Total No. of Questions : 10]

SEAT No. :

P3065

[Total No. of Pages :3

[5461] - 101

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2012 Course) (End Sem.)(401001) (Semester - I)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.***
2) ***Figures to the right indicates full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume any missing data if necessary.***
5) ***Use of Scientific Calculator is allowed.***

Q1) a) List the characteristics of sewage? Explain the difference between Self Cleansing Velocity and Non-Scouring Velocity w.r.t sewers. **[3+2]**

b) What is BOD? Explain the limitations of BOD test on wastewater sample. **[2+3]**

OR

Q2) a) What is the effect of change in life style of people on quality of sewage generated? **[5]**

b) Explain the significance of Dissolved Oxygen test of wastewater sample. **[5]**

Q3) a) What is the purpose of providing Grit Chamber in wastewater treatment plant? Also explain the significance of velocity control devices. **[3+2]**

b) Distinguish between Primary and Secondary treatment of wastewater? **[5]**

OR

Q4) a) With a neat sketch explain Activated sludge process. Why recirculation of sludge is necessary in activated sludge process? **[3+2]**

P.T.O.

b) Enlist only the operational problems associated with trickling filters? The BOD removal efficiency of a trickling filter system is 79 percent, and the efficiency of the primary treatment that precedes it is 35 percent. If the raw BOD is 200 mg/L, what is the amount of BOD entering into the trickling filter? **[2+3]**

Q5) a) Explain with sketch the concept of sewage treatment using oxidation ponds? Also mention the design considerations. **[4+4]**

b) Explain with sketch the concept of aerated lagoons. Give the design considerations. **[4+4]**

OR

Q6) a) Elaborate the theory of phytoremediation technology and root zone cleaning system for wastewater treatment. **[4+4]**

b) It is proposed to provide an oxidation pond of 1m depth for treating sewage from a residential colony with 10000 persons. The per capita sewage contribution of the colony is 100 litres. The 5 day BOD of sewage is 200mg/L. Assume the organic loading in the pond as 300 kg/hectare/day. Find the following for oxidation pond. **[8]**

i) Surface area required (m^2)

ii) Capacity of the pond. (m^3)

iii) Detention time (days)

Q7) a) With a neat sketch, write the principle, advantages and disadvantages for an Up-flow Anaerobic Sludge Blanket (UASB) Reactor. **[3+3+2]**

b) What are the stages of anaerobic digestion of sludge? Also explain the factors governing anaerobic digestion. **[4+4]**

OR

Q8) a) Explain in detail concept of Bio-gas production, its characteristics and applications. **[3+3+2]**

b) The moisture content of sludge is reduced from 95% to 90% in a sludge digestion tank. Find the percentage decrease in the volume of sludge? Why dewatering of sludge is necessary? Enlist the methods of dewatering of sludge. **[3+3+2]**

Q9) a) Explain the difference between Industrial wastewater treatment and Municipal (domestic) wastewater treatment? Also explain the necessity of equalization tank and neutralization tank. **[5+4]**

b) Explain with sketch the treatment flow sheet of Sugar industry. Show the various sources of wastewater generation in the flow sheet. Also mention the wastewater characteristics. **[4+3+2]**

OR

Q10) a) Write the characteristics of spentwash related to distillery industry. What are the problems associated with discharge of spent wash without treatment. Explain the treatment process to be adopted. **[2+3+4]**

b) Write note on: **[3+3+3]**

i) Effect of dairy wastewater on environment.

ii) Wastewater sampling methods.

iii) Effluent discharge standards as per CPCB.

Total No. of Questions :10]

SEAT No. : ____

P3066

[Total No. of Pages : 3

[5461]-102
B.E. (Civil)
TRANSPORTATION ENGINEERING - II
(2012 Pattern) (Semester - I)

Time : 2½ Hours] ***[Max. Marks :*** *70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, Q.3 or Q4, Q.5 or Q6, Q.7 or Q8, Q.9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables, slide rule, Mollies charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) State the significance of Nagpur Road Plan in the Highway Development of India. **[5]**

b) Explain the manual method of carrying out Traffic volulme survey. **[5]**

OR

Q2) a) State the advantages and limitations of a traffic rotary. **[5]**

b) Calculate the extra widening required for a pavement of width 7m on a horizontal curve of radius 200m, if the longest wheel base of the vehicle expected on the road is 6m. Design speed is 180 Kmph. **[5]**

Q3) a) In a braking test, a vehicle travelling at a speed of 50 Kmph was stopped by applying brakes fully and the skid marks were 6m in length. Determine the average skid resistance of the pavement surface. **[6]**

b) Discuss the importance of highway drainage in roads. **[4]**

OR

Q4) a) Explain the construction process of a WBM pavement. **[6]**

b) List and explain the various bituminous materials used in road construction. **[4]**

P.T.O.

Q5) a) Enlist the various types of airport obstructions. Explain any two in details. **[6]**

b) Enlist the factors considered while selecting site for airports. **[4]**

c) Differentiate between : **[6]**

i) Runway and Taxiway

ii) Hangar and Apron

iii) Minimum Turning Radius and Minimum Circling Radius

OR

Q6) a) An airport is proposed at an elevation of 400m above mean sea level where the airport reference temperature is 35°C. The maximum elevation difference along the proposed profile of a runway is 6m. If the basic length of runway is 1000m, determine the actual length of runway to be provided after applying suitable corrections. **[6]**

b) Write a note on zoning requirements of airports. **[4]**

c) Explain with the help of a neat sketch the three controls of an aero plane. **[6]**

Q7) a) State the remedial measures to reduce the effect of scour. **[4]**

b) The normal velocity of flow in a river is 2 m/sec. The normal waterway under the bridge, the artificial waterway under the bridge and enlarged area upstream of the bridge are respectively 7000 m^2, 6000 m^2 and 9000 m^2. Calculate the height of afflux and increase in velocity due to afflux by applying Merriman's formula. Assume coefficient of discharge C= 0.99. **[6]**

c) Describe the various types of abutments stating the suitability of each. **[6]**

OR

Q8) a) Write a note on loads and stresses acting on bridges. **[4]**

b) Discuss the requirements of traffic in the design of highway bridges. **[6]**

c) Derive an expression for the economical span of the bridge stating the assumptions clearly. **[6]**

Q9) a) Explain with the help of neat sketches : **[6]**

i) Swing Bridges

ii) Cylinder Piers

b) Enlist the various types of fixed span bridges and explain any one in detail. **[6]**

c) Explain how pontoon bridges are different from the traditional bridges. **[6]**

OR

Q10)a) Differentiate between rocker and roller bearings used in bridges. **[6]**

b) Enlist the various techniques of erection of bridges and explain any one in detail. **[6]**

c) Discuss the various aspects of bridge maintanace. **[6]**

Total No. of Questions :10]

SEAT No. : ____

P3067

[Total No. of Pages : 3

[5461]-103
B.E. (Civil)
STRUCTURAL DESIGN AND DRAWING - III
(2012 Pattern) (Semester - I) (401003)

Time : 3 Hours] ***[Max. Marks :*** 70

Instructions to the candidates:

1) ***Answer Q.1 or Q2, Q.3 or Q4, Q.5 or Q6, Q.7 or Q8, Q.9 or Q10***
2) ***Figures in bold to the right indicate full marks.***
3) ***IS 456, IS 1343, IS 3370 and IS 1893 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) Explain the procedure to decide the profile of cable while designing a simply supported prestressed beam. **[4]**

b) A prestressed simply supported concrete beam is 120 mm wide and 300 mm deep with an effective span of 6 m. It supports an UDL of 4 kN/m, which includes the self-weight of the beam. The beam is prestressd by a straight cable carrying a force of 200 kN located at an eccentricity of 50 mm. Determine the location of the thrust line along the beam and plot its position at mid-span, quarter span and support section. **[6]**

OR

Q2) a) Explain the time dependent losses in prestressed concrete. **[4]**

b) The end block of a post tensioned beam is 600 mm wide and 600 mm deep. Four cables each made of 8 wires of 12 mm diameter strands carrying load of 1160 kN. The cables are anchored by plate anchorage 160 mm square located with their centers at 135 mm from edges of the end block. The cable duct is 50 mm in diameter. Assume f_{ck} = 40MPa, and f_{ci}=25 MPa. Using the IS code provisions, check the bearing stresses. **[6]**

P.T.O.

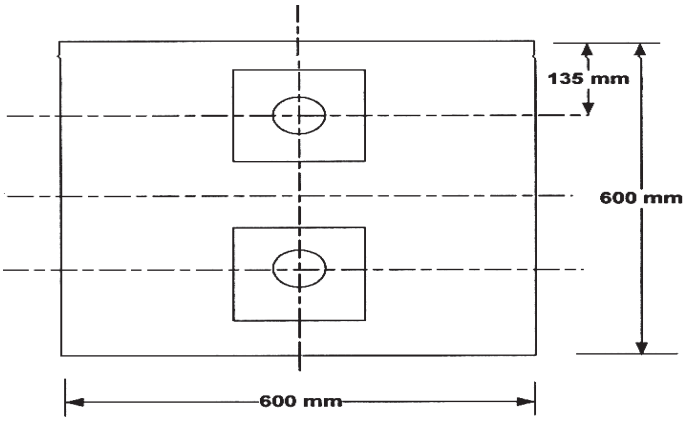


Fig.1

Q3) a) Explain the codal provisions for permissible compressive and tensile stresses of concrete in prestressed concrete structure. **[4]**

b) Using seismic coefficient method, calculate the base shear and show shear distribution over the height of four storey reinforced concrete office building located in Pune. There are four frames placed c/c distance of 7.5 m with three bay of size 7.5 m. Storey height of 3m is provided. The column and beam sizes may be taken as 400 mm ×400mm and 250 mm × 400 mm respectively. Thickness of slab is 150 mm. The wall thickness is 120 mm with 20 kN/m^{3}density. Consider OMRF structure. Consider live load as 3 kN/m^2. **[6]**

OR

Q4) a) What are bursting and bearing stresses. Explain in detail the design of end block of a prestressed beam. **[4]**

b) Using the portal method for lateral load analysis, find the moments and shears in all beams and columns for an internal frame of 2 bay of 4 m width and three storey of 3.5 m height each configuration. A building consists of three frames spaced 5m c/c and the lateral loads acting at panel point of a frame are 17 kN at terrace floor and 25 kN at typical floor. **[6]**

Q5) a) Explain with neat sketches, types of retaining wall. **[2]**

b) Perform the stability analysis for L-shaped retaining wall provided to retain a horizontal leveled backfill having unit weight respectively equal to 17 kN/m^3. Angle of repose = 30°, Coefficient of friction between concrete and soil =0.55, SBC of soil = 150 kN/m^2, depth of foundation = 1.0 m. Also check the stability of wall in submerged condition. Take submerged density of soil as 15 kN/m^3. **[14]**

OR

Q6) Design a T-shaped retaining wall of height 5.2 m to retain a backfill with two different layers. The upper layer of 2.5 m height is having unit weight equal to 17 kN/m^3 with angle of repose = 30°. The lower layer has unit weight of 18 kN/m^3 and angle of repose equal to 28°. Coefficient of friction between concrete and soil = 0.55, SBC of soil = 150 kN/m^2, depth of foundation = 1.2m. Sketch the details of reinforcement in the wall and base slab. **[16]**

Q7) a) Draw the deflected shape of slab type of footing in longitudinal direction and show the typical detailing of a longitudinal section of footing. **[3]**

b) Design a slab type combined footing for two boundary columns spaced 2.5 m apart out to out. The columns are 400 mm × 400 mm. Both columns carry 500 kN characteristic loads. The SBC of soil is 180 kN/m^2 . Use M30 grade of concrete and steel of grade Fe 500. **[13]**

OR

Q8) Design a slab beam type combined footing for two columns spaced 3.5m apart center to center carrying a service load of 800 kN and 1000 kN each. The columns are 400 mm × 400 mm and 500 mm × 500 mm respectively. The width of the footing is limited to 2.2 m. The SBC of soil is 180 kN/m^2. Use M25 grade of concrete and steel of grade Fe 500. **[16]**

Q9) a) Using coefficients from IS 3370, determine the bending moments and hoop tension at 1m interval of height for a circular water tank of height 4m and diameter 8m. The tank wall is free at top and hinged at bottom.**[6]**

b) Design the wall of a square water tank of size 4.0 m × 4.0 m ×3.0m. Use Fe 500 grade of steel and M30 grade of concrete. Provide detailing of reinforcement. **[12]**

OR

Q10) Design a rectangular water tank open at top resting on ground having a size of 5.5m × 4.0m × 2.5m high. Use M35 and Fe 500 grade material. Sketch details of reinforcement for the wall. **[18]**

Total No. of Questions : 10]

SEAT No. :

P3068

[Total No. of Pages : 3

[5461]-104
B.E. (Civil)
STRUCTURAL DESIGN OF BRIDGES
(2012 Pattern) (Semester-I) (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) ***Figures in bold to the right, indicate full marks.***
3) ***IRC : 6, IRC : 112, IS 456, IS 800, IS 1343 and Steel table are allowed in the examination.***
4) ***Neat diagrams should be drawn wherever necessary.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) What is impact load? How are they claculated? **[10]**

OR

Q2) What loads act on a railway steel bridge? **[10]**

Q3) Explain Carboun's method. **[10]**

OR

Q4) An interior panel of a T beam deck slab bridge is 2.0 m × 2.5 m. Calculate the maximum bending moment developed due to placing of IRC class AA tracked loading. Consider $m_1 = 0.03$ and $m_2 = 0.028$. **[10]**

Q5) Design the members U_3-U_4, U_3-L_3 for the broad gauge railway steel truss bridge shown in Fig. 1. The details are as follows. **[18]**

a) Weight of stock rail = 0.60 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 = 6.0 kN/m^3

e) Spacing of truss = 4 m c/c

f) Equivalent uniformly distributed load for BM and SF are 2,330 kN and 2,596 kN respectively

g) CDA = 0.483

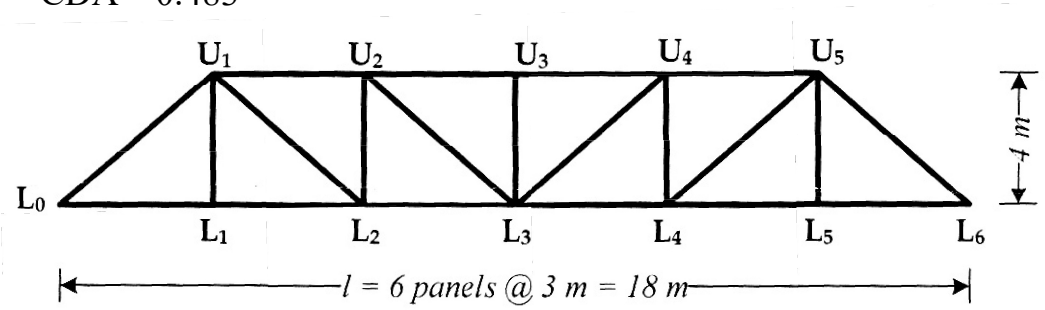


Fig. 1

OR

Q6) For the Problem given in Q. 5 design the members L_3-L_4 and U_3-L_3. **[18]**

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

a) Dead load, live load and impact load = 2000 kN

b) Vertical reaction due to overturning effect of wind = 200 kN

c) Lateral wind due to wind at each bearing = 85 kN

d) Span of bridge = 25 m

Also sketch the details of the bearing.

OR

Q8) Design the Elastomeric bearing for following data and sketch the details: **[16]**

a) Maximum normal load - 1750 KN

b) Minimum normal load - 500 KN

c) Lateral laod - 40 KN

d) Longitudinal load - 95 KN

e) Total longitudinal translation - 15 mm

f) Rotational at support - 0.001

g) Allowable compressive stress of concrete - 8 N/mm^2

h) Allowable compressive stress of elastometer - 9 N/mm^2

Q9) a) Explain the loads acting on abuments. **[8]**

b) Explain the analysis of abutments. **[8]**

OR

Q10) Perform stability analysis for RC abutment for a RC T-beam deck slab bridge with the following data: **[16]**

a) Span = 20 m

b) Width of carriageway = 7.5 m

c) Live load reaction from the deck slab = 1,200 kN

d) Dead weight of span = 5,000 kN

e) Longitudinal force = 200 kN

f) Top width of the abutment = 5.5 m

g) Bottom width of the abutment = 7.2 m

h) RL of formation = 340.150 m; RL of cg of grider = 338.100 m; RL of center of bearing pin = 337.000 m; RL of bed level = 329.800 m

i) Unit weight of backfill soil = 18 kN/m^3

j) Allowable bearing pressure = 175 kN/m^2

k) Coefficient of friction between soil and abutment = 0.3589

l) Materials = M 35 grade concrete and steel of grade Fe500

Total No. of Questions : 10]

SEAT No. :

P3069

[Total No. of Pages : 4

[5461]-105
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 Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Enlist and explain various phases involved in Systems Approach in Civil Engineering. **[5]**

b) Find maximum of $f(x) = x(1.5 - x)$ in the interval of (0, 1) within 10% accuracy using Dichotomous search techniques. **[5]**

OR

Q2) a) Differentiate between linear and non-linear programming techniques. State the applications of one linear and non-linear programming in Civil Engineering. **[5]**

b) Minimize $f(x) = 2x_1^2 + 2x_1x_2 + 2x_2^2 - 4x_1 - 6x_2$ using Newton's method. Take initial interval $x^0 = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$. **[5]**

Q3) a) Using Lagrange Multiplier technique, minimize $f(x) = \dfrac{18}{x_1x_2}$ Subject to $x_1^2 + x_2^2 = 9$. **[4]**

b) A duplicating machine, maintained at the office, has a job arrival rate of 5 jobs per hour. The service rate is 10 jobs per hour. The office has an 8 hour shift. Analyze **[6]**

i) equipment utilization
ii) % time an arrival has to wait
iii) average system time

OR

P.T.O.

Q4) a) 5 jobs are to be processes on 1 machine. The time (in minutes) required are tabulated below. Determine the sequence of jobs so as to minimize the elapsed time: **[6]**

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

b) Using steepest gradient technique, maximize **[4]**

$f(x) = 6x_2 + 2x_1x_2 - 2x_1^2 - 2x_2^2$ With initial value (1, 1).

Q5) a) With respect to Dynamic Programming, explain the following terms; **[8]** Stage, State, Return Function and Bellman's principle of optimality

b) A developer has to invest Rs. 60 million in 3 residential projects A, B & C. The returns depending on the level of investment are tabulated below. Determine the amount that has to be invested in the three projects to maximize the returns. **[8]**

Investment	Returns from Residential Projects (Rs.)		
	A	B	C
0	0	0	0
10	18	26	23
20	28	27	29
30	43	33	41
40	47	44	46
50	53	55	52
60	63	62	61

OR

Q6) a) Explain the concept of Single stage decision process and multi-stage decision process with suitable example. **[6]**

b) A pipeline is to be laid between points 1 and 11. The costs c_{ij} of laying the pipeline along different routes are mentioned below. Using dynamic programming determine the minimum cost and corresponding route for laying the pipeline. **[10]**

$c_{1,2} = 25$ $c_{1,3} = 29$ $c_{1,4} = 31$
$c_{2,5} = 24$ $c_{2,6} = 22$ $c_{2,7} = 25$
$c_{3,5} = 26$ $c_{3,6} = 20$ $c_{3,7} = 18$
$c_{4,5} = 23$ $c_{4,6} = 22$ $c_{4,7} = 21$
$c_{5,8} = 16$ $c_{5,9} = 28$ $c_{5,10} = 28$
$c_{6,8} = 17$ $c_{6,9} = 19$ $c_{6,10} = 24$
$c_{7,8} = 28$ $c_{7,9} = 27$ $c_{7,10} = 29$
$c_{8,11} = 32$ $c_{9,11} = 23$ $c_{10,11} = 31$

Q7) a) Using two phase method solve, **[8]**

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

Subject to:

$x_1 + x_2 + x_3 = 2$

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

$x_1 + 2x_3 \geq 3$

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

b) Explain the concept of; **[8]**

i) Big M Method

ii) Duality in Linear Programming Problem

OR

Q8) a) minimize $Z = 2x_1 + 9x_2 + x_3$ **[8]**

S.T. $x_1 + 4x_2 + 2x_3 \geq 5$

$3x_1 + x_2 + 2x_3 \geq 4$

$x_1, x_2, x_3 \geq 0$, Solve by using Simplex method

b) Explain following terms graphically using suitable examples: **[8]**

i) Unbounded solution

ii) Infinite solution

iii) Infeasible solution

iv) Feasible region

Q9) a) Coarse aggregates are to be supplied to different construction sites. The supply and demand criteria have been tabulated along with the unit cost of transportation. Determine the initial basic feasible solution using VAM. Also determine the optimal value of the transportation cost **[10]**

Construction Site

Quarriers	1	2	3	4	5	Supply
A	15	10	7	9	12	50
B	14	17	11	6	18	70
C	22	23	21	13	20	80
Demand	20	30	40	50	60	

b) Five rail units are to be assigned to five coal distribution sites. The matrix represents the returns obtained by transporting the coal to different sites. Determine the optimum assignment to maximize the returns. **[8]**

Coal Distribution sites

Rail wagon	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

OR

Q10)a) A company has to assign six different machines to four different jobs. The cost in hundreds of rupees are estimated as follows: **[8]**

Job

Machine	1	2	3	4
1	6	5	1	6
2	2	5	3	7
3	3	7	2	8
4	7	7	5	9
5	12	8	8	6
6	6	9	5	10

Solve the problem and find the minimum assignment cost.

b) Solve the following transportation problem using Vogel's Approximation, Row minima and column minima methods. **[10]**

Destination

		D1	D2	D3	D4	D5	availability
	O1	3	5	8	9	11	20
origin	O2	5	4	10	7	10	40
	O3	2	3	8	7	7	30
Demand		10	15	25	30	40	

Total No. of Questions : 10]

SEAT No. :

P3070

[Total No. of Pages : 2

[5461]-106
B.E. (Civil Engineering)
ADVANCED CONCRETE TECHNOLOGY
(2012 Course)(Semester-I) (End Semester) (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 sulpher infiltrated concrete. **[4]**

b) What do you mean by quality assurance and quality control? Give the IS recommendations of quality assurance and quality control. **[6]**

OR

Q2) a) Write a short note on waste material based concrete. **[4]**

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

Q3) a) Write a short note on high performance concrete. **[4]**

b) Write a short notes on non destructive testing methods. **[6]**

i) Stress wave propagation method

ii) Nuclear methods

OR

Q4) a) What is light weight concrete? How it can be achieved in practice? **[4]**

b) Explain the step by step procedure involved in the design of pumpable concrete mixes. **[6]**

Q5) a) What are the factors affecting the fiber interaction with matrix? **[4]**

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

i) Carbon fibers. ii) Metallic fibers.

c) Explain the basic concept of using fibers in the concrete composite. Explain the role of fibers improving the mechanical properties under tension and bending. **[6]**

OR

P.T.O.

Q6) a) Explain the historical development of fiber reinforced concrete composite. **[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) Write a short note on Glass fiber reinforced concrete composite. **[4]**

b) What precautions should be taken during mixing and casting of fiber reinforced concrete composite? **[6]**

c) Describe the SIFCON material with reference to definition, structure properties and its application. **[6]**

OR

Q8) a) What are the factors affecting strength of hardened FRC? **[4]**

b) Explain stress strain property and compressive strength properties of FRC. **[6]**

c) Explain the behavior of hardened polymeric fiber reinforced concrete under flexure. **[6]**

Q9) a) Define Ferro cement. Write advantages of ferrocement. **[6]**

b) Explain how ferrocement differs then concrete? Write about tensile property of ferrocement. **[6]**

c) Explain closed mould technique for ferrocement with merits and demerits. **[6]**

OR

Q10)a) Enlist factors affecting ferrocement material in fresh and hardened state. Explain the effect of water cement ratio on properties of ferrocement material? **[6]**

b) Explain the properties and specifications of ferrocement material. **[6]**

c) Explain open mould technique for ferrocement with merits and demerits. **[6]**

Total No. of Questions : 8]

SEAT No. :

P3071

[Total No. of Pages : 2

[5461]-107

B.E. (Civil)

ARCHITECTURE AND TOWN PLANNING

(2012 Course) (Semester-I) (End Semester) (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, Q. 7 or Q. 8.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain in depth the elements responsible for Architectural composition. **[7]**

b) Comment upon : "Relation between quality of life and livability". **[7]**

c) Elaborate the benefits of town planning. **[6]**

OR

Q2) a) Explain different qualities of Architecture. And elaborate user friendly, contextual qualities. **[6]**

b) Elaborate : "Importance of sustainable architecture" by appropriate case study. **[7]**

c) Write a short note on : importance of Development Plan. **[7]**

Q3) a) Enlist the civic surveys for DP? How these are carried out? Explain the importance of the same. **[8]**

b) Comment upon : Traffic transportation systems in town and its impact. **[9]**

OR

Q4) a) Enlist the planning agencies and explain functioning of any one planning agencies in detail. **[9]**

b) Elaborate the importance of traffic management with a case. **[8]**

P.T.O.

Q5) a) In what way MRTP Act 1966 is influential for DP? **[8]**

b) Explain the need of UDPFI guidelines for different aspects of town planning such as ..... land use, infrastructure indepth. **[9]**

OR

Q6) a) Mention various steps in the Legislative mechanism for preparation of DP. **[8]**

b) Explain the opportunities observed in SEZ and its impact on economy. **[9]**

Q7) a) Explain in brief : Special townships. **[8]**

b) Enlist and explain minimum four applications of GIS in town planning. **[8]**

OR

Q8) a) Write a note on LARR Act 2013. **[8]**

b) Enlist and explain various applications of GPS in town planning. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3072

[Total No. of Pages : 3

[5461]-108

B.E. (Civil Engineering)

ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicates full marks.***
3) ***Neat diagrams should be drawn wherever necessary.***
4) ***Assume suitable data wherever required.***

Q1) a) Write a note of regional distribution of basalts. **[6]**

OR

b) Discuss in detail the varieties of Deccan Trap Basalts. **[6]**

Q2) a) How the strength and water tightness affects the dam site. **[7]**

OR

b) What are the geological considerations made during the selection of the spillway location at the dam site? **[7]**

Q3) a) Explain in brief the various parameters of morphometric analysis carried for river basins. **[7]**

OR

b) Write in brief the construction of percolation tank in the amygdaloidal basaltic terrain **[7]**

P.T.O.

Q4) a) Discuss in brief the various geophysical methods for sub surfacial data investigations. **[8]**

OR

b) i) Discuss in brief the 'Q' system of classification of rocks. **[4]**

ii) Write a note of characteristics of discontinuities. **[4]**

Q5) a) Calculate the Core Recovery and RQD from the following given data: **[7]**

Run from (m) to (m)	Piece No.	Length in cm	Nature of fracture at lower end of piece
0 - 3	1	5	J
	2	8	J
	3	16	J
	4	15	J
	5	6	J
	6	8	J
	7	7	J
3 - 6	8	14	J
	9	8	J
	10	5	J
	11	16	J
	12	9	J
	13	5	J
	14	14	J
	15	5	J
	16	6	J
	17	15	J
	18	9	J
	19	8	J
	20	15	J
	21	5	J
	22	16	J

OR

b) Explain in brief the Bieniawaski's Geomechanical classification. **[7]**

Q6) a) Calculate the apparent resistivity of the region with different depth zones. **[7]**

Sr. No.	R	a	2πaR
1	1.96	1	
2	1.87	2	
3	1.78	3	
4	1.67	4	
5	1.56	5	
6	1.45	7	
7	1.23	10	

OR

b) Discuss a case history of dam where economy has been achieved by understanding the geology of region. **[7]**

Q7) a) Discuss with geological background the suitability or unsuitability of excavating a tunnel where columnar basalts are occurring. **[7]**

OR

b) Give in brief the report on constructing a reservoir will be feasible or unsuitable in a region where the occurrence of limestone and sandstone occurs on geological background. **[7]**

Q8) a) Construction of bridge pier on partly weathered rock and on dyke. Discuss the feasibility. **[7]**

OR

b) Write a note on fractures from tunneling point of view. **[7]**

Q9) a) Reservoir Induced Seismicity (RIS) in Deccan Trap. **[7]**

OR

b) Types of faults and recognition of them during the civil engineering works. **[7]**

Q10) a) Write a note on Active fault at dam site. **[7]**

OR

b) Write a note on physiographic division of India. **[7]**

Total No. of Questions : 8]

SEAT No. :

P3073

[Total No. of Pages :4

[5461] - 109

B.E. (Civil Engineering)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(2012 Pattern) (Semester - I) (Elective - II) (End Sem.) (401005 A)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

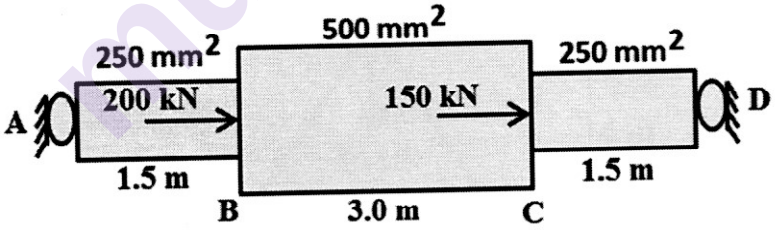
1) *Answer Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicates full marks.*
4) *Use of electronic pocket calculator is allowed.*
5) *Assume suitable data if necessary.*

Q1) a) Write short note on **[6]**

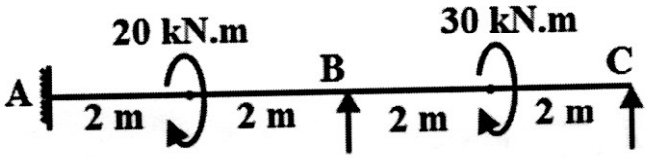
i) Gauss Jordon Method

ii) Gauss Seidel Method

b) Determine displacement at joint B and C in the bar structure as shown in figure using stiffness matrix method. Take E = 210 GPa. **[6]**



c) Determine support reactions of continuous beam ABC as shown in figure using flexibility matrix method. Take EI constant. **[8]**



OR

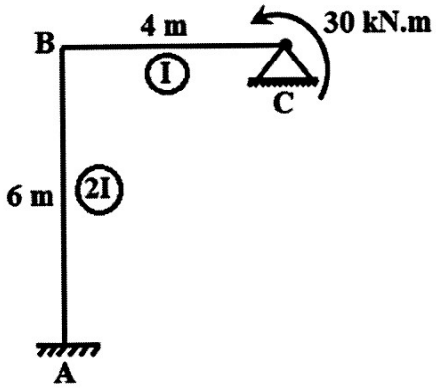
P.T.O.

Q2) a) Write computer algorithms for following numerical methods. **[6]**

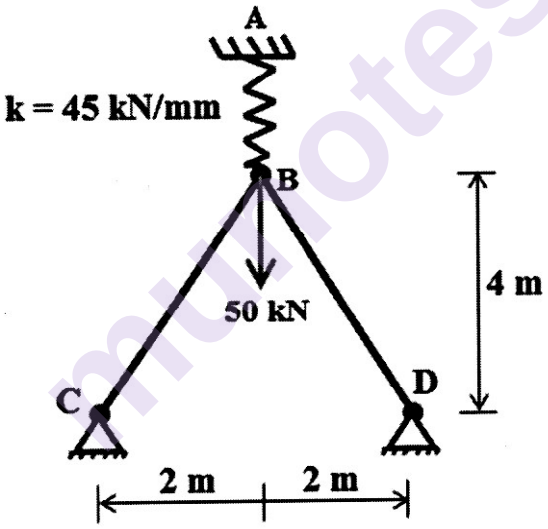
i) Gauss Jordon method

ii) Gauss Seidel method

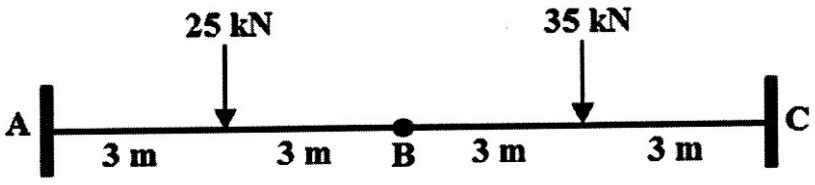
b) Determine support reactions of the portal frame ABC as shown in figure using flexibility matrix method. Take EI constant. **[8]**



c) Determine deflections at loaded joint of the truss supported by spring at A. The stiffness of spring is 45 kN/mm. Take cross-sectional area of both the members 750 mm^2 and E = 200 GPa. **[6]**

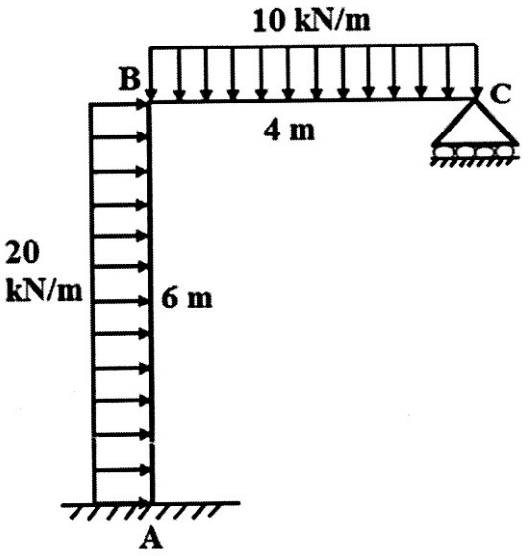


Q3) Analyze the continuous beam ABC as shown in figure using stiffness matrix method. The beam is fixed at A, C and internal hinge at B. Take EI constant. Draw BMD. **[18]**

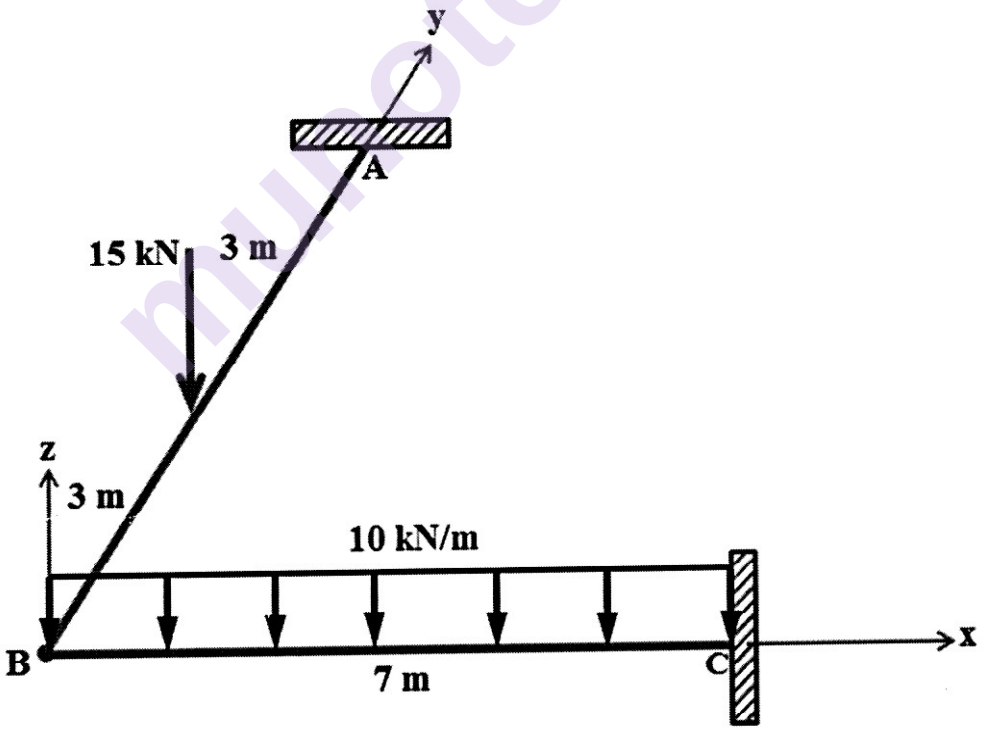


OR

Q4) Analyze the portal frame ABC as shown in figure using stiffness matrix method. Neglect axial deformation. Take EI constant. Draw BMD **[16]**



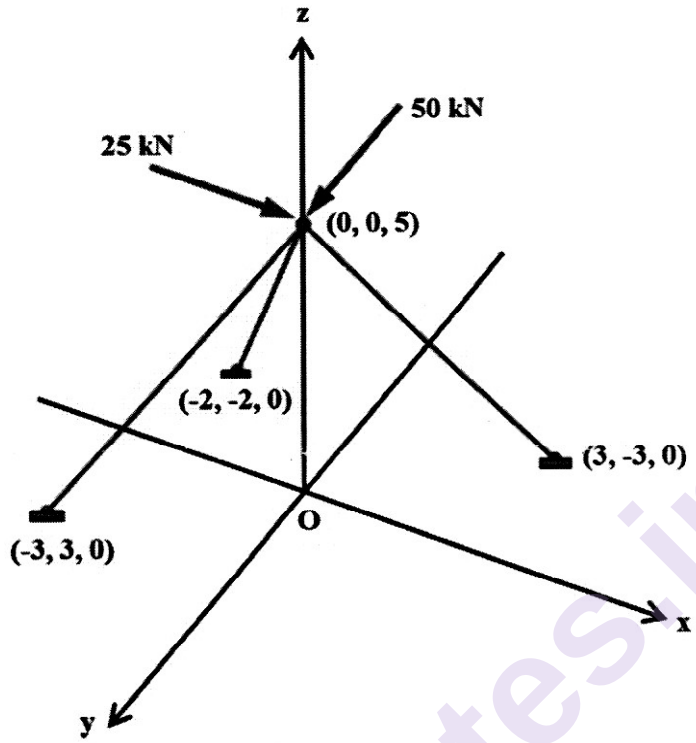
Q5) Determine moments and reactions of the two member grid structure as shown in figure using stiffness matrix method. Take EI = 0.4 GJ. **[16]**



OR

Q6) Derive stiffness matrix and transformation matrix for grid element with 06 D.O.F. **[16]**

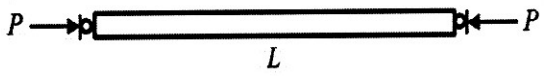
Q7) The tripod shown in figure is subjected to loads. Determine the deflections at the loaded joint using stiffness matrix method. Take E = 200 GPa and c/s area of all members 600 mm^2. **[16]**



OR

Q8) a) Estimate the deflection at center of a fixed beam subjected to central point load using finite difference method. The beam has length 4 m and magnitude of point load is 100 kN. Use four sub intervals. Take EI constant. **[8]**

b) Estimate the critical buckling load 'P' of a uniform pin ended column of length L=9m and flexural rigidity EI using three sub intervals. Apply finite difference method. **[8]**



Total No. of Questions : 12]

SEAT No. :

P3074

[Total No. of Pages :2

[5461] - 110

B.E. (Civil)

INTEGRATED WATER RESOURCES PLANNING AND MANAGEMENT

(2012 Pattern) (Semester - I) (401005 B) (End Sem.) (Elective - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 and Q11 or Q12.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of scientific calculator is allowed.***

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) Present framework for water management in your institute. **[3]**

b) What is meant by riparian rights? **[3]**

Q3) a) Write a note on: Concepts of 'Virtual Water'. **[3]**

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

OR

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

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

Q5) a) What is meant by recharge import? **[4]**

b) What is the use of geo-informatics for drought management? **[4]**

OR

Q6) a) What are the measures to control water logging? **[4]**

b) How to do the assessment of flood damage? **[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) What are navigation & recreational water demands. **[8]**

b) How the irrigation water utilization is done? **[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) Social impact of water resources development on agro-industry to enhance living standards. **[8]**

b) Write a note on water quality management for various uses. **[8]**

Q11) a) How the management of IWRM is carried out 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.

OR

Q12) a) Define watersheds. How the watersheds are classified? Explain integrated approach for watershed management. **[8]**

b) Define RS & GIS. Write a role of RS & GIS in watershed management. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3075

[Total No. of Pages :2

[5461] - 111

B.E. (Civil)

TQM & MIS IN CIVIL ENGINEERING

(2012 Pattern) (End Sem.) (401005 C) (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, and Q.9 or Q.10.***
2) ***Figures to the right side indicate full marks.***

Q1) a) What is TQM? List out the benefits and obstacles in implementing TQM. **[6]**

b) Elaborate the contribution of Phillip Crosby in TQM. **[4]**

OR

Q2) a) What is the definition of MIS? And what are the applications of the MIS in civil engineering. **[6]**

b) What is House of Quality? **[4]**

Q3) a) As a quality manager, recommend measures to be adopted by the contractor, in the construction of rubble masonary. **[6]**

b) Define Data and information. Explain with an suitable example. **[4]**

OR

Q4) a) Discuss the procedure to implement six sigma. **[5]**

b) Indentify the probable defects at the time of construction of flooring. **[5]**

Q5) a) Differentiate TQM & TQC. **[6]**

b) Explain in detail Quality Management System. **[5]**

c) Explain 3 subsystems of MIS. **[6]**

OR

P.T.O.

Q6) a) Write a note on Quality Circle. **[5]**

b) Prepare a checklist for construction of Dog legged Staircase. **[6]**

c) Explain importance of ISO 9001 Certification. **[6]**

Q7) a) Explain the types of Benchmarking with an suitable example. **[6]**

b) Explain cost of quality with an suitable example. **[6]**

c) What are the limitations in implementation of MIS in construction industry. **[6]**

OR

Q8) a) Write a note on Kaizen with an suitable example. **[6]**

b) Explain in detail the concept of Supply chain management. **[6]**

c) What are the benefits of strategic planning. **[6]**

Q9) In the context of MIS, describe each of the following applications and evaluate their benefits.

a) Enterprise Resource Planning (ERP) systems. **[8]**

b) PRRT **[7]**

OR

Q10) a) Write a note on GIS applications in Construction industry. **[6]**

b) Explain the use of Mobile technology in implementation of TQM on construction site of commercial complex. **[6]**

c) Write a note on Information security system Management. **[3]**

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P3076

[Total No. of Pages :3

[5461] - 112

B.E. (Civil)

EARTHQUAKE ENGINEERING

(2012 Pattern) (Elective - II) (401005 D) (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 8, and Q.9 or Q.10, and Q.11 or Q.12.***
2) ***Figures to the right indicate full marks.***
3) ***IS 456, IS 1893 and electronic pocket calculators are allowed in the examination.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Mere reproduction from IS Code as answer, will not be given full credit.***
6) ***If necessary assume suitable data and mention it clearly.***

Q1) Explain plate tectonic theory. **[6]**

OR

Q2) Define terms: **[6]**

a) Focus of an earthquake;

b) Epicenter of an earthquake;

c) Magnitude of an earthquake;

d) Isoseismal lines;

e) Seismograph; and

f) Seismogram

Q3) A vibrating system is defined by the following parameters- mass= 3kg, Stiffness= 100N/m, Damping Coefficient=3N.s/m. Determine **[6]**

a) Damping Factor

b) Damped natural frequency

c) Logarithmic Decrement.

OR

P.T.O.

Q4) An elevated water tank of 20,000 liter capacity has a natural period of in lateral vibration as 1.0 sec when empty. When same water tank is full of water its natural period lengthens to 2.2 sec. Determine the lateral stiffness k of elevated water tank and self weight of water tank W. Assume elevated water tank as SDOF and neglect the self weight of supporting columns. **[6]**

Q5) Calculate the approximate fundamental time period (Ta), average design response acceleration (Sa/g), design base shear (V_b) and storey-wise distribution of V_b for a G+3 hospital building having reinforced concrete shear wall (RC Shear Wall) as lateral load resisting system (LLRS). The typical floor plan of hospital building with locations of RC shear walls (LLRS) and elevation of LLRS is shown in figure 5.1 below. Use following data: **[8]**

a) The building is constructed on hard strata.

b) Dead load on floor is 5.50 kN/m^2 and on roof 2.75 kN/m^2.

c) Live load on floor is 4.00 kN/m^2 and on roof 2.00 kN/m^2.

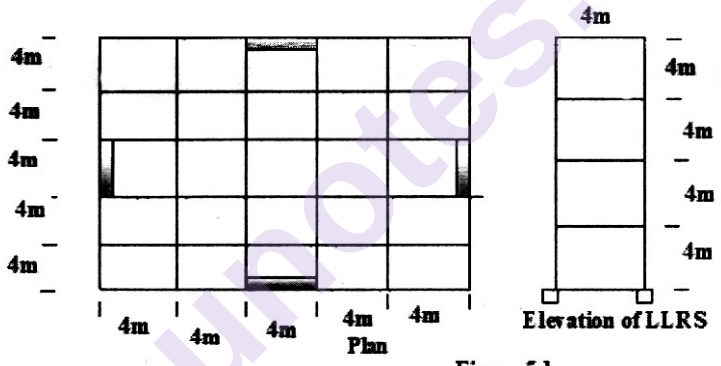


Figure 5.1

OR

Q6) a) Explain significance of ductile detailing in earthquake resistance design of structure. **[4]**

b) What are lap splice? Explain with neat sketches lap splice for beam and column. **[4]**

Q7) A 450 mm × 450 mm column is reinforced with 8 number 12 mm ϕ bars. It is supported on an isolated footing subjected to a dead load of 1000 kN and a moment of 35kNm. The SBC of soil is 225kN/m^2. Design footing using M20 grade of concrete and Fe 500 steel. **[16]**

OR

Q8) a) What are effects of different types of earthquake induced forces on various types of foundations. **[8]**

b) What do you meant by liquefaction? Discuss measures taken to reduce the effect of liquefaction. **[8]**

Q9) a) Explain with example the role of: **[8]**

i) Active dampers,

ii) Passive dampers and

iii) Tuned mass dampers (TMD) in controlling earthquake induced vibration.

b) Explain the concept of base isolation technique. Also give suitable live example of structure where base isolation technique is used to minimize damage to structure during an earthquake. **[8]**

OR

Q10) a) What is disaster management? Explain various phases of disaster management. **[8]**

b) Describe various steps followed in rescue operations at collapsed structure? **[8]**

Q11) a) What is need of retrofitting and rehabilitation of structures? **[9]**

b) How would you carry the seismic evaluation of RC building for the requirement and level of retrofitting. **[9]**

OR

Q12) a) Explain the various techniques of retrofitting. **[9]**

b) What is shear wall? Explain behavior of shear wall under earthquake (lateral) load? What are advantages of shear wall over other lateral load resisting systems. **[9]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3077

[Total No. of Pages :2

[5461] - 113

B.E. (Civil)

ADVANCED GEOTECHNICAL ENGINEERING

(2012 Pattern) (End Sem.) (Elective - II) (Semester - I) (401005 E)

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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and mention it clearly.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Write short note on double diffuse layer. **[5]**

b) Results of laboratory test conducted on soil as follows:- **[5]**

i) % passing 0.075mm sieve = 14

ii) % passing 4.75mm sieve = 92

iii) D10 = 0.14 mm

iv) D30 = 0.33mm

v) D60 = 1.0mm

vi) W_L = 8%

Classify the soil as per Indian Standards.

OR

Q2) a) State the different critieria for soil classification and explain any one. **[5]**

b) Write short note on hydrogen bond and electrostatic bond. **[5]**

P.T.O.

Q3) a) Explain how soil reinforcement is used beneath unpaved roads and beneath foundations. **[5]**

b) An anchored sheet pile wall is to retain soil to a height of 5.5m. The soil including that into which the pile is driven, is cohesionless soil with $\phi = 30^{o}$, $\gamma = 20.8$ kN/m^3. The surface of the retain soil is horizontal and leveled with the top of the wall. Determine the minimum penetration depth of the pile to achieve the free earth support anchorage provided 1.83 m from top of the sheet pile. **[5]**

OR

Q4) a) Write a short note on application on geosynthetics in geoenvironment engineering. **[5]**

b) Compare Coulomb's wedge theory with Rankine's theory. **[5]**

Q5) a) Discuss the criteria for design of foundations for reciprocating type machines as per IS. **[8]**

b) Explain Pauw's Analogy of foundation soil system. **[8]**

OR

Q6) a) Write the short note on vibrating spring mass system with damping. **[8]**

b) Differentiate between free vibrations and forced vibrations. **[8]**

Q7) a) Write a short notes of **[8]**

i) dynamic compaction

ii) Vibroflotation

b) Explain the concept of soil reinforcement, State the applications of reinforced soil and explain any one in detail. **[9]**

OR

Q8) a) What is the purpose of sand drain? Discuss its suitability and design criteria. **[9]**

b) Explain deep mixing of ground improvement and grouting technique. **[8]**

Q9) a) Write short note on composite Rheological models. **[9]**

b) Discuss model to explain secondary consolidation and creep. **[8]**

OR

Q10) a) What is Rheology and geological elements? **[8]**

b) State all geological models and explain any two of them. **[9]**

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P3078

[Total No. of Pages : 3

[5461]-114
B.E. (Civil)
DAMS AND HYDRAULIC STRUCTURES
(2012 Pattern) (Semester-II) (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, Q11 or Q12.***
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) How the dam instrumentation is helpful for health monitoring of dams? **[6]**

OR

Q2) To achieve overall economy of the water resource project, during planning, what measures are required to be adopted? **[6]**

UNIT-II

Q3) Define 'Elementary Profile' of a gravity dam and drive the equations for determination of base width on the basis of 'No Tension' and 'No Sliding' conditions. **[2+6]**

OR

Q4) a) Enlist different galleries used in gravity dams. Briefly explain function of any two of them. **[2+4]**

b) How the joints in gravity dam are sealed? **[2]**

P.T.O.

UNIT-III

Q5) a) Give four causes of overtopping of dams. **[4]**

b) Enlist various components of pumped storage power plant. **[2]**

OR

Q6) a) Write a note on importance of energy dissipators. **[4]**

b) What is peak load plant? Give suitable example. **[1+1]**

UNIT-IV

Q7) a) Briefly explain: **[2]**

i) Pitching

ii) Rock toe

b) Determine the coordinates of base parabola for zoned earth dam section with following details. **[8]**

i)	Slope of upstream face (casing)	=	3 : 1
ii)	Slope of downstream face (casing)	=	2.5 : 1
iii)	Top width	=	6 m
iv)	Slope of upstream face (hearting)	=	1 : 1
v)	Slope of downstream face (hearting)	=	1 : 1
vi)	Height of dam	=	33 m
vii)	Free board	=	3 m

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

c) State the corrections suggested by Khosla. Explain in detail the correction for mutual interference of piles. **[3+5]**

OR

Q8) a) While applying the correction for slope of floor, how the nature of correction (viz. additive or subtractive) is decided. **[2]**

b) A weir of height 3 m is constructed on permeable foundation on horizontal floor of thickness 2 m. Pile number-1 of 7 m depth (measured from floor bottom) is provided on upstream of weir. Pile number-2 of 8 m depth (measured from floor bottom) is provided on downstream of weir. The length of floor is 65 m. Determine the correction for floor thickness in magnitude and nature at key point C1 and also the corrected value of residual seepage head. The weir retains water upto full height. **[8]**

(Given : $\Phi_{C1} = 67\%$ & $\Phi_{D1} = 77\%$).

c) Write a short note on: **[4+4]**

i) Rolled fill method

ii) Sudden drawdown condition

UNIT-V

Q9) a) Design an unlined alluvial trapezoidal canal section to carry a discharge of 12 m^3/s. The longitudinal slope is 1 in 3000 and the side slope is 0.5 H : 1 V. Use Lacey's theory and take silt factor $f = 0.9$. **[8]**

b) What is canal fall? Under what circumstances canal falls are provided? State the factors affecting number of canal falls in a specific reach. **[2+3+3]**

OR

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

i) Regime Channel

ii) Economics of canal lining

b) Briefly explain Kennedy's theory. What are the drawbacks of Kennedy's theory? **[4+4]**

UNIT-VI

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

i) Attracting groyne

ii) Deflecting groyne

b) What do you understand by cross drainage work? Explain in detail level crossing. **[8]**

OR

Q12)a) Write short note on: **[8]**

i) Super passage

ii) Canal syphon

b) What do you understand by river training work? What are the functions of fish ladder and silt excluder? **[8]**

Total No. of Questions : 12]

SEAT No. :

P3079

[Total No. of Pages : 5

[5461]-115

B.E. (Civil)

QUANTITY SURVEYING CONTRACTS & TENDERS

(2012 Pattern) (Semester - II) (401008)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve 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) ***Answer to the two sections must be written in separate answer book.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat diagram wherever necessary.***
5) ***Use of logarithmic table, slide rule and electronic pocket calculator are allowed.***
6) ***Assume suitable data if necessary, stating it clearly.***

Q1) a) Explain the method of measurement of brick masonry in superstructure and rule for making deduction for opening. **[4]**

b) Differentiate between approximate and detailed estimate. **[2]**

OR

Q2) a) Determine approximate estimated cost of a residential building, using following data. **[4]**

i) Built up area of the proposed building = 450 Sq. m.

ii) A building was constructed with similar specification in nearby area with following details;

Cost of construction : 30,00,000/-(Thirty lakh), built up area 200 Sq.m.

iii) The building is constructed 3 years ago. Assume 24% rise in construction cost over rates prevailing before three years.

iv) Consider a provision of 15% of construction cost for water supply, drainage and electrification.

b) State the following sentences as true or false with appropriate reasons. Any two **[2]**

i) Construction rate for different floors in case of multi-storied building remains same.

ii) Rate for excavation in a given soil for foundation trenches is higher than rate for open excavation.

iii) The rate for RCC work in different items like footing, beam, slab, chajja and staircase for given grade of concrete remains same.

P.T.O.

Q3) Figure 1 shows plan and section of a residential building. The schedule for openings is as below.

Doors, D = 1.2m × 2.1m; windows, W = 1.5m × 1.2m.

R.C.C. Lintel of size 0.23m × 0.23m with 15cm bearing on either side of the opening.

