perform the intersection and union operation for given fuzzy sets, [4]
 $A = \{(0.95, 1) (0.8, 2) (0.6, 3) (0.55, 4) (0.3, 5)\}$ &
 $B = \{(0.25, 2) (0.5, 3) (0.75, 4) (0.9, 5) (1, 6)\}$

- Q3)** a) State Yes/No with respect to Hopfield Neural Network. [6]
i) Recurrent network : Yes/No
ii) Single layer network : Yes/No
iii) Convergence to local minima : Yes/No
iv) Uses Hebb Rule for weight initialization : Yes/No.
v) Binary threshold units : Yes/No
vi) Type is associative memory network : Yea/No
b) Differentiate fuzzy relations & fuzzy composition. [4]

P.T.O.

OR

- Q4) a)** Consider a single-layer perceptron having 2 inputs & 1 output. Let threshold be 0.5, learning rate be 0.6, bias be -2 and weight values $W_1 = 0.3$ & $W_2 = 0.7$. Given the input patterns in the table, compute the value of the output & train using perceptron learning rule for first training pattern only. Source/Target Pattern : **[6]**

X_1	X_2	D
1	1	1
1	0	1
0	1	-1
0	0	1

- b) Enlist the operations on fuzzy sets. **[4]**

- Q5) a)** Using your own intuition & your own definition of the universe of discourse, plot fuzzy membership functions to the following variables. **[5]**

i) Height of liquid in a tank :

- a) Very full
- b) Full
- c) Medium
- d) Small
- e) Very small

ii) Let A denotes the age in years. The linguistic variables are defined as, **[5]**

- a) Very young (VY) - $A < 15$
- b) Young (Y) - $12 \leq A < 30$
- c) Middle aged (M) - $25 \leq A < 50$
- d) Old (O) - $45 \leq A < 65$
- e) Very Old (VO) - $60 < A$

- b) What is implication? **[8]**

Discuss following implications with examples.

- i) Dienes - Rescher
- ii) Mamdani
- iii) Zadeh

Write their mathematical expressions.

OR

- Q6)** a) Describe any three defuzzification methods with neat diagrams. [9]
b) Discuss Takagi & sugeno's approach to FLC along with its principle and list advantages/disadvantages of this method. [9]

- Q7)** a) State the control system design problem. Define control (decision) surface. State assumptions in FLCs. [8]
b) Compare and contrast FLCs with traditional PID controllers. Discuss their principle of working. [8]

OR

- Q8)** a) Discuss the Aircraft landing control problem. [8]
b) Discuss the architecture of FLC with Mamdani approach. [8]

- Q9)** a) Explain the term : ANFIS
Discuss the architecture of ANFIS system. [8]
b) What is regression?
How do we apply ANFIS for regression? What is the importance of regression? [8]

OR

- Q10)** Write short note on : (8 marks each) : [16]
a) Hybrid learning algorithms.
b) CANFIS



Total No. of Questions : 8]

SEAT No. :

P3128

[Total No. of Pages : 2

[5354]-618
B.E. (E & TC)
BIOMEDICAL SIGNAL PROCESSING
(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) *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 electrical activity of heart. What is the significance of Einthoven's triangle? [8]
- b) Explain Reflex action and receptors in neural systems. [6]
- c) Explain the sources of variability of noise in Biosignal acquisition. [6]

OR

- Q2)** a) Explain Blood pressure Measurement techniques. [8]
- b) Explain 3 different types of Bioelectrodes with help of suitable diagrams. [6]
- c) Draw and explain the Block diagram of ECG recorder. [6]

- Q3)** a) Explain the use of EEG signal to diagnose brain disorders like Epilepsy and sleep disorders. [8]
- b) Draw and explain 10 - 20 electrode system used in EEG acquisition. [8]

OR

- Q4)** a) Explain use of adaptive filters in noise cancellation and adaptive cancellation of maternal ECG from fetal ECG. [8]
- b) Draw schematic and explain Instrumentation amplifier and Isolation Amplifier for biosignals. [8]

P.T.O.

- Q5)** a) With the help of circuit diagram and frequency response explain all topologies of active filters. [10]
- b) Explain various EEG waveforms with their frequency ranges and significance. [8]

OR

- Q6)** a) Explain grounding and shielding techniques in Biomedical Instrumentation. [10]
- b) Compare FIR and IIR filters. [8]
- Q7)** a) Explain difference between stationary and nonstationary signals. State the edge effect due to finite length of sequences. [8]
- b) State sampling theorem and explain its significance in data acquisition of Biosignals. [8]

OR

- Q8)** a) Explain Multivariate analysis and its significance. Distinguish between PCA and ICA. [8]
- b) What is Digital Signal Processing? Explain the use of Digital signal processing in Biomedical Applications. [8]



Total No. of Questions : 8]

SEAT No. :

P3129

[Total No. of Pages : 2

[5354]-619

B.E. (E & TC)

NANOELECTRONICS & MEMS

(2012 Pattern) (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) Assume suitable data if necessary.

- Q1)** a) What are different types of crystal planes? Explain with neat diagram. [7]
b) What are the various types of defects in crystal structure. Explain in Detail. [6]
c) Explain thermal oxidation and its types in detail. [7]

OR

- Q2)** a) Describe CZ process in detail with neat diagram. [7]
b) Explain gettering process of contamination reduction in detail. [7]
c) Explain Quantum dot and Quantum particle in brief. [6]

- Q3)** a) Enlist various intrinsic characteristics of MEMS. [9]
b) Explain in detail different types of stress and strains. [9]

OR

- Q4)** a) Explain different types of beams in detail. [9]
b) Write short note on Sensor Noise and Design complexity. [9]

- Q5)** a) Explain different types of sensors and actuators. [8]
b) Explain in detail Acceleration sensor. [8]

P.T.O.

OR

- Q6)** a) Write Short note on :
- i) Magnetic actuation [8]
 - ii) Piezo resistive sensing
- b) Explain the working of thermocouple in detail. [8]
- Q7)** a) Write short on : [8]
- i) X-Ray Photoelectron Spectroscopy
 - ii) Profilometers
- b) Explain Hall Effect Sensor and its types in detail. [8]

OR

- Q8)** a) Explain Hot Probe method in detail. [8]
- b) Explain Fourier Transform Infrared Spectroscopy method in detail. [8]



Total No. of Questions : 10]

SEAT No. :

P3130

[Total No. of Pages : 3

[5354]-620

B.E. (E & TC)

DETECTION AND ESTIMATION THEORY

(2012 Pattern) (Elective - IV)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q.No. 1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q7 or Q.8, Q.9 or Q.10.
- 2) Figures to the right indicate full marks.

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]

$$H1 : Y_k = 1 + N \quad K = 1, 2, \dots, K$$

$$H2 : Y_k = 2 + N \quad K = 1, 2, \dots, K$$

$$H3 : Y_k = 3 + N \quad K = 1, 2, \dots, K$$

The additive noise N is Gaussian with mean zero and variance σ^2 . The costs are $C_{ii} = 0$ and $C_{ij} = 1$ for $i \neq j$. $I_j, j = 1, 2, 3$ determine the decision regions

P.T.O.

- b) Discuss the Bays estimation method briefly for Least Square Estimation and Kalman filter. [5]

Q5) a) Write a note on Discrete Wiener Filter. [8]

- b) Explain Kalmans filter in context of estimation theory. [8]

OR

Q6) a) What is Cramer Rao Bound inequality and what are its limitations discuss in detail. [8]

- b) Write a note on Recursive Least-Square Estimator. [8]

Q7) a) 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.
- b) In on-off keying system, the source transmits signal of amplitude I volt or 0 volt. Noise $n(t)$ is added which has zero mean and variance = 1 and it is Gaussian. Set up the LRT (Likelihood Ratio Test) for this problem. [8]

OR

Q8) a) A rectangular pulse of known amplitude A is transmitted starting at time instant t_0 with probability $1/2$. The duration T of the pulse is a random variable uniformly distributed over the interval $[T_1, T_2]$. The additive noise to the pulse is white Gaussian with mean zero and variance $N_0/2$. Determine the likelihood ratio. [8]

- b) Explain best linear unbiased Estimator (BLUE)? [8]

- Q9)** a) Explain the Radar Elementary concepts- Range, Range Resolution, and Doppler Shift. [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. :

P3131

[Total No. of Pages : 2

[5354]-620-A

B.E. (E & TC)

WIRELESS NETWORKS (Theory)

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

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 right indicate full marks.
- 4) Assume suitable data, if necessary.

- Q1)** a) Draw and explain the 4G wireless access technology paths. [7]
- b) With neat diagram explain wireless network architecture, what are the characteristics & functions of Access Point (AP) & wireless Adaptor (CPE). [7]
- c) What are commonality among WCDMA CDMA - 2000, TD-CDMA & TD-SCDMA. [6]

OR

- Q2)** a) Give the data capability supported by 2.5G and 3G technologies. [7]
- b) List the different protocols with specifications used in Wi-Fi. [7]
- c) Describe the four service classes of UMTS. [6]

- Q3)** a) Sketch LTE Network and explain the functions of basic five elements. (i.e UE, e Node B, E-UTRA, EPC & Non-LTE application servers) [9]
- b) Explain cell search and cell reselection process. [6]
- c) Describe Heterogenous Network (HetNET) in detail. [3]

OR

- Q4)** a) What is TDD? Explain LTE-TDD frame structure with relationships. [9]
- b) Give the scheduler decisions involved in LTE with policies. [9]

P.T.O.

- Q5) a)** What is unique aspect of WiMAX? Compare 802-16 variants specifications with frequency band and functionality. [8]
- b) Which are three methods incorporated in WiMAX for QoS? Explain in brief. [8]

OR

- Q6) a)** Explain the functions of MS,ASN & CSN in detail in WiMAX system.[8]
- b) With signal flow diagram, describe the handover process in WiMAX.[8]

- Q7) a)** Give the advantages of VoIP. What are the challenges of VoIP? [8]
- b) Describe the functions of [8]
- i) Gateway
 - ii) Gatekeeper
 - iii) Multipoint Control Unit (MCU) of H.323.

OR

- Q8) a)** Describe redirect server operation in SIP. [8]
- b) What are the different MEGACO commands? Explain the function of each. [8]



Total No. of Questions : 10]

SEAT No. :

P3132

[Total No. of Pages : 2

[5354]-620-B
B.E. (Open Elective)
(Information Technology, Computer Engineering &
Electronics and Telecommunications)
UNIFIED COMMUNICATION AND CONTACT CENTER
APPLICATIONS
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answers Question 1 or 2, 3 or 4, 5 or 6, 7 or 8 and 9 or 10.*
- 2) *Draw neat diagrams whenever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary,*

Q1) a) Explain the significance of RTP in UDP? **[5]**

b) What is H.323? Explain with neat diagram of H.323 protocol stack? **[5]**

OR

Q2) a) Describe E.164 Numbering Plan? **[5]**

b) Draw and explain SIP call flow? **[5]**

Q3) a) What is SS7 protocol? **[5]**

b) What do you mean by codec? Explain any one. **[5]**

OR

Q4) a) Explain in any two features **[5]**

i) Call Forward

ii) Call coverage

iii) Automatic call back

b) Differentiate between hosted and on-premise telephony solutions.

What does the capabilities message of H.245 contain? **[5]**

P.T.O.

- Q5)** a) Explain the lifecycle of an inbound voice contact. Describe the components involved and their functionalities. [6]
- b) What are the benefits of computer telephony Integration. [6]
- c) Explain the functionalities of PABX, ACD, Self Service and CTI in an Inbound Call Center. [6]

OR

- Q6)** a) How does the IVR work? [6]
- b) What is inbound and outbound contact center? [6]
- c) Draw a flow chart for selecting agent in inbound chat contact. [6]

- Q7)** a) What are the different types of report in contact center? [8]
- b) What is a customer service in a call center? [8]

OR

- Q8)** 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) Explain the 3 modes of outbound dialing? Provide key differentiators between the three with sample use cases for each. [8]

- Q9)** a) List down and explain various types of deployment models are used in cloud? [8]
- b) What is DevOps and explain it helps Continuous Integration? What are UCaaS and CCaaS and list five key advantages of this? [8]

OR

- Q10)**a) What is the difference between a server and a cloud? [8]
- b) What is BYOD (bring your own device)? Explain anyone application in detail.. [8]



Total No. of Questions : 10]

SEAT No. :

P3133

[Total No. of Pages : 3

[5354]-621

B.E. (Electrical Engineering)

POWER SYSTEM OPERATION & CONTROL

(2012 Pattern) (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 side indicate full marks.*
- 3) *Use of electronic pocket Calculator is allowed.*
- 4) *Assume Suitable data if necessary.*

- Q1)** a) What are the different methods to improve steady state stability? Elaborate with reasoning. **[5]**
- b) Draw “D” curve of synchronous generator capability showing all the constraints with proper reasons. **[5]**

OR

- Q2)** a) Draw schematic diagram of STATCOM. Also give details about construction and principle of operation with its operating characteristic. **[5]**
- b) A 200MVA, 11kV, 50Hz, 4-pole synchronous generator has an inertia constant of 6MJ/MVA. **[5]**
- i) Find the energy stored in the rotor.
 - ii) The machine is operating with the load of 120MW is suddenly changed to 160MW. Find the retardation. Neglect the losses
 - iii) If the retardation is maintained for 5 cycles, find the change in power angle and rotor speed in rpm at the end of this period.

- Q3)** a) What do you mean by subsynchronous resonance? What are the different effects of subsynchronous resonance. **[5]**
- b) What are different combinations used in SVC? Elaborate any two types with diagram and characteristic. **[5]**

OR

P.T.O.

Q4) a) A synchronous generator is connected to infinite bus through a transformer and transmission network. A three phase fault is occurred at generator bus bar. Derive the critical clearing angle for transient stability using equal area criteria. **[5]**

b) What are the different controllers used in reactive power compensation? Explain with suitable diagram. **[5]**

Q5) a) With suitable control system diagram, explain two area load frequency system. **[8]**

b) Two synchronous generators operating in parallel supply a total load of 200 MW. The ratings of the machines 1 and 2 are 100 MW and 200 MW. Machines 1 and 2 have governor droop characteristic of 4% and 3% respectively, from no load to full load. Assume that at full load, machines run at rated speed and the system frequency is 50 Hz. Calculate the load taken by each machine and the operating frequency. **[8]**

OR

Q6) a) Derive the formula for steady state change in frequency for change in demand, if single area load frequency control is considered to be first order system. **[8]**

b) Two generators rated 200MW and 400MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. The speed changers are so set that at operating frequency of 50Hz, the total load shared is 600MW with the ratio of their ratings. If the load reduces to 400MW, how it will be shared among the generators and what will be the operating frequency? Assume free governor operation. **[8]**

Q7) a) A generating station is having two units, the incremental cost curve of two units are given by **[8]**

$$\frac{dF_1}{dP_1} = 0.1P_1 + 20Rs / MWhr$$

$$\frac{dF_2}{dP_2} = 0.12P_2 + 16Rs / MWhr$$

For the load of 180MW determine annual saving for economical loading instead of equal loading.

b) Explain the different thermal constraints on unit commitment. **[8]**

OR

Q8) Read the following statements carefully and state whether it is true or false with proper justification. **[16]**

- a) Incremental cost in economical load scheduling among the generator is different.
- b) The generator is having less operating cost should share large load than other generators operating in parallel in economical load dispatch.
- c) In economic load dispatch with considerable power loss, equality constraints is $\sum_{i=1}^n P_{Gi} = P_D$ Where P_{Gi} is generation and P_D is load
- d) Once the unit is decommitted, there is minimum time required to recommit. It is known as minimum up time in thermal constraints.

Q9) a) What do you mean by power pool? What is the role of power pool in energy control? **[9]**

b) Write short note on “emergency power exchange and energy banking”. **[9]**

OR

Q10)a) Define following terms **[9]**

- i) SAIDI
- ii) CAIDI
- iii) SAIFI

b) Write short note on “capacity and diversity interchange”. **[9]**



Total No. of Questions : 8]

SEAT No. :

P3134

[Total No. of Pages : 2

[5354]-622
B.E. (Electrical)
PLC AND SCADA APPLICATIONS
(2012 Pattern)

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) Draw and explain overall PLC system. **[8]**
b) Explain counters and its types used in PLC. **[8]**
c) Explain input analog devices. **[6]**

OR

- Q2)** a) Write a short note on input and output modules. **[7]**
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) What is effect of change of Kp in PID controller on the output of the closed loop system. **[7]**
- Q3)** a) Explain any one type of thermal sensor. **[8]**
b) Explain temperature control system using PLC with the help of block diagram only. **[8]**

P.T.O.

OR

- Q4)** a) Draw and explain working of AC motor overload protection. [8]
b) Write a short note on variable frequency drive. [8]

- Q5)** a) Draw Block diagram of SCADA and explain it in detail. [8]
b) State advantages and disadvantages of SCADA system. [8]

OR

- Q6)** a) Explain SCADA systems in interconnected power system. [8]
b) Define SCADA, MTU, RTU, HMI. [8]

- Q7)** a) Write a short note on TCP/IP protocol. [8]
b) Write a short note on DNP3 protocol. [8]

OR

- Q8)** a) Explain IEC61850 layered architecture. [8]
b) Write a short note on Control and Information Protocol (CIP). [8]



[5354]-623
B.E. (Electrical)
CONTROL SYSTEM - II
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) Explain in detail design procedure of lead compensator. **[8]**

b) A system is represented by the state model. **[6]**

$$\dot{X} = \begin{bmatrix} -2 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -3 \end{bmatrix} X + \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} u, \quad Y = [1 \ 0 \ 0] X$$

Determine controllability & observability of above using Kalman's test.

c) Define the terms : **[6]**

- i) State variable
- ii) State vector
- iii) State space
- iv) State trajectory.

OR

Q2) a) A system is represented by a state model

$$\dot{X} = \begin{bmatrix} 0 & 1 \\ -1 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 2 \end{bmatrix} u, \quad Y = [1 \ 0] X$$

It is required to place the poles of the system at $S = -3 \pm j4$. Design a suitable state feedback gain matrix 'K' using transformation matrix method. **[8]**

P.T.O.

- b) Solve the homogeneous state equation, given that

$$\dot{X} = \begin{bmatrix} -4 & 1 \\ -3 & 0 \end{bmatrix} X \quad Y = [1 \ 0]X \quad X_0 = [1 \ 1]^T \quad [8]$$

- c) What is lag compensator? Explain with the help of pole-zero plot, TF & circuit diagram. [4]

Q3) a) Define the terms phase trajectory and phase portrait and explain the procedure of construction of phase trajectory using delta method. [10]

- b) With suitable sketches write a short note on stability Analysis of a non linear system using describing function method. [8]

OR

Q4) a) In a unity feedback system, an ideal relay with output ± 2 units is connected in cascade with $G(s) = \frac{10}{s(s+3)(s+4)}$. Determine the amplitude & frequency of limit cycle, if it exists, by describing function method. [10]

- b) With suitable sketches show various types of singular points. Also mention the location of closed loop poles in each case. [8]

Q5) a) What is ZOH? Derive its transfer function. [8]

- b) Obtain Z transform of following sequences. [8]

i) $f(k) = \{2, 4, \underset{\uparrow}{5}, 7, 3\}$

ii) $f(k) = \left(\frac{1}{2}\right)^k u(k)$

Also state ROC in both cases.

OR

Q6) a) Explain with neat diagram process of analog to digital conversion of a signal. [8]

b) Solve following difference equation. [8]

$$x(k+2) - 3x(k+1) + 2x(k) = u(k)$$

given that $x(0) = 0$ and $x(1) = 1$

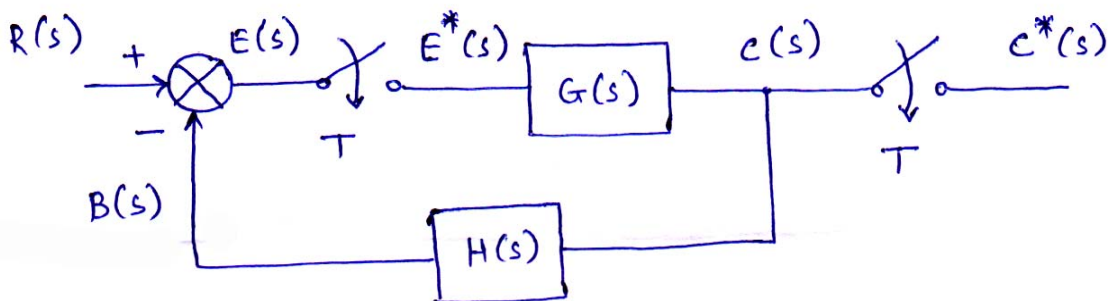
Q7) a) What is pulse transfer function? Write general procedure to obtain pulse transfer function. [8]

b) Obtain the cascade realization of the system described by - [8]

$$D(z) = \frac{z^3 + 3z^2 + 7z + 5}{z^3 + 3z^2 + 9z + 14}$$

OR

Q8) a) Obtain the pulse transfer function of following closed loop system. [8]



b) Obtain parallel realization of the system described by

$$D(z) = \frac{z^2 + 11z + 15}{z^2 + 7z + 12} \quad [8]$$



Total No. of Questions : 11]

SEAT No. :

P3136

[Total No. of Pages : 2

[5354]-624

B.E. (Electrical)

SPECIAL PURPOSE MACHINES

(2012 Pattern) (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, Q11 is compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

Q1) Describe the process of torque production in case of permanent magnet system. Write the respective mathematical expressions. [7]

OR

Q2) Explain the concept of electronic commutation. [7]

Q3) Discuss the development of magnetomotive force produced by a three phase balanced distributed winding. [7]

OR

Q4) Derive the mathematical expression for torque developed in PMSM. [7]

Q5) Obtain the abc- $\alpha\beta$ transformation to get $\alpha\beta$ -dq transformation clearly state the meaning of each notation used and assumptions made. [6]

OR

Q6) With suitable block diagram explain unity power factor operation of PMSM. [6]

Q7) a) With a neat diagram explain construction details of radial gap reluctance machine also explain its working. State its two applications. [8]

b) State the differences between switch reluctance motor and synchronous reluctance motor. [8]

OR

P.T.O.

- Q8)** a) Derive the mathematical expression for static and dynamic torques in reluctance machine by usual notations. [8]
- b) Explain control of switched reluctance motor with a suitable block diagram. [8]

- Q9)** a) Explain the concept of lead angle in case of stepper motor. Also explain how lead angle concept is used in control of stepper motor. [9]
- b) With suitable diagram explain construction and working of variable reluctance stepper motor. [9]

OR

- Q10)**a) Draw and explain following characteristics of stepper motor. [9]
- i) Torque-current characteristics
- ii) Torque-stepping rate characteristics.
- b) With usual notations, derive the expression for mechanical torque developed in variable reluctance motor. [9]

Q11) Attempt any two. [16]

- a) With suitable diagram explain any two types of linear induction motors.
- b) Draw and explain performance characteristics of linear induction motor.
- c) Discuss various applications of linear induction machine.



Total No. of Questions : 10]

SEAT No. :

P3137

[Total No. of Pages : 2

[5354]-625
B.E. (Electrical)
POWER QUALITY
(2012 Pattern) (Elective - I)

Time : 2.30 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) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary*

Q1) a) Explain Various definitions of Power Quality with reference to various stake holders. **[5]**

b) What is Grounding? How Power quality can be improved by effective grounding practices? **[5]**

OR

Q2) a) Define the important terms related to poor Power quality considering IEEE Standard 1159. **[5]**

b) Write notes on classification of transients. **[5]**

Q3) a) Define Flicker. What are the causes and its impact on power system equipment? **[5]**

b) Define long duration rms voltage variations. **[5]**

OR

Q4) a) Define Voltage sag and voltage unbalance. **[5]**

b) Define short duration RMS voltage variations. Draw V-T plot. **[5]**

Q5) a) Define and classify harmonics. What are the causes of harmonics? **[8]**

b) Explain with suitable diagram triplen harmonics and its impact on power system. **[8]**

P.T.O.

OR

Q6) a) Define Power and power factor in power system under non-sinusoidal conditions. [8]

b) What are the causes and effects of harmonics on equipment? [8]

Q7) a) Explain the concept of PCC. What are the principles of harmonic control? [8]

b) Explain the procedure for harmonic evaluation as per IEEE standard 519. [8]

OR

Q8) a) Explain any two harmonic controlling devices. [8]

b) Write note on computer tools for harmonic analysis. [8]

Q9) a) Discuss various power quality measuring devices. [10]

b) Write note on test location and test duration. [8]

OR

Q10)a) Explain the procedure for selection of power quality monitoring equipment. What are various equipment used for PQ monitoring? [10]

b) Write note on Choosing monitoring locations. [8]



[5354]-626

B.E. (Electrical) (Semester - I)
RENEWABLE ENERGY SYSTEMS
(2012 Pattern) (Elective - 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 and Q.7 or Q.8.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain direct & diffused radiation and effect on power generation. [5]
b) The latitude of 30° N & the tilt angle 30° towards the equator, determine the ratio R_b for 10: 30 am on July 25. [5]
c) Define following parameters for solar cell [5]
i) Efficiency of solar cell
ii) Fill Factor
iii) Short circuit voltage
d) State different types of speed control strategies for wind Turbine. [5]

OR

- Q2)** a) List the different silicon technologies available for solar PV cell. Explain any one in detail. [5]
b) Calculate F.F, Maximum power & cell efficiency with following parameters
 $V_{oc} = 0.24V$, $I_{sc} = -10$ ma, $V_m = 0.14V$, $I_m = -6.5mA$
Intensity = 100 W/m², Area = 4 C m² [5]
c) Explain any one type of CSP. [5]
d) Define following. [5]
i) Wind Turbine efficiency
ii) Cut - in - Speed
iii) Cut - out - Speed
iv) Yaw Control
v) Pitch Control

P.T.O.

- Q3)** a) Explain gasifier in detail with neat diagram? [8]
b) Discuss the method of power generation from liquid waste [8]

OR

- Q4)** a) What are the Biomass Resources? Explain with the help of block diagram a biomass based Power generation. [8]
b) The following data are given for a family biogas digester suitable for the output of five Cows the retention time is 20 days, temperature 30°C, and dry matter Consumed per day = 2 kg, Biogas yield is 0.24 m³ per kg. The efficiency of burner is 60%, Methane proportion is 0.8. Heat of combustion of methane = 28 MJ/m³ Calculate i) the volume of biogas digester ii) The power available from the digester. [8]

- Q5)** a) What is SMES? What are its features? Explain any two? [8]
b) What are the different losses in electrochemical cell? Give the information about Battery parameters. [8]

OR

- Q6)** a) What is a fuel cell? What are the advantages and disadvantages of a fuel cell? [8]
b) A hydrogen oxygen fuel cell operates at 25°C. Calculate the voltage output of the Cell, the efficiency, and the electric work output of cell, the efficiency, and the Electric work output per mole of H₂ consumed and per mole of H₂O produced. Also compute the heat transferred to the surrounding. [8]

Given: $\Delta H^0_{298^0 K} = - 285838 \text{ kJ/kg mole}$

$\Delta G^0_{298^0 K} = - 237191 \text{ kJ/kg mole}$

- Q7)** a) Define & limitation of i) Payback period Method ii) Initial rate of return/ Return on Investment. [6]
b) What are different parameters required for synchronization of renewable energy Source with grid. [4]
c) Explain with the help of block diagram grid connected PV System. [8]

OR

- Q8)** a) What is mean by Time Value of money? Why it should be considered?
What is Net Present Value (NPV). [6]
- b) What are different parameters required for synchronization of renewable energy Source with grid. [4]
- c) Compare simple payback period with life cycle costing. [8]



[5354]-627

B.E. (Electrical) (Semester - I)
DIGITAL SIGNAL PROCESSING
(2012 Pattern) (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 Q 10.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of Scientific Calculator is allowed.
- 5) Assume Suitable data if necessary.