Determine quantities of following items and enter them in a measurement sheet with appropriate description.

a) RCC M20 in footing **[2]**

b) RCCM20 in beam(ground beams, plinth beams and floor beams) **[3]**

c) Brick Masonry in C.M(1:6) in superstructure. **[3]**

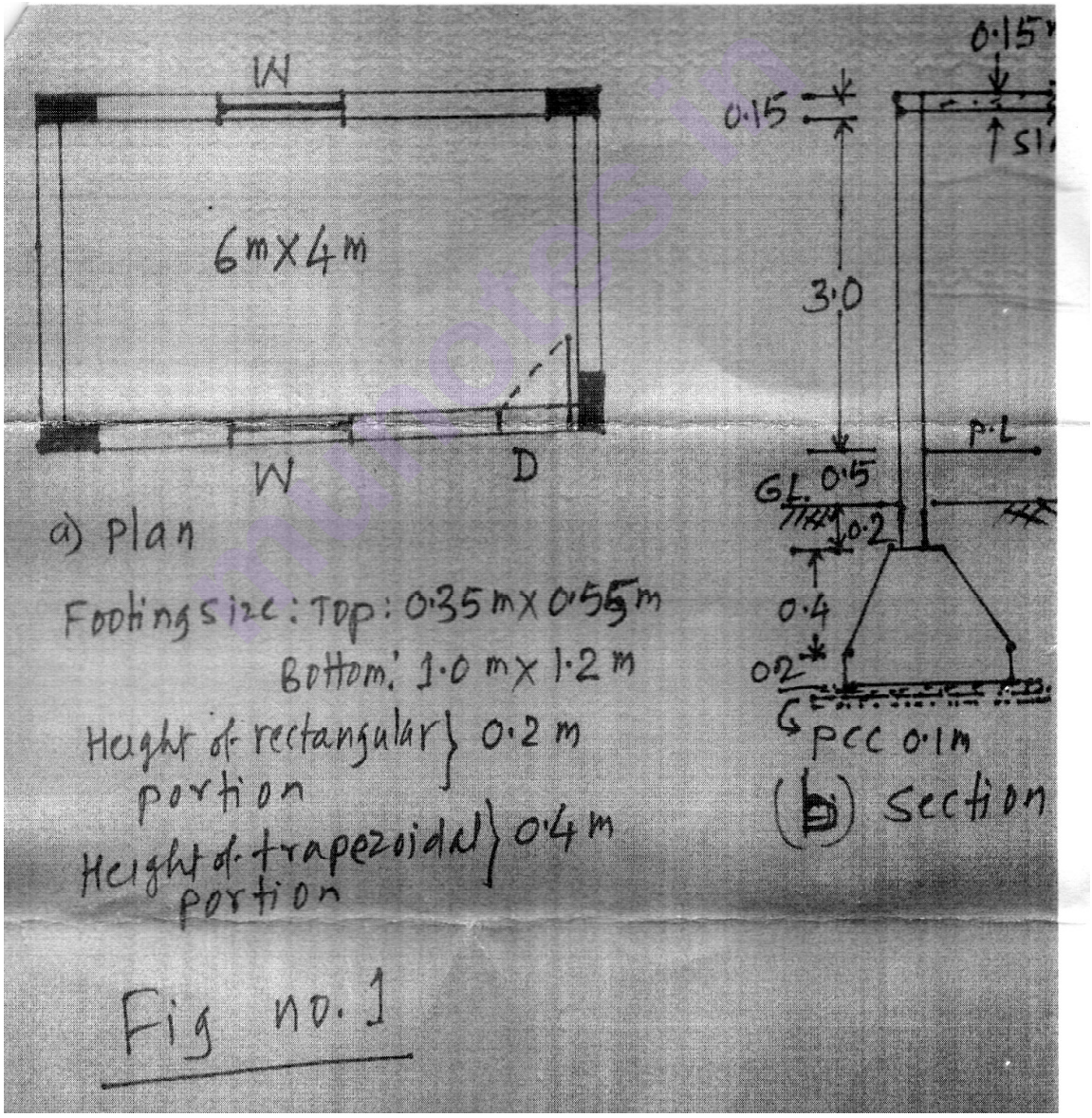


Fig no. 1

OR

Q4) a) 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. Present market rate for front belt : Rs. 20,000/m^2. **[5]**

b) Explain following terms, **[3]**

i) Reversionary value

ii) Sinking Fund

iii) Salvage value

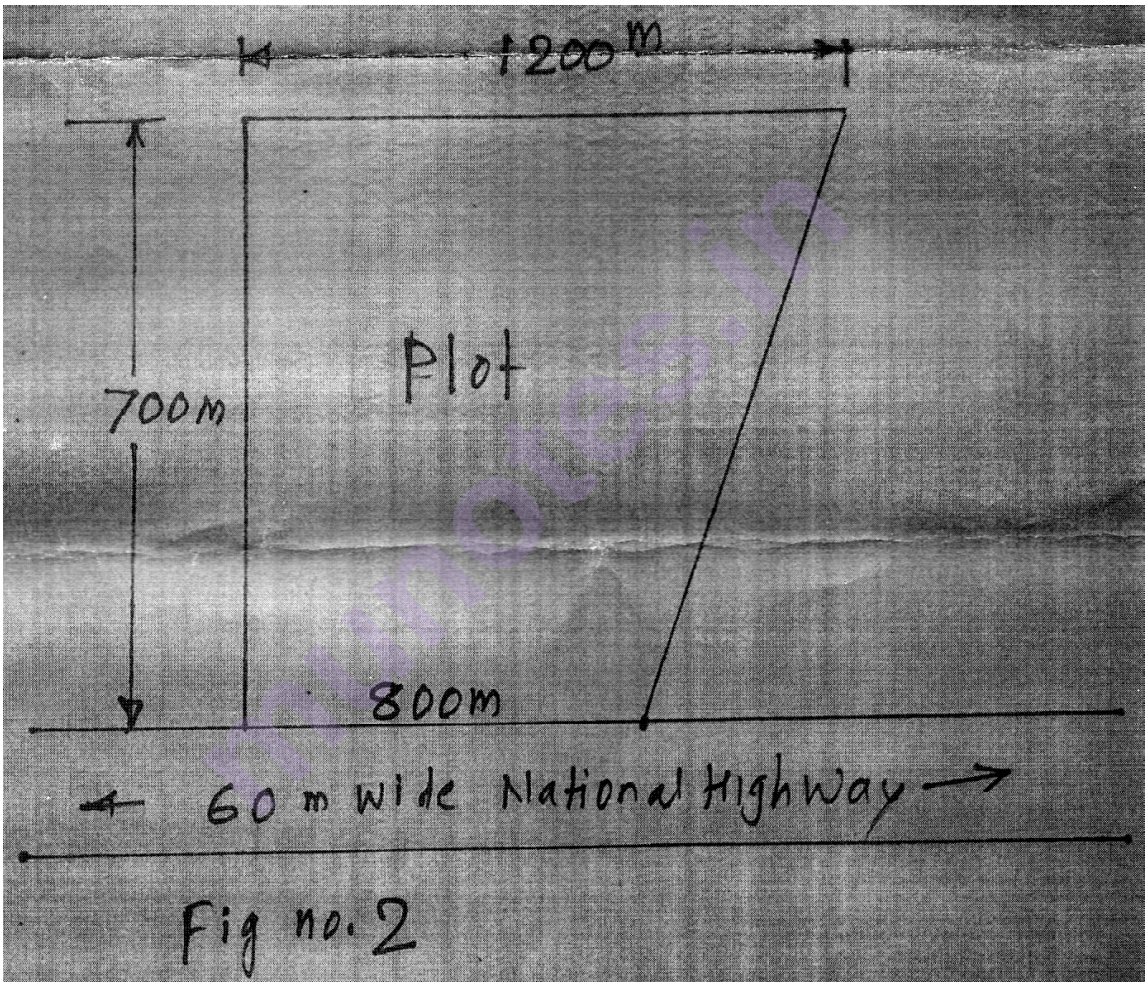


Fig no. 2

Q5) Determine quantity of steel reinforcement for slab panel of 6m×4m, 0.15m thick and having all discontinuous edges. Reinforcement details are as below.**[6]**

a) Steel along long and short span : 10mm @ 120 mm/cc.

b) Bars are alternately bent up at support.

c) Steel bars of 4no/8 mm diameter are provided in the edge strips as distribution steel.

OR

Q6) The quantity of stone masonry in C.M.(1:6) for plinth and foundation is 156 Cu. M. Determine the quantities of basic materials required to complete the work. **[6]**

Q7) a) Draft detailed specification for the item of providing and laying brick masonry (1:6) in superstructure with reference to

i) Different materials, quality and testing

ii) method of execution and workmanship and

iii) mode of measurement and payment. **[6]**

b) The quantity of R.C.C (1:1.5:3) work for a residential building is 87 Cu.M. The RCC work consists of 1.2 % steel reinforcement. Determine the quantities of basic materials required to execute the RCC work. **[6]**

c) Write briefly about the specification for quality of cement, sand used for cement concrete works. **[6]**

OR

Q8) a) What is the need and necessity of providing detailed specification to each item of work in construction.Write a general specification for second class building. **[6]**

b) Workout the unit rate for the following finished items required for a building. RCC work in CC 1:1.5:3 in RCC column **[8]**

The following rates of materials and labour at the site

i) Cement Rs. 300/- per bag

ii) Sand Rs. 2100/- per cu.m.

iii) Aggregate Rs. 750/- per cu.m.

iv) Standard bricks Rs. 7,500/- per 1000 No's

v) Steel Rs. 50,000/- per tonne

vi) Man Mazdoor Rs. 250/- per day

vii) Bar bender Rs. 500/- per day

viii) Carpenter Rs 600/day

c) What is meant by over head and its different types give examples? How contingency does differs from overhead. **[4]**

Q9) a) Explain the P.W.D.procedure for execution of major 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) Differentiate between item rate tender and percentage rate tender. **[4]**

b) Write short note on (any three) **[12]**

i) security deposit

ii) Earnest money deposit

iii) Pre-bid conference

iv) Liquidated damages

Q11)a) Explain the Lump Sum Contracts with reference to; nature of agreement contract documents and advantages. **[6]**

b) Explain the followings with suitable examples, **[6]**

i) Valid contract

ii) Null or void contract

iii) termination of contract

c) List out advantages and disadvantages of labour contract. **[4]**

OR

Q12)a) What is the Role of Arbitrator in Civil engineering construction? What are the different types of arbitration? **[6]**

b) What is professional liability in civil engineering construction. What are the conditions under which Action against Building Engineers can be initiated **[4]**

c) What are the conditions under which the court of law **[6]**

i) Can remove an arbitrator

ii) Setting aside the award of an arbitrator

iii) Modify the award by an arbitrator

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3080

[Total No. of Pages : 2

[5461]-116
B.E. (Civil)
ADVANCED STRUCTURAL DESIGN
(2012 Pattern) (End Semester) (Elective - III) (401009A) (Semester - II)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2; Q.3or Q.4; Q.5or Q.6; Q.7or 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) How are tension members designed using cold form light gauge sections. **[10]**

OR

Q2) Highlight the advantages and disadvantages of using cold form light gauge sections. **[10]**

Q3) What is a mechanism? Explain with a suitable example. **[10]**

OR

Q4) Explain with neat sketches self - supporting and guyed chimneys. **[10]**

Q5) Applying the yield line theory, derive the ultimate load carrying capacity of a simply supported slab of span ℓ resting on supports on two opposite sides. **[16]**

OR

Q6) What is yield line theory? Explain the limitations of conventional design of slabs. **[16]**

Q7) For the elevated tank shown in Fig.1, calculate the moments at the base for tank full condition. Assume suitable dimensions for the structural components. **[18]**

OR

P.T.O.

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

Q9) A reinforced concrete shear wall is subjected to the following loads: Shear force = 3,000 kN; axial force = 3,000kN; axial force on boundary element = 600 kN, and moment = 2,000kN. Design the shear wall using M25 grade concrete and Fe500 grade of steel. Sketch the details of reinforcement. **[16]**

OR

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

a) Classification of RC shear walls

b) Failure modes in RC shear walls

c) Boundary elements in shear walls

d) Sketch typical reinforcement details in a RC shear wall.

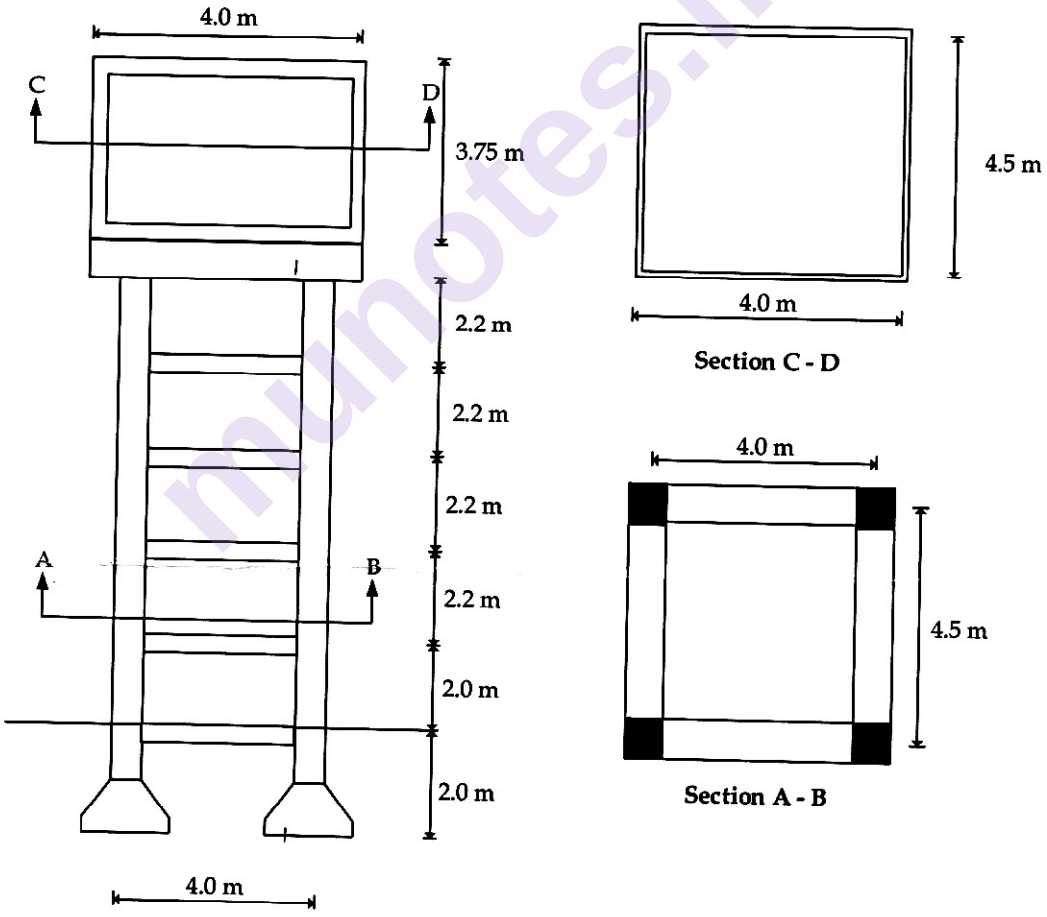


Fig. 1

Total No. of Questions : 10]

SEAT No. :

P3081

[Total No. of Pages : 2

[5461]-117
B.E. (Civil)
ADVANCED FOUNDATION ENGINEERING
(2012 Pattern) (End- Semester - II) (Elective - III) (401009 B)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) *Neat diagrams must be drawn wherever necessary.*
2) *Figures to the right indicate full marks.*
3) *Your answers will be valued as a whole.*
4) *Assume suitable data, if necessary.*

Q1) Explain the I.S. code provisions for the design & construction of pile foundations for the off shore structures with suitable sketches. **[10]**

OR

Q2) What are the various types of deep foundations, Also, Explain the I.S. code provisions with respect to minimum depth of deep foundations. **[10]**

Q3) Explain any one field method for estimation of load carrying capacity of under reamed pile foundation with suitable sketch. Also, explain interpretation of data from the field test. **[10]**

OR

Q4) Explain the classification of piles with respect to materials used & functions. Also explain the specific situations where these piles are used. **[10]**

Q5) a) Explain the various components of total settlement. Also, explain how immediate settlement & settlement due to consolidation is evaluated **[8]**

b) Explain any one field test used for the design of combined footing Also, Explain the data obtained from field test & its interpretation in design. **[8]**

OR

Q6) a) Compare the I.S. code provisions & IRC provisions in respect of design of well foundation. **[8]**

b) Explain the equations proposed by skempton for the estimation of ultimate bearing capacity for different types of soil strata. Also, Explain the meaning of each term. **[8]**

P.T.O.

Q7) a) Explain the design guidelines for well foundation for the following components with suitable sketches **[9]**

i) Well curb

ii) Cutting edge

iii) Skin friction

iv) Bottom plug.

b) Draw a typical section of rockfilldam & Explain the functions of its various components. Also, state the advantages and disadvantages of rockfilldam. **[9]**

OR

Q8) a) Explain the various forces acting on well foundation. How the forces are evaluated using the provisions of IS and IRC codes. **[9]**

b) Explain any casestudy of failure of well foundation with respect to
(i) structural failure **[9]**
(ii) settlement.

Q9) a) Explain the stress distribution around a tunnel situated at a great depth below the ground surface for

(i) Elastic case and **[8]**

(ii) plastic case.

b) Explain

(i) Positive projecting conduit and

(ii) Negative projecting conduit with suitable sketches. **[8]**

OR

Q10)a) Explain how the load on conduit due to line load is evaluated. **[8]**

b) Write a short note on 'Imperfect ditch conduit and evaluation of load on imperfect ditch conduit. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3082

[Total No. of Pages : 3

[5461]-118
B.E. (Civil)
HYDRO POWER ENGINEERING
(2012 Pattern) (Semester - II) (Elective - III)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) *Attempt Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
2) *Figures to the right indicate full marks.*

Q1) a) What is Cascade hydro power plant? Explain it with an example. **[4]**

b) Explain basin wise hydro power potential in India. Which basin are lagging in harnessing potential. **[3]**

OR

Q2) a) Explain procedure to determine hydro power potential in stream. **[4]**

b) Compare tidal power plant with hydro power plant. **[3]**

Q3) a) Explain the components of valley type hydro power plant. **[4]**

b) Compare surface hydro power plant with underground hydro power plant. **[3]**

OR

Q4) a) Explain Run-off hydro power plant. **[4]**

b) State the functions of **[3]**

i) HRT

ii) Penstock

iii) Surge tank

iv) Draft tube

P.T.O.

Q5) Calculate monthly electric bill in kWh (30 days) for data given. **[6]**

Sr.	Appliance	Power (Watt)	No.	Daily usage in (Hrs)
1	Fluorescent tube	40	03	07
2	Heater	2000	01	06
3	Mixer-Grinder	300	01	01
4	Refrigerator	400	02	18
5	LED bulbs	15	07	08

OR

Q6) A load on hydro plant varies from minimum 12,500 kW to maximum 44,500 kW.Three turbo generators of 17000 kW capacity each have been installed. **[6]**

Calculate :

a) Total installed capacity

b) Capacity factor

c) Max load

d) Load factor

e) Utilization factor

Q7) a) Explain different types of intake structure in hydro power plant. **[6]**

b) Write function, types and installation of penstock for surface type of hydro power plant. **[5]**

c) Explain overall safety measures during construction, working of under ground hydro power plant. **[5]**

OR

Q8) a) Explain : i) Draft tube

ii) Tail Race tunnel **[6]**

b) With a neat sketch, explain Ferebay and settling chamber in hydro power plant. **[5]**

c) What are different methods of designing penstock. Explain any one. **[5]**

Q9) a) What are factors for selection of Turbine. **[5]**

b) Write procedure for designing pelton wheel turbine. **[8]**

c) Distinguish between Reaction Turbine and Impulse Turbine. **[5]**

OR

Q10)a) Design a pelton wheel turbine for given data: **[8]**

i) Power to be generated = 14000 kW.

ii) Design head = 900 m

iii) Coefficient of velocity = 0.98

iv) Speed ratio (Ku) = 0.46

v) Overall efficiency = 0.90

b) Explain Surge tank – significance, function, types with examples. **[6]**

c) Write a measures to minimize cantation in turbine. **[4]**

Q11)a) Explain tariffing for electric energy and types of tariffs for hydro power plant. **[8]**

b) Explain 'Private participation' in hydro power sector. What are government policies in India for it. **[8]**

OR

Q12)a) What are salient features of Electricity Act 2003. **[8]**

b) What is carbon credit? Explain significance and sustainability in development of country. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3083

[Total No. of Pages : 2

[5461]-119
B.E. (Civil)
AIR POLLUTION AND CONTROL
(2012 Pattern) (Semester - II) (Elective - III) (End Sem.)

Time :2 ½ 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 wherver necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables are allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are the zones of atmosphere? Explain Chemosphere and Ionosphere. **[6]**

b) Explain the difference between ambient air sampling and stack sampling. **[4]**

OR

Q2) a) What are the scales of meteorology? Explain. **[6]**

b) Write a short note on High volume sampler. **[4]**

Q3) a) What do you understand by stability of the atmosphere? Explain stable atmospheric condition. **[6]**

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

OR

Q4) a) Enlist and Explain any two methods to control odour pollution. **[6]**

b) Explain in brief radiation inversion with a neat sketch. **[4]**

Q5) a) Design a parallel type electrostatic precipitator with 10 channels to handle 10000 m^3/hr of gas for efficiency of i) 90%, ii) 95% and iii) 99%. Assume 1) velocity of particle = 0.1 m/sec, 2) height of plate = 2m and 3) spacing between plates = 0.15m. **[8]**

b) Draw a neat sketch of reverse flow cyclone and the standard cyclone proportions in terms of diameter D. State expression for (dpc) cut size of particle and separation factor (Fc). **[8]**

OR

P.T.O.

Q6) a) Explain working principle and collection mechanism of wet scrubbers or wet collectors. State its advantages and disadvantages. **[8]**

b) Explain working principle of bag filter with a neat sketch. State its advantages also. **[8]**

Q7) a) Explain an important provision made in "THE AIR (Prevention and Control of pollution) ACT 1981". **[8]**

b) Explain tangible and intangible economic losses due to air pollution. **[8]**

OR

Q8) a) Consider breeze from west and explain land use planning to control air pollution with a neat sketch. **[8]**

b) Explain Cost–benefit analysis (CBA) or Cost–Benefit Ratio in view of : purposes of CBA, Process, Evaluation, and Cost-benefit ratio analysis with example. **[8]**

Q9) a) Explain any two methodologies for preparing environmental impact assessment report. **[9]**

b) Explain the EIA cycle and procedures. **[9]**

OR

Q10)a) Discuss the Environmental Rules 1999 for sitting of industries. **[9]**

b) Explain roles of different authorities in the EIA Process. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3084

[Total No. of Pages : 3

[5461]-120
B.E. (Civil Engineering)
FINITE ELEMENT METHOD IN CIVIL ENGINEERING
(2012 Course) (Semester - II) (Elective - III) (401009E)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

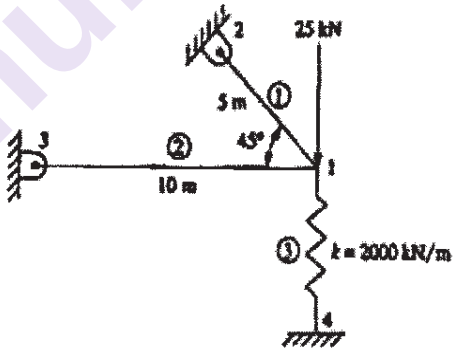
Q1) a) Derive strain displacement relations for 3D elasticity problem. **[6]**

b) What is node? Explain types of nodes with suitable example. **[4]**

OR

Q2) Give two and three dimensional Pascal's triangle. Explain its use in FEM analysis. **[10]**

Q3) For the assemblage as shown in figure, determine stress in each element. Take E = 210GPa, A=5×10^{-4} m^2, nodal displacement, the forces in each element and the reactions. **[12]**



OR

Q4) Determine deflection and rotation at the center of beam. Also fine support reactions and moments. E = 200GPa, A = 5×10^{-4} m^2. **[12]**

P.T.O.

Q5) a) Derive the area coordinates of constant strain triangular (CST) element. **[10]**

b) Distinguish between CST and LST elements. **[6]**

OR

Q6) a) Derive the stiffness matrix of two noded bar element using variational principle. **[10]**

b) State and Explain 'Principle of minimum potential energy' **[6]**

Q7) a) A six noded rectangular element has 4 corner nodes and one node at the centre of the two edges parallel to x axis. The other two edges are parallel to y axis. Obtain the six shape functions using Lagrange interpolation. **[10]**

b) Derive natural coordinates of 1 D bar element in x-y coordinate system. **[6]**

OR

Q8) a) Derive shape functions for the two noded beam element using polynomial in Cartesian coordinate system. **[10]**

b) State and explain principle of virtual work and minimum potential energy. **[6]**

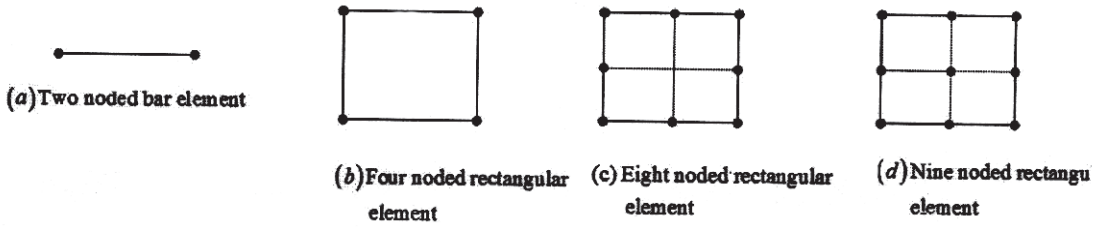
Q9) Derive shape functions of following isoparametric elements in natural coordinate system (ξ, η). **[16]**

a) Two noded bar element

b) Four noded rectangular element

c) Eight noded rectangular element

d) Nine noded rectangular element



(a) Two noded bar element

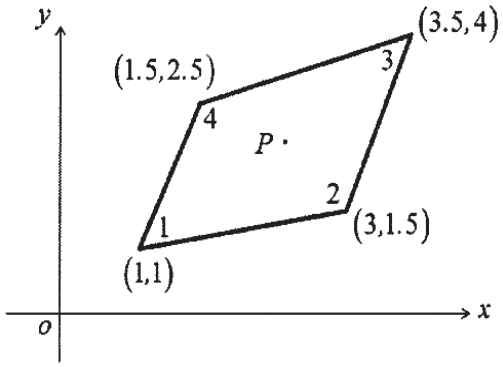
(b) Four noded rectangular element

(c) Eight noded rectangular element

(d) Nine noded rectangu element

OR

Q10) Derive the Jacobian matrix for the four noded quadrilateral isoparametric element as shown in figure. **[16]**



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Total No. of Questions : 10]

SEAT No. :

P3085

[Total No. of Pages : 2

[5461]-121

B.E. (Civil)

CONSTRUCTION MANAGEMENT

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

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.***
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 brief overview of Indian construction industry with reference to advanced technologies used for construction. **[5]**

b) Prepare WBS for construction of Tunnel. **[5]**

OR

Q2) a) Write short note on Line of Balance Technique. **[5]**

b) Write Note on Project Monitoring and Reporting System. **[5]**

Q3) a) Explain Project Management Consultancy with its role and selection process. **[5]**

b) What is Work study and Work measurement? Explain in brief. **[5]**

OR

Q4) a) Explain Workmen Compensation Act 1923. **[5]**

b) Explain the importance and difficulties related to the Capital Investment. **[5]**

P.T.O.

Q5) a) Write short note on Value Engineering. **[8]**

b) Explain: **[8]**

i) Simulation analysis

ii) Decision tree analysis

OR

Q6) a) Explain the insurance in the Risk Management. **[8]**

b) Explain with suitable example Break Even Analysis. **[8]**

Q7) a) Explain : Performance appraisal and Job Evaluation. **[8]**

b) Write short note on : Codification of Materials. **[8]**

OR

Q8) a) Write note on Training and Career planning. **[8]**

b) Explain Material Management System and its linkages with other functional areas in Construction Management. **[8]**

Q9) a) Define Artificial intelligence and write the applications of Artificial Intelligence in Civil engineering. **[10]**

b) Explain Fuzzy Logic and its applications in civil engineering. **[8]**

OR

Q10)a) Explain Artificial Neural Network in detail. **[10]**

b) Write short note on : Genetic Algorithm. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

P3086

[Total No. of Pages : 4

[5461]-122
B.E. (Civil)
ADVANCED TRANSPORTATION ENGINEERING
(2012 Course) (End Sem.) (401010B) (Elective-IV) (Semester-II)

Time : 2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:

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

Q1) a) Write a note on Transport Policy. **[5]**

b) What do you understand by trip generation? Explain with an example. **[5]**

OR

Q2) a) Explain the concept of Hyperloop. **[4]**

b) As a transport planner, what steps would you propose to increase the use of public transportation system in your city? **[6]**

Q3) a) Highlight the contribution of JNNURM scheme in the development of Pune city. **[5]**

b) Differentiate between B/C ratio and NPV method of economic valuation. **[5]**

OR

Q4) Write notes on: **[10]**

a) Vehicle Operating Cost

b) Concept of Integrated Inter Modal Transit System

P.T.O.

Q5) a) Explain the process of conducting moving vehicle survey. What are the traffic parameters that can be gathered from such a survey and how would you use the data obtained to solve traffic problems. **[12]**

b) With respect to Signal design, define the following terms: **[4]**

i) Cycle

ii) Phase

iii) Cycle length

iv) Interval

OR

Q6) a) Explain grade separated intersections, its advantages and limitations. **[6]**

b) How would you conduct parking demand survey in your college campus? **[6]**

c) Explain the concept of PCU value. **[4]**

Q7) a) Design a flexible pavement as per IRC 37-2001 for the construction of a new road based on following data. Draw a typical cross-section showing all the basic layers. **[10]**

i) Two lane single carriageway.

ii) Initial traffic in the year of completion of construction = 1400 CVPD. (sum of both directions)

iii) Traffic growth rate per annum = 5%.

iv) Design life = 15 years.

v) CBR = 6%.

vi) Terrain - Rolling

Assume any necessary data but state it clearly.

b) Explain how distress in field is measured using manual methods. **[6]**

OR

Q8) a) Write notes on: **[10]**

i) AASHTO guide to design of pavements.

ii) Modifications made in IRC 37-2012 edition as compared to IRC 37-2001.

b) The rebound deflection values in mm, determined at 10 spots on a National Highway with heavy traffic are given below. **[6]**

1.20, 1.34, 1.25, 1.55, 1.56, 1.55, 1.62, 1.28, 1.41, 1.36

Determine the values of:

i) Mean deflection

ii) Standard deflection

iii) Characteristics deflection

Q9) a) Design the tie bars considering deformed bars for the following data: **[10]**

Slab thickness = 36 cm

Lane width – 3.5 m

Coefficient of friction = 1.5

Density of concrete = 2600 kg/m^3

Allowable tensile stress in deformed bars = 2000 kg/cm^2

Allowable bond stress = 25 kg/cm^2

Diameter of tie bar = 14 mm

b) Discuss the advantages and limitations of rigid pavements over flexible pavements. **[8]**

OR

Q10)a) Explain the effect of variation of temperature on cement concrete pavements. **[6]**

b) Write notes on: **[12]**

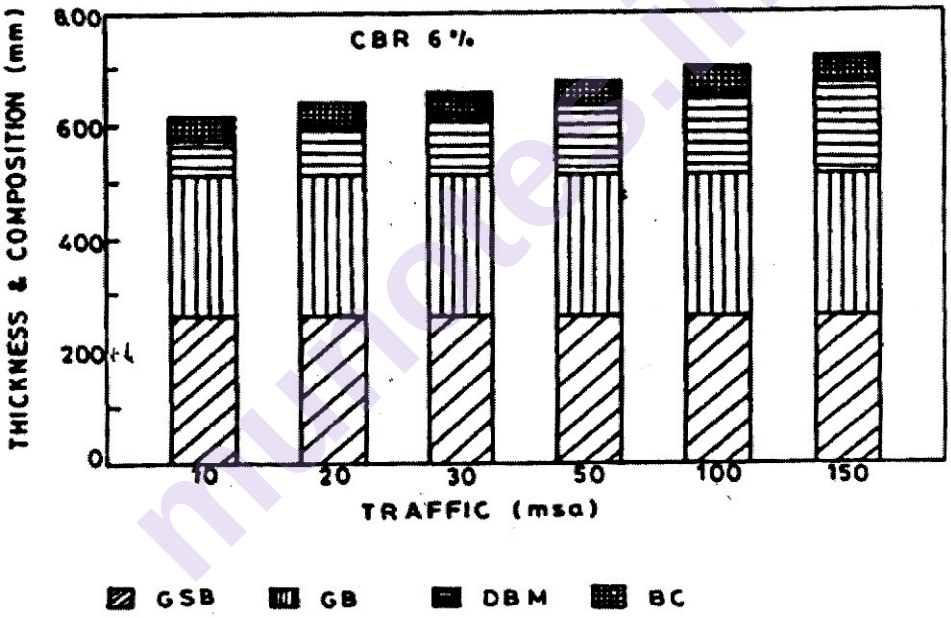
i) Joints in rigid pavements.

ii) Correction for seasonal variation in subgrade moisture content in Benkelman Beam Deflection study.

PAVEMENT DESIGN CATALOGUE

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

CBR 6%				
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	



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Total No. of Questions : 10]

SEAT No. :

P3087

[Total No. of Pages : 4

[5461]-123

B.E. (Civil)

STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS IN CIVIL ENGINEERING

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8 Q. 9 or Q. 10.***
2) ***Figures to the right indicate full marks.***
3) ***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 Newton Raphson Method with an example. **[4]**

b) Find a real root of $2x - \log x = 6$, using False Position Method, correct up top three decimal places. **[6]**

OR

Q2) a) Explain Trapezoidal Rule and Simpson's 1/3rd and 3/8th Rule, give applications of Simpson's Rule. **[4]**

b) Evaluate $\int_0^4 e^x dx$ by Trapezoidal Rule, Simpson's 1/3rd and 3/8th Rule, given that, $e = 2.72$, $e^2 = 7.39$, $e^3 = 20.09$, $e^4 = 54.6$. **[6]**

Q3) a) Explain optimization techniques and use of solution of linear equations and its methods in brief. **[4]**

b) Solve using Gauss Elimination method, Following set of equations: **[6]**

$$2x + 4y + z = 3,\ 3x + 2y - 2z = -2,\ x - y + z = 6$$

OR

Q4) a) Explain Gauss Elimination Method with an example. **[4]**

b) Solve using Gauss Siedel Method: **[6]**

$$10x + y + z = 12,\ 2x + 10y + z = 13,\ 2x + 2y + 10z = 14$$

P.T.O.

Q5) a) Explain classification of data and methods of data collection. **[4]**

b) Calculate mean, median, mode, mean deviation and standard deviation from following data: **[5]**

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	15	30	53	75	100	110	115	125

c) Calculate coefficient of quartile deviation and coefficient of variation from the following data: **[7]**

Class interval	0-20	20-40	40-60	60-80	80-100
Frequency	15	30	53	75	100

OR

Q6) a) Explain various methods for measures of dispersion and measures of central value with formulae. **[4]**

b) Given below is the information of daily wages paid to the workers on two construction projects X and Y: **[7]**

Daily Wages (Rs.)	Number of workers	
	Proj X	Proj Y
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 find:

i) Which project pays higher wages

ii) Which project has more consistent wage structure

c) Following are the marks (out of 100) scored by two students A and B in 10 subjects. Find (using coefficient of variation) which of the two students is more consistent with marks. **[6]**

A	32	28	47	63	71	39	10	60	96	14
B	19	31	48	53	67	90	10	62	40	80

Q7) a) A fair dice is tossed twice. Find the probability of getting 4, 5 or 6 on the first toss and a 1, 2, 3 or 4 on the second toss. **[4]**

b) A and B play for a prize of Rs. 1000, A is to throw a dice first and is to win if he throws 6. If he fails, B is to throw and is to win if he throws 6 or 5. If he fails, A is to throw again and to win if he throws 6, 5 or 4, and so on. Find their respective expectations. **[6]**

c) The probability that a contractor will get plumbing contract is 2/3 and the probability that he will not get an electrical contract is 5/9. If the probability of getting at least one contract is 4/5, what is the probability that he will get both the contracts. **[7]**

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) The probabilities of X, Y and Z becoming managers are 4/9, 2/9 and 1/3 respectively. The probabilities that the bonus scheme will be introduced if X, Y and Z become managers are 3/10, ½ and 4/5 respectively. **[7]**

i) What is the probability that the bonus scheme will be introduced.

ii) If the bonus scheme has been introduced, what is the probability that the manager appointed was X.

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

b) Calculate Karl Pearson's coefficient of correlation from the following data: **[6]**

X	100	200	300	400	500	600	700
Y	30	50	60	80	100	110	130

c) The following data gives the experience of machine operators and their performance ratings as given by the number of good parts turned per pieces: **[7]**

Operator	1	2	3	4	5	6	7	8
Experience (years) (X)	16	12	18	4	3	10	5	12
Performance Ratings (Y)	87	88	89	68	78	80	75	83

OR

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

b) From the data given below, find: **[7]**

i) Two regression equations

ii) Coefficient of correlation between marks in Economics and Statistics

iii) The most likely marks in statistics when the marks in economics is 30

Marks in Economics	25	28	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

c) The correlation of coefficient between two variables X and Y is $r = 0.6$, If $S_x = 1.5$, $S_y = 2.00$ $\underline{X} = 10$ and $\underline{Y} = 20$, find the regression lines of: **[6]**

i) Y on X

ii) X on Y

Total No. of Questions : 10]

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P3088

[Total No. of Pages : 2

[5461]-124

B.E. (Civil)

PLUMBING ENGINEERING

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***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 drinking water norms as per CPCB and explain plumbing for public health centre. **[6]**

b) Explain Green plumbing code supplement India (GPCS - I). **[4]**

OR

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

b) Explain local laws laid down by local governing body for plumbing. **[4]**

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

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

OR

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

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

P.T.O.

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

b) Explain importance of ventilation in piping. State maximum value of pneumatic pressure difference in Pascal's so that the seal is protected, State vent terminals as per code. **[10]**

OR

Q6) a) How does grease trap works explain with neat sketch also explain its maintenance? **[8]**

b) State the trap requirements as per uniform plumbing code for: **[10]**

i) Trap seal and trap seal protection

ii) Design of trap

iii) Trap setting and protection

Q7) a) State requirements of a sanitary closet. Explain Washout Water Closets & Hopper Closets with neat sketch. **[8]**

b) Explain drainage air test & drainage water test procedures. **[8]**

OR

Q8) a) Explain sizing of house drain & sizing its vent pipe. **[8]**

b) Explain basic guide to calculate falls and gradients for drainage. **[8]**

Q9) a) Explain RCC, PVC, Nu-Drain, and Stoneware for building sewers. **[8]**

b) Explain requirements for brick built manholes for sewer line with neat sketch. **[8]**

OR

Q10)a) Explain design of water supply systems for multi-storey buildings. **[8]**

b) Explain drainage system considerations for multi-storey buildings. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3089

[Total No. of Pages : 2

[5461]-125

B.E. (Civil)

GREEN BUILDING TECHNOLOGY

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer 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) Justify the statement, "Indoor environmental quality is dependent upon materials used in construction". **[6]**

b) Explain the importance of building envelope in climate responsive architecture. **[7]**

c) Why "Life Cycle assessment of materials" is important? Give suitable example. **[7]**

OR

Q2) a) How the concept of, "Reuse and recycle of construction waste reduces burden on natural resources"? **[6]**

b) What is meant by 'heat flow through materials? What is the relation of the above said term with mechanical ventilation and climatic behavior? **[7]**

c) Explain the term Embodied Energy and mention its significance for any construction project. **[7]**

Q3) a) Elaborate in depth : Fresnel lens, LED. **[8]**

b) What is the significance of solar energy? Elaborate the applications of the same in relation with suitable example of any Green Building. **[9]**

OR

P.T.O.

Q4) a) What is the importance of water conservation? Explain the same by appropriate examples. **[8]**

b) Write a note on SWM and explain any one technique. (Sketch is essential). **[9]**

Q5) a) What is the importance of CDM? Explain its impact in relation with developed and developing countries? **[9]**

b) Write a note on Kyoto protocol. **[8]**

OR

Q6) a) Discuss in detail the salient features of ECBC code. **[8]**

b) Elaborate by drawing the flow chart, various stages under CDM. **[9]**

Q7) a) Compare and contrast between "BREEAM and CASBEE". **[8]**

b) What is the need of rating? Explain any two salient points for rating. **[8]**

OR

Q8) a) Explain in detail, "LEED - India" rating system. **[8]**

b) What advantages are given to, "Rated Buildings"? Explain with a case study. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3090

[Total No. of Pages : 2

[5461]-126

B.E. (Civil Engineering)

FERROCEMENT TECHNOLOGY

(2012 Course) (Semester-II) (End Sem.) (401010DC) (Open Elective)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Discuss raw material and skills with respect to ferrocement? **[7]**

b) Discuss curing and maintenance of ferrocement structures? **[7]**

c) What are the design recommendations of ACI code for ferrocement? **[6]**

OR

Q2) a) Write advantages and applications of ferrocement? **[7]**

b) Explain various parameters affecting the properties of ferrocement? **[7]**

c) Evaluate predominant stresses in structural members such as arches, shells and beams curved in plan? **[6]**

Q3) a) What are the specifications for ferrocement water tank and ferrocement double wall? **[8]**

b) Why ferrocement structures are suitable for earthquake zones. Explain with suitable examples? **[9]**

OR

P.T.O.

Q4) a) Explain factors governing cost analysis of ferrocement structures? **[8]**

b) Explain in detail the use of ferrocement as under-reamed piles, encased columns and raft foundation? **[9]**

Q5) a) Explain benefits of constructing swimming pools and spherical tanks using ferrocement? **[8]**

b) Explain in detail with a neat sketch arch shaped ferrocement counterfort retaining wall? **[9]**

OR

Q6) a) Ferrocement is an effective technique for water retaining structures. Explain? **[8]**

b) What are the different types of ferrocement retaining walls and explain cantilever ferrocement retaining wall in detail? **[9]**

Q7) a) Explain special applications of ferrocement such as for ferrocrete boats and large size digesters? **[8]**

b) Discuss various precast products in ferrocement? **[8]**

OR

Q8) a) Write short notes on pyramid, domes and shells? **[8]**

b) What are the benefits of ferrocement for precast products and write factors affecting the selection of precast ferrocement components? **[8]**

Total No. of Questions : 10]

SEAT No. :

P3091

[Total No. of Pages : 2

[5461]-127
B.E. (Civil)
SUBSEA ENGINEERING
(2012 Pattern) (Open Elective-IV) (Semester-II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

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

b) State the scenario of oil, gas and coal consumption as energy source. **[6]**

OR

Q2) a) Enlist components of subsea production system. **[4]**

b) Explain the overview of Indian and overseas oil and gas industry. **[6]**

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

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

OR

Q4) a) Explain relation between major components of subsea production system. **[6]**

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

P.T.O.

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

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

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 challenges in subsea surveys. **[8]**

b) Explain civil engineering risks at field development. **[8]**

OR

Q8) a) Classify foundations required at subsea establishments. **[8]**

b) State typical load considerations for subsea foundation design. **[8]**

Q9) a) Sketch typical off shore trussed structures showing typical design loads under consideration. **[9]**

b) Discuss typical design options available for deep water pipe/riser design. **[8]**

OR

Q10)a) Water pipe of 60 mm diameter contains oil pressure head 150 mm. 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 270 MPa. **[9]**

b) Explain the design parameters of manifold. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P3092

[Total No. of Pages : 2

[5461]-128

B.E. (Civil)

WAVE MECHANICS

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12.***
2) ***Figures to right indicate full marks.***

Q1) a) Explain generation & delay of waves. **[4]**

b) Explain 'SWAN' model. **[3]**

OR

Q2) a) Explain basic hydro dynamic eq^{n} in wave. **[4]**

b) Explain 'MIKE' model. **[3]**

Q3) a) Explain kinematic free surface wave boundary condition. **[4]**

b) Write classification of waves. **[3]**

OR

Q4) a) Explain dynamic boundary condition for wave. **[3]**

b) Define: **[4]**

i) Wave particle acceleration

ii) Wave particle velocity

Q5) a) Explain wave shoaling phenomena. **[3]**

b) Differentiate between wave set up and wave set down. **[3]**

OR

P.T.O.

Q6) a) What is effect of wave run up on coast. **[3]**

b) Distinguish between wave shoaling and wave breaking. **[3]**

Q7) a) What is Tucker method in wave statistic. What are assumptions and limitations. **[8]**

b) How do you analyse wave by Scott spectrum method. **[8]**

OR

Q8) a) What is wave statistics? Explain any one method of analysis of wave statistics. **[8]**

b) Describe 'JONSWAP' spectrum for wave spectrum analysis. **[8]**

Q9) a) What are the measures to control coastal erosion. **[8]**

b) Explain the 'Beach nourishment' in detail. **[8]**

OR

Q10)a) What are causes of coastal erosion. **[8]**

b) What is Near shore system? What are they? **[8]**

Q11)a) What are different process of littoral? **[6]**

b) What is sediment budgeting? **[6]**

c) What are different engineering studies of littoral processes. **[6]**

OR

Q12)a) Due to littoral movement, how does shore get change. **[6]**

b) What is 'Foredune'? Explain its role in shore processes. **[6]**

c) Explain littoral - process, material and wave conditions. **[6]**

Total No. of Questions : 8]

SEAT No. :

P3093

[Total No. of Pages : 2

[5461]-129

B.E. (Civil)

REPAIRS AND REHABILITATION OF CONCRETE STRUCTURES

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain following in detail: **[10]**

i) Damage to concrete due to chemical attacks.

ii) Damage to concrete due to mechanical actions.

b) Discuss in detail non-destructive techniques for determination of concrete properties. **[10]**

OR

Q2) a) Explain in detail: **[10]**

i) Concrete endoscopy.

ii) Corrosion mechanism of prestressed steel.

b) Discuss thermal and chemical resistant protective coatings. **[10]**

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

i) Polymer modified concrete.

ii) Short creting

b) Explain in detail seismic strengthening of existing RC structures. **[8]**

OR

P.T.O.

Q4) a) Discuss repair materials and their properties. **[8]**

b) Discuss in detail repair and restoration of heritage structures. **[8]**

Q5) a) Explain in detail mechanism of corrosion. **[8]**

b) Discuss in detail repair of damaged water retaining structures. **[8]**

OR

Q6) a) Explain in detail preventive measures of corrosion. **[8]**

b) Discuss repair of hydraulic structures. **[8]**

Q7) a) Discuss 'Retrofitting of structures'. W.r.t.its significance and procedures. **[8]**

b) Explain Retrofitting of following RCC members using FRP. **[10]**

i) Slab ii) Column

OR

Q8) a) Write detailed note on Retrofitting with examples. **[8]**

b) Write note on FRP. W.r.t its development and behavior. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3094

[Total No. of Pages : 5

[5461] - 131

B.E. (Mechanical Engineering)

REFRIGERATION AND AIR-CONDITIONING (Theory)

(2012 Pattern) (End Semester) (Semester - I) (402041)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer five questions from the following.***
2) ***Draw neat labelled diagrams; wherever necessary.***
3) ***Use of electronic calculator is permitted.***
4) ***Use of Steam Table, Psychrometric chart, Refrigerant Property Table is Permitted.***
5) ***Use of programmable calculator is not allowed.***
6) ***Assume suitable/standard data, if necessary.***

Q1) a) Why Coefficient of Performance (COP) of a refrigerator is more during winter season than summer? **[4]**

b) The Refrigeration cycle operates on Reverse Carnot Cycle. The capacity of a refrigerator is 200 TR, when working between 267 K and 298K. Determine the mass of ice produced per day from water at 25ºC. Also; determine the power required to drive the unit?

Assume Latent heat of ice as 335 KJ/kg. (L_{ice}=335kJ/kg). **[6]**

OR

Q2) a) Ethylene glycols and Propylene glycols are used as Secondary Refrigerants. Justify your answer? **[4]**

b) A Bell-Coleman refrigeration cycle operates between pressures of 4 bar and 16 bar. The air temperature after heat rejection to surrounding is 37ºC and air temperature at the exit of refrigerator is 7ºC. The isentropic efficiencies of turbine and compressor are 0.85 and 0.80 respectively. Determine Compressor and Turbine work per ton of Refrigeration (TR) and COP of the system?

Assume γ_{air}=1.4 and $C_{p\text{-}air}$=1.005 kJ/kg K. **[6]**

P.T.O.

Q3) a) What are the desirable properties of an ideal refrigerant? Also; enumerate any two thermodynamic properties required for the refrigerant? **[4]**

b) A multiple evaporator R22 refrigeration system has three evaporators, all working at the same temperature of -16ºC between the temperature limits of -16ºC and 30ºC with single compressor. The refrigeration loads of respective evaporators are 20 TR, 10 TR and 30 TR respectively. The refrigerant vapour leaving the evaporators is dry and there is no sub-cooling of the refrigerant in the condenser. Determine: **[6]**

i) Refrigeration effect per kg of the refrigerant.

ii) Mass of the refrigerant circulated in kg/min in each evaporator.

iii) Compressor power required.

iv) COP of the system

Properties of R22

Saturation Temperature (ºC)	Specific heat of Vapour (KJ/kg K)	Specific Enthalpy KJ/kg		Specific Entrophy (KJ/kg K)	
		h_f	h_g	s_f	s_g
-16ºC	0.6782	26.72	245.08	0.01080	0.9576
30ºC	0.9081	84.38	261.60	0.3115	0.8964.

OR

Q4) a) List out the two alternative refrigerants to CFC-12 in domestic refrigerators and justify your answer? **[4]**

b) In an Aqua-Ammonia vapour absorption refrigeration system; the heat is supplied to NH_3 generator by condensing steam at 2 bar and 98% dry. the temperature in the refrigerator is to be maintained at -5ºC, when the surrounding temperature is at 30ºC. Find the maximum possible COP of the system, if the saturation temperature of steam corresponding to 2 bar is 120ºC and latent heat of steam is 2201 KJ/kg.

If the refrigeration load load is 20 TR and actual COP is 75% of the maximum COP, find the mass of steam required in kg/hr. Assume, only latent heat of steam is utilised for heating purpose? **[6]**

Q5) a) Define the following terms: **[4]**

i) Dalton's law of Partial Pressure.

ii) Degree of Saturation.

iii) Dew Point Temperature.

iv) Saturated air.

b) The pressure and temperature of the air in a room is 1 bar and 28ºC. If the relative humidity is found to the 30%, determine: **[8]**

i) Dew point temperature of the air.

ii) The Specific volume of each constituent.

iii) The Specific Humidity.

c) State and explain the factors which govern the optimum effective temperature? **[4]**

OR

Q6) a) Define the following terms: **[4]**

i) Grand sensible heat factor (GSHF)

ii) Infiltration and Ventilation air

iii) Room sensible heat factor (RSHF)

iv) Outside air total heat load (OATHL)

b) Mechanical Engineering Departmental office of 25 person's seating capacity is provided with summer air-conditioning system with the following data: **[8]**

Outside Condition	34ºC DBT and 28ºC WBT
Inside conditions:	24ºC DBT and 50% RH
Volume of air supplied	0.4m^3/min/person
Sensible heat load in the office	125600 kJ/hr
Latent heat load in the office	42000 kJ/hr

Find the sensible heat factor of the plant?

c) Write a note on "Indoor air quality"? **[4]**

Q7) a) Explain with neat Sketch any two of the following Air-conditioning system: **[8]**

i) Year round air-conditioning system.

ii) Industrial air-conditioning system.

iii) Comfort air-conditioning system.

b) Explain the working of Thermostatic Expansion valve with the help of neat sketch? Enumerate its advantages and disadvantages over other type of expansion devices. **[8]**

OR

Q8) a) What do you mean by Evaporators? Explain the functioning of flooded evaporators with the help of neat sketch? **[8]**

b) Write a note on "operating and safety controls" of Refrigeration and Air-Conditioning Systems. List out minimum 08 safety controls of the system? **[8]**

Q9) a) Why "Ducts" are arranged in an air-conditioning system? Explain either "Radial Perimeter duct system" or "Extended plenum duct system" with neat sketch? **[6]**

b) A 12 cm long duct passes air at the rate of 1.2 m^3/s. If the friction factor is 0.0048, calculate the pressure drop in the following cases: **[6]**

i) When the duct is circular of diameter 28 cm;

ii) When the duct is 28 cm square section.

c) Explain the following types of supply air outlets? **[6]**

i) Grille outlets

ii) Ceiling diffuser outlets

iii) Slot diffuser outlets.

OR

Q10) a) What do you mean by equivalent diameter of rectangular duct? Derive an expression for equivalent diameter of rectangular duct for the same air flow as

$D = 1.265\left[\frac{a^3 b^3}{a+b}\right]^{0.2}$ where, 'a' and 'b' are the sides of the rectangular duct. **[6]**

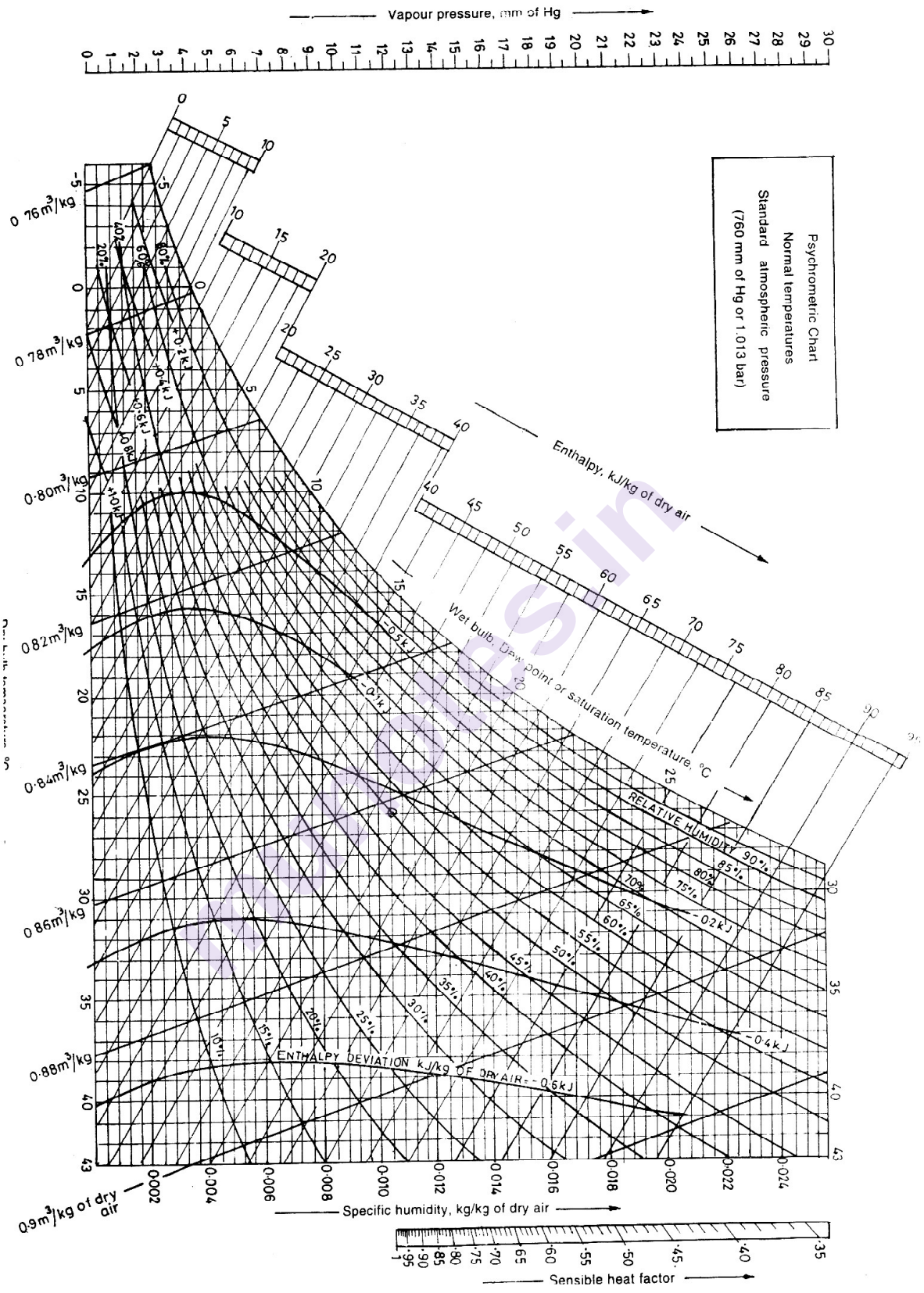
b) Explain any two of the following air distribution systems: **[8]**

i) Ejector system

ii) Downward system

iii) Upward system

c) State the principles of air distribution? **[4]**


Vapour pressure, mm of Hg
Psychrometric Chart
Normal temperatures
Standard atmospheric pressure
(760 mm of Hg or 1.013 bar)
Enthalpy, kJ/kg of dry air
Wet bulb, Dew point or saturation temperature, °C
RELATIVE HUMIDITY
ENTHALPY DEVIATION kJ/kg OF DRY AIR
Specific humidity, kg/kg of dry air
Sensible heat factor
0·9m³/kg of dry air

Total No. of Questions :10]

SEAT No. :

P3095

[Total No. of Pages : 3

[5461]-132
B.E. (Mechanical Engineering)
CAD/CAM AND AUTOMATION
(2012 Course) (Semester-I) (402042)

Time : 2½ Hours] *[Max. Marks :* 70

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8, Q.No.9 or Q.No.10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of Electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) A rectangle ABCD with vertices A(3,2), B(5,2), C(5,7) and D(3,7) is rotated through 90° clockwise about vertex A. Find the coordinates of new vertices. **[6]**

b) Compare with neat sketch, Bezier, B spline and Cubic curves. **[6]**

OR

Q2) a) Compare Analytical Curves with Synthetic curves. **[4]**

b) Three tension springs with stiffness 21 N/mm are arranged once in series and then in parallel. Compare the deflection of free end if tensile force applied at free end is 2.1 kN. **[8]**

Q3) a) A line with vertices (10, 10) and (10, 50) is mirrored about y axis. Find the new vertices. **[4]**

b) Explain ralation between Intrinsic and Global coordinate system in FEM. **[4]**

OR

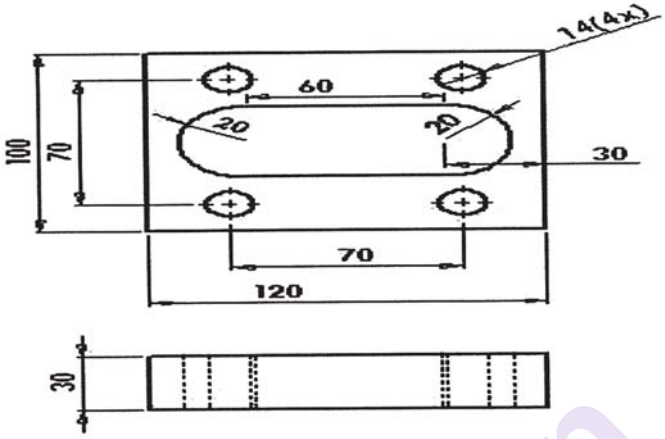
Q4) a) Write short note on CSG. **[4]**

b) Explain the need of defining a shape function in FEM. **[4]**

P.T.O.