Q1) a) Determine inverse Z-transform of the signal $X(z) = \frac{z}{3z^2 - 4z + 1}$ if ROC is $|Z| > 1$. [5]

- b) State and explain following properties of Z-transform. [5]
- i) Linearity
 - ii) Time shifting

OR

Q2) a) Explain linear and non linear discrete time system. [5]

- b) Find the DTFT of the signal $x(n) = (0.5)^n u(n) + 2^n u(-n - 1)$. [5]

Q3) a) State and explain following properties of DTFT. [5]

- i) Periodicity
 - ii) Frequency shifting.
- b) Find the following system is time invariant or time variant. [5]

$$y(n) = ax(n - 1) + bx(n - 2)$$

OR

Q4) a) State and explain sampling theorem. [5]

- b) Define Z-transform and inverse Z-transform with significance of ROC. [5]

P.T.O.

Q5) a) Find the DFT of the following sequence. [8]

$$x(n) = \begin{cases} \frac{1}{5} & \text{for } -1 \leq n \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

b) Explain Radix-2 DITFFT algorithm for $N = 8$. [8]

OR

Q6) a) State and explain following properties of DFT. [8]

i) Periodicity

ii) Time shifting.

b) Explain Radix-2 DIFFFT algorithm for $N = 8$. [8]

Q7) a) Compare analog filter with digital filters. [6]

b) Obtain the direct forms-I and II realization of third order IIR filter which is expressed by [10]

$$H(z) = \frac{0.28z^2 + 0.319z + 0.04}{0.5z^3 + 0.3z^2 + 0.17z - 0.2}$$

OR

Q8) a) Compare FIR filter with IIR filters. [6]

b) Explain bilinear transformation technique for design of IIR filter. [10]

Q9) a) Explain the design technique of FIR filter with rectangular window. [9]

b) Explain application of DSP in measurement of power frequency. [9]

OR

Q10) a) Explain application of DSP in measurement of harmonics. [9]

b) Write short note on “DSP based protective relaying”. [9]



Total No. of Questions : 10]

SEAT No. :

P3140

[Total No. of Pages : 2

[5354]-628

B.E. (Electrical)

RESTRUCTURING & DEREGULATION

(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) 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 concept of Renewable Energy Credits and Carbon Credits. [5]
b) What are the key features of Electricity Act 2003. [5]

OR

- Q2)** a) Explain functions of Ministry of power and Power Finance Corporation. [5]
b) Why the reformation has taken place in electrical power system? [5]

- Q3)** a) Explain the desirable characteristics of tariff of electricity. [5]
b) Explain the key indices for assessment of utility performance. [5]

OR

- Q4)** a) Explain Average and Marginal costs. [5]
b) What is the role of Maharashtra Electricity Regulatory Commission (MERC). [5]

- Q5)** a) What are the different models based on contractual arrangement explain any one in detail. [8]
b) Explain electricity reform of Latin America. [8]

OR

P.T.O.

- Q6)** a) What are the different models based on structural models explain any one in detail. [8]
b) Write various steps that led to California Energy crisis. [8]

- Q7)** a) What are various market pricing methods, explain any one in detail. [8]
b) What are the various trading arrangement models explain any two in detail. [10]

OR

- Q8)** a) Explain in detail ancillary service market of trading electricity. [8]
b) What are various settlement processes in electricity markets? Explain in detail. [10]

- Q9)** a) What are various methods of congestion management explain any one in detail. [8]
b) Elaborate the reasons of congestion in power network. [8]

OR

- Q10)**a) What are various transmission pricing methods explain any one in detail. [8]
b) Explain the necessity of transmission planning with reference to market structure. Also explain the concept of transmission rights. [8]



Total No. of Questions : 10]

SEAT No. :

P3141

[Total No. of Pages : 3

[5354]-629
B.E. (Electrical)
ELECTROMAGNETIC FIELDS
(2012 Pattern) (Elective - 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 indicate marks.*
- 4) *Use of logarithmic tables, slide rules, Mollier Charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data if necessary.*

Q1) a) In each of the following parts find the numerical value of $\text{div } \bar{D}(\nabla \cdot \bar{D})$: [6]

i) $\bar{D} = (2xyz - y^2)\hat{a}_x + (x^2z - 2xy)\hat{a}_y + x^2y\hat{a}_z \text{ C / m}^2$ at point P(2,3,-1).

ii) $\bar{D} = (2r \sin \theta \cos \phi)\hat{a}_r + (r \cos \theta \cos \phi)\hat{a}_\theta - r \sin \phi \hat{a}_\phi \text{ C / m}^2$ at point Q($r = 1.5, \theta = 30^\circ, \phi = 50^\circ$).

b) Derive Laplace's and Poisson's equation from Gauss's Law. [4]

OR

Q2) a) Find the relative permittivity of the dielectric material present in a parallel-plate capacitor if : (i) $S = 0.12\text{m}^2$, $d = 80\mu\text{m}$, $V_o = 12\text{V}$, and the capacitor contains $1\mu\text{J}$ of energy. (ii) $E = 200\text{kV/m}$ and $\rho_s = 20\mu\text{C/m}^2$. [6]

b) Explain magnetic flux and magnetic flux density. [4]

Q3) a) State and explain two Maxwell's equations in static electric field and static magnetic field. [6]

b) An electric dipole located at the origin in free space has moment $\bar{p} = 3\hat{a}_x - 2\hat{a}_y + \hat{a}_z \text{ nC.m}$ Find $V(1, 2, 3)$. [4]

P.T.O.

OR

Q4) a) Give the mathematical equation for a curl of a vector. Define curl of a vector in rectangular coordinate system and cylindrical coordinate system. [6]

b) Define current density. Derive the integral form of continuity equation. [4]

Q5) a) Derive an expression for a force on (i) a moving charge and (ii) on a differential current element. [8]

b) Find the magnetic field intensity within a magnetic material. [8]

Where (i) $M = 180 \text{ A/m}$ and $\mu = 1.8 \times 10^{-5} \text{ H/m}$.

(ii) $\bar{B} = 450 \mu\text{T}$ and $\chi_m = 15$

OR

Q6) a) Derive the boundary conditions at an interface between two magnetic media having permeability μ_1 and μ_2 in terms of magnetic field intensity and magnetic flux density. [8]

b) Calculate the inductance of : i) 10 m length of co-axial cable filled with a material for which $\epsilon_r = 18$, $\sigma = 0$, $\mu_r = 8$ and having dimensions $a = 2\text{mm}$ and $b = 4\text{mm}$. ii) a toroid formed by surfaces $3\text{cm} < \rho < 5\text{cm}$, $z = 0$ and $z = 1.5$ wrapped with 500 turns of wire, filled with magnetic material for which $\mu_r = 6$. [8]

Q7) a) List the Maxwell's equation in point form and integral form for time varying fields. State the significance of each equation. [8]

b) Write a short note on Motional electromotive forces. [8]

OR

Q8) a) If $\bar{J}_d = 5 \cos(2 \times 10^8 t - 10z) \hat{a}_x \mu\text{A} / \text{m}^2$ in a material for which $\sigma = 0$, $\epsilon = 5\epsilon_0$, $\mu = 4\mu_0$. Find (i) \mathbf{D} , (ii) \mathbf{E} , (iii) \mathbf{B} , (iv) \mathbf{H} . [8]

b) State the point form of Ampere's law. Derive the modified form of Ampere's law proposed by Maxwell. [8]

- Q9)** a) Define Uniform Plane wave. Derive the wave equations in free space. [10]
- b) Explain the propagation of waves in good conductors. State the significance of skin effect in conductors. [8]

OR

- Q10)** a) Define Poynting theorem. Derive an expression for Poynting vector. State the significance of each term in equation of Poynting vector. [10]
- b) State the Maxwell's equation in phasor form. [8]



Total No. of Questions : 8]

SEAT No. :

P3142

[Total No. of Pages : 2

[5354]-630

B.E. (Electrical)

EHV AC TRANSMISSION

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

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) Figures to the right indicate full marks.
- 4) Assume Suitable data if required.
- 5) Use of calculator is allowed.

- Q1)** a) The field strength on the surface of a sphere of 4 cm diameter is equal to the corona inception gradient in air of 30 kv/cm. Find the charge on sphere. [4]
- b) A power of 2,000 MW is to be transmitted over a distance of 1600 km. The alternative used is 3 phase 400 kV and 1000 kV AC line. Suggest the number of circuits required, currents transmitted and the total line losses. Assume r and x of conductor as 0.0136 ohm/km & 0.272 ohm/km for 400 kV line and 0.0036 ohm/km and 0.231 ohm/km for 1000 kV line respectively. [8]
- c) Derive expression for inductance of multi conductor lines and state Maxwell's coefficients. [8]

OR

- Q2)** a) Calculate Geometric Mean Radius (GMR) of a bundled conductor for 750 KV AC line having 4 sub conductors each of 3.46 cm diameter and sub conductor spacing 45 cm. [6]
- b) Explain the field of a point charge and its properties. Derive the equation for the electrostatic field of a point charge. [7]
- c) Explain different types of vibrations of transmission conductors in brief. [7]

P.T.O.

- Q3)** a) Evaluate the horizontal, vertical and total value of electrostatic field components near the single circuit transmission line which are energized by three phase voltages. [9]
- b) Discuss the effects of high electrostatic field on : [9]
- i) Humans
 - ii) Animals
 - iii) Plants

OR

- Q4)** a) Explain the terms in detail : [9]
- i) Primary shock current
 - ii) Secondary shock current
 - iii) let-go currents
- b) Derive the expression for electrostatic induction on unenergized circuit of double circuit line. [9]

- Q5)** a) Write a note on 'Measurement of Audible Noise' produced by corona. [8]
- b) Draw a charge-voltage diagram and derive an expression $P_c = 1/2 KC (V_m^2 - V_0^2)$ for corona loss. [8]

OR

- Q6)** a) Discuss visual corona under standard operating condition and conditions other than standard operating condition. [8]
- b) Explain the quantities on which the audible noise depends for the EHV AC lines. [8]

- Q7)** a) Brief, the line insulation design based upon transient over voltages. [8]
- b) Explain detail classification of cables and mention typical insulation thickness for EHV cables. [8]

OR

- Q8)** a) State the design factors considered under steady state condition of transmission line. Also state their limits for satisfactory performance. [8]
- b) Define $\tan \delta$ loss factor and derive an expression for insulation resistance of a cable. [8]



Total No. of Questions : 8]

SEAT No. :

P3143

[Total No. of Pages : 2

[5354]-631

B.E. (Electrical)

INTRODUCTION TO ELECTRICAL TRANSPORTATION
SYSTEMS

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 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 Needs and Importance of Mobility? Discuss various applications of Electric Mobility. [12]

b) Explain Evolution of Transportation System in Detail. [8]

OR

Q2) a) Explain conversions module integrations and their operation. [8]

b) Explain various sources of energy used in transportation and their characteristics. [12]

Q3) a) Explain BLDC machines, AC machines, DC machines drives with its characteristics. [12]

b) How road safety is achieved. [4]

OR

Q4) a) Explain the concept of driverless vehicle with a neat Block diagram. [10]

b) Need for power converters. [6]

Q5) a) Explain in detail one of the configurations of hybrid cars with a neat diagram. [10]

b) Compare AC traction with DC traction. [8]

P.T.O.

OR

- Q6)** a) Compare series parallel configuration of hybrid cars. [8]
b) Explain typical power train architecture of hybrid cars. [10]

- Q7)** a) Explain the concept of special vehicles in detail. [8]
b) Explain the control scheme used in traction type of elevators. [8]

OR

- Q8)** a) Explain control schemes in elevators with new power-electronics controlled drives. [8]
b) Explain load characteristics of Elevator systems. [8]



Total No. of Questions : 10]

SEAT No. :

P3144

[Total No. of Pages : 3

[5354]-632
B.E. (Electrical)
SWITCHGEAR AND PROTECTION
(2012 Pattern)

Time : 2½Hours]

[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) Draw and explain the trip circuit of circuit breaker. **[6]**

- b) In a 220kV system, the reactance and capacitance up to the location of circuit breaker is 8Ω and $0.025\mu\text{F}$, respectively. A resistance of 600Ω is connected across the contacts of the circuit breaker. **[4]**

Determine the following :

- i) Natural frequency of Oscillation.
- ii) Damped frequency of Oscillation.
- iii) Critical value of resistance which will give no transient oscillation.

OR

Q2) a) Explain the current chopping phenomenon. **[6]**

- b) Write a note on “Autoreclosing”. **[4]**

Q3) a) Explain the different ratings of a circuit breaker. **[6]**

- b) What are the various causes of faults? **[4]**

OR

P.T.O.

- Q4)** a) State and derive the equation for restriking voltage, RRRV and max. RRRV. [6]
- b) A CB is tested for its make-break test. The values obtained during the testing are as follows : Under a faulty condition, the CB is closed and the peak of the first envelop of current is recorded as 50kA. The peak to peak system voltage is 36kV. The AC & DC component of the breaking test are 25kA and 10kA respectively. Determine : [4]
- Rated line voltage for which the breaker is to be installed.
 - Peak making current
 - Symmetrical breaking current.
 - Asymmetrical breaking current.

- Q5)** a) Draw and explain Horn-Gap arrester. [8]
- b) Draw block diagram of static relays also mention its advantages and limitations. [8]

OR

- Q6)** a) Explain how to protect an overhead transmission line from direct lightning strokes. [8]
- b) What is PMU? Draw and explain it with block diagram. [8]

- Q7)** a) Explain “the magnetic inrush current” phenomenon in transformer and how to overcome the same. [8]
- b) What are the abnormal conditions and causes of failure in 3 phase induction motor. [8]

OR

- Q8)** a) Explain the protection of alternator against [10]
- Interturn faults
 - Loss of excitation
 - Loss of prime - mover
- b) A generator is provided with restricted earth-fault protection. The ratings are 11kV, 5000 kVA. The percentage of winding protected against phase to ground fault is 80%. The relay setting such that it trips for 25% out of balance. Calculate the resistance to be added in neutral to ground connection. [6]

- Q9)** a) Explain with neat diagram high impedance differential protection for bus-bar. [8]
- b) Write a note on :
- i) Three stepped distance protection [4]
- ii) WAM [6]

OR

- Q10)**a) Explain how impedance relay is used for transmission line protection. Derive its torque equation & draw its characteristics on R-X plain. [8]
- b) i) Draw the algorithm for impedance numerical relay. [4]
- ii) Draw and explain schematic of carrier aided protection. [6]



Total No. of Questions : 10]

SEAT No. :

P3145

[Total No. of Pages : 3

[5354]-633

B.E. (Electrical)

POWER ELECTRONICS CONTROLLED DRIVES

(2012 Pattern) (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) State essential parts of electrical drive and describe the function of each component in brief. [5]
- b) A drive has following equations for motor and load torques : [5]
- $$T = (15 + 0.5\omega_m) \text{ and } T_l = 5 + 0.6\omega_m$$
- Obtain the steady state speed and comment on steady state stability using the condition for stability.

OR

- Q2)** a) A 220 V, 1500 rpm, 10 A separately excited dc motor is fed from a single phase fully controlled rectifier with an AC source voltage of 230 V, 50 Hz. $R_a = 2\Omega$. Assuming continuous conduction at firing angle of 35° and for rated motor torque operation find the speed in rpm. [5]
- b) Explain load equalization in an Electric drive. How is it achieved? [5]
- 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 1000 rpm. Calculate the resistance to be placed in armature circuit to limit braking current to twice the full load value. [6]
- b) With a neat diagram explain the regenerative braking mode of DC separately excited motor using class B chopper. [4]

OR

P.T.O.

- Q4)** a) A star connected squirrel cage induction motor has following ratings and parameters : [5]
 400V, 50Hz, 4 pole 1370 rpm, $R_s = 2\Omega$, $R_r' = 3\Omega$, $X_s = X_r' = 3.5\Omega$
 For regenerative braking Assuming motor speed torque characteristics from full load motoring to full load braking to be parallel straight lines, calculate Speed for a frequency of 30 Hz and 80% of full load torque.
- b) Explain the thyristorised stator voltage control of 3 ph induction motor. What are its demerits? [5]

- Q5)** a) Explain the Principle of vector control. How Induction Motor is converted to Characteristics of DC 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) What are the topologies used for PM BLDC Half Wave drives? Explain any one. [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]

Solve any Three

- Q9)** a) What special considerations are needed for inverter duty motors? [6]
- b) What motors are suitable for Sugar mill drive applications? [6]
- c) How motor duty and heating and cooling cycle affects the temperature of motor? [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) Textile mills
- b) Centrifuged Pump
- c) Traction drives
- d) Electric and Hybrid Vehicle



Total No. of Questions : 8]

SEAT No. :

P3146

[Total No. of Pages : 2

[5354]-634

B.E. Electrical (End Semester)
HIGH VOLTAGE ENGINEERING
(2012 Pattern) (Elective - III)

Time : 2.30 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 diagram 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 corona discharge for point plane electrode with positive & negative pulse application. [7]
- b) Explain conduction & breakdown in pure liquids. [7]
- c) State & explain Paschen's law with example. [6]

OR

- Q2)** a) Explain cavitation & bubble theory in liquids. [7]
- b) Explain breakdown due to internal discharges in solid dielectrics. [7]
- c) Explain various methods to minimize switching surges. [6]

- Q3)** a) Draw neat schematic diagram of three stage cascade transformer with isolating transformer for excitation & explain how High AC voltage is produced? [8]
- b) Explain generation of high frequency AC voltage with the help of Tesla coil. [8]

OR

P.T.O.

- Q4)** a) Explain tripping and control of impulse generator methods with neat diagram: [8]
- i) Three electrode gap method
 - ii) Trigatron gap method
- b) With neat sketch explain the Marx circuit for generation of impulse voltage. Explain the function of each part. [8]

- Q5)** a) Explain principle & working of generating voltmeter. [8]
- b) Explain Capacitance voltage transformer (CVT). [8]

OR

- Q6)** a) Explain the effect of following factors on sparkover voltage of sphere gap unit. [8]
- i) nearby earthed object.
 - ii) atmospheric conditions and humidity.
 - iii) irradiation and
 - iv) polarity and rise time of voltage waveform
- b) Explain measurement of high power frequency AC using current transformer with electro optical signal converter. [8]

- Q7)** a) Explain various tests conducted on insulator & bushings. [9]
- b) Give classification of H. V. Laboratories with explanation. [9]

OR

- Q8)** a) Explain single point & bus grounding system used for impulse test labs. [9]
- b) Explain testing of surge arrester. [9]



Total No. of Questions : 9]

SEAT No. :

P3147

[Total No. of Pages : 2

[5354]-635

B.E. (Electrical) (End Semester)

HVDC AND FACTS

(2012 Pattern) (Elective - III)

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) *Use of calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

Q1) With reference to Graetz's circuit explain the effects of angle of delay and angle of advance commutation. Derive the expression for the same. **[10]**

OR

Q2) Compare CIA, CC and CEA controls of HVDC system. **[10]**

Q3) Give the layout of HVDC system and components used therein. **[10]**

OR

Q4) What is VSC based HVDC link? Explain control of the same. **[10]**

Q5) Solve any two of the following : **[16]**

- a) Discuss different ways of harmonic control employed in power electronic controller.
- b) With suitable diagrams explain static power electronic converter structures.
- c) Explain different challenges to be faced by power electronic controllers.

P.T.O.

- Q6)** a) Explain different modes of operation of TCSC. [9]
b) Explain internal control structure and operation of STATCOM. [9]

OR

- Q7)** a) With suitable diagrams elaborate operation of solid state series controller. [9]
b) Explain operation of TCR+TSC. How harmonics generation can be kept minimum? [9]

- Q8)** a) Explain internal control structure of UPFC. [8]
b) Discuss applications of UPFC. [8]

OR

- Q9)** a) Explain modes of operation of UPFC. [10]
b) Explain operational limitations of UPFC. [6]



Total No. of Questions : 8]

SEAT No. :

P3148

[Total No. of Pages : 3

[5354]-636

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

DIGITAL CONTROL SYSTEMS

(2012 Pattern) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Neat diagrams wherever necessary.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of logarithmic tables, electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain with neat diagram, the various standard discrete test signal used in digital control system. **[4]**
- b) Describe design procedure of digital lead compensator using bode plot for discrete time system. **[8]**
- c) Compute STM of the difference equation $X(k+1) = Gx(k) + Hu(k)$

Where $G = \begin{pmatrix} 0 & 1 \\ -0.2 & -1 \end{pmatrix}$; $H = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$. Also find its solution if $x(0) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$. **[8]**

OR

- Q2)** a) Check whether the following systems are **[8]**
- i) Static or Dynamic
 - ii) Time invariant or Time variant
- 1) $Y(n) = \cos x(n)$ 2) $Y(n) = x(2n)$
- b) Examine the stability of the following characteristic equation by Jury's test. $P(z) = Z^4 - 1.2Z^3 - 0.07Z^2 + 0.3Z - 0.08 = 0$. **[8]**
- c) Explain discretization of continuous time state space equation. **[4]**

P.T.O.

Q3) a) Given

$$x(k+1) = \begin{pmatrix} 1 & 1 \\ -2 & -1 \end{pmatrix} x(k) + \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} u(k) \text{ \& } y(k) = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} x(k).$$

Determine controllability & Observability of the system. **[10]**

b) What is principle of duality? Explain the effect of pole-zero cancellation on controllability & Observability. **[6]**

OR

Q4) a) Derive Ackermann's formula for determination of state feedback gain matrix K. **[6]**

b) Design a full state observer for the system having.

$$G = \begin{pmatrix} 0 & -0.16 \\ 1 & -1 \end{pmatrix}; \quad H = \begin{pmatrix} 0 \\ 1 \end{pmatrix}; \quad C = (0 \quad 1).$$

Desired Eigen values of observer matrix are $Z = 0.5 + j0.5$; $Z = 0.5 - j0.5$. **[10]**

Q5) a) Consider the system defined by : **[10]**

$$\frac{Y(z)}{U(z)} = \frac{z^2 + 0.5z}{z^3 + z^2 + 2z + 0.5}.$$

Determine State space representation in Controllable canonical form & Observable canonical form.

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

$$\frac{Y(z)}{U(z)} = \frac{z+1}{z^2+1.3z+0.4} \cdot \text{Derive its Jordan canonical form.} \quad [5]$$

b) Explain Pole-zero matching with example. [5]

c) Define Euler's forward & backward method with suitable example. [6]

Q7) 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]

OR

Q8) a) Explain computer program structure for simulation of discrete time control system with algorithm & flow charts. [8]

b) Draw a neat block diagram of digital temperature control scheme and explain the function of each block. [10]



Total No. of Questions : 8]

SEAT No. :

P3149

[Total No. of Pages : 2

[5354]-637

B.E. (Electrical)

INTELLIGENT SYSTEMS AND IT'S APPLICATION
IN ELECTRICAL ENGINEERING
(2012 Pattern) (Elective - III)

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

- Q1)** a) Explain Brain Vs Artificial Neuron model. [6]
b) Explain Activation functions used in ANN. [6]
c) Explain Bi-directional Associative Memory. [8]

OR

- Q2)** a) Explain Historical views on ANN. [6]
b) Explain supervised Vs unsupervised learning. [6]
c) Explain ART in brief. [8]

- Q3)** a) Elaborate various fuzzy relations with neat sketch. [9]
b) Enlist the properties of fuzzy set. [9]

OR

- Q4)** a) Explain different fuzzy membership functions. [9]
b) Explain mathematically various operations on fuzzy set. [9]

- Q5)** a) Interpret predicate logic formula and give it's inference. [8]
b) What is fuzzy quantifiers? [8]

OR

P.T.O.

- Q6)** a) Explain mamdani inference system. [8]
b) Explain method of defuzzification. [8]

- Q7)** a) Explain expert system in detail. [8]
b) Explain mutation process with example. [8]

OR

- Q8)** a) What is rule based system? [8]
b) Explain crossover and it's importance in GA learning. [8]



Total No. of Questions : 8]

SEAT No. :

P3150

[Total No. of Pages : 2

[5354]-638

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

SMART GRID

(2012 Pattern) (Elective -IV)

Time : 2:30 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) Explain the concept of Resilient and Self healing Grid. [6]
b) Name different smart storage technologies and explain any two in detail. [8]
c) State and explain briefly the components of Geographic Information System (GIS). [6]

OR

- Q2)** a) State and explain the challenges for smart Grid. [6]
b) Write a note on, "Real time pricing". [6]
c) Explain the concept Plug in Hybrid Electric Vehicles. [8]

- Q3)** a) Discuss different issues of micro grid when interconnected. [8]
b) Describe the concept and formation of Micro Grid. [8]

OR

- Q4)** a) Explain about protection and control of microgrid. [8]
b) Describe Power Quality Issues of grid connected Renewable Energy Sources. [8]

P.T.O.

- Q5)** a) Explain the power quality audit and its importance in smart grid. [8]
b) Write a note on, Power quality management in smart grid. [8]

OR

- Q6)** a) Describe the concept, power quality conditioners related to smart grid.[8]
b) Explain importance of power quality in smart grid & how it can be improved. [8]

- Q7)** a) Explain the, concept WAN related to smart grid. [9]
b) Explain the importance of Bluetooth in smart grid. [9]

OR

- Q8)** a) Write a note on Wi-Max based communication in smart grid. [9]
b) Write a note on, “IP based protocols”. [9]



Total No. of Questions : 5]

SEAT No. :

P3151

[Total No. of Pages : 2

[5354]-639
B.E. (Electrical)
ROBOTICS AND AUTOMATION
(2012 Pattern)

Time : 2:30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Q1 or Q2.*
- 2) *Solve any two sub-questions from Q3 to Q5.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Your answer will be valued as a whole.*
- 6) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 7) *Assume suitable data, if necessary.*

- Q1)** a) Explain in detail automation versus robot science. [7]
b) Explain Robot anatomy with neat sketch. [7]
c) Explain hand prosthesis in detail. [6]

OR

- Q2)** a) Explain Yaw, pitch and roll through graphical representation. [7]
b) Explain degree of freedom with neat sketch. [7]
c) Explain Robotic laws. [6]

- Q3)** Solve any two : [16]
a) Explain Homogeneous matrix in detail.
b) Explain co-ordinate reference frame.
c) How many parameters are required for specifying position and orientation of rigid body? Explain.

P.T.O.

Q4) Solve any two :

[18]

- a) Explain Euler-Lagrange method to control robot motions and hence comment on Euler angle.
- b) Explain Kinematic Chain with neat sketch.
- c) How end effector rotary motion about an arbitrary axis can be achieved using dynamic control.

Q5) Solve any two.

[16]

- a) Explain various linear control schemes.
- b) Explain resolved motion rate control.
- c) Explain resolved motion position control.



Total No. of Questions : 10]

SEAT No. :

P3152

[Total No. of Pages : 2

[5354]-650

B.E. (Electrical)

ILLUMINATION ENGINEERING

(2012 Pattern) (Elective - IV)

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) 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 any four advantages of good lighting. [4]

b) Explain all important parts of human eye and state their function. [6]

OR

Q2) a) Draw and explain operating characteristics of discharge lamps. [4]

b) State advantages and disadvantages of halogen lamp. Also state its applications. [6]

Q3) a) Give classification of luminaries according to type of protection against ingress solid bodies. [4]

b) Draw a circuit of impulser ignitor and explain its working. [6]

OR

Q4) a) Compare CFL and incandescent lamp on any four points. [4]

b) Explain the meaning of following terms - [6]

i) Visual perception

ii) Visual performance

P.T.O.

- Q5) a)** Define following terms : [8]
i) Candle power
ii) Maintenance factor
iii) Beam factor
iv) Luminous efficiency.
- b) State and explain - law of inverse squares, Lambert's cosine law. [8]

OR

- Q6) a)** A room of size 20m × 5m is illuminated by 20 number of 200 watt lamps. The MSCP of each lamp is 250. Assume utilization factor of 0.6 and depreciation factor of 1.2. Find the average illumination produced on the floor. [8]
- b) State and explain the factor to be considered for designing illumination scheme for commercial installation. [8]

- Q7) a)** State any eight objectives of road lighting. [8]
- b) Explain the factors considered for designing of sports complex illumination scheme. [8]

OR

- Q8) a)** State any four desired characteristics of electric signs used for advertisements, Explain exposed filament lamp signs. [8]
- b) With suitable diagrams explain various arrangement of luminaries for straight road. [8]

- Q9) a)** With a neat diagram explain construction & working of [9]
i) Solar tube
ii) Light tube dome
- b) With suitable diagram explain working of OLED. [9]

OR

- Q10) a)** State the advantages & disadvantages of LASER. [9]
- b) State the advantages and disadvantages of OLED. [9]



Total No. of Questions : 10]

SEAT No. :

P3154

[Total No. of Pages : 3

[5354]-651

**B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION-I
(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., Q.9 or Q.10.*
- 2) Figures to the right side indicate full marks.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Use of calculator is allowed.*
- 5) Assume Suitable data if necessary*

- Q1) a)** Define Self-regulating process. Derive the first order differential equation for self-regulating process. **[5]**
- b) Explain in brief purpose of Correlations for Tuning Constants. **[5]**

OR

- Q2) Explain in brief:** **[10]**
- a) Loop gain
 - b) Time constant of a process
 - c) Interacting and non interacting process
 - d) Valve gain
 - e) Process degree of freedom

- Q3) a)** Identify process variables in a stirred tank heater process. Define control objective and proper pairing of variables. **[5]**
- b) Discuss in brief control performance measures for setpoint input. **[5]**

P.T.O.

OR

- Q4)** a) How will you analyze a typical feedback flow control process? If the actual flow is not equal to desired flow; how will you check / troubleshoot it? [8]
- b) For a Single Loop Programmable Controller (SLPC) list any four configurable parameters. [2]

- Q5)** a) Enlist any four different non-linear elements in a process control loop. Explain in brief any one element. [8]
- b) Compare feedback and Feedforward control algorithms with neat diagrams. [8]

OR

- Q6)** a) Elaborate any three selection criteria for final control element. [6]
- b) Explain with suitable example use of cascade control to enhance the performance. [10]

- Q7)** a) For a given process gain matrix, [10]

$$k = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

Determine RGA matrix and decide the pairing of variables. Also enlist properties of RGA Matrix.

- b) Discuss in brief Interaction and its effect on process performance. [8]

OR

- Q8)** a) The transfer function model of two input two output system is given by, [12]

$$\begin{bmatrix} \frac{-0.006e^{-9.73s}}{59.5s + 1} & \frac{0.016e^{-7.03s}}{37.12s + 1} \\ \frac{-0.034e^{-23s}}{81.45s + 1} & \frac{0.185e^{-11.81s}}{18.62s + 1} \end{bmatrix}$$

Determine the RGA matrix, decide pairing of variables and find out static decoupler.

- b) Explain in brief Decoupling of control loops. [6]

- Q9)a)** In context to control for safety, match the pairs: **[5]**
- | | |
|--|----------------------------|
| i) Never turn off | a) be avoided |
| ii) Manual bypass valves around control and shutdown valves should | b) too many alarms |
| iii) Same sensor for control, alarm and SIS should | c) Critical functions |
| iv) Do not have | d) Safety interlock system |
| v) Use redundancy in instruments for | e) Never be opened |
- b) Explain with neat flowchart sequence of design steps. **[11]**

OR

- Q10)a)** Explain in brief important properties in selecting variables and sensors. **[8]**
- b) Explain in brief temporal hierarchy approach for selecting segments of design problem. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3155

[Total No. of Pages : 2

[5354]-652

B.E. (Instrumentation & Control) (Semester - I)
PROJECT ENGINEERING AND MANAGEMENT
(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) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of calculator is allowed.*
- 5) *Assume Suitable data jf necessary*

Q1) Explain project planning and control process in detail. **[6]**

OR

Q2) How is the impact of organizational structure on the management of human resources? **[6]**

Q3) What are the various project scheduling and planning tools? How do project scheduling help to achieve project execution? **[8]**

OR

Q4) What are the various project life cycle phases. Explain. **[8]**

Q5) Prepare P&ID for three element drum level control. Follow ISA/ANSI standard. **[6]**

OR

Q6) Write importance of installation details. Draw installation sketch for Thermo well. **[6]**

P.T.O.

- Q7) a)** What are the various types of cable trays? Explain. [8]
b) Write differences between BOM and MBOM. [8]

OR

- Q8) a)** What are the types of cables used in plant automation? Suggest cables for carrying transmission signal. Justify your answer. [8]
b) What is loop wiring diagram? Draw a loop wiring diagram for three element drum level control. [8]

- Q9)a)** Prepare Inquiry; Quotation, Comparative statement and Purchase order for control valve. [10]
b) What is mean by tender? What are the types of tenders? [8]

OR

- Q10)a)** Explain bid evaluation process in detail. [9]
b) What are the installation and commissioning activities involved in project? [9]

- Q11)a)** What are various types of control panels? Explain one in detail. [8]
b) What is cold and hot commissioning for control panel? [8]

OR

- Q12)a)** Write the specifications of control panel in detail. [8]
b) What are SAT, FAT and CAT. Write FAT for control panel. [8]



[5354]-653

B.E. (Instrumentation and Control)**DIGITAL CONTROL****(2012 Pattern)***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) Solve difference equation

$$y(k+2) + 3y(k+1) + 2y(k) = 0; y(-1) = -\frac{1}{2}, y(-2) = \frac{3}{4} \quad [6]$$

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

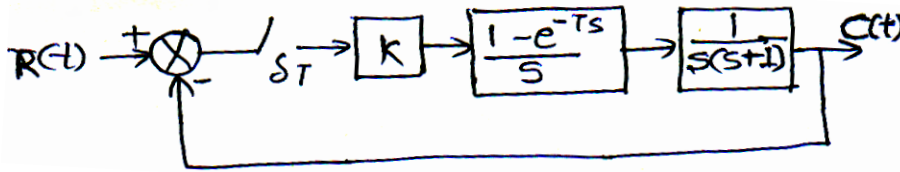
Q2) a) Find the equivalent sampled impulse response sequence and the equivalent z- transfer function for the cascade of the two analog systems with sampled input. [6]

$$H_1(s) = \frac{1}{s+2} \text{ and } H_2(s) = \frac{2}{s+4}$$

i) If the systems are directly connected. ii). If the systems are separated by a sampler.

b) Obtain mathematical model of zero order Hold. [4]**P.T.O.**

Q3) Consider closed loop control system shown in figure determine range of K for stability of system. [10]



OR

Q4) Consider system described by. [10]

$y(k) - 0.6y(k-1) - 0.81y(k-2) + 0.67y(k-3) - 0.12y(k-4) = x(k)$ where $x(k)$ is input and $y(k)$ is output of system. Determine stability of system. Use Jury's stability test.

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. [8]

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \\ x_3(k+1) \end{bmatrix} = \begin{bmatrix} -1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -3 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \\ x_3(k) \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} u(k) \text{ and } y(k) = \begin{bmatrix} -1 & 2 & 1 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \\ x_3(k) \end{bmatrix} + u(k)$$

OR

Q6) a) Obtain discrete time state model of system for given continuous time system model using sample time $T = 0.1$ Sec. [10]

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ 0 & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \text{ and}$$

$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

- b) Obtain state space representation of following pulse transfer function of system in canonical forms. [6]

$$\frac{Y(z)}{U(z)} = \frac{3 - z^{-1} - 3z^{-2}}{1 + \frac{1}{3}z^{-1} - \frac{2}{3}z^{-2}}$$

- Q7)** a) A discrete time regulator system has the plant. [12]

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -4 & -2 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k)$$
 Design a state feedback

controller which will place the closed loop poles at $-\frac{1}{2} \pm j\frac{1}{2}, 0$.

- b) List different types of state observer, Explain any two in detail. [6]

OR

- Q8)** a) A discrete time regulator system has the plant. [10]

$$x(k+1) = \begin{bmatrix} 2 & -1 \\ -1 & 1 \end{bmatrix} x(k) + \begin{bmatrix} 4 \\ 3 \end{bmatrix} u(k)$$
 and

$y(k) = [1 \ 1] x(k)$. Design a state observer such that system has deadbeat response.

- b) Investigate the controllability and observability of system whose state model is; [8]

$$x(k+1) = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 0 \\ 0 & 1 & 3 \end{bmatrix} x(k) + \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 0 & 1 \end{bmatrix} u(k)$$
 and $y(k) = [1 \ 0 \ 0] x(k)$

- Q9)** Write short note on: [16]

- a) Steady state quadratic optimal control
b) Optimal regulator system based on quadratic performance Index.

OR

Q10) Consider following discrete time control system defined by

[16]

$$x(k+1) = \begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u(k) \text{ and } x(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}.$$

Determine the optimal control law to minimize the performance index. Also determine minimum value of J

$$J = \frac{1}{2} \sum_{k=0}^{\infty} x^*(k) Q x(k) + u^*(k) R u(k) \quad Q = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, R = 1$$



Total No. of Questions : 10]

SEAT No. :

P3157

[Total No. of Pages : 2

[5354]-654

B.E. (Instrumentation) (Semester - I)
ADVANCED BIO-MEDICAL INSTRUMENTATION
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the 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.*

- Q1)** a) Explain with neat diagram different modulation techniques used in telemetry. [6]
- b) List the applications of biotelemetry. [4]

OR

- Q2)** a) What is an Autoanalyser? Draw a neat labeled block diagram of Auto analyser. [6]
- b) Explain the acoustic impedance with respect to Ultrasound imaging. [4]

- Q3)** a) Elaborate the various methods of image reconstruction in CT machine. [5]
- b) What is X- ray Fluoroscopy and its applications? [5]

OR

- Q4)** a) Explain M mode of ultrasound with any one application of it. [5]
- b) Explain the working of PET scanner. [5]

- Q5)** a) What is electrosurgical diathermy? What do you mean by bipolar and unipolar modes of ESU? [8]
- b) Draw and explain the Heart-Lung Machine. State the type of Pump that is used in Heart-Lung Machine. [8]

P.T.O.

OR

- Q6)** a) Explain various modes of pacemaker? Explain any one in detail. [8]
b) Explain the AC and DC defibrillators. Why it is necessary to apply defibrillator shock in synchronization with ECG? [8]
- Q7)** a) What is an endoscope? Explain the construction with the help of a neat Diagram. [8]
b) Explain thermal and non thermal interaction of tissue with LASER. [8]

OR

- Q8)** a) Describe different types of lasers used in Biomedical applications. [8]
b) Describe applications of lasers in Dermatology. [8]
- Q9)** a) Explain in brief haemodialysis machine with the help of block diagram.[10]
b) Define orthotic and prosthetic devices with suitable examples. [8]

OR

- Q10)**a) Draw and explain the structure of a nephron. Explain process of Urine formation in nephron. [8]
b) What is Lithotripsy? What are the ways of shock wave generation? Draw shock wave used in Lithotripsy and explain importance of its parameters. [10]



Total No. of Questions : 10]

SEAT No. :

P3158

[Total No. of Pages : 2

[5354]-655

B.E. (Instrumentation & Control)
BUILDING AUTOMATION-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, Q9 or Q10.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Write a Short notes on Role of Stakeholder in BAS system design [6]
b) Write a short notes on Dry bulb & Wet bulb temperature. [4]

OR

- Q2)** a) Write short notes on Life cycle of building. [6]
b) Write a short notes on Heating Coil used in AHU. [4]

- Q3)** a) Define and Explain: [6]
i) Static Pressure
ii) Velocity Pressure
iii) Absolute Pressure
b) Write a short notes on Importance of Co2 in BAS system. [4]

OR

- Q4)** a) List Various Types of damper explain Parallel blade type damper with neat sketch. [6]
b) Write a short note on Ultrasonic flow meter. [4]
- Q5)** a) Write a short note on CAV system. [8]
b) What is CRAC? Explain CRAC System with neat sketch. [8]

P.T.O.

OR

- Q6)** a) Explain Unit Heater with neat sketch. [8]
b) Explain Single duct variable air volume system with neat sketch. [8]

- Q7)** a) What is Vapour Compression Cycle explain in detail? Explain any one type of compressor used in Vapour Compression cycle with neat sketch. [10]
b) List the different characteristics of Refrigerant used in vapour compression cycle. [8]

OR

- Q8)** a) List Different Types of Boiler, Explain Fire tube type of boiler with neat sketch. [10]
b) List Different types of condenser used in vapour compression cycle, Explain anyone type of compressor with neat sketch. [8]

- Q09)**a) What is MODBUS? Explain MODBUS ASCII and MODBUS RTU With neat sketch, [8]
b) Explain Architecture of DDC with neat sketch. [8]

OR

- Q10)**a) Explain in Detail BACnet protocol with neat sketch. [8]
b) Explain in LON protocol with neat sketch. [8]



Total No. of Questions : 10]

SEAT No. :

P3159

[Total No. of Pages : 2

[5354]-656
B.E. (Instrumentation)
ADVANCED CONTROL SYSTEM
(2012 Pattern) (Elective - I: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) *Neat diagram must be drawn whenever necessary.*
- 3) *Figure to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Obtain describing function of dead zone and hysteresis [8]
b) Explain how stability of nonlinear system is determined with phase portrait. [2]

OR

- Q2)** a) Explain model reduction by Padde approximation. [8]
b) Draw unstable and stable and unstable nodal point. [2]

- Q3)** Draw a block diagram if system given by transfer function. [10]

$$G(s) = \frac{10}{(s+2)(s+1)(s+4)}$$

has dead zone nonlinearity. Obtain stability of system

OR

- Q4)** a) Explain frequency domain stability criteria. [5]
b) Explain how stability of system can be determined using Popov's Method. [5]

- Q5)** a) Explain minimum variance approach to design STR. [8]
b) What do you mean by implicit and explicit STR? Explain with neat example [8]

P.T.O.

OR

- Q6)** a) Explain pole assignment approach for designing of STR. [8]
b) Why do you require parameter estimation in STR? Explain any one technique for parameter estimation. [8]

- Q7)** a) Explain adaptive control for chemical reactor with neat diagram. [9]
b) Explain adaptive control for pulp dryer with neat diagram. [9]

OR

- Q8)** a) Explain adaptive control for rolling mill. [9]
b) Explain SattControl ECA 40 adaptive controller. [9]

- Q9)** Consider a system is given by $\dot{x} = \begin{bmatrix} 0 & 1 \\ 0 & -1 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$ the control law is given. by $u = -kx = -k_1x_1 - k_2x_2$. Determine constant k_1 and k_2 such that function $j = \int_0^{\infty} (x^T x + u^2) dt$ is minimized. [16]

OR

- Q10)** a) Explain observer design in optimal control. [8]
b) Explain design of optimal control using Pontryagin's minimum principles. [8]



Total No. of Questions : 10]

SEAT No. :

P3160

[Total No. of Pages : 2

[5354]-657

B.E. (Instrumentation & Control)

ADVANCED SENSORS

(2012 Pattern) (Elective - I:D) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Neat diagram must be drawn whenever necessary.*
- 3) *Figure to the right candidates indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain static characteristics of sensor with examples. [5]
b) Give detail classification of temperature sensor with their operating principles. [5]

OR

- Q2)** a) Explain dynamic characteristics of sensor with examples. [5]
b) Give detail classification of flow sensor with their ranges and operating principles. [5]

- Q3)** a) Explain selection criteria for sensor fabrications in detail. [5]
b) With neat block diagram explain manufacturing process of sensor. [5]

OR

- Q4)** a) Discuss different techniques used for sensor fabrication. [5]
b) Explain recent techniques sensor fabrication. [5]

- Q5)** a) List different chemical sensing mechanisms. [8]
b) Give classification of biosensors. [8]

P.T.O.

OR

- Q6)** a) Give different types of gas sensors. Explain any one in detail. [8]
b) Explain working of fibre optic sensor with block diagram. [8]

- Q7)** a) Explain term smart sensor. Give importance of smart sensors in industry. [8]
b) Explain selection criteria for smart sensor. [8]

OR

- Q8)** a) Explain advantages of smart sensors. [8]
b) Enlist smart temperature IC sensors. Explain any one in detail. [8]

- Q09)** a) Give various applications of Chemical sensors. [9]
b) Explain how and where biosensors are used in industry. [9]

OR

- Q10)** a) Explain application of fiber optic sensor with neat sketch. [9]
b) Discuss application gas sensors in industry. [9]



Total No. of Questions : 10]

SEAT No. :

P3161

[Total No. of Pages : 2

[5354]-658

**B.E. (Instrumentation & Control)
ADVANCED DIGITAL SIGNAL PROCESSING
(2012 Pattern)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Assume suitable data if necessary.*
- 2) Use of calculators, log tables, charts is allowed.*
- 3) Figures to the right indicate full marks.*

- Q1)** a) Define TFD. State methods for TFD analysis. [5]
b) Explain multirate systems with suitable example. [5]

OR

- Q2)** Explain the limitations of STFT. [10]

- Q3)** Explain decimation with polyphase filters. [10]

OR

- Q4)** a) Explain WSS and SSS with suitable examples. [5]
b) Increase the sampling frequency of 100 Hz signal from 1000 Hz to 4000 Hz. [5]

- Q5)** a) Define ESD and PSD. State the methods of PSD estimation. [6]
b) Explain Welch's PSD estimation method. [10]

OR

- Q6)** a) Enlist parametric PSD estimation methods. Explain any one with suitable diagram. [10]
b) Explain applications of PSD estimation. [6]

P.T.O.

- Q7)** a) Explain LMS algorithm. [10]
b) Explain system identification using adaptive filtering. [8]

OR

- Q8)** a) Define cepstral coefficients. State properties of complex spectrum. [10]
b) Explain homomorphic signal processing with suitable example. [8]

Q09) Explain features of DSP processor ADSP 21xx. [16]

OR

Q10) Explain status registers in DSP processors. [16]



Total No. of Questions : 10]

SEAT No. :

P3162

[Total No. of Pages : 2

[5354]-659

B.E. (Instrumentation & Control)
OPTO - ELECTRONICS INSTRUMENTATION
(2012 Pattern) (Elective - II) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q2, Q3 or Q4,Q5 or Q6,Q7or Q8, Q9 or Q10.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Use of electronic pocket calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) What is holography ? With the help of diagram explain any one holographic application? [5]
b) Draw and explain Inter Symbol Interference caused because of broadening of light pulses? What is its effect on bandwidth ? [5]

OR

- Q2)** a) Explain with proper diagrams properties of LASER (any four) ? [5]
b) What is optical power budget? Explain with suitable example and formulae? [5]
- Q3)** a) What is connector? Explain with schematic diagram working of an expanded beam connector? [5]
b) Explain the terms Excess loss, Insertion loss and cross talk? [5]

OR

- Q4)** a) What is mean by Numerical Aperture (N.A.) of a optical fiber? On what factors does it depends? What is its physical significance? [5]
b) Enlist the methods of Q-switching? Explain any one with diagram? [5]
- Q5)** a) What is the need of optical amplifier over a conventional repeater ? Explain construction and working of semiconductor LASER amplifier? [8]
b) Write a note on Integrated optics?. [8]

P.T.O.

OR

Q6) a) Explain with neat diagram the working and application of a passive Y-junction beam splitter? [8]

b) Draw a neat diagram of an IO polarization controller and explain its working? Give its application? [8]

Q7) a) Explain with block diagram basic optical fiber sensor system? What are the advantages and disadvantages of fiber sensors over conventional sensors? [8]

b) Explain how polarization optical fiber sensor is used for measurement of current? Draw a suitable diagram to explain its working? [8]

OR

Q8) a) Explain with neat sketch working of optical fiber flowmeter? [8]

b) Draw a neat diagram of Fluoroptic temperature sensor and explain its working? [8]

Q9) Write note on.

a) Fiber grating technology and its applications. [9]

b) Fiber optical gyroscope. [9]

OR

Q10) Explain the following terms with neat diagram and give their applications.

a) Laser doppler velocimetry. [9]

b) Distributed optical fiber sensors. [9]



Total No. of Questions : 10]

SEAT No. :

P3163

[Total No. of Pages : 2

[5354]-660

**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 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) Elaborate on the sensor requirement for environmental applications. [5]
b) What are the requirements of water treatment facilities. [5]

OR

- Q2)** a) Explain the instrumentation in ground water level measurements. [6]
b) Compare portable & stationary analytical instruments [4]
- Q3)** a) Explain in short conductivity analyzer. [6]
b) Explain the design criteria for the settling tank. [4]

OR

- Q4)** a) Explain the working of total hydrocarbon analyzer with a neat diagram.[5]
b) Discuss the water quality standards for raw & treated water. [5]
- Q5)** a) Define sampling? Write short note on automatic waste water sampling method & equipment [10]
b) Explain the necessity of rain water harvesting. List the methods for the same. [8]

P.T.O.

OR

- Q6)** a) Explain the Instrumentation setup for waste water treatment plant with neat diagram [10]
b) Compare Non open channel flow measurement & open channel waste water flow measurements. [8]

- Q7)** a) Discuss the air sampling methods & equipments. [8]
b) Define sound pollution? Describe the acoustic noise measurements & monitoring. [8]

OR

- Q8)** a) Discuss the analytical methods for air pollution studies. [8]
b) Define sound pollution? Explain its effects on environment [8]

- Q9)** a) Explain the Instrumentation involved in weather station [8]
b) Write short note on Rover Environmental Monitoring station [8]

OR

- Q10)**a) Discuss on Global environmental analysis [8]
b) Write short note on Rain Gauge [8]



Total No. of Questions : 10]

SEAT No. :

P3164

[Total No. of Pages : 2

[5354]-661

B.E. (Instrumentation & Control Engineering)

ROBOTICS & AUTOMATION

(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, Q9 or Q10.*
- 2) *Neat circuit diagrams should be drawn whenever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) Explain architecture of robotic system. [6]
b) State accuracy and repeatability of robotic system. [4]

OR

- Q2)** a) Give specifications of robot controller. (any three) [6]
b) Which different types of grippers are used for robots? [4]

- Q3)** a) Machine vision is applied for discrimination of items. One of the applications is QR code. Enlist two other such applications. [6]
b) Enlist different components used in machine vision system for a typical robot. [2]
c) List various materials for manipulator links. [2]

OR

- Q4)** a) Write short note on controllers used for robotic automation. [6]
b) State various gears used in robot grippers. [4]

- Q5)** a) List present industrial robot control schemes. [6]
b) Explain how kinematics is used in position and force control of robots. [10]

OR

- Q6)** a) What is the meaning of typical three dimensional transformation matrix contents? [4]
b) Why jacobians (matrices) are important in robotics? [6]
c) What is direct kinematics? [6]

P.T.O.

- Q7)** a) State difference between online and offline programming in robotics. [10]
b) List various robot programming languages? [6]

OR

- Q8)** a) Why offline programming is advantageous? [4]
b) How is a typical PLC interfaced with robot? (Do not draw schematic) [6]
c) Draw schematic for PLC robot interface. [6]

- Q9)** a) Write a short note on multiple robots. [8]
b) How to choose a right industrial robot? [10]

OR

- Q10)** a) Describe a case study for use of robot. Include points (not limited to) cycle time, problem analysis, benefits, safety, reliability, pay load. [8]
b) List any four non-manufacturing robot applications (Do not include sports applications). [10]



Total No. of Questions : 10]

SEAT No. :

P3165

[Total No. of Pages : 2

[5354]-662

B.E. (Instrumentation & Control)

SENSOR NETWORKS

(2012 Pattern) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Explain Decentralized management in detail. [3]
b) Write a short note on Wireless networking. [3]
c) Explain a communication in a wireless sensor networks. [4]

OR

- Q2)** a) Compare traditional networks and wireless sensor networks [5]
b) Explain a sensing and sensors in detail. [5]

- Q3)** a) Compare serial Peripheral Interface (SPI) and Inter Integrated circuits (I²C). [5]
b) Explain XYZ node architecture in detail. [5]

OR

- Q4)** a) Write a short note on precision agriculture. [5]
b) Explain IMote Node Architecture in detail. [5]

- Q5)** a) Explain different types of channels in detail of channel encoding. [7]
b) Explain pulse code modulation and delta modulation with suitable diagrams. [8]

OR

- Q6)** a) Explain pulse code modulation and delta modulation with suitable diagrams. [7]
b) Explain source encoding with calculations of efficiency of a source encoder in detail. [8]

P.T.O.

- Q7)** a) Explain the contention free and contention based medium access protocol in detail. [7]
b) Explain the MAC protocols and its control layers in details. [8]

OR

- Q8)** a) Explain sensor MAC of contention based MAC protocols [7]
b) Write a short note on mobility adaptive hybrid MAC [8]

- Q9)** a) Explain destination sequenced distanced vector. [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 flooding and Gossiping in detail in network layer. [10]



Total No. of Questions : 10]

SEAT No. :

P3166

[Total No. of Pages : 2

[5354]-664

B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION - II
(2012 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer any one question in or condition.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Non programmable calculator is permitted.*

Q1) Describe the feature based model concept, process gain, average residence time, apparent time delay and apparent time constant. **[10]**

OR

Q2) Explain ultimate gain and ultimate period concept in process control? Also give the importance of normalized time delay and its ranges for good control? **[10]**

- Q3)** a) Describe the step response of systems with integration and delay's? **[5]**
b) Describe the reason of inverse response in system models for various values of time constants? What is its effects in control. **[5]**

OR

Q4) What is RGA? Describe the need of RGA analysis in MIMO systems for control? **[10]**

- Q5)** a) Describe the distillation process in detail alongwith figure? **[8]**
b) Describe the column pressure control loop in distillation process? **[8]**

OR

- Q6)** a) Describe the types of reactions and reactors used in chemical plant? **[8]**
b) Differentiate the flow and temperature control loop from control point of view? **[8]**

P.T.O.

- Q7)** a) Classify the pumps? Explain any one in detail analysis and controls associated with it for better performance? [10]
b) Differentiate between linear and non linear systems? [6]

OR

- Q8)** a) Classify the compressors? Explain any one type in detail and control associated with it for better performance? [10]
b) Discuss the time and frequency domain performance specifications for better control of processes? [6]

- Q9)** a) Describe the basic control used in heat exchangers? Give the modeling concept in it? [9]
b) Describe the functional and control details in steam heaters and condensers? [9]

OR

- Q10)** a) Explain the use of antisurge control system used in compressors? [9]
b) Explain the on-off level control of dual pump station? [9]



Total No. of Questions : 10]

SEAT No. :

P3167

[Total No. of Pages : 2

[5354]-665

B.E. (Instrumentation & Control)
INDUSTRIAL AUTOMATION
(2012 Pattern) (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 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 general objectives of plant automation. [6]
b) Compare PLC and DCS system based on the performance criteria. [4]

OR

- Q2)** a) Write a short notes on Hybrid DCS. [6]
b) Write a short notes on communication standard RS 232. [4]

- Q3)** a) Explain OSI/ISO model used in communication system. [6]
b) Explain PWM Instruction used in PLC. [4]

OR

- Q4)** a) Write the a OPC (Object linking and embedding for Process Control). [6]
b) Write a short notes on profibus PA. [4]

- Q5)** a) Explain various Transmission mode in MODBUS Protocol. [10]
b) Write a short notes on PTO instruction used in PLC. [8]

OR

- Q6)** a) Explain in detail about the structured text and functional block diagram of PLC Programming. [10]
b) Explain analog control using PLC. [8]

P.T.O.