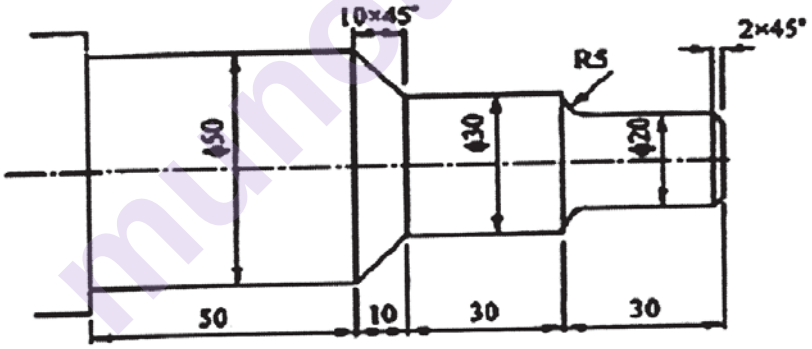
Q5) a) Explain the steps to be followed in developing a CNC part program. **[8]**

b) Write a CNC program using G and M codes for contouring a component shown in following figure. Assume suitable data for speed, feed and depth of cut. **[10]**



OR

Q6) a) Write a CNC program using G and M codes to turn a component shown below. Assume suitable data for speed, feed and depth of cut. Use only canned rough turn and finish cycles. **[10]**



b) Write G codes for : **[8]**

X-Y plane selection
Feed Per Minute
Feed Per Revolution
Cancel Canned Cycle

Write M codes for :

Coolant on
End of program
Tool change
Spindle stop

Q7) a) Explain Fused Deposition Modeling (FDM) in detail with neat sketch. State its advantages and applications. **[8]**

b) Explain 3D printing process in detail with neat sketch. State its advantages and applications. **[8]**

OR

Q8) a) Explain Stereo Lithography technique in detail with neat sketch. State its advantages. **[8]**

b) Explain Selective Laser Sintering (SLS) in detail with neat sketch. State its limitations and applications. **[8]**

Q9) a) Differentiate between Point to point & continuous path robotic systems. **[8]**

b) Write short note on FMS. **[8]**

OR

Q10)a) Write short note on Group Technology. **[8]**

b) Explain Robot Anatomy with the help of supporting sketches. **[8]**

Total No. of Questions :10]

SEAT No. :

P3096

[Total No. of Pages : 4

[5461]-133

B.E. (Mechanical)

DYNAMICS OF MACHINERY

(2012 Course) (Semester - I) (402043) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

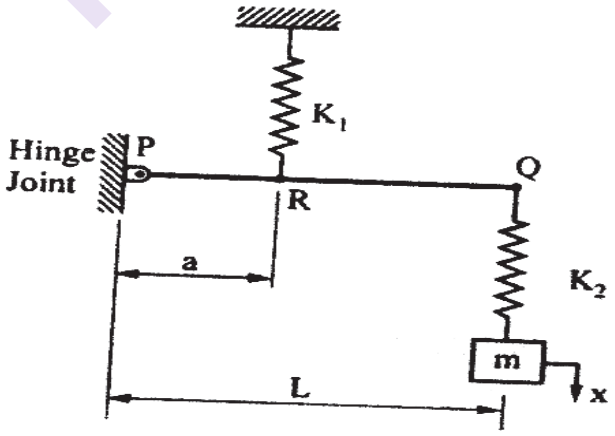
Instructions to the candidates:

1) ***Solve 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) ***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, B, C & D are four masses attached on a shaft at radii 0.1 m, 0.225 m, 0.15 m and 0.15 m respectively. Planes in which masses revolve are spaced 0.6 m apart and the weights of B, C and D are 10 kg, 5.5 kg and 3.6 kg respectively. Estimate the required mass at A and the relative angular positions of all the four masses so that the shaft is in complete balance. **[10]**

OR

Q2) a) Determine the natural frequency of the system shown in the fig. Assume the bar PQ to be rigid and weightless. **[6]**



b) What is critical speed of shaft? Find out the expression for deflection of the shaft carrying a single rotor without damping. **[4]**

P.T.O.

Q3) a) A gun barrel, weighing 600 kg has a recoil spring of stiffness 345 N/mm. If the barrel recoils one meter on firing, find

i) The initial recoil velocity of the gun

ii) The critical damping coefficient which is engaged at the end of the recoil stroke.

Assume no energy is lost in the recoil of the barrel. **[6]**

b) Define following terms **[4]**

i) Damping Ratio

ii) Logarithmic Decrement

iii) Damping Factor

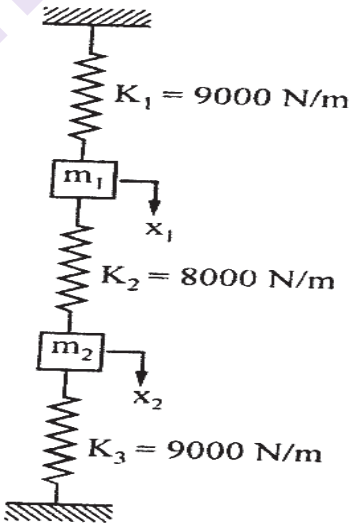
iv) Quality Factor

OR

Q4) a) When a single cylinder engine of total mass 300 kg is placed on the four springs, each spring is compressed by 2 mm. A dashpot, offering 400 N of damping force at relative velocity of 200 mm/sec, is attached to the engine to damp out the vibrations. The reciprocating mass of engine is 20 kg and stroke of the piston is 130 mm. If the engine is running at 1500 rpm find the amplitude of steady state vibrations. **[6]**

b) Explain frequency response curve with neat diagram. **[4]**

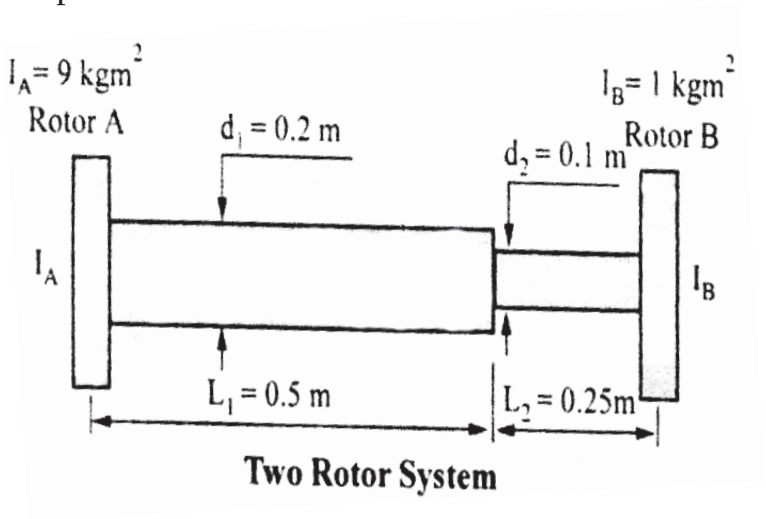
Q5) a) For the system shown in following fig, both the masses are displaced 8 mm, the upper mass in downward direction whereas the lower mass in upward direction. Find the resultant motion of masses. Assume $m_1=m_2=10$ kg. **[12]**



b) Explain torsionally equivalent shaft. **[4]**

OR

Q6) a) For a 2 rotor system shown in following fig, find the natural frequency and the position of node. Assume G= 80×10^9 N/m^2. **[12]**



Two Rotor System

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

Q7) a) What is vibration isolation? Explain any four isolating materials along with their industrial applications. **[6]**

b) Draw and explain transmissibility versus frequency ratio curves. **[6]**

c) A vibrometer has a natural frequency of 5 rad/sec and a damping factor of 0.2. The instrument is used to measure a vibrating body having a harmonic frequency of 45 rad/sec. The difference between the maximum and minimum reading is 7 mm. Find the amplitude of motion of vibrating body. **[6]**

OR

Q8) a) A device used to measure torsional acceleration consists of a ring having a moment of inertia of 0.05 kgm^2 connected to a shaft by spiral spring having a stiffness of 1 Nm/rad and a viscous damper having a constant of 0.15 Nm-sec/rad. When the shaft vibrates with a frequency of 25 cpm, the relative amplitude between the ring and the shaft is found to be 3°. What is the maximum acceleration of the shaft? **[6]**

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

c) What are the different types of vibration pick ups? Explain any one in detail. **[6]**

Q9) a) What is a sound field? Differentiate between the free field and diffuse field. **[6]**

b) Determine the total sound pressure level due to 90,95,88 dB sound pressure level, arising due to three different sound sources. **[4]**

c) What is the decibel scale? Why is a logarithmic scale chosen for sound measurement? **[6]**

OR

Q10)a) An operator in textile mill is operating six machines. The sound pressure levels of the machines at his position are 60 dB, 56 dB, 62 dB, 53 dB, 51 dB and 54 dB respectively. What is the total noise level when all machines are working. **[6]**

b) Define following terms: **[4]**

i) Acoustic impedance

ii) Sound pressure level

iii) Sound intensity

iv) Sound power level

c) What is sound enclosure? Describe any one type of sound enclosure.**[6]**

Total No. of Questions : 10]

SEAT No. :

P3097

[Total No. of Pages : 2

[5461]-134
B.E. (Mechanical)
ENERGY AUDIT AND MANAGEMENT
(2012 Pattern) (End Sem.) (402044A) (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) ***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: **[6]**

i) Commercial and non-commercial energy.

ii) Energy conservation and its need.

iii) Functions of Bureau of Energy Efficiency.

b) Discuss the present energy scenario of India in terms of non-renewable and renewable energy. **[4]**

OR

Q2) a) What are the salient features of the Energy Conservation Act 2001? **[6]**

b) What are the thrust areas of India's Energy Policy? **[4]**

Q3) a) What is energy benchmarking? Give an example. **[4]**

b) What is the need and outcome of a walk in audit? **[6]**

OR

Q4) a) List the various steps involved in a three phased detailed audit. **[5]**

b) What is fuel substitution? Briefly explain fuel substitution with an example. **[5]**

Q5) a) In a class room, there are existing 12 numbers 40 watt each florescent lamps, 8 numbers ceiling fans of 200 watt each and the class room is engaged continuously for 6 hours a day for 20 days in a month.
If all the florescent lamps and ceiling fans are replaced by energy efficient 27 watt each compact florescent lamps and 120 watt each ceiling fans, calculate the energy saving per month. Assume electricity cost as Rs. 10 per kilowatt hour. Should this ENCON project be implemented for energy savings? **[8]**

b) What are important guidelines to achieve energy efficiency in steam piping systems? **[8]**

OR

P.T.O.

Q6) a) For an initial investment of Rupees 10 Lacks, Internal Rate of Return (IRR) for a project which has the following cash flow: **[8]**

Year	1	2	3	4	5
Cash flow (Rupees):	2,00,000/-	2,00,000/-	3,00,000/-	3,00,000/-	3,50,000/-

b) Briefly explain any four options for financing an energy management program in any organization? **[8]**

Q7) a) What are the various factors affecting the efficiency calculation of a Boiler System? List the ENCON opportunities in a boiler system. **[8]**

b) Draw the Sankey diagram representing all the heat losses for: **[8]**

i) Boiler. ii) Furnace.

OR

Q8) a) Explain the various energy efficiency opportunities in Fans and Blowers. **[8]**

b) A pump is delivering 48 m^3/hr liquid with a discharge head of 37 m of water column drawn from a well with a suction head of 4 m of water column from centerline of a pump. The power drawn by the pump is 9.3 kW. If the efficiency of the pump is 65%, calculate the motor efficiency. Assume density of liquid being pumped as 1000 kg/m^3. **[8]**

Q9) a) Discuss the energy saving opportunities in a college canteen? **[6]**

b) Explain different types of instruments used during an energy audit. **[6]**

c) What is the different energy saving opportunities in any residential electrical lighting system? **[6]**

OR

Q10)a) How is acid rain formed? What are the different effects of acid rain? **[6]**

b) Write a note on Kyoto Treaty. **[6]**

c) Why cogeneration systems play an important role in any industry? **[6]**

Total No. of Questions : 10]

SEAT No. :

P3098

[Total No. of Pages : 2

[5461]-135
B.E. (Mechanical)
TRIBOLOGY
(2012 Pattern) (End Semester) (Elective-I) (402044B) (Semester-I)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Write Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn whenever 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 the desirable properties of solid lubricants. Also list the applications of solid lubricants. **[6]**

b) What are the different parameters which affect the viscosity of lubricating oil? **[4]**

OR

Q2) a) Define tribology. Explain any five tribological adverse effects generally arises in industry. **[6]**

b) Explain the methods of wear testing. **[4]**

Q3) a) Explain the working principle of hydrodynamic journal bearing. **[4]**

b) State the significance of following design variables in hydrodynamic journal bearings. **[6]**

i) Length to diameter ratio (l/d)

ii) Unit bearing pressure (p_b)

iii) Radial clearance (c)

OR

Q4) a) Explain the theory of abrasive wear. **[4]**

b) Derive the Petroffs equation for hydrodynamic journal bearing. **[6]**

Q5) a) Derive an expression for frictional power loss in hydrostatic step bearing. **[8]**

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

Shaft speed	=	720 rpm
Supply pressure	=	5 Mpa
Recess diameter	=	250 mm
Shaft diameter	=	400 mm

P.T.O.

Film thickness	=	0.15 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 rate of lubricant in *l*/min.
iii) The pumping power loss;
iv) The frictional power loss;

OR

Q6) a) A plate of 25 mm length and infinite width is separated from the plane by an oil film of 25 μm thickness and having viscosity of 0.05 N-s/m^2. If the normal load per unit width of 20 kN is applied on the plate. **[8]**

Determine:

i) The time required to reduce the fluid film thickness to 2.5 μm; and
ii) The maximum pressure;

b) Derive an expression for load carrying capacity and time of approach for squeeze film lubrication in case of two parallel circular plates separated by a fluid film. **[8]**

Q7) a) Compare oil lubricated bearings with gas lubricated bearings (at least eight comparable points). **[8]**

b) Explain the stress distribution in Hertzian contacts with example of any one condition for contact surfaces. **[8]**

OR

Q8) a) Explain the working principle of active and passive magnetic bearings. Also states advantages of magnetic bearings over conventional bearings? **[8]**

b) Explain the working principle of aerostatic step bearing in details. **[8]**

Q9) a) Why surface engineering process are required? Also state the parameters used for specifying the coatings. **[6]**

b) Write a note in brief about foil bearing and hybrid bearing. **[6]**

c) Explain : lubrication in extrusion and lubrication in forging. **[6]**

OR

Q10) Write a short note on followings: (Any Three) **[18]**

a) Porous bearing.
b) Plasma arc spraying.
c) Tribological aspects of wheel on rail road.
d) Mechanics of tyre road interaction.

Total No. of Questions : 10]

SEAT No. :

P3099

[Total No. of Pages : 4

[5461]-136
B.E. (Mechanical Engineering)
RELIABILITY ENGINEERING
(2012 Pattern) (End Semester) (Semester-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) Define probability density function and list various discrete and continuous probability distributions. **[4]**

b) Calculate failure density and hazard rate for the failure data of 400 Allen screws tested simultaneously for 240 hrs. **[6]**

Time Interval (hrs.)	0-40	40-80	80-120	120-160	160-200	200-240
Number of failed components	114	70	30	30	60	96

OR

Q2) a) Define and distinguish between reliability and quality of the product. **[4]**

b) Obtain the reliability of the system for the block diagram shown in figure 1. All the elements are identical and independent with a reliability value of 0.88. **[6]**

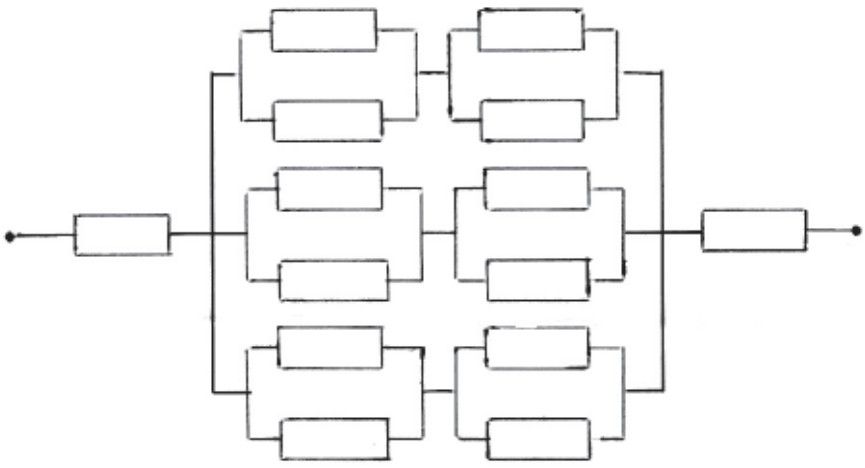


Figure 1

P.T.O.

Q3) a) It is desired to have reliability of the system as 0.945. How many numbers of identical and independent subsystems with reliability of 0.68 are required when connected in parallel? **[4]**

b) A system of three elements 1, 2 and 3 are having failure rates $\lambda 1 = 0.007$, $\lambda 2 = 0.003$, $\lambda 3 = 0.001$ 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 30 hours and desired system reliability of 0.91. **[6]**

OR

Q4) a) Explain equal apportionment technique and state its limitations. **[4]**

b) A system consists of three subsystems with elements as connected is shown in figure 2. Determine the reliability goal of each subsystem using minimum effort method if the system reliability is to be improved to a value of 0.88. **[6]**

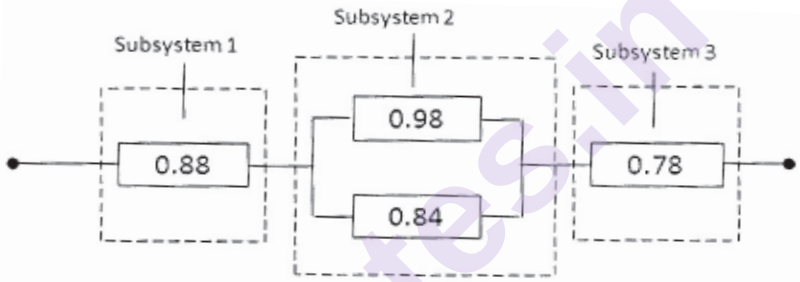


Figure 2

Q5) a) A fuel injector assembly has to be designed with a reliability value of 0.96 for 900 hours. Obtain the operational availability if maintainability of the fuel injector assembly over the same period of time 0.88 and administrative and logistic time is 30% of MTTR. Assume that the repair time follows an exponential distribution and a constant hazard rate for failure of carburetor assembly. Also, obtain the inherent availability of the system over the same period of time. **[8]**

b) Explain in brief the various cost of unreliability? Write down the salient points of built in-testing (BIT) technique. **[8]**

OR

Q6) a) A material handling system has to be designed with a reliability value of 0.93 for 1050 hours. Operational availability is required to be 95% of the probability of survival over the same period of time. Consider the mean administrative and logistic time as 20% of mean time to repair. Assuming a constant hazard rate for failure and ignoring the preventive maintenance downtime find the mean time to repair (MTTR), mean down time (MDT) and inherent availability. **[8]**

b) Define maintainability and state the factors which affect maintainability. Also, compare the inherent, achieved and operational availability. **[8]**

Q7) a) The figure 3 shown below is a fault tree diagram. The failure modes of A, C and D have failure rates 0.002, 0.001 and 0.004 per hour respectively. The failure modes of B, E and F have failure rates 0.001, 0.003 and 0.002 per hour respectively. Find out the failure rate of the system. Also, draw the block diagram of the system. **[10]**

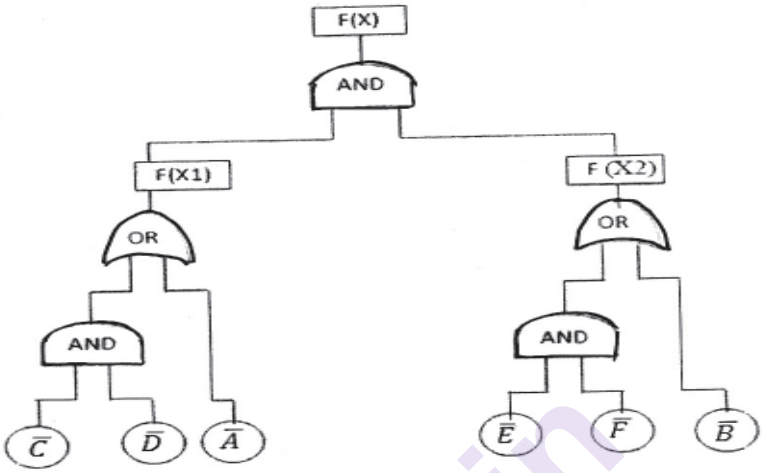


Figure 3

b) What is Design of Experiments (DOE)? Also, comment on the statement that a well-designed experiment assist in determining the key factors in a process and in selecting the process parameters at which the process would give better performance. **[8]**

OR

Q8) a) Progress in tool wear is continuously monitored by three digital microscopes namely A, B and C, functioning independently. Each of the microscopes receives power supply from independent sources. Microscope A receives power from D and E sources and the power from any one source is sufficient for operation of microscope A. Microscope B receives power from F source. Microscope C receives power from G and H sources and the power from any one source is sufficient for operation of microscope C. To effectively monitor the tool wear, it is necessary that at least one of the microscope function satisfactorily. Draw the block diagram for the complete system. Also, construct the fault tree and, based on this calculate the reliability of the system. The reliabilities of microscopes and failure rates of power sources can be referred from following table. **[10]**

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

b) Explain the steps involved in carrying out FMECA with an example. Explain the significance of RPN. **[8]**

Q9) a) The stress developed in a machine component is known to be normally distributed with a mean stress of 200 N/mm^2 and standard deviation of 30 N/mm^2. The mean material strength of machine component is 330 N/mm^2 and standard deviation of 45 N/mm^2. **[8]**

Assuming that the material strength of machine component and induced stresses are independent, determine:

i) The probability of survival of machine component

ii) Average factor of safety and

iii) Minimum and maximum values of factor of safety.

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

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

b) What is FRACAS? State its application in manufacturing industry and explain how FMECA benefits the FRACAS? **[8]**

OR

Q10)a) Following table gives the failure data of 12 springs used in an engine. Find reliability of springs using: **[8]**

i) Mean method and ii) Median method

Plot the graph between failure time and reliability for both methods. State, which method is more accurate?

Spring No.	1	2	3	4	5	6	7	8	9	10	11	12
Failure time Hrs.	235	340	176	67	489	524	695	257	392	798	456	617

b) Reliability test and durability test appear very similar from the testing mechanic's viewpoint; it is often difficult to discern any differences. Comment on the statement. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3100

[Total No. of Pages : 2

[5461]-137

B.E. (Mechanical)

MACHINE TOOL DESIGN

(2012 Pattern) (Semester-I) (End Sem.) (Elective-I) (402044D)

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 80 mm diameter workpiece is being turned on a lathe at 360 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 410 N, 85 N and 145 N respectively. Calculate the power rating of the motor assuming a coefficient of efficiency of 0.87 for the drive and permissible overloading coefficient of 0.83. **[10]**

OR

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

Q3) A bed subjected to torsional loading is constructed as a closed box-type structure, while a bed subjected to bending is constructed as an I section. Justify the statement with mathematical proof. **[10]**

OR

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

P.T.O.

Q5) a) What are the requirements of machine tool spindles? **[8]**

b) Discuss in detail how optimization of spacing between spindle supports is achieved. **[8]**

OR

Q6) a) Sketch unit supports and spindle ends in a high speed machine tools? What are the basic considerations in designing the spindle unit supports? **[8]**

b) State the factors that are to be considered while selecting the sliding bearing material. **[8]**

Q7) a) Explain the concept of static and dynamic rigidity of a machine tool. Also, state the procedure for estimating them. **[8]**

b) State the design parameters for continuous function knobs, cranks, toggles and levers. **[8]**

OR

Q8) a) Explain the effect of forced vibration due to perturbance of the cutting process on machine tools. **[8]**

b) Explain the effect of damping factor, the ratio of exciting and natural frequencies on displacement ratio (Magnification factor). **[8]**

Q9) a) With the help of a block diagram explain a closed loop N.C. system for turning and drilling operations. **[10]**

b) Explain retrofitting with reference to an old lathe unit. **[8]**

OR

Q10)a) Justify the techniques that can be applied in design of machine tool structures for micro machining. **[10]**

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

Total No. of Questions : 10]

SEAT No. :

P3101

[Total No. of Pages :3

[5461] - 138

B.E. (Mechanical)

GAS TURBINE PROPULSION

(End Sem.) (2012 Course) (402045 A) (Elective - II) (Semester - I)

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 allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) List advantages and disadvantages of gas turbine plant over I.C. engines. **[4]**

b) A gas turbine plant works between 300K and 1200K. Pressure ratio is 5. If air flows at 1500kg/minute find power generation capacity and efficiency. Show the cycle on T-S chart. **[6]**

OR

Q2) a) List out advantage of closed cycle gas turbine over open cycle gas turbine. **[4]**

b) The pressure ratio and maximum temperature of a Brayton cycle are 5:1 and 923 K, respectively. Air enters the compressed at 1 bar and 298 K. Calculate for 1 kg of air flow, the compressor work, turbine work and the efficiency of the cycle. **[6]**

Q3) a) Discuss the effect of pressure ratio on efficiency of gas turbine plant for given maximum temperature with the help of T-s diagram. **[6]**

b) Compare rocket engine with jet engine. **[4]**

OR

P.T.O.

Q4) a) What are various mechanical losses in gas turbine plant. **[4]**

b) A gas turbine plant works between 300K and 1200K. Pressure ratio is 5. Air is heated in heat exchanger with exchanger effectiveness 0.8. Neglecting pressure losses and for mass flow of air 5.25 kg/second, find out power output of the plant. **[6]**

Q5) a) Draw the inlet and outlet triangles of single stage axial flow turbine with different notation. **[6]**

b) State different manufacturing techniques for blade of gas turbine plant and explain any one of them in brief. **[6]**

c) Explain any one method of blade fixing on the turbine shaft. **[4]**

OR

Q6) a) Discuss in brief performance curves of gas turbines. **[4]**

b) Final stage of a gas turbine rotor with part reaction blading receives gas at 1.5 bar and static temperature of 680ºC. Mean blade velocity is 200m/s and gas velocity at entry to moving blades has peripheral component of 430 m/s and axial component of 330m/s. Gas expands to 1.04 bar with temperature drop of 67ºC. Calculate: Work done per kg of gas, Initial and final total temperatures of gas and Axial velocity at exit. **[8]**

c) Discuss in brief: cooling of gas turbine blades. **[4]**

Q7) a) Discuss in brief: performance characteristics of axial flow compressor. **[6]**

b) Explain surging and stalling. How to avoid them? **[4]**

c) Prove that degree of reaction for a stage of axial flow compressor $R = \frac{1}{2}\frac{V_f}{U}(\tan\beta_1 + \tan\beta_2)$ where β_1, β_2 are blade angles with respect to axial direction? **[8]**

OR

Q8) a) Draw velocity triangles for axial flow compressors and obtain expression for work. **[6]**

b) A 8 stage axial compressor with 50% reaction blading takes air at 22ºC at 3 kg/s. Pressure ratio is 6 with isentropic efficiency 88%. All stages are similar. Mean blade velocity is 180m/s and axial flow velocity is 110m/s. Find power required and blade angles. **[12]**

Q9) a) Discuss factors affecting performance of combustion chamber. **[8]**

b) What do you understand by flame stability? List out methods and explain any one method. **[8]**

OR

Q10) a) Discuss any four requirements of gas turbine combustion chamber. **[8]**

b) Compare different types of combustion chambers and explain any one with sketch. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3102

[Total No. of Pages :2

[5461] - 139

B.E. (Mechanical)

PRODUCT DESIGN AND DEVELOPMENT

(2012 Course) (402045 B) (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 and Q.9 or Q.10.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) Explain Standardization, Simplification and Specification in detail? **[10]**

OR

Q2) Explain Team Role, Team Building and Team Evaluation in detail? **[10]**

Q3) Explain following: **[10]**

a) Design Evaluation.

b) Estimation of Technical Feasibility.

OR

Q4) Explain Market Segmentation and List Down its Variables? **[10]**

Q5) a) Explain Types of Portfolio Architecture in detail? **[8]**

b) Discuss Steps in Teardown Process in Detail? **[8]**

OR

Q6) a) Explain following tools used in Benchmarking process: **[8]**

i) Intended Assembly Cost Analysis.

ii) Function Form Diagram

iii) Trend Analysis

b) Explain Benchmarking Process in detail? **[8]**

P.T.O.

Q7) a) Explain Four Guidelines to Design Injection Molded parts with neat sketch and Example? **[8]**

b) Explain four Guidelines of Machined Part Design with example and neat Sketch? **[8]**

OR

Q8) a) Explain four Guidelines of joining Design with example and neat Sketch? **[8]**

b) Explain four Guidelines of Cast Part Design with example and neat Sketch? **[8]**

Q9) a) Explain Different Phases of Product Life Cycle? **[9]**

b) Discuss Components/Elements of Product Life Cycle Management in Detail? **[9]**

OR

Q10) a) Discuss following Concept in Detail: **[9]**

i) Concept of Product Data Management.

ii) Benefits and Applications of Product Life Cycle.

b) Discuss in detail need of PLM in the context of globalization. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3103

[Total No. of Pages :6

[5461] - 140

B.E. (Mechanical)

OPERATION RESEARCH

(2012 Course) (Semester - I) (Elective - II) (402045 C) (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) ***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: **[10]**

P.T.O.

Territory	I	II	III	IV
Annual sales (Rs.)	1,26,000	1,05,000	84,000	63,000

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). **[6]**

	Destinations				
Plants or Origins	1	2	3	4	Supply
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

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 and 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 **[8]**

i) Economic ordering quantity

ii) Minimum yearly average cost.

iii) Minimum yearly total inventory cost. When the cost per unit item is 2/- per unit.

iv) Optimum number of orders per year.

v) The optimum period of supply per optimum order.

The increase in the order cost associated with ordering (1) 20% more than the EOQ.

b) The following mortality rates have been observed for a certain type 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. **[10]**

Job	J1	J2	J3	J4	J5	J6
Machine M1 [Turning]	10	3	5	4	2	1
Machine M2 [Threading]	2	4	6	3	1	2
Machine M3[Knurling]	8	6	7	9	7	7

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. **[8]**

You are required to

i) Find the proportion of time during which there is no customer in the shop.

ii) Find the probability of finding at least one customer in the shop.

iii) What is the average number of customers in the system?

iv) Find the average time spent by a customer in the shop including service.

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 (J1)	Sequence	Machine				
		A	B	C	D	E
	Time (hrs)	3	4	2	6	2

Job (J2)	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. **[12]**

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.

OR

Q10) a) A project has the following data. **[12]**

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

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. :

P3104

[Total No. of Pages :2

[5461] - 141

B.E. (Mechanical)

ADVANCED MANUFACTURING PROCESSES

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

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 indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of scientific calculator allowed.***

Q1) a) Explain High Velocity Hydroforming with schematic diagram? Enlist process parameters. **[5]**

b) Differentiate between Roll Forming and Flow Forming process and state their applications. **[5]**

OR

Q2) a) Sketch a spinning setup with labelling the various important parts. **[5]**

b) Explain the principle of High Energy Rate Forming (HERF). What are the common HERF processes? **[5]**

Q3) a) What materials can be joined with Friction Stir Welding Process? Enlist system parameters of Friction Stir Welding Processes. **[5]**

b) Compare Vacuum Die casting with Squeeze Casting. **[5]**

OR

Q4) a) Explain temperature distribution and resulting metal flow in Friction Stir Welding. **[5]**

b) Differentiate between Spinning and Shear Spinning. **[5]**

P.T.O.

Q5) a) With a schematic describe the five sub-systems (components) of a diamond turn machine tool. **[8]**

b) Explain how micro-electric discharge machining (micro-EDM) process differs from Electric discharge machining process (EDM). Compare micro-EDM with EDM based on process parameters. **[8]**

OR

Q6) a) With neat sketch of their working principle, differentiate between electrochemical grinding and electrochemical-etching. **[8]**

b) Explain with neat sketch the different machining zones in electrochemical grinding. **[8]**

Q7) a) 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]**

b) State with sketches the principle of Laminated Object Manufacturing (LOM) and Fused Deposition Modeling (FDM). **[8]**

OR

Q8) a) Describe the process steps for manufacturing a component from design/ drawing stage to finished component using an additive manufacturing process. **[8]**

b) With a schematic explain the working principle and process steps of extrusion based additive manufacturing process. **[8]**

Q9) Write short note on: **[18]**

a) Surface profiler.

b) Scanning Tunneling Microscope.

c) Interference Microscopes.

OR

Q10) a) Explain with sketch the principle of online dimensional measurement using laser-based diffraction technique. **[6]**

b) State advantages of electron microscopes over optical microscopes. Classify electron microscopes. **[6]**

c) Comment on importance of measuring techiques in micromachining. Also, classify measuring systems used for dimensional measurements and topographic inspection in micromachining. **[6]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3105

[Total No. of Pages : 3

[5461]-142
B.E. (Mechanical)
POWER PLANT ENGINEERING
(2012 Course) (End Sem.) (402047) (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) ***Draw neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Use of steam Table and Mollier Chart is allowed.***
5) ***Assume suitable data wherever necessary.***
6) ***Figures to the right indicate full marks.***

Q1) a) What is Carbon Credits? What is its significance in current energy scenario? **[4]**

b) A thermal power plant of 210 MW capacity has a maximum load of 160 MW. Its annual load factor is 0.6. The total coal consumption is 1 kg per kWh of energy generated and the cost of coal is Rs. 450.00 per tonne. Calculate: **[6]**

i) The annual revenue earned if energy is sold at Rs. 1 per kWh and

ii) The capacity factor of the plant.

OR

Q2) a) What are the element which contribute the cost of electricity? **[4]**

b) A power plant has the following annual factors: load factor = 0.75, capacity factor = 0.60, use factor 0.65. Maximum demand is 60 MW. Estimate: **[6]**

i) The annual energy production,

ii) The reserve capacity over and above the peak load, and

iii) The hours during which the plant is not in service per year.

P.T.O.

Q3) a) What are the good requirements of coal handling plant? **[4]**

b) Steam at a pressure of 15 bar and 250°C is expanded through a turbine at first to a pressure of 4 bar. It is then reheated at constant pressure to the initial temperature of 250°C and is finally expanded to 0.1 bar. Draw the T-S diagram and estimate the work done per kg of steam flowing through the turbine and amount of heat supplied during the process of reheat. Compare the work output when the expansion is direct from 15 bar to 0.1 bar without any reheat. Assume all expansion processes to be isentropic. **[6]**

OR

Q4) a) Enlist the advantages and disadvantages of Hydro Electric Power Plant (HEPP). **[4]**

b) Draw a neat diagram of CANDU type of reactor and give its advantages and disadvantages over other types of reactors. **[6]**

Q5) a) Explain with neat sketch of diesel power plant showing all system used. **[8]**

b) In a constant pressure open cycle gas turbine air enters at 1 bar and 20°C and leaves the compressor at 5 bar. Using the following data: temperature of gases entering the turbine = 680°C, pressure loss in the combustion chamber = 0.1 bar, compressor efficiency = 85%, turbine efficiency = 80%, combustion efficiency = 85%, $\gamma = 1.4$ and $C_p = 1.024$ kJ/kgK for air and gas, find: **[8]**

i) The quantity of air circulation if the plant develops 1065 kW.

ii) Heat supplied per kg of air circulation,

iii) The thermal efficiency of the cycle.

Mass of fuel may be neglected.

OR

Q6) a) Explain with details the Intercooling, reheating and regeneration of gas turbine power plant. **[8]**

b) What are the advantages and disadvantage of Diesel power plant? **[8]**

Q7) a) Explain with neat sketch of solar pond and solar flat plat collector. **[8]**

b) Explain with neat sketch of Hybrid and Tidal power plant. **[8]**

OR

Q8) a) What are the different challenges in commercialization of nonconventional power plant? **[8]**

b) Write short note on: **[8]**

i) Fuel cell, ii) Geothermal power plant

Q9) a) Explain different types of switch gears used in power plant electrical circuits. **[9]**

b) State any six effects of thermal pollution. Name any three source of thermal pollution. **[9]**

OR

Q10)a) Write short notes on: **[9]**

i) Circuit breaker

ii) Control System

iii) Causes of short circuits

b) Write short notes on: **[9]**

i) Global warming

ii) Noise pollution

iii) Green house effect

Total No. of Questions : 10]

SEAT No. :

P3106

[Total No. of Pages : 5

[5461]-143

B.E. (Mechanical)

MECHANICAL SYSTEM DESIGN

(2012 Course) (Semester - II) (402048)

Time : 3 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 diagram must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of programmable calculator is not allowed.*
5) *Assume suitable data wherever necessary.*

Q1) a) Figure 1 shows gearing diagram of a multispeed gearbox with number of teeth on each gear as specified. Speed of input shaft is 700 RPM. Answer the following questions based on the figure. **[4]**

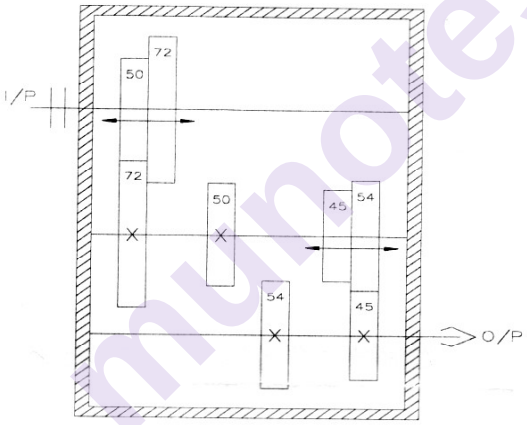


Figure.1

i) Draw correct speed diagram of the gearbox.

ii) Write correct structure formula of the gearbox.

b) It has been observed from a sample of 200 bearing bushes that the internal diameters are normally distributed with a mean of 40.010 mm and a standard deviation of 0.005 mm. The upper and lower limits for the internal diameter are 40.02 and 40.00 mm respectively. Calculate the number of rejected bushes. **[6]**

Z	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	3.0
Area	0.3413	0.3849	0.4192	0.4452	0.4641	0.4772	0.4861	0.4918	0.4987

OR

P.T.O.

Q2) a) What is the need and of multi-speed gearbox in drive system of a machine tool? **[4]**

b) What do you understand by the term "Reliability and Margin of safety", in the modern engineering design? **[6]**

Q3) a) Horizontal belt conveyor is to be used for transporting 500 metric ton of iron ore per hour at belt speed of 1 .5 m/s. Mass density of iron ore is 1800 kg/m^2. If surcharge factor for polyamide belt is 0.0725, determine the required effective belt width. **[4]**

b) Draw and explain screw take up arrangement in belt conveyor **[6]**

OR

Q4) Derive the expression for frictional force between the idler and idler roller pin for carrying and return run idlers. **[10]**

Q5) a) How pressure vessels are classified as per IS 2825. Explain your answer with reference to the following. **[6]**

i) Operating conditions

ii) Material of construction

iii) Radiography requirement

b) A tube, with 50mm and 80mm as inner and outer diameters respectively, is reinforced by shrinking a jacket of outer diameter 100mm. The compound tube is to withstand an internal pressure of 40MPa. The shrinkage allowance is such that the maximum tangential stress in each tube has same magnitude. Calculate

i) Shrinkage pressure and

ii) The original dimensions of tubes

Assume E = 207 KN/mm^2 **[12]**

OR

Q6) a) A cylindrical pressure vessel of 1250 mm in diameter and 20 mm in thickness is provided with a nozzle of 200 mm inner diameter and 15 mm thickness. The extension of nozzle inside the vessel is 15 mm. The corrosion allowance is 2 mm while the weld joint efficiency for shell as well as nozzle is 85%. The design pressure is 3MPa.The yield strength of material for the shell and nozzle is 200 N/mm^2. Determine whether or not reinforcing pad is required for the opening. If so determine the dimensions of the reinforcing pad made out of a plate of 14 mm thickness. **[12]**

b) What are the different types of vessel support? Explain any one type of support for vertical cylindrical pressure vessel with the help of diagram.**[6]**

Q7) a) Write a note on the materials used for manufacture of a crank shaft. **[6]**

b) Design a cast iron piston for a four-stroke diesel engine : **[10]**

Material of piston = FG200

Thermal conductivity of piston material = 46.6 W/m/°C

Factor of safety = 5

Cylinder bore = 250 mm

Length of stroke = 300 mm

Speed = 600 rpm

Indicated Mean Effective Pressure = 4 bar

Mechanical Efficiency = 80%

Maximum Gas Pressure = 4MPa

Fuel Consumption = 0.25 kg/kW/hr

Higher Calorific Value of fuel = 44000 kJ/kg

Assume that 5% of the total heat developed in the cylinder is transmitted by the piston. The temperature difference between the centre and the edge of the piston head is 220 °C.

i) Calculate the thickness of the piston head by strength and thermal consideration and decide the thickness.

ii) State whether the ribs are required. If so, calculate the number and thickness of piston ribs.

iii) State whether a cup is required in the top of the piston head. If so, calculate the radius of the cup.

OR

Q8) The following data is given for the I section (4t × 5t) connecting rod of a Diesel engine **[16]**

Cylinder bore = 85mm

Length of connecting rod = 350mm

Cross sectional area of connecting rod = $11t^2$

Where t is thickness of web and flanges of I section

Maximum gas pressure = 4MPa

Factor of safety against buckling failure = 5

(l/d) ratio for piston pin bearing = 1.5

(l/d) ratio for crank pin bearing = 1.25

Allowable bearing pressure for piston pin bearing = 13MPa

Allowable bearing pressure for crank pin bearing = 11 MPa

Length of stroke = 140mm

Mass of reciprocating parts = 1.5kg

Engine speed = 2000 rpm

Material of bolt = Chromium molybdenum steel

Yield strength of bolt material = 450 N/mm^2

Factor of safety for bolts = 5

Density of connecting rod = 7800 kg/m^3

Calculate

a) Dimensions of the cross section of connecting rod at middle.

b) Dimensions of small and big end bearings.

c) Nominal diameter of bolts for the cap

d) Magnitude of whipping stress

Q9) a) Explain with suitable example the method of optimum design for the case of redundant specifications? **[6]**

b) A shaft is to be used to transmit a torque of 2000 N-m. The required torsional stiffness of shaft is 100 N-m/degree, while the factor of safety based on yield strength is 2. Using the maximum shear stress theory, design the shaft with the objective of minimizing the weight, out of the following materials. Also find out diameter and length of shaft for the same. Assume combined shock and fatigue load factor for twisting moment as 1.25. **[10]**

Material	Weight Density, N/m^3	Modulus of Rigidity, N/mm^2	Tensile Yield Strength, N/mm^2
Chromium Steel	77×10^3	84×10^3	420
Plain Carbon Steel	76.5×10^3	84×10^3	230
Titanium Alloy	44×10^3	42×10^3	900
Magnesium Alloy	17.5×10^3	15×10^3	225

OR

Q10)a) Explain briefly the guidelines a designer has to follow to ensure safety in products. **[6]**

b) A tensile bar of circular cross section is subjected to the cyclic tensile force (F) which varies from zero to maximum. Determine the most significant objective of maximizing the energy absorption capacity using factor of safety (FS). Following limitations are to be used in the design due to space and assembly restriction. **[10]**

$d \le d_{max}$ and

$L_{min} \le L \le L_{max}$

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3107

[Total No. of Pages : 3

[5461]-144

B.E. (Mechanical)

REFRIGERATION AND AIR CONDITIONING EQUIPMENT DESIGN

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

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Neat diagram must be drawn wherever necessary.***
2) ***Figures to the right side indicates full marks.***
3) ***Use of logarithmic table, mollier chart, electronic pocket calculator, steam table & p-h chart is allowed.***
4) ***Assume Suitable data if necessary.***
5) ***Use of Refrigeration table is permitted.***

Q1) a) An R-12 saturated vapour compression cycle works between the pressure limits of 1.4 bars evaporator pressure and 10 bar condenser pressure. The mass flow rate of R-12 to L.P. compressor is 16 kg/min. calculate the power needed to run the plant and cop of the system when:

i) System uses two stage compression with liquid intercooler. The intermediate pressure is 4 bar and the vapour after intercooling is dry saturated

ii) Single stage compression without intercooling Assume no subcooling in the condenser. **[8]**

b) Explain capacity control of Reciprocating compressors. **[2]**

OR

Q2) a) A single compressor using R-12 as refrigerant has three evaporators capacity 10 TR, 20 TR and 30 TR. All the Evaporators operates at –10°c and the vapours leaving the evaporators are dry & saturated. The condenser temperature is 40°C. The liquid refrigerant leaving the condenser is subcooled to 30°c.

Assuming tsentropic compression find. **[7]**

i) The mass of refrigerant flowing through each evaporater.

ii) The power required to drive the compressor.

iii) The cop of the system.

b) Explain performance characteristic curves for Reciprocating compressors. **[3]**

P.T.O.

Q3) a) Explain with neat sketch, How LP cutout and solenoid valve control the evaporator temperature. **[5]**

b) Which are the different methods for defrosting. Explain reverse cycle defrosting with neat sketch. **[5]**

OR

Q4) a) What are limitations of VCS for the production of low temperature. **[5]**

b) Sketch and explain linde-Hampson cycle using T-S & P-h Diagram. **[5]**

Q5) a) Determine the length of tubes in a 3-pass, shell and tube R22 condenser with 108 tubes for 40 TR chiller. The condensing temperature is 43°c. The heat rejection ratio is 1.25 water is cooled to 30°c in the cooling tower. The temperature rise of water may be taken as 4.8°c. Use integral fin copper tubes with on O.D. of 1.59cm, an ID of 1.37m with 748 fin s/m length of tube. Fins are 1mm thick and 1mm high over tubes.Assume temperature drop of 5°c through the condensing film. **[10]**

b) Explain the operational considerations of condensers. **[6]**

OR

Q6) a) The condensing area is to be specified for a R-22 condenser of a refrigerating system that provides a capacity of 80 kw for air conditioning. The evaporating temp. is 5°c and the condensing temp. is 45°c at design conditions. Water from a cooling tower enters the condenser at 30°c and leaves at 35°c.

A Two - pass condenser with 42 tubes will be used, and the length of tubes is to be specified to provide the necessary area. The tubes are copper and are 14mm ID and 16 mm OD. **[8]**

b) Explain design consideration of evaporators. **[8]**

Q7) a) A cooling tower is to be designed to take the heat load of 200 TR refrigerating plant using F-12 as refrigerant. The heat rejection ratio of the system is 1.2. The raise in temp. allowed in the condenser is 5°c. The atmospheric air condition is 35°c DBT. and 25°c WBT. The air leaves the tower at 30°c and 90% RH. 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, 16gm/kg and 24.4 gm/kg

respectively. where as the specific volume of air at the inlet of the tower is 0.895m^3kg. 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 is the heat balance and heat transfer related to cooling towers. **[7]**

OR

Q8) a) Explain the thermal analysis of cooling towers. **[8]**

b) Explain the performance curves of cooling tower. **[9]**

Q9) a) What is heat pipe? Explain advantages of heat pipe over other heat transport material. **[8]**

b) Write short note on performance characteristics of heat pipe. **[9]**

Q10)Write short note on **[17]**

a) Thermoelectric Refrigeration.

b) Magnetic Refrigeration.

c) Steam jet Refrigeration.

Total No. of Questions : 10]

SEAT No. :

P3108

[Total No. of Pages : 2

[5461]-145
B.E. (Mechanical)
ROBOTICS
(2012 Pattern) (End-Sem.) (Semester - II) (Elective - III) (402049B)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Explain properties of Jacobian matrix of a manipulator. **[4]**

b) Suggest which configuration robot is suitable for following application and justify i)Spray Painting ii) Pick & Place. **[6]**

OR

Q2) a) What is the physical significance of angular velocity vector? **[4]**

b) What are Homogeneous Transformation & Homogeneous Transformation matrix? **[6]**

Q3) a) Explain the steps involved in DH notation process. **[6]**

b) Define Robot & Explain components of Robot (Anatomy) **[4]**

OR

Q4) a) State characteristics of velocity ellipse for planar 2R manipulator. **[4]**

b) Discuss importance of forward and inverse kinematics. **[6]**

Q5) a) Write a note on recursive forward dynamics algorithm. **[8]**

b) Explain in details, Euler-Lagrange formulation for dynamics. **[8]**

OR

Q6) a) Derive an expression for velocity of end effector of a Cartesian configuration. **[10]**

b) Compare L-E formulation and N-E formulation. **[6]**

P.T.O.

Q7) a) Describe the different steps in trajectory planning. **[8]**

b) A rotary arm of a manipulator is to ratate from 15° to 120° in 8 seconds. Determine coefficients of cubic polynomial to interpolate a smooth trajectory. Plot the position, velocity and acceleration variation against time. **[8]**

OR

Q8) a) Write short note on control i) law of positioning ii) considerations in trajectory planning. **[8]**

b) Fig. shows as error time graph. Sketch the PID controller o/p w.r.t. time. Assume Kp=5, Ki=0.7 & Kd=0.5 & Po=20% i.e. controller o/p is zero when error is zero. **[8]**

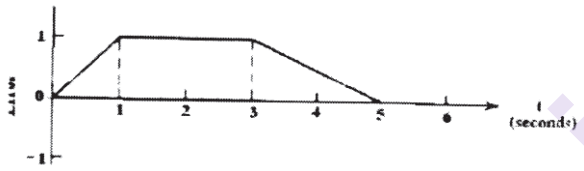


Figure 3

Q9) a) Explain with block diagramme Machine vision system for Robots. **[8]**

b) What is image processing? State image processing techniques used in robot. **[10]**

OR

Q10)a) Explain the forward & backwrad search technique in problem solving for AI. **[10]**

b) Write a short note on i) Genetic algorithm ii) Linearkalman Filter iii) Artificial neural network. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3109

[Total No. of Pages : 4

[5461]-146

B.E. (Mechanical)

INDUSTRIAL ENGINEERING

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

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1or Q2, Q3or Q4,Q5 or Q6, Q7 or Q8, Q9 or Q10 or Q11 or Q.12.***
2) ***Answer should be written in one answer book.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain with neat flow chart types of organisation. **[4]**

b) A manufacturing unit is producing 8,000 products by employing 50 workers at 8 hrs./day for 25 days in a month. If company increases this quantity to 9,600 products by hiring 10 additional workers at 8 hrs./day for 25 days in a month. Is there increase in labor productivity? What will be the increase in labor productivity if company increases quantity to 10,000 products without hiring additional workers? **[4]**

OR

Q2) a) Discuss the scope and any four objectives of industrial engineering. **[4]**

b) A company produces 1500 kg of tablets by consuming 2000 kg mix of raw material for a particular period. For the next period, the output is 3200 kg by consuming 4265 kg of the raw material and for the third period, the output is increased to 3500 kg by consuming 4200 kg of raw material. Comment on increase or decrease of productivity for second and third period. **[4]**

Q3) State the various steps of method study and explain in detail critical exmination of methods. **[6]**

OR

P.T.O.

Q4) Explain principles of motion economy related to use of human body, arrangement of workplace and design of tools and equipment. **[6]**

Q5) The two steps in preparing chocolate candy bars are molding and packaging. Personal fatigue and delay allowances are set at 12%. The molding machine operator is rated at 90% and the packer is rated at 110%. Observed times per batch are given below. Determine the normal and standard time for both task. **[6]**

	observed time in minutes			
Task	1	2	3	4
Molding	26	30	29	31
Packing	45	50	35	30

OR

Q6) A group of 10 workers working for 8 hours per day produced 320 pieces of component. It was observed that 15% of the total available time workers were idle and for remaining time they worked at an average performance of 80%. Calculate standard time for the Job assuming operations to be completed manually and workers are entitled for 12% relaxation allowances. **[6]**

Q7) a) Explain in brief various functions of production planning and control. **[8]**

b) Historical data on the sale of mobile phones of a company for the year 2011 to 2017 is given below. Using the regression analysis establish the trend values and extrapolate for the year 2018 ignoring the effect of seasonal and random fluctuations. What is the forecast for the year 2018. **[9]**

Year	2011	2012	2013	2014	2015	2016	2017
Sales	3286	4751	5867	4580	5020	8444	11072

OR

Q8) a) Explain the concept of supply chain management and supply chain network. Describe any one order control strategy in detail. **[8]**

b) Historical data on the sale of lubrication pumps for the last 12 years is given below. By the method of three yearly moving average establish the trend values and forecast demand for 13th year. If actual demand for 13th year is 520 nos. what shall be the forecast for 14th year? **[9]**

Year	1	2	3	4	5	6	7	8	9	10	11	12
Sales Nos.	332	344	328	336	370	408	420	432	428	450	498	540

Q9) a) Explain in detail factors affecting selection of location for the industrial plant. **[8]**

b) A company buys an item in lots of 500 units which is a three months requirement. The cost per unit is Rs.90 and the ordering cost in Rs.180 per batch order. The inventory carrying cost is estimated at 20% of the average inventory investment. What is the annual total cost of existing inventory policy? How much money can be saved from economic order quantity purchase? **[9]**

OR

Q10)a) What are different principles of material handling? Explain different material handling equipment's with their applications. **[8]**

b) A company spends Rs. 34,000/- on its purchasing activity and Rs.67,200/- for maintenance of inventory of Rs. 4,20,000/- annually. Around 850 orders are placed every year to replenish stocks of the various items. One of the item whose annual consumption is 9600 nos. costing Rs.30/- each is brought by the company based on staggered deliveries. How frequently should the company receive staggered deliveries and in what quantities? What is the corresponding annual total cost for this item. **[9]**

Q11)a) An industry manufacturing small capacity motors has the cost structure as follows

Material cost :Rs.50

Labor cost: Rs. 80

Variable overhead : 75% of labour cost.