- Q7)** a) Explain the procedure for interfacing PLC with SCADA system using different communication protocol. [8]
b) Explain database management level and its function in DCS. [8]

OR

- Q8)** a) Explain the main components of DCS System. [8]
b) Give detail DCS specification for any Automation system. [8]
- Q9)** a) Explain Safety Instrumented System with neat sketch. [8]
b) Write a short notes on safety management system. [8]

OR

- Q10)**a) What is Hazop, Explain the Procedure of Hazop. [8]
b) Explain IEC6 1511 standered for functional safety. [8]



Total No. of Questions : 10]

SEAT No. :

P3168

[Total No. of Pages : 2

[5354]-666

B.E. (Instrumentation & Control)
DIGITAL IMAGE PROCESSING (ELECTIVE - III)
(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 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 elements of digital image processing systems. [6]
b) Explain Gabor transform. [4]

OR

- Q2)** a) Explain image smoothing methods. [6]
b) Explain statistical parameters with respect to DIP. [4]

- Q3)** a) Explain image color models. [6]
b) Explain multi resolution property of wavelet transform. [4]

OR

- Q4)** a) Explain spatial filtering in image enhancement. [6]
b) Explain wavelet transform. [4]

- Q5)** a) Explain image boundary detection. [10]
b) Explain image representation schemes. [8]

OR

- Q6)** a) Explain image regional descriptors. [10]
b) Explain image classifiers. [8]

P.T.O.

- Q7)** a) Explain Huffman coding. [8]
b) Explain lossy compression. [8]

OR

- Q8)** a) Explain LZW and RLE coding. [8]
b) Explain transform based image compression. [8]

- Q9)** a) Explain applications of DIP in Agricultural. [8]
b) Explain applications of DIP in Biometrics. [8]

OR

Q10) Write short note on applications of DIP in: (Any two) [16]

- a) Space
- b) Military
- c) Biomedical



Total No. of Questions : 10]

SEAT No. :

P3992

[Total No. of Pages : 2

[5354]-667

B.E. (Instrumentation and Control)
BUILDING AUTOMATION - II (Elective - III)
(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 diagram must be drawn wherever necessary.*
- 3) *Figures to right indicate full marks.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) What do you mean by zoning? Explain importance of zoning [6]
b) What are the different factors affecting sensitivity of conventional Detectors for fire alarm system? [4]

OR

- Q2)** a) What is the difference between NAC and IDC? Give one example of each. [6]
b) Explain the following terms in fire Alarm System [4]
i) Zone
ii) Circuit
iii) Notification Appliances
iv) Initiating Devices.

- Q3)** a) Enlist various automatic fire detectors. Explain any one. [6]
b) Describe addressable pull stations. [4]

OR

- Q4)** a) Explain style-4 and style-6 for SLC wiring [6]
b) Explain 4-wire smoke detectors. [4]

P.T.O

- Q5)** a) Explain different Class of fires. Also explain fire Hydrants for each class [8]
b) Explain and compare wet pipe and dry pipe system. [8]

OR

- Q6)** a) What is necessity of flow switch and tamper switch in fire suppression system? [8]
b) Explain fire suppression systems. [8]

- Q7)** a) What is the importance of access control system? What are the components of access control system? [10]
b) List and discuss various credentials for access control system. [8]

OR

- Q8)** a) What is security system? Discuss importance & applications of security systems with suitable examples. [10]
b) Discuss advantages and disadvantages of various biometrics. [8]

- Q9)** a) Explain system architecture of CCTV system. What are terminologies for cameras? [8]
b) Write short note on Video Steamer. [8]

OR

- Q10)**a) Explain technologies used for perimeter intrusion detection system. [8]
b) Explain the importance of intrusion system along with one application.[8]



Total No. of Questions : 10]

SEAT No. :

P3169

[Total No. of Pages : 2

[5354]-668

B.E. (Instrumentation & Control)
PROCESS MODELING AND OPTIMIZATION
(2012 Pattern) (Elective - III) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the 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) Fit a second degree parabola to the following data:

[10]

x	1	1.5	2	2.5	3	3.5	4
y	5	6	7	8	5.7	6.9	10.1

Find the law of the form $Y = a + bX + cX^2$

OR

Q2) Derive mathematical model of flash drum.

[10]

Q3) With an example explain subspace state space identification.

[10]

OR

Q4) With an example explain the relationships among time Laplace and frequency domain.

[10]

Q5) a) Explain multi-variable Nyquist plot.

[9]

b) Skogestad and Morari method.

[9]

OR

Q6) a) With an example explain open loop and close loop characteristics equations.

[9]

b) Skogestad and Morari method.

[9]

P.T.O.

- Q7) a)** For the following functions determine convexity and concavity. [8]
- i) $25x^2 - 5x^3$
 - ii) $14x^2 - 24x$
 - iii) $9x^2$
 - iv) $3x^2 + x^3$

- b) With an example explain Equality and Inequality Constraints. [8]

OR

- Q8) a)** Explain the Payback period and Return on Investment. [8]

- b) Explain Net present and Internal Rate of Return. [8]

- Q9) a)** Find the maximum value of $Z = 5x + 7y$. [10]
subject to the constraints:

$$x + y \leq 45,$$

$$x - y \geq 0,$$

$$y \geq 7,$$

$$0 \leq y \leq 34,$$

$$0 \leq x \leq 28$$

- b) Explain the Secant methods. [6]

OR

- Q10) a)** Maximize $Z = 12x_1 + 9x_2$ [10]
Subject to constraints.

$$13x_1 + 4x_2 \leq 1,000$$

$$4x_1 + 7x_2 \leq 800$$

$$6x_1 + 5x_2 \leq 3,500$$

$$x_1, x_2 \geq 0$$

- b) Explain direct methods for unconstrained multi-variable optimization. [6]



Total No. of Questions : 10]

SEAT No. :

P3170

[Total No. of Pages : 3

[5354]-670

B.E. (Instrumentation & Control)
COMPUTER TECHNIQUES AND APPLICATION
(2012 Pattern) (Elective - III) (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) *Use of scientific calculator is allowed.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn whenever necessary.*
- 5) *Assume suitable data if necessary.*

- Q1)** a) How does compaction help in minimizing external fragmentation? [5]
- b) Assume you have the following processes to execute with one processor, arriving in the order listed below:

Process	Burst Time
P1	10
P2	29
P3	03
P4	07
P5	12

Draw a Gantt Chart illustrating the execution of these processes using FCFS scheduling. What is the average waiting time and average turnaround time for each process? [5]

OR

- Q2)** a) List and explain the five states through which a process may go during its execution. [5]
- b) Write Note: Intertask Dependencies in Parallel Computers. [5]

P.T.O.

- Q3)** a) With neat diagrams, explain any four types of Directory Structures. [5]
- b) In an examination paper there are 4 questions and each answer do not require equal time to correct. 1000 candidates write the examination. 4 teachers are employed to correct the papers. Answer to question 1 takes 2 minutes to correct, question 2 takes 3 minutes, question 3 takes 2.5 minutes and question 4 takes 4 minutes. Due to this speed mismatch, storage should be provided between teachers. Answer the following with respect to data parallelism. [5]
- i) What is the idle time of teachers?
- ii) What is the system efficiency?

OR

- Q4)** a) What are real time operating systems? Explain the different types of RTOS. [5]
- b) Write Note: Demand Paging. [5]

- Q5)** a) Explain the following with respect to Networks [6]
- i) WAN
- ii) Tree Topology
- iii) Star Topology
- iv) Ring Topology
- b) Compare Circuit Switching and Packet Switching Networks. [6]
- c) Explain the TCP/ IP reference model with neat diagram. [6]

OR

- Q6)** a) Discuss the features and applications of Industrial Ethernet. [6]
- b) What is the IEEE 488 standard? Discuss its advantages. [6]
- c) Write Note on: ISO-OSI layer model. [6]

- Q7)** a) List and explain the basic operating modes of ARM processors. [8]
- b) Discuss the architectural overview of ARM 7 processor. [8]

OR

- Q8)** a) Write an assembly program for adding 10 numbers stored in memory location for ARM 7 processor. [8]
- b) Explain the interrupt structure of ARM 7 processor. [8]

- Q9)** a) What is software debugging? Explain any three debugging techniques. **[8]**
b) Explain in brief the Software Development Life Cycle. **[8]**

OR

- Q10)** a) Explain white box and black box testing. Discuss the advantages and limitations of each. **[8]**
b) Write Note on: Validation testing. **[8]**



Total No. of Questions : 10]

SEAT No. :

P3171

[Total No. of Pages : 2

[5354]-670-A
B.E. (Instrumentation & Control)
SMART MATERIALS AND SYSTEMS
(2012 Pattern) (Semester - II) (Elective - IV)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Enlist any six smart material properties. **[6]**
b) How shape memory polymers or ceramics behave as smart materials: mention two properties (either polymers or ceramics)? **[4]**

OR

- Q2)** a) How smart materials are developed? **[6]**
b) Discuss various features of shape memory alloy. **[4]**

- Q3)** a) Compare shape memory polymers with shape memory alloys with respect to: weight , change in elastic modulus, ease of processability (any two)**[4]**
b) How conductive polymers behave as smart materials: elaborate in brief.**[6]**

OR

- Q4)** a) Enlist different piezoelectric materials. **[4]**
b) Discuss Magnetorheological fluids or super conductor, in context to smart materials. **[6]**

- Q5)** a) Enlist different accelerometers. **[8]**
b) Elaborate any one accelerometer with type, construction, principle and manufacturer. **[8]**

P.T.O.

OR

- Q6)** a) Elaborate how a linear spring with a SMA wire can form an actuator. [4]
b) Elaborate piezo actuator working (consider points: size and single or stack) [6]
c) Discuss electro static transducers. [6]
- Q7)** a) For MEMS, define chemical vapor deposition technique (CVD) [4]
b) Enlist various steps in CVD. [4]
c) Discuss safety issues in CVD. [4]
d) Enlist MEMS applications. (any two) [4]

OR

- Q8)** a) What are different features of MEMS? Elaborate any four. [4]
b) Enlist any two applications of MEMS. [4]
c) How lithography, lift -off technique, etching is applied in MEMS silicon fabrication? (3 marks, 3 marks, 2 marks)
- Q9)** a) Mention two areas where Lab - on -chip is applied. [4]
b) What is Lab on chip technology elaborate. [4]
c) Imagine or discuss any one application of lab on chip. [4]
d) Enlist important -key words used in Lab on chip technology (any six)[6]

OR

- Q10)**a) How smart material systems or sensors are used in Airbag systems or Health care systems? [4]
b) Draw diagram for above (airbag system or health care application) [4]
c) Imagine your own application in brief using smart sensor or system. [8]
d) State manufacturer of any airbag smart system. [2]



Total No. of Questions : 10]

SEAT No. :

P3172

[Total No. of Pages : 2

[5354]-670-B
B.E. (Instrumentation & Control)
INSTRUMENTATION IN AGRICULTURE & FOOD
PROCESSING
(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, Q9 or Q10.*
- 2) *Neat diagrams must 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 significance of different engineering properties of soil. [5]
b) Give the features of fine wire thermocouples and list various application areas in which they are used. [5]

OR

- Q2)** a) Write a short note on Mohr's circle. [6]
b) Comment on the following "CIP (Clean-in-place) is commonly used in food & beverage industries". [4]

- Q3)** a) Write a short note of irrigation efficiency [5]
b) Explain the pasteurization process and related instrumentation involved in a dairy plant. [5]

OR

- Q4)** a) Explain the Clarifier stage along with related instrumentation involved in sugar manufacturing process. [6]
b) List the parameters which are maintained in a green house. [4]

- Q5)** a) Explain the working of rain gage and maximum and minimum thermometer used in agrometrological weather station. [10]
b) List different types of pumps used in agriculture and explain the pump characteristics. [8]

P.T.O.

OR

- Q6)** a) Explain hydraulic controls in a tractor. [10]
b) Explain the working of soil moisture measurement using TDR technique. [8]

- Q7)** a) Write a short note on Biosensor. [8]
b) List some key features of Indian food standards bill 2005. [8]

OR

- Q8)** a) Explain various problems encountered in a cold storage unit. [8]
b) Write a short note of International food standards. [8]

- Q9)** a) List and explain the need of various control equipments in a controlled atmosphere storage unit. [8]
b) Develop PLC ladder for automation of food packing plant by assuming suitable sequence. [8]

OR

- Q10)** a) Explain the application of SCADA for cold storage systems. [8]
b) Write a short note on recent trends in food processing. [8]



Total No. of Questions : 10]

SEAT No. :

P3173

[Total No. of Pages : 2

[5354]-670-D

**B.E. (Instrumentation & Control Engineering)
AUTOMOBILE INSTRUMENTATION
(2012 Pattern) (Elective - IV) (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 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) Security & warning system in automobiles.
- b) Solid state Ignition system

OR

Q2) Elaborate on principle and construction of starter drive unit. **[10]**

Q3) Explain construction and principle of operation of electronic control of pumps? **[10]**

OR

Q4) Explain the principle and construction of series motor. **[10]**

Q5) Explain the following with respect to automobile: **[16]**

- a) Crank angle position sensor
- b) Coolant temperature measurement

OR

Q6) a) Explain the working of Solenoids with neat diagram **[8]**

b) Describe air mass flow for engine applications in automobile. **[8]**

P.T.O.

- Q7)** Explain the following with respect to automobile: **[18]**
- a) Generation of direct current mechanism
 - b) Head light and side light system
 - c) Cutout

OR

- Q8)** a) Write short note on alternators principle and constructional aspects. **[9]**
- b) Write a note on Wiper system & Trafficator. **[9]**

- Q9)** Write short notes on: **[16]**
- a) Bumper design for safety
 - b) NVH (noise, vibration and harshness) of chassis

OR

- Q10)** a) Explain the principle of operation of emission measuring instruments. **[8]**
- b) Write short note on automatic seat belt tightner system. **[8]**



Total No. of Questions : 8]

SEAT No. :

P3216

[Total No. of Pages : 2

[5354]-671

B.E. (Computer Engineering)
DESIGN & ANALYSIS OF ALGORITHMS
(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 diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain divide and conquer strategy with example. [8]
b) Explain the following terms with reference to greedy technique.
i) Feasible solution and optimal solution.
ii) Control of abstraction. [8]
c) What are the general characteristics of branch and bound approach?[4]

OR

- Q2)** a) Define asymptotic notations. Explain their significance in analyzing algorithms. [4]
b) Write the algorithm for solving the problem of optimal binary search tree (OBST) Give its time complexity. [8]
c) Write the algorithm for m-coloring graph using backtracking strategy with its time complexity. [8]

- Q3)** a) Explain in brief NP complete problem. Prove that the clique decision problem (CDP) is NP complete problem. [8]
b) Explain the concept of approximation algorithm in brief. [8]

OR

- Q4)** a) What are P and NP classes explain with examples? What is their relationship? [8]
b) Explain the concept of Randomized algorithm and Approximation algorithm in brief with example. [8]

P.T.O.

- Q5)** a) What is dining philosophers problem? Write concurrent algorithm for the same. [8]
b) How parallel algorithms can be used to solve graph problems? [8]

OR

- Q6)** a) What is parallel computing? Which are the different parallel computing models explain in brief. [8]
b) How parallel computing can be applied to obtain minimum spanning tree using Kruskal's algorithm? [8]

- Q7)** a) Write short note on power optimized scheduling algorithm used in embedded systems. [9]
b) What is Internet of Things (IoT)? Explain different elements of IoT. [9]

OR

- Q8)** a) Explain in detail Bully algorithm for dynamically selecting a coordinator in distributed system. [9]
b) Explain data management algorithms and clustering used in IoT. [9]



Total No. of Questions : 10]

SEAT No. :

P3217

[Total No. of Pages : 2

[5354]-672

B.E. (Computer Engineering)

PRINCIPLES OF MODERN COMPILER DESIGN

(2012 Pattern)

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) Discuss the action taken by every phase of compiler on following string:[6]
 $A = B * (C + D) - E$
- b) Translate the following statements into three address code: [4]
 $x = A [i] * m / n ^ p + g \& q [i]$

OR

- Q2)** a) What is Lex? How tokens are generated in Lex? [6]
b) Explain: Error detection and recovery in YACC? [4]
- Q3)** a) Write Syntax Directed Translation scheme for boolean expression? [4]
b) Compare: Quadruple, Triple, Indirect Triple. [6]

OR

- Q4)** a) Differentiate between SLR, LR(K) and LALR parser. [6]
b) Explain advantages of dividing three address statements into basic blocks. [4]
- Q5)** a) Explain: Issues in code generation. [6]
b) Write the need for code optimization. [4]
c) Explain labelling algorithm for tree. [8]

P.T.O.

OR

- Q6)** a) Discuss the principle sources of code optimization, give proper examples wherever necessary. [8]
b) What are different terms related to simple code generation algorithm. [4]
i) Register descriptor.
ii) Address descriptor.
c) What is next use information? Explain its use in code generation. [6]
- Q7)** a) Explain type checking with respect to context handling. [6]
b) What is meant by desugaring? Why is importance of it. [6]
c) Compare between Structure and Union type. [4]

OR

- Q8)** a) Write note on Java CC. [6]
b) Write note on Desugaring. [6]
c) Compare register oriented and stack oriented architectures. [4]
- Q9)** a) Explain Dynamic compilation. [6]
b) Write note on data parallelism. [6]
c) Explain marshalling and unmarshalling of messages. [4]

OR

- Q10)** a) Explain cross compilation using XMLVM. [6]
b) Write note on nVidia cuda compiler. [6]
c) Write difference between GCC and G++. [4]



Total No. of Questions : 10]

SEAT No. :

P4254

[Total No. of Pages : 2

[5354] - 673

**B.E. (Computer Engineering)
SMART SYSTEM DESIGN & APPLICATIONS
(2012 Pattern) (Semester - I)**

Time : 2½ hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Explain the various AI problems and AI techniques. [8]
b) What are various agent environments? Give PEAS representation for an agent. [6]
c) Write short notes on Kalman Filters. [4]

OR

- Q2)** a) Define problem formulation? Describe the components of problem with suitable example. [8]
b) Explain the hardware requirements for robotics? [6]
c) Explain rote learning with example. [4]

- Q3)** a) What is propositional logic? Explain with example. [4]
b) Explain A Star search algorithm using an example. [6]
c) Write short note on structure of intelligent agents. [4]

OR

- Q4)** a) Explain types of decision trees in data mining. [4]
b) What is Expert System? List out application of expert system? [6]
c) What is reasoning? What is its role in artificial intelligence. [4]

P.T.O.

- Q5)** a) Explain iterative deepening depth search algorithm with its function. [6]
b) Write a short note on: [8]
i) Inductive learning
ii) Learning Decision Tree.

OR

- Q6)** a) What is problem? What are the basic elements needed for solving single state problem and formalize the 8- Puzzle problem? [8]
b) Explain machine learning types. [6]
- Q7)** a) Define supervised learning? Explain and draw a decision tree for deciding whether to wait for a table if a restaurant currently has no free tables.[6]
b) Explain the steps to assess the performance of the learning algorithm with an example. [6]

OR

- Q8)** a) Explain in brief language models with suitable examples. [6]
b) Write a note on Bayesian Network. [6]
- Q9)** a) What are the basic inference task that must be solved in a generic temporal model. [6]
b) Write a short note on planning with operator. [6]

OR

- Q10)**a) Enumerate and explain the different. Edge profile using in edge detection. [6]
b) Write short note on biological neural network. [6]



Total No. of Questions : 8]

SEAT No. :

P3218

[Total No. of Pages : 2

[5354]-674

B.E. (Computer Engineering)

IMAGE PROCESSING

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Write short notes on Human visual system. [6]
b) Explain the concept of sampling & quantization of a digital image. [6]
c) Explain any two region based feature extraction techniques. [8]

OR

- Q2)** a) Explain image enhancement. List and explain image enhancement techniques in spatial domain. [6]
b) Compare high pass filter and low pass filter. Explain one type filter each. [6]
c) With the appropriate mask, explain the following: [4]
i) Point detection.
ii) Line detection.
d) Write short notes on chain code. [4]
- Q3)** a) What is the need for image compression? Explain redundancy in images. Explain image - compression scheme. [8]
b) What is the need of object recognition. State and explain automated object recognition system. [8]

P.T.O.

OR

- Q4)** a) Explain any two object recognition method. [8]
b) Obtain the Huffman code for the word "COMMITTEE". What are the different parameters involved in it. [8]

- Q5)** a) Explain medical image obtained with non-ionizing radiation. What are the medical imaging modalities? Explain in brief. [10]
b) How image enhancement techniques can be used in mammography & X-rays images. [8]

OR

- Q6)** Write a short note on (any three): [18]
a) Does & Risk
b) RBC Image processing.
c) Dental & Digital X-Ray processing.
d) 3-D Visualization.

- Q7)** a) What is image interpretation? What are the different elements of image interpretation. [8]
b) Define remote sensing. Explain in brief remote sensing process. What are the different pre-processing techniques used in remote sensing. [8]

OR

- Q8)** Write short note on (any two): [16]
a) Visual image interpretation.
b) Photogrammetric imaging devices.
c) Remote sensing data products.



Total No. of Questions : 12]

SEAT No. :

P3219

[Total No. of Pages : 2

[5354]-675

B.E. (Computer Engineering)

COMPUTER NETWORK DESIGN AND MODELLING

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Explain in detail model for Analysis, Architecture & Design. **[6]**

OR

Q2) What are Service characteristics? **[6]**

Q3) a) Explain in detail flow & types of flows. **[4]**

b) Write a note on external relationships in reference architecture. **[4]**

OR

Q4) a) Explain Matrix for delay. **[4]**

b) What are the application groups. **[4]**

Q5) Explain Requirement gathering and analysis during network design. **[8]**

OR

Q6) Write short note on: **[8]**

a) Developing RMA requirement.

b) Requirement mapping.

P.T.O.

- Q7)** a) What is In-Band and Out Band Management of the network? Explain in detail. [8]
b) What are the various parameters of Network back bone design? How these parameters can influence the network design. [6]

OR

- Q8)** a) Explain how address mechanism plays important role while network design. [8]
b) Describe augmented MENTOR Design. [6]

- Q9)** a) List out four types of problems that the performance architectural addresses. Give examples of each type of problem. [8]
b) What is object aggregation? Explain various events in NS3 or equivalent. [8]

OR

- Q10)** a) Explain different routing strategy? Explain any two in detail. [8]
b) Discuss the different performance mechanism; also compare DiffServ and IntServ. [8]

- Q11)** a) Write short note on: [12]
i) Importance of modeling and simulations in computer network
ii) Modeling network elements.
iii) Smart pointer.
b) What are the major components of evaluation process for vendor s, service providers and equipment? [6]

OR

- Q12)** a) Explain following performance mechanisms: [12]
i) Prioritization, Traffic Management, Scheduling and Queuing.
ii) Quality of service.
b) Explain network simulator ns - 3 [6]



Total No. of Questions : 10]

SEAT No. :

P3220

[Total No. of Pages : 2

[5354]-676

B.E. (Computer Engineering)

ADVANCED COMPUTER PROGRAMMING

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

- Q1)** a) Explain with examples Object Transfer service using Path Reversal. [5]
b) What are Locks? Explain Distributed Lock services using Timestamps. [5]

OR

- Q2)** a) What is bounded buffer? How semaphores are useful in bounded buffer. [5]
b) Define Service oriented architecture. List any four SOA characteristics. [5]

- Q3)** a) What is auto-boxing and unboxing? When does it happen in Java? [5]
b) What is a thread? Describe the complete life cycle of thread. [5]

OR

- Q4)** a) Write an applet for each of following graphics methods.
drawoval(), drawrect(), drawline(), filloval() [5]
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?

P.T.O.

- Q5)** a) What is cloud computing? Explain its framework model in detail. [9]
b) What is Ajax? What are Ajax applications? What are the advantages and disadvantages of Ajax? Also write difference between AJAX and JavaScript. [8]

OR

- Q6)** a) What is difference between web services and software component? How do we create a web service in Java? Give suitable example of web service in Java. [9]
b) What is EJB? How it is different from RMI? Explain in detail web services and software component. [8]

- Q7)** a) Write a short notes on Hadoop Ecosystem. Also explain Features and advantages of Hadoop. [8]
b) Write short notes on: [8]
i) MongoDB
ii) AJAX
iii) RDBMS verses Hadoop.

OR

- Q8)** a) What do you mean by Hadoop YARN? What are the failure handling in YARN? [8]
b) Explain shared Nothing Architecture (SNA) with advantages and disadvantages. [8]

- Q9)** a) Explain with examples ETL Processing. [8]
b) Explain the different execution modes of Pig. [9]

OR

- Q10)** a) Explain with examples Hadoop Daemons, MongoDB, Word-Count Program and MapReduce function. [9]
b) Explain the functionalities of Mapper, Reducer, Combiner, Partitioner. Also write searching and sorting using MapReduce. [8]



Total No. of Questions : 8]

SEAT No. :

P3221

[Total No. of Pages : 3

[5354]-677

B.E. (Computer Engineering)

DATA MINING TECHNIQUES AND APPLICATIONS

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1) a) Explain Data Preprocessing Steps in brief. [8]
b) A database has Nine transactions. Let minimum support count is 2. [6]

TID	List of itemIDs
T100	I1,I2,I5
T200	I2,I4
T300	I2,I3
T400	I1,I2,I4
T500	I1,I3
T600	I2,I3
T700	I1,I3
T800	I1,I2,I3,I5
T900	I1,I2,I3

Generate all candidate item set and frequent item sets using Apriori algorithm.

- c) Write and explain K-Nearest -Neighbor Classification Algorithm with suitable example. [6]

OR

- Q2) a) Explain binning methods for data cleaning with suitable example. [6]
b) Explain mining Multilevel association rules. What is Uniform support?[6]
c) What is decision tree pruning? Explain Error based pruning and Reduced Error Pruning methods for Tree Pruning. [8]

P.T.O.

- Q3)** a) Given two objects represented by the tuples (24, 1, 42, 10) and (20, 0, 36, 8):
- i) Compute the Euclidean distance between the two objects. [6]
 - ii) Compute the Manhattan distance between the two objects.
- b) What is Hierarchical Clustering? Explain Agglomerative Nesting and Divisive Analysis Hierarchical Clustering methods with example and diagram. [5]
- c) Write algorithm for K-means clustering and explain it with suitable example. [6]

OR

- Q4)** a) Write equations for Minimum distance, Maximum Distance and Average Distance Formulas for measuring distance between clusters. Explain nearest neighbour clustering, single linkages algorithm farthest neighbour clustering algorithm, complete linkages algorithm with help of these formulas. [6]
- b) Explain K-Medoids clustering algorithm with example. [6]
- c) Explain Partitioning methods in large databases. [5]
- Q5)** a) What is a dimensionality reduction technique in text mining? List all techniques and explain any one of them. [8]
- b) Explain Web structure Mining and web content mining. [6]
- c) Explain Precision and Recall in the terms of retrieved and relevant documents. [3]

OR

- Q6)** a) Write Crawling Algorithm and explain working of Web Crawler. [8]
- b) Explain following terms: [9]
- i) TF
 - ii) IDF
 - iii) Feature Vector

- Q7)** a) Write short note on [6]
i) Holistic learning
ii) Systematic learning.
b) What is Big Data? Explain in short. What are the challenges in Big data Analysis? [4]
c) What is supervised, unsupervised and semi supervised learning? [6]

OR

- Q8)** a) Write a note on Advances in technology for big data mining. [8]
b) Draw a diagram for reinforcement learning model and explain it in detail. [8]



Total No. of Questions : 10]

SEAT No. :

P3222

[Total No. of Pages : 2

[5354]-678

B.E. (Computer Engineering)

PROBLEM SOLVING WITH GAMIFICATION

(2012 Pattern) (End Seme)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Assume suitable data, if necessary.*

- Q1)** a) What is Gamification? List the advantages of Gamification. [5]
b) Explain the role of Choice architecture in Gamified systems. [5]

OR

- Q2)** a) Explain the concept of SAPS with examples. [5]
b) How playful or gameful experience can be enhanced to Motivational experience? Explain with example. [5]

- Q3)** a) Explain the concept of Apparatus and Image in the context of video games. [5]
b) Write short note on Social games and list one example. [5]

OR

- Q4)** a) What problems any organization can face if the design of any gamified system is not made agile? [5]
b) What are the different stages of mastery? [5]

- Q5)** a) Explain any five game mechanics which can be used in any gamified system designed for solving social problem. [10]
b) What are the different game elements which are used in Eight queen's problem. [5]
c) Explain the principle of objective-challenge-reward loop in brief found in most of the gamified solutions. [3]

P.T.O.

OR

- Q6)** a) List and explain the concerns associated with designing of most commonly used Game Mechanics? [10]
b) Explain positive and negative feedback with example [8]

- Q7)** a) Explain in brief how Level model, User model and Event model can be created. [10]
b) How concept of Gamification can be used to develop any online Technical Discussion Forum like Quora? [6]

OR

- Q8)** a) How game mechanics for tracking scores and levels can be coded? [10]
b) How the Gamification used in an application for personal improvement? [6]

- Q9)** a) Explain the various features of GitHub [8]
b) How Bigdoor platform can be used to develop Loyalty program? [8]

OR

- Q10)** a) How mambo platform can be used for c-learning activity? Explain useful features of mambo. [8]
b) List and explain the features of any Gamification server. [8]



Total No. of Questions : 10]

SEAT No. :

P3223

[Total No. of Pages : 2

[5354]-679

B.E. (Computer Engineering) (Semester - I)
PERVASIVE COMPUTING
(2012 Pattern) (Elective - II (b))

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Discuss SMART DUST and Tiny OS. **[4]**
b) Explain context aware computing and types of contexts with example. **[6]**

OR

- Q2)** a) How cooltown model can be implemented at workplace discuss. **[4]**
b) Explain location management principles and techniques in mobile computing. **[6]**

- Q3)** a) Define planned action and situated action. **[4]**
b) Brief about device connectivity with suitable examples and available Technologies for. **[6]**

OR

- Q4)** a) Why user interfaces are primarily visible? Discuss benefits of using visual interfaces auditory interfaces. **[6]**
b) Explain context aware applications and steps to develop them. **[4]**

- Q5)** a) Explain mobile and wireless security issues. **[8]**
b) Explain core capabilities for context aware applications. **[8]**

P.T.O.

OR

- Q6)** a) Discuss actuator services in detail. [8]
b) Explain experimental comparison of collaborative defence strategies for network security. [8]
- Q7)** a) Define Authentication and authorization in detail with respect to pervasive computing. [8]
b) Explain Human - Computer interaction in detail. What is Human - Device interaction, explain. [8]

OR

- Q8)** a) Explain social networking and media exchange example for smart interaction. [8]
b) Explain following with respect to security: [8]
i) Man in the middle attack.
ii) Replay attacks.
- Q9)** a) Explain graduated levels and system support for each of the UbiCom property. [6]
b) Differentiate between Human intelligence and machine intelligence. [6]
c) Compare & contrast the following techniques for lowering energy use:[6]
i) MEMS
ii) Energy harvesting
iii) Ultra-capacitor and fuel cells.

OR

- Q10)**a) Explain various issues related to distributed systems interaction to be more intelligent. [8]
b) Review following technologies. Justify whether they are sustaining or disruptive. [10]
i) Mobile
ii) Radio
iii) email
iv) e- Book
v) e - Commerce.



Total No. of Questions : 10]

SEAT No. :

P3224

[Total No. of Pages : 2

[5354]-680

B.E. (Computer) (Semester-I)
EMBEDDED SECURITY
(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) *Figures to the right indicate full marks.*
- 3) *Draw neat diagram wherever necessary.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) What is Intel Active Management Technology (AMT)? [4]
b) Explain three pillars of Mobile Computing. [6]

OR

- Q2)** a) Explain in brief Target Data Breach. [4]
b) Differentiate between Management Engine vs. Intel AMT? [6]

- Q3)** a) Explain in brief OpenSSL Heartbleed? [4]
b) Explain in detail RSA algorithm? [6]

OR

- Q4)** a) What are the Security Requirements used by the Common Vulnerability Scoring System (CVSS)? [4]
b) Explain in detail the working of SIGMA protocol? [6]

- Q5)** a) Explain the features of Field Programmable Fuses? [8]
b) Explain any two boot attack. [8]
i) Evil maid.
ii) BIOS Alteration attack.
iii) Rooting.

P.T.O.

OR

- Q6)** a) Differentiate integrated Vs. Discrete TPM (Trusted Platform Module). [8]
b) Explain how software can use a trusted platform module (TPM) to authenticate hardware devices. [8]

- Q7)** a) Explain in detail Digital Right Management (DRM). [8]
b) Explain End-to-End Content Protection with neat diagram. [8]

OR

- Q8)** a) Explain Dynamic Application Loader (DAL) Architecture with neat block diagram. [8]
b) Write short notes on
i) Intel Wireless Display (WiDi)
ii) HDCP (High bandwidth Digital Content protection) Protocol. [8]

- Q9)** a) Write a short note on: [9]
i) protected Input and Output
ii) Software guard Extension
iii) DAL
b) Explain how embedded security is provided for IOT(Internet of Things). [9]

OR

- Q10)**a) Explain the Security-Hardening Measures in details. [9]
b) Explain in detail IOT reference architecture. [9]



Total No. of Questions : 09]

SEAT No. :

P3225

[Total No. of Pages : 2

[5354]-681

B.E. (Computer Engineering)
MULTIDISCIPLINARY NATURAL LANGUAGE
PROCESSING (End Sem)
(2012 Pattern) (Elective - II)

Time : 2½ 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) What is Natural language Processing (NLP)? Explain Parsing in NLP. [6]
b) What is Probabilistic Parsing? Explain it with suitable example. [4]

OR

- Q2)** a) Explain Machine Translation in terms of Spoken language translation. [6]
b) Write a short note on : Ambiguity resolution and it's techniques. [4]

- Q3)** a) What is Sequence Labeling ? Explain Graphical Models for Sequence labeling in NLP. [6]
b) Explain in short ,Finite State Machine (FSM) based morphology. [4]

OR

- Q4)** a) Explain in detail : The EM algorithm in NLP. [6]
b) Define the terms: [4]
i) Segmentation
ii) Hybrid Parsing

P.T.O.

- Q5)** a) Write a short note on following levels of speech communication.(any two). [8]
- i) Linguistic level
 - ii) Physiological level
 - iii) Acoustic level
- b) Explain Sentence-level Phenomena in performance grammar. [8]

OR

- Q6)** a) Explain Acoustic Analysis of Speech variables during depression and after improvement. [8]
- b) Enlist the reasons of Speech Disorders or Language Disorders. [8]
- Q7)** a) What is WordNet ? Explain it's structure with suitable example. [8]
- b) Explain with suitable example, the IndoWordNet. [8]

OR

- Q8)** a) What is Metaphors? Explain it with suitable example. [8]
- b) Explain in detail: Word Sense Disambiguation (WSD) [8]

- Q.9)** Write a short Note on : (Any Three) [18]
- a) Difference between Multilingual and Cross -Lingual NLP.
 - b) NLP applications.
 - c) Sentiment Analysis.
 - d) Machine Translation NLP.
 - e) Natural Language Tool Kit (NLTK) in Python.



Total No. of Questions : 10]

SEAT No. :

P3226

[Total No. of Pages : 2

[5354]-682

B.E. (Computer Engineering) (End Sem)

**SOFTWARE DESIGN METHODOLOGIES AND TESTING
(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.*

- Q1)** a) Explain the concept of object oriented analysis and designing and its role in modern application software development [5]
- b) Explain use case actor. Who are primary and secondary actors? Explain with example. [5]

OR

- Q2)** a) Explain the significance of static modeling? Give the UML notations for Representing class in class diagram. [5]
- b) What is software Design? What is the major classification of software design based on abstraction level? [5]

- Q3)** a) Explain multiple client multiple service architectural pattern with a suitable example. [5]
- b) Explain factory pattern. Describe its intent, motivation and implementation with suitable example. [5]

OR

- Q4)** a) Explain location transparency and platform transparency in service oriented architecture. [5]
- b) Explain the Iterator pattern with suitable example and class diagram. [5]

P.T.O.

- Q5)** a) What is defect management? Discuss the generic steps in defect management process? [8]
b) Explain V test model with suitable block diagram? [8]

OR

- Q6)** a) What is validation ? Explain various levels of validation? [8]
b) What are various principles of testing? [8]

- Q7)** a) Differentiate between alpha and beta testing? [6]
b) Explain graph based testing with example? [6]
c) What is security testing. Explain different types security testing. [6]

OR

- Q8)** a) What is performance testing. Explain the need of performance testing. [6]
b) What is equivalence partitioning? Explain with example. [6]
c) Write short note on test metrics. [6]

- Q.9)** a) Difference between functional and nonfunctional testing. [8]
b) Write a short note on GUI testing? [8]

OR

- Q.10)** a) What is mobile testing? Mention the challenges in mobile testing? [8]
b) Write short note on:
i) JUnit
ii) Selenium [8]



Total No. of Questions : 8]

SEAT No. :

P3227

[Total No. of Pages : 2

[5354]-683

B.E. (Computer Engineering)
HIGH PERFORMANCE COMPUTING
(2012 Pattern) (Semester - II)

Time : 2½ 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 whenever necessary*
- 3) *Assume suitable data if necessary*

- Q1)** a) What is Dataflow Model? [4]
b) State and explain Basic working principal of Super Scalar Processor?[6]

- Q2)** a) Explain Mapping Technique for load balancing? [6]
b) Write a Short note on Concurrency and Task-Interaction? [4]

- Q3)** a) Explain Principles of Message Passing Programming (MPP)? [8]
b) Describe in details Topologies and Embedding? [7]

OR

- Q4)** a) Explain in detail Non-Blocking Communication Using MPI? [8]
b) Write a Short note on Groups and Communicators? [7]

- Q5)** a) State and explain the Performance Analysis of Parallel Algorithms? [7]
b) Write a short note on Job scheduling? [8]

OR

- Q6)** a) Explain in detail OPENMP: a Standard for Directive Based parallel programming? [8]
b) Write a short note on thread termination? [7]

P.T.O.

- Q7)** a) Explain the Latency hiding/Tolerating techniques and their limitations?[8]
b) Explain in detail 1-D and 2-D Partitioning? [7]
c) Explain Parallel Best-First Search algorithm in detail? [5]

OR

- Q8)** a) Explain in detail Quicksort algorithm with example? [8]
b) Explain the Bandwidth and Latency Limitations? [7]
c) Write a note on 0/1 integer-Linear programming problem with an example? [5]



Total No. of Questions : 10]

SEAT No. :

P3228

[Total No. of Pages : 2

[5354]-684

B.E. (Computer Engineering)

MOBILE COMPUTING (Elective - III)

(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 and Q9 or Q10
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Assume suitable data if necessary.

Q1) a) What is the need of spread spectrum technology? Explain DSSS with one example [5]

b) Describe mobile computing architecture with neat diagram. [5]

OR

Q2) a) Differentiate between different wireless switching techniques. [5]

b) Explain in detail GSM network architecture. [5]

Q3) a) Explain with a neat diagram GSM network interfaces and protocols. [5]

b) Compare TDMA and FDMA systems. [5]

OR

Q4) a) What is handover? When handover in mobile communication takes place? [5]

b) How the next generation wireless technologies are different than 3G technologies. [5]

Q5) a) What is basic purpose of DHCP? Name the entities of DHCP. [6]

b) Explain tunneling and encapsulation in mobile IP. [6]

c) Explain in detail the differences between AODV and the standard distance vector algorithms. [6]

OR

P.T.O.

- Q6)** a) What is tunneling ? How does a tunnel differ from a route? [6]
b) Explain Snooping TCP. Give the advantages and disadvantages of Snooping TCP. [6]
c) What are the security threats to a MANET ? Why a MANET faces greater security threats than a fixed infrastructure network? [6]

- Q7)** a) Describe pull-based data-delivery mechanism in detail . What are the advantages and disadvantages of pull-based data-delivery? [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) What is selective tuning? Discuss the methods used for selective tuning.[8]
b) Explain what is synchronization protocol? Explain how Bluetooth synchronizes mobile applications. [8]

- Q9)** a) What is mobile agent? What are advantages of using a mobile agent. [8]
b) Write Short note on [8]
i) Difference between iOS and Android OS.
ii) Service discovery and device management in mobile O.S.

OR

- Q10)**a) Explain what is gateway? Describe a transcoding gateway and its applications in mobile computing systems. [8]
b) Write Short note on [8]
i) Functions of Application Server.
ii) Requirement of Mobile File System.



Total No. of Questions : 10]

SEAT No. :

P3229

[Total No. of Pages : 2

[5354]-685

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

WEB TECHNOLOGY

(2012 Pattern) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 and Q9 or Q10*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data if necessary.*

Q1) a) Explain IoT Strategic Research and Innovation Directions. **[5]**

b) Write down various Device Level Energy Issues **[5]**

OR

Q2) a) Discuss Internet of Things Vision in detail. **[5]**

b) Explain Five Fundamental characteristic of IoT. **[5]**

Q3) a) Explain Value Creation from Big Data and Serialization process **[5]**

b) Explain IoT for Retailing industry and Oil and Gas industry. **[5]**

OR

Q4) a) What are the challenges in Data Aggregation for the IoT in Smart Cities. **[4]**

b) Write Contribution from FP7 Projects for IoT. **[6]**

Q5) a) Write down Importance of Standardization. **[8]**

b) Explain Research Roadmap for IoT Testing Methodologies. **[8]**

OR

Q6) a) Write difference between Data Interoperability and Semantic interoperability **[8]**

b) Explain M2M Service Layer Standardization **[8]**

P.T.O.

- Q7)** a) Explain various Vulnerabilities of IoT [6]
b) Explain different Identity management in Internet of Things. [12]

OR

- Q8)** a) Explain any three identity management model. [12]
b) What are the Challenges for a secure Internet of Things? [6]

- Q9)** a) Explain Different access control schemes in IoT. [8]
b) What is public key infrastructure? Explain PKI components in details. [8]

OR

- Q10)** a) Explain Research challenges in Trust and Identity. [4]
b) Explain following with respect to SAML approach. [12]
i) Assertions
ii) Protocol
iii) Bindings
iv) Profiles



Total No. of Questions : 10]

SEAT No. :

P3230

[Total No. of Pages : 2

[5354]-686

B.E. (Computer Engineering)

CLOUD COMPUTING (Elective - III)

(2012 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) Explain cloud computing reference model. **[5]**

b) Explain greenfield and brownfield deployment. **[5]**

OR

Q2) a) Explain taxonomy of virtualization. **[5]**

b) Enlist and explain pros and cons of virtualization. **[5]**

Q3) a) Explain google big table in detail. **[5]**

b) Discuss the significance of hypervisor in cloud. Explain type-I & type-II hypervisor. **[5]**

OR

Q4) a) Explain role of VSAN in cloud storage and it's benefits. **[5]**

b) Explain HDFS in details. **[5]**

Q5) a) Explain scheduling techniques in cloud computing. **[8]**

b) Elaborate anatomy of cloud infrastructure. **[8]**

OR

P.T.O.

- Q6)** a) Explain virtual machine life cycle. [8]
b) Elaborate benefits of converged infrastructure. [8]

- Q7)** a) Explain the model for federated cloud computing. [6]
b) What do you mean by SLA? Elaborate various types of SLA? [6]
c) Explain the phases of cloud service life cycle. [6]

OR

- Q8)** a) Explain cloud interface standards along with SOAP & REST. [6]
b) Write a short note on work flow modeling. [6]
c) Elaborate performance related issues of the HPC cloud computing. [6]

- Q9)** a) Elaborate various techniques for data security in cloud computing. [8]
b) Explain digital identity and access management. [8]

OR

- Q10)** a) Explain various security risks in cloud computing. [8]
b) Write a short note on following offering on saas segment to improve information security. [8]
i) Vulnerability management.
ii) Identity management - as - a - service.



Total No. of Questions : 10]

SEAT No. :

P3231

[Total No. of Pages : 2

[5354]-687

B.E. (Computer Engineering)

CYBER SECURITY (Elective - III) (End-Semester)

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) What are the elements of Information security? Explain in brief [5]

b) Explain the operation of polyalphabetic cipher. [5]

OR

Q2) a) Explain operational model of network security. [5]

b) Encrypt the plain text 'COE' using hill cipher, use keyword 'ANOTHERBZ'[5]

Q3) a) Explain the operation of triple DES algorithm [5]

b) Explain operation of RSA public key encryption algorithm. [5]

OR

Q4) a) Compare between symmetric key encryption and asymmetric key encryption. [5]

b) Explain digital signature algorithm. [5]

Q5) a) Explain working of S/MIME with secrecy and authentication [9]

b) Describe the operation of secure socket layer protocol in detail [9]

OR

P.T.O.

- Q6)** a) What are the security services provided by PGP? [6]
b) List and explain components of IPSec protocol [6]
c) Explain the operation of secure electronic transaction protocol in brief.[6]

- Q7)** a) Explain operation of anomaly based intrusion detection system in detail[8]
b) What is trusted system? Explain in brief [8]

OR

- Q8)** a) Explain the operation of mis used-based intrusion detection system [8]
b) Describe operation of packet filtering firewall [8]

- Q9)** a) What is war dialing? Describe various hardware and soft ware used for war dialing. [8]
b) Describe various wireless network defences and counter measures. [8]

OR

- Q10)**a) List and explain various Volp attacks [8]
b) What are the various hacking devices used in hacking [8]



Total No. of Questions : 10]

SEAT No. :

P3232

[Total No. of Pages : 2

[5354]-688

B.E. (Computer Engineering)

BUSINESS ANALYTIC AND INTELLIGENCE (Elective - IV(A))

(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 and Q9 or Q10.*
- 2) *Figures to the right indicate full marks.*

Q1) a) Explain components of business intelligence system in detail. [5]

b) Differentiate data, information and knowledge with example. [5]

OR

Q2) a) Explain "Predictive business analytics" technique in detail. [5]

b) Mathematical modeling plays important role in business intelligence. Comment. [5]

Q3) a) Explain components of decision support system with diagram. [5]

b) Explain various data mining techniques in decision support system. [5]

OR

Q4) a) Explain OLAP operations with example [5]

b) What is materialized view and snapshot materialized view. Explain with example. [5]

Q5) a) What are outliers? Explain various types of outliers with suitable example. [10]

b) Explain various data cleaning techniques with example. [7]

OR

P.T.O.

Q6) a) Explain KNN distance based method of outlier detection with example. **[10]**

b) Design star schema for inventory control system by considering following dimension list (Assume MOLAP technology) **[7]**
Time, Item, Branch & Location

Q7) a) Explain the concept of business Intelligence infrastructure. Explain and draw suitable diagram for BI infrastructure requirements **[10]**

b) Explain various BI operations required for business continuity. **[7]**

OR

Q8) a) Explain designing of business intelligence in detail. **[10]**

b) Explain business intelligence scalability and availability. **[7]**

Q9) a) Explain following business analytical techniques in detail. **[10]**

i) Descriptive

ii) Prescriptive

b) Explain application of business intelligence for marketing. **[6]**

OR

Q10)a) Explain the application of business intelligence in **[10]**

i) CRM

ii) ERP

b) Explain BI application in fraud detection. **[6]**



Total No. of Questions : 10]

SEAT No. :

P3233

[Total No. of Pages : 3

[5354]-689

B.E. (Computer Engineering)

OPERATION RESEARCH FOR ALGORITHMS IN SCIENTIFIC APPLICATIONS

(2012 Pattern) (Elective -IV)

Time : 2 ½Hours]

[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)** a) Discuss briefly different programming problems addressed as Operations Research problems. [5]
- b) With the help of suitable diagram, illustrate elements of decision support system [5]

OR

- Q2)** a) Solve the linear programming problem using simplex method [5]
- Maximize $Z = x_1 + 9x_2 + x_3$
Subject to $x_1 + 2x_2 + 3x_3 \leq 9$
 $3x_1 + 2x_2 + 2x_3 \leq 15$
with all variables non negative
- b) Analyze following terms for Linear programming [5]
- i) Slack and Surplus variables
 - ii) Generation of initial feasible solution
 - iii) Penalty costs
 - iv) Standard form

- Q3)** a) A furniture manufacturing company plans to make two products: Chairs and Tables from its available resources, which consists of 400 boards feet of wood and 450 man-hours. A chair requires 5 board feet and 10 man-hours and has a profit of 45. Each table uses 20 board feet and 15 man-hours and has a profit of 80. The problem is to determine how many chairs and tables the company can make, keeping within its resource constraints, so as to maximize its profit. Solve the problem using graphical method [5]
- b) Describe steps of North-West corner rule for finding initial basic feasible solution of transportation problem. [5]

P.T.O.

OR

Q4) a) What is Hungarian method of finding optimal solution of Assignment Problem? [5]

b) Solve following system of equation with graphical method. [5]

$$x_1 + x_2 \leq 20$$

$$30x_1 + 20x_2 \leq 522$$

$$3x_1 + 4x_2 \leq 72 \text{ such that } x_1, x_2 > 0$$

Q5) a) Describe Hurwicz and Laplace Criterion of decision theory [8]

b) What is Row and Column Dominance Rule? Apply the Same to following 3 * 3 Pay-off matrix to reduce it to a 2 * 2 matrix [10]

		P2		
		I	II	III
P1	I	1	7	2
	II	6	2	7
	III	5	1	6

OR

Q6) a) At a one-man barber shop, the customers arrive following Poisson process at an average rate of 5 per hour and this is according to exponential distribution with an average service rate of 10 minutes. Assuming that only 5 seats are available for waiting customers, find the average time a customer spends in the system. [10]

b) Discuss Kendall's Notation for Representing Queueing Model. [8]

Q7) a) If there are five activities P,Q,R,S and T such that P,Q,R have no immediate predecessors, S and T have immediate predecessors P, Q and Q,R respectively, Represent the scenario using network diagram. [8]

b) Compute Earliest start, Earliest finish, Latest start and latest finish of each activity of the project given below [8]

Activity	1-2	1-3	2-4	2-5	3-4	4-5
Duration	8	4	10	2	5	3

OR

- Q8)** a) Explain the terms with reference to CPM [8]
- i) Event
 - ii) Predecessor event
 - iii) Successor event
 - iv) Activity
 - v) Dummy activity
 - vi) Network.
- b) Explain various application areas of PERT and CPM techniques. [8]

- Q9)** a) What are characteristics of Dynamic Programming Problem? [8]
- b) Describe steps of solving Linear Programming problem using Dynamic Programming. [8]

OR

- Q10)**a) Discuss Bellman's Principles of optimality. [8]
- b) What are recent development of Operations Research with Bio Technology Perspective? [8]



Total No. of Questions : 10]

SEAT No. :

P3234

[Total No. of Pages : 2

[5354]-690

B.E. (Computer Engineering)

MOBILE APPLICATIONS

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

Time : 2 Hours 30 Mins.]

[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 Diagram must be drawn wherever necessary.*
- 4) *Assume Suitable Data if necessary.*

Q1) Attempt the following:

- a) What are the different Benefits of mobile apps? Explain with example [6]
- b) What is the mobile web and write the difference between desktop web and mobile web. [4]

OR

Q2) Attempt the following:

- a) What is the need of third party framework? Write any three mobile frameworks in detail [6]
- b) Elaborate the ratios of peoples are using mobile browsers and are not?[4]

Q3) Attempt the following:

- a) What is the Fragmentation? Explain Different resolution Groups in Display of Mobile web. [6]
- b) What is WAP? Explain difference between WAP1 and WAP2 [4]

OR

Q4) Attempt the following:

- a) What is automation testing? Explain any method with example [6]
- b) Explain Different Input Methods of Mobile Web [4]

P.T.O.

Q5) Attempt the following:

- a) What is WML? Explain Difference between XML and WML standards [10]
- b) What is HTML5 Mobile Boilerplate? [6]

OR

Q6) Attempt the following:

- a) Write down the Syntax Rules of HTML5 [10]
- b) What is CSS and CSS3 of Mobile Web? [6]

Q7) Attempt the following:

- a) Why cloud base browsers are faster than direct browsers? [10]
- b) What are different Java Script Libraries [6]

OR

Q8) Attempt the following:

- a) Explain Enyo and Montage framework. [10]
- b) Explain with example CSS Selectors. [6]

Q9) Attempt the following:

- a) How user will find your application(offline and online). [10]
- b) Explain Mobile SEO in details. [8]

OR

Q10) Attempt the following:

- a) 'What are the different Location techniques to determine the geographical locations of the device. [10]
- b) How to get the Cell location without the Carrier's assistance. [8]



Total No. of Questions : 10]

SEAT No. :

P3235

[Total No. of Pages : 2

[5354]-690-B

B.E. (Computer Engineering)

Programming Paradigms for Complex Problems-Case Studies in Python
(2012 Pattern) (Semester - II) (Open Elective)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 and Q9 or Q10.
- 2) Assume suitable data, if necessary. Neat Diagrams must be drawn whenever necessary.

- Q1)** a) For a programming language describe Values, Types and Type classes. [6]
b) Describe importance of un-typed lambda calculus. [4]

OR

- Q2)** a) For a programming language describe Variants and Exception. [6]
b) Write a python program for students queue forming according to their height. Explain the step-wise working with suitable input data. [4]

- Q3)** a) Write python functions [6]
i) Build a string using numbers from 1 to 100
ii) De-duplicate a list (remove duplicates) from a list of numbers
b) What is referential integrity? Explain the same with regards to functional programming language. [4]

OR

- Q4)** a) What is relationship among Polymorphic types and type constructors? [6]
b) What is Deductive and Inductive Reasoning? [4]

- Q5)** a) Describe with suitable examples [6]
i) Function types with function arguments
ii) Function types with function as result
b) Describe Abstract types, algebraic approach with respect to formal reasoning on programs. [8]
c) Write a note on Type inferring in gofer. [4]

P.T.O.

OR

- Q6)** a) Write a recursive python program for Stack operations. [8]
b) Write a program to calculate factorial using recursion. [4]
c) With suitable example, explain List and Stream as recursive data types. [6]

- Q7)** a) What is Coroutine? Compare [8]
i) Coroutine and Subroutine
ii) Coroutine and Generators
iii) Coroutine and mutual recursion
b) Discuss following properties of Iterators [8]
i) Non-blocking and Blocking,
ii) Dynamic Cursor Support.