Fixed overhead : Rs. 2,40,000/annum.

Sales price: Rs. 230/motor

Determine the number of motors to be manufactured to break-even.

Number of motors to be sold to make a profit of Rs.1,00,000/-

Number of motors to be sold to break even if price is reduced by

Rs. 15/ motor. **[8]**

b) What do you understand by industrial safety? What are different safety issues and general safety rules in industry? **[8]**

OR

Q12)a) Explain break-even analysis with neat chart? What are assumptions made in break-even analysis? What are different applications of break-even analysis? **[8]**

b) Explain in brief different functions of human resource department. Comment on concept of key result areas and performance appraisal of employee. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3110

[Total No. of Pages : 2

[5461]-148

B.E. (Mechanical)

AUTOMOBILE ENGINEERING

(2012 Pattern) (Semester - II) (Open Elective - III)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1or Q2, Q3or 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) Sketch a neat layout of rear wheel drive and explain its working. **[6]**

b) Explain with sketch the working of constant Gear box. **[4]**

OR

Q2) a) Sketch a typical layout of light motor vehicle and briefly describe its various parts. **[6]**

b) Explain diaphragm clutch with neat sketch. **[4]**

Q3) a) Explain with neat sketch differential. **[6]**

b) Describe with neat sketch function and working of single plate dry clutch. **[4]**

OR

Q4) a) Enumerate different types of steering gears. Explain the construction and working of a rack and pinion type steering gear. **[6]**

b) How tyres are classified? Explain any one with neat sketch. **[4]**

Q5) a) Explain with neat sketch coil spring suspension State advantages and disadvantages over conventional suspension. **[10]**

b) Write short note on air brake system. State its advantages over hydraulic brake system. **[8]**

OR

P.T.O.

Q6) a) Explain hydraulic brake system in detail. Also state its advantages and disadvantages over other brake system. **[10]**

b) Explain construction and working of Hydra gas suspension. **[8]**

Q7) a) Explain with neat sketch hybrid vehicle layout. **[6]**

b) Find the power of a car weighing 11281.5 N including 4 passenger, luggage fuel lubricating oil and cooling water engine running in top gear at 5000 r.p.m. Size of wheel tyre is 0.508m. Crown wheel to pinion ratio=4.3 Frontal area of body = 2.2 m2. Take coefficient of rolling friction and air resistance as 0.012 and 0.0007 respectively. **[10]**

OR

Q8) Write short notes on any four: **[16]**

a) Vehicle interior and ergonomics
b) Seat belt
c) Vehicle performance curves
d) Stability of vehicle
e) NVH in automobiles

Q9) a) Explain with neat sketch battery tests . **[5]**

b) Explain with neat sketch. Electric fuel pump **[6]**

c) Explain vehicle maintenance chart **[5]**

OR

Q10)Write short notes on any four: **[16]**

a) Lead acid battery
b) Positive earth return system
c) Horn
d) Maintenance of clutch
e) Sensors

Total No. of Questions : 10]

SEAT No. :

P3111

[Total No. of Pages : 4

[5461]-149

B.E. (Mechanical)

STEAM ENGINEERING & ENERGY CONSERVATION

(End Semster) (2012 Pattern) (Semester - II) (Open Elective - III) (402049 DC)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1or Q2, Q3or Q4,Q5 or Q6, Q7 or Q8 and Q.9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use of scientific calculators, steam tables, Mollies charts, Data book is allowed.***

Q1) a) Explain why steam is considered to be the most effective medium for process heating applications. Compare with other alternatives. **[5]**

b) State 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) Why is superheated steam not used in process heating. What are the advantages of using Saturated steam? **[5]**

b) Steam condition at inlet to Pressure Reducing Station (PRS) is P1 = 10kg/cm^2 abs, Dryness Fraction = 0.97, Steam condition at outlet to PRS = 3kg/cm^2 abs. Using steam table determine dryness fraction of steam at PRS outlet. What is the latent heat of wet steam at PRS Outlet? **[5]**

OR

Q3) a) Draw a labeled sketch of a horizontal double-pass shell-and-tube heat exchanger showing the following components: a) shell, b) tubes, c) tube - sheets, d) Nozzles on both shell and tube sides, e) segmental baffles, f) pass - partition plate, g) Lifting lugs, h) drains & vents on shell and tube sides and i) expansion bellows. Also, clearly indicate the baffle window and cross-flow zone. **[4]**

b) Draw and explain the working of a) baffle type b) Cyclone type moisture separators. **[6]**

OR

P.T.O.

Q4) a) With the help of suitable sketches/drawings, explain why segmental baffles are used in shell-and-tube heat exchangers. **[4]**

b) Steam requirement for a plant is as follows-. **[6]**

Steam flow required = 3000kg/hr, Inlet pressure = 7 bar saturated, Piping equivalent length = a) 150 Mtrs b) 420 Mtrs. 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.

OR

Q5) a) List down the common types of flow meters. Explain vortex flow meter with neat diagram. Mention the advantages and drawbacks. **[5]**

b) Explain difference between thermister, RTD and thermocouple. **[5]**

c) Write one major reason for the selection of the following **[6]**

i) Pressure balance trim ii) Perforated Trim

iii) Multi stage parabolic traim

OR

Q6) a) Explain the important components of pressure reduction station with neat sketch **[5]**

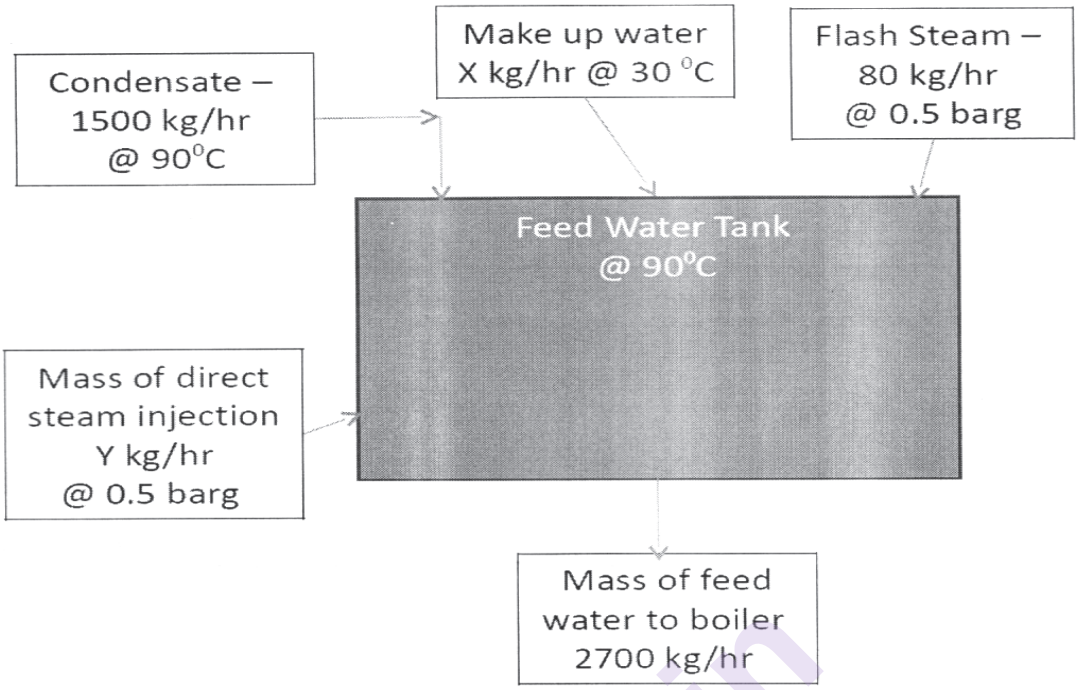
b) Explain Electromagnetic flow meter with neat diagram. **[5]**

c) What are three common characteristics of control valve trim? Explain each. **[6]**

Q7) a) Write the detailed classification of steam traps and explain Ball Float Trap with neat sketch. Why is it an ideal process trap? **[6]**

b) Describe the working of steam operated condensate removal pump. **[4]**

c) Do the heat and mass balance and evaluate the mass of feed water and direct steam needed to raise the temperature of feed water to 90 deg c. **[8]**



OR

Q8) a) Why Thermodynamic trap is the most suitable trap for main steam lines? Explain with neat sketch. Write the advantages and drawbackes. **[6]**

b) Differentiate between Balanced pressure thermostatic trap and inverted bucket trap with neat diagrams. **[6]**

c) What is CRF (condensate recovery factor)? What are various benefits of condensate recovery? **[6]**

Q9) a) During a survey of a plant it was observed that the boiler was working with following parameters **[10]**

Boiler capacity = 8000 kg/hr F&A 100°C, Rated pressure = 12kg/cm^{2}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.

i) Actual steam evaporation in kg/hr at rated pressure of 12 kg/cm^2 abs and FW temp as above

ii) Monitory loss/year due to actual TDS maintained by Boiler operator -without codensate recovery.

b) Write short note on application of steam in paper industry. **[6]**

OR

Q10)a) During a survey of a plant it was observed that the boiler was working with following parameters. **[10]**

Boiler capacity = 10000 kg/hr F & A 100°C, Rated pressure = 12 kg.cm^2 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.

i) Actual steam evaporation in kg/hr at rated pressure of 12kg/cm^2 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 Dairy industry. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3112

[Total No. of Pages : 2

[5461]-150

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

COMPUTATIONAL FLUID DYNAMICS

(2012 Pattern) (Elective-IV) (Semester-II) (402050A)

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 electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Write Navier-Stokes equations for incompressible flow and explain each term. **[6]**

b) Explain the concept of conservation and non-conservation principle using suitable example. **[4]**

OR

Q2) a) Give examples of any two types of grid used in CFD simulations. Explain any two with neat sketches. **[6]**

b) Comment on the strength and weaknesses of the CFD. Give suitable example of any one weakness of CFD. **[4]**

Q3) a) With any suitable example show that the central difference scheme is more accurate than the forward difference method. **[7]**

b) What is an implicit method? Comment on preference of implicit method in numerical simulations. **[3]**

OR

Q4) a) 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]**

b) Derive an expression for forward and central difference schemes. **[4]**

P.T.O.

Q5) a) Explain any suitable numerical scheme used to solve following governing equation. **[10]**

$$\frac{\partial^2 u}{\partial t^2} + c^2 \frac{\partial^2 u}{\partial x^2} = 0, \qquad c = \text{constant} > 0$$

Write an algorithm to solve the above equation. Assume suitable boundary conditions.

b) Derive an expression for numerical solution of two-dimensional convection diffusion system using upwind approach. **[8]**

OR

Q6) a) What is Peclet number? Derive its expression and explain the significance of the Peclet number. **[10]**

b) Explain the stability criteria for the Mac-Cormack method. **[8]**

Q7) a) How pressure is determined in SIMPLE numerical method. **[10]**

b) Describe the space discretization and detailed nomenclature in finite volume method. **[6]**

OR

Q8) a) Explain the need of relaxation techniques in finding solution of Navier-Stokes equations. Write in brief about under-relaxation. **[10]**

b) Derive an expression of finite volume method for one dimensional case study. **[6]**

Q9) a) What is Reynolds Averaged Navier-Stokes (RANS)? Explain in detail. **[8]**

b) What is pre-processing in CFD analysis? Explain any two important steps involved in pre-processing with significance. Draw neat sketches. **[8]**

OR

Q10)a) Why is turbulence modeling necessary? What are the different turbulent models used in practical applications? Give suitable example. **[10]**

b) Write short note on solution controls in commercial CFD software. Explain the parameters in brief. **[6]**

✈ ✈ ✈

Total No. of Questions : 10]

SEAT No. :

P3113

[Total No. of Pages : 4

[5461]-150-A
B.E. (Mechanical)
FINITE ELEMENT ANALYSIS - II
(2012 Course) (Semester-II) (Elective-IV) (402050 B)

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) With neat sketch, explain p and h methods of mesh refinement in Finite Element Analysis. **[6]**

b) State and explain characteristics of global stiffness matrix. **[4]**

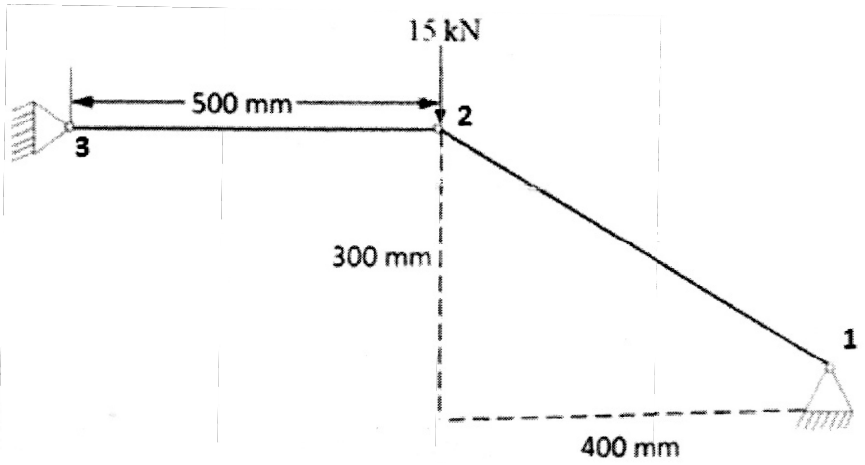
OR

Q2) a) Explain "Galerkin Weighted Residual Method" to formulate FEM equations. **[6]**

b) State stress-strain relations for plane stress and plane strain formulations in elasticity. **[4]**

Q3) a) Derive the expression for stiffness matrix for bar element using classical approach. **[4]**

b) For the two-bar truss shown in figure below, determine the displacement of node 2 and stresses in the element. All the elements have E = 70 GPa and A = 200 mm^2. **[6]**



OR

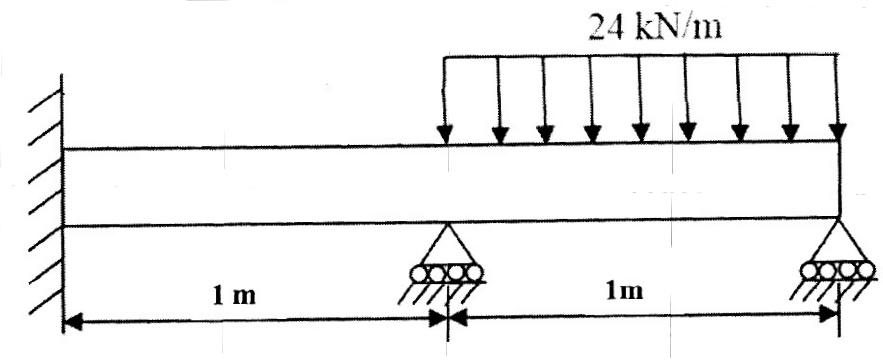
P.T.O.

Q4) For the beam shown in figure below, determine: **[10]**

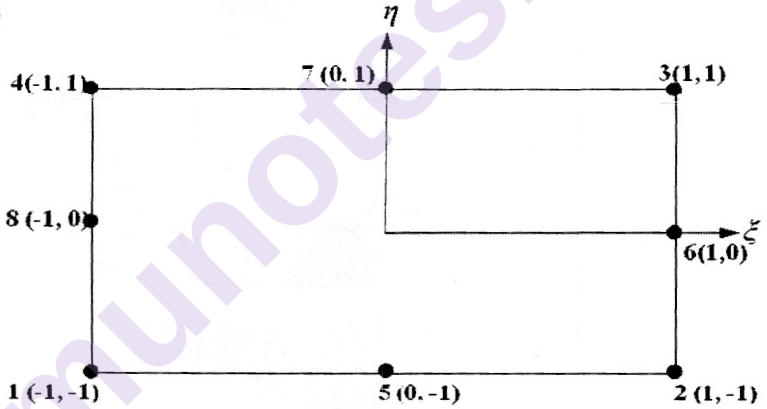
a) Slopes at each node and,

b) Vertical deflection at the mid-point of the distributed load.

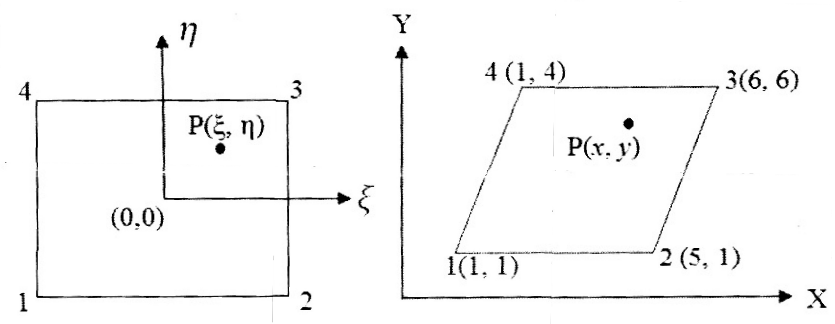
Take E = 200 GPa and I = 5×10^6 mm^4



Q5) a) Obtain the shape functions N_1, N_2, N_3 and N_7 for following serendipity eight node rectangular element. **[8]**



b) For four node quadrilateral element, find the *x* and *y* coordinates of point P whose location in parent element are given by. Also find u, v displacements of point P in X and Y directions respectively if displacement vector is $\{q\}$ =[0, 0, 0.20, 0, 0.15, 0.10, 0, 0.05]^T. **[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 = using Gauss Quadrature method. **[10]**

Q7) a) Derive elemental stiffness matrix (conduction + convection) formulations for 1D steady state heat transfer problems. **[8]**

b) A metallic fin, with thermal conductivity 70 W/m °K, 1 cm radius and 5 cm long extends from a plane wall whose temperature is 140°C. Determine the temperature distribution along the fin if heat is transferred to ambient air at 20°C with heat transfer coefficient of 5 W/m^2 °K. Take two elements along the fin. Assume that the tip of fin is insulated. **[8]**

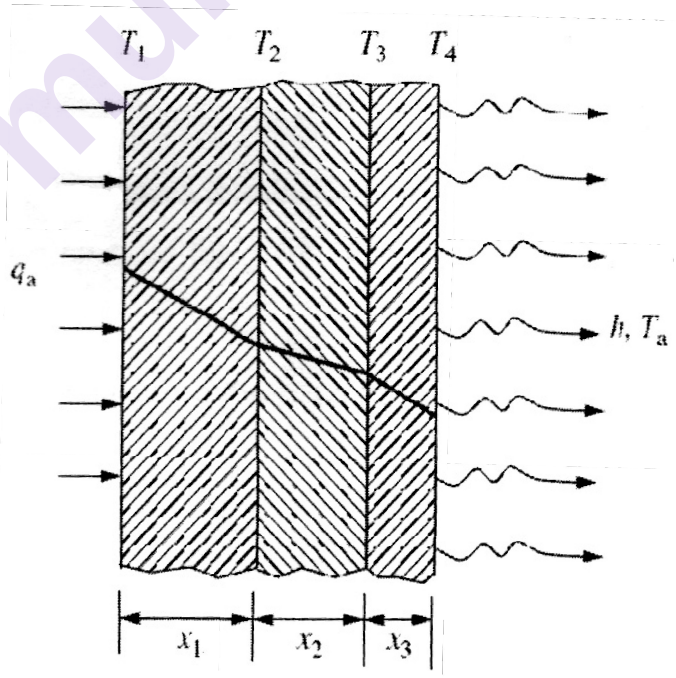
OR

Q8) A composite wall, with three layers of different materials as shown in figure below has the following properties for the different layers: **[16]**

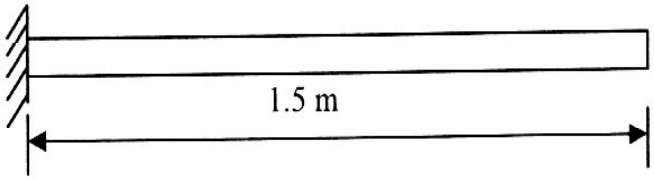
Layer-1: Gypsum, k_3 = 0.05 W/m °C, x_3 = 1 cm and q = 15 W/m^2

Layer-2: Fibre-glass, k_2 = 0.0332 W/m °C and x_2 = 5 cm

Layer-3: Concrete, k_1 = 1.2 W/m °C, x_1 = 15 cm, h = 15 W/m^2 °C and T_a = 25 °C. Calculate the temperatures T_1, T_2, T_3 and T_4 assuming unit area of heat flow.



Q9) 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 $A = 20 \times 10^{-6}$ m^2, length $L = 1.5$ m, modulus of elasticity $E = 2 \times 10^{11}$ N/m^2 and density $= 7800$ kg/m^3. Model the bar by using two elements. **[16]**



OR

Q10)a) Derive consistent mass matrix for bar, beam and truss element. **[12]**

b) 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. :

P3114

[Total No. of Pages : 2

[5461]-150-B

B.E. (Mechanical Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2012 Course) (End Sem.) (402050 C) (Elective-IV) (Semester-II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q. 1 or Q. 2, Q. 3 or Q.4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10.***
2) ***Use only one answer book & supplement if required.***
3) ***Use of scientific calculator, steam table, mollier chart is allowed.***
4) ***Figures to right indicate full marks.***

Q1) a) Write note on: **[5]**

i) Stage Velocity Triangles

ii) Specific Speed

b) Explain performance characteristics curves for fan and blowers. **[5]**

OR

Q2) a) Differentiate between compressible & incompressible flow machines. **[5]**

b) Explain the basic equation of energy transfer between fluid & rotor. **[5]**

Q3) a) Explain with neat sketch of Air vessel in reciprocating pump. **[5]**

b) A double acting reciprocating pump running at 40 rpm is discharging 1 m^3 of water per min The pump has a stroke of 400 mm. The diameter of the piston is 200 mm. The delivery & suction head are 20 m & 5 m respectively. Find the slip of the pump & power required to drive the pump. **[5]**

OR

Q4) a) What is slip in pump? Explain the meaning of negative slip. **[5]**

b) A single acting reciprocating pump has a plunger diameter 250 mm & stroke of 450 mm runs at 60 rpm. The length & diameter of delivery pipe are 60 m & 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 sump. Assume friction factor = 0.01. **[5]**

Q5) a) Explain performance of axial fan with graph. **[8]**

b) How the dust erosion of centrifugal impeller does occur? What is its effect on the performance? **[8]**

OR

P.T.O.

Q6) a) Enlist the methods to reduce the fan noise. **[8]**

b) Discuss various applications of fans & blowers. **[8]**

Q7) a) Explain UGV & DGV with velocity triangle. **[8]**

b) A centrifugal blower takes in 180 m^3/min of air at suction pressure of 1.013 bar & temperature of 430 C and delivers it at 750 mm of W.G. taking the efficiencies of the blower and drive as 80% & 82% respectively. Determine the power required to drive the blower and the state of air at exit. **[8]**

OR

Q8) a) Write short note on selection of blowers for a desired application. **[8]**

b) A centrifugal fan has the following data: **[8]**

Inner diameter of the impeller	=	18 cm
Outer diameter of the impeller	=	20 cm
Speed	=	1450 rpm
Relative velocity at entry	=	20 m/s
Absolute velocity at entry	=	21 m/s
Relative velocity at exit	=	17 m/s
absolute velocity at exit	=	25 m/s
Flow rate	=	0.5 kg/s
Motor efficiency	=	78%
Density of air	=	1.25 kg/m^3

Determine:

i) Stage pressure rise.

ii) Degree of reaction.

iii) Power to drive the fan.

Q9) a) Explain enthalpy-entropy diagram for centrifugal compressor. **[8]**

b) Draw velocity triangles at the entry & exit for the following axial compressor stage. **[10]**

i) R = ½ ii) R < ½

OR

Q10)a) What are the basic design features in axial flow compressor? **[8]**

b) Draw & explain performance curves of centrifugal compressors. **[10]**

Total No. of Questions : 12]

SEAT No. :

P3115

[Total No. of Pages : 2

[5461]-151

B.E. (Mechanical Sandwich)

AUTOMOBILE ENGINEERING (Self study - III)

(2012 Pattern) (Semester - I) (Open Elective - III) (402064)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates :

1) ***Answer three questions from Section I and three questions from Section II.***
2) ***Answer to the two sections should be written in separate 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 Grade resistance and Rolling resistance. **[4]**

b) State types of Chassis and Explain any one with neat sketch. **[12]**

OR

Q2) a) Explain Frameless body construction with merits and Demerits. **[8]**

b) Explain Front engine drives and rear engine drives. **[8]**

Q3) a) State the various types of clutch and explain any one with neat sketch. **[8]**

b) State the types of gear box and explain any one with neat sketch. **[8]**

OR

Q4) a) Explain different types of clutch actuations in brief. **[8]**

b) Explain torque converter with neat sketch. **[8]**

Q5) a) Explain steering geometry for steering system. **[6]**

b) Explain damping and shock absorbers. **[6]**

c) Write short note on "Power steering" **[6]**

OR

P.T.O.

Q6) a) Explain air brake system with neat sketch. **[6]**

b) Explain self leveling suspension. **[6]**

c) Explain collapsible steering system. **[6]**

SECTION - II

Q7) a) Explain importance of ergonomics in automobile safety. **[8]**

b) Explain seat belt arrangement provided in automobiles with neat sketch. **[8]**

OR

Q8) a) State types of seats used in automobile and explain any one with neat sketch. **[8]**

b) Explain automobile lamps and indicators. **[8]**

Q9) a) Explain traction and tractive efforts for vehicle performance. **[8]**

b) Explain types of test tracks for vehicle testing. **[8]**

OR

Q10)a) Explain road performance curve and stability of vehicles. **[8]**

b) Explain crash testing and its types. **[8]**

Q11)a) State different types of bulldozers and explain any one with neat sketch. **[6]**

b) Explain construction details of tractor vehicle. **[6]**

c) Explain application of off-road machine. **[6]**

OR

Q12)a) Explain multi-axle vehicles. **[6]**

b) Explain heavy wheeled tractor with neat sketch. **[6]**

c) Write short note on "dumpers". **[6]**

Total No. of Questions : 12]

SEAT No. :

P3116

[Total No. of Pages : 3

[5461]-152

B. E. (Mechanical Sandwich)
POWER PLANT ENGINEERING
(2012 Course) (Semester - I) (Self Study - IV)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right 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 nccessary.***
6) ***Answer to the two sections should be written in separate books.***

SECTION - I

Q1) a) Explain why Rankine Cycle rather than Carnot cycle is used as practical cycle for steam power plant. **[6]**

b) A steam turbine operates on Rankines cycle. Steam entering the turbine has a pressure and temperature of 50 bar and 500ºC, expands to a condenser pressure of 0.05 bar. Steam is condensed completely. Find heat supplied, turbine work, pump work, dryness fraction of steam entering the condenser and Rankine cycle efficiency. **[12]**

OR

Q2) a) Give classification of fuels. What do you mean by higher and lower calorific value of fuels. **[8]**

b) Write a short note on Fluidised Bed combustion & what is calorific value of fuel. **[10]**

Q3) a) Explain with neat sketch Loeffler Boiler. Give its advantages and disadvantages. **[8]**

b) Discuss the factors to be consider while selecting site for thermal power plant. **[8]**

OR

Q4) a) Explain with neat sketches travelling grate stoker and spreader stoker. **[8]**

b) Give general layout of ash handling and dust collection system and explain in brief. **[8]**

P.T.O.

Q5) a) Explain the following **[8]**

i) Hydrograph

ii) Flow duration curve

b) Explain elements of hydro electric power plant **[8]**

i) Catchment area

ii) Reserviour

iii) Dam

iv) Spill ways

v) Surge tank

vi) Pen stocks

vii) Draft tube

viii) Power house

OR

Q6) a) Explain with neat sketch the principle of operation of a Francis turbine. **[8]**

b) Give advantages and dis-advantages of Hydro Electric Power Plant. **[8]**

SECTION - II

Q7) a) Give classification of Nuclear Reactor. **[8]**

b) Explain with neat sketch Pressurised Water Reactor(PWR) with heat sketch. **[8]**

OR

Q8) a) Explain with neat sketch Diesel Power Plant. **[8]**

b) Give various factors which are to be considered while selecting site for Diesel Power Plant. **[8]**

Q9) a) Explain Thermodynamic cycle for gas turbine power plant with sketch. **[8]**

b) Advantages and disadvantages of gas turbine power plant over diesel power plant. **[8]**

OR

Q10)a) Explain with neat sketch Solar Thermal Power Plant. **[8]**

b) Write note on Prospectus and development of non conventional power plant in India. **[8]**

Q11)a) Define **[8]**

i) Connected load

ii) Peak load

iii) Demand factor

iv) Load factor

v) Diversity factor

vi) Plant capacity

vii) Types of loads

viii) Plant use factor

b) Explain with sketch for Diesel Power Plant **[8]**

i) Input-Output curve

ii) Heat Rate Curve

iii) Incremental Rate Curve

OR

Q12)a) Write short note on load duration curve and load curve. **[8]**

b) Discuss the effect of variable load on plant operation & give list of all types of non conventional power plants. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3117

[Total No. of Pages : 4

[5461]-153

B.E. (Mechanical-Sandwich)

MECHANICAL VIBRATIONS

(2012 Course) (End Sem.) (402066) (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) ***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) Three masses m_A, m_B and m_C of 45 kg, 55 kg, and 60 kg are rotating at radii 30 mm, 35 mm and 25 mm respectively. The masses are at 75°, 155° and 250° respectively from horizontal. Distance between plane of rotation of m_A and m_B is 130 mm and between m_B and m_C is 50 mm. The planes of masses are placed in A-B-C order from left to right. They are balanced by masses m_L and m_M rotating in planes L and M at 70 mm radius. Plane M is on right of plane L at 190 mm and plane L is on right of plane A at 60 mm. Find out the masses m_L and m_M and their angular positions from horizontal by graphical method. **[10]**

OR

Q2) a) Find the natural frequency of oscillation in Hz for the roller rolling on horizontal surface without slipping as shown in the Fig. No. 1. The mass of the roller is 10 kg and the radius of roller is 60 mm and stiffness of spring is 2.5 kN/m. **[6]**

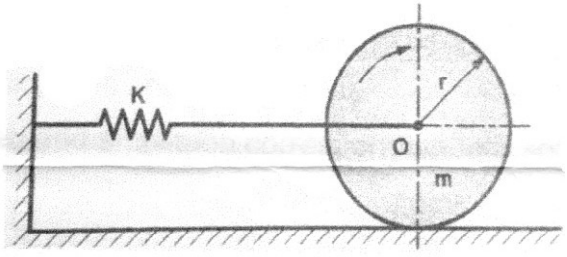


Fig. No.1

b) Derive the equation of motion for simple spring mass undamped free vibratory system using Rayleigh's method. **[4]**

P.T.O.

Q3) a) Determine the natural frequency of the system as shown in the Fig. No. 2. **[6]**

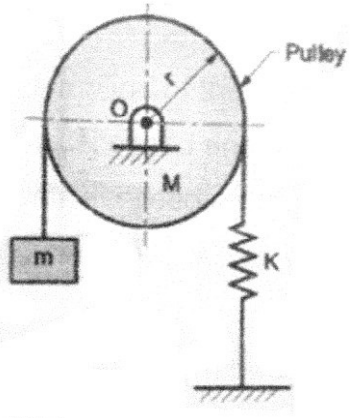


Figure No. 2

b) Define following terms: **[4]**

i) Logarithmic Decrement ii) Damping Factor

iii) Critical damping coefficient iv) Damped natural frequency

OR

Q4) a) An underdamped shock absorber is to be designed for the motor cycle of mass 200 kg, such that during a road bump, the damped period of vibrations are limited to 2 seconds and amplitude of vibrations should reduced to $1/16^{th}$ in one cycle find the **[6]**

i) Spring stiffness

ii) Damping coefficient of shock absorber

b) Derive the equation for loss of amplitude per cycle in case of dry friction damping. **[4]**

Q5) a) An electric motor is supported on a spring and dashpot. The spring has a stiffness 6400 N/m and dashpot offers a resistance of 500 N at 4.0 m/s. The unbalance mass 0.5 kg rotates at 5 cm radius and the total mass of vibratory system is 20 kg. The motor runs at 400 rpm. Determine: **[10]**

i) Damping factor

ii) Amplitude of vibrations and phase angle

iii) Resonant speed and amplitude corresponding to resonance

iv) Forces exerted by dashpot and spring on motor

b) Explain in detail with plot: **[6]**

i) Frequency Response curves

ii) Phase angle verses frequency ratio

OR

Q6) a) A vehicle has a mass of 500 kg and the total spring constant of its suspension system is 19600 N/m. The profile of the road may be approximated as a sine wave of amplitude 10 mm and a wavelength of 1.5 m. Determine: **[10]**

i) Critical speed of vehicle

ii) Amplitude of steady state motion of the mass

1) When driven at critical speed and neglecting damping

2) When driven at critical speed and having damping factor 0.5

iii) Amplitude of motion of the mass when vehicle is driven at 50 km/h and damping factor 0.4

b) A rotor having mass of 5 kg is mounted midway on a simply supported shaft of diameter 10 mm and length 400 mm. The C.G. of rotor is 0.02 mm away from geometric centre of the rotor. If the rotor rotates at 3000 rpm. Determine: **[6]**

i) Critical speed of the shaft

ii) Amplitude of steady state vibrations

iii) Dynamic load on each bearing if the shaft is vertical.

Q7) a) Derive the differential equation for the system as shown in Fig. No. 3. and determine: **[12]**

i) Natural frequencies

ii) Ratio of amplitudes for two nodes

iii) Principal mode shapes when k = 40 N/m amd m = 10 kg

Take k_1 = k N/m, k_2 = 2 N/m, k_3 = 3k N/m, m_1 = m kg and m_2 = 2m kg

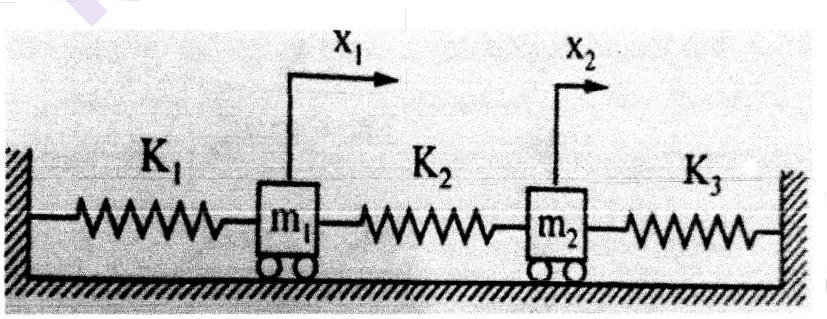


Fig. No.3

b) i) Explain with neat diagram mathematical model of a Bike. **[6]**

ii) Define following terms related to two DOF system

1) Mode shapes 2) Node point

OR

Q8) a) Determine the natural frequency and amplitude ratios for the system shown in Figure No. 4. Consider K_1 = 1000 N/m, K_2 = 500 N/m, m_1 = 50 kg and m_2 = 10 kg. **[12]**

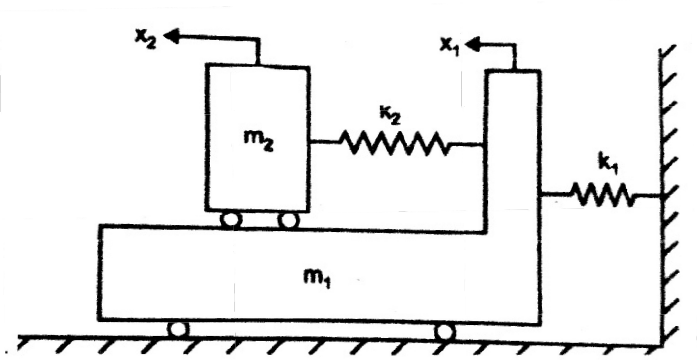


Figure No.4

b) Determine the natural frequency and node position of torsional vibration of 2 rotor system. The shaft is connected with 2 rotors at the end. If **[6]**

- Mass of rotors - m_1 = 600 kg, m_2 = 1000 kg
- Diameters of rotors - d_1 = 1.5 m, d_2 = 2m
- Shaft diameter - d = 0.1 m
- Shaft length - l = 0.3 m
- Modulus of rigidity of shaft G = 0.83×10^{11} N/m^2

Q9) a) What are different types of vibration exciters? Explain with diagram principle and working of Mechanical Exciters. **[8]**

b) A centrifugal fan weighs 46 kg and has a rotating unbalance of 0.24 kg-m. When dampers having damping factor of 0.2 are used, specify the spring stiffness for mounting such that only 10% of the unbalanced force is transmitted to the floor. Also determine the magnitude of the transmitted force. The fan runs at the constant speed of 1000 rpm. **[8]**

OR

Q10)a) What is FFT? Explain the working of FFT analyzer with the help of block diagram. state various applications of FFT analyzer. **[8]**

b) A vibrometer having the amplitude of vibration of the machine part as 4 mm and damping factor is 0.2, performs harmonic motion. If the difference between the maximum and minimum recorded value is 10 mm. Determine the natural frequency of the vibrometer if the frequency of vibration part is 12 rad/sec. **[4]**

c) What is vibration absorber? Explain any one in detail. **[4]**

Total No. of Questions : 8]

SEAT No. :

P3118

[Total No. of Pages : 3

[5461]-155
B.E. (Mechanical - Sandwich)
INDUSTRIAL HYDRAULICS & PNENUMATICS
(2012 Course) (Semester-II) (402067)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer to all questions should be written in one Answer sheet only.***
2) ***Neat diagrams should be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are various Energylosses in Hydraulic systems? Explain in details. **[6]**

b) What are the properties of Hydraulic fluids explain in details. **[6]**

c) Explain with neat sketch working of "Balanced vane Pump". **[8]**

OR

Q2) a) Explain with neat sketch "Reservoir Assemby". **[6]**

b) Explain with neat sketch working of "weight loaded accumulator" **[6]**

c) Explain with neat sketch & CKT working of "Counter balance Valve" **[8]**

Q3) a) Explain with neat sketch working of "Regenerative ckt". **[8]**

b) Explain with neat sketch "Synchronization ckt". **[8]**

OR

Q4) a) Explain with neat sketch "Sequencing circuit". **[8]**

b) Write a short note on "Sources of contamination & types of contamination". **[8]**

Q5) a) Write a short note on "Types & selection of compressors". **[8]**

b) Write a short note on "Mufflers Lubricators & Air Dryers used for Pneumatic system". **[8]**

OR

P.T.O.

Q6) a) What are the "Applications of Pneumatics in low cost and Industrial automation"? Explain in details. **[8]**

b) Write a short note on "Types of Vacuum Pumps". **[8]**

Q7) a) What are the design parameters for designing of a "Hydraulic system"? **[9]**

b) What are the design Parameters for designing of "Pneumatic System?". **[9]**

OR

Q8) A machine tool slide is to be moved by means of hydraulic cylinder as follows if. **[18]**

a) Initially it moves through a distance of 250 mm against a load of 10 KN in 05 seconds.

b) It the follows a working stroke of 120 mm against a load of 40 Kn. The feed rate required is between 0.5 to 01 m/min.

c) The return stroke is as fast as possible draw and design a suitable Hydraulic circuit for above requirements select the different components from the data given & mention their ratings.

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S_1	38
S_2	76
S_3	152

2. Pressure Gauge :

Model	Range (bar)
PG_1	0 - 25
PG_2	0 - 40
PG_3	0 -100
PG_4	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R_1	11.4	70
R_2	19	210
R_3	30.4	70
R_4	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.3
F_4	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D_1	350	19
D_2	210	38
D_3	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

9. Cylinder-(Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

10. Oil Reservoirs :

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

Total No. of Questions : 10]

SEAT No. :

P3119

[Total No. of Pages : 4

[5461]-156

B.E. (Mechanical Sandwich)

REFRIGERATION AND AIR CONDITIONING

(2012 Pattern) (Elective-I) (402068 A) (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) ***Your answers will be valued as a whole.***
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 Bell Coleman cycle. How COP of Bell Coleman cycle is evaluated? **[5]**

b) Give the classification of refrigerant with suitable example. **[5]**

OR

Q2) a) Discuss the procedure to evaluate COP of multievaporator system with individual expansion valve. **[5]**

b) Explain the design features of AC plant for Multiplex. **[5]**

Q3) a) Discuss the effect of operating parameters on VCC performance. **[5]**

b) Write note on : ODP & GWP. **[5]**

OR

Q4) a) Consider R134a refrigerant for cold storage plant of 100 TR capacity. Required temperature is –20°C and cooling water is available at 30°C. Making suitable assumptions find theoretical COP of refrigeration system and power input if there is 10°C subcooling. **[5]**

b) With schematic diagram explain the working of Electrolux refrigerator. **[5]**

Q5) a) Explain BF, SHF, RSHF, & ESHF. **[8]**

b) Explain ASHRAE Comfort chart. What are the factors affecting human comfort? **[10]**

OR

P.T.O.

Q6) a) List the factors contributing cooling load. How GTH is calculated? **[10]**

b) 50 cmm first air stream at 30°C DBT and 20°C WBT is mixed with 100 cmm air at 20°C DBT and 12°C WBT. Find mixture properties.

If mixture DBT required are 25°C DBT, then what should be cmm of second air stream? **[8]**

Q7) a) Draw neat diagram of EXV and explain its working. What is selection criteria for expansion device? **[8]**

b) Give the classification of refrigerant compressors. Explain in brief. **[8]**

OR

Q8) a) Compare all air system with all water system. Draw neat schematic of both the types of system. **[8]**

c) Explain working of capillary tube as an expansion device. **[8]**

Q9) a) Explain static regain method of duct design. **[8]**

b) For a fan-duct system shown in Fig. 1, present the static and total pressure changes. Take exit loss coefficient as $C_0 < 1$. **[8]**

OR

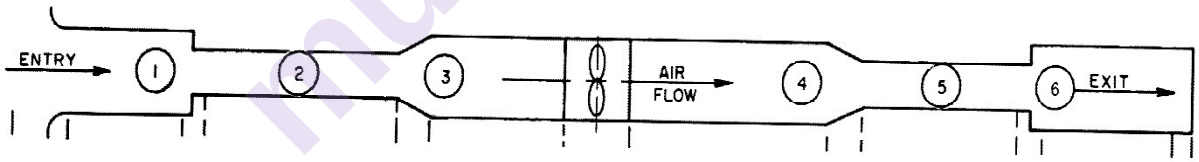
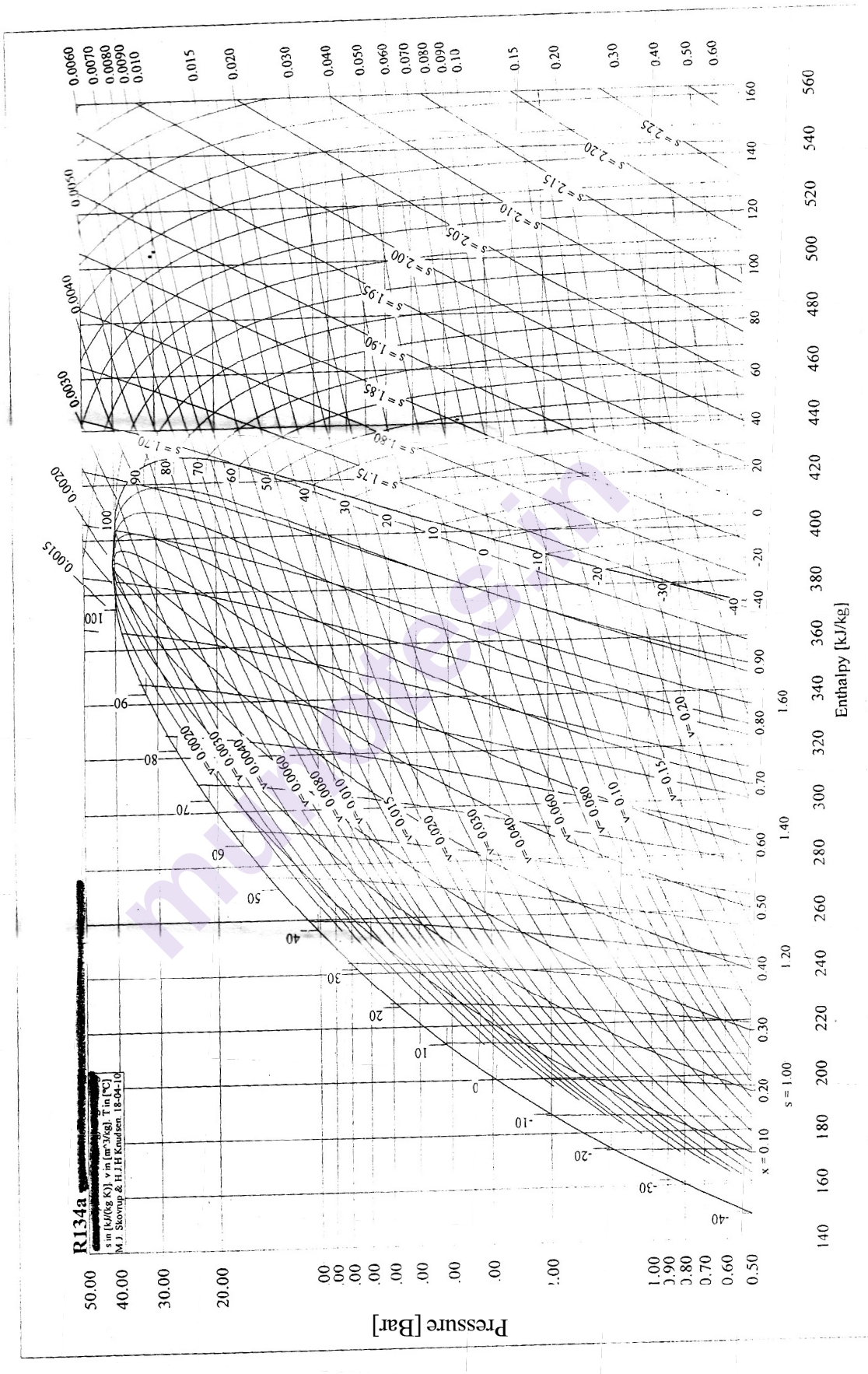
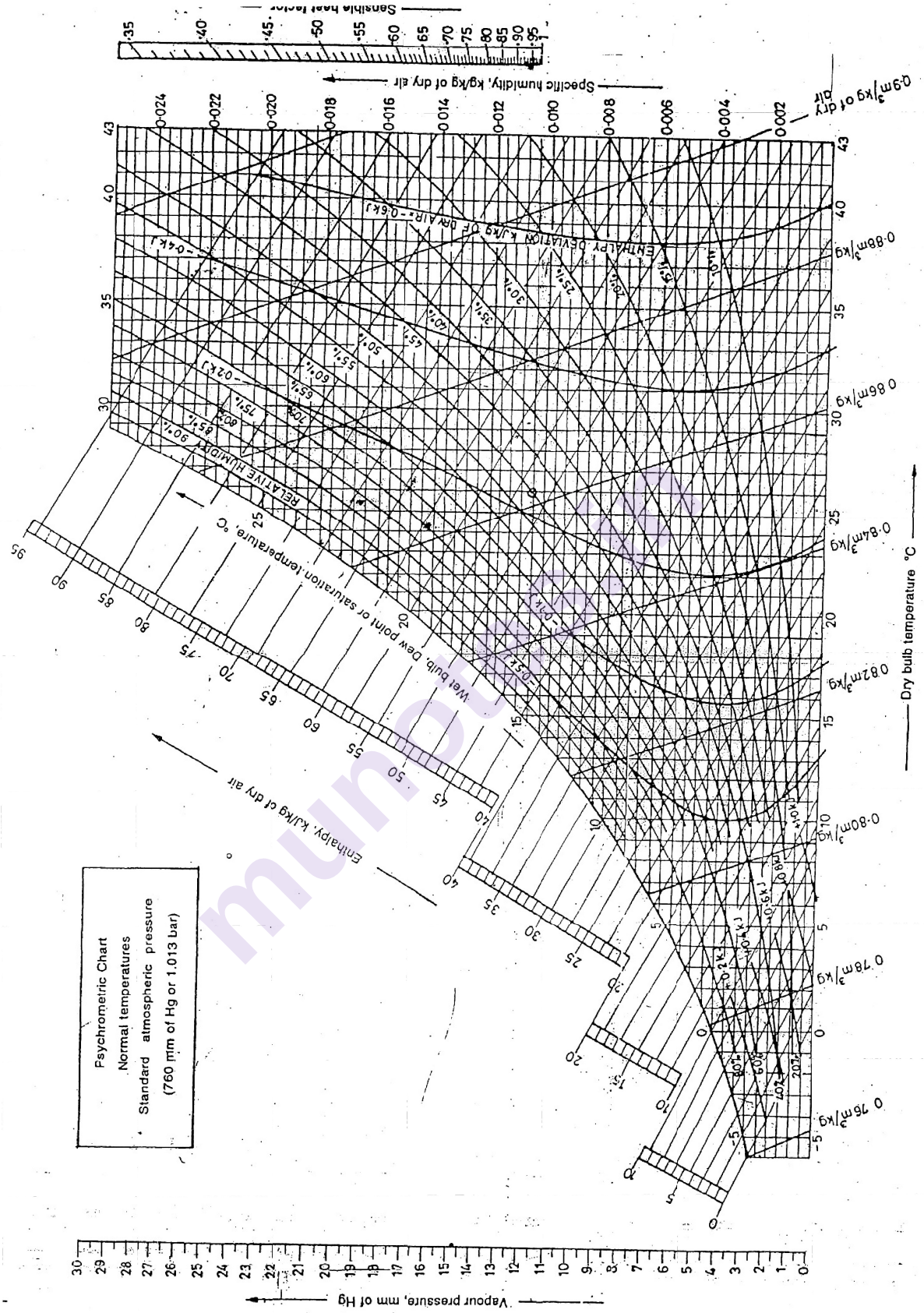


Fig. 1 for Q.9 b)

Q10)a) Write note on - Fan Laws. **[8]**

b) What are the various friction and dynamic losses in ducts? Explain. **[8]**


R134a
Pressure [Bar]
Enthalpy [kJ/kg]


Psychrometric Chart
Normal temperatures
Standard atmospheric pressure
(760 mm of Hg or 1.013 bar)
Enthalpy, kJ/kg of dry air
Wet bulb, Dew point or saturation temperature, °C
Dry bulb temperature °C
Vapour pressure, mm of Hg
Specific humidity, kg/kg of dry air
Sensible heat factor
RELATIVE HUMIDITY
ENTHALPY DEVIATION kJ/kg OF DRY AIR
0.9m³/kg of dry air
0.88m³/kg
0.86m³/kg
0.84m³/kg
0.82m³/kg
0.80m³/kg
0.78m³/kg
0.76m³/kg

Total No. of Questions : 10]

SEAT No. :

P3120

[Total No. of Pages : 3

[5461]-157

B.E. (Mechanical Sandwich Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2012 Pattern) (Elective-I) (402068 C) (Semester-II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q. 1 or Q. 2, Q. 3 Or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, and Q. 9 or Q 10.***
2) ***Use only one answer book & supplement if required.***
3) ***Use of scientific calculator, steam table, mollier chart is allowed.***
4) ***Figures to right indicate full marks.***

Q1) a) Write note on stage velocity triangles with neat sketch. **[5]**

b) Explain performance characteristics curves for fan and blowers. **[5]**

OR

Q2) a) What is specific speed? Explain significance of specific speed. **[5]**

b) Explain the basic equation of energy transfer between fluid & rotor. **[5]**

Q3) a) Explain effect of acceleration in suction & delivery pipe on indicator diagram. **[5]**

b) A double acting reciprocating pump running at 40 rpm is discharging 1 m^3 of water per min. The pump has a stroke of 400 mm. The diameter of the piston is 200 mm. The delivery & suction head are 20 m & 5 m respectively. Find the slip of the pump & power required to drive the pump. **[5]**

OR

Q4) a) Explain with neat sketch working of Reciprocating Pump. **[5]**

b) A single acting reciprocating pump has a plunger diameter 250 mm & stroke of 450 mm runs at 60 rpm. The length & diameter of delivery pipe are 60 m & 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 sump. Assume friction factor = 0.01. **[5]**

P.T.O.

Q5) a) Explain performance of axial fan with graph. **[8]**

b) Explain different mechanical losses in Fans and Blowers. **[8]**

OR

Q6) a) Enlist the methods to reduce the fan noise. **[8]**

b) Discuss various applications of fans & blowers. **[8]**

Q7) a) Explain UGV & DGV with velocity triangle. **[8]**

b) A centrifugal blower takes in 180 m^3/min of air at suction pressure of 1.013 bar & temperature of 43°C and delivers it at 750 mm of W.G. taking the efficiencies of the blower and drive as 80% & 82% respectively. Determine the power required to drive the blower and the state of air at exit. **[8]**

OR

Q8) a) How does dust erosion of centrifugal impeller occurs? What is it's effect on the performance? **[8]**

b) A centrifugal fan has the following data: **[8]**

Inner diameter of the impeller	=	18 cm
Outer diameter of the impeller	=	20 cm
Speed	=	1450 rpm
Relative velocity at entry	=	20 m/s
Absolute velocity at entry	=	21 m/s
Relative velocity at exit	=	17 m/s
Absolute velocity at exit	=	25 m/s
Flow rate	=	0.5 kg/s
Motor efficiency	=	78%
Density of air	=	1.25 kg/m^3

Determine:

i) Stage pressure rise

ii) Degree of reaction

iii) Power to drive the fan

Q9) a) Explain enthalpy-entropy diagram for centrifugal compressor. **[8]**

b) Draw velocity triangles at the entry & exit for the following axial compressor stage. **[10]**

i) R = ½ ii) R < ½

OR

Q10)a) What are the basic design features in axial flow compressor? **[8]**

b) An axial compressor stage has the following data: **[10]**

Temperature and Pressure at entry	:-	300 K, 1.0 bar
Degree of reaction	:-	50%
Mean blade ring diameter	:-	36 cm
Rotational speed	:-	18000 rpm
Blade height at entry	:-	6 cm
Air angles at rotor and stator exit	:-	25°
Axial velocity	:-	180 m/s
Work done factor	:-	0.88
Stage efficiency	:-	85%
Mechanical efficiency	:-	96.7%

Determine:-

i) Air angle at the rotor and stator entry.

ii) Mass flow rate of air.

iii) Power required to drive the compressor.

iv) Loading coefficient.

v) The pressure ratio developed by the stage.