OR

- Q8)** a) What exactly is meta-programming? How is it supported by python? [8]
b) How do scripting languages affect accessibility? [8]

- Q9)** a) What is name in name space? Describe following terminologies with respect to name spaces. [8]
i) Context
ii) Name space identifier
iii) Local name
b) What do you mean by package management? List advantages of software package management systems. [8]

OR

- Q10)** a) List and explain benefits of Modular programming. [8]
b) What is version control? What are the benefits of the same? [8]



Total No. of Questions : 10]

SEAT No. :

P 5245

[Total No. of Pages : 2

[5354] - 690 - D

B.E. Computer Engineering

FUNDAMENTALS OF

SOFTWARE DEFINED NETWORKING

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

Time : 2.30Hours]

[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 network topologies with advantages and disadvantages. **[6]**

b) Explain SDN challenges. **[4]**

OR

Q2) a) Explain SDN architecture **[6]**

b) Explain Open Flow Specification **[4]**

Q3) a) What is RIP routing? Explain RIP 1 and RIP 2? **[4]**

b) Write a short note on **[6]**

a) OpenFlow Switch

b) OpenFlow Controller

c) OpenFlow Protocol

OR

Q4) a) Explain network Scalability in terms of data centers, Service providers, ISP automation. **[6]**

b) Write a short note on **[4]**

a) Flow Table

b) Timers

Q5) a) What is relation of SDN to network virtualization and NFV? **[6]**

b) Explain Component of virtual Network. **[6]**

c) Why we need network abstraction? **[4]**

P.T.O.

OR

- Q6)** a) Explain abstraction of physical network. [6]
b) What is network as a service (NaaS)? [6]
c) What is role of NAT device in the network? [4]

- Q7)** a) How SDN help for network programmability. [8]
b) Explain following SDN based network application. [8]
i) Internet Research
ii) Ruler Connectivity

OR

- Q8)** a) Explain SDN network management [8]
b) Explain following SDN application [8]
i) Mobile application offloading
ii) Mobile Virtual Machine

- Q9)** a) Explain ODL Controller. [6]
b) Explain applicability of Open - Flow protocol in SDN controller. [8]
c) What is virtual networking? [4]

OR

- Q10)** a) Explain Floodlight controller. [6]
b) How SDN Controller Works? [8]
c) What is Virtual Machine? [4]



Total No. of Questions : 10]

SEAT No. :

P3237

[Total No. of Pages : 3

[5354]-690-E

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

BIG DATA AND DATA ANALYTICS (Elective - IV)

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) How Decision Support System and Business Intelligence are related? [5]
b) Explain following terms in the context of data warehouse [5]
i) Subject oriented
ii) Integrated

OR

- Q2)** a) Explain Components of Decision Support System with diagram. [5]
b) What is Big data analytics? [5]

- Q3)** a) Explain Virtualization approaches with respect to Big data Analytics. [5]
b) What are the applications of Big data analytics? [5]

OR

- Q4)** a) Why “Model Building” is important in data analytic lifecycle? Justify. [5]
b) How results are communicated to end user in data analytic lifecycle? Explain. [5]

- Q5)** a) Differentiate Supervised and Unsupervised machine learning techniques with example? [6]
b) What is the difference between linear regression and logistic regression? [5]
c) Describe support vector machine with suitable example. [6]

P.T.O.

OR

- Q6)** a) What are the applications of machine learning ? Explain any one in detail [6]
b) Differentiate between training and testing data set with suitable example. [6]
c) Describe time series analysis with suitable example. [5]

- Q7)** a) Explain association rule mining for Market Basket Analysis with example [10]
b) Describe classification tree with suitable example. [7]

OR

- Q8)** a) Explain the hierarchical method of clustering [7]
b) Consider the following training data set. Construct a decision tree using ID3 algorithm. [10]

Day	Out look	Temperature	Humidity	Wind	Play tennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Q9) Write Short Note on

- i) Basic Features of R [5]
- ii) Data Frames and Lists with example [6]
- iii) Reading Data Sets and Exploring Data from R [5]

OR

- Q10)a)** Write a program in R to process Grocery data set using Apriori algorithm for Market basket Analysis [10]
- b) Write short notes on Manipulating and Processing Data in R [6]



Total No. of Questions : 10]

SEAT No. :

P3175

[Total No. of Pages : 3

[5354]-692

B.E. (Information Technology)
SOFTWARE MODELING AND DESIGN
(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, Q9 or Q10.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw appropriate diagrams using UML 2.0 notations.*
- 4) *Use of non programmable electronic calculator is allowed.*

- Q1) a)** Identify classes, and relate the classes using appropriate relationships by drawing class diagrams. **[6]**
- i) Company is led by CEO (Chief executive officer).
 - ii) A college belonging to university is composed of the parts as one admin office, several departments, and research centers.
- b) With the context of use case diagram, show the relationships include & extend using an example. **[4]**

OR

- Q2) a)** Explain with an example : **[6]**
- i) Aggregation Verses Association
 - ii) Aggregation Verses Composition
- b) Show the following description with appropriate OCL notation. **[4]**
- i) No employee's salary can exceed the salary of the employee's boss.
 - ii) No window will have an aspect ratio less than 0.8 or greater than 1.5.

P.T.O.

- Q3) a)** Draw a state diagram for ATM system with the following scenario Initially the ATM is in IDLE state and displays bank's advertisement on the screen. When the customer inserts the card into the ATM, the ATM transits from the IDLE state to ACTIVE state. ATM being in active state, when the Card Inserted event arrives, it is goes in the waiting for PIN state, during which time the ATM is waiting for the customer to input the PIN. When the customer completes the entering of PIN, the ATM transits to the Validating PIN state. When the customer entered PIN matches the stored PIN for the card. Assuming the PIN validation successful, the ATM transits to waiting for Customer choice state. [6]
- b) Explain Fork and Join with example in context with Activity diagram. [4]

OR

- Q4) a)** Consider an online web based "Computer Rental System "Draw a **sequence diagram** for **Rent a computer** use case with the following assumptions.
The customer needs to first select the type of computer he wants to rent. The database of computers is maintained based on its types like: Desktop, Laptop, Notepads, Pocket PC etc. Based on the type of computer the rents are displayed, if the chosen type of computer is available, the booking is done, confirmed, the booking details are stored and the customer is issued an electronic confirmation of the booking.[6]
- b) Explain transition & guard condition in state diagram with example. [4]

- Q5) a)** Describe batch transformation and continuous transformation. [8]
- b) Write the purpose of deployment diagram. Draw & explain the following element of deployment diagram [8]
- i) Node
 - ii) Artifact
 - iii) Node instance

OR

- Q6) a)** Explain layered architecture & partitions. [8]
- b) Draw component diagram for online shopping system. [8]

- Q7)** a) What is design pattern? Explain 4 essential elements of patterns. [8]
b) Explain the Design pattern documentation. [8]

OR

- Q8)** a) Write a short note on [8]
i) Observer design pattern
ii) State design pattern
b) Write the classification, motivation, class diagram and uses of adapter design pattern. [8]

- Q9)** a) Differentiates between Black box testing and white box testing. [8]
b) Draw and explain V-model. [10]

OR

- Q10)**a) Explain unit testing in details. [8]
b) Define software validation and software verification. [10]
Explain verification and validation concept by considering the following statements:
i) Are we building the product right?
ii) Are we building the right product?



Total No. of Questions : 10]

SEAT No. :

P3176

[Total No. of Pages : 3

[5354]-693

B.E. (Information Technology)

MACHINE LEARNING

(2012 Pattern)

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) What is a cross-validation? How it improves the accuracy of the outcome? [5]
- b) Define and explain Squared Error (SE) and Mean Squared Error (MSE) w.r.t. Regression. [5]

OR

- Q2)** a) What is a geometrical machine learning model? Explain it with one example. [5]
- b) What is a polynomial regression? How it can be represented in a form of a matrix? [5]
- Q3)** a) Define following w.r.t. Binary Classification: [4]
- i) True positive
 - ii) False positive
 - iii) True Negative
 - iv) False Negative
- b) Suppose classifier's prediction is given as follows: [6]

		Predicted	
		+	-
Actual	+	60	15
	-	10	15

Calculate Accuracy, Weighted Accuracy, Precision and Recall for it.

OR

P.T.O.

- Q4) a)** What is a support vector ? How the margins are defined in support vector machine. [4]
- b) What do you mean by zero centered and un-correlated features? What is the use of it in the solution of multivariate linear regression? [6]

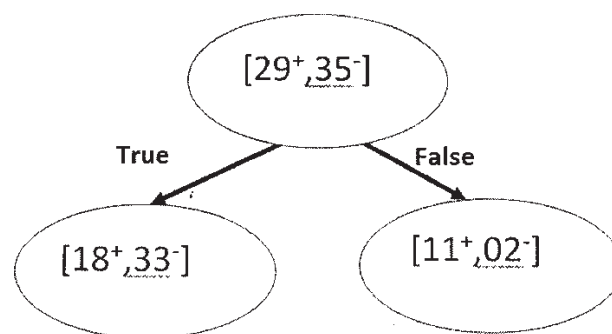
- Q5) a)** Define Cluster Tree? Write and explain Agglomerative Clustering algorithm. [9]
- b) A survey is conducted on two attributes ‘Acid Durability (secs)’ and ‘Strengths(kg/m²)’ to classify whether a special paper tissue is ‘good’ or not. Following are the samples received. [9]

Sr. No.	Acid Durability (secs)	Strength (kg/m ²)	Target Class
1	7	7	Bad
2	7	4	Bad
3	3	4	Good
4	1	4	Good
5	2	5	Good

If a particular sample is surveyed with ‘Acid Durability’ = 3 seconds and ‘Strength=7 kg/m²’, then what will be its target class if value of k=2 and k=3?

OR

- Q6) a)** Define with respect to Association Rule Mining: [8]
- Support
 - Confidence
 - Lift
- b) Consider a dataset of 29 positive samples and 35 negative samples. The dataset is split on certain condition. The split is as shown in the figure. Calculate “Information Gain” of the given split. [10]



- Q7)** a) Define and explain: [8]
i) Bernoulli's Distribution
ii) Binomial Distribution
b) Write and explain Naïve Bayes Classification Algorithm. [8]

OR

- Q8)** a) Describe Normal Distribution with its features. [8]
b) Approximately 1% of population among the age group of 40-50 have diabetes. A person with diabetes has a 90% of chance of a positive test, while a person without diabetes have 9% of chance of false positive result. What is the probability that a person has diabetes given that she just had a positive test? [8]

- Q9)** a) Explain Deep Learning. What are the challenges in Deep Learning? [7]
b) Write a short note on: [9]
i) Sequence Prediction
ii) Sequence Classification
iii) Sequence Generation

OR

- Q10)** a) Can we ensemble multiple models of same Machine Learning algorithm? Describe. [8]
b) Explain Multi-task learning with Task grouping and overlap methodology. [8]



Total No. of Questions : 8]

SEAT No. :

P3177

[Total No. of Pages : 2

[5354]-694

B.E. (Information Technology)

SOFT COMPUTING

(2012 Pattern) (Elective - 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.*

- Q1)** a) Comment on the nature of problems solved with soft computing. [6]
b) List and explain performance issues of EBP. [8]
c) What do you understand by resonance in ART networks. [6]

OR

- Q2)** a) Explain in brief “Rough sets”. [6]
b) Comment on the performance issues in EBP. [8]
c) What is recurrent neural network? Explain learning principle. [6]

- Q3)** a) What is meant by fuzzy logic system? Illustrate it with proper examples. [8]
b) Explain the Alpha-cut method for discrete fuzzy sets to perform arithmetic operations. [8]
i) Subtraction
ii) Division

OR

- Q4)** a) What is defuzzification? Explain. [8]
b) List and explain following fuzzy set operations with example. [8]
i) Normal fuzzy set
ii) Product of fuzzy set

P.T.O.

- Q5)** a) What is difference between evolutionary strategy and evolutionary programming. [8]
b) With the neat flowchart explain working of simple genetic algorithms. [8]

OR

- Q6)** a) List and explain in brief types genetic algorithms. [8]
b) With the neat flowchart explain operation of genetic programming.[8]

- Q7)** a) Describe an application how soft computing can be used in semantic web. [9]
b) Describe an applications of fuzzy for natural language processing. [9]

OR

- Q8)** a) Describe an application how soft computing can be used in object tracking. [9]
b) Describe an applications of evolutionary computing in image processing. [9]



Total No. of Questions : 10]

SEAT No. :

P3178

[Total No. of Pages : 2

[5354]-695

B.E. (Information Technology)

USABILITY ENGINEERING

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 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 three main dimensions on which users experience differs [6]
b) Explain Good Error messages with example. [4]

OR

- Q2)** a) How Cost saving is possible with the help of Usability engineering methods. [6]
b) Write a short note on : Graphical User Interfaces. [4]
- Q3)** a) Why user interface should be based on the user's language & not on system oriented term. [6]
b) Why Feedback is important in Usability Heuristics. [4]

OR

- Q4)** a) Explain Gestalt principles. [6]
b) List various issues related to interaction design. [4]
- Q5)** a) Explain formative & summative techniques of evaluation. [10]
b) What are the attributes of usability performance measurement? [8]

OR

P.T.O.

- Q6)** a) Explain different stages of usability testing with example. [10]
b) Explain the importance of Observations, Questionnaires and interviews in usability assessment [8]

- Q7)** a) How Interactive tutorials are useful to understand user interface? [8]
b) How information in the interface useful for users while interacting with interface. [8]

OR

- Q8)** a) How user & Vendor Benefits from Consistency and Standards. [8]
b) Explain principle of good UI design. [8]
- Q9)** a) Explain GOMS model with diagram. [8]
b) Write a short note on : Collaborative system. [8]

OR

- Q10)** Write a short note on (Any 2) [16]
a) Intelligent User Interfaces
b) Virtual Reality
c) Ethics of usability



Total No. of Questions : 8]

SEAT No. :

P3179

[Total No. of Pages : 3

[5354]-696

B.E. (Information Technology)

MODERN COMPILERS

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) *Figures to the right indicate full marks.*

- Q1)** a) Write translation of following in IR operators and IR tree: [6]
i) simple variable : $i+5$
ii) array declaration: $a[j]$
b) What is the architecture of Pentium computers? Write any two problems and corresponding solution of this architecture with respect to instruction selection? [6]
c) Explain the algorithm of Mark-and-Sweep garbage collection. Derive the cost of garbage collection for it. [8]

OR

- Q2)** a) Draw a stack frame. Explain the concepts of static linking, display array, lambda lifting with respect to stack frame. [6]
b) Write Maximal Munch algorithm for optimal tiling instruction selection and comment on its efficiency. [6]
c) Explain copying collection with a neat diagram. Write the algorithm for pointer forwarding. [8]
- Q3)** a) Explain call-by-name and call-by-need with respect to lazy evaluation. [6]
b) Explain strictness analysis with an example. How to compute strictness? [6]
c) What is meant by private field in programming language? What are various ways to support it in programming language? [6]

P.T.O.

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) What is variable capture? How to avoid variable capture, explain with suitable sample code? [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) Discuss two flavors of Inter-procedural Constant Propagation with suitable algorithm. [8]
b) What is call graph? Draw call-graph for the following code sequence. Identify the inside-out & outside-in order for the same. [8]

```
procedure a()
begin
    call b()
    call c()
    call c()
End
procedure b()
begin
    call c()
    call d()
end
procedure c()
begin
end
procedure d()
begin
end
```

- Q7)** a) What are reasons for variable aliases? Explain variable aliases based on type and based on flow. [8]
b) Explain the architecture and working of Hybrid Compiler. [8]

OR

- Q8)** a) How can we speed up the evaluation of dataflow equations while carrying out the dataflow analysis? [8]
- b) What is reaching definitions? Write in and out definitions for reaching definitions. [8]



Total No. of Questions : 10]

SEAT No. :

P3180

[Total No. of Pages : 2

[5354]-697

B.E. (Information Technology)

PARALLEL ALGORITHMS AND DESIGN

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) What do you mean by sequential model of computation? Explain.[5]
b) With respect to hypercube model, what is a hypercube connection?
What is The diameter of an n-node hypercube? [5]

OR

- Q2)** a) Define PRAM model of computation? [5]
b) Design the parallel algorithm to construct merging network and use the same For merge sort. [5]

- Q3)** a) Describe the pyramid network with suitable diagram. Also give its diameter and bisection with. [5]
b) What is mean by speed up in parallel algorithms? How much performance gain is achieved by parallelizing a given application over a sequential implementation? [5]

OR

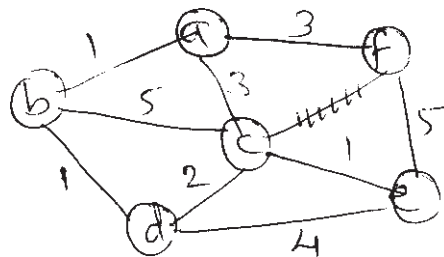
- Q4)** a) Differentiate between hypercube and Cube connected cycle parallel computation network. [5]
b) What is data parallelism? Explain is it similar to pipelining. Discuss. [5]

P.T.O.

- Q5)** a) Discuss parallel quick sort algorithm in detail. [8]
 b) Explain Homomorphism-based Structured in Parallel Programming? [8]

OR

- Q6)** a) Which of the following sequences are biotonic sequences: [8]
 i) 8,4,2,1,2,5,7,9
 ii) 6,2,6,9,7
 b) Discuss hyperquick sort algorithm with an example. [8]
- Q7)** a) Explain Conjugate Gradient Method-Sequential Algorithm. [8]
 b) What is MST? Solve Given problem using Kruskal parallel computing algorithm. [10]



OR

- Q8)** a) Write short note on any three: [12]
 i) Permutation in parallel computing
 ii) Combination in parallel computing
 iii) Derangements in parallel computing
 iv) The applications of Depth First Search
 b) Explain the need of BFS Traversal of graph algorithm? [6]
- Q9)** a) Explain the terms and its stages with neat Diagram. [8]
 i) Pipelines
 ii) Homomorphism.
 b) Explain Homomorphism-based Structured in Parallel Programming? [8]

OR

- Q10)** a) Explain the knapsack problem with branch and bound algorithm? [8]
 b) What is computer algebra system? Draw and explain its framework. [8]



Total No. of Questions : 10]

SEAT No. :

P3181

[Total No. of Pages : 2

[5354]-698

B.E. (Information Technology)

CLOUD COMPUTING

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Describe characteristics of Cloud Computing. [6]
b) Explain any two advantages of Virtualization. [4]

OR

- Q2)** a) Explain the cloud cube model. [5]
b) State and explain life cycle of SLA. [5]

- Q3)** a) Compare following Hypervisors in brief. [6]
i) KVM
ii) HyperV
b) What is Community Cloud? Explain. [4]

OR

- Q4)** a) Explain the model for federated cloud computing. [6]
b) Explain in brief server virtualization. [4]

- Q5)** a) Discuss with diagram surfaces of attacks in Cloud Computing. [8]
b) Describe in brief OS security. [8]

OR

P.T.O.

- Q6)** a) Enlist & explain cloud security threats. [8]
b) Discuss two ways of determining Trust. [8]

- Q7)** a) Write short note on Amazon EC2 cloud. [8]
b) Explain with diagram the term 'Cloud Stack'. [8]

OR

- Q8)** a) Draw and explain Google cloud structure. [8]
b) Explain the open source cloud. [8]

- Q9)** a) Write short note RFID tag. [8]
b) State and explain with diagram Human Centered Design Life Cycle. [10]

OR

- Q10)** a) Explain in brief any two ubiquitous computing applications. [8]
b) Describe in brief any five network design issues. [10]



Total No. of Questions : 10]

SEAT No. :

P3182

[Total No. of Pages : 2

[5354]-699

B.E.

BUSINESS INTELLIGENCE

(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 indicate full marks. Assume Suitable data if necessary.

- Q1)** a) Define BI. List at least four BI tools. [4]
b) Draw the architecture of Data Warehouse and explain its major features. [6]

OR

- Q2)** a) Write a short note on OLAP. Define data cube in context of OLAP system. What are the different operations that can be performed on a data cube. [6]
b) Draw and explain the dimension model for the following scenario. A **bookshop** selling books of different categories such as textbooks, language books and novels. It maintains an **Online Book database** for customers to buy books online. The bookshop may have several **branches** in different locations. Model should consist of at least 1 fact table and 2-3 dimension tables. [4]

- Q3)** a) Explain transaction, recurring/periodic and accumulating snapshot types of dimensional modeling. [6]
b) Explain the need and process of Change Data Capture. [4]

OR

- Q4)** a) What are aggregate fact tables? What is its importance? Justify it with suitable example. [4]
b) What is meant by loading in ETL? Explain in short initial loading, incremental loading and full loading. [6]

P.T.O.

- Q5)** a) What is materialized view? Give an example of materialized view and snapshot materialized view. [8]
b) Explain with an example of different security levels in BI reports. [8]

OR

- Q6)** a) Draw the different Query Rewrite steps. How Query rewrite is different from cost based query rewrite? [8]
b) Define Dashboard. Which softwares are used in Dashboard creation? Create and explain one scenario for Dashboard presentation. [8]
- Q7)** a) What is clustering? How it is different from classification? Discuss the k-means algorithm for clustering with the help of an example. [8]
b) Explain Components and applications of time-series analysis. [8]

OR

- Q8)** a) What is classification in context of data mining? Explain decision tree classification with the help of an example. [8]
b) Compare and contrast In-DB and In-memory analytics. Write a note on Google analytics case study. [8]
- Q9)** a) What kind of data warehouse application is suitable for Hive? What are the types of tables in Hive? [8]
b) What are the different types of BI? Explain Agile BI and Embedded BI in detail. [10]

OR

- Q10)** Write on following: (any 3) : [18]
a) BI on Cloud
b) BI tool : QlikView
c) Compare and Contrast Pig and Hive
d) Tableau



Total No. of Questions : 10]

SEAT No. :

P3183

[Total No. of Pages : 2

[5354]-700

B.E. (Information Technology)

SERVICE ORIENTED ARCHITECTURE

(2012 Pattern) (Semester - I) (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) *Figures to the right indicate full marks.*

- Q1)** a) Explain any 4 common pitfalls of adopting SoA. [4]
b) Define service oriented Architecture? Explain different roots of SoA. [6]

OR

- Q2)** a) Explain message exchange patterns. [6]
b) What is intermediaries of web services & it's different types. [4]
- Q3)** a) Explain security and it's requirement needed for web service. [5]
b) List & explain how service orientation principles relate to object-orientation principles. [5]

OR

- Q4)** a) Explain WS-Policy framework in web services? [5]
b) With using Basic notification architecture explain the concept of WS-Notification. [5]
- Q5)** a) Explain the common top-down strategy process steps. [8]
b) Differentiate between services and service candidates. [4]
c) List the goals of performing a service-oriented Analysis. [4]

OR

P.T.O.

- Q6)** a) Explain in brief different basic modelling building blocks in SoA. [8]
b) Explain Entity centric business services with any case study. [8]
- Q7)** a) Discuss XML schema Language Basics. [8]
b) Explain different high level guidelines for choosing service layers for configuration. [8]

OR

- Q8)** a) Enlist and explain the tools which is require to design a service interface using the WSDL and XML schema markup languages. [6]
b) Discuss different positioning standards for SoA. [10]
- Q9)** a) Which service design Guidelines used as a starting point from which we can derive our own standards. [6]
b) Explain step by step process of entity centric business service design. [8]
c) Explain how QoS compliance in SoA goverance works with recent trends of SoA. [4]

OR

- Q10)** a) Explain application service design in detail. [6]
b) Write a short note on : [12]
i) WS-BPEL elements
ii) Task centric business service design.
iii) SoA and cloud computing.



Total No. of Questions : 10]

SEAT No. :

P3993

[Total No. of Pages : 2

[5354]-710-B

B.E. (IT)

REAL TIME & EMBEDDED SYSTEMS (EL-IV)

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

Q1) a) List the challenges of design and development of embedded system and discuss relevant toolset to meet them. **[6]**

b) Explain Myrinet with suitable Myrinet network diagram. **[4]**

OR

Q2) a) What is embedded system? How it is different from other systems? Explain with examples. **[6]**

b) What are main features of CAN2.0 bus standards **[4]**

Q3) a) Comment on Instruction pipelining in the SHARC processor. **[6]**

b) Explain the structure of 12C bus, Draw state transition diagram for 12C bus master. **[4]**

OR

Q4) a) Draw general architectural block diagram of ARM processor. List main features of ARM processor. **[6]**

b) Explain following with respect to CAN bus **[4]**

- i) ID Filtering
- ii) Error handling
- iii) Overload frames
- iv) Wired AND logic.

P.T.O

- 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) What are the assumptions for priority driven scheduling of periodic tasks? Explain weighted round robin scheduling algorithm. What are the advantages over simple round robin scheduler? [8]

OR

- 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) What is deadlock & explain how to avoid deadlock with priority ceiling protocol. [8]
- b) State & explain priority inversion problem with appropriate example & name protocols used to remove this problem. [8]

OR

- Q8)** a) What is resource reclaiming? State needs of resource reclaiming algorithm. [8]
- b) State algorithms for combined scheduling of periodic & aperiodic tasks & Compare them. [8]

- Q9)** a) Explain features & characteristics of Real Time Operating System. [8]
- b) Explain commercial Real Time Database. [8]

OR

- Q10)**a) Explain features & characteristics of Real Time Database. [8]
- b) Write note on commercial RTOS. [8]



Total No. of Questions : 10]

SEAT No. :

P3184

[Total No. of Pages : 2

[5354]-701

B.E. (Information Technology)

E & M GOVERNANCE

(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) List and explain with example the reasons for using the Internet as a basic infrastructure for e-Business? [6]
b) Discuss the terms front-office and back-office systems? [2]

OR

- Q2)** a) What are the main e-business requirements, roles and their challenges? [6]
b) What is the key difference between e-Commerce and e-Business? [2]

- Q3)** Firm 'A' only has business-to-business clients, like sport shops, warehouses and small bag shops. One of their key business processes is order acquisition (which includes negotiating with potential clients) [10]
a) Give an example of a sub process and a compound activity of this business process.
b) Different characteristics of business processes can impact the extent to which they can be automated. What can you say about the mentioned business process and the possibilities to automate it?

OR

- Q4)** a) Explain three Levels of e-Business Strategy. [4]
b) What is a business process? List the seven characteristics of a business process. [6]

P.T.O.

- Q5)** a) IT supporting e-business strategic objectives. Discuss. [8]
b) Explain how the Internet makes outsourcing of information intensive services more attractive. [8]

OR

- Q6)** a) Which three factors contribute to the success of e-markets? Give one example for each factor. [8]
b) Explain how the element of trust has changed in an e-market perspective compared to a traditional market? Use the following terms in your answer: [8]
i) Quality of information
ii) Information security
iii) Geographic location
iv) Partnerships

- Q7)** 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) Explain framework for m-commerce. What are the implementation challenges in M-commerce? [8]

OR

- Q8)** a) Define m-commerce and explain how an e-government could use it to increase its efficiency and effectiveness. [8]
b) Write a short note on m-commerce life cycle. Discuss advantages and disadvantages of m-commerce. [8]

- Q9)** a) Discuss the five major m-commerce applications, and provide a specific example of how each application can benefit a business. [6]
b) Discuss how m-commerce can expand the reach of e-business. [6]
c) What are various mobile commerce services for consumer? Explain. [8]

OR

- Q10)** a) The mobile devices of the future will be more powerful, less heavy, and comprise new interfaces to the user and to new networks. Describe the special technologies used in m-commerce. [6]
b) List and explain are the emerging live issues in mobile commerce? [6]
c) Discuss various issues of mobile commerce services for business? Explain. [8]



Total No. of Questions : 10]

SEAT No. :

P3185

[Total No. of Pages : 2

[5354]-702

B.E. (Information Technology)
GEO INFORMATICS SYSTEM
(2012 Pattern) (Elective - II) (Semester - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) Explain the role of computer in map projection. [5]
b) Explain the components of geo informatics. [5]

OR

- Q2)** a) Explain different types of map projection with suitable example. [5]
b) Explain Electromagnetic remote sensing process in detail. [5]
- Q3)** a) Explain the concept of synthetic aperture radar. [5]
b) Explain linkage of GIS to remote sensing. [5]

OR

- Q4)** a) Explain different satellite system parameters. [5]
b) Explain basic character of digital image. [5]
- Q5)** a) Explain the concept of geometric transformation. [8]
b) Explain different types of errors. [8]

OR

- Q6)** a) Explain conversion of existing data. [8]
b) Explain spatial data processing in detail. [8]

P.T.O.

- Q7)** a) Explain different types of data queries. [8]
b) Explain comparison of raster & vector based data analysis. [8]

OR

- Q8)** a) Explain the concept of data exploration. [8]
b) Explain different GIS models. [8]

- Q9)** a) Explain the components of ITS & its integration with GIS. [9]
b) Explain the urban & municipal application of GIS. [9]

OR

- Q10)** a) Describe analysis & visualization of traffic data in GIS. [9]
b) Explain geospatial database design methodologies. [9]



Total No. of Questions : 8]

SEAT No. :

P3186

[Total No. of Pages : 2

[5354]-703

B.E. (Information Technology)
NATURAL LANGUAGE PROCESSING
(2012 Pattern) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

- Q1)** a) How meaning of sentences is computed and represented in NLP? [6]
b) Compare top down chart parser and bottom up chart parser. [6]
c) Why augmented transition networks are used in NLP? Explain with suitable example. [8]

OR

- Q2)** a) In which aspects sentence to be processed should be well formed? If it is not then, how NLP system is expected to process the input. [6]
b) Consider the following CFG: [6]

S → NPV
S → NP AUX V
NP → ART N

Trace one of the chart parsers in processing the sentence

1 The 2 man 3 is 4 laughing 5

with the lexicon entries:

the: ART
man: N
is: AUX
laughing: V

Show every step of the parse, giving the parse stack, and drawing the chart each time a non-terminal constituent is added to the chart.

- c) What are issues in lexicon design? Why there is need of morphological analysis? Explain with example. [8]

P.T.O.

- Q3)** a) How does Context dependant Best-First parser works? Explain with suitable example. [10]
b) Explain Viterbi algorithm with example. For what purpose it is used?[8]

OR

- Q4)** a) How does Shift Reduce Parser encode uncertainty to improve the efficiency while parsing? Explain with proper example. [10]
b) What is Probabilistic Context-Free Grammar? Explain with suitable example. [8]

- Q5)** a) How does the relative scoping of the quantifiers and operators add to the complexity of ambiguity in the Logical form? Justify with appropriate examples? [8]
b) What is WordNet? How can it help the user? [8]

OR

- Q6)** a) Explain Model theoretic representation in detail. [8]
b) Explain the term Semantic Ambiguity? Briefly explain any two linguistic tests to define the notion of Semantic Ambiguity. [8]

- Q7)** a) Explain metrics used in assessing the quality of Machine translation?[8]
b) How NLP is used to develop automatic question answering system.[8]

OR

- Q8)** a) What is Semantic Web Search? How does it improve the accuracy of the search. [8]
b) Explain the use of NLP in automatic text clustering. [8]



Total No. of Questions : 10]

SEAT No. :

P3187

[Total No. of Pages : 3

[5354]-704

B.E. (Information Technology)

DISTRIBUTED SYSTEM

(2012 Pattern) (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 right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

- Q1) a)** Give five types of hardware resource and five types of data or software resource that can usefully be shared. Give examples of their sharing as it occurs in practice in distributed systems. **[6]**
- b) Explain the concept of Web Service? Illustrate use of communication patterns available in web services with the help of “Travel Agent Service” application. **[4]**

OR

- Q.2 a)** Describe precisely what is meant by a scalable system. Scalability can be achieved by applying different techniques. What are these techniques? **[6]**
- b) Explain the concept of Web Service. Illustrate with suitable diagram, how “Travel Agent Service” application combines other web services. **[4]**
- Q.3 a)** Differentiate between: **[6]**
- i) RMI and RPC
 - ii) RMI and CORBA
 - iii) RMI and Socket
- b) Use CORBA IDL to specify a bank account. An account should have the information about account name, account number, and balance. The methods for this bank account should include open, deposit, withdraw, and balance inquiry. Your IDL should be able to run through CORBA IDL compiler. **[4]**

P.T.O.

OR

- Q4)** a) What is stub? How are stubs generated? Explain how the use of stubs help in making an RPC mechanism transparent. [6]
- b) Define the interface to the Election service in CORBA IDL and Java RMI. Note that CORBA IDL provides the type long for 32 bit integers. Compare the methods in the two languages for specifying input and output arguments. [4]
- Q5)** a) Define Global State. Explain the ‘Snapshot’ algorithm for determining global states of distributed systems. [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) Explain the concept of logical clock and their importance in distributed system. Write Lamport’s timestamp algorithm in Pseudo Code and explain it with suitable example. [8]
- b) Explain Recart and Agarwala’s algorithm for mutual exclusion in detail. What are drawbacks of this algorithm? [8]
- Q7)** a) Discuss any four distributed file system requirements? Explain in brief, different types of services provided by distributed file system. [8]
- b) What is Quality of Service Management? Explain two main subtasks of QOS Manager with the help of a flowchart. [8]

OR

- Q8)** a) Write a note on: [8]
- i) Andrew File System
 - ii) Sun Network File System
- b) What is Quality of Service Management? Explain typical infrastructure components for a simple multimedia conferencing application. [8]

- Q9)** a) What is a digital signature? What are its usage in the security of a distributed system? Give a method for generating and verifying a digital signature with public keys. [10]
- b) State and explain various security mechanisms for achieving security in distributed systems. [8]

OR

- Q10)**a) Describe Kerberos authentication system architecture with neat diagram. Explain why Kerberos is not complete security solution. [10]
- b) Explain the Secure Mobile code in brief with reference to JAVA sandbox. [8]



Total No. of Questions : 10]

SEAT No. :

P3188

[Total No. of Pages : 2

[5354]-705

B.E. (Information Technology)

ADVANCED DATABASES

(2012 Pattern) (Semester - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1. or Q.2, 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 with example concept of Distributed Query processing in Distributed database? [5]
b) Write short note on Parallel Database Architecture. [5]

OR

- Q2)** a) Explain concept of 2PC Two Phase commit protocol in distributed transactions. [5]
b) What is NoSQL? Explain different types of NoSQL Databases. [5]
- Q3)** a) Describe storage and access methods in ORDBMS? [5]
b) Explain concept of CQL Data Model and Indexing in Detail. [5]

OR

- Q4)** a) What is Big Data? Explain in detail applications of Big Data. [5]
b) Write short notes on Key Value based Dynamodb? [5]
- Q5)** a) What are Graph Database and Graph Mining? Why Graph Mining is Important? Explain different applications of Graph Mining. [8]
b) What is Social Network Analysis? Explain with example. [8]

OR

P.T.O.

- Q6)** a) What is a social Network? Explain concept of mining on social networks [8]
b) Write a short note on following [8]
i) Data Stream Mining
ii) Apache Flume NG

- Q7)** a) What is text mining? Explain Techniques of Text Mining in detail. [6]
b) Describe Discovery and Analysis of web usage patterns in detail. [6]
c) Explain Data Modeling for web usage mining in detail. [6]

OR

- Q8)** a) Explain mining web linkage structure in detail. [6]
b) Explain different methods of Text categorization in detail. [6]
c) Explain Information Retrieval and Information extraction in detail. [6]

- Q9)** a) Explain different challenges to develop cloud databases. [8]
b) Write a short note on Spatial Databases. [8]

OR

- Q10)**a) Compare Multimedia and Cloud databases. [8]
b) What is deductive database? Explain fixed point operator in deductive Database. [8]



Total No. of Questions : 10]

SEAT No. :

P3189

[Total No. of Pages : 2

[5354]-706

B.E. (Information Technology)

MOBILE COMPUTING

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q1. or Q.2, 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 Soft handoff and Hard handoff mechanism. [4]
b) Draw and explain Mobile computing architecture. [5]

OR

- Q2)** a) Explain mobility management in GSM Architecture. [4]
b) Explain 1G, 2G, 2.5G and 3G. [5]
- Q3)** a) Explain role of SM-SC with diagram. [5]
b) Explain HLR, VLR, AUC and EIR in GSM architecture. [5]

OR

- Q4)** a) Explain in detail VLR Overflow Control. [5]
b) Explain with diagram Mobile-Originated Messaging and Mobile Terminated Messaging. [5]
- Q5)** a) How GSM architecture is modified to support GPRS? Explain with diagram. [9]
b) Draw and explain WAP architecture. [8]

P.T.O.

OR

- Q6)** a) Which are the design guidelines for WAP? Explain the disadvantages of implementing TCP/IP directly over mobile network? [9]
b) Explain SGSN and GGSN in GPRS with diagram. Explain benefits of GPRS. [8]

- Q7)** a) Explain advantages and disadvantages of application to application messaging architecture. [9]
b) Draw and explain analysis, design and Testing 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 is a smart client? What are the requirements to deploy smart client applications? How to differentiate between smart client applications and thin client applications? [8]

- Q9)** a) What are the challenges in Usability Testing of mobile applications. [9]
b) Draw flowchart for application life cycle of android. [8]

OR

- Q10)**a) List and describe application components of android. [9]
b) Explain significance of Dalvik VM and Application framework in Android OS architecture. [8]



Total No. of Questions : 10]

SEAT No. :

P3190

[Total No. of Pages : 2

[5354]-707

B.E. (Information Technology)
ADVANCED GRAPHICS AND ANIMATION
(Elective - III) (2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Q1. 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) Which polygon tables are used for representing polygon surfaces? And how? **[5]**

b) State and explain properties of B-Spline curve. **[5]**

OR

Q2) a) Draw and explain Koch snowflake fractals with example. **[5]**

b) What do you mean by the interpolation and approximation splines? Give the procedure for spline specifications. **[5]**

Q3) a) Differentiate various solid modeling methods on following points.**[5]**

- i) Uniqueness
- ii) Compactness and efficiency
- iii) Accuracy
- iv) Domain

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

- i) Cone tracing
- ii) Pencil Tracing

OR

Q4) a) Explain Basic Ray Tracing Algorithm. **[5]**

b) Explain Gouraud Shading method. **[5]**

P.T.O.

- Q5)** a) Write a short note on “3D viewing. [8]
b) What is OpenGL extension? Explain how these extensions used in OpenGL with sample code. [8]

OR

- Q6)** a) What is texture mapping? Explain any one texture mapping technique with implementation in OpenGL. [8]
b) Does OpenGL support shadows implementation directly? Explain how it is implemented? [8]

- Q7)** a) Explain various animation functions in detail. [8]
b) Which are the different animation software’s? Explain any one animation software in detail. [8]

OR

- Q8)** a) Explain the steps for designing animation Sequences. [8]
b) Write short notes on: [8]
i) Key frame systems
ii) Morphing
iii) Simulating acceleration

- Q9)** a) What is meant by virtual reality system? Explain the applications of virtual reality system. [8]
b) Explain Visual Thinking and Icons with respect to Virtual Reality. [10]

OR

- Q10)**a) What is Virtual Reality Modeling Language? What are the types of Virtual Reality? [8]
b) Explain driving simulation application and different virtual reality devices used in it. [10]



Total No. of Questions : 10]

SEAT No. :

P3191

[Total No. of Pages : 2

[5354]-708

B.E. (Information Technology)

INFORMATION STORAGE AND RETRIEVAL

(Elective - III) (2012 Pattern) (End-Sem)

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) *Assume suitable data, if necessary.*

Q1) What is term weighting? Explain the TF-IDF scheme to calculate the weight of index term. Find the weight of following terms. **[10]**

Document	Text	Terms
D ₁	SNMP,SNMP,FTP	SNMP,FTP
D ₂	HTTP,FTP,HTTP,ARP, HTTP,SNMP,HTTP	SNMP,FTP,HTTP,ARP
D ₃	NIC,INTERNET,HTTP, PROTOCOL,HUB	NIC,HTTP,PROTOCOL, HUB,INTERNET

OR

Q2) a) Explain Single Link algorithm with example. **[6]**

b) Write a short note on probabilistic model. **[4]**

Q3) a) Explain inverted File structure with the help of diagram. State how it is useful in implementation of Information Retrieval System. **[5]**

b) Justify how vector model is used to retrieve partial matching documents. **[5]**

P.T.O.

OR

Q4) What is signature file? Describe false drop and search optimization using signature files. Justify with example [10]

- Q5)** a) What is the need of distributed IR? Draw and explain architecture of distributed IR system. [8]
b) What do you mean by collection partitioning & source selection in Distributed IR? [8]

OR

- Q6)** a) Explain with example some of the predicates used in multimedia query language. [8]
b) What is indexing? How to index multimedia objects? [8]

- Q7)** a) Compare any two search engines with respect to features they support. [6]
b) What is page ranking? Explain with example how to calculate a page rank of web page? Comment on significance of dampening factor.[12]

OR

- Q8)** a) Explain importance of web crawling in searching. Describe with example two commonly used crawling strategies by web crawler.[10]
b) What are the challenges while searching the web? [8]

- Q9)** a) How to collect and integrate specialized information on the web? [8]
b) How semantic web is useful in web searching? [8]

OR

- Q10)**a) Explain content based recommender system with example. [8]
b) What are the practical issues in collaborative filtering? [8]



Total No. of Questions : 10]

SEAT No. :

P3192

[Total No. of Pages : 2

[5354]-709

B.E. (Information Technology) (Semester - II)

IT ENABLED SERVICES

(Elective - III) (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, 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 IT strategy? Why it is necessary to have one for the organization? [6]
b) What is three-D framework for Business & IT alignment? [2]

OR

- Q2)** a) What are the subcomponents of IT strategy? Explain any one in brief. [6]
b) Describe reasons for formulation of IT strategy. [2]
- Q3)** a) What are the strategic questions used for IT planning? [6]
b) Draw and explain Technology management strategic framework based on the available technology, past successes and experiences. [6]

OR

- Q4)** a) Describe the SITP approach : e-Business Value Matrix. [6]
b) What are various stages of PMO and how you will measure the maturity of PMO? [6]
- Q5)** a) Describe ITIL in brief. [8]
b) What is Capacity Management? Explain. [8]

OR

P.T.O.

- Q6)** a) Describe Incident Management in brief. [8]
b) Describe 'Outsourcing' in brief. [8]

- Q7)** a) Explain types of array in PHP in detail with one example. [8]
b) Describe in brief WSDL document structure and its use. [8]

OR

- Q8)** a) Describe following terms in brief: [8]
i) UDDI
ii) SOAP
b) Write a PHP program to display students information (Roll No., Name, Date of Birth). Create HTML form to read information. [8]

- Q9)** a) Write a case study on Internet banking. [9]
b) Explain Barriers to trade in ITES and explain role of WTO & UNCTAD in ITES. [9]

OR

- Q10)**a) Discuss current employment in IT/ITES industry. [9]
b) Write short note on ERP. [9]



Total No. of Questions : 10]

SEAT No. :

P3193

[Total No. of Pages : 2

[5354]-710

B.E. (Information Technology) (Semester - II)

ADVANCED COMPUTER NETWORKS

(Elective - III) (2012 Pattern)

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) How to control traffic in ATM networks? [6]
b) State the functions of ISDN? [4]

OR

- Q2)** a) State importance of latency in the network? [6]
b) What is Round Trip Time with its example? [4]

- Q3)** a) How inter-domain and intra-domain integrated routing is performed? [6]
b) What is auto-configuration in IPv6. [4]

OR

- Q4)** a) How fragmentation is carried out in ATM networks. [6]
b) State different multicast routing techniques. [4]

- Q5)** a) Explain Traffic Engineering with MPLS? [10]
b) Explain CIDR w.r.t. address blocks and bit masks. [8]

OR

- Q6)** a) Explain in detail Multi-Protocol Label Switching (MPLS)? [10]
b) Describe Virtual Private Networks w.r.t. L2 and L3. [8]

P.T.O.

- Q7)** a) What are the characteristics and operations Mobile IP. [10]
b) Compare IPv4 and IPv6. [6]

OR

- Q8)** a) Explain the process of routing? [8]
b) Explain suitability of IPv6 for existing infrastructure? [8]

- Q9)** a) State characteristics of Mobile ad hoc Networks. [6]
b) Explain DSR Protocol for ad hoc Wireless Networks. [10]

OR

- Q10)** a) What are different issues of Wireless ad hoc Networks? [6]
b) Describe DSDV protocol for ad hoc Wireless Networks. [10]



Total No. of Questions : 10]

SEAT No. :

P3194

[Total No. of Pages : 2

[5354]-710-A

B.E. (Information Technology) (Semester - II)

BIOINFORMATICS

(Elective - IV) (2012 Pattern)

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 whenever necessary.*
- 3) *Full marks for right and well labeled diagram.*
- 4) *Assume Suitable data when necessary.*

- Q1)** a) Define bioinformatics? Discuss challenges of bioinformatics [5]
b) Enlist biological database? Give an example of database. [5]

OR

- Q2)** a) Write a structure visualization tools available on web. [5]
b) Explain the difference between PAM & BLOSUM matrix. [5]

- Q3)** a) What is Data mining? Explain data mining applications in genomic sequences. [5]
b) What is the role of microarray in bioinformatics? [5]

OR

- Q4)** Explain methods of computational sequence alignment:
a) Dynamic programming. [5]
b) Dot matrix methods. [5]

- Q5)** a) Write about the impact of drug discovery process in business management. [8]
b) What are the components of modeling and simulation system? [8]

OR

P.T.O.

- Q6)** a) Discuss the comparative modeling. [8]
b) What is pattern matching? Discuss different methods of pattern matching. [8]
- Q7)** a) Enlist different bioinformatics tools. Explain any one in brief. [8]
b) Explain FASTA algorithm in detail with neat diagrams. [8]

OR

- Q8)** a) Discuss BLAST Algorithm. [8]
b) Explain the difference in the approach of BLAST and FASTA? [8]
- Q9)** a) What is modern biotechnology? What is biotechnology in agriculture? [6]
b) What is Genetic Marker? What is GMO (Genetically modified organism)? [6]
c) Write about dangers of Genetic Engineering. [6]

OR

- Q10)** a) Define Biotechnology. What is the significance of environmental Biotechnology? [8]
b) Explain various applications of genetic engineering. [10]



Total No. of Questions : 10]

SEAT No. :

P3195

[Total No. of Pages : 2

[5354]-710-C

B.E. (Information Technology) (Semester - II)
GREEN IT - PRINCIPLES AND PRACTICES
(Elective - IV) (2012 Pattern)

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 the objectives of Green IT? Explain the Green IT framework proposed by Organization for Economic Co-operation and Development. [7]
- b) Explain life cycle of electronic device with a diagram? Also list the stages in the life cycle in decreasing order based on their environmental impact from your perspective. [7]

OR

- Q2)** a) For enterprises, do green initiatives and green IT presents a burden or an opportunity to leverage their benefits? [7]
- b) What are the methods for achieving data efficiency? How data efficiency helps to reduce energy requirements? [7]
- Q3)** a) What are the environmental, economic and social concerns related to software development? Are these concerns interrelated and integrated? [7]
- b) Explain the evolution of IT infrastructure towards cloud-based systems. [7]

OR

- Q4)** a) Explain the IT infrastructure in view of server technology, networking and storage facilities within a data center. [7]
- b) What are the quality attributes of software? [7]

P.T.O.

- Q5)** a) Explain economy, people, process and technology dimensions in a green IT strategy implementation. [7]
b) Explain the relation and its impact between stakeholders and information across various levels in a multi-level sustainable system for sustainable software performance. [7]

OR

- Q6)** a) What is Life cycle Assessment (LCA)? Explain the four stages of LCA. [7]
b) What are the steps in developing a green IT strategy? Explain with suitable diagram. [7]
- Q7)** a) List and explain the seven sustainability dimensions of information technology. [7]
b) What are the pros and cons of green practices within an organization? [7]

OR

- Q8)** a) What are the major elements of the value chain, and how does 'closing the loop' relate to the value chain? [7]
b) How green IT and sustainable IT services help an IT enterprise to nurture business, customer and societal values to achieve? [7]
- Q9)** a) With the help of suitable diagram explain the phases in the process of formulation and implementation of green IT strategies in an enterprise? [7]
b) Explain RoHS, REACH and WEEE. What is the difference between them? [7]

OR

- Q10)** a) How risk management is executed for successful implementation of green IT initiatives? [7]
b) How greening an enterprise boosts return on investments [7]



Total No. of Questions : 10]

SEAT No. :

P3196

[Total No. of Pages : 2

[5354]-710-D

B.E. (Semester - II)

INFORMATION TECHNOLOGY

Internet of Things (Elective - IV)

(2012 Pattern)

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 is Internet of Things? List applications of IoT. Explain in detail one application of IoT. [6]
b) Explain in detail History & overview of IoT. [4]

OR

- Q2)** a) Explain in detail IoT Architecture with neat diagram. [6]
b) What is need of IoT? Explain how IoT plays important role in modern technology. [4]
- Q3)** a) What is RFID? Explain RFID with neat diagram. [6]
b) What is Scalability & Interoperability in IoT? Explain in detail. [4]

OR

- Q4)** a) What is WSN? How WSN is used in IoT? [6]
b) What are the challenges and issues in RFID system? [4]
- Q5)** a) What is clustering? Explain in detail clustering in Internet of Things. [9]
b) Explain in detail different design parameter of IoT. Explain in detail 3 design parameter in detail. [9]

P.T.O.

OR

- Q6)** a) What is software agent? Explain in detail software agents for object representation in IoT. [9]
b) Why identity management needed in Internet of Things? Explain any 2 Identity management techniques of Internet of Things. [9]
- Q7)** a) Explain in detail threat analysis, use cases & misuse cases in IoT. [10]
b) Explain in detail non repudiation & availability of Internet of Things. [8]

OR

- Q8)** a) What is need of security in IoT? Explain in detail various security issues in IoT with examples. [10]
b) Explain in detail IoT security tomography & layered attacker model. [8]
- Q9)** a) What is business model in IoT? Explain role of business model in IoT. [6]
b) Explain business innovation in Internet of Things & value creation in IoT. [8]

OR

- Q10)** a) Write applications of Internet of Things for smart metering & advanced metering infrastructure. [6]
b) How IoT is used in e-Health body area network & automotive applications? Explain in detail. [8]



Total No. of Questions : 10]

SEAT No. :

P3199

[Total No. of Pages : 4

[5354] - 713

B.E. (Chemical) (Semester - I)
CHEMICAL ENGINEERING DESIGN - II
(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) *You are advised to attempt not more than five questions.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

Q1) a) Explain in brief process description of a plate type continuous distillation column for a binary mixture. **[7]**

b) Draw Sieve-plate performance diagram. **[3]**

OR

Q2) Find the column diameter of a tray column for the following specifications: **[10]**

Feed is 10% w/w Acetone in aqueous waste stream at 20°C of flow rate 13000 kg/h (which is maximum)

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), $X_w = 0.01$

Reflux ratio $R = 1.35$, Plate efficiency = 60%,

Plate pressure drop = 100 mm water, Top pressure = 1 atm.

P.T.O.

Vapour density at bottom = 0.72 kg/m^3 ,

Liquid density at bottom = 952 kg/m^3

Surface tension at bottom = $58 \times 10^{-3} \text{ N/m}$; Molecular Wt = 18.4

Surface tension at top = $22.5 \times 10^{-3} \text{ N/m}$; Molecular Wt = 56.1

Take plate spacing = 0.5 m

Vapour density at top = 2.07 kg/m^3

Liquid density at top = 752 kg/m^3

Assume column efficiency = 60%

Take minimum feed rate as 70% of maximum flow rate.

top $k_1 = 9.0 \times 10^{-2}$,

base $k_1 = 7.5 \times 10^{-2}$

Design for 85% flooding at maximum flow rate.

- Q3) a)** Find the column diameter of a packed absorption column operating at 20°C and at atmospheric pressure, if $m \frac{G_m}{L_m} = 0.8$, Gas flow rate is 1.39 kg/s ,
- Liquid flow rate is 29.5 kg/s ,
- Molecular Weight of Gas = 64 (SO_2 gas)
- Molecular Weight of air = 29
- Slope of Equilibrium line = 27.4
- For 38 mm ceramic Intalox Saddles, $F_p = 170 \text{ m}^{-1}$
- Liquid density = 1000 kg/m^3

Liquid viscosity = 10^{-3} Ns/m²

$\Delta P = 20$ mm H₂O per metre packing

$k_4 = 0.35$

At flooding $k_4 = 0.8$

take gas density at 20°C = 1.21 kg/m³. [6]

- b) Explain in brief function of a Full redistributor in a packed absorption column. [4]

OR

Q4) a) Describe in brief various types of supports required for piping. [8]

b) Define Schedule number of a pipe. [2]

Q5) a) State materials and properties of materials used for valves and pipe fittings. [8]

b) State parameters to be considered in design of pipeline for transportation of natural gas. [4]

c) Explain prevention of Hydrate formation in the natural gas pipeline. [4]

OR

Q6) Explain in brief with relevant equations design of pipeline for transportation of crude oil. [16]

Q7) a) Explain properties of steam and steam tables. [8]

b) Distinguish between Water-Tube and Fire-Tube boilers. State under what circumstances each type would be used. [10]

OR

Q8) a) What is the use of compressed air in industries? What is process air and instrument air? [8]

b) Explain in brief treatment of water which is used as a feed in a boiler. [10]

Q9) a) Explain in brief preventive maintenance. [6]

b) Explain in brief maintenance of a Centrifugal pump. [6]

c) Write a short note on Necessity of Process Safety. [4]

OR

Q10) a) Explain in brief about maintenance of a Gate valve and a Globe valve. [8]

b) Explain in brief why lubrication is a necessary part of plant maintenance? Give names of commonly used lubricants in industries. [8]



Total No. of Questions : 10]

SEAT No. :

P3200

[Total No. of Pages : 2

[5354] - 714

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(2012 Pattern) (End Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answers any five questions.*
- 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) What is role of standards for air in pollution control studies. **[10]**

OR

Q2) Explain the harmful effects of Mercury on human health. **[10]**

Q3) How absorption is used for removal of SO_x? **[10]**

OR

Q4) Explain the Operating principles of Venturi scrubber with neat figure. **[10]**

Q5) Explain the effects of oil pollution with example. **[16]**

OR

Q6) Draw a diagram of trickling filter. Label its parts. And explain its mechanism. **[16]**

P.T.O.

Q7) Explain the process design and basic operating principles of activated sludge (suspended growth) process. Derive relation of it. **[18]**

OR

Q8) Explain the process design and basic operating principles of trickling filter (attached growth) process. **[18]**

Q9) Discuss Membrane Separation process De nitrification in detail. **[16]**

OR

Q10) Discuss Ion Exchange process for water treatment. **[16]**



Total No. of Questions : 10]

SEAT No. :

P3201

[Total No. of Pages : 3

[5354] - 715

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

MEMBRANE TECHNOLOGY

(2012 Pattern) (Elective - I)

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) *Assume suitable data, if necessary.*

Q1) a) Explain with suitable sketch the basic principle of membrane separation process. **[5]**

b) What are composite membranes? How are they prepared? **[5]**

OR

Q2) Explain the following methods of preparation of membrane : **[10]**

a) Track etching.

b) Template leaching.