Total No. of Questions : 10]

SEAT No. :

P3121

[Total No. of Pages : 3

[5461]-158

B.E. (Mechanical Sandwich)

CAD/CAM AND AUTOMATION

(2012 Course) (End Sem.) (Semester-II) (402068 D) (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 side indicate full marks.***
3) ***Use of calculators is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Derive shape function for 1D Element. **[6]**

b) Explain Rotational Mapping. **[4]**

OR

Q2) A triangle PQR with vertices P(2, 5), Q(6, 7) and R(2, 7) is to be reflected about a line $2y = x + 6$. Determine co-ordinates of the reflected triangle. **[10]**

Q3) a) Discuss Constructive Solid Geometry. **[5]**

b) Discuss Homogeneous Transformations. **[5]**

OR

Q4) Plot the Bezier curve controlled by points in sequence as (0, 0), (1, 2), (3, 3) and (4, 0). Determine the equation in parametric form and coordinates of points at u = 0, 0.2, 0.4, 0.6, 0.8, 1. **[10]**

P.T.O.

Q5) a) Explain tool length and cutter radius compensation with diagram. **[8]**

b) Write CNC program using G and M codes to turn the component shown in fig. 1 having Stock size is ϕ 40mm. Use rough and finish canned cycle. Assume suitable data for speed and feed. **[10]**

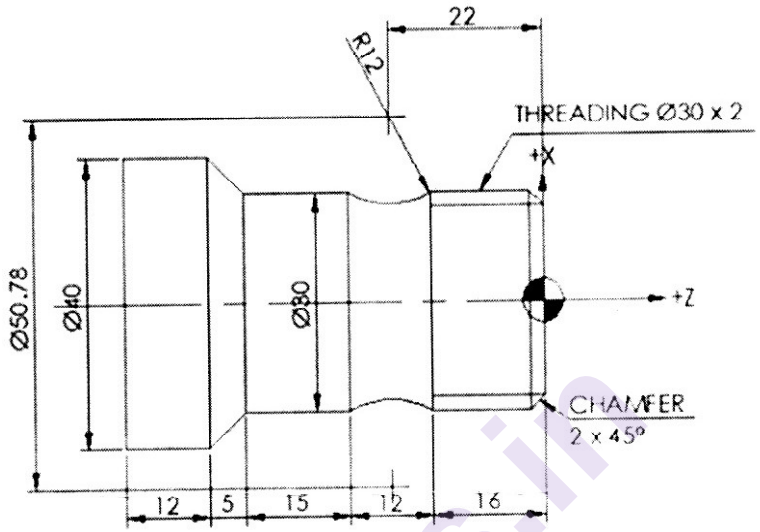


Fig. 1

OR

Q6) a) Write CNC program using G and M codes to contour the component shown in fig. 2. Final thickness of component is 5 mm and of blank is 7 mm. Assume suitable data for speed and feed. **[10]**

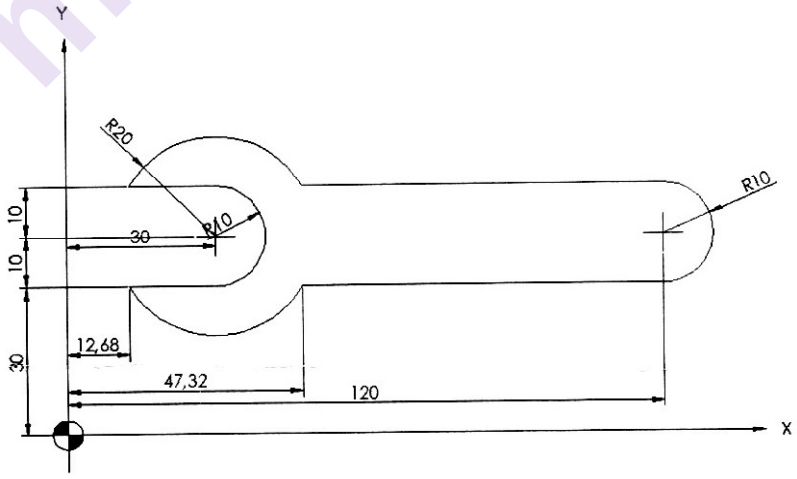


Fig. 2

b) Explain canned cycles for Grooving and threading for horizontal machining center. **[8]**

Q7) a) Classify RP Processes. **[8]**

b) Explain Selective Laser Sintering for rapid prototyping. **[8]**

OR

Q8) a) Explain Stereo Lithography Apparatus method for rapid prototyping. **[8]**

b) Discuss Rapid Tolling and STL format for Rapid prototyping. **[8]**

Q9) a) Discuss automation strategies. **[8]**

b) Discuss various joints used in robot. **[8]**

OR

Q10)a) Explain mechanical grippers in detail. **[8]**

b) Discuss Computer Integrated Manufacturing. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3122

[Total No. of Pages : 3

[5461]-159

B. E. (Mechanical Sandwich Engg.)
ENERGY AUDIT AND MANAGEMENT
(2012 Course) (Semester - II) (End Sem.) (Elective - II) (402069A)

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 neat figures wherever necessary.***
4) ***Use of scientific calculators is allowed.***

Q1) a) Comment on the current updated energy situation in India and highlight the strength and weaknesses. **[6]**

b) Explain Energy Audit report format. **[4]**

OR

Q2) a) What is the Energy Audit Methodology for Textile Industry? **[6]**

b) Write down the principles of energy management and list down the objectives. **[4]**

Q3) a) lnvestment for a set of interrelated energy projects identified in a medium size process plant work out to R, 1 2 Lacs. Annual savings for the first four consecutive years are Rs. 3,00,000; Rs. 4,00,000; Rs. 4,00,000 and Rs. 4,50,000 respectively. The cost of Capital is 12% p.a. What is the net present value (NPV)? And as per NPV, suggest weather the plant can go ahead with the projects. **[7]**

b) What is Energy Audit? What are different types of Energy Audit? **[3]**

OR

Q4) a) Define and explain Simple payback Period and IRR? **[6]**

b) Explain Energy Conservation Act 2001 and it's features. **[4]**

Q5) a) Explain methods of performance evaluation of pumping systems. **[8]**

b) Find out the efficiency of the boiler by direct method with the data given below : **[8]**

P.T.O.

i) Type of boiler : Coal fired

ii) Quantity of steam (dry) generated : 12 TPH

iii) Steam pressure (gauge) / temp : 10 kg/cm^2(g)/ 200°C

iv) Quantity of coal consumed : 2.1 TPH

v) Feed water temperature : 75°C

vi) Gross Calorific Value of coal : 12000 kJ/kg

vii) Enthalpy of saturated steam at 10.2 kg/cm^2 pressure : 1785 kJ/kg

viii) Enthalpy of feed water : 320 kJ/kg

OR

Q6) a) Explain direct and indirect method to find out boiler efficiency. **[8]**

b) Explain the following parameters in the brief **[8]**

i) Excess air ratio

ii) Stochiometric air quantity

iii) Balanced draught

iv) Natural Draught

Q7) a) Explain the terms **[6]**

i) Maximum demand

ii) Copper losses

iii) Luminous efficiency

b) Connected load for infrastructure is as below :

i) 05 bulbs of 60W each

ii) 06 fluorescent tube of 40W each,

iii) An old refrigerator of 200 watt

It is decided to replace all the bulbs and tubes with 11 CFL of 15W each and old refrigerator by energy efficient refrigerator of 175W. Considering the usage of 06 hrs per day and electric tariff of Rs. 4 per kWh. Calculate the annual energy savings in KWh and money. **[10]**

OR

Q8) a) Discuss various factors which constitute the billing amount for a medium scale industry. **[8]**

b) Explain different losses occurring in electric motors. **[8]**

Q9) a) Explain with diagrams cogeneration systems using the back pressure turbine, extraction-condensing turbine and double extraction back pressure tubine. **[9]**

b) Describe suitable factors influencing selection of cogeneration plant? Also explain types of Co-generation plants. **[9]**

OR

Q10)a) Explain topping cycle and the bottoming cycle with sketch. **[8]**

b) Write a short note **[10]**

i) CMD Project

ii) Carbon Credit

iii) Waste Heat Recovery

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3123

[Total No. of Pages : 6

[5461]-160

B.E. (Mechanical S/W)

OPERATIONS RESEARCH

(2012 Pattern) (End Sem.) (Semester - II) (Elective - II) (402069 B)

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) ***Answers in One answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Discuss the various characteristics of OR. **[4]**

b) Reduce the following game by dominance and find the game value. **[6]**

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

OR

Q2) A machine tool company decides to make four subassemblies through four contractors is to receive one assembly. The cost of each assembly is known and given in the following table. Find the assignment of the contractors and subassemblies that will minimize the total cost. **[10]**

		Contractors			
		I	II	III	IV
Subassemblies	A	5	7	11	6
	B	8	5	9	6
	C	4	7	10	7
	D	10	4	8	3

P.T.O.

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) **[6]**

Destinations

Plants or Origins	1	2	3	4	Supply
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

OR

Q4) An analysis of company reveals the following information: **[10]**

Element of Cost	Variable Cost in %	Fixed Cost
Direct Material	35.5	----
Direct Labour	30.2	----
Distribution Overhead	13.2	190500
Factory Overhead	5.4	59200
Administrative Overhead	1.3	68900
Budgeted Sales	----	2050000

Determine:

a) Break - Even Sales Volume.

b) The Profit or Budgeted Sales Volume

c) The Profit if the Actual Sales,

i) Drop by 20%.

ii) Increase by 15 % from Hundred sales.

Q5) a) Discuss in brief any two Inventory Control Techniques. **[4]**

b) A the data on the running costs 3 per year and the resale price of an equipment. A whose purchase price is Rs. 2,00,000 are as follows :

Year	1	2	3	4	5	6	7
RunningCost(Rs)	30000	38000	46000	58000	72000	90000	110000
Resale price (Rs)	100000	50000	25000	12000	8000	8000	8000

i) What is the optimum period of replacement?

ii) When Equipment A is two years old, Equipment B which is new model for the same usage is available. The optimum period for replacement is 4 years and an average cost of Rs 72,000. Should equipment A be changes with equipment B ? If so Why. **[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 **[8]**

i) Economic ordering quantity

ii) Minimum yearly average cost.

iii) Minimum yearly total inventory cost. When the cost per unit item is 2/- per unit.

iv) Optimum number of orders per year

v) The optimum period of supply per optimum order.

The increase in the order cost associated with ordering (1) 20 % more than the EOQ

b) The following mortality rates have been observed for a certain type 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. **[10]**

Job	J1	J2	J3	J4	J5	J6
Machine M1 [Turning]	10	3	5	4	2	1
Machine M2 [Threading]	2	4	6	3	1	2
Machine M3 [Knurling]	8	6	7	9	7	7

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 **[8]**

i) Find the proportion of time during which there is no customer in the shop.

ii) Find the probability of finding at least one customer in the shop.

iii) What is the average number of customers in the system?

iv) Find the average time spent by a customer in the shop including service.

b) Processing time (in Minute) of six jobs on two machines are given below. Find out the sequence that minimizes the total elapsed time required to complete the tasks on two machines. **[8]**

Job	J1	J2	J3	J4	J5	J6
MachineM1	4	6	7	8	9	1
Machine M2	5	8	1	3	6	10

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. **[12]**

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

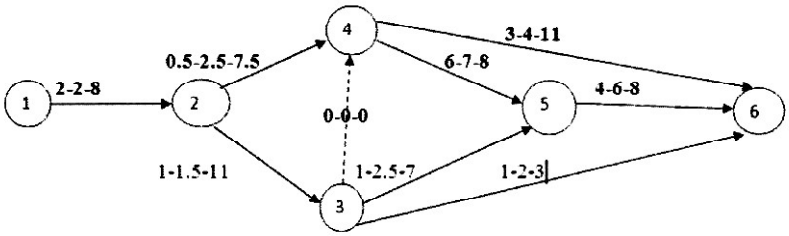
i) Draw an arrow diagram for this project.

ii) Find out the critical path

iii) For each non-critical activity find out the total, free and independent float or Slacks.

OR

Q10)a) Consider a network shown below. For each activity, the three time estimates are given in the order to-tm-tp along the arrow. Determine the critical path. What is the probability that the project will be completed in 20 days? [Given Z = 0.48 the Probability = 0.6844] **[12]**



b) Discuss in brief. **[6]**

i) Common Errors/Flaws in Network

ii) Crashing in the network.

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3124

[Total No. of Pages : 2

[5461]-160-A

B. E. (Mechanical S/W)

ROBOTICS

(2012 Course) (Semester - II) (End Sem.) (402069C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain sensor selection criteria for robotic applications. **[4]**

b) Give the specification for PUMA Robot. **[6]**

OR

Q2) a) What is the physical significance of angular velocity vector? Transformation matrix of an object with respect to the robot base is given by $\text{Base}_{\text{Tobject}} = \begin{bmatrix} 1 & 0 & 0 & 15 \\ 0 & 0 & 1 & -35 \\ 0 & -1 & 0 & 20 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ **[4]**

b) The gripper of the robot has its application vector parallel to X-axis of the robot base frame and the sliding vector parallel to the Y-axis of the robot base frame. Determine the 3 × 3 rotation matrix between the robot base and gripper, also between the object and the gripper. **[6]**

Q3) a) Explain the working principle of tactile sensor with neat sketch. **[6]**

b) Differentiate between serial and parallel manipulator. **[4]**

OR

Q4) a) State characteristics of velocity ellipse for planar 2R manipulator. **[4]**

b) Discuss importance of forward and inverse kinematics. **[6]**

Q5) a) Write a note on recursive forward dynamics algorithm. **[8]**

b) Explain Lagrangian-Euler formaulation for single link with rotary joint. Derive an expression for torque at joint. **[8]**

OR

P.T.O.

Q6) a) Get expression for velocity of CG of third link of a 3 DOF 3R plannar manipulator. **[10]**

b) Explain singular continuity for planar 4-bar mechanism. **[6]**

Q7) a) Explain in details the turning method of PID control. **[8]**

b) A rotary arm of a manipulator is to rotate from 23 to 117 in 9 seconds. Determine coefficients of cubic polynomial to interpolate a smooth trajectory. Plot the position, velocity and acceleration variation against time. **[8]**

OR

Q8) a) Describe the different steps in trajectory planning. **[8]**

b) Fig. shows as error time graph. Sketch the PID controller o/p w.r.t. time. Assume Kp = 10, K = 2 & Kd = 0.5 & Po = 0 i.e. controller o/p is zero when error is zero. **[8]**

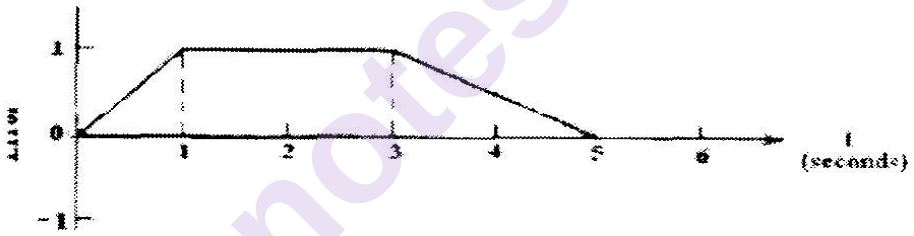


Figure 3

Q9) a) What is edge detection? Explain about sampling. **[8]**

b) Define artificial intelligence. Explain the areas of particular importance of artificial intelligence. **[10]**

OR

Q10)a) Explain with block diagramme Machine vision system for Robots. **[10]**

b) Explain the different steps involved in Segmentation. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3125

[Total No. of Pages : 2

[5461]-161

B. E. (Automobile Engineering)
AUTOMOTIVE REFRIGERATION AND AIR CONDITIONING
(2012 Course) (Semester - I) (End Sem.) (416488)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket, psychrometric chart, calculator and steam tables is allowed.***

Q1) a) Explain with neat diagram Vapour Absorption System. **[6]**

b) Draw the P-V and T-S diagram for Carnot cycle, Simple vapor compression cycle. **[4]**

OR

Q2) a) Explain environmental Legislation for Automotive A/C system. **[6]**

b) Explain in brief Refrigerant Piping. **[4]**

Q3) a) What are the different components of Air conditioning system explain it in brief. **[6]**

b) Write note on **[4]**

i) Accumulators and

ii) Driers

OR

Q4) a) Explain in brief A/C Duct and Air Filter. **[6]**

b) Explain different Vehicle A/C operating mode. **[4]**

Q5) a) Explain Psychometric Properties in Brief. **[4]**

b) Determine final DBT and RH of air washed with re-circulated spray water if the air is initially at DBT 35° C and 50% RH as it enters an Air Washer has humidifying efficiency of 85%. Show the process on diagram. **[12]**

OR

P.T.O.

Q6) a) Explain in brief process of Adiabatic Chemical Dehumidification. **[8]**

b) Explain Evaporative cooling Process. **[8]**

Q7) a) Explain various Factors forming load on Air conditioning system. **[6]**

b) Explain TemperatureSensors used in A/C systems. **[6]**

c) Explain A/C system electrical and Electronic control system. **[6]**

OR

Q8) Automotive vehicle is maintained at 24°C DBT and 60 % under following condition,

Outside Design Condition : 38° C DBT 28°C WBT

Sensible Heat Load in Vehicle : 46.4 KW

Latent Heat Load in Vehicle : 11.6 kW

Total Infiltration air : 1200 m^3/h

Apparatus Dew Pt. Temp : 10°C

Quantity of Recirculated Air : 60%

If quantity of recirculated air mixed with conditioned air after cooling coil find, mass of air entering cooler, mass of total air passing through vehicle, bypass factor of cooling coil, capacity of A/C System. **[18]**

Q9) a) Explain methods of Leak Detection in A/C system. **[8]**

b) How the temperature and Pressure measurement is done in A/C systems. **[8]**

OR

Q10)a) Explain in brief retrofitting. **[6]**

b) Explain process of lubrication and lubricants used in A/C system. **[6]**

c) Write downPrechecks done before testing of A/C system. **[4]**

♦ ♦ ♦

Total No. of Questions :10]

SEAT No. : ____

P3126

[Total No. of Pages : 2

[5461]-162
B.E. (Automobile Engineering)
AUTOMOTIVE CHASSIS & SYSTEMS
(Semester - I) (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.***

Q1) a) Explain center point steering. **[5]**

b) why do the automotive vehicles need a suspension system? **[5]**

OR

Q2) a) What will be the effect of change of following parameters on Steering and Tyres?

i) Castor Angle ii) King Pin Inclination **[5]**

b) What is the effect of Unbalanced Wheel on vehicle handling and tyres? **[5]**

Q3) a) What are the different types of independent suspensions used for Rear Axel? Explain any one with neat figure. **[5]**

b) What are the types of tyre trade wear patterns? Explain briefly. **[5]**

OR

Q4) a) Explain Air Suspension system with its layout. How rising spring stiffness of air spring is achieved? **[5]**

b) Explain use of Anti-Roll Bar. **[5]**

Q5) a) Enlist different types of drum brake layouts. Explain any one layout with neat figure. **[10]**

b) Explain properties of friction lining and pad materials with neat graphical representation. **[8]**

OR

P.T.O.

Q6) a) Classify the braking system and compare Disc and Drum Brake. **[8]**

b) Enlist different types of disc brake arrangements. Explain any one arrangement with neat figure. **[10]**

Q7) a) Enlist active safety devices and passive safety devices used in automotive vehicles. Is a seat belt passive safety device or active safety device? Justify. **[8]**

b) Explain working of Rollover Mitigation system. **[8]**

OR

Q8) a) Explain Electronic stability program system operation. **[8]**

b) What is the importance of Head restraint in automotive vehicle? How it helps in case of accident? **[8]**

Q9) a) List out the salient features of different types of vehicles frames with neat sketches. **[10]**

b) Explain different ways to position the engine with neat figures. **[6]**

OR

Q10)a) Explain manufacturing process of chassis. **[8]**

b) Explain causes of chassis failure in detail. **[8]**

Total No. of Questions :9]

SEAT No. :

P3127

[Total No. of Pages : 2

[5461]-163
B.E. (Automobile)
MACHINE AND VEHICLE DYNAMICS
(2012 Pattern) (Semester - I) (End Semester)

Time : 2½ Hours] *[Max. Marks :* 70

Instructions to the candidates:

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

Q1) a) Explain the term "Logarithmic Decrement". **[4]**

b) Derive expression for radial engine balancing. **[6]**

OR

Q2) Four masses A, B, C and D carried by a rotating shaft at radii 80 mm, 100 mm, 160 mm and 120 mm respectively are completely balanced. Masses B, C and D are 8 kg, 4 kg and 3 kg respectively. Determine the mass A and the relative angular positions of the four masses, if the planes are spaced 500 mm apart.**[10]**

Q3) A mass of 2 kg is supported on spring of 3 kN/m and has a dashpot having damping coefficient of 5 N-sec/m. If the initial displacement of 8mm is given, find **[10]**

a) Damped natural frequency
b) Logarithmic decrement
c) Amplitude after 3 cycle

OR

Q4) The vibrating system is displayed for vibration characteristics. The total mass of system is 30 kg. At the speed of 900 rpm, system and eccentric mass have phase difference of 90° and corresponding amplitude is 18 mm. The eccentric unbalance mass of 1.2 kg has radius of rotation 45 mm determine: **[10]**

a) Natural frequency
b) Damping factor
c) Amplitude at 1550 rpm
d) Phase angle at 1550 rpm

P.T.O.

Q5) a) What is Draw Bar Pull and explain its relation with Engine power. **[8]**

b) Derive power limited acceleration. **[8]**

OR

Q6) a) Derive axial loading in brief. **[8]**

b) Explain the terms in brief: **[8]**

i) Maximum Decelerating Rates

ii) Stopping Distance

iii) Maximum Braking Efficiency

Q7) a) Draw and describe 'The mathematical modeling of vehicle handling'. **[8]**

b) Discuss with suitable example active, semi active and passive suspension. **[8]**

OR

Q8) a) Explain in brief about Neutral steer, understeer and oversteer. **[8]**

b) Discuss road roughness and effect of it on comfort and ride. **[8]**

Q9) Write a short note on any three from following: **[3×6=18]**

a) Suspension Effects on Cornering

b) Low speed cornering and static margin

c) Lateral Acceleration Gain

d) Constant Radius Method

e) Tire Nomenclature

Total No. of Questions : 9]

SEAT No. :

P3128

[Total No. of Pages : 2

[5461]-164

B.E. (Automobile Engineering)

FUNDAMENTALS OF COMPUTATIONAL FLUID DYNAMICS

(2012 Course) (End Semester) (Semester-I) (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) ***Use of logarithmic tables, Sliderule, Electronics pocket calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain strengths and weakness of CFD. **[6]**

b) Write short note on Concept of substantial derivative. **[4]**

OR

Q2) a) Explain the types of grids used in CFD. **[6]**

b) Explain in short flow modeling using control volumes. **[4]**

Q3) $x_1 + 2x_2 = 4$ **[10]**

$-x_1 + x_2 + 2x_3 = 1$

$x_2 + 3x_3 + x_4 = 7$

$2x_3 + 2x_4 = 8$

Solve by Thomas Algorithm.

OR

Q4) Derive, **[10]**

$$\frac{D}{Dt} = \frac{\partial}{\partial t} + (V * \nabla).$$

P.T.O.

Q5) a) Explain first order wave equation solution with Moc Cormack method. **[8]**

b) Explain phase relative error for upstream differencing scheme. **[8]**

OR

Q6) a) Explain 1D and 2D steady Convection Diffusion system by Central difference approach. **[8]**

b) Explain first order wave equation solution with Lax Wendroff scheme. **[8]**

Q7) a) Explain the numerical procedure using SIMPLE algorithm. **[8]**

b) Explain the application to flow through pipe with suitable example. **[8]**

OR

Q8) a) Explain finite volume method. **[8]**

b) Explain the numerical procedure to find the Solution of Navier-Stoke's equation for incompressible flow using SIMPLER algorithm. **[8]**

Q9) Write short note on, (Any Three): **[18]**

a) Physical Boundary condition types.

b) Explain the solver settings in CFD.

c) Explain K-6 model equation with advantages.

d) Steps in pre-processing.

Total No. of Questions : 8]

SEAT No. :

P3129

[Total No. of Pages : 4

[5461]-165

B.E. (Automobile Engineering)

FUNDAMENTALS OF FINITE ELEMENT ANALYSIS

(2012 Course) (Semester - I) (End Sem.) (Elective - I) (416491B)

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) Write and Explain the 'Principle total potential energy approach in finite element analysis. **[6]**

b) For truss shown in figure (1), determine the nodal displacement. The force acting on node 2 in X direction is 10 kN and Y direction is 5 kN. Take modulus of elasticity E = 200 GPa and area of cross section of each element is 200 mm^2. **[8]**

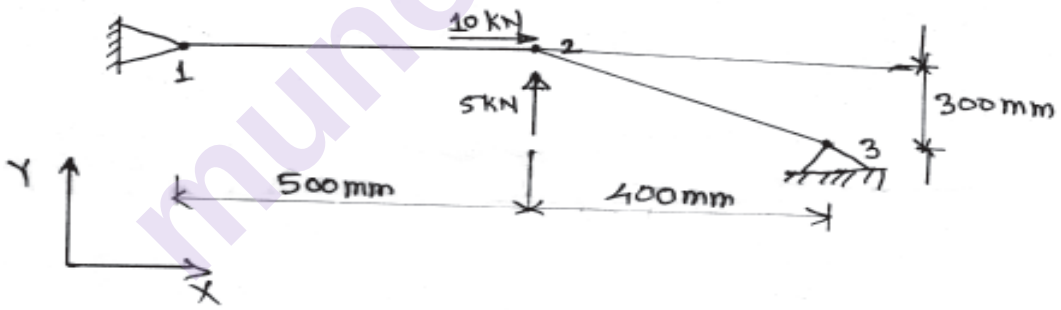


Figure No. 1

c) Write the short note on **[6]**

i) Pascal's Triangle

ii) Axi-symmetrical Element

OR

Q2) a) Explain the 'weighted residual approach' in finite element analysis. **[6]**

P.T.O.

b) Find the displacement of all elements of stepped bar shown in figure (2). Take modulus of elasticity E = 200 GPa. **[8]**

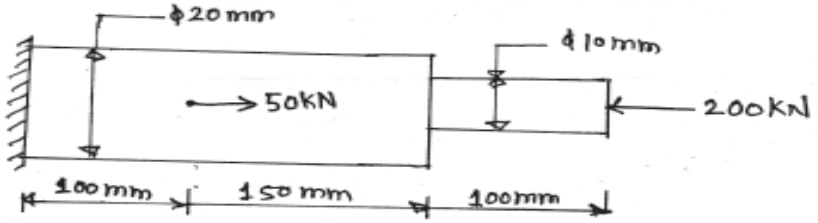


Figure No. 2

c) Write the short note on **[6]**

i) constant strain triangle

ii) Linear strain rectangle

Q3) a) Drive the shape function of 3 node bar element using iso-parametric formulation. **[8]**

b) Evaluate the integrals using three points Gaussian quadrature method **[10]**

i) $\int_{-1}^{1} (e^x + x^3 + x^2)\,dx$

ii) $\int_{-1}^{1} (3^x - x)\,dx$

OR

Q4) a) Explain the following terms **[8]**

i) iso-parametric elements

ii) Sub parametric elements

iii) Super parametric elements

iv) Sub modelling

b) The iso-parametric shape function of CST element shown in figure(3) are given $N_1 = \xi$, $N_2 = \eta$, $N_3 = 1 - \xi - \eta$. Evaluate the shape function interior point P. The displacement of nodes 1,2,3 are 2.5mm, 3mm, 5mm respectively. Evaluate the displacement of point P. **[10]**

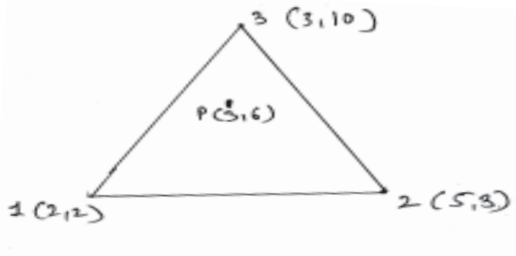


Figure No. 3.

Q5) a) Formulate the 1D steady state conduction heat transfer equation using the Galerkin approach. **[8]**

b) A composite wall consisting of two material shown in figure 4. The outer temperature is $T_0 = 20^oC$, convection heat transfer takes place on inner wall $T_\infty = 800^oC$ and $h = 25 W/m^2\ ^oC$. Determine the temperature distribution in wall. **[8]**

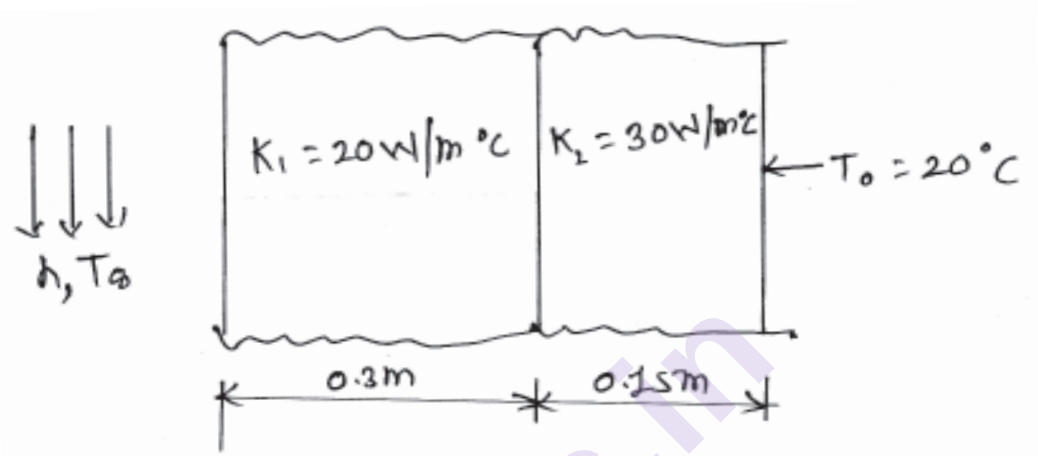


Figure No. 4

OR

Q6) For the one dimensional road shown in figure 5. Is insulated except the ends, determine the temperature at L/3, 2L/3 and L. Let's thermal conductivity of rad $K = 60\ W/m\ ^oC$ and right end having the $h = 800\ W/m^2\ ^oC$ and $T_\infty = 0^oC$ and the temperature at left end is 95^oC. **[16]**

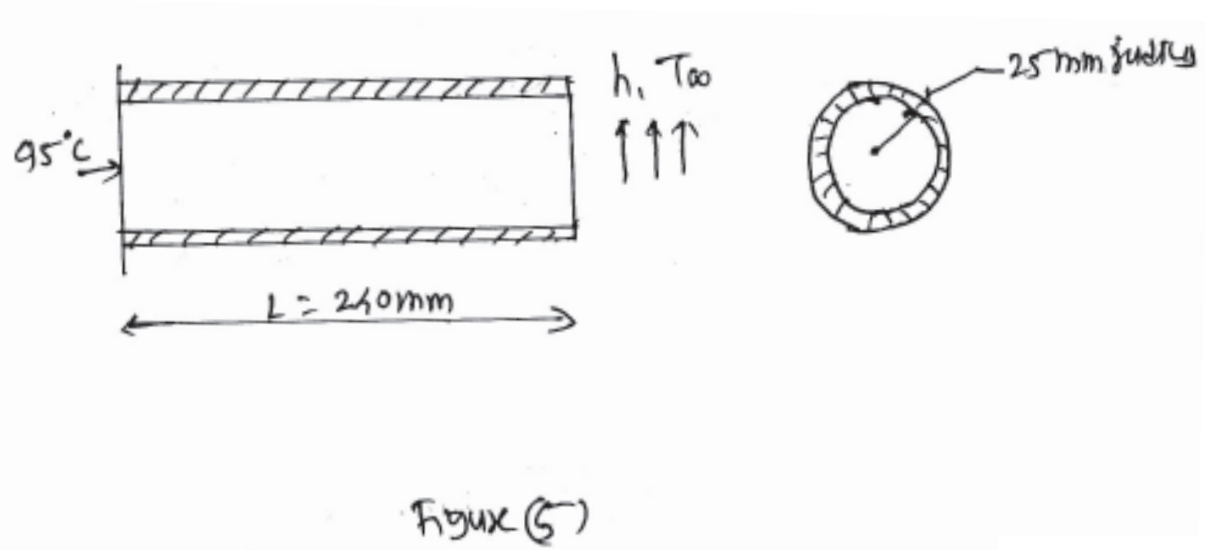


Figure (5)

Q7) a) Explain the difference between lumped mass matrix and consistent mass matrix. **[8]**

b) Find the natural frequency of bar shown in figure 6, using consistent and lumped mass matrix method. Use one element for bar. Modules elasticity of E = 200GPa, density of material ρ = 7800 kg/m^2 and length of rad L = 2m **[8]**

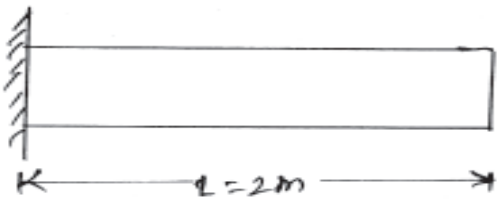


Figure No. 6

OR

Q8) a) Formulate the consistent matrices for 1D bar element. **[8]**

b) For the stepper bar shown in figure (7). Determine the first two natural frequencies for un-damped free vibration. Let $A_1 = A_2 = 5$ cm^2, $A_3 = 10$ cm^2 E = 21 GPa and ρ = 7860 kg/m^2, use consistence mass matrices for each element. **[8]**

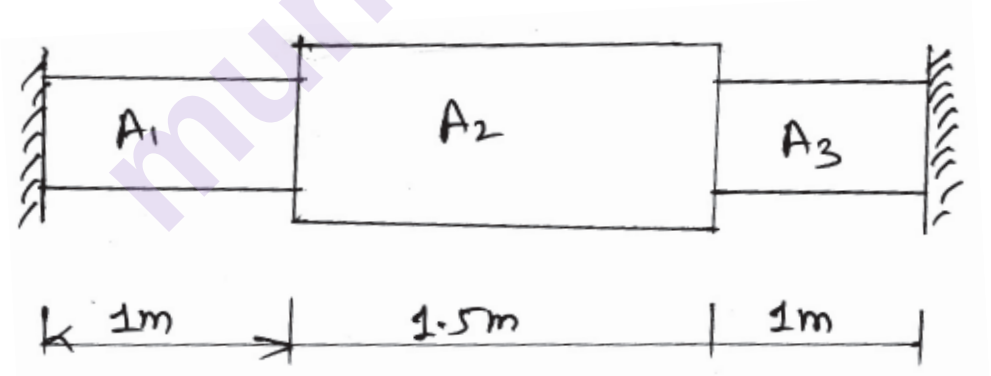


Fig. (7)

Total No. of Questions : 10]

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P3130

[Total No. of Pages : 3

[5461]-166

B.E. (Automobile)

CAE AND AUTOMATION

(2012 Course) (Semester-I) (End Sem.) (Elective-I) (416491 C)

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 wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of slide rule, electronic pocket calcultor and is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Plot the Bezier curve having end points $P_0(0, 0)$ and $P_3(7, 0)$. The other control points are $P_1(7, 0)$ and $P_2(7, 6)$. Plot the values for u = 0 to 1, with increment of 0.1. Assume the characteristic polygon is drawn in the sequence P_0-P_1-P_2-P_3. **[6]**

b) Describe in brief features Based Modelling with sketches. **[4]**

OR

Q2) a) A rectangle ABCD having diagonal corner A(2, 2) and C(10, 8) is to be reflected about the line y = 1.7321 x - 3. Determine: **[6]**

i) The concatenated transformation matrix.

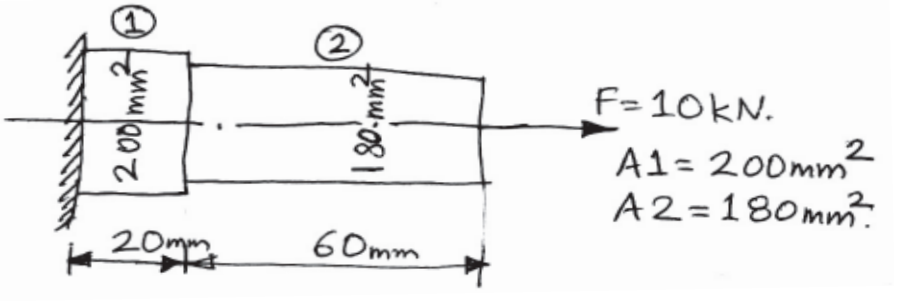
ii) The coordinate of the rectangle after transformation.

b) Write short note on perspective projections. **[4]**

Q3) a) Line L_1 has end points (1, 2, 7) and (5, 6, 1), while line L_2 has end points (7, 3, 4) and (3, 9, 10). Find the parametric equation of lines. **[4]**

b) A stepped bar is made of two materials joined together as shown in Fig. 1. The bar is subjected to an axial pull of 10 kN. Determine the displacements of each of the section, using a 1D spar element. **[6]**

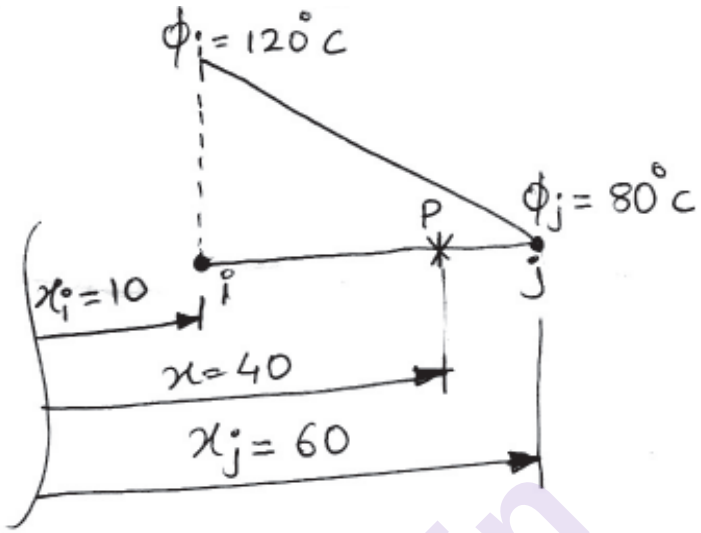
E_1 = 200 GPa E_2 = 120 GPa



OR

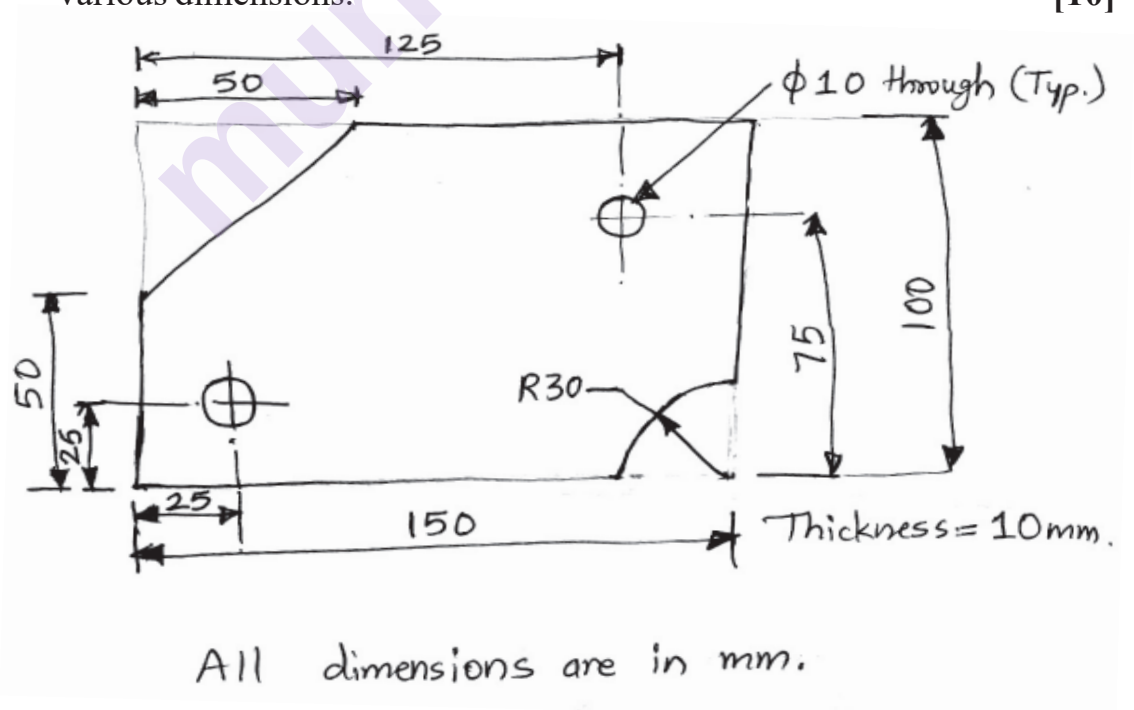
P.T.O.

Q4) a) Determine the temperature at x = 40 mm, if the temperature at nodes ϕ_i = 120°C, ϕ_j = 80°C and x_i = 10 mm, x_j = 60 mm. **[6]**



b) Describe with neat sketches 3D elements used in finite element analysis. **[4]**

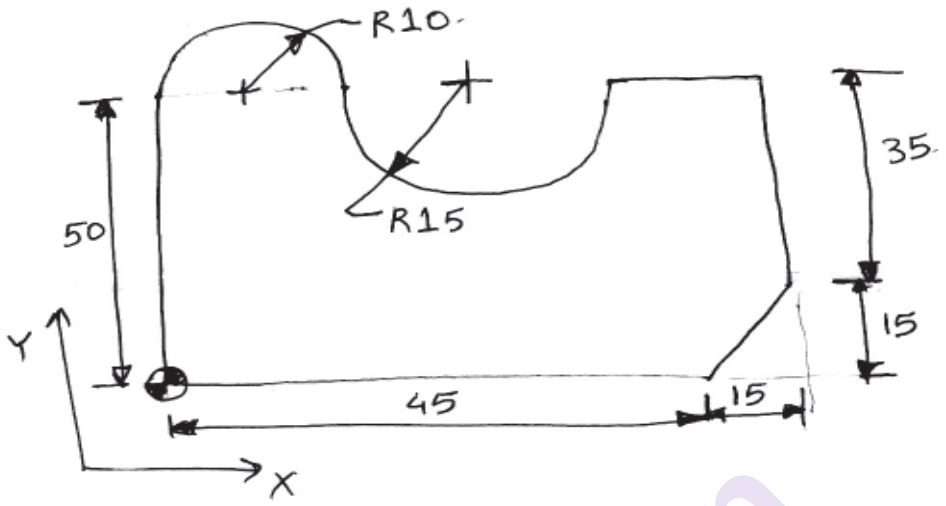
Q5) a) Write a manual part programme for the component shown in fig. 2. Assume the raw product as cast iron and the machining is to achieve the various dimensions. **[10]**



b) Explain with neat sketch Generative Process Planning. **[8]**

OR

Q6) Write a NC part programme to machine by using G and M code to cut a slot of 5 mm deep for the component shown in figure. Using an endmill of 6 mm diameter and assume suitable machining parameters. **[18]**



Q7) a) Explain different types of FMS layouts with neat diagrams. **[8]**

b) Following Table shows the machines required to process the parts. Group the parts and machines in group using production flow analysis. Prepare the part-machine incidence matrix and sort the rows and columns using binary weights. **[8]**

Part	1	2	3	4	5	6	7	8	9
Machines required	2, 4	1, 3, 5	7, 8	2, 4, 6	3, 5	2, 4, 6	7, 8	3, 5	7, 8

OR

Q8) a) Compare Fixed, Programmable & Flexible automation. **[8]**

b) Describe with neat sketch computer Integrated Manufacturing. List the benefits derived from CIM. **[8]**

Q9) a) Describe Robot configurations & work space with neat sketch. **[8]**

b) Describe different types of work cell layout with neat sketch. **[8]**

OR

Q10)a) Explain the different parameters to be considered in robot selection. **[8]**

b) Explain with neat sketch, different types of robot joints and their characteristics. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3131

[Total No. of Pages : 2

[5461]-167

B.E. (Automobile Engineering)

HYBRID AND FUEL CELL VEHICLE (416492A)

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

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 and Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Suggest the challenges and opportunities in technology of hybrid vehicle. **[4]**

b) Explain the construction and working of shunt wound motor. **[6]**

OR

Q2) a) Write the importance of electric vehicle in today's transportation sector. **[4]**

b) Describe the constructional details and working principle of DC Motor. **[6]**

Q3) a) What is mean by hybrid vehicle and explain possible combinations of hybrid vehicle. **[4]**

b) Discuss in detail various road loads offered by vehicle. **[6]**

OR

Q4) a) Discuss the advantages and disadvantages of series hybrid vehicle. **[4]**

b) Draw and explain typical layout of combined hybrid vehicle with its power flows. **[6]**

Q5) a) Discuss the concept of hybrid efficiency and hybrid performance in hybrid vehicle. **[8]**

b) Define the concept of hybridness and explain its importance in design of hybrid vehicle. **[8]**

OR

P.T.O.

Q6) a) Select and justify the design consideration you should consider for design of electric hybrid vehicle? **[8]**

b) List and explain the various operation modes of series hybrid vehicle. **[8]**

Q7) a) Explain the construction and working of Nickel Cadmium battery with neat sketch. **[8]**

b) Draw a neat sketch of fuel cell efficiency characteristics and explain in detail. **[8]**

OR

Q8) a) Explain with neat sketch construction and working principle of proton exchange membrane fuel cell. **[8]**

b) Explain the construction and working principle of rotary positive displacement pump. **[8]**

Q9) a) Draw and explain post transmission system in hybrid vehicle. **[6]**

b) What are the good requirements of electric battery in hybrid vehicle? **[6]**

c) Explain the construction and working of direct methanol fuel cells. **[6]**

OR

Q10)a) What are the various factors affecting on energy of battery? **[6]**

b) Discuss the various operation modes in pneumatic hybrid engine. **[6]**

c) Classify and explain positive displacement pump in hybrid vehicle. **[6]**

Total No. of Questions : 12]

SEAT No. :

P3132

[Total No. of Pages : 2

[5461]-168

B.E. (Automobile)

AUTOMOTIVE MATERIALS

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

Time :2 ½ 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 question 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]**

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

P.T.O.

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. :

P3133

[Total No. of Pages : 2

[5461]-169

B.E. (Automobile)

AUTOMOTIVE HYDRAULICS AND PNEUMATICS

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

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer five questions.***
2) ***figures to right indicates full marks.***
3) ***Assume suitable data wherever necessary.***

Q1) a) Explain the industrial application of fluid power. **[6]**

b) Explain flared fitting . **[4]**

OR

Q2) a) Describe construction and working of gear pump. **[6]**

b) Explain hoses used in Hydraulic application. **[4]**

Q3) a) Explain Advantages and disadvantages of poppet value. **[6]**

b) Draw and explain Teleschopic cylinder. **[4]**

OR

Q4) a) Draw graphical symbol for

i) $^{2}/_{2}$ dcv's ii) $^{4}/_{2}$ iii) $^{5}/_{3}$ **[6]**

b) Difference between positive displacement pump and non-positive displacement pump. **[4]**

Q5) a) Draw and explain Hydroulic sequencing circuit with minimum two applications. **[10]**

b) Draw and explain speed control of hydraulic cylinder circuit. **[6]**

OR

P.T.O.

Q6) a) With the help of circuit diagram explain double pump Hydraulic system (Hi - Lo Circuit). **[8]**

b) Explain the application of counter balance value with suitable circuit diagram. **[8]**

Q7) a) Draw pneumatric symbols for.

i) $^{4}/_{2}$ valve ii) Mufflers

iii) Airmoter iv) Pressure Regulating valve **[8]**

b) Explain Axial piston pump with neat sketch. **[8]**

OR

Q8) a) Comparision of prenumatic & Hydroulies power transmission. **[8]**

b) Explain law of compression list types of compressions used in pneumatics system. **[8]**

Q9) a) Draw and explain Hydraulic tipping mechanism. **[10]**

b) Explain the types and application of Accumulaters. **[8]**

OR

Q10)a) Explain Clutch Actuating mechanism used in Automobiles. **[8]**

b) Draw & explain Accumulator as shock a shock absorber use.in vahicles. **[8]**

Total No. of Questions : 9]

SEAT No. :

P3134

[Total No. of Pages : 2

[5461]-170

B.E. (Automobile)

VEHICLE PERFORMANCE AND TESTING

(2012 Pattern) (Semester-II) (End Sem.) (416495)

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 is compulsory.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Explain with neat diagram Lambda closed loop control system. **[4]**

b) Explain construction and working of catalytic converter. **[6]**

OR

Q2) a) Write and explain procedure for clutch testing. **[4]**

b) What are the different methods used to test tires. **[6]**

Q3) a) How the steering and suspension system affects on performance of vehicle. **[6]**

b) Explain working of torque converter. **[4]**

OR

Q4) a) Explain in brief Transition testing, accelerated testing and virtual testing. **[6]**

b) Explain high speed track, pavement track, corrugated track, mud track. **[4]**

P.T.O.

Q5) a) Explain with neat diagram the Adaptive cruise control. **[8]**

b) Explain with neat diagram working of collapsible steering system. **[8]**

OR

Q6) a) What is Active safety and passive safety state ergonomics consideration in safety. **[8]**

b) Explain term Driving control accessibility and driver seat anthropometry. **[8]**

Q7) a) Explain different types of Crash testing. **[8]**

b) Explain in brief with neat diagram Human crash Testing. **[8]**

OR

Q8) a) What is Crash test data acquisition. **[8]**

b) Explain in brief Braking distance test. **[8]**

Q9) Write short note on (any 3): **[18]**

a) State causes and remedies for engine noise and vibration.

b) Explain mechanisms of Noise generation.

c) Sensors used in automotive testing.

d) Model testing.

e) Full Scale Testing.

Total No. of Questions : 10]

SEAT No. :

P3135

[Total No. of Pages : 3

[5461]-171

B.E. (Automobile Engineering)
AUTOMOTIVE SYSTEM DESIGN
(2012 Pattern) (Semester - II) (416496)

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) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator.***
5) ***Assume suitable data if necessary.***

Q1) a) Derive the expressions for torque transmission capacity for single plate clutch by assuming uniform wear and uniform pressure both. **[6]**

b) What are the advantages of increasing numnber of gear ratio steps in automobile gearbox? **[4]**

OR

Q2) a) A four speed gear box is to have the following gear ratio 1.0, 1.5, 2.48 and 3.93. The centre distance between the lay shaft and main shaft is 73.12 mm and the smallest pinion is to have at least 15 teeth with a diameteral pitch of 3.25 mm. Find the number of teeth of the various wheels. Find the exact gear ratios. **[6]**

b) Discuss about clutch frictional materials and their properties. **[4]**

Q3) a) Enlist bearing types and explain the parameters to be considered for selection of bearing. **[6]**

b) State and explain the types of live axles. **[4]**

OR

Q4) a) Enlist the types of gear train. **[2]**

b) Name the basic types of universal joints and explain any one in detail with sketch. **[8]**

P.T.O.

Q5) a) What is the braking efficiency? Explain in detail. **[8]**

b) A motor car has a wheel base of 2.64m,the height of its CG above the ground is 0.61m and it is 1. 12m in front of the rear axle. if the car is travelling at 40km/h on a level track, determine the minimum distance in which the car may be stopped, when.

i) The rear wheels are braked

ii) The front wheel are braked

iii) All wheels are braked **[10]**

OR

Q6) In a hydraulic single line braking system the force on foot pedal is 100N, pedal leverage ratio is 4.4, cross sectional area of master cylinder is $4cm^4$, cross sectional area of front piston 20 cm^4.Cross sectional area of the rear piston is 5 cm^4. Distance moved by effort is 1 cm. Calculate the following.**[18]**

a) Front to rear brake ratio

b) Total force ratio

c) Distance moved by output

d) Cylinder movement ratio

e) Total movement ratio.

Q7) a) i) Explain the design features of leaf spring. **[12]**

ii) Discuss the vehicle dynamics.

iii) Discuss the forces on vehicle suspension system.

b) Write a note on air springs. **[4]**

OR

Q8) a) What is nipping in leaf springs? **[16]**

b) Brake fade and Brake torque.

c) Brake balance and Braking efficiency.

d) Components used in hydraulic brake system.

Q9) a) What do you understand by optimum and adequate design? **[6]**

b) A hollow shaft is required to transmit 60 KW at 110 rpm. The maximum torque being 20% greater than the mean. The shear stress is not to exceed 63Mpa and twist in a length of 3 meters not to exceed 1.4 degrees. Find the external diameter of the shaft, if the internal diameter to external diameter is 3/8. Take modulus of rigidity as 84 Gpa. **[10]**

OR

Q10)Design a Tensile Bar for Minimum Cost of the following materials. **[16]**

Assume Factor of Safety of 2.

Material	Mass density (Kg/m^3)	Yield strength (Mpa)	Material cost Rs/N
Steel	3000	16	130
Al alloy	3000	32	50
Magnesium alloy	2100	32	20

Area of bar should be at least 85 mm^2 length of bar is 200 mm and a constant tensile load on bar is of 5000N.

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

P3136

[Total No. of Pages : 2

[5461]-172

B.E. (Automobile Engineering)

AUTOMOTIVE NVH

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

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Figures to the right side indicate full marks.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of Logarithmic tables, Sliderule, Electronic pocket calculator is allowed.***
4) ***Assume Suitable data if necessary.***
5) ***Q No.3 & 8 is compulsory.***

Q1) a) Explain mathematical model. Draw the mathematical model for car. **[6]**

b) What are the types of vibration? Explain any two in details. **[6]**

OR

Q2) a) What are the different types of damping? Explain any one. **[6]**

b) Derive the equation for single degree of freedom system to find out natural frequency with energy method. **[6]**

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

a) Vibration Isolation

b) Vibration absorber

Q4) a) Draw the Anatomy of Human Ear and explain Mechanism of hearing. **[10]**

b) Explain weighting networks in details. **[8]**

OR

Q5) a) What are the types of sound propagation? Effects of reflecting surfaces on sound propagation. **[8]**

b) Explain relation between sound power, sound intensity and sound pressure level. **[10]**

P.T.O.

Q6) a) Explain pass by noise test with the help of neat sketch. **[8]**

b) What is mean by FFT? Explain FFT with neat sketch. **[8]**

OR

Q7) a) Explain Drive by noise test with the help of neat sketch. **[8]**

b) What are the different techniques use for vibration measurement? Explain any one. **[8]**

Q8) Write a short note: (any four) **[16]**

a) Transmission noise

b) Aerodynamics noise

c) Tyre noise

d) Noise control methods

e) Vibration control Techniques

Total No. of Questions : 10]

SEAT No. :

P3137

[Total No. of Pages : 2

[5461]-173
B.E. (Automobile Engg.)
OFF ROAD VEHICLE
(2012 Course) (End sem.) (Elective III) (Semester-II) (416497 B)

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 chassis and transmission considerations in an off road vehicle. **[8]**

b) Differentiate between crawler mounted tractor and wheel mounted tractor. **[8]**

OR

Q2) a) Explain the aggregate processing plant with neat sketch. **[8]**

b) Explain the construction and working of dipper shovel. **[8]**

Q3) Explain the applications of a scraper. **[4]**

OR

Q4) Explain the construction and working of dragline. **[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 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 tha safe warning system for a dumper. **[8]**

Q9) a) Explain the main components of hydraulic system with the help of block diagram. **[8]**

b) Write down the characteristics of soil. **[8]**

OR

Q10) Explain the following. **[16]**

a) Soil Horizons with neat sketch.

b) i) Distinguish between Ground Pressure and Nominal ground pressure.

ii) Explain about Mobility index

✠ ✠ ✠

Total No. of Questions : 10]

SEAT No. : ____

P3138

[Total No. of Pages : 2

[5461]-174

B.E. (Automobile)

ALTERNATIVE FUELS AND EMISSION CONTROL

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

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer question nos. 1 or 2, 3 or 4, 5 or 6, 7 or 8, and 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, electronic pocket calculator is allowed.***

Q1) a) How are SI and CI engine fuels rated? **[4]**

b) Write the calorific value & general chemical formula of following fuels. (any4) **[6]**

i) Petrol

ii) Diesel

iii) LPG

iv) CNG

v) BIO GAS

OR

Q2) a) Discuss important qualities of SI and CI engine fuel. **[6]**

b) Write a note on biogas as a fuel for IC engine. **[4]**

Q3) a) Explain the properties of hydrogen fuel & give its advantages over conventional fuels. **[4]**

b) What are the different synthetic fuels used in IC engines? Explain its effect on engine performance. **[6]**

OR

P.T.O.