Q3) Explain construction and working of the following membrane modules used in membrane separation processes : **[10]**

a) Spiral-wound module.

b) Plate and frame module.

OR

P.T.O.

Q4) Explain following phase inversion techniques used for preparation of membranes. [10]

- a) Thermal precipitation.
- b) Immersion precipitation.

Q5) a) Explain Gel layer model used for concentration polarization of membrane. [8]

b) Explain concentration polymerization in Liquid separation process. [10]

OR

Q6) a) What is membrane fouling? State the source of fouling and methods to reduce fouling. [8]

b) Distinguish between osmosis and reverse osmosis. Explain use of RO process for desalination of water. Derive the expression for salt rejection factor in the form, [10]

$$R = \left[1 - \frac{\rho_i \cdot B}{A(\Delta P - \Delta \Pi)} \right] \times 100\%$$

Q7) Explain application of ultra filtration in following : [16]

- a) Food industry.
- b) Separation of oil water emulsion.

OR

Q8) Explain application of reverse osmosis in following : [16]

- a) Waste water treatment.
- b) Organic solvent separation.

Q9) Explain application of pervaporation in following :

[16]

- a) Solvent dehydration
- b) Organic/organic separation.

OR

Q10) Write short notes on:

[16]

- a) Membrane distillation.
- b) Electrodialysis.



Total No. of Questions : 10]

SEAT No. :

P3202

[Total No. of Pages : 2

[5354] - 716

B.E. (Chemical)

CORROSION ENGINEERING

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 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 10 kg iron completely rusted. **[5]**

OR

Q2) a) What are different types of corrosion that we commonly come across? **[5]**

b) Explain differential aeration 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) Galvanic corrosion.
b) Concentration cell corrosion.

OR

- Q8)** Write note on : [16]
a) Pitting corrosion.
b) Passivity.

- 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]



Total No. of Questions : 10]

SEAT No. :

P3203

[Total No. of Pages : 2

[5354] - 717

B.E. (Chemical Engineering) (Semester - VII)

PETROLEUM REFINING

(2012 Pattern) (Elective - I)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 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 the structure and properties of Paraffins, Napthenes and Aromatics present in the crude. [6]
- b) What is gasoline? Explain with reference to its composition and boiling point range. [4]

OR

- Q2)** a) Explain the process of desalting crude oil with the help of neat diagram. [6]
- b) How geochemical techniques for the exploration of crude oil? [4]

- Q3)** a) Explain the diethyl amine absorption and regeneration unit for H₂S removal. [6]
- b) Explain schematic diagram of an oil rig for exploration. [4]

OR

- Q4)** a) Why pre-treatment of Naphtha necessary? Explain with reactions involved. [4]
- b) Explain atmospheric distillation unit. List different products obtained in Atmospheric distillation of crude oil. [6]

P.T.O.

- Q5)** a) Explain the role of different catalysts used in unit processes associated with refining of crude oil. [10]
- b) Explain Naphtha reforming with the help of suitable flow diagram. [7]

OR

- Q6)** a) Describe delayed coking process with the help of diagram and reactions involved. [10]
- b) Explain fluidized bed catalytic cracking with the help of reactions. [7]

- Q7)** a) Describe major processes in lube oil refining. [10]
- b) Write propane de-asphalting process in detail. [7]

OR

- Q8)** a) What are the feed stocks for lubricating oils? Explain the desirable properties of these feed stocks. [10]
- b) Explain de-waxing in lubricating oils manufacture. [7]

- Q9)** a) Explain hydrogen production using steam reforming process. [8]
- b) Explain in brief various supporting processes used in refinery. [8]

OR

- Q10)** a) Explain in detail, floating roofed tank arrangement, for the storage of crude oil. [8]
- b) Explain elevated flair system to dispose vapours in refinery. [8]



Total No. of Questions : 10]

SEAT No. :

P3204

[Total No. of Pages : 2

[5354] - 718

B.E. (Chemical)

CHEMICAL PROCESS SYNTHESIS

(2012 Pattern) (End Sem.) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *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 two approaches of chemical process design. **[5]**

b) Explain in short overall process design. **[5]**

OR

Q2) Explain briefly different parameters in choice of reactor. **[10]**

Q3) a) Discuss principle, working and construction of hydrocyclone separator. **[5]**

b) Discuss various types dryers. **[5]**

OR

Q4) Explain various parameters which governs reactor performance. **[10]**

Q5) a) Discuss heuristic used for the sequence selection for simple distillation columns. **[8]**

b) Discuss heat integration of sequences of simple distillation column. **[8]**

OR

P.T.O.

Q6) Explain with sketches the concept of heat integration of sequences of simple distillation column. [16]

Q7) a) Discuss integration of refrigeration cycles. [8]

b) What is simple furnace model? [8]

OR

Q8) a) Explain composite curves with suitable example related to heat recovery. [8]

b) Discuss integration of heat pump. [8]

Q9) a) Explain in brief overall safety and health considerations. [9]

b) Discuss major hazards in Process Plants. [9]

OR

Q10) Write note on : [18]

a) LD_{50} .

b) Safety devices.



Total No. of Questions : 10]

SEAT No. :

P3205

[Total No. of Pages : 2

[5354] - 719

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

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

(2012 Pattern) (Elective - 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 indicate full marks.*
- 4) *Assume suitable data, if necessary.*

Q1) Write short notes on : **[10]**

- a) Manager.
- b) Attributes and Characteristics of a successful Entrepreneur.

OR

Q2) Write distinguishing points between : **[10]**

- a) Entrepreneur Vs. Entrepreneurship.
- b) Entrepreneur and Manager.

Q3) What is feasibility? Explain management Feasibility in detail. **[10]**

OR

Q4) Explain the role of National Institute of Entrepreneurship and Small Business Development (NIESBUD) and Small Industries Service Institute (SISI) in entrepreneurship development. **[10]**

Q5) Write an explanatory note on: **[16]**

- a) Team Role Theory.
- b) Limitation of Stages of Team development.

P.T.O.

OR

- Q6)** a) Explain Business communication and communication process. [8]
b) Explain the Hierarchy of needs given by Abraham Maslow. [8]

- Q7)** 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]

OR

Q8) Discuss in Detail on computer based Project Management. [16]

- Q9)** a) Explain in detail about Marketing and Marketing Management. [10]
b) Explain in detail the role of information in marketing decisions, support your answer with specific example. [8]

OR

- Q10)** Explain the following: [18]
a) Channel of Distribution.
b) Promotion and pricing.
c) Product and brand management.



Total No. of Questions : 10]

SEAT No. :

P3206

[Total No. of Pages : 2

[5354] - 720

B.E. (Chemical)

PIPING DESIGN AND ENGINEERING

(2012 Pattern) (End Sem.) (Elective - II)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) a) Water flows through a 16cm pipeline (0.275 mm in wall thickness) at 3500 m³/min. Using the Hazen-Williams equation with a C factor of 120, calculate the pressure loss due to friction in 1000m of pipe length. **[4]**

- b) Write note on : **[6]**
- i) Lockhart Martinelli method and
 - ii) Bakers Method for two phase pressure drop calculation.

OR

Q2) a) Discuss in brief principal of piping network analysis. **[5]**

- b) Water flows through a 16cm pipeline (0.375 cm wall thickness) at 3000 m³/min. Assuming a pipe roughness of 0.002 cm, calculate the friction factor and head loss due to friction in 1000 m of pipe length. **[5]**

Q3) Explain Gasket Selection Criterion, Properties of Gasket, and different types of gaskets used in Industry with suitable example. **[10]**

OR

Q4) What are the steps followed during sizing of control valve? **[10]**

P.T.O.

- Q5) a)** A process liquid is pumped from a storage tank to a distillation column, using a centrifugal pump. The pipeline is 80 mm internal diameter commercial steel pipe, 100 m long. Miscellaneous losses are equivalent to 600 pipe diameters. The storage tank operates at atmospheric pressure and the column at 1.7 bar. The lowest liquid level in the tank will be 1.5m above the pump inlet, and the feet point to column is 3 m above the pump inlet. Properties of fluid : density 900 kg/m³, viscosity : 1.36 mNm⁻²s. [8]
- b) Write note on pump characteristic and explain its significance. [8]

OR

- Q6) a)** Briefly design steps followed for calculation of thickness of pipe based on internal and external pressure. [8]
- b) Explain the pressure loss in slurry pipeline with heterogeneous pipe flow. [8]

- Q7) a)** What are service conditions considered for selection of insulating material? [8]
- b) Write note on the retrofit layer thickness calculation for cylinder. [8]

OR

- Q8) Write a short note on:** [16]
- a) Hot & Cold insulation in piping.
- b) Critical thickness of insulation.

- Q9) a)** What are factors considered when the designer is locating equipment in the plot plan? [8]
- b) Distinguish between the PDF, P & ID and block diagram. [10]

OR

- Q10) Write short note on:** [18]
- a) Piping Isometrics.
- b) Equipment layout.
- c) Pipe Rack.



Total No. of Questions : 10]

SEAT No. :

P3207

[Total No. of Pages : 2

[5354] - 721

B.E. (Chemical)

ADVANCE SEPARATION PROCESSES

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume suitable data, if necessary.*

Q1) Explain multicomponent distillation details with low key & high key components. **[10]**

OR

Q2) Explain Thiele-Geddes method in detail. **[10]**

Q3) Give the working principles and design aspects of extractive distillation process. **[10]**

OR

Q4) Explain working principles and design aspects of reactive distillation process in detail. **[10]**

Q5) Write short notes on : **[16]**

- a) Liquid emulsion membranes.
- b) Micro filtration and ultrafiltration.

OR

P.T.O.

Q6) Write short notes on : **[16]**

- a) Electro-dialysis.
- b) Reverse osmosis.

Q7) a) Explain the mechanism of separation in the Chromatography operation. **[8]**

- b) Explain the mechanism of adsorption process in detail with application. **[8]**

OR

Q8) a) Explain the industrial applications of Chromatography processes. **[8]**

- b) Give the basic concept of Chromatography process along with characteristics of solids and their selection for various applications. **[8]**

Q9) Write short notes on : **[18]**

- a) Zone electrophoresis.
- b) Zone refining.

OR

Q10) Write short notes on : **[18]**

- a) Design and development of flotation equipment.
- b) Ultra centrifugation.



Total No. of Questions : 10]

SEAT No. :

P3208

[Total No. of Pages : 2

[5354] - 722

B.E. (Chemical)

PROCESS MODELING & SIMULATION

(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer all 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 the equations and notations for Dalton's law, Raoult's law and relative volatility of an ideal vapour-liquid equilibrium system. **[10]**

OR

Q2) Explain Flow of Film on the outside of circular tube. **[10]**

Q3) Derive a model for cooling tower. **[10]**

OR

Q4) Derive a model for agitated vessel. **[10]**

Q5) Explain the steady state model and thermal equilibrium model for LPG vaporizer with a neat diagram. **[16]**

OR

Q6) Derive the equations describing the Batch distillation column with constant hold up. **[16]**

P.T.O.

Q7) Derive the model equations for Bubble column reactor. **[18]**

OR

Q8) Develop a mathematical model for Fluidized bed reactor. **[18]**

Q9) What are the types of simulations? Explain the difference in it. **[16]**

OR

Q10) Explain ASPEN in detail. **[16]**



Total No. of Questions : 10]

SEAT No. :

P3209

[Total No. of Pages : 2

[5354]-723
B.E. (Chemical)
PROCESS ENGINEERING COSTING & PLANT DESIGN
(2012 Pattern)

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) Illustrate the concepts of material balance with reaction using suitable neat flow diagrams .Take your own basics. **[10]**

OR

Q2) Explain the types of Taxes & Insurances in detail. **[10]**

Q3) Draw & Explain the tree diagrams showing cash flow for industrial operation. **[10]**

OR

Q4) A company has three alternative investment, which is being considered. If company incharge expects 15 % rate of return original investment which one is better? **[10]**

Item	Investment (I)	Investment (II)	Investment (III)
Initial Fixed Capital (Rs.)	1,00,000	1,70,000	2,10,000
Working Capital Investment (Rs.)	10,000	10,000	15,000
Annual Cash- flow(Rs.)	30,000	52,000	59,000
Annual Expenditure(Rs.)	15,000	28,000	21,000

P.T.O.

Q5) Explain step wise pinch technology in details with cold and hot composite curves and network diagram. [14]

OR

Q6) Prepare the techno-economic feasibility report for ABC chemical company. [14]

Q7) What do mean by Project Engineering? Explain the work that is necessary to carry out as a project engineer. [18]

OR

Q8) The following equation shows effects of x & y on total cost of particular operation : [18]

$$C_T = 2.33x + \frac{11900}{xy} + 1.86y + 10$$

Determine x & y values.

Q9) Draw and explain minimum departments necessary in site layout for ABC chemical company. Also show the unit plot plan for the plant area in detail. Scale for the diagram is not necessary. [18]

OR

Q10) What is CPM & PERT? Illustrate the same with any suitable example. [18]



Total No. of Questions : 10]

SEAT No. :

P3210

[Total No. of Pages : 2

[5354]-724
B.E. (Chemical)
ENERGY CONSERVATION IN CHEMICAL PROCESS
INDUSTRIES
(2012 Pattern)

Time : 2 ½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer any five 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 power generation by wind and Geothermal energy. **[10]**

OR

Q2) State Energy Management & State its objectives. **[10]**

Q3) Explain in detail Applications of renewable energy sources. **[10]**

OR

Q4) Define energy audit as per the energy conservation Act 2001. Explain detailed energy audit methodology. **[10]**

Q5) Discuss the importance of nuclear option for power generation in India? **[16]**

OR

Q6) What is co-generation? Explain the importance co-generation in sugar industries. **[16]**

Q7) a) Write in details elements of energy management program. **[8]**

b) Enlist activities for promoting energy conservation in present status. **[8]**

P.T.O.

OR

- Q8)** a) Enlist the checklist for energy conservation in motors and transformers. **[8]**
b) How and where the energy losses can be minimized in coolers. **[8]**

- Q9)** a) Draw the sketch of Evaporators and explain its principle and working. **[9]**
b) Explain Waste- Minimization and Resource Conservation. **[9]**

OR

- Q10)** Explain waste minimization and its classification, housekeeping, process change, recycling, product modification, waste minimization methodology steps, benefits of waste minimization in Cement industry. **[18]**



Total No. of Questions : 10]

SEAT No. :

P3211

[Total No. of Pages : 2

[5354]-725

B.E. (Chemical Engineering)
CHEMICAL PROCESS SAFETY
(2012 Pattern) (Semester - II) (Elective - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q5 or Q.6, Q.7 or Q.8, Q.9 or Q. 10.*
- 2) *Neat diagrams must be drawn wherever necessary.*

- Q1)** a) Explain safety program with a neat diagram. [6]
b) Define Threshold Limit Values. [4]

OR

- Q2)** a) Estimate in detail worker exposures to toxic vapors. [6]
b) Explain evaluation phase in Industrial hygiene. [4]

- Q3)** a) Discuss in short various legislations on safety control in chemical process plants. [7]
b) Explain in short Dose versus Response curves. [3]

OR

- Q4)** Explain in detail about Unconfined Vapor Cloud Explosion (UVCE). [10]

- Q5)** 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]

OR

- Q6)** a) Explain pressure versus time curves for Runaway reactions. [8]
b) Describe the ventilation and sprinkler systems to prevent fires and explosions. [8]

P.T.O.

- Q7)** 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]

OR

- Q8)** a) Describe hazards Identification and state process hazards checklists. [10]
b) Describe Review of probability theory for Risk Assessment. [8]

- Q9)** a) Explain in detail Emergency Shutdown System. [8]
b) Discuss types of safety reviews and concept of risk assessment. [8]

OR

Q10) 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



Total No. of Questions : 10]

SEAT No. :

P3212

[Total No. of Pages : 2

[5354]-726
B.E. (Chemical Engineering)
FOOD TECHNOLOGY (End Semester)
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q5 or Q.6, Q.7 or Q.8.and Q.9 or Q. 10.*
- 2) *Assume suitable data wherever necessary.*
- 3) *Draw neat figures wherever necessary.*
- 4) *Use of Scientific Calculators is allowed.*
- 5) *Figures to the right indicate full marks.*

- Q1)** a) Explain the theory of irradiation alongwith its equipment used.Also explain how it is useful in food preservation.Explain with suitable examples. **[5]**
b) Explain the theory of evaporation alongwith its equipment used in food processing. Also explain how it affects on food. **[5]**

OR

- Q2)** a) Explain the scope and importance of food processing in India **[5]**
b) Explain the theory of freezing alongwith its equipment used in food processing. Also explain how it affects on food. **[5]**

- Q3)** a) Explain the construction and working of fluid bed drier. Explain with neat diagram and suitable examples. **[5]**
b) What do you mean by pasteurization? Explain the process of pasteurization with neat diagram and suitable example. **[5]**

OR

- Q4)** a) Explain the theory of cream separation and its equipment used. **[5]**
b) Explain theory and process of butter making. **[5]**

- Q5)** a) Explain the flowchart of fruit processing with suitable example. **[8]**
b) Enlist and explain various fruit and vegetable storage techniques.Explain any two of them in detail. **[8]**

OR

P.T.O.

- Q6)** a) Write short note on fruit and vegetable preservatives. [4]
b) Explain the process of fruits and vegetable preservation by using chemicals. [6]
c) Enlist various chemical, physical and biological properties of fruit and vegetable. [6]

- Q7)** a) What do you mean by active packaging ? Enlist and explain various factors included into it. [8]
b) Write short note on bar code and other markings printed on food packets [4]
c) What is combined packaging system? Explain. [4]

OR

- Q8)** a) Write short note on following packaging materials [8]
i) Textiles and wood
ii) Metal
iii) Aluminium packaging
b) What are functions of packaging materials and what are various factors important from marketing point of view of food products that can be achieved through proper packaging [8]

- Q9)** a) Differentiate between shipping containers and retail containers. [9]
b) Explain Hurdle technology in detail [9]

OR

- Q10)a)** Write short note on [18]
i) Codex Alimentarius
ii) HACCP
iii) US food and drug administration



Total No. of Questions : 10]

SEAT No. :

P3213

[Total No. of Pages : 2

[5354]-727
B.E. (Chemical)
ADVANCED MATERIAL (Elective - III)
(2012 Pattern)

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) *Assume suitable data, if necessary.*

Q1) Explain in detail the all stempered ductile iron. **[10]**

OR

Q2) Explain advanced powder synthesis technique. **[10]**

Q3) Explain the kevlar and Nomex in detail. **[10]**

OR

Q4) Explain advanced ceramic materials in detail. **[10]**

Q5) Explain the factor influencing the properties of composite material. **[16]**

OR

Q6) a) Explain the industrial application of composite material. **[8]**

b) Explain fiber winding technique in detail. **[8]**

Q7) Give the type of rainforcement and explain in detail each type. **[16]**

P.T.O.

OR

- Q8)** a) Explain the mechanical behaviour and properties of metal composite. **[8]**
b) Explain the ceramic composite in detail. **[8]**

Q.9) Explain the properties and fabrication method of the carbon composite. **[18]**

OR

- Q10)**a) Explain the application of carbon composite. **[9]**
b) Explain the nanomaterial in detail. **[9]**



Total No. of Questions : 10]

SEAT No. :

P4283

[Total No. of Pages : 2

[5354]-728

B.E. (Chemical)

CATALYSIS

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

Time : 2½ Hours]

[Max. Marks : 70

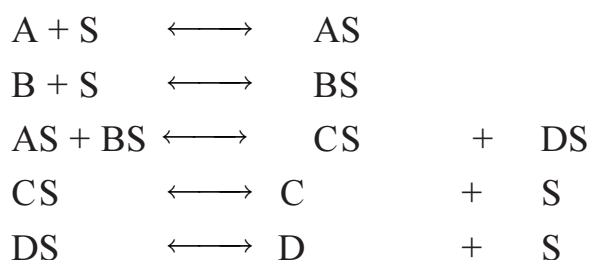
Instructions to the candidates:

- 1) Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q. 7or 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) Explain the application of catalyst in petrochemical and petroleum refining industry. [10]

OR

Q2) Derive the rate law for following reactions (surface Reaction is Rate Controlling) [10]



Q3) The following data were obtained at 87 deg Celsius for the equilibrium adsorption of n-hexane on silica gel particles [10]

Partial Pressure of hexane in gas, atm	Hexane adsorbed g mol/(g gel)
0.0020	10.5×10^{-5}
0.0040	16×10^{-5}
0.0080	27.2×10^{-5}
0.0113	34.6×10^{-5}
0.0156	43×10^{-5}
0.0206	47.3×10^{-5}

Establish the values of C_m and K_c .

P.T.O.

OR

Q4) Explain: [10]

- a) Phase Transfer Catalyst
- b) Tri phase catalysis

Q5) a) Explain prove volume distribution. [8]

b) Explain preparation of catalyst. [8]

OR

Q6) An 50.67 gm sample of Glaucosil is studied with N₂ adsorption at -195.8 °C. The following data were obtained [16]

Pressure, mm Hg	8	30	50	102	130	148	233	258	332
Volume adsorbed, cm ³ (at 0 °C and 1 atm)	103	116	130	148	159	163	188	198	221

The vapour pressure of N₂ at -195.8 °C is 1 atm. Estimate the surface area (square meters per gram) of the sample. Density of liquid N₂ at -195.8 °C is 0.808 gm/cm³

Q7) Explain: [16]

- a) Industrial application of Zeolites
- b) ZSM-5

OR

Q8) Explain: [16]

- a) Modification of Zeolite
- b) Industrial application of molecular sieves

Q9) a) Explain Enzyme inhibition. [9]

b) Explain any two industrial reactions where biocatalysts are used. [9]

OR

Q10)a) Derive the kinetics equation for Competitive inhibition. [9]

b) Estimate V_{max} and K_m for the following enzyme catalyzed reaction data: [9]

Initial Substrate Concn (mmol/l)	1	4	6	8	12	15	20
Initial Rate (mmol/l/min)	0.001875	0.002609	0.002727	0.002791	0.002857	0.002885	0.002913



Total No. of Questions : 10]

SEAT No. :

P5246

[Total No. of Pages : 2

[5354]-729

B.E. (Chemical Engineering) (Semester - VIII)

NANOTECHNOLOGY

(2012 Pattern) (Elective - IV)

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) Use of Calculator is allowed.
- 5) Assume Suitable data if necessary.

Q1) a) Write an essay on the Feynmanns hypothesis and the important milestones in the development of nanotechnology. [5]

b) Explain in detail electrical, magnetic, optical, thermal, and mechanical properties of nano-structured materials. [5]

OR

Q2) a) List out challenges faced by Nanotechnology? [5]

b) Explain different modes of classification of Nano-materials. [5]

Q3) a) Explain Chemical Vapor Deposition of Carbon Nano-tubes. [5]

b) Explain molecular beam epitaxy for synthesis of nano-particals? [5]

OR

Q4) a) Explain characterization technique based on Atomic Force Microscope. [5]

b) Explain the principle of working of X-ray diffraction method? [5]

Q5) a) Explain de Broglie's hypothesis with suitable expressions. [7]

b) What are semiconductors? Explain its various types. [10]

OR

Q6) a) Derive Schrodinger's equation for subatomic particles. [10]

b) Describe in detail Heisenberg uncertainty principle. [7]

P.T.O.

- Q7)** a) Enlist and Explain colloidal properties of nanoparticles. [10]
b) Explain Self assembly and catalysis of nanoparticles. [7]

OR

- Q8)** a) Explain in detail the uses of Nanotechnology in waste water treatment. [7]
b) What are the different forces acting on colloidal nanoparticles? Explain Van der Waals forces between colloidal particles. [10]

- Q9)** a) Describe the use of nano-materials in surface coating with suitable examples. [8]
b) Explain the use of nanotechnology in drug delivery. [8]

OR

- Q10)** a) What are the societal, health and environmental impacts of nanotechnology? [8]
b) Write briefly on commercial processes of nanotechnology and its applications in chemical engineering. [8]

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P3214

[Total No. of Pages : 2

[5354]-730
B.E. (Chemical)
FUEL CELL TECHNOLOGY
(2012 Pattern) (Elective - IV)

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.*
- 3) *Assume suitable data, if necessary.*

Q1) a) What are various types of fuel cells? **[5]**

b) Which of the fuel cells can be used for the military applications? **[5]**

OR

Q2) a) During electrolysis one coulomb of electricity deposits 5×10^{-7} kg of divalent metal at cathode. Calculate the atomic mass of metal if E.C.E. of metal = $5 \times 10^{-7} \text{kgC}^{-1}$ **[5]**

b) What is Emf of a cell? How it is calculated from emf of a half cell? **[5]**

Q3) Describe mechanism of electrode reaction occurring at the surface of electrodes. **[10]**

OR

Q4) How hydrogen can be produced by Thermochemical splitting of water? Describe the process in details by giving its advantages and disadvantages over other methods. **[10]**

Q5) a) What are the criteria for selecting cathodic materials of a proton exchange membrane fuel cell system? **[8]**

b) Describe various anodic catalyst materials used in the construction of a Proton Exchange Membrane Fuel Cell and their possible functions in its working **[8]**

P.T.O.

OR

Q6) Write short notes on ANY THREE: [16]

- a) Stability of a platinum cathode catalyst
- b) Persulphonic acid membrane materials
- c) Gas Diffusion Layer Materials
- d) Electrode Support Materials

Q7) a) What are the criteria for selecting anodic materials of a Solid Oxide fuel cell system? [8]

- b) Describe with the help of a diagram reduction reaction on the TPB of an cathode made of Ni-YSZ. [8]

OR

Q8) Write down the reactions involved in the estimates of adsorption, desorption and diffusion which help in estimating the extent of three phase regions. [16]

Q9) a) Write a detailed note on steam reforming needed in fuel processing. [9]

- b) Write a detailed note on partial oxidation needed in fuel processing. [9]

OR

Q10) Write short notes on any three: [18]

- a) Autothermal reforming
- b) Sulfer Reduction in reforming
- c) Carbon Deposition Avoidance
- d) Impurities Reduction in reforming



Total No. of Questions : 10]

SEAT No. :

P3215

[Total No. of Pages : 2

[5354]-730-A
B.E. (Chemical) (Semester - II)
PETROCHEMICAL ENGINEERING
(2012 Pattern) (Elective - IV)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer any five questions.*
- 2) *figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

Q1) Write down the importance of Petrochemicals and 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) Explain with neat diagram process for Benzene production and list out its derivatives. **[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. **[8]**

b) Write a note on furnaces used in petrochemical plants. **[8]**

OR

Q6) Enumerate the synthetic chemical intermediates and products from olefins and describe the production of ethylene by naphtha cracking process. **[16]**

P.T.O.

Q7) a) Define polymerization. Describe the steps and mechanisms of condensation Polymerization. [8]

b) Explain the various applications of polymers in chemical industries. [8]

OR

Q8) a) With neat sketches explain in detail about production of Nylons along with its engineering Problems. [8]

b) What are various polymeric products? Differentiate between different polymerization Processes. [8]

Q.9) Discuss about recent advances in petrochemical plants & refineries in India. [18]

OR

Q10) Write a note on following: [18]

a) Safety consideration in petrochemical plants

b) Integration of refinery and petrochemical plants.