Q4) a) Write note on alcohol as fuel for IC engine. **[4]**

b) Explain any two synthetic fuels with its properties, advantages, disadvantages & handling. **[6]**

Q5) a) What is the effect of compression ratio on SI engine emission? **[8]**

b) What is positive crankcase ventilation? Explain. **[8]**

OR

Q6) a) How will you reduce the NOx emission in IC engine? **[6]**

b) Explain effect of design and operating parameters on SI engine emission. **[10]**

Q7) Explain effect of design and operating parameters on CI engine emission. **[16]**

OR

Q8) a) Why turbocharger is used in automobile engines, explain effects of turbo charging on emission? **[8]**

b) Describe the sources and causes of soot and particulate formation? **[8]**

Q9) Write a note on.

a) Effect of NOx emission on human as well as on environment. **[6]**

b) Indian emission norms. **[6]**

c) Ambient air quality monitoring **[6]**

OR

Q10)a) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? **[9]**

b) Explain the remedies for engine emission. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3139

[Total No. of Pages : 2

[5461]-175

B.E. (Automobile)

TRANSPORT MANAGEMENT AND MOTOR INDUSTRY

(2012 Pattern) (Elective-IV) (Semester-II) (416498 A)

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 rules of motor vehicle ACT? **[5]**

b) What is the process of transfer of ownership of vehicle? **[5]**

OR

Q2) a) Explain the new motor vehicle act. **[5]**

b) Explain OTT of transport and non transport vehicle. **[5]**

Q3) a) Explain procedure of driving licenses. **[5]**

b) What is certificate of fitness and its validity, **[5]**

OR

Q4) a) What is third party insurance? **[5]**

b) Difference between assurance and insurance. **[5]**

P.T.O.

Q5) a) Explain the meaning of vehicle scheduling. **[8]**

b) Explain Calculation of cost of transport. **[8]**

OR

Q6) a) What are the modes of road Transport? **[8]**

b) Write classification of transport. **[8]**

Q7) a) Differentiate between MSRTC and Privet Bus. **[8]**

b) Explain transportation of Petroleum Product. **[8]**

OR

Q8) a) Explain the good transport management. **[8]**

b) Explain GPS System. **[8]**

Q9) a) Explain the role of ARAI in Automobile industry. **[9]**

b) Explain traffic management techniques. **[9]**

OR

Q10)a) Write Short Note on BEST, PMT, MSRTC BUS services. **[9]**

b) Explain VRDE. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3140

[Total No. of Pages : 4

[5461]-176

B.E. (Automobile)

OPERATION RESEARCH

(2012 Course) (Elective-IV) (Semester-II) (416498 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Figures to the right side indicate full marks.***
2) ***Use of Electronic calculator is allowed.***
3) ***Assume Suitable data if necessary.***

Q1) a) Application of operation Research & explain in details. **[4]**

b) Solve the following LPP by Simplex Method **[6]**

Max $Z = 10X_1 + 20X_2$ Subjected to the following constraints

$30X_1 + 20X_2 \leq 1500$

$X_1 + X_2 \leq 1000$

OR

Q2) a) Explain stages of Operation Research. **[4]**

b) Max $Z = 11X_1 + 12X_2$ Subjected to the following constraints **[6]**

$30X_1 + 20X_2 \leq 150$

$X_1 + X_2 \leq 100$

Solve maximize problem any suitable method.

Q3) a) Explain Hungerian Method. **[4]**

b) Find set up cost by Hungerian method. **[6]**

14	5	8	7
2	12	6	5
7	8	3	9
2	4	6	10

OR

P.T.O.

Q4) The Dakota Furniture Company manufactures desks, tables, and chairs. The manufacture of each type of furniture requires lumber and two types of skilled labor: finishing labor and carpentry labor. The amount of each resource needed to make each type of furniture is given in the table below: **[10]**

Resource	Desk	Table	Chair
Lumber	8 units	6 units	1 unit
Finishing hours	4 hours	2 hours	1.5 hours
Carpentry hours	2 hours	1.5 hours	0.5 hours

At present, 48 units of lumber, 20 finishing hours, and 8 carpentry hours are available. A desk sells for €60, a table for €30, and a chair for €20. Dakota belives that demand for desks and chairs is unlimited, but at most 5 tables can be sold.

Since the available resources have already been purchased, Dakota wants to maximize total revenue.

Q5) a) Compare CPM & PERT, & steps in CPM. **[8]**

b) A project Schedule has the following characteristics. **[8]**

Activity	Time (Days)	Activity	Time (Days)
1 - 2	4	5 - 6	4
1 - 3	1	5 - 7	8
2 - 4	1	6 - 8	1
3 - 4	1	7 - 8	2
3 - 5	6	8 - 10	5
4 - 9	5	9 - 10	7

i) Compute the Network.

ii) Find the Critical Path.

iii) Compute E & L and Total Float for each activity.

OR

Q6) a) Processing of 2 & 3 jobs on N machines by sequencing method. **[6]**

b) Draw the network diagram and determine the critical path for the following project: **[10]**

Activity	Time estimate (Weeks)
1 - 2	5
1 - 3	6
1 - 4	3
2 - 5	5
3 - 6	7
3 - 7	10
4 - 7	4
5 - 8	2
6 - 8	5
7 - 9	6
8 - 9	4

Draw all possible paths.

Q7) a) Solve the following game: **[8]**

		Player B Strategies			
		I	II	III	IV
Player A Strategies	1	1	–6	8	4
	2	3	–7	2	–8
	3	5	–5	–1	0
	4	3	–4	5	7

b) Explain maximin/minimax principle, saddle point, solution for (2 × 2) game. **[8]**

OR

Q8) a) Explain Minimax and Maximin principles & What is a fair game? **[8]**

b) Solve the game with the following pay-off matrix. **[8]**

		Player B Strategies				
		I	II	III	IV	V
Player A Strategies	1	7	5	2	3	9
	2	10	8	7	4	5
	3	9	12	0	2	1
	4	11	–2	–1	3	4

Q9) a) Explain replacement of items that fail suddenly, group replacement. **[8]**

b) Find the cost of the individual replacement policy of an installation of 300 bulbs, given the following: **[10]**

i) Cost of individual replacement of bulb is Rs. 2.

ii) Conditional probability of failure of bulbs is as follows.

Weekend	0	1	2	3	4
Probability of Failure	0	0.1	0.3	0.7	1.0

OR

Q10)a) A machine costs Rs. 500. Operation and maintenance costs are zero for the first year and increased by Rs. 100 every year. If money is worth 5% every year, determine the best age at which the machine should be replaced. The resale value of the machine is negligibly small. What is the weighted average cost of owning and operating the machine. **[10]**

b) Explain Individual & Group replacement with all formulation. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3666

[Total No. of Pages : 2

[5461]-181

B.E. (Electronics) (Semester - VII)

VLSI DESIGN

(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 and Q. 7 or Q. 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What are the different data types of VHDL? With examples explain entity, port and architecture in VHDL. **[8]**

b) Draw the CMOS digital design of the given equation. **[6]**

$$\overline{(A.B)+(C.D.E.)}$$

c) Explain in brief channel length modulation. **[6]**

OR

Q2) a) Draw logic symbol, truth table and logic gate circuit and write a HDL code for 8:1 Mux using behavior modeling style by using if statement. **[6]**

b) Explain the features of CPLD. **[6]**

c) Describe power dissipation, Noise Margin, Power Delay Product, Energy dissipation. **[8]**

Q3) a) Classify memories with respect to their programming technologies. Draw the architecture of SRAM with 6T. **[8]**

b) Explain with neat diagram DRAM and its working and also explain sense amplifier with it. **[8]**

OR

Q4) a) Compare SRAM and DRAM. **[8]**

b) Describe in detail Address decoders, refreshing circuit and timings of read and write with respect to DRAM. **[8]**

P.T.O.

Q5) a) What is floor planning, shape functions and floor plan sizing? **[8]**

b) What are the different types of routing available in VLSI design? Explain local routing. **[5]**

c) Explain Area routing with example. **[4]**

OR

Q6) a) What do you mean by placement and routing? Explain channel routing in brief. **[8]**

b) Explain Global routing in detail and also write Maze Algorithm for it. **[9]**

Q7) a) Explain need of Design for Testability (DFT). Define controllability, predictability, testability with respect to Fault testability. **[8]**

b) Explain in brief about partial and full scan used in testability. **[5]**

c) Write a short note on JTAG. **[4]**

OR

Q8) a) Explain in detail TAP controller with its signals and pins also write its flowchart. **[8]**

b) What do you understand by Built in self test, explain in brief with neat diagram. **[5]**

c) Write a short note on Boundary Scan. **[4]**

Total No. of Questions :8]

SEAT No. : ____

P3141

[Total No. of Pages : 2

[5461]-182
B.E. (Electronic)
ELECTRONIC SYSTEM DESIGN
(2012 Course) (Semester-I) (404202)

Time : 2½ Hours] ***[Max. Marks :*** *70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, and Q7 or Q8.***
2) ***Figures to the right indicates full marks.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain stages in product design. **[8]**

b) Explain Interpretation of DAC specifications from design point of view. **[6]**

c) Explain Error budget analysis with case study. **[6]**

OR

Q2) a) What are the different factors affecting on choice of Op-Amps in signal conditioning. **[8]**

b) Explain Pilot Production batch. **[4]**

c) Explain 12C, CAN, Flexry & SPI. **[8]**

Q3) a) Write short note on debugging tools and techniques for software design. **[8]**

b) What are the features of assembler and cross compilers? **[8]**

OR

Q4) a) Explain different stages of software development in electronic product. **[8]**

b) Compare Assembly Language & HLL. **[8]**

P.T.O.

Q5) a) What are the different PCB Design issues of analog and mixed signal circuits. Explain in details. **[8]**

b) List different EMI/EMC standards. Explain its importance. **[8]**

OR

Q6) a) Write shorte note on signal integrity. **[4]**

b) Explain the importance of shielding and grounding. **[6]**

c) Explain PCB design practices for high speed circuits. **[6]**

Q7) a) Explain how debugging of electronics circuit is carried out by logic analyzer. **[9]**

b) Explain fault finding stages in analog & digital circuits. **[9]**

OR

Q8) a) Explain Environmental Testing & need of Environmental Testing. **[9]**

b) Write features of Analog CRO & DSO? Write limitations of Analog CRO over DSO. **[9]**

Total No. of Questions :8]

SEAT No. :

P3142

[Total No. of Pages : 2

[5461]-183
B.E. (Electronics)
ADVANCED POWER ELECTRONICS
(2012 Course) (Semester-I) (End Term)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) discuss any two control schemes for non-circulating current type dual converter with block diagram. **[8]**

b) Justify why multilevel inverters are preferred over conventional inverter. Comment on P.F. **[4]**

c) With the help of circuit diagram and waveform explain 3ϕ IGBT based PWM Rectifier & state its advantages. **[8]**

OR

Q2) a) Compare circulating & non-circulating type dual converter. **[4]**

b) Explain operation of single phase midpoint cycloconvertor with R & RL loads with neat waveforms. **[8]**

c) Explain EMI and Line power quality problem of Thyristor converter. **[8]**

Q3) a) Describe the operation of single phase full converter fed DC drives for continuous current mode with circuit diagram and waveform. **[8]**

b) A 15 hp, 220V, 2000 rpm separately excited dc motor controls a load requiring a torque of T_L=45 N.m at a speed of 1200 rpm. The field resistance is R_f= 147Ω, the armature circuit resistance is R_a=0.25Ω & the voltage constant of the motor is Kv = 0.7032 v/A rad/s. The field voltage is V_f=220V. The viscous friction & no load losses are negligible. The armature current may be assumed continuous. Determine

i) The back emf; Eg ii) The required armature voltage va &

iii) The rated armature current of the motor. **[8]**

OR

P.T.O.

Q4) a) Explain with circuit diagram operation of four quadrant chopper drive with suitable load. **[8]**

b) What is braking? Explain regenerative braking of DC machine. Mention its advantages and disadvantages. **[8]**

Q5) a) Explain the significance of V/f control for 3 phase Induction motor. Explain the requirement of 3ϕ induction motor drive. **[8]**

b) Explain electromagnetic braking of 3 phase induction motor & discuss any one protection circuit for 3 phase induction motor. **[10]**

OR

Q6) a) With the help of suitable circuit diagram and waveforms explain the working of variable frequency PWM VSI drives. **[10]**

b) What are AC drives? Draw circuit model of IM & discuss parameters 'Slip' (s) of Induction motor. **[8]**

Q7) a) Explain block diagram of volts/hertz control of sychronous mota drive along with the torque slip characteristics & the applications. **[8]**

b) Discuss universal motor drive. **[8]**

OR

Q8) a) Explain salient pole motor with phase diagram & plot of torque versus torque angle. **[8]**

b) How is the step of a variable reluctance stepper motor controlled? **[8]**

Total No. of Questions : 8]

SEAT No. :

P3143

[Total No. of Pages : 2

[5461]-184

B.E. (Electronics)

IMAGE PROCESSING & MACHINE VISION

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

Q1) a) Explain the terms Brightness Adaptation and Simultaneous contrast. **[6]**

b) With the help of masks explain any two Image Smoothing filters. **[8]**

c) Explain Wavelet transform in detail. **[6]**

OR

Q2) a) Explain one technique for Image Acquisition in detail. **[6]**

b) Describe the basic principles of image enhancement by: **[8]**

i) Spatial domain methods

ii) Frequency domain methods

c) Explain Haar transform in detail. **[6]**

Q3) a) Explain edge detection method using gradient operators. **[8]**

b) What is Thresholding? What is the role of illumination in thresholding. **[8]**

OR

Q4) a) Explain Hough Transform in detail. **[8]**

b) Explain segmentation using region splitting & region merging. **[8]**

P.T.O.

Q5) a) What is the advantage of variable length coding. Explain with example. **[8]**

b) With the help of neat block diagram explain lossless predictive coding. **[8]**

OR

Q6) a) What are different types of data redundancies. Explain fidelity criteria. **[8]**

b) Explain transform coding for image compression in detail. **[8]**

Q7) a) Explain different noise models in detail. **[8]**

b) Explain any two methods of image restoration. **[10]**

OR

Q8) a) Explain fingerprint recognition application in detail with block diagram. **[8]**

b) Write short note on following: **[10]**

i) Electron microscopy.

ii) Acoustic Imaging.

Total No. of Questions : 10]

SEAT No. :

P3144

[Total No. of Pages : 2

[5461]-185

B.E. (Electronics Engineering)

EMBEDDED SYSTEM AND RTOS

(2012 Pattern) (End Sem.) (Semester-I) (404204 B) (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 the hardware and software requirement for Vending machine. **[6]**

b) Explain critical section of code, Resources, Shared resources and Task. **[4]**

OR

Q2) a) With the help of neat diagram explain Task Control Block. Explain different data structures used in TCB. **[6]**

b) Explain dead-lock in RTOS. How to avoid the dead-lock? **[4]**

Q3) a) State the characteristics of Embedded system. Explain different categories of Embedded system. **[6]**

b) Draw and explain Kernel Structure in µC/OS-II. **[4]**

OR

Q4) a) State and explain service function for task management in µC/OS-II. **[6]**

b) Explain advantages and disadvantages of real time kernel. **[4]**

Q5) a) Explain the structure of Event Control Block. Show how task and ISR interacts with each other using ECB. **[8]**

b) What is Event flag? Explain services/functions supported by the event flag management in µC/OS-II. **[8]**

OR

P.T.O.

Q6) a) Explain the following functions in μC/OS-II. **[8]**

i) OSSemCreate( ) ii) OSSemPend( )

iii) OSMutexPost( ) iv) OSMutexDel( )

b) Explain the Semaphore. Explain different types of semaphore. Compare Semaphore and Mutex. **[8]**

Q7) a) What is the inter task communication? Explain different kernel objects used for inter task communication in μC/OS-II. **[8]**

b) With the help of Memory Control Block structure explain memory management in μC/OS-II. **[8]**

OR

Q8) a) Explain proting of μC/OS-II on any microcontroller. **[8]**

b) Explain message mailbox and message queue. Explain difference between message mailbox and message queue. Explain the function to create the mailbox. **[8]**

Q9) a) Explain Linux file system. **[6]**

b) With the help of neat block diagram explain the functional blocks of Boot loader. **[6]**

c) Explain with neat diagram Linux kernel structure. **[6]**

OR

Q10)a) Explain device driver methods in Linux. **[6]**

b) Explain Porting of U-Boot in Linux. **[6]**

c) Explain Kernel configuration in Linux. **[6]**

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Total No. of Questions : 8]

SEAT No. :

P3145

[Total No. of Pages : 2

[5461]-186

B.E. (Electronics Engineering)

BIOMEDICAL INSTRUMENTATION

(2012 Pattern) (End Semester) (404204 C) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Biomedical instrumentation system and its component. **[8]**

b) Write short note on ECG machine. **[6]**

c) Explain various types of EEG electrodes. **[6]**

OR

Q2) a) Explain and sketch arrangement of: **[8]**

i) Unipolar limb leads.

ii) Bipolar limb leads.

iii) Einthoven triangles.

b) Explain sensor performance characteristics. **[6]**

c) Write short note on active and passive transducers used in biomedical system. **[6]**

Q3) a) Explain the necessity and functioning of Pacemaker. Discuss different type of batteries used in Pacemaker. **[8]**

b) Write short note on Echocardiography. **[8]**

OR

P.T.O.

Q4) a) Write short note on Stress Test System. **[8]**

b) Write short note on Vector Cardiography. **[8]**

Q5) a) Write short note on: **[8]**

i) Elements of Blood Cell test.

ii) Pulse Oximeter.

b) Explain different technique for electrical safety of medical instruments. **[8]**

OR

Q6) a) Write short note on blood cell counter. **[8]**

b) Describe the working of Flame photometer. **[8]**

Q7) a) Explain Biotelemetry system in detail? **[10]**

b) What are the properties of X-ray machine? Explain in detail the technique for visualization of X-ray. **[8]**

OR

Q8) a) Explain various applications of LASER in medicine. Write general LASER safety guideline. **[10]**

b) Explain application of Telemetry in patient caring. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3146

[Total No. of Pages : 2

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B.E. (Electronics Engineering)

DSP PROCESSORS

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

Time :2 ½ 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) Draw block diagram of decimator. Explain decimation process with neat diagram for decimation factor M. **[5]**

b) What is meant by overflow and underflow in Arithmetic operations? Explain method for detecting overflow. **[5]**

OR

Q2) a) What is difference between parallel processing and pipe lining? **[5]**

b) Discuss MAC implementation of 8 tap FIR filter with suitable schematic. **[5]**

Q3) a) Write short note on barrel shifter. **[5]**

b) List data addressing modes of TMS 320C67xx processor. **[5]**

OR

Q4) a) Draw and explain genetic diagram of host port interface. **[5]**

b) Consider MAC unit whose inputs are 16-bit numbers. If 256 products are to be summed up, how many guard bits should be provided to accumulator so that overflow condition will not occur? **[5]**

Q5) a) Explain how two-dimensional signals are processed on DSP processor. **[8]**

b) Write difference equation and system function for FIR filter. Draw block diagram for FIR filter implementation. Explain algorithm for implementing FIR filter on TMS 320C54xx processor. **[8]**

OR

P.T.O.

Q6) a) What are Q notations used in DSP algorithm? Elaborate on differences between fixed point and floating-point processing. **[8]**

b) Explain the term Adaptive filters. Draw block diagram of adaptive filter Write expressions for output of filter. **[8]**

Q7) a) Discuss 2 point DFT computation using butterfly algorithm. For DIF and DIT method. **[10]**

b) What is overflow and scaling problem in DSP processor? Suggest methods to avoid these. **[8]**

OR

Q8) a) A time domain sequence of 25 bits is convolved with another sequence of 20 bits using DFT-IDFT method. A radix 2 DIT FFT algorithm is used. Find total no of complex multiplications involved in computation of convolution. **[10]**

b) What is bit reserved indexing in FFT algorithm? Explain the procedure for bit reversed index generation. **[8]**

Q9) a) Discuss I/O interface timing diagram for read - write- read sequence of operations. **[8]**

b) What are interrupts? What do you understand by term interrupt handling? With the help of flowchart/ algorithm explain interrupt handling in TMS 32C54xx. **[8]**

OR

Q10)a) What is DMA? Explain role of DMA in improving speed of DSP processor. **[8]**

b) How memory is interfaced with processor? Explain with suitable block schematic. Discuss memory map of TMS 32C54xx series. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3147

[Total No. of Pages : 2

[5461]-189

B.E. (Electronics Engineering)

ROBOTICS AND AUTOMATION (404205B)

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

Time :2 ½ 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) Define and specify measurement units of following specifications of robot. **[5]**

i) Accuracy.
ii) Repeatability

b) Draw work envelop and explain merits and demerits of following geometries of robot: **[5]**

i) Cylindrical Co-ordinate system.
ii) Cartesian Co-ordinate system.

OR

Q2) a) What is automation? What are the effects of modern developments in automation on global competitiveness? **[5]**

b) Differentiate between: **[5]**

i) Reach & Stroke
ii) Robotics and Automation

Q3) a) Explain need of automation in industry and relation of automation with productivity. **[5]**

b) What are different types of grippers? Explain mechanism of any one with proper diagram. State application of it. **[5]**

OR

Q4) a) List application of Robots. Describe any two in detail. **[5]**

b) List various sensors used in robot. Describe any one sensor for following points. **[5]**

i) Working Principle
ii) Different Types
iii) Application

P.T.O.

Q5) a) What is D-H representation? Discuss D-H algorithm with the help of neat diagram. **[10]**

b) With the help of suitable diagram explain RYP and Euler's angles? Write significance of each. **[6]**

OR

Q6) a) Explain the forward & backward kinematics solution.

What is its significance? Give typical set of forward & backward equations. **[10]**

b) What is Jacobian? Explain matrix with the help of suitable equations. **[6]**

Q7) a) What are different parameters involved in Trajectory Planning? Explain various steps in Trajectory planning. **[10]**

b) Explain the term-Robot arm dynamics. Discuss the E-L formulation used for a robotic manipulator. **[8]**

OR

Q8) a) Explain method of Cubic polynomial linear segments with parabolic blending. **[10]**

b) Define the terms. **[8]**

i) Solvability

ii) Stiffness

iii) Singularities

What is importance of each term?

Q9) a) Draw neat block diagram of neural controller. Explain importance of each block and its working in detail. **[8]**

b) Explain with neat block diagram how vision system is used in complex control system. **[8]**

OR

Q10)a) What is fuzzy logic? Draw the block diagram of fuzzy controller and explain it in detail. Draw appropriate waveforms. **[8]**

b) Draw Architecture of robot human interaction. Explain importance of each element. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3148

[Total No. of Pages : 2

[5461]-190

B.E. (Electronics)

ELECTRONICS IN AGRICULTURE (404205C)

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

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidate:

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

Q1) a) Enlist types of data acquisition systems. Explain which type of data acquisition system is best suitable for agricultural application and why. **[8]**

b) What is the role of pH meters in agriculture field analysis and explain any one method of pH measurement. **[8]**

c) State in your own words requirements of communication protocols for application in agriculture vehicles. **[4]**

OR

Q2) a) What do you mean by virtual instrumentation? Explain Role of LABVIEW with suitable agricultural application. **[8]**

b) Discuss calibration procedure of nitrogen, phosphorous estimation. **[8]**

c) What are the problems in agriculture communication? **[4]**

Q3) a) Comment on Spectral reflectance characteristics of Soil & Leaf. **[6]**

b) Define various terminologies used in Geographical information system. **[6]**

c) Draw a neat sketch of Framework of GIS for land development. **[4]**

OR

Q4) a) Compare Remote sensing & GIS. Explain which is suited for agriculture applications. **[6]**

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

i) Geometric correction

ii) Rasterization in GIS.

c) State the applications where Farm management information system supports Farmers. **[4]**

P.T.O.

Q5) a) State the various types of environmental parameters which need to be monitored for better health of plant. Compare various types of soil moisture measuring techniques. **[6]**

b) Enlist types of hydraulic sprayers & Explain any one with suitable agricultural application. **[6]**

c) Discuss: Why to monitor crops? How to monitor crops? **[4]**

OR

Q6) a) Explain how following instruments are helpful in crop monitoring. **[6]**

i) Lysimeters ii) LVDT

b) What are the factors influencing soil temperature & state various tools & techniques of soil water monitoring and measurement. **[6]**

c) What do you mean by yield monitoring & mapping. **[4]**

Q7) a) Explain the instrumentation for monitoring the greenhouse environment. Draw suitable block diagram. **[6]**

b) State various ICT tools available for Agriculture information communication. How this concept is beneficial for farmers & government. **[6]**

c) What are the effects of toxic gases on plant health? **[6]**

OR

Q8) a) How do plants contribute to the ecosystem services upon which humanity depends? **[6]**

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

i) Agriculture Network Information Center

ii) Electronics publishing in agriculture.

c) What do you mean by controllable drying? Why drying needs to be controlled? **[6]**

Total No. of Questions : 8]

SEAT No. :

P3149

[Total No. of Pages : 2

[5461]-191
B.E. (Electronics)
MOBILE COMMUNICATION
(2012 Pattern) (Semester - I) (End Semester) (Elective - II) (404205D)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Reflection, diffraction and scattering with neat diagram and expressions. **[10]**

b) Write a note on

i) Frequency Re-use

ii) Channel Assignment Strategies **[5]**

c) With help of neat diagram explain Maximum likelihood sequence estimation type of Equalizer. **[5]**

OR

Q2) a) With a neat diagram, Explain **[10]**

i) Cell splitting,

ii) Cell sectoring.

b) What is Handoff? Why is it necessary in Mobile Cellular System? **[5]**

c) Determine the various factors that decide the performance of adaptive equalizers. **[5]**

Q3) a) Classify Speech Coders and determine the various properties useful in designing a speech coders. **[6]**

b) Explain with example minimum 3 types of Bock Codes. **[6]**

c) Write a note on Linear predictive coders. **[6]**

OR

P.T.O.

Q4) a) Explain the ALOHA packet radio protocol. **[6]**

b) Explain the significance of Channel coders in Mobile communication and write a note on Block Codes. **[6]**

c) Compare TDMA, FDMA and SDMA access techniques. **[6]**

Q5) a) Give the limitations of Wireless networking and write the difference between wireless and fixed telephone networks. **[8]**

b) Draw the format for packet data transmission and explain the OSI model of X.25 protocol. **[8]**

OR

Q6) a) What is common channel signaling? Draw the architecture of CCS. **[8]**

b) Write a note on Signaling system No.7 Protocol. **[8]**

Q7) a) Classify the logical channels in GSM and explain the functions of each channel. **[8]**

b) Explain forward link and reverse link channel structure of IS-95 CDMA. **[8]**

OR

Q8) a) Write a note on **[8]**

i) GSM frame Structure

ii) GSM Services and Features

b) Draw and explain the forward channel modulation process in CDMA. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3150

[Total No. of Pages : 2

[5461]-192

B.E. (Electronics)

COMPUTER NETWORKS

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain different types of addresses used in TCP/IP protocol. Explain the relationship of layer and addresses in TCP/IP with suitable diagram. **[7]**

b) Explain the architecture of 802.11. **[6]**

c) Explain the stop and wait Automatic Repeat Request protocol with diagram. **[7]**

OR

Q2) a) What are different network software design issues? Explain them in detail. **[7]**

b) Explain with diagram Fiber Optic Cable. Also give their applications. **[6]**

c) What is framing? What are the types of framing? Explain the bit oriented protocol. **[7]**

Q3) a) Give classification of routing algorithms. Also explain the same. **[6]**

b) What is congestion? What are the congestion control categories? Explain back pressure closed loop congestion control. **[6]**

c) Differentiate between Static and Dynamic routing. **[4]**

OR

P.T.O.

Q4) a) Explain Distance Vector Routing. **[6]**

b) What is traffic shaping? Explain leaky bucket algorithm. **[6]**

c) Compare IPV4 vs IPV6. **[4]**

Q5) a) Explain in detail DNS with diagram. **[6]**

b) Write short note on DHCP. **[6]**

c) Draw and explain architecture of WWW. **[6]**

OR

Q6) a) Create a web page using HTML specifying various commands and its outcomes. **[6]**

b) Write short note on FTP. **[6]**

c) Draw and explain format of an e-mail with an example. **[6]**

Q7) a) Explain RSA algorithm. **[6]**

b) Explain the Protocol Analyzer. **[6]**

c) Compare Symmetric and Asymmetric key cryptography. **[4]**

OR

Q8) a) Explain Transposition cipher with an example. **[6]**

b) Draw and explain the model of network security. **[6]**

c) What is cryptography? Draw and explain cryptography components. **[4]**

Total No. of Questions : 10]

SEAT No. :

P3151

[Total No. of Pages : 3

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B.E. (Electronics)

PROCESS AUTOMATION

(2012 Pattern) (Semester - II) (404210)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw the following P&ID symbols. **[5]**

i) Pneumatic Actuator

ii) Control Valve

iii) Solenoid Actuator

iv) Orifice Plate

v) Ventury Tube

b) Explain the steps involved in Ziegler Nichol's method of process loop tuning. **[5]**

OR

Q2) a) Explain with neat diagram single speed and multiple speed floating control action. **[5]**

b) Draw and explain control valve characteristics. **[5]**

Q3) a) Explain with suitable example process control block diagram. **[4]**

b) How would you realize PID controller using operational amplifier. Explain with the help of neat circuit diagram. **[6]**

OR

P.T.O.

Q4) a) State various control system objectives and control system evaluation criteria. **[4]**

b) Draw a neat sketch and explain working of a pneumatic spring diaphragm actuator. **[6]**

Q5) a) Explain with neat diagram architecture of a PLC? Give important specifications of a PLC. **[9]**

b) Develop the physical ladder diagram for a motor with the following. NO START button, NC STOP button, thermal overload limit switch opens on high temperature, green light when running, red light for thermal overload. **[8]**

OR

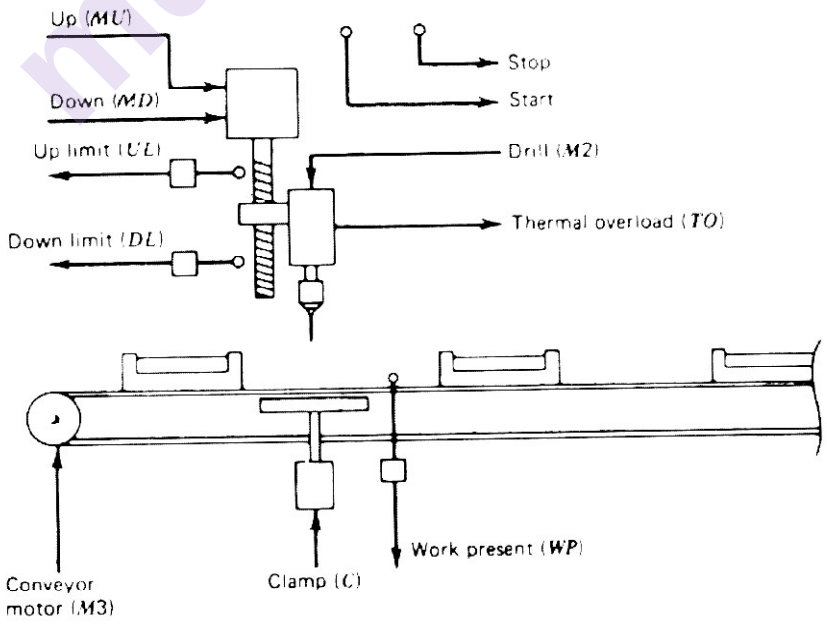
Q6) a) Explain the PLC operation with respect to **[9]**

i) I/O scan mode

ii) Execution mode

iii) Scan time

b) The system shown in figure has the objective of drilling a hole in an object moved on a conveyor belt. Develop the ladder diagram that accomplishes this objective. **[8]**



Q7) a) Explain with neat P&I diagram feedback control scheme for a heat exchanger. **[9]**

b) Explain inferential control scheme to control tops product composition in a distillation column. **[8]**

OR

Q8) a) Explain with neat P&I diagram Air : Fuel ratio control in a boiler. **[9]**

b) Explain with block diagram the concept of Model Predictive Control. **[8]**

Q9) Write short notes on

a) Virtual Instrumentation **[8]**

b) Direct Digital Control **[8]**

OR

Q10)a) Enlist different types of recorders. Explain with the help of neat diagram working principle of any one type of recorder. **[8]**

b) Explain architecture of SCADA system for monitoring processes that are spread out across a large geographic area. **[8]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. : ____

P3152

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B.E. (Electronics)

AUDIO AND VIDEO ENGINEERING

(2012 Pattern) (Elective - III) (Semester-II) (404211 B) (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.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Draw and explain NTSC encoder in detail? **[7]**

b) What is vertical and horizontal resolution & derive expression for maximum video bandwidth. **[7]**

c) What is composite Video Signal? Explain all its parts. **[6]**

OR

Q2) a) Discuss Composite and component video encoding in brief. **[7]**

b) What are the advantages of interlaced scanning? Why progressive scanning is preferred in HDTV? **[7]**

c) Differentiate between digital & analog TV. **[6]**

Q3) a) Discuss the objectives of H.264. Draw and discuss block schematic of H.264. **[8]**

b) Explain the following- **[8]**

i) 3D TV

ii) Perspective of TV white spaces

OR

Q4) a) Write short note on- **[8]**

i) Camcorders

ii) Webcam

b) Discuss in brief IPTV and Wi-Fi TV. **[8]**

P.T.O.

Q5) a) Explain the concept of reverberation with suitable diagram. Write the equation for reverberation time. **[8]**

b) What are the acoustic requirements of auditorium? **[6]**

c) Explain characteristics of microphone (Any four) **[4]**

OR

Q6) a) Draw and explain block schematic of Public Address system. Discuss its need. **[8]**

b) What is audio masking? Explain the different types of masking with neat diagrams. **[6]**

c) What are the special types of microphones? **[4]**

Q7) a) Compare CD, DVD and Blu Ray DVD on the basis of - **[8]**

- Wavelength of LASER
- Storage capacity
- Variants and formats of these discs
- Application

b) Explain MP3 audio compression format. **[4]**

c) State advantages and disadvantages of optical recording techniques. **[4]**

OR

Q8) a) Draw and explain the block diagram of a CD player. Write important specifications of CD. **[8]**

b) Explain in detail Dolby sound system and also state its advantages. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3153

[Total No. of Pages : 2

[5461]-196

B.E. (Electronics)

OPTICAL & MICROWAVE COMMUNICATION

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain the following characteristics of photo detectors: **[7]**

i) Quantum efficiency

ii) Response time

b) Write short notes on meridional rays and skew rays. **[6]**

c) Explain Wavelength Division Multiplexing. **[7]**

OR

Q2) a) Explain intramodal and intermodal dispersion in optical fiber. How dispersion affects transmission bandwidth of optical fiber. **[7]**

b) Explain the mechanism of amplification in an EDFA with a suitable energy level diagram. State the performance parameters of EDFA. **[7]**

c) Compare LED & LASER diode. **[6]**

Q3) a) Explain the working principle of reflex klystron using Applegate diagram. State its applications and performance characteristics. **[8]**

b) How the oscillations are sustained in cavity magnetron? Explain the process of phase focusing effect in Magnetron. **[8]**

OR

Q4) a) What is velocity modulation? How oscillations are sustained in reflex Klystron. State applications of reflex klystron and its performance characteristics. **[8]**

b) What do you mean by linear beam tubes? Draw the diagram and Explain its operation of TWT. Also state advantages of TWT amplifier. **[8]**

P.T.O.

Q5) a) Discuss why hybrid or E-H Tee is referred as Magic Tee. Write scattering matrix of magic tee & illustrate its application. **[8]**

b) Draw and Explain two hole directional coupler and explain its performance characteristics. **[8]**

OR

Q6) a) Define following terms, for rectangular waveguide. Cutoff wavelength, Dominant mode, Guide wavelength, Wave impedance. **[8]**

b) Determine the cut off wavelength for the dominant mode in a rectangular waveguide of breadth 10 cms. For a 2.5 GHz signal propagated in this wavelength. Calculate phase velocity & Group velocity. **[8]**

Q7) a) What is IMPATT diode? Draw the schematic diagram and equivalent circuit of the IMPATT diode. An IMPATT diode has drift length of 2μm. Determine the operating frequency of IMPATT diode if drift velocity is 10^7 cm/s. **[9]**

b) Explain how PIN diode can be used as a microwave switch? **[9]**

OR

Q8) a) Explain GUNN effect with two valley model. Explain its characteristics and applications. **[9]**

b) Explain the principle IV characteristics and equivalent circuit of microwave Tunnel diode. **[9]**

Total No. of Questions : 8]

SEAT No. :

P3154

[Total No. of Pages : 2

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B.E. (Electronics)

SOFT COMPUTING

(End-Sem) (2012 Pattern) (Semester-II) (404211 D) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Using MP model, implement OR function. **[8]**

b) Explain fuzzy relation in detail. **[6]**

c) Differentiate between Multi-layer Perceptron (MLP) and Radial Basis Function Network (RBFN). **[6]**

OR

Q2) a) Define Activation Function and explain them. **[8]**

b) Discuss various operations on fuzzy set. **[6]**

c) Explain K-means algorithm in detail. **[6]**

Q3) a) Given a rule: **[10]**

Rule 1 : If temperature is HOT, then fan should run FAST.

Rule 2 : If temperature is MODERATELY HOT, then fan should run MODERATELY FAST.

The temperature is expressed in degree F and speed is in 1000 rpm.

Given, H = HOT = {0.4/70, 0.6/80, 0.8/90, 0.9/100}

F = FAST = {0.3/1, 0.5/2, 0.7/3, 0.9/4}

H' = MODERATELY HOT = {0.2/70, 0.4/80, 0.6/90, 0.8/100}

Compute F' = MODERATELY FAST, using Mamdani implication rule and max-min composition method.

b) What is defuzzification and explain any one method in detail. **[6]**

OR

P.T.O.

Q4) a) Explain block diagram of Fuzzy Inference System. **[8]**

b) Explain Mamdani Fuzzy Inference Model in detail. **[8]**

Q5) a) Draw a neat diagram of Fuzzy Logic Controller & explain it. **[9]**

b) Explain the Fuzzy Logic Controller in Aircraft Landing Machine application. **[9]**

OR

Q6) a) What are the advantages and applications of Fuzzy Logic Controller? **[9]**

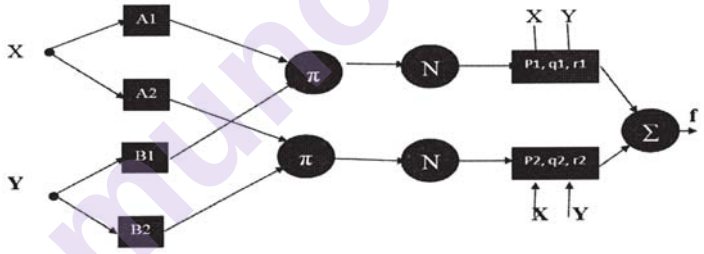
b) Discuss the assumptions in Fuzzy Logic Control design. **[9]**

Q7) a) Explain in detail ANFIS architecture in detail. **[8]**

b) Explain two pass learning in ANFIS. **[8]**

OR

Q8) Compute the output f for the ANFIS network shown in figure. Assume A1, A2, B1, B2 as gbell membership functions. **[16]**



Given, x =25 and y = 30

Premise Parameters:			
A1	a = 50	b = 3	c = 0
A2	a = 50	b = 3	c = 100
B1	a = 50	b = 3	c = 0
B2	a = 50	b = 3	c = 100
Consequent Parameters:			
f1	p1 = 0.5	q1 = 1	r1 = 0.2
f2	p1 = 0.8	q1 = 0.7	r1 = 0.5

Total No. of Questions : 8]

SEAT No. :

P3155

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B.E. (Electronics)

BIOMEDICAL SIGNAL PROCESSING

(2012 Course) (Elective-IV) (Semester-II) (404212A)

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) Explain the Bioelectric signals and Electrodes used for measuring ECG and EEG signals. **[8]**

b) Draw the block diagram of Biomedical Instrumentation system and state the function of each block. **[6]**

c) What are the sources of Noise in bio-signals. How to reduce Noise. **[6]**

OR

Q2) a) Draw and explain the piping diagram for heart system. Explain its working. **[8]**

b) What is Einthoven's triangle? Draw and explain its significance. **[6]**

c) Draw and explain the block diagram of Electrocardiograph. **[6]**

Q3) a) Describe the structure and functions of Neurons. **[8]**

b) Explain the Electrical activity of Nerve Cell. **[8]**

OR

P.T.O.

Q4) a) Explain the concept of Synapse and Reflex action with necessary diagram. **[8]**

b) Which types of Filters are used in Central Nervous system. Give the functions of the filter and state its specification. **[8]**

Q5) a) Explain EEG rhythms with waveform. Give the categorization of EEG activity in detail. **[8]**

b) Explain the concept of brain computer interface system and its component. **[8]**

OR

Q6) a) What is the advantage of using Z-Transform in Brain parameter analysis. **[8]**

b) Draw and explain the working of Instrumentation amplifier used in Signal processing. **[8]**

Q7) a) Give the difference between stationary and non-stationary signals. Support your answer with specific application to biomedical domain. **[10]**

b) Explain the concept of removal of periodic events using adoption cancellation. **[8]**

OR

Q8) Write short notes on: **[18]**

a) FIR and IIR filters.

b) 10 - 20 Electrode Placement.

Total No. of Questions : 8]

SEAT No. :

P3156

[Total No. of Pages : 2

[5461]-199

B.E. (Electronics)

NANO ELECTRONICS & MEMS

(2012 Course) (Elective-IV) (Semester-II) (404212B) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Describe in detail the synthesis of carbon nanotubes using gaseous carbon Source based techniques. **[7]**

b) Explain construction & working of Fin FET. State advantages of Fin FET over normal FET. **[7]**

c) Compare different methods which are used in IC fabrication. **[6]**

OR

Q2) a) Explain properties of nanotubes strength & elasticity. What are the applications of carbon nanotubes? **[7]**

b) Write on the sensing mechanisms and principles of Bio-medical micro systems. **[7]**

c) Discuss the integration of micro optics with MEMS. **[6]**

Q3) a) Briefly explain the historical developments of MEMS? **[9]**

b) Explain the Electron Beam lithography process in detail. Mention its merits and Limitations. **[9]**

OR

P.T.O.

Q4) a) What is etching? Compare and contrast dry and wet etching. **[9]**

b) Draw & explain experimental methods of measuring intrinsic stress. **[9]**

Q5) a) Discuss in detail the preparation, fabrication, application and advantages of Silicon as substrate material for MEMS. **[8]**

b) List out various silicon compounds. Explain their characteristics & uses in MEMS device fabrication. **[8]**

OR

Q6) a) Explain in detail any four different MEMS devices with microatuators. **[8]**

b) Explain concept of sliding mode control & working principle of silicon piezoresistor. **[8]**

Q7) a) How do you measure pressure using microphone? Explain the working of thermally activated MEMS relay. **[8]**

b) Define transducer. How can we categorize the transduction principles. Explain working principle of chemical sensors. **[8]**

OR

Q8) a) With suitable diagram explain three principal signal transduction methods for micro pressure sensors. **[8]**

b) Give few examples of MEMS device which are characterized by sensors & actuators. State advantages & applications of biological transducers. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3157

[Total No. of Pages : 2

[5461]-200-A

B.E. (Electronics)

MECHATRONICS

(2012 Pattern) (Elective-IV) (Semester-II) (404212D)

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) a) Explain the functions of Mechatronics System. **[5]**

b) Compare between the conventional and mechatronic design systems. **[5]**

OR

Q2) Write the short notes on (any two):

a) Belt drives. **[5]**

b) Mechanical Switch. **[5]**

c) Autonomous Mechatronic System (AMS). **[5]**

Q3) a) State the process of conceptual design of self optimizing system with neat diagram. **[6]**

b) Describe the architecture of the Operator-Controller-Module (OCM). **[4]**

OR

Q4) a) What are the special requirements of Mechatronics that differentiate from Classic Systems and Control Design? **[6]**

b) Write a short note on state space analysis. **[4]**

P.T.O.

Q5) a) Explain in detail IEEE 488 - The General Purpose Interface Bus (GPIB). **[10]**

b) Write a short note on Serial Asynchronous data format. **[8]**

OR

Q6) Write short note on the following (Any three):

a) RS - 232 Serial Interface. **[6]**

b) PLC. **[6]**

c) Serial and Parallel Transmission. **[6]**

d) Simplex, Half-Duplex and Full-Duplex. **[6]**

Q7) a) Explain in detail about the function of signal conditioning circuit in the PC-based data logging system. **[10]**

b) Explain about the hardware option available in the data logging system. **[6]**

OR

Q8) a) What are the basic elements in the data logging system? Explain in detail. **[10]**

b) Explain any one application of data logging system in Mechatronics. **[6]**

Q9) a) Explain in detail Surface Micromachining fabrication process of MEMS. **[10]**

b) What are the mechanical properties of MEMS? **[6]**

OR

Q10)a) Explain in detail LIGA process of MEMS. **[8]**

b) Write a short note on Micromachined pressure sensors. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3158

[Total No. of Pages : 2

[5461]-200-B

B.E. (E & TC/Electronics)

ADVANCED AUTOMOTIVE ELECTRONICS

(2012 Course) (Semester-II) (End Sem.) (Open Elective) (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) What do you mean clutch engagement & disengagement? Explain engagement and disengagement of clutch when pulling away from standstill and gear change. **[8]**

b) Explain the phenomenon of knock in SI engine and Compare it with CI engine with suitable diagrams. **[8]**

c) Discuss the effect of air/fuel ratio on performance of SI engine. **[4]**

OR

Q2) a) With suitable block diagram explain automatic cruise control system. List sensors used in such system. **[8]**

b) What is Direct & Indirect tyre pressure monitoring system? How does it work? Explain with suitable diagram. **[8]**

c) Write down the firing order for two and four cylinder engine & explain the necessity of firing order in multi-cylinder engines. **[4]**

Q3) a) What do you mean by In-vehicle networking? State the benefits of vehicle networking. **[6]**

b) Compare event driven and time driven communication. **[6]**

c) Comment on Flexible time triggered communication on CAN. **[4]**

OR

P.T.O.

Q4) a) What are the CAN protocol layers? What are the four different frames? Write the message format. **[6]**

b) Draw & explain application of CAN in vehicle dynamics control system. **[6]**

c) Explain open issues for Automotive communication systems. **[4]**

Q5) a) State & explain biggest challenges in Model based development & proposed solutions. **[6]**

b) Draw & explain anti-jerk control system. **[6]**

c) State the guidelines for adopting Model based development. **[4]**

OR

Q6) a) Explain the benefits of Model based Hardware & software development in automotive industry. **[6]**

b) State the significance of PID control & explain the waveforms of closed loop ignition control. **[6]**

c) Comment on causes of emission formation. **[4]**

Q7) a) List six stage diagnosis processes in your own words. Explain black box fault finding with suitable diagram. **[6]**

b) State the possible faults for the following symptoms: **[6]**

i) Engine difficult to start when cold.

ii) Engine starts then stop.

iii) Knock during acceleration.

c) With the help of suitable diagram explain anti collision warning system. **[6]**

OR

Q8) a) What are the safety features in today's automotive cars? Explain anyone in detail. **[6]**

b) Describe how color of smoke from a diesel engine can be used as an aid to fault diagnosis. **[6]**

c) Draw anti-lock braking system & explain what ABS system should be able to do & when. **[6]**

✈ ✈ ✈

Total No. of Questions : 8]

SEAT No. :

P3159

[Total No. of Pages : 2

[5461]-201

B. E. (E & TC)

VLSI DESIGN & TECHNOLOGY

(2012 Pattern) (Semester - I) (End Sem.) (404181)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What do you mean by operator overloading? Explain? **[4]**

b) State the Different Data Types used in VHDL with example. **[4]**

c) Which and why the structural hierarchy is used in FPGA. Explain? **[6]**

d) What do you mean by Supply and Ground Bounce. **[6]**

OR

Q2) a) Write VHDL code for 1100 Mealy sequence detector with test bench. **[8]**

b) Draw and explain PAL and PLA. Give example of each. **[6]**

c) Define Clock Skew, and Clock Jitter. Explain its effect? **[6]**

Q3) a) What is technology scaling? What are its effects? **[4]**

b) Which lambda rules are used for CMOS layout? Give its significance. **[4]**

c) Design CMOS logic for $Y = \overline{A(D+E)+BC}$. Calculate W/L ratio for N_{mos} and P_{mos} area needed on chip. **[10]**

OR

Q4) a) Explain transmission gate. States its advantages. Implement a circuit of 2:1 multiplexer using transmission gate. Comment on the number of transistor required using transmission gates and conventional method. **[10]**

P.T.O.

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

i) Velocity saturation

ii) Body effect

iii) Hot electron effect

iv) Channel Length Modulation

Q5) a) Explain with diagram small signal low frequency and small signal high frequency model of MOS transistor. **[8]**

b) Draw and explain Current sink and source circuits. **[8]**

OR

Q6) a) Explain Device parasitic and their limitation on the performance of CMOS circuits. **[8]**

b) Draw and explain current mirror circuits. **[8]**

Q7) a) Draw and Explain TAP Controller with state diagram. **[8]**

b) What are the types of faults? Explain with schematic. **[8]**

OR

Q8) a) What is scan path? Give advantages and disadvantages of scan path. **[8]**

b) Explain the faults caused by manufacturing defects. **[8]**

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Total No. of Questions :10]

SEAT No. : ____

P3160

[Total No. of Pages : 2

[5461]-202
B.E. (E & TC)
COMPUTER NETWORKS
(Semester - I)(End Sem) (2012 Pattern) (404182)

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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black 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 with suitable diagram, components used for data communication. **[6]**

b) Prove that for pure ALOHA throughput is @ 18%. **[4]**

OR

Q2) a) Explain with suitable example how effect of noise is reduced in UTP cable. **[5]**

b) Draw and explain transition state diagram used in PPP protocol. **[5]**

Q3) a) Justify, CSMA/CD not suitable for wireless communication. **[6]**

b) Explain different services provided by IEEE802.11. **[4]**

OR

Q4) a) Explain following : i) Repeater ii) NIC iii) Bridge **[6]**

b) Draw and explain LCP Frame Format. **[4]**

Q5) a) Explain subnetting and supernetting with suitable example. **[5]**

b) Explain with suitable diagram how ARP packet is encapsulated directly into data field in MAC frame **[5]**

c) Draw and explain IPv6 datagram format. **[7]**

OR

P.T.O.

Q6) a) Write short note on - Open shortest path first routing protocol. **[5]**

b) Explain multiplexing and demultiplexing in IP layer. **[6]**

c) For IP address 10.65.10.0 and subnet mask 255.255.255.224 calculate -
i) No. of subnet ii) No. of host per subnet iii) Valid subnet **[6]**

Q7) a) Explain different categories of services are useful for describing the transport service. **[6]**

b) Explain 4 ways of releasing using 3 ways handshake. **[6]**

c) Write short note on TCP congestion control. **[5]**

OR

Q8) a) Explain TCP timer management. **[8]**

b) Explain transport service primitives. **[5]**

c) Explain in brief services by transport layer. **[4]**

Q9) a) Explain Hyper Text Transfer Protocol. **[6]**

b) Explain subsystem of e-mail system. **[6]**

c) Explain with suitable example components of DNS. **[4]**

OR

Q10)a) Explain POP.. **[6]**

b) Explain Static & Dynamic Web Pages. **[6]**

c) Write short note no WWW. **[4]**

Total No. of Questions :8]

SEAT No. : ____

P3161

[Total No. of Pages : 2

[5461]-203
B.E. (E&TC)
MICROWAVE ENGINEERING
(2012 pattern) (Semester-I) (End Semester)

Time : 2:30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

Q1) a) A rectangular waveguide has a = 3cm and carries dominant mode of a signal 7.63GHz. Find the characteristic wave impedance. **[7]**

b) Explain the concept of Circulator and its construction with the help of Magic Tee. **[7]**

c) What is the significance of an Impedance. Explain different types of an impedance. **[6]**

OR

Q2) a) Define waveguide. Enlist the dominant mode in rectangular waveguide. Distinguish between waveguide and transmission line. **[7]**

b) Describe the properties of E-plane and H-plane tees along with neat diagram and write the S Matrix for the same. **[7]**

c) An Isolator has insertion loss 0.5 dB and isolation of 30 dB determine scattering matrix of isolator if the isolated port are perfectly matched to the junction. **[6]**

Q3) a) A Two cavity Klystron is operated at a frequency 10 GHz with Beam Voltage (Vo) = 1200V, Beam Current (Io) = 30mA, Gap Spacing in either cavity (d)=1mm, Gap Spacing between centers of cavity (L)=4cm, Effective shunt Impedance (Rsh)= 40 $K\Omega$. Neglecting beam loading, calculate. **[9]**

i) Input RF voltage, V1 for a maximum output voltage

ii) Voltage Gain

iii) Efficiency

P.T.O.

b) What is slow wave structure? What are their types? Which one is most practical? How does it aid the performance of TWT? **[9]**

OR

Q4) a) By means of an Applegate diagram, explain the operation of two cavity klystron. **[9]**

b) Explain PI mode of operation of Magnetron. **[9]**

Q5) a) With the help of two valley model along with the emphasis on drift velocity, explain the negative resistance property of a Gunn diode. **[8]**

b) Explain the construction, working and applications of following. **[8]**

i) Varactor diode

ii) PIN diode

OR

Q6) a) Explain the use of tunnel diode as an amplifier. **[8]**

b) Enlist the high frequency limitations of bipolar devices. Also enlist advantages of microwave solid state devices compared to microwave tubes. **[8]**

Q7) a) Describe how can the power of a microwave generator be measured using: **[8]**

i) Bolometer

ii) Calorimeter technique

b) Explain phase shift measurement using double minimum method at microwave frequency. **[8]**

OR

Q8) a) Explain attenuation measurement technique in detail. **[8]**

b) Write explanatory notes on: **[8]**

i) VSWR Meter

ii) Tunable Detector

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Total No. of Questions : 12]

SEAT No. :

P3162

[Total No. of Pages : 2

[5461]-204

B.E. (Electronics and Telecommunication)

DIGITAL IMAGE PROCESSING

(2012 Pattern) (End Semester) (Semester-I) (Elective-I) (408184A)

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 indicate full marks.***
3) ***Assume suitable data if necessary.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) What are the different image file formats? Explain any one. **[3]**

b) Explain 4-connectivity, 8-connectivity and M-connectivity between the pixels. **[3]**

OR

Q2) What are the various steps in image processing? Explain in detail. **[6]**

Q3) a) What is image restoration? Explain with the help of block diagram. **[4]**

b) What is image blurring? Explain how to remove image blurring. **[3]**

OR

Q4) What is image enhancement? Explain following image enhancement techniques: **[7]**

a) Log transformation

b) Gray level slicing

Q5) a) Explain coding redundancy and interpixel redundancy in an image. **[4]**

b) Explain lossless image compression. Where you find the important applications of lossless image compression. **[3]**

OR

Q6) Explain DCT based compression technique of an image in detail. **[7]**

P.T.O.

Q7) a) Explain the following edge detection operators in image processing. **[9]**

i) Prewitt operator

ii) Canny operator

iii) Laplacian of Gaussian operator

b) Explain Hough Transform in detail. Also, give one application of Hough Transform. **[9]**

OR

Q8) a) What is adaptive thresholding? Write an algorithm for Otsu's method of thresholding and explain the same. **[9]**

b) Explain following morphological operations in image processing. **[9]**

i) Dilation

ii) Erosion

iii) Opening and closing

Q9) a) What are statistical moments? Explain different statistical moments used for shape representation. **[8]**

b) Explain 4-chain code and 8-chain code for the representation of an image. **[8]**

OR

Q10)a) Explain principal components for the description of an image. **[8]**

b) Explain "Polygonal approximation" and "Signatures" for the representation of an image. **[8]**

Q11)a) Explain following image classifiers. **[8]**

i) Minimum distance classifier.

ii) Correlation based classifier.

b) Explain with an algorithm, "Biometric Authentication", in image processing. **[8]**

OR

Q12)a) What is a "feature" and "feature extraction"? Explain the different types of features used for character Recognition using image processing. **[8]**

b) Explain Remote sensing application of an image processing in detail. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3163

[Total No. of Pages :2

[5461] - 205

B.E. (E & TC)

EMBEDDED SYSTEM & RTOS

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain various processor technologies in design of embedded processor. **[5]**

b) Explain characteristics of embedded system. **[5]**

OR

Q2) a) Explain waterfall model. **[5]**

b) Compare foreground /background system with RTOS. **[5]**

Q3) a) What is need of semaphore? How do you create counting semaphore? **[5]**

b) What do you mean by clock tick in RTOS. Explain the time management functions in µ COS - II **[5]**

OR

Q4) a) Explain OS MutexCreate( ) and OS MutexPost( ) function. **[4]**

b) Write a program in embedded C to implement mailbox. **[6]**

P.T.O.

Q5) a) Explain the memory storage considerations for embedded linux system. **[8]**

b) Compare BIOS with boot loader in embedded system. **[8]**

OR

Q6) a) List and explain various file systems used in embedded linux. **[8]**

b) Explain the cress development environment used for embedded linux. **[8]**

Q7) a) Explain linux kernel configuration steps. **[8]**

b) Define software testing. Explain various level of testing. **[8]**

OR

Q8) a) Draw and explain linux kernel architecture. **[8]**

b) What is device driver? What is use of device driver in embedded linux system? Explain different types of device driver used in embedded system. **[8]**

Q9) a) Explain Automatic chocolate vending mechine with suitable block diagram and state its hardware requirements. **[10]**

b) Explain software and hardware codesign in embedded system. **[8]**

OR

Q10) a) Explain the lab tools required for embedded system design. **[10]**

b) Explain software development tools for embedded system. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3164

[Total No. of Pages :2

[5461] - 206

B.E. (E & TC)

SOFTWARE DEFINED RADIO

(2012 Course) (Semester - I) (Elective - I) (418184 C)

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

Q1) Explain the benefits of SDR. **[8]**

OR

Q2) Explain the role of antenna and low noise amplifier using SDR. **[8]**

Q3) a) Explain the following parameters w.r.t. data converters. **[4]**

i) Signal-to-Noise-and- Distortion-Ratio (SINAD).

ii) Effective number of bits (ENOB)

b) State and explain the channel capacity expression of MIMO. **[4]**

OR

Q4) a) Compare ASIC, FPGA and DSP hardware in SDR implementation. **[4]**

b) Explain in brief Joint Tactial Radio System. **[4]**

Q5) For a single stage decimator LPF, compute the approximate length and number of multiplications per second using the kaiser formulae for the following specifications. **[4]**

Sampling Rate = 90 kHz

Decimation factor = 90

Passband = 0 to 450 Hz

Transition band = 450 to 500Hz

Passband Ripple, $\delta_p = 0.002$

Stopband Ripple $\delta_s = 0.01$

OR

P.T.O.

Q6) Explain sample rate conversion principles. **[4]**

Q7) a) Explain OFDM receiver block diagram and FFT block. **[8]**

b) Explain cognitive radio capabilities with example. **[8]**

OR

Q8) a) Draw and explain switched beam antenna array and compare it with adaptive array. **[8]**

b) Explain the following concepts w.r.t. cognitive radio. **[8]**

i) Spectrum sensing - basic assignment methods.

ii) Dynamic spectrum Access (DSA) - mention any 4.

Q9) a) Explain role of SDR and CR in advanced wireless communication system. **[8]**

b) Explain horizontal and vertical handoff. **[8]**

OR

Q10) a) Explain with neat diagram OFDM transmitter. **[8]**

b) Explain in detail the function of up-converter. **[8]**

Q11) Write a short note on.

a) Operating modes of PSCR. **[9]**

b) Explain Network inter-operatibility. **[9]**

OR

Q12) a) Write a short note on-Beagle board based SDR. **[9]**

b) Explain GNU Radio application in SDR. **[9]**

Total No. of Questions : 8]

SEAT No. :

P3165

[Total No. of Pages :2

[5461] - 207

B.E. (E & TC)

INDUSTRIAL DRIVES AND CONTROL

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) With neat circuit diagram explain operation of four quadrant chopper fed drive for a separately excited dc motor. **[6]**

b) With the help of neat circuit diagram explain working of CSI for speed control of three phase induction motor. What are the advantages of CSI drive over VSI drive? **[8]**

c) With the help of block schematic explain working of typical Switched reluctance motordrive. **[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 by Y-connected, 208V, 50Hz and is set to maximum possible value. The AC input to a 3 phase full converter on armature side is a 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 (1) and the armature current at no load is 10% of the rated value.

iii) The speed regulation.

P.T.O.

b) With the help of neat circuit diagram and waveforms explain working of three phase PWM VSI inverter fed drive for three phase induction motor. **[6]**

c) Explain working of synchronous cylindrical rotor motor drive. **[6]**

Q3) a) With the help of a neat circuit diagram and waveforms explain the operation of Permanent magnet synchronous motor drive. **[10]**

b) With neat block/ circuit diagram explain operation of stepper motor driver. **[8]**

OR

Q4) Write short notes on: **[18]**

a) Three phase BLDC drive.

b) Servo motor drive.

c) Hybrid Stepper motor.

Q5) a) What is the need of charge controller in Photovoltaic Power Systems? Explain the working of any two types of charge controllers in PV power system. **[8]**

b) Explain working of typical wind power system. Explain significance of hub, nacelle, gearbox, and yaw control. **[8]**

OR

Q6) a) With the help of neat block diagram explain Stand alone and grid connected Solar power system. **[8]**

b) What are the types of wind generator? Explain any one in detail. **[8]**

Q7) 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]**

OR

Q8) 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]**

Total No. of Questions : 8]

SEAT No. :

P3166

[Total No. of Pages :2

[5461] - 208

B.E. (E & TC)

MULTI RATE AND ADAPTIVE SIGNAL PROCESSING

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
3) ***Assume suitable data if necessary.***

Q1) a) Sketch the amplitude spectrum of Harr wavelet function belonging to subspace W_{-3} and W_3. **[5]**

b) Find out the time variance of Harr scaling function belonging to subspace V_2. **[5]**

c) State and explain uncertainty principle with example. **[5]**

d) Explain analytic signal. How it can be used to find instantaneous frequency. **[5]**

OR

Q2) a) Find out the projection of x(t) using Harr scaling function belonging to subspace V_0. Sketch the projection and write down the equation of x(t) using basis of subspace V_0. **[10]**

Where $x(t) = t \quad 0 \le t \le 1$

$2-t \quad 1 \le t \le 2$

b) Derive the equation for an input- output of a up sampler in frequency domain. Assume up sampling factor of two. Use z domain equations to explain the same. **[5]**

c) Find analytic signal and instantaneous frequency of

$y(t) = \cos(50t) \cos(150t)$ **[5]**

P.T.O.

Q3) Given $x[n] = \{1, 5, -3, 2, 1, 9, 8, 6\} \in V_3$ **[18]**

Develop complete Wavelet Packet tree till Vo and Calculate the coefficients along with bases. Prove perfect reconstruction using the leaves from 0th subspace. Sketch the basis used.

OR

Q4) a) State which V subspace Y(t) (defined below) belongs to and why? **[4]**

b) Decompose the signal into V and W subspaces down the ladder and also reconstruct it. **[7]**

c) Establish relationship between V_j, V_{j-1} and W_{j-1} for given nested subspaces of $L_2(R)$. **[7]**

$Y(t) = 5\Phi(t) + 3\,\Phi(t - 1) + 8\,\Phi(t - 2) + 2\,\Phi(t - 3) + \Phi(t - 4) + 6\,\Phi(t - 5)$.

Q5) a) Draw the diagram of an adaptive filter and write the equations for its operations, using LMS algorithm. **[8]**

b) Explain methods to find Wiener FIR optimal filter. **[8]**

OR

Q6) a) Draw the structure of an adaptive noise canceller. Discuss the significance of each signal. **[8]**

b) State the "Least Mean squares" problem and way to solve it. **[8]**

Q7) Given $x[n] = \{8,2,6,7\} \in V_2$

Develop wavelet lifting scheme, using MRA framework decompose the signal to the 0th subspace. Show perfect reconstruction. Clearly show 'split' 'update' and 'predict' stages and their outputs. Show how the computations take place *in place*? **[16]**

OR

Q8) Show de noising effect on the signal defined in Q3. Clearly show decomposition and reconstruction stages (after suppressing high frequency coefficients). **[16]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P4349

[Total No. of Pages : 2

[5461] - 209
B.E. (E & TC) (Semester - I) (Elective - II)
ELECTRONIC PRODUCT DESIGN
(2012 Pattern)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3or Q.4, Q.5or Q,6, Q7or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates Full marks.***
4) ***Use of Non programmable calculator is permitted.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain man machine dialogue. **[8]**

b) Explain in detail the need of Prototyping. **[6]**

c) What is real time software ? Explain its significance in product design with example. **[6]**

OR

Q2) a) Explain the factors to be considered for packaging of electronic products. **[8]**

b) How the specifications are formulated. Explain the difference between specifications and requirements. **[8]**

c) List and explain the different commonly identifiable limitations of software. **[4]**

Q3) a) What is bypassing and decoupling issues in PCB? **[8]**
Explain with suitable example.

b) What are the grounding methodologies? **[6]**
Explain with suitable diagram.

c) Explain the techniques for ESD protection. **[4]**

OR

Q4) a) Discuss the PCB layout design rules for analog circuits and digital circuits. **[8]**

b) Explain the need of functional partitioning on PCB with diagram. **[6]**

c) Explain the need of multilayer PCB design in detail. **[4]**

P.T.O.

Q5) a) Explain the significance of EMI & EMC in Product testing. **[8]**

b) What is debugging ? Explain the steps of debugging. **[8]**

OR

Q6) a) Compare the conducted EMI with radiated EMI. **[8]**

b) Enlist the important parameters to be considered while selecting passive, active and switching components. **[8]**

Q7) a) Define the documentation and explain different types of documentations. **[8]**

b) What is the importance of Bill of Material? Explain the Bill of Material with suitable example. **[8]**

OR

Q8) a) What is accountability and liability with respect to product documentation? **[8]**

b) Explain the layout of documentation. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3167

[Total No. of Pages : 2

[5461]-210
B.E. (E & TC)
PLCs & AUTOMATION
(2012 Course) (Semester - I) (Elective - II) (404185C)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain following term w.r.t. PLC, **[7]**

i) I/O Scan mode
ii) Execution mode
iii) Scan time
iv) Soft PLC

b) What are the characteristics of processes make them potential candidate for SCADA. **[7]**

OR

Q2) a) Explain panel Engineering for automation **[7]**

i) Point to point control system
ii) Straight line control system

b) Write difference between Smart Transmitter & Analog Transmitter. **[7]**

Q3) a) Draw and explain bottle filling plant. Construct ladder diagram for the same. **[7]**

b) What is Field Bus? Explain important features of Field Bus. **[7]**

OR

Q4) a) HART Protocol in Industrial Communication. **[6]**

b) A temperature sensor has a span fo 10-350 degree Celsius. A measurement results in a value of 155 degree celsius for temperature, specify the error if the accuracy is. **[8]**

i) $\pm$ 0.4% of full scale value.
ii) $\pm$ 0.65% of span.
iii) $\pm$ 0.9% of reading.

P.T.O.

Q5) a) What are different types of standard signals used in process transmitters. Which signal is used most commonly? What is Live zero and dead zero in current transmissions. **[8]**

b) Explain effects of modern developments in Automation on Global Competitiveness. **[6]**

OR

Q6) a) How performance of control system is evaluated? **[6]**

b) The control valve has a linear variation of opening as the input voltage varies from 0 to 10V as the a microcontroller output an 8 bit word to control the value opening an 8 bit DAC to generate the value voltage. **[8]**

i) Find the reference voltage required to obtain a full open valve (10v)

ii) Find the percentage of valve opening 10V a 1 bit change in the input word.

Q7) Explain: **[14]**

a) Process Variable, Set Variable, Controlled Variables Controlling variable with suitable example.

b) Self regulation, Human aided control system, Automatic control system and Servomechanism with suitable example.

OR

Q8) a) A sensor outputs a range of 20 to 250mv as a variable varies over its range. Develop signal conditioning so that this becomes 0 to 5V. (Circuit must have very high input impedance) **[7]**

b) Draw and explain construction and working principle of DPT. **[7]**

Q9) a) Explain fundamental need of CNC machines. Explain the factors due to which CNC Machines have taken over from CNC machines tools. **[7]**

b) What is HMI? Explain different types of HMI's used in PLC. **[7]**

OR

Q10) Write shortnote on **[14]**

i) Networking of PLC

ii) VFD

iii) PID Controller

iv) IEC61131

Total No. of Questions : 8]

SEAT No. :

P3168

[Total No. of Pages : 2

[5461]-211
B.E. (E & TC)
ARTIFICIAL INTELLIGENCE
(2012 Pattern) (Semester - I) (End Semester) (Elective - II)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidate:

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) What is AI? Mention some of its applications. **[8]**

b) Explain A star algorithm. **[6]**

c) Explain the forward chaining algorithm. **[6]**

OR

Q2) a) Explain "Simple Reflex based agent" with the help of schematic diagram. **[8]**

b) Compare Deft First and Best First Search methods. **[6]**

c) Explain Unification algorithm. **[6]**

Q3) a) Define Neural Network. Explain its applications. **[8]**

b) Explain the architecture of Artificial Neural Network in detail. **[8]**

OR

Q4) Write short note on (any two) **[16]**

a) Instance based learning

b) Ensemble Learning

c) Inductive Learning

d) Explanation based Learning

Q5) a) Explain Waltz algorithm in detail. **[9]**

b) Explain typical architecture of Expert system. **[9]**

OR

P.T.O.

Q6) a) Explain the process of designing an expert system of medical diagnose system. **[9]**

b) What is the perception? Give typical structure of it. **[9]**

Q7) a) What is NLP? What are its different phases? **[8]**

b) Explain the steps in Natural Language Processing (NLP). **[8]**

OR

Q8) a) Explain the concept of Syntactic Analysis with suitable example. **[8]**

b) Explain the concept of Semantic Analysis with suitable example. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3169

[Total No. of Pages : 2

[5461]-212
B.E. (E & TC)
MOBILE COMMUNICATION
(2012 Course) (End Sem.) (404189) (Semester-II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat 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 with suitable diagram, datagram packet switching? **[6]**

b) Total 4 Erlang of traffic offered by group of 3 trunks. Find GoS and Probability that at least one trunk is free? **[4]**

OR

Q2) a) State & explain different forms of grading? **[5]**

b) Prove that for two stage network having equal incoming and outgoing trunk, cross point $C_2 = 2N^{3/2}$. **[5]**

Q3) a) Draw and explain Time Multiplexed Time Switching. **[5]**

b) Explain basic components for cellular system. **[5]**

OR

Q4) a) Draw and explain PCM signalling. **[6]**

b) A cellular telephone consist of 9 clusters with 4 cells in each clusters and 10 channels in each cell. **[4]**

Find:

i) No. of channels per cluster

ii) Total channel capacity

P.T.O.

Q5) a) Explain functions of each GSM logical channel. **[9]**

b) Explain different security algorithm used in GSM. **[8]**

OR

Q6) a) Draw and explain different GSM interfaces. **[6]**

b) Explain different radio transmission parameters in GSM? **[5]**

c) Draw & explain in brief GSM time hierarchy? **[6]**

Q7) a) Explin with suitable diagram, point to point SMS service? **[4]**

b) Draw and explain architecture of GPRS network? **[6]**

c) Explain GSM supplimentary services. **[7]**

OR

Q8) a) Draw and explain GSM physical layer? **[5]**

b) Explain GSM channel coding for full rate speech? **[6]**

c) Explain ciphering & deciphering used in GSM? **[6]**

Q9) a) Draw and explain DSSS transmitter and receiver. **[6]**

b) Write CDMA IS-95 technology along with advantages & disadvantages. **[5]**

c) Write important parameters of W-CDMA system. **[5]**

OR

Q10)a) What are the attributes of WCDMA? **[6]**

b) Draw and explain architecture of CDMA-2000? **[5]**

c) Draw and explain: **[5]**

i) Pilot downlink control logical channel of IS 95

ii) Sync downlink control logical channel of IS 95

Total No. of Questions : 8]

SEAT No. :

P3170

[Total No. of Pages : 3

[5461]-213

B.E. (E&Tc)

BROAD BAND COMMUNICATION SYSTEM

(2012 Pattern) (Semester - II) (404190) (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) ***All questions carry equal marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, and electronic pocket calculator and steam tables are allowed.***
6) ***Assume suitable data if necessary.***

Q1) a) With neat block diagram, explain features of key elements of optical transmission link. Explain advantages & disadvantages of optical fiber communication system. **[6]**

b) Describe the system design considerations involved in establishing point to point optical fiber link. **[6]**

c) Explain the following with their applications **[8]**

i) Fiber bragg grating

ii) Diffraction grating

OR

Q2) a) Explain various attenuation mechanisms in official fiber. **[6]**

b) Analog optical fiber link has following rise time components: **[6]**

Source (LED) 10ns;

Fiber cable : intermodal 9ns/km;

Intra modal : 2ns/km;

Detector (APD): 3ns

P.T.O.

The desired link length without repeaters is 5km and the required optical Bandwidth is 6MHz. Determine whether the above combination of components give an adequate response.

c) A 2 × 2 bi conical tapered fiber coupler with 40/60 splitting ratio has insertion losses of 2.7 dB for 60% channel and 4.7 dB for 40% channel.

i) If input power is 200uW, find output levels P_1 & P_2.

ii) Find excess loss of coupler

iii) Verify that splitting ratio is 40/60. **[8]**

Q3) a) State and explain Kepler's three laws of planetary motion. Explain the forces associated with it. **[8]**

b) What does LEO, MEO and GEO orbits mean by? State specific applications of each. **[8]**

OR

Q4) a) What is the mechanism of launching a satellite? Briefly explain each step of launch sequence. **[8]**

b) Calculate look angle to geo stationary satellite if earth station latitude and longitude are 42º N and 0º. The sub satellite point is 56º W. **[8]**

Q5) a) With the help of block diagram, explain typical tracking, telemetry, command and monitoring system. **[8]**

b) Explain the transponder arrangement and frequency plan (uplink and downlink) for any satellite. Also draw block diagram of single conversion transponder for 6/4 GHz band. **[8]**

OR

Q6) a) With the help of neat sketch, explain typical satellite antenna coverage zone. **[8]**

b) Write the short note on power systems used in satellite. **[8]**

Q7) a) Explain basic transmission theory of satellite communication link design. What do you mean by EIRP? **[9]**

b) In relation to satellite communication, define noise temperature and derive the equation for carrier to noise ratio at the output of demodulator. **[9]**

OR

Q8) a) Discuss the importance of G/T ratio for earth station. How does it affect C/N ratio for satellite communication system? **[9]**

b) A satellite transponder is used for TV program distribution with objective of overall circuit C/N = 17 dB. If the downlink provides C/N of 20 dB. Determine the EIRP of TV up linking terminal assuming following data:

i) Uplink Frequency = 6 GHz

ii) Transmission BW = 30 MHz

iii) Satellite receiver G/T = – 3.0 dB

iv) slant range = 40.600 km

Assume negligible antenna misalignment losses and negligible inter modulation noise components. **[9]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3171

[Total No. of Pages : 2

[5461]-214

B.E. (E & TC)

SPEECH AND AUDIO SIGNAL PROCESSING (404191 A)

(2012 Pattern) (Semester-II) (End Sem.) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q2, Q.3 or Q4, Q5 or Q.6, Q.7 or Q.8, Q.9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain speech production process with LTV model. How LTV model is appropriate to represent production of continuous speech signal? **[6]**

b) Explain in brief the main function/s of outer ear, middle ear and inner ear. **[4]**

OR

Q2) a) Explain the three bone structure inside the ear to transfer air pressure from outer ear to middle ear. How impedance matching is achieved? **[6]**

b) What is manner of articulation and place of articulation in speech production? How it is used in classification of stops? **[4]**

Q3) a) How autocorrelation and average magnitude difference function are useful to estimate the pitch period? Explain with suitable example. **[6]**

b) What is broad band and narrow band spectrogram? What is the standard window size of broad band and narrow band spectrogram? Comment on the time and frequency resolution. **[4]**

OR

Q4) a) Write the mathematical expression for the computation of short time energy and zero crossing rate? How these values can be used to classify voiced and unvoiced speech segments? **[6]**

b) What is the importance of short time analysis/processing of speech signal? Explain the importance with suitable example. **[4]**

Q5) a) Explain the basic principle of LPC. Write the mathematical expression for the transfer function of source filter model. How the number of formants are decided? **[8]**

b) How to use LPC parameter for computation of pitch and formants? **[8]**

OR

P.T.O.

Q6) a) Explain Durbin's recursive method of computation of LPC parameters. Start with Toeplitz matrix generated using autocorrelation method for LPC computation. Illustrate with suitable example for P=2. **[8]**

b) What is the difference in computation of LPC parameters using autocorrelation and covariance method. Explain covariance method for computation of LPC parameters. **[8]**

Q7) a) Explain homomorphic processing for speech signal. How it is useful in speech processing. **[8]**

b) Explain how to estimate pitch and formants using cepstrum? **[8]**

OR

Q8) a) Explain how to compute Mel frequency cepstral coefficients. **[8]**

b) Explain practical implementation of system for obtaining,

i) the complex cepstrum; and

ii) the cepstrum. **[8]**

Q9) a) Explain Dynamic Time Warping (DTW) technique? Explain different conditions used for optimization of DTW. **[9]**

b) What is speech enhancement? Explain spectral subtraction method in detail. **[9]**

OR

Q10)a) Explain in brief speaker recognition system. What are the different features used for speaker recognition. Explain in brief. **[9]**

b) Explain automatic speech recognition system for automatic telephone dialing system (use of statistical method). Explain feature extraction, training and testing phase. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

P3172

[Total No. of Pages : 2

[5461]-215

B.E. (E & TC)

RF CIRCUIT DESIGN

(2012 Pattern) (404191 B) (Semester-II) (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 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]**

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]**

P.T.O.

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. : ____

P3173

[Total No. of Pages : 2

[5461]-216

B.E. (E & TC)

AUDIO VIDEO ENGINEERING

(2012 Pattern) (Semester-II) (404191 C) (End Sem.)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

Q1) a) Explain the concept of Additive and Subtractive Mixing. **[5]**

b) Draw the block diagram of TV pattern generator. List the various patterns used. **[5]**

OR

Q2) a) Compare PAL, NTSC and SECAM color TV systems. **[5]**

b) Explain the Chromaticity diagram. **[5]**

Q3) a) Compare LED, LCD and Plasma display devices. **[4]**

b) What is Mac signal? What are various types of MAC? Draw D2 MAC signal. **[6]**

OR

Q4) a) Compare CAS and DTH. **[4]**

b) Explain the working of CCTV in detail by giving one example. **[6]**

Q5) a) Explain Wi-Fi TV with relevant block diagram in detail. **[8]**

b) Explain the concept of Mobile TV in detail. **[8]**

OR

Q6) a) What is video projector? What are the different projection technologies? **[8]**

b) Write a short note on digital satellite TV. **[8]**

P.T.O.

Q7) a) Explain the working of Blue Ray Disc and DVD. **[8]**

b) Explain the basic principle of optical recording and reproduction with suitable sketches. **[10]**

OR

Q8) a) Explain the terms: **[8]**

i) CD recording

ii) MP3 Player

b) Describe high density method of video recording and reproduction. **[10]**

Q9) a) What are requirements for good auditorium? Give salient features of acoustic design for an auditorium. **[8]**

b) What is reverberation? Define reverberation time. Explain the importance of it. **[8]**

OR

Q10)a) Draw the block diagram of PA system and explain. **[8]**

b) State the various types of microphones. Explain any one showing construction details, working. specifications and applications. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3174

[Total No. of Pages : 2

[5461]-217

B.E. (E & T.C.)

SOFT COMPUTING TECHNIQUES

(Elective III) (2012 Pattern) (Semester-II) (404191 D) (End Sem)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw and explain the MP model of neuron. **[8]**

b) Explain the architecture & training algorithm of Self Organizing feature map. **[6]**

c) What is the significance of fuzziness? Discuss primary and composite linguistic terms. **[6]**

OR

Q2) a) Explain the operation of biological neural network. **[8]**

b) Describe the mapping function like Gaussian, Multi-quadrics and Inverse Multi-quadrics. **[6]**

c) Explain the concept of fuzzy relation with example. **[6]**

Q3) a) Explain the block diagram of Fuzzy Inference System in detail. **[8]**

b) Discuss Mamdani Fuzzy model in detail. **[8]**

OR

Q4) a) Explain in detail the process of defuzzification. Explain any one method of defuzzification. **[8]**

b) Given a rule:

IF x is A, THEN y is B, where A = {0.3/l, 0.7/2, 0.8/3} and

B = {0.8/5, 0.6/7, 0.3/9}

Infer B' for another rule: IF x is A' THEN y is B', where

A' = {0.2/l, 0.9/2, 0.4/3}

Using Mamdani implication rule and max-min composition. **[8]**

P.T.O.

Q5) a) Explain the architecture of fuzzy logic controller. **[9]**

b) Discuss the steps involved in fuzzy logic controller. **[9]**

OR

Q6) a) Discuss the applications of fuzzy logic controller in Aircraft landing control problem in detail. **[9]**

b) Compare fuzzy logic controller with traditional PID controller. State the applications of fuzzy logic controller. **[9]**

Q7) a) Draw the architecture of ANFIS & explain it. **[8]**

b) Explain two pass learning in ANFIS. **[8]**

OR

Q8) a) Explain Hybrid Learning algorithm in ANFIS. **[8]**

b) What are the advantages and applications of ANFIS? **[8]**

Total No. of Questions : 8]

SEAT No. :

P3175

[Total No. of Pages : 2

[5461]-218

B.E. (Electronics & Telecommunication)

BIOMEDICAL SIGNAL PROCESSING

(2012 Pattern) (End Sem.) (404192A) (Elective-IV) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw and explain unipolar and bipolar arrangement of ECG acquisition. **[8]**

b) Explain how a bioelectrode is a transducer. Draw equivalent circuit of bioelectrode. **[6]**

c) Write a note on sources of variability of noise in bio-signal acquisition. **[6]**

OR

Q2) a) Explain BP measurement by using Sphygmomanometer and by Oscillometric method. **[8]**

b) Explain the significance of Wigner Ville distribution. **[6]**

c) Draw and explain electro-conduction system of heart. **[6]**

Q3) a) Draw and explain10-20 electrode placement for acquisition of EEG. **[8]**

b) Explain various EEG waveforms with their frequency and significance. **[8]**

OR

Q4) a) Write a note on ECG amplifier and isolation circuit. **[8]**

b) Explain different Montage configurations for EEG signal acquisition. **[8]**

P.T.O.

Q5) a) Explain what is power-line coupling and how does it affect the bio-signal acquisition. **[8]**

b) Explain the stationary and nonstationary signals. State the edge effect due to finite length of sequences. **[8]**

OR

Q6) a) Explain the technique to cancel out maternal Ecg from fetal Ecg. **[8]**

b) State the Weiner Hopf equation. Compare it with LMS algorithm. **[8]**

Q7) a) State the importance of Principal component analysis for biosignals. **[10]**

b) Compare FIR and IIR filters. **[8]**

OR

Q8) a) Explain shielding and grounding Techniques in Biomedical Instrumentation. **[10]**

b) Distinguish between PCA and ICA. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3667

[Total No. of Pages : 2

[5461]-219
B.E. (Electronics & Telecommunication)
NANO ELECTRONICS & MEMS
(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.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Discuss the historical development in the field of Nano electronics. Also discuss its various applications. **[6]**

b) What is Fin FET? How it is different than normal FET? **[6]**

c) What are the different technologies which are used for silicon crystal growth? **[8]**

OR

Q2) a) Write short notes on : **[6]**

i) Dopant diffusion

ii) Sputtering

b) What is etching? What do you mean by wet etching and dry etching? **[7]**

c) What is integration? Discuss three different approaches for circuits that can be integrated with MEMS. **[7]**

Q3) a) Explain the intrinsic characteristics of MEMS. **[8]**

b) Explain the types of Beams. **[8]**

OR

Q4) a) Explain with applications MEMS based sensor and actuation. **[8]**

b) Explain the following : **[8]**

i) Stress and Strain

ii) Torsion Deflection

P.T.O.

Q5) a) Explain electrostatic actuators and sensors. **[8]**

b) Compare of major sensing and actuation methods. **[8]**

OR

Q6) a) Explain with applications MEMS based sensor and actuation. **[8]**

b) Explains the following with neat Diagram : **[8]**

i) Profilometers

ii) Reflectrometers

Q7) a) Explain with Diagram Hot Probe method and sheet resistance method. **[6]**

b) Comment on MEMS miniaturization approaches. **[6]**

c) Explain with neat Diagram Atomic Force Microscopy. **[6]**

OR

Q8) a) Explain with neat Diagram FTI Spectroscopy. **[6]**

b) Explain magnetic actuation. **[6]**

c) Explain Hall effect of measurement. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3176

[Total No. of Pages : 2

[5461]-220
B.E. (E & TC)
DETECTION AND ESTIMATION THEORY
(2012 Pattern) (Semester-II) (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) ***Assume suitable data if necessary.***

Q1) a) Explain Binary hypothesis testing. **[5]**

b) How mini max criterion is useful in minimizing the maximum average cost for the selected priori probability. **[5]**

OR

Q2) a) Explain Baye's Estimation and its types. **[5]**

b) Explain in brief about Generalized Likelihood Ratio Test. **[5]**

Q3) a) Explain how Sequential Detection differs from Neyman-Pearson (NP) detection and its limitations. **[5]**

b) Explain the criteria of Maximum Likelihood Estimators and its applications. **[5]**

OR

Q4) a) How Cramer-Rao Inequality principle helps in parameter estimation. **[5]**

b) Consider a signal embedded in noise: **[5]**

$$x[n] = A + w[n] \quad n = 0,1,...,N-1$$

where $w[n]$ is of unspecified PDF with $\text{var}(w[n]) = \sigma_n^2$ and the unknown parameter $\theta = A$ is to be estimated. Explain how Best Linear Unbiased Estimator helps in estimation.

P.T.O.

Q5) a) Find maximum likelihood estimate of WGS with variance σ^2 with unknown hypothesis H0 and H1 with N number of samples producing zero and M output respectively. **[8]**

b) Draw the structure of Discrete Wiener Filters with the help mathematical expressions. **[8]**

OR

Q6) a) Explain how Recursive Least-Square Estimator helps in estimation of random parameters. **[8]**

b) Explain why Wiener filters are termed as linear Bayesian estimators. When are these filters optimal? **[8]**

Q7) a) What do you mean by the composite hypothesis testing problem? Contrast between Bayesian and generalized likelihood ration test (GLRT) based approaches for the same. **[8]**

b) Consider a real wide-sense stationary (WSS) random process x with autocorrelation sequence. **[8]**

$$r_{xx}[k] = 4.8 * 2^{-|k|} - 2.7 * 3^{-|k|}$$

Find the coefficients of second-order optimal linear predictor filter.

OR

Q8) a) What do you mean by the non-parametric detection? Discuss the sign detector in brief. **[8]**

b) Discuss in brief about Linear Minimum Mean Square Error (LMMSE) Estimator. **[8]**

Q9) a) Show how to determine the following parameters for radar systems: Distance, Direction, Elevation angle, Range Ambiguities. **[9]**

b) Explain with neat sketch how adaptive CFAR detection helps in RADAR. **[9]**

OR

Q10) a) Explain the working of Basic RADAR in brief with block diagram for detection and locations of objects. **[9]**

b) Explain doppler shift in RADAR system with suitable mathematical expressions. **[9]**

Total No. of Questions : 8]

SEAT No. :

P3709

[Total No. of Pages : 2

[5461]-220A
B.E. (E & TC Engg.)
WIRELESS NETWORKS
(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, and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non-programmable electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain technology and service trends of emerging wireless technologies. **[7]**

b) Explain modulation and coding system used in mobile communication. **[7]**

c) Write short note on UMTS Speech Service. **[6]**

OR.

Q2) a) Explain in short OFDMA technology. **[6]**

b) Write a short note on VPN. **[7]**

c) Explain with neat figure TD-CDMA system architecture. **[7]**

Q3) a) Explain in detail LTE uplink and downlink channels. **[9]**

b) Write short note on VOLTE. **[9]**

OR

Q4) a) With neat diagrams explain uplink resource request and assignment in LTE. **[9]**

b) What is significance of carrier aggregation? Explain with neat diagram. **[9]**

P.T.O.

Q5) a) What is need of frequency planning in WiMAX? Explain with neat figures. **[8]**

b) Draw and explain frame structure of WiMAX 802.16E. **[8]**

OR

Q6) a) Write short note on QoS in WiMAX. **[8]**

b) Explain with neat diagram, WiMAX mobility concept. **[8]**

Q7) a) Draw and explain SIP network architecture. **[8]**

b) Explain MEGACO protocol stack with neat diagram. **[8]**

OR

Q8) a) Explain H.323 call establishment and release using signal flow diagram. **[8]**

b) Write short note on SIGTRAN protocol stack. **[8]**

✷ ✷ ✷

Total No. of Questions : 8]

SEAT No. :

P3177

[Total No. of Pages : 2

[5461]-220-B

B.E. (E & TC/Electronics)

ADVANCED AUTOMOTIVE ELECTRONICS

(2012 Course) (Semester-II) (Open Elective) (End Sem.) (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) ***Assume suitable data if necessary.***

Q1) a) Draw a neat sketch of Internal combustion engine. List major components of the engine. **[8]**

b) Compare types of Electric vehicles based on propulsion, Energy system, characteristics & major issues. **[8]**

c) Enlist some of the present & potential applications of automotive electronics. **[4]**

OR

Q2) a) Describe networking of control system in drivetrain with necessary diagrams. **[8]**

b) What do you mean by transmission in automobile? Compare manual & automatic transmission. **[8]**

c) What is the current status of Emission norms in India? **[4]**

Q3) a) Comment on Automotive communication system: characteristics & constraints. **[6]**

b) With suitable example explain message scheduling in the dynamic segment of the FlexRay communication cycle. **[6]**

c) Differentiate low cost automotive networks. **[4]**

OR

P.T.O.

Q4) a) Enlist the protocols needed for emerging multimedia applications in automotive system & explain any two in detail. **[6]**

b) Discuss common features & differences of automotive protocols. **[6]**

c) Describe open issues of automotive communication system. **[4]**

Q5) a) Suggest type of control system for cruise control & explain with necessary diagram. **[6]**

b) Draw & explain approach to analyze cost & benefit of Model based software development. **[6]**

c) Compare traditional development & model based development. **[4]**

OR

Q6) a) What are the benefits of model based design of embedded software systems in car industry? **[6]**

b) Draw & explain torque control model & speed control model. **[6]**

c) Compare different types of control methods to explore system response. **[4]**

Q7) a) List out types of sensors monitored by OBD ECU & explain task performed by ECU for Sensor diagnostics. **[6]**

b) Write a note on fault code readers & scan tools. **[6]**

c) Comment on "Why on board diagnostics?" **[6]**

OR

Q8) a) Differentiate Remote keyless entry & Passive keyless entry. **[6]**

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

i) Intelligent airbag sensing system

ii) Tire pressure warning.

c) Draw & explain typical motor reverse circuit for Driver seat adjustment. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3178

[Total No. of Pages : 2

[5461]-220-C

B.E. (IT, E & TC & Comp.)

UNIFIED COMMUNICATIONS AND CONTACT CENTER APPLICATIONS

(2012 Pattern) (Semester-II)

414464 E : Open Elective (Information Technology)

410452 : Elective - IV (Computer Engineering)

404192 : Elective - IV (Electronics and Telecommunications)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Questions 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 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) Compare analog telephony with digital telephony and bring out salient features of digital telephony. **[5]**

b) What is the functionality of RAS? List different type of RAS messages. **[5]**

OR

Q2) a) Explain in detail about different type of response 1xx, 2xx and their meaning. **[5]**

b) Draw a SIP session setup example with SIP trapezoid. **[5]**

Q3) a) Explain Channel associated signaling and Common channel signaling. **[5]**

b) Draw a diagram to show the messages involved in setting up a call in ISDN. **[5]**

OR

Q4) a) With reference to SIP explain the terms Redirect Server and Registrar. **[5]**

b) Draw a neat diagram of H.323 protocol stack. **[5]**

P.T.O.

Q5) a) What is blending? How does it work? **[8]**

b) What are the functional roles in a Contact Center? What are their responsibilities? What are the supporting components for each of them? **[8]**

OR

Q6) a) Explain STUN, TURN. **[8]**

b) Explain the functionalities of PABX, ACD, Self Service and CTI in an Inbound Call Center. **[8]**

Q7) a) Explain the significance of reporting and analytics in contact center. **[8]**

b) 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]**

OR

Q8) a) With a neat diagram explain a typical campaign life-cycle. **[8]**

b) Compare and contrast vertical and horizontal scaling in the cloud. **[8]**

Q9) Write notes on: **[18]**

a) Workforce management components in contact center.

b) Email protocols.

c) WebRTC.

OR

Q10) Write notes on: **[18]**

a) Web Session and Http cookies.

b) Websocket.

c) Cascading Style Sheets.

Total No. of Questions : 10]

SEAT No. :

P3179

[Total No. of Pages : 2

[5461]-220 D

B.E. (Computer Engineering)

BUSINESS ANALYTIC AND INTELLIGENCE

(2012 Course) (Semester-II) (Elective-IV (A)) (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, 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) Draw and explain cycle of Business Intelligence. **[6]**

b) Differentiate between DBMS system and BI system. **[4]**

OR

Q2) a) Say whether each of the following is an example of data or information. **[6]**

i) The name of best selling News Paper

ii) 35209857

iii) The average marks for the assignment

b) Explain Business Intelligence Architecture with diagram? **[4]**

Q3) a) Design Decision Support System for Medical application to predict whether disease is Positive or Negative for a particular patient. Assume suitable dataset and model. **[6]**

b) Explain components of Decision support system with diagram. **[4]**

OR

Q4) a) Explain Drill Down and Pivot operations of OLAP with example. **[6]**

b) What is snapshot materialized view? Give one example of Snapshot materialized view. **[4]**

P.T.O.

Q5) a) What are outliers? Explain various types of outliers with suitable example. **[8]**

b) Suppose for the attribute income mean value is $ 54000 and standard deviation is $ 16,000. Normalize income value $ 73,600 using Z-score normalization method. **[5]**

c) For the given data for Book Price (in dollars), apply Binning mean technique for smoothing the noise. 15, 21, 21, 29, 34, 24, 4, 8, 9, 25, 26, 28. **[4]**

OR

Q6) a) Explain distance based and density based method of outlier detection with example. **[10]**

b) List and explain the different challenges in outlier detection. **[7]**

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 the techniques of managing and maintaining Business Intelligence systems. Why it is important to maintain BI Systems? **[10]**

b) List and explain important factors for planning BI system scalability. **[7]**

Q9) a) Explain Market Basket analysis with example for Marketing application. **[10]**

b) Explain the application of Business Intelligence in Banking. **[6]**

OR

Q10) a) Explain BI Applications in Credit Card Fraud Detection with suitable example. **[10]**

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

i) Data Analytics

ii) Business Analytics

Total No. of Questions : 10]

SEAT No. :

P3180

[Total No. of Pages : 3

[5461]-220-E

B.E. (E & TC/Electronics)

DATA SCIENCE & ANALYTICS

(2012 Course) (Open Elective) (End Sem.) (Semester-II) (404192ED)

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 any two models of NoSQL Databases. **[6]**

b) Explain different operations on Database View with suitable example. **[4]**

OR

Q2) a) Explain Dynamic SQL and Embedded SQL. **[6]**

b) List the features of SQL and PP/SQL. **[4]**

Q3) a) Describe Business Intelligence Architecture. **[6]**

b) Compare Structured Data and Unstructured Data. **[4]**

OR

Q4) a) Explain DDL, DML, DCL, TCL with suitable example. **[6]**

b) Write a short Note on Database Indexing. **[4]**

Q5) a) Explain Need of Data analytic lifecycle. **[9]**

b) Design a Data Analytical Model for Telecommunication Billing System. **[8]**

OR

Q6) a) Explain Key roles for successful analytic projects. **[9]**

b) Explain various methods for Data Preparation. **[8]**

P.T.O.

Q7) a) Explain Data Types in R with suitable example. **[8]**

b) Describe Generic Function in R. **[8]**

OR

Q8) a) Explain Data Visualization methods in R. **[8]**

b) Write a short Note on Data exploration. **[8]**

Q9) a) Consider following Data set: **[9]**

Outlook	Temperature	Humidity	Wind	Class Attribute
Sunny	Hot	High	False	N
Sunny	Hot	High	True	N
Overcast	Hot	High	False	P
Rain	Mild	High	False	P
Rain	Cool	Normal	False	P
Rain	Cool	Normal	True	N
Overcast	Cool	Normla	True	P
Sunny	Mild	High	False	N
Sunny	Cool	Normal	False	P
Rain	Mild	Normal	False	P
Sunny	Mild	Normal	True	P
Overcast	Mild	High	True	P
Overcast	Hot	Normal	False	P
Rain	Mild	High	True	N

Construct a decision tree based on above training set using ID3 algorithm.

b) Write a short Note on Linear Regression. **[8]**

OR

Q10)a) Describes A priori algorithm. Illustrate the working of the algorithm with the help of following data set. Assume minimum support = 2. T contains 15 records. **[9]**

A1	A2	A3	A4	A5	A6	A7	A8	A9
1	0	0	1	1	1	0	0	1
0	1	0	1	0	0	0	1	0
0	0	0	0	1	0	0	1	1
0	1	1	1	0	1	1	1	0
0	0	0	0	0	1	0	0	1
0	1	1	1	0	0	1	1	0
1	1	0	0	0	1	1	0	0
0	0	0	1	1	0	1	1	0
0	0	0	0	1	1	0	0	0
0	0	1	0	1	0	0	0	1
0	0	1	0	0	1	1	0	1
0	1	0	1	1	1	1	0	0
1	0	0	0	0	1	0	0	0
0	1	1	0	0	0	0	1	0
1	0	0	0	0	1	1	0	0

b) Write a short Note on Text Analysis. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3181

[Total No. of Pages : 2

[5461]-220-F

B.E. (E & TC)

INDUSTRIAL INTERNET OF THINGS

(2012 Pattern) (Open Elective) (End Sem.) (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 Electronic Calculator is allowed.***

Q1) a) What are the challenges and benefits in implementing IIoT? **[7]**

b) Explain WSN network design for IoT. **[7]**

c) Explain in detail RFID tag structure. **[6]**

OR

Q2) a) Define IoT and Explain its characteristics. **[7]**

b) Draw and explain functional Blocks in IoT. **[7]**

c) What is the difference between sensors and actuators? **[6]**

Q3) a) What are the cloud platforms used in IoT? Explain the features of any one such platform. **[8]**

b) Explain the Publish and Subscribe Pattern and why it is useful in IoT? **[8]**

OR

Q4) a) Write various features of 6 LoWPAN. Why it is suitable to use in IoT/ IIoT? **[8]**

b) Explain the ZigBee IP and Z-Wave and its role in IIoT. **[8]**

P.T.O.

Q5) a) Comment on how Operational Technology (OT) and Information Technology are different in case of security issues. **[8]**

b) Draw a typical Operational Technology manufacturing network and write about any two components. **[8]**

OR

Q6) a) Elaborate the term Identity Access Management with reference to security in IIoT. **[8]**

b) Discuss following terms with reference to IIoT: **[8]**

i) Security

ii) Privacy

iii) Threat

iv) Trust

v) Integrity

vi) Non Repudiation

Q7) a) What is Big Data? What is Big Data Analytics? Explain any one software tool available for Big Data Analytics? **[9]**

b) Explain in detail any one application of IoT/IIoT in the area of Smart Cities. **[9]**

OR

Q8) a) What are the implications of IIoT on Bid Data Analytics? What are the challenges in handling data by Industrial Internet? **[9]**

b) Explain in detail any one application of IoT/IIoT application in the area of Home Automation. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3182

[Total No. of Pages : 2

[5461]-221

B.E. (Electrical Engg.)

POWER SYSTEM OPERATION & CONTROL

(2012 Course) (Semester - I) (403141)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Compare the steady state, transient state and dynamic state stability with reference to type of disturbance, time of study and stability limit. **[6]**

b) Explain the concept of swing curve in power system stability. **[4]**

OR

Q2) a) What are the problems in A.C. Transmission? How does the use of FACTS devices solve the problems. **[5]**

b) What is Sub synchronous resonance? Explain its causes and effects. **[5]**

Q3) a) Discuss the effect of change in excitation on the reactive power management. **[5]**

b) With neat diagram, characteristics, explain the SVC (FC-TCR). **[5]**

OR

Q4) a) Differentiate the FACTS controllers on the basis of the type of connections. **[5]**

b) Draw a loading capability curve of a synchronus generator and expalin reactive power generation and absorption by the unit. **[5]**

Q5) a) Draw and explain the proportional plus integral load frequency control of an isolated power system. **[12]**

b) Discuss the speed governor system for a turbo generator. **[6]**

OR

P.T.O.

Q6) a) Explain various constraints used in automatic generation control. **[6]**

b) Draw and explain the block diagram of two area load frequency control and sketch the response for tie line power and frequency deviation with respect to time. **[12]**

Q7) a) Discuss hydro constraints and thermal constraints used for unit commitment. **[8]**

b) Discuss economic load dispatch solution, in case of including generator limits and without including transmission losses. **[8]**

OR

Q8) a) Explain with example the priority list method used for Unit Commitment. **[8]**

b) Explain dynamic programming method of committing generating units. Also explain the advantages of dynamic programming method over priority list method. **[8]**

Q9) a) Explain economy interchanges evaluation between interconnected utilities. **[8]**

b) Explain the Reliability evaluation of Generation system with **[8]**

i) Generation Model

ii) Load Model and

iii) The Risk Model

OR

Q10)a) Explain with mathematical formula, the customer oriented and energy based Reliability indices. **[8]**

b) Write short notes on **[8]**

i) Power pools

ii) Energy banking

♦ ♦ ♦

Total No. of Questions :8]

SEAT No. :

P3183

[Total No. of Pages : 2

[5461]-222
B.E. (Electrical)
PLC AND SCADA APPLICATIONS
(Semester - I) (2012 Pattern) (End Semester) (403142)

Time : 2½ Hours] *[Max. Marks :* 70

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Black figures to the right indicate full marks.***

Q1) a) Define Programmable Logic controller and explain its types. **[7]**

b) Explain Ton timer along with its three bits. **[8]**

c) Explain output ON/OFF devices. **[7]**

OR

Q2) a) State disadvantages of Programmable Logic Controller. **[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	1	1
0	1	0	1	1	0
1	0	0	1	1	0
1	1	1	1	0	0

c) What is tuning of PID? Explain various methods of PID tuning. **[7]**

Q3) a) Explain any one type of magnetic sensor. **[8]**

b) How flow of water in the tank is measured? **[8]**

OR

Q4) a) Draw and explain controller for DC motor. **[8]**

b) Write a short note on AC motor starter. **[8]**

P.T.O.

Q5) a) What are different generations of SCADA? **[8]**

b) Explain with block diagram use of SCADA in power system generation. **[8]**

OR

Q6) a) Explain SCADA system application in water purification system. **[8]**

b) What are the different applications of SCADA system. **[8]**

Q7) a) Write a short note on Device Net protocol. **[8]**

b) Explain Control Net protocol in detail. **[8]**

OR

Q8) a) Explain flexible function block (FFB) process. **[8]**

b) Explain Process Field Bus (Profibus) protocol. **[8]**

Total No. of Questions :8]

SEAT No. :

P3184

[Total No. of Pages : 2

[5461]-223
B.E. (Electrical)
CONTROL SYSTEM-II
(Semester-I) (2012 Course) (403145)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

Answer any one question from each pair of questions: Q1 & Q2, Q3 & Q4, Q5 & Q6, and Q7 & Q8.

Q1) a) Draw important electrical networks used practically for the compensation for the control systems? **[8]**

b) A unity feedback system has an open loop transfer function. **[12]**

$G(s) = \dfrac{0.025}{s(1+0.5s)(1+0.05s)}$ Design a suitable Lag compensator so that phase margin is 40° and Kv=20/sec.

OR

Q2) a) Define and explain the terms: Eigen values, Eigen vectors, Diagonalisation and Vander Monde Matrix. **[8]**

b) Determine the state controllability and observability of the following system: **[12]**

$$A = \begin{bmatrix} -3 & 1 & 1 \\ -1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix}; B = \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 2 & 1 \end{bmatrix}; C = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

Q3) a) State and explain various types of non linearities in control systems. **[8]**

b) A unity feedback control system with $G(s) = \dfrac{1}{s(s+1)(s+10)}$ includes ideal relay with output equal to ∓ 2 unit. Determine the amplitude and frequency of limit cycle by Describing function method. **[8]**

OR

P.T.O.

Q4) a) Explain Jump resonance and frequency entrainment for non-linear system. **[8]**

b) Derive the Describing function for Ideal Relay. **[8]**

Q5) a) Draw the block diagram of digital control system and explain the function of each block. **[8]**

b) Find the Z-transform of the sequence: **[10]**

i) $X(t) = e^{-at} \cos \omega t$

ii) $X(n) = (a)^n u(n-1)$

OR

Q6) a) Explain important properties of Z-transform. **[8]**

b) Find the inverse Z-transform of the function **[10]**

i) $$X(z) = \frac{10Z}{(Z-1)(Z-0.2)}$$

ii) $$X(z) = \frac{Z}{(Z-1)(Z-2)}$$

Q7) a) Define pulse Transfer Function. State general procedure for obtaining pulse Transfer Function. **[8]**

b) Obtain Direct realization of **[8]**

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

OR

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

b) Obtain Cascade realization of **[8]**

$$D(z) = \frac{Z^3 + 3Z^2 + 7Z + 5}{Z^3 + 3Z^2 + 9Z + 14}$$

Total No. of Questions : 11]

SEAT No. :

P3185

[Total No. of Pages :2

[5461] - 224

B.E. (Electrical)

SPECIAL PURPOSE MACHINES

(2012 Course) (Elective - I) (403143 A) (Semester - I) (End Sem.)

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 and 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) Derive an expression for magnetic force and torque in system with parmanent magnets. **[7]**

OR

Q2) Discuss the process of MMF produced by distributed winding. **[7]**

Q3) With usual notations, derive the expressions for torque for permanent magnet synchronous motor. **[7]**

OR

Q4) Give comparative analysis of sinusoidal and trapezoidal motor operations. **[7]**

Q5) With suitable block diagram explain field oriented control of PMSM. **[6]**

OR

Q6) Explain constant torque angle control stratergy for PMSM. **[6]**

P.T.O.

Q7) a) Draw and explain characteristics of switch reluctance motor. State applications of reluctance motor. **[8]**

b) Explain effects of saturation in case of reluctance motor. **[8]**

OR

Q8) a) Explain static and dynamic torque production in case of switched reluctance motor. **[8]**

b) Discuss the selection of number of poles and pole arc in switched reluctance machine. **[8]**

Q9) a) Explain the concept of lead angle in case of control of stepper motor. State applications of stepper motor. **[9]**

b) Explain operation of VRM stepper motor. **[9]**

OR

Q10) a) Draw and explain characteristics of stepper motor. **[9]**

b) Explain steady state operation mode of stepper motor by using constant current drive. **[9]**

Q11) Solve any two of the following. **[16]**

a) Explain constructional features and working of linear induction motor.

b) Explain various important characteristics of linear induction machine.

c) State the applications of linear induction machine.

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3186

[Total No. of Pages :2

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B.E. (Electrical)

POWER QUALITY

(2012 Course) (Semester - I) (Elective - I) (403143B) (End Sem.)

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 calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Define power quality? Explain the reasons for increased concern in power quality. **[5]**

b) What are the various causes of over voltages? **[5]**

OR

Q2) a) Define and explain **[5]**

i) Short duration voltage fluctuations

ii) Long duration voltage fluctuations.

b) What are the problems associated with grounding affecting power quality? **[5]**

Q3) a) Write various sources of transient over voltages and explain any one in detail. **[5]**

b) What are the causes of Voltage Flicker? **[5]**

OR

Q4) a) Explain in detail one method followed for mitigating voltage sag. **[5]**

b) Define long duration rms voltage variations. **[5]**

P.T.O.

Q5) a) Explain the causes of harmonics in power system. **[8]**

b) Explain the harmonic effects on Transformers and motors briefly. **[8]**

OR

Q6) a) Define power and power factor in power system under non sinusoidal conditions. **[8]**

b) Define THD and TDD with reference to harmonic measurements. **[8]**

Q7) a) Explain the concept of point of common coupling and its use in harmonic study. **[8]**

b) Explain in brief devices for controlling harmonic distortion. **[8]**

OR

Q8) a) Explain various principles of controlling harmonic distortion. **[8]**

b) Discuss shunt passive filters used for harmonic reduction. **[8]**

Q9) a) Explain various equipment required for power quality monitoring. **[10]**

b) What are the objectives of the power quality monitoring? **[8]**

OR

Q10) a) What are the desirable characteristics of power quality measurement equipments? (Explain with example). **[10]**

b) Write note on test location in PQ monitoring. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3187

[Total No. of Pages :3

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B.E. (Electrical)

RENEWABLE ENERGY SYSTEMS

(2012 Pattern) (Semester - I) (End Semester) (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.***

Q1) a) List the different types of collectors. Explain any one in detail. **[5]**

b) Explain solar PV cell. Plot electrical characteristic of silicon PV cell showing maximum power point for various solar irradiation levels. **[5]**

c) Show the components of PV system with energy storage device. Draw energy flow diagram for this system. Write the steps of design for this configuration. **[5]**

d) Compare Horizontal and vertical axis wind turbine. **[5]**

OR

Q2) a) Define **[5]**

i) Zenith angle

ii) Declination angle

iii) Air mass

iv) Latitude

v) Solar azimuth angle.

b) Explain any one instrument used for measuring solar radiation. **[5]**

c) What are the factors affecting the design of wind turbine? **[5]**

d) A horizontal axis wind turbine has a diameter of 5m. When wind speed unaffected by the turbine is 9m/s, turbine rotates at 300 nom and produces 3 kW of mechanical power. Find power coefficient. (ρ= 1.223kg/m^3). **[5]**

P.T.O.

Q3) a) What is biogas? What are the factors that affect the generation of biogas in a biogas plant? List the various advantages of biogas production. **[8]**

b) Discuss the method of power generation from liquid waste land fill gas. **[8]**

OR

Q4) a) Write a short note on any one gasifier. Draw a neat labelled diagram. **[8]**

b) The following data is given for a biogas digester suitable for the o/p of five cows: retention time 20 days, temp 30ºC, dry matter consumed/day = 2kg, biogas yield is 0.24 m^3 per kg, η of burner = 60%, methane proportion is 0.8, Heat of combustion of methane = 28 mJ/m^3 density of dry material = 50 kg/m^3. **[8]**

Calculate

i) Volume of biogas digester.

ii) Power available from the digester.

Q5) a) What are different methods for hydrogen production? Explain in brief. **[8]**

b) What is a fuel cell? What are the advantages and disadvantages of a fuel cell? **[8]**

OR

Q6) a) Explain the principle of working of a battery. Describe a lead acid battery? **[8]**

b) Perform the necessary calculations of show that the maximum efficiency for the methane fuel cell volatge is 1.15 volts. What flow rate in kg/hr of methane and oxygen would be required to produce a power output of 100kW. What heat transfer Rates would be involved under these circumstances? **[8]**

Give: ΔH^o 25º C = - 195,500 Cal/gm mole.

ΔG^o 25º C = - 212,800 Cal/gm mole.

Q7) a) Explain with the help of block diagram grid connected PV System. **[6]**

b) Define and Explain with an example about Life Cycle Costing? **[4]**

c) A person wants to purchases solar water heating system of Rs. 20,000/- it is required to do a down payment of Rs. 4,000/-. An annual end of year payment of Rs. 2,400/- is required for 10 years. But the person paid Rs.2,200/- yearly and balance at the end. Determine the value of balance payment if money is worth 10% interest. **[8]**

OR

Q8) a) Define & Explain **[6]**

i) Time value of money.

ii) Net Present value.

iii) Initial Rate of Return.

b) Define & Explain with an example about internal Rate of Return. **[4]**

c) A co-generation system installation is expected to reduce the company's annual energy bill by Rs. 25 Lacs. If the capital cost of new co-generation installation is Rs. 90 Lacs and the annual operating and maintenance cost is Rs. 5 Lacs **[8]**

i) What will be the expected payback period for the project?

ii) What will be the Initial (Simple) Rate of Return/ Return on Investment (ROI)?

Total No. of Questions : 9]

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P3188

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B.E. (Electrical)

DIGITAL SIGNAL PROCESSING

(2012 Course) (Semester - I) (Elective - I) (403143 D)

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 is compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) With block diagram explain process at A to D conversion. **[5]**

b) State and explain any two properties of 'Z' transform. **[5]**

OR

Q2) a) State and explain any two properties at DTFT. **[5]**

b) Explain detail classification at Discrete Time System. **[5]**

Q3) a) Explain linear convolution and its properties. **[5]**

b) Explain steady state and transient response of 1st order system. **[5]**

OR

Q4) a) What are different types to find inverse Z? Explain anyone in details. **[5]**

b) How to determine stability and causality to DTS? **[5]**

P.T.O.

Q5) a) Find the DFT of following sequence $x(n) = \{\underset{\uparrow}{1},1,1,1\}$ **[8]**

b) Explain DIT-FFT algorithm with N=4. **[8]**

OR

Q6) a) Explain DIF-FFT algorithm with N = 4. **[8]**

b) Explain sampling theorem in frequency domain. **[8]**

Q7) a) Explain impulse invariance method for filter design. **[8]**

b) Compare analog and digital filter. **[8]**

OR

Q8) a) How to determine linear convolution using circular convolution. **[8]**

b) Explain cascade form structure of IIR filter. **[8]**

Q9) Write short note on any three. **[18]**

a) Application of DSP in harmonic analysis.

b) Application of DSP in machine control.

c) DSP based protective relaying.

d) Direct form structure in FIR Filter.

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Total No. of Questions : 10]

SEAT No. :

P3189

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B.E. (Electrical)

RESTRUCTURING AND DEREGULATION

(2012 Course) (Semester-I) (403144A) (Elective- II)

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, and 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 in brief the regulatory process in India. **[5]**

b) Write a short note on Renewable energy Credits. **[5]**

OR

Q2) a) Explain the term Return in equity in detail. **[5]**

b) Explain the main functions of Central Electricity Authority. **[5]**

Q3) a) Explain in brief capital cost, marginal cost. **[5]**

b) Describe the desirable characteristics of tariff of electricity. **[5]**

OR

Q4) a) Describe the working of Indian Energy Exchange (IEX) for a day ahead market. **[5]**

b) Write short note on Carbon credits. **[5]**

Q5) a) Write short note on multi-lateral trade based on industry structure and contractual arrangements. **[8]**

b) Write short note on wholesale competition, retail competition based on industry structure and contractual arrangements. **[8]**

OR

P.T.O.

Q6) a) Compare between competition for the market and competition in the market. **[8]**

b) What are models based on energy trading? **[8]**

Q7) a) Specify peculiarities of electricity as a commodity. Explain rules that govern the electricity market **[8]**

b) Explain the dynamic pricing of electricity. **[8]**

OR

Q8) a) Explain concept of trading power system. **[8]**

b) Compare integrated trading model and decentralized trading model. **[8]**

Q9) a) Explain the key features of Indian Grid Code and also explain transmission congestion issues. **[10]**

b) Write short note on Locational pricing model. **[8]**

OR

Q10) a) Explain three parts of ABT. Also explain how with implementation of ABT, the grid discipline in improved in Indian power sector. **[10]**

b) What are the pricing related issues in transmission pricing? **[8]**

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Total No. of Questions : 8]

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P3190

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B.E. (Electrical)

ELECTRO MAGNETIC FIELDS

(End Sem.) (2012 Pattern) (Elective - II) (403144 B) (Semester-I)

Time : 2 ½Hours] *[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) ***Use of logarithmic tables, slide rules, Mollier Charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Derive an expression for electric field intensity at point P due to uniform charge distribution along an infinite sheet with uniform charge density ρ_s C/m^2. **[8]**

b) Define current density. Derive the point form and integral form of continuity equation. **[6]**

c) A circular loop located on $x^2 + y^2 = 9, z = 0$ carries a direct current of 10A along $\bar{a}_\phi$. Determine H at (0, 0, 4) and (0, 0, -4). **[6]**

OR

Q2) a) Derive the expression for energy stored in an electrostatic field in terms of D & E. What is the energy density? Write the expression for it. **[8]**

b) Obtain the expression for H (magnetic field intensity) due to infinitely long straight conductor carrying current I at any point P using Ampere's circuital law. **[6]**

c) A homogeneous dielectric ($\varepsilon_r = 2.5$) fills region 1 ($x \leq 0$) while region 2 ($x \geq 0$) is free space.

If $D_1 = 12\ \hat{a}_x - 10\ \hat{a}_y + 4\ \hat{a}_z$ n C / m^2. Find D_2 and θ_2. **[6]**

Q3) 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) Derive an expression for force on i) a moving charge and ii) force between differential current elements. **[8]**

OR

P.T.O.

Q4) a) Define torque. A rectangular coil of area 10 cm^2 carrying current of 50 A lies on plane $2x + 6y - 3z = 7$ such that the magnetic moment of the coil is directed away from the origin surrounded by a uniform field $0.6\hat{a}_x + 0.43\hat{a}_y + 0.5\hat{a}_z$ Wb/m^2 .Find the torque on the coil. **[8]**

b) Explain different magnetic materials with suitable examples. **[8]**

Q5) a) State Faraday's law of electromagnetic induction? Derive an expression for motional emf. **[8]**

b) State the Maxwell's equations for static and time varying electric and magnetic fields in both integral and point form. **[8]**

OR

Q6) a) Find the amplitude of displacement current density: **[8]**

i) In the air space at a point within a large power distribution transformer where $\bar{B} = 0.8 \cos [1.257 \times 10^{-6} (3 \times 10^8 t - x)] \hat{a}_y$ T.

ii) In a metallic conductor at 60Hz, if $\varepsilon = \varepsilon_o$, $\mu = \mu_o$, $\sigma = 5.8 \times \frac{10^7 s}{m}$ and $\bar{J} = \sin (377t - 117.1z) \hat{a}_y$ MA / m^2.

b) Define displacement current. Derive the modified point form of Ampere's law $\nabla \times \bar{H} = J_c + \frac{\partial \bar{D}}{\partial t}$ **[8]**

Q7) a) What is uniform plane wave? In relation with uniform plane wave explain the terms **[10]**

i) Propagation constant.

ii) Attenuation constant.

iii) Phase velocity.

What is their significance?

b) Derive the wave equations in free space. Write the properties of plane waves in good conductors and perfect dielectric. **[8]**

OR

Q8) a) State and prove Poynting theorem. Interpret each term. **[10]**

b) What is a phasor? State and explain Maxwell's equation in phasor form for time harmonic electromagnetic fields in a linear, isotropic and homogenous medium. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P3191

[Total No. of Pages :2

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B.E. (Electrical)

EXTRA HIGH VOLTAGE AC TRANSMISSION

(2012 Course) (Semester -I) (403144 C) (Elective-II) (End Sem.)

Time : 2½ Hours *[Max. Marks :70*

Instructions:

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 the terms Aeolian vibration, Galloping and Wake - induced Oscillations with respect to transmission line performance. **[8]**

b) What do you mean by bundled conductors? Give properties of these conductors and show conductor configurations used for bundles in EHV-lines. **[8]**

c) Explain the field of a point charge and its properties. **[4]**

OR

Q2) a) Explain temperature rise of EHV conductors using heat balance equation. **[8]**

b) Prove that a one 750 kV line power handling capacity of a.c transmission line carry as much power as four 400 kV circuits for equal distance of transmission. **[8]**

c) The conductor configuration of 750 kV EHV line are N = 4, d = 3.46cm & B = 45 cm. Calculate r_{eq}. **[4]**

Q3) a) Explain the terms primary shock current, secondary shock current and let-go current. **[8]**

b) Discuss effect of power frequency magnetic fields on human health and specify permissible limits. **[8]**

OR

P.T.O.

Q4) 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. **[8]**

b) Derive expression for electrostatic induction on un energized circuit of double circuit line. **[8]**

Q5) a) State and explain the mechanism of corona formation. **[8]**

b) Draw a charge - voltage diagram and derive an expression $P_c = \frac{1}{2} KC (V_m^2 - V_0^2)$ for corona loss. **[10]**

OR

Q6) a) State and explain at least 4 formulae for power loss due to corona. **[8]**

b) With a simple block diagram, explain the Audible noise measuring circuit in Extra high voltage ac lines. **[10]**

Q7) a) State and explain at least four factors to be considered in the design of ehv lines based upon the steady state limits. Also state their limiting value. **[8]**

b) Name the materials used for insulation in E.H.V cables; and state the properties of SF_6 gas as an insulating in cables. **[8]**

OR

Q8) a) Give classification of cable & explain any one in detail. **[8]**

b) Define tan δ loss factor & derive an experssion for insulation resistance of a cable. **[8]**

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Total No. of Questions : 08]

SEAT No. :

P3192

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[5461] - 231

B.E. (Electrical)

INTRODUCTION TO ELECTRICAL TRANSPORTATION SYSTEMS

(2012 Course) (Semester -I) (Elective - II) (403144)

Time : 2 ½ Hour *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain various components of Hybrid Electric vehicles. **[6]**

b) Which are the various sources of energy ? Explain any one in detail. **[8]**

c) Explain electric wheel chair with salient features. **[6]**

OR

Q2) a) Draw & explain block diagram of BLDC motor. **[8]**

b) Explain need of various power electronics converters. **[6]**

c) Explain in detail personal Mobility. **[6]**

Q3) a) Explain smart traffic control with their benefits. **[8]**

b) Explain various Instruments of electric vehicle. **[8]**

OR

Q4) a) Draw & explain electric power steering. **[8]**

b) How driverless vehicle works? Explain in detail. **[8]**

Q5) a) Explain power train architecture of electric vehicle. **[8]**

b) Draw & explain acceleration and speed characteristics of electric vehicles. **[8]**

OR

Q6) a) Explain working principle of MagLev Train. **[6]**

b) Explain suitability of DC series motor for traction service. **[4]**

c) Compare AC & DC traction systems. **[6]**

P.T.O.

Q7) a) Explain power electronic controlled drives for elevators. **[6]**

b) Draw & explain load characteristics of elevator systems. **[8]**

c) Explain energy efficient elevator systems. **[4]**

OR

Q8) a) Write short note on special purpose vehicles. **[8]**

b) Explain emerging trends in elevators. **[10]**

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Total No. of Questions : 10]

SEAT No. :

P3193

[Total No. of Pages : 3

[5461]-232
B.E. (Electrical)
SWITCHGEAR & PROTECTION
(2012 Course) (End Sem.) (403147)

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 wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain essential qualities of protective relaying. **[6]**

b) Draw & explain trip circuit of circuit breaker. **[4]**

OR

Q2) a) A circuit breaker interrupts the magnetizing current of 220 kV, 100 MVA, 3 phase transformer. The magnetizing current of transformer is 5% of full load current. Determine the maximum voltage that will appear across contacts of circuit breaker when the magnetising current is interrupted at 56% of its peak value. Given that stray capacitance is 0.0028 μF/phase and inductance per phase is 30 H. **[6]**

b) What do you mean by 'Reach' in case of distance relay. Define over reach & under reach. **[4]**

Q3) a) With neat diagram explain construction & working of puffer type SF_6 circuit breaker. **[6]**

b) Explain Slepain's Theory (Recovery rate theory) of are interruption in case of circuit breaker. **[4]**

OR

P.T.O.

Q4) a) Write short note on 'Auto reclosing' of CB. **[6]**

b) Explain following terms related to CB switching. **[4]**

i) Restriking voltage

ii) RRRV

Q5) a) With neat block diagram explain working of Numerical relay. State its advantages over electromagnetic and static relay. **[10]**

b) Draw & explain construction & working of Thyrite type lightning Arrester. **[8]**

OR

Q6) a) With neat block diagram explain working of static relay. State its advantages over electromagnetic relay. **[10]**

b) Compare gap type lightning Arresters with gapless type Arresters. **[8]**

Q7) a) Draw and explain protection of power transformer against incipient faults. State drawbacks of this protection. **[8]**

b) A 3 phase 33 kV/3.3kV, $\lambda/\triangle$ connected transformer is protected by differential protection. CT's on LT side have ratio of 400/5. Determine the CT ratio on HT side. Draw the diagram. **[8]**

OR

Q8) Explain:-

a) Inter turn fault protection on same phase in case of 3 ph alternator. **[5]**

b) Protection of alternator in case of loss of prime-mover. **[5]**

c) Protection of alternator in case of unbalanced loading. **[6]**

Q9) a) Explain selection of CT ratios for bus-bar protection. **[8]**

b) A line section has an impedance of 2.5 + j6Ω. Show on R-X plane this impedance as an impedance vector. If the relay is adjusted to just operate for a zero impedance short circuit at the end of line section, show on same R-X diagram, the operating characteristics of impedance, reactance & mho relay used for the purpose. Assume that centre of mho relay lies on the line impedance.

If the arcing occurs having resistance of 2Ω anywherse on the line find for each type of distance relay, the maximum portion of line that can be protected. **[8]**

OR

Q10)a) Draw & explain protection of parallel feeder using over current relays.**[4]**

b) With neat diagram explain three stepped distance protection scheme for transmission line. **[6]**

c) Write short note on Wide Area Measurement (WAM) system. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3194

[Total No. of Pages : 2

[5461]-233

B.E. (Electrical)

POWER ELECTRONICS CONTROLLED DRIVES

(2012 Course) (Semester - II) (403148)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is an Electric drive? Discuss essential parts of Electric Drive with the help block diagram. **[5]**

b) A drive has the following parameters : **[5]**

J = 1 kg-m^2, T=15– 0.01N, N-m and passive load torque T_1 = 0.005N, N-m; where N is the speed in rpm.

Initially the drive is operating in steady state. Now it is to be reversed. For this moor characteristics is altered such that, T= –15 – 0.01N, N-m for positive as well as negative values of N. Calculate the reversal time.

OR

Q2) a) Explain DC. dynamic braking of 3 phase induction motor along with speed torque curves. **[5]**

b) Explain nature and classification of load torques. **[5]**

Q3) a) Explain operation of chopper controlled separately excited DC motor drive with suitable waveforms. **[5]**

b) A 230 V, 960 rpm & 200A separately excited DC motor has an armature resistance of 0.02 Ω. The motor is required to hold the rated load torque by Dynamic Braking at 1200 rpm without emf exceeding 230V. Calculate the value of external resistance to be connected across armature & braking torque. **[5]**

OR

P.T.O.

Q4) a) Explain plugging method for braking operation of DC shunt motor. **[5]**

b) Explain regenerative braking of VSI fed induction motor drives. **[5]**

Q5) a) Sketch the closed loop control for speed control of 3 phase induction motor using Current Source Inverter. Explain the speed control strategy. **[8]**

b) Write a short note on Servo drives. **[8]**

OR

Q6) a) Write a short note on commutatorless DC motor drive. **[8]**

b) Explain with block diagram vector control of three phase Induction motor. **[8]**

Q7) a) What are the control strategies for Permanent magnet synchronous motor drive? How constant torque angle control is used? **[8]**

b) Write a short note on speed controller in PMBLDC motor. **[8]**

OR

Q8) a) Draw neat diagram and explain vector control of PM synchronous motor. **[8]**

b) Describe the operation of PMBLDC motor drive. State its advantages. **[8]**

Q9) a) Write a short note on any two, **[10]**

i) Torque requirement of traction drive at low speed when it is just being started and during free running condition.

ii) Selection criteria of motors.

iii) Requirements of drive for Textile mill operations.

b) How motor duty, heating and cooling affects the temperature of motor? **[8]**

OR

Q10)a) Explain the industrial application of electrical drives in

i) Centrifugal pumps

ii) Paper mills **[10]**

b) What are the various motor duty patterns? How motors are classified based on duty. **[8]**

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Total No. of Questions :8]

SEAT No. :

P3195

[Total No. of Pages : 2

[5461]-235

B.E. (Electrical)

HIGH VOLTAGE ENGINEERING

(2012 Course) (Semester - II) (End Semester) (Elective - III) (403149)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Draw neat labelled diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain Streamer mechanism of breakdown in gases with suitable diagram. **[6]**

b) Compare treeing and tracking phenomenon in solid dielectrics. **[7]**

c) Explain in detail Statistical method of insulation Coordination. **[7]**

OR

Q2) a) Describe breakdown in non-uniform fields and corona discharge. Explain concept of positive corona and negative corona. **[7]**

b) A solid dielectric material with dielectric constant of 5.2 has void of thickness 2mm. The dielectric material thickness is 9mm and voltage applied across it is 80kV (rms). If void is filled with air and has dielectric strength of 30kV/cm (peak). Find the voltage at which internal discharge can occur. **[7]**

c) With neat diagram explain mechanism of Lightning. **[6]**

Q3) a) Explain Tesla coil with neat diagram. Give its applications, advantages and disadvantages. **[9]**

b) Explain the Trigatron method of tripping control used in Impulse generators with suitable diagrams. **[9]**

OR

Q4) a) Explain the necessity of cascading of Transformer. Draw a 3 stage cascade transformer and mark its voltages at various levels. Also give its advantages and disadvantages. **[9]**

b) Define and draw an impulse current wave. Explain with suitable diagram Impulse Current Generator. Also give the function of different parts of an impulse current generator. **[9]**

P.T.O.

Q5) a) Describe the generating voltmeter used for measuring high dc voltages. How does it compare with a potential divider for measuring high dc voltages? **[8]**

b) An impulse generator has 8 stages with condenser rated for 0.16 μF and 125kV. The load capacitor available is 1000 pF. Find the series resistance and damping resistance needed to produce 1.2/50 μsec impulse wave. What is the maximum output voltage of generator, if the charging voltage is 120kV? **[8]**

OR

Q6) a) Give the basic circuit for measuring the peak voltage of (i) ac voltage and (ii) impulse voltage. What is the difference in measurement technique in the above two cases? **[8]**

b) Explain how a sphere gap can be used to measure the peak value of voltages. What are the parameters and factors that influence such voltage measurement? **[8]**

Q7) a) Why is grounding very important in an HV laboratory? Describe a typical grounding system used. **[8]**

b) What are the different power frequency tests done on insulators? Mention the procedure for testing. **[8]**

OR

Q8) a) Explain the following terms as referred to high voltage testing: **[8]**

i) withstand voltage

ii) flashover voltage

iii) 50% flashover voltage

iv) wet and dry power frequency tests

b) Classify the different High voltage laboratories and give salient features of each of them. **[8]**

Total No. of Questions : 9]

SEAT No. : ____

P3196

[Total No. of Pages : 2

[5461]-236

B.E. (Electrical)

HVDC AND FACTS

(2012 Course) (Elective-III (B)) (403149 B) (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) Compare HVDC system with EHVAC system on techno-commercial terms. **[10]**

OR

Q2) What are the advantages of multi-terminal HVDC system over classical HVDC system? Discuss types of multi-terminal system. **[10]**

Q3) Explain generation of harmonics in HVDC systems. Discuss mechanisms used for control harmonics. **[10]**

OR

Q4) Is HVDC light is superior to classical HVDC? In what ways? Justify. **[10]**

Q5) Attempt any two **[16]**

a) Explain Power Converter structures.

b) Explain AC controller structures.

c) Explain considerations in selection of power converters.

P.T.O.

Q6) a) Explain different controllers used for implementation of TCSC. **[8]**

b) Explain different SVC configurations. **[10]**

OR

Q7) a) Compare SVC with STATACOM. **[9]**

b) How SSSC is different than TCSC? Also explain applications of SSSC. **[9]**

Q8) a) Describe the steady state operation of UPFC. **[8]**

b) With suitable diagram explain modes of operation of UPFC. **[8]**

OR

Q9) a) Explain controller used for UPFC. **[8]**

b) Explain control of active power and reactive power by UPFC. Derive necessary mathematical expressions. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3197

[Total No. of Pages : 2

[5461]-237

B.E. (Electrical)

DIGITAL CONTROL SYSTEMS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt questions Q.1 & Q.2, Q.3 & Q.4, Q.5 & Q.6, Q.7 & Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rules, electronic unprogrammable pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the various standard discrete input test signals with neat diagrams. **[6]**

b) Define State Transition Matrix & explain its properties. **[8]**

c) The characteristic equation of a discrete system is given by

$P(Z)=Z^4-1.2Z^3+0.072Z^2+0.3Z-0.08=0$

Find the stability of this system using Routh stability criterion. **[6]**

OR

Q2) a) Explain sampling and reconstruction process. State Sampling theorem and give its importance. **[8]**

b) Explain mapping between S-plane & Z-plane with proper diagrams. **[6]**

c) For the system x(t) = Ax(t) + Bu(t), where $A=\begin{pmatrix}1 & 1\\ -1 & 1\end{pmatrix}$, compute e^{At} using Caley Hamilton Theorem. **[6]**

Q3) a) Write a short note on pole placement design technique. **[8]**

b) Define and explain the concepts 'Controllability and observability of discrete- data Control System, With their methods. **[8]**

OR

P.T.O.

Q4) a) Derive Ackermann's formula for determination of state feedback gain matrix K. **[6]**

b) Given

$$x(k+1)=\begin{pmatrix}1 & 1\\ -2 & -1\end{pmatrix}x(k)+\begin{pmatrix}1 & 0\\ 0 & 1\end{pmatrix}u(k)\ \&\ y(k)=\begin{pmatrix}1 & 0\\ 0 & 1\end{pmatrix}x(k)$$

Determine controllability & Observability of the system. **[10]**

Q5) a) Define Euler's forward, backward method & Trapezoidal method with suitable example. **[8]**

b) Consider the system defined by

$$\frac{Y(z)}{U(z)}=\frac{z^2+0.5z}{z^3+z^2+2z+0.5}$$

Determine State space representation in Controllable canonical form & Observable canonical form. **[8]**

OR

Q6) a) Explain pole zero matching with example. **[4]**

b) Explain bilinear transformation with frequency warping. **[6]**

c) The pulse transfer function of discrete time system given as

$$\frac{Y(z)}{U(z)}=\frac{z+1}{z^2+1.3z+0.4}$$

Derive its Jordan canonical form. **[6]**

Q7) 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]**

OR

Q8) a) Explain Hybrid system simulation with block diagram & their application. **[8]**

b) Draw a neat block diagram of digital position control scheme and Explain the function of each block. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3198

[Total No. of Pages : 2

[5461]-238
B.E. (Electrical)
ILLUMINATION ENGINEERING
(2012 Course) (Elective-IV) (End Sem.) (403150 C) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of lograthmic 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 electrically produced light. **[4]**

b) What are the remedies to minimize bad effects of optical hazards? **[6]**

OR

Q2) a) Compare filament lamp with fluorscent lamp on any four points. **[4]**

b) Explain construction and working of induction lamp with a suitable diagram. **[6]**

Q3) a) Give a detail classification of dimmers used for light control. **[4]**

b) State the advantages and disadvantages of choke coil ballast. **[6]**

OR

Q4) a) State any four advantages of CFL. **[4]**

b) Explain the meaning of following terms: **[6]**

i) Visual performance ii) Visual activity

P.T.O.

Q5) a) Define following terms: **[8]**

i) Luminous efficiency ii) Utilization factor

iii) Reflection factor iv) Candle power

b) State and explain laws of illumination. **[8]**

OR

Q6) a) A room of size 15 m × 6 m is to be illuminated with 20 lamps each of 200 watt. The MSCP of each lamp is 250. Take depreciation factor of 1.2 and utilization factor of 0.6. Find the average illumination on the floor. **[8]**

b) State and explain the factors to be considered for designing of illumination scheme for industrial installation. **[8]**

Q7) a) State the classification of projectors used for flood lighting. Also state the lamps used in these projectors. **[8]**

b) Explain the factors considered for designing of illumination scheme for sports complex. **[8]**

OR

Q8) a) Explain flood lighting signs for advertisement. **[8]**

b) Elaborate the various arrangement of luminaries for straight road. **[8]**

Q9) a) With a neat diagram explain construction & working of : **[9]**

i) Light tube dome

ii) Main reflective conduit light tube

b) State the advantages and disadvantages of OLED. **[9]**

OR

Q10)a) State the precautions to be taken for installation of fibre optic cables.**[9]**

b) State the advantages and disadvantages of LED for illumination purpose.**[9]**

Total No. of Questions : 8]

SEAT No. :

P3199

[Total No. of Pages : 2

[5461]-239

B.E. (Electrical Engineering)

SMART GRID

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define smart grid and its need. **[6]**

b) Explain the concept vehicle to Grid. **[6]**

c) Highlight on role of geographic information system in smart grid, and also give its function. **[8]**

OR

Q2) a) Give present development and international policies in smart grid. **[6]**

b) Write a note on, "Smart substation". **[6]**

c) Explain how Smart Appliances can be the part of Smart Grid. **[8]**

Q3) a) Explain microgrid architecture. **[8]**

b) Discuss different Applications of micro grid. **[8]**

OR

Q4) a) Explain about protection and control of microgrid. **[8]**

b) Describe the concept and formation of Micro Grid. **[8]**

P.T.O.

Q5) a) Explain EMC and its importance in smart grid. **[8]**

b) Describe the concept, power quality conditioners related to smart grid. **[8]**

OR

Q6) a) Describe Web Based Power Quality Monitoring. **[8]**

b) Explain the power quality audit and its importance in smart grid. **[8]**

Q7) a) Explain the concept related to smart grid. **[9]**

b) Write a note on Cyber Controlled Smart Grid. **[9]**

OR

Q8) a) Explain the importance of Wi-Max based communication. **[9]**

b) Write a note on cloud computing. **[9]**

Total No. of Questions :10]

SEAT No. :

P3200

[Total No. of Pages : 2

[5461]-240-A
B.E. (Electrical)
VLSI DESIGN
(2012 Pattern) (Elective - IV) (Open Elective) (403150 D)
(Semester-II) (End Sem.)

Time : 2 ½ 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, 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) Explain the following with example. **[6]**

i) Entity

ii) Architecture

iii) Schematic

b) Compare Combinational circuit and Sequential circuits. **[4]**

OR

Q2) a) Explain with example any one sequential statement and any one concurrent statement. **[6]**

b) Explain metastability in flip flops. **[4]**

Q3) a) Write VHDL code for 4-bit parallel in parallel out left shift register. Draw circuit & TT also. **[6]**

b) List various data types and data objects in VHDL. **[4]**

OR

Q4) a) Explain with example configuration statement used in VHDL. **[6]**

b) Draw state diagram for 1011 code detector. **[4]**

P.T.O.

Q5) a) Differentiate ASIC and FPGA. **[8]**

b) With neat schematic explain the architectural building blocks of CPLD. **[8]**

OR

Q6) a) List the features, specifications and applications of CPLD. **[8]**

b) Explain with diagram a generic architecture of FPGA. **[8]**

Q7) a) Explain CMOS NAND and CMOS NOR gate **[8]**

b) Draw and explain the CMOS inverter voltage transfer characteristics. **[8]**

OR

Q8) a) Define V_{IL}, V_{IH}, V_{OL}, V_{OH}. Explain with diagram Noise margin. **[8]**

b) Compare TTL, ECL and CMOS logic. **[8]**

Q9) a) Design and develop the circuit for 8×8 memory. **[10]**

b) Explain the application of seven segment display and key board using VHDL. **[8]**

OR

Q10 a) Design and develop the circuit for signed and unsigned comparators. **[9]**

b) Design and develop the circuit Barrel shifter using VHDL. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3658

[Total No. of Pages : 2

[5461]-241

B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION - 1

(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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of calculator is allowed.***

Q1) a) Explain in brief dynamics of Multi-capacity processes. **[4]**

b) Identify process variables in a liquid level control system. Define control objective and proper pairing of variables. **[6]**

OR

Q2) Explain in brief : **[10]**

a) Self regulation

b) Interacting processes

c) Transmitter gain

d) Variable time constant

e) Degrees of Freedom

Q3) a) Compare SLPC and MLPC. **[6]**

b) Discuss in brief procedure of Scaling of Instruments. **[4]**

OR

Q4) a) Explain in brief valve gain and process time constant. **[4]**

b) How will you analyze a typical pressure control system? **[6]**

P.T.O.

Q5) a) Discuss with suitable example Feedforward controller. **[8]**

b) Explain the control performance measures for disturbance input changes. **[8]**

OR

Q6) a) Explain with suitable application Split Range Control. **[8]**

b) Explain with suitable example use of cascade control to enhance the performance. **[8]**

Q7) a) Discuss in brief Interaction and its effect on process performance. **[8]**

b) 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.

OR

Q8) 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) Explain in brief Decoupling of control loops. **[8]**

Q9) a) Comment on Safety of Systems. **[6]**

b) Explain with neat flowchart sequence of design steps. **[10]**

OR

Q10)a) Explain with neat flowchart sequence of design steps. **[8]**

b) Explain in brief factors that influence operability from the perspective of control performance. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3201

[Total No. of Pages : 2

[5461]-242

B.E. (Instrumentation and Control)

PROJECT ENGINEERING AND MANAGEMENT

(2012 Pattern) (Semester - I)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) Explain the matrix type project organization with advantages & disadvantages. **[6]**

OR

Q2) Explain clearly the responsibilities of project team leader. **[6]**

Q3) What is WBS? Explain the reasons to create it. **[6]**

OR

Q4) Explain clearly the difference between PEM & CPM. **[6]**

Q5) Explain in brief

a) Pressure & Temperature Sheet **[8]**

b) Material Balance sheet

OR

Q6) Write importance of installation details. Draw installation DPT. **[8]**

Q7) a) What is Hazardous area classification? Elaborate its importance in project design. **[8]**

P.T.O.

b) What is loop wiring diagram? Develop loop wiring diagram for industrial level control loop. **[8]**

OR

Q8) a) What are the types of cables used in plant automation? Explain the important parameters required to be considered in selection of signal cable. **[8]**

b) What is loop wiring diagram? Develop loop wiring diagram for industrial pressure control loop. **[8]**

Q9) a) Prepare Inquiry, Quotation, Comparative statement and Purchase order for DPT. **[10]**

b) Enlist and explain documents required in procurement process. **[8]**

OR

Q10)a) What is vendor liaising? What is contractor liaising? Explain how it benefits in project commissioning **[9]**

b) What are the practical failures observed in loop checking of project engineering? **[9]**

Q11)a) What are different ergonomic considerations in control centre and control panel design? **[8]**

b) Differentiate clearly cold and hot commissioning activities and steps in plant commissioning? **[8]**

OR

Q12)a) Prepare the calibration report of the pressure gauge. Explain how pressure gauge is protected and from pressure jerks in industrial environment.**[8]**

b) Draw dimensional sketch of consoles features used. Also prepare FAT and CAT report for the same. **[8]**

Total No. of Questions :10]

SEAT No. :

P3202

[Total No. of Pages : 3

[5461]-243

B.E. (Instrumentation & Control Engineering)

DIGITAL CONTROL

(2012 Pattern) (406263) (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, 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.***
5) ***Use of calculators/Log table is allowed.***

Q1) a) Solve the difference equation given as, **[6]**

$c(k+2) - 5c(k+1) + 6c(k) = u(k)$ given that, $c(0)=0$ & $c(1)=1$

b) Explain sampling theorem and Aliasing. **[4]**

OR

Q2) a) Determine Pulse Transfer function for system represented by block diagram. **[6]**

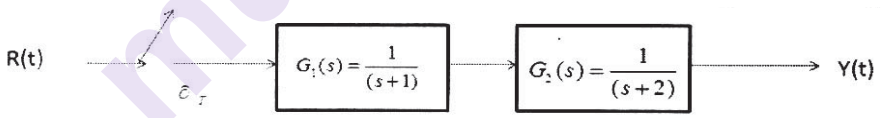


Fig.1

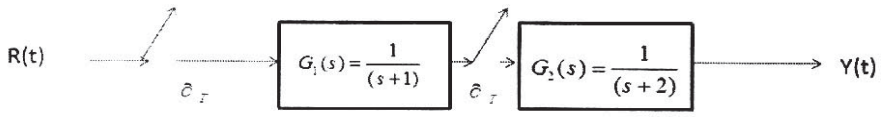


Fig.2

b) Find Inverse Z transform of the function, **[4]**

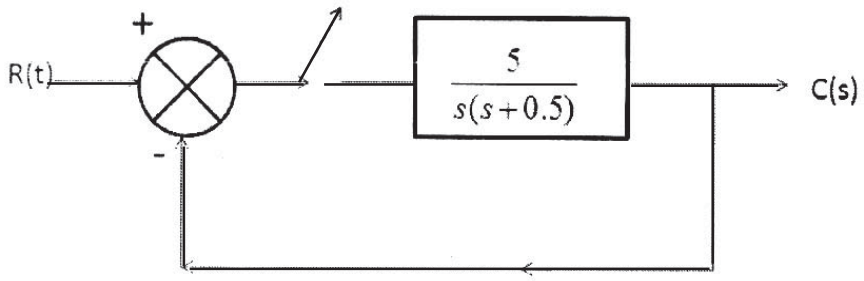
$G(z)=\dfrac{0.632z}{z^2-1.368z+0.3678}$, Sampling Time T = 1 sec.

P.T.O.

Q3) Determine the pulse transfer function and stability of the system shown in the figure for Sampling Time **[10]**

a) T=0.5 sec,

b) T=1 sec



OR

Q4) List and explain various stability analysis methods for discrete time control systems. Determine stability of system having following characteristic equation. $Q(z) = 2z^4 + 8z^3 + 12z^2 + 5z + 1$ **[10]**

Q5) a) Find Eigen values and Eigen vectors, **[10]**

$$A = \begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}$$

b) Obtain a state space representation of the following system in the diagonal canonical form. $\frac{Y(z)}{U(z)} = \frac{z^{-1} + 2z^{-2}}{1 + 0.7z^{-1} + 0.12z^{-2}}$ **[8]**

OR

Q6) a) Obtain state transition matrix for system **[8]**

$$x(k+1) = \begin{bmatrix} 0 & 1 \\ -0.24 & -1 \end{bmatrix} x(k)$$

b) Convert following state model into pulse transfer function; **[10]**

$$x(k+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -24 & -26 & -9 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(k) \text{ and } y(k) = [2\ 3\ 1] x(k)$$

Q7) a) Check following system for state controllability and observability. **[10]**

$$x(k+1)=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -6 & -11 & -6\end{bmatrix}x(k)+\begin{bmatrix}1\\0\\1\end{bmatrix}u(k) \text{ and } y(k)=[10\ 5\ 1]x(k)$$

b) State various transformation required to convert given state model into standard; **[6]**

i) Controllable Canonical form

ii) Observable Canonical form

iii) Jordan Canonical Form

OR

Q8) Consider following system defined by **[16]**

$$x(k+1)=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -0.16 & 0.84 & 0\end{bmatrix}x(k)+\begin{bmatrix}1\\1\\1\end{bmatrix}u(k)$$

Determine state feedback gain matrix K such that closed loop system exhibit deadbeat response to any initial state.

Q9) Explain the terms; **[16]**

a) Optimal Control

b) Optimal state Regulator

c) 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.

$$J=\frac{1}{2}\sum_{k=0}^{\infty}x^{*}(k)\mathrm{Q}x(k)+u^{*}(\mathrm{k})\mathrm{R}u(k)$$

$$Q=\begin{bmatrix}1 & 0\\ 0 & 0\end{bmatrix}, R=1$$

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Total No. of Questions : 10]

SEAT No. :

P3203

[Total No. of Pages :2

[5461] - 244

B.E. (Instrumentation & Control)

ADVANCED BIOMEDICAL INSTRUMENTATION

(2012 Pattern) (Semester - I) (Elective - I) (End Sem.) (406264 A)

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) ***Use of scientific calculator is allowed.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) List various applications of Telemedicine. **[4]**

b) What is Flow Cytometry? What are its advntages over Coulter counter? **[6]**

OR

Q2) a) Explain with neat diagram different modulation techniques used in telemetry. **[6]**

b) What is X-ray Fluoroscopy and its applications? **[4]**

Q3) a) What are commonly used radiation detectors? Explain with their specific application. **[5]**

b) Define Housenfield number. What is the role of it in Image reconstruction? **[5]**

OR

Q4) a) What is the operating principle of MRI. **[4]**

b) Draw the block diagram of pulse height analyser and explain it's working. **[6]**

P.T.O.

Q5) a) Explain different front panel controls of an ESU machine. **[8]**

b) What is a programmable pacemaker? Explain with the help of a neat block diagram. **[8]**

OR

Q6) a) What is the principle of high frequency heat therapy? Explain the operation of short wave diathermy machine with the help of a block diagram. **[8]**

b) Explain in detial heart lung machine with the help of a block diagam. **[8]**

Q7) a) What is an Endoscope? Explain its working with the help of a block diagram. **[8]**

b) List down and explain different types of lasers used in opthalmolgy. **[8]**

OR

Q8) a) What is retinal detachment? Explain its cause and repairing method. **[8]**

b) Describe various applications of lasers used in Dermatology. **[8]**

Q9) a) Define orthotic and prosthetic devices. Elaborate the concept with four examples. **[8]**

b) What measurements are essential during the process of haemodialysis. Explain how these are carried out with the help of a diagram. **[10]**

OR

Q10) a) What is Lithotripsy? What are the ways of shock wave generation? Draw shock wave used in Lithotripsy and explain importance of its parameters. **[12]**

a) What are Wheelchair types? Which materials are suitable for them? **[6]**

Total No. of Questions : 10]

SEAT No. :

P3204

[Total No. of Pages :2

[5461] - 245

B.E. (Instrumentation & Control)

BUILDING AUTOMATION - I

(2012 Pattern) (406264 B) (End Sem.) (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.***
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 BMS? Explain role of stake holders in BAS designing. **[6]**

b) List out four human comfort parameters and explain anyone in detail. **[4]**

OR

Q2) a) Explain architecture of Intelligent Building with neat sketch. **[5]**

b) List out different pressure sensors used in HVAC and explain piezoelectric type. **[5]**

Q3) a) Explain following terms: **[6]**

i) Latent Heat,

ii) Enthalpy,

iii) Entropy

b) Define Dry Bulb Temperature and Wet Bulb Temperature. **[4]**

OR

Q4) a) Explain components of AHU. **[5]**

b) List out types of dampers and explain parallel blade type. **[5]**

P.T.O.

Q5) a) Explain principle of variable air volume box constant air volume box. List out various types of VAV. **[10]**

b) Explain principle, working of Fan Coil Unit with neat diagram. **[8]**

OR

Q6) a) Explain Unit Heater and Unit Ventilator with neat diagram. **[10]**

b) Explain application of VAV and CAV. **[8]**

Q7) a) Explain refrigeration cycle in detail. **[8]**

b) Explain Water Cooled Chiller with neat diagram. **[8]**

OR

Q8) a) List out various types of Boiler. Explain any one type in detail. **[8]**

b) List out various types of Heat Exchanger. Explain any one type in detail. **[8]**

Q9) a) Which types of protocols are used in BAS? Explain BacNet in detail. **[8]**

b) Explain architecture of DDC. **[8]**

OR

Q10) a) Explain OSI model in detail. **[8]**

b) Explain MODBUS protocol in detail. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3205

[Total No. of Pages : 2

[5461]-246

B.E. (Instru. & Control)

ADVANCED CONTROL SYSTEM

(2012 Course) (Semester - I) (406264) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Use of Calculators, log tables, charts is allowed.***
3) ***Figures to the right indicate full marks.***

Q1) a) Distinguish between linear & non linear system? **[4]**

b) Obtain the describing function for the Dead zone. **[6]**

OR

Q2) a) Enlist types of nonlinearities explain with example? **[4]**

b) Obtain the describing function for the saturation characteristic? **[6]**

Q3) a) Define Stability, Assymptotic stability, Global stability in sense of Lyapunous. **[4]**

b) Linearize the following system using Jacobian linearization method **[6]**

$$\dot{x}_1 = x_2,\ \dot{x}_2 = -x_1 - x_2 - x_1 x_2 + 4$$

Assume that operating point at $x_0 = [11]^+$.

OR

Q4) a) If $x = \begin{bmatrix} 1 & -1 \\ 0 & -2 \end{bmatrix}$ can you find thelyapunous function for the system. Justify your answer. **[4]**

b) Explain model reference Adaptive control system with neat diagram. **[6]**

Q5) Write short note on (Any 2) **[16]**

a) Indirect self tuning regulator

b) Linear quadratic self tuning regulator

c) Continuous time self tuners

OR

P.T.O.

Q6) Write short note on (Any 2) **[16]**

a) Soft control ECAHO and Fisher control DPR 900.

b) Exact : The foxboro adaptive controller

c) ABB adaptive controller

Q7) a) State equation are given below determine feedback gain matrix for system the desired pole location at (–50, –50) **[10]**

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}-2 & -4\\ 1 & -4\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 2\end{bmatrix}u$$

$$y=\begin{bmatrix}0 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$$

b) Consider the plant equation **[8]**

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}1 & 0\\ -1 & 2\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}1\\ 0\end{bmatrix}u$$

Prove that system is unstable and controllable?

OR

Q8) Write short note on **[18]**

a) Temperature control in distillation column

b) Exact : The foxboro adaptive controller

Q9) Obtain the control law that minimizes the performance index **[16]**

$J=\int_0^\infty \left(x_1^2+u_1^2\right)dt$ for the system

$$\begin{bmatrix}\frac{dx_1}{dt}\\ \frac{dx_2}{dt}\end{bmatrix}=\begin{bmatrix}0 & 1\\ 0 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 1\end{bmatrix}u$$

using reduced matrix Ricatti equation.

OR

Q10)a) Define controllability & observalibility write different condition for different test. **[10]**

b) Find controllability for the system **[6]**

$$A=\begin{bmatrix}-2 & 1\\ 0 & -1\end{bmatrix}\quad B=\begin{bmatrix}1\\ 0\end{bmatrix}$$

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3206

[Total No. of Pages : 2

[5461]-248

B.E. (Instrumentation & Control)
ADVANCED DIGITAL SIGNAL PROCESSING
(2012 Course) (Semester - I) (Elective - I) (406264E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Assume suitable data if necessary.***
3) ***Use of Calculators, log tables, charts is allowed.***
4) ***Figures to the right indicate full marks.***

Q1) a) Perform upsampling of the signal $x(n) = n/2$ for the $n > 0$ and $x(n) = 0$ for $n <= 0$, by factor 4. **[5]**

b) Disucss the need of time frequency analysis of the signal with suitable example. **[5]**

OR

Q2) Decompose the following filter H(Z) into 3 component polyphase filters and draw its efficient structure, $H(Z) = 2.1 - 0.5z^{-1} + 0.3z^{-2} - 4.2z^{-3} + 0.6z^{-4} - 1.4z^{-5} - 0.2z^{-6} - 0.7z^{-7}$. **[10]**

Q3) a) Explain frequency domain analysis of sampling rate conversion process. **[5]**

b) Discuss WSS and SSS with suitable examples. **[5]**

OR

Q4) a) Explain signal decimation with suitable example. **[5]**

b) Define and explain the properties of STFT. **[5]**

Q5) a) Compare parametric and non parametric method of PSD estimation. **[6]**

b) Explain Bartlett's PSD estimation method. **[10]**

OR

P.T.O.

Q6) a) Explain ARMA model PSD estimation method. **[10]**

b) Discuss the applications of PSD estimation. **[6]**

Q7) a) Explain LMS adaptive filtering algorithm with suitable block diagram. **[10]**

b) Explain echo cancellation using adaptive filtering. **[8]**

OR

Q8) Derive the filter coefficients update relation for adaptive filter using RLS adaptive filtering algorithm with suitable block diagram. **[18]**

Q9) a) Draw and explain block diagram of ADSP 21xxx DSP processor. **[12]**

b) Discuss the need of DSP processor architecture. **[4]**

OR

Q10)a) Explain addressing modes in DSP processor. **[12]**

b) State the features of DSP processors. **[4]**

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Total No. of Questions : 10]

SEAT No. :

P3207

[Total No. of Pages :2]

[5461] - 249

B.E. (Instrumentation & control)

OPTO-ELECTRONICS INSTRUMENTATION

(2012 Pattern) (406265A) (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, and Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) What is hologram? How it is constructed? show with proper diagram hologram making process? Why LASER is needed for it? **[10]**

OR

Q2) What do you mean by frequency stabilization and mode-locking techniques in LASERS. Explain with proper diagram. **[10]**

Q3) Define and explain with diagrams critical angle, Brewster's angle and total internal reflection in optical fiber? **[10]**

OR

Q4) What are different types of sources and detectors? Enlist them? Explain construction any working of any one optical detector with suitable diagrams? **[10]**

Q5) a) Explain working of a simple strip waveguide phase modulator with suitable diagram? **[10]**

b) Write short note on an a coustic-optical modulator? **[6]**

OR

Q6) a) Explain construction and working of polarization controller? Draw proper figures of it? **[10]**

b) Write a short note on optical amplifiers and fiber amplifiers? **[6]**

P.T.O.

Q7) a) Draw a block diagram of fiber optic sensing system ? Enlist various fiber optic sensing systems (any six)? Explain the working of all above blocks? **[10]**

b) Write a short note on advantages and disadvantages of fiber optic sensing systems. **[6]**

OR

Q8) a) Explain with suitable diagram fiber microbending sensor used for pressure measurement. **[10]**

b) Write a short note on extrinsic fiber optic sensing techniques. **[6]**

Q9) a) Explain concept of LASER interferometers with suitable diagrams. **[9]**

b) Explain principle of working of Laser Doppler Velocimetry. **[9]**

OR

Q10)a) Explain concept of electronic speckle pattern Interferometry. **[9]**

b) Write short note on distributed optical fiber sensing. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P3208

[Total No. of Pages :2

[5461] - 250

B.E. (Instrumentation & Control)

ENVIRONMENTAL INSTRUMENTATION

(2012 Course) (End Sem.) (Semester-I) (406265) (Elective-II)

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, and Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Write short note on photo Ionization. **[5]**

b) Explain the working of conductivity analyzer with their application. **[5]**

OR

Q2) a) Write short note on Hindered Settling. **[5]**

b) Elaborate the necessity of Instrumentation & control for environment. **[5]**

Q3) a) Explain thermal conductivity detector used in water treatment. **[6]**

b) Write short note on sludge removal & storage. **[4]**

OR

Q4) a) Explain the role of gas chromatography in environmental analysis. **[5]**

b) What are the requirements of water treatment facilities. **[5]**

Q5) a) Explain the waste water measurement techniques with neat diagram. **[10]**

b) Explain the role of NGO's & municipal corporation in rain water harvesting. **[8]**

OR

P.T.O.

Q6) a) Draw & explain the instrumentation setup for waste water treatment plant. List out the latest methods of waste water treatment plant. **[10]**

b) Explain the non open channel flow measurement system with neat diagram. **[8]**

Q7) a) Discuss on control of air pollution techniques. **[8]**

b) Write short note on the acoustic noise measurements & monitoring. **[8]**

OR

Q8) a) Discuss on the methods for air pollution studies. **[8]**

b) Define sound pollution? Explain its effects on environment. **[8]**

Q9) a) Write short note Barometer. **[8]**

b) Elaborate virtual instrument environmental engineering laboratory. **[8]**

OR

Q10) a) Discuss on the role of weather station for global environmental analysis. **[8]**

b) Write short note on Ceilometer. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3209

[Total No. of Pages :2]

[5461] - 251

B.E. (Instrumentation & Control Engineering)

ROBOTICS & AUTOMATION

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

Time : 2:30 Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) Write short notes on: **[10]**

a) Various joints and links used to specific a robot.

b) Automation in robotics.

OR

Q2) Give specifications of two sensors used for robots. **[10]**

Q3) Define accuracy and repeatability. How are they defined in robotics? **[10]**

OR

Q4) Differentiate between high-level and low-level vision with respect to robots. **[10]**

Q5) Elaborate on industrial robot control schemes. **[17]**

OR

Q6) a) Why path planning is important? **[18]**

b) What is meant by manipulator dynamics?

c) What is role of robot kinematics?

P.T.O.

Q7) What are the different levels of programming robots. **[16]**

OR

Q8) Explain in detail control of industrial robots using PLCs. **[16]**

Q9) How is selection of a robot done? **[17]**

OR

Q10) Write short notes: **[16]**

a) Robots in manufacturing applications.

b) Robots in non-manufacturing applications.

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Total No. of Questions : 10]

SEAT No. :

P3210

[Total No. of Pages : 2

[5461]-252

B.E. (Instrumentation & Control)

SENSOR NETWORKS

(2012 Pattern) (Semester - I) (End Sem.) (Elective - II) (406265D)

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 XYZ node architecture in detail. **[5]**

b) Explain a communication in a wireless sensor networks. **[5]**

OR

Q2) a) Explain a sensing and sensors in detail. **[5]**

b) Explain basics of sensor classifications in WSN with examples. **[5]**

Q3) a) Explain the processing components of the artificial retina in detail with suitable diagram. **[5]**

b) Compare traditional networks and wireless sensor networks. **[5]**

OR

Q4) a) Describe architecture of a wireless sensor node. **[5]**

b) Explain IMote Node Architecture in detail. **[5]**

Q5) a) Explain different types of channels in detail of channel encoding. **[7]**

b) Explain digital communication system in detail with basic components. **[8]**

OR

P.T.O.

Q6) a) Explain pulse code modulation and delta modulation with suitable diagrams. **[7]**

b) Explain source encoding with calculations of efficiency of a source encoder in detail. **[8]**

Q7) a) Explain the five characteristics of MAC protocols in sensor networks. **[7]**

b) Explain Zebra MAC in detail of hybrid MAC protocols. **[8]**

OR

Q8) a) Explain the contension free and contension based medium access protocol in detail. **[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 flooding and Gossiping in detail in network layer. **[10]**

b) Explain optimized link state routing of proactive routing. **[10]**

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Total No. of Questions : 10]

SEAT No. :

P3211

[Total No. of Pages : 2

[5461]-254

B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION - II

(2012 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer any one in OR condition.***
2) ***Figures to right indicate full marks.***
3) ***Assume suitable data if necessary.***
4) ***Non programmable calculator is permitted.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) Draw and explain the six possible characteristics of stable and unstable processes alongwith lag and inverse response. **[10]**

OR

Q2) Enlist various model techniques? Explain any one in detail and also comment on need of modeling in process instrumentation? **[10]**

Q3) Describe the need and implementation of override control technique in process and its applications? **[10]**

OR

Q4) Explain the steam temperature and pressure control techniques used in boiler application? **[10]**

Q5) a) Describe burner management system used in boiler system? **[8]**

b) Describe the basic controls used in heat exchangers? **[8]**

OR

P.T.O.

Q6) a) Enlist the types of heat exchangers? Also comment on gain, time constant and degrees of freedom in case of heat exchanger? **[8]**

b) Explain the boiler safety standards and inspection procedures? **[8]**

Q7) a) Describe the distillate reflux flow control alongwith sketch? **[8]**

b) What is frequency response? How does it be carried out in case of distillation process? **[8]**

OR

Q8) a) Describe the overhead and bottom composition control in distillation process? **[8]**

b) Describe the stability, lag, time constant and the nature of process behaviour of flow and temperature control in chemical reactor? **[8]**

Q9) a) Classify the pumps. Describe Multi-pump system controls? **[9]**

b) What is RGA? Give its importance and need in MIMO systems. **[9]**

OR

Q10)a) Classify the compressors? Explain any one in detail and comment on its model structure and its stability? **[9]**

b) Describe the controller designing concept in non linear systems? **[9]**

Total No. of Questions : 10]

SEAT No. :

P3212

[Total No. of Pages : 2

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B.E. (Instrumentation & Control)
INDUSTRIAL AUTOMATION
(2012 Course) (Semester - II) (406268)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) List and explain any two classical approach for plant automation. **[6]**

b) Explain the role of automation in industry. **[4]**

OR

Q2) a) Explain in detail Automation strategy evolution. **[5]**

b) Explain various functional level of automation. **[5]**

Q3) a) Explain the OSI/ISO reference model in communication system. **[6]**

b) With respect to OSI model Explain HART Protocol. **[4]**

OR

Q4) a) Explain foundation fieldbus model with an example. **[5]**

b) Write a short notes on Devicenet & Controlnet. **[5]**

Q5) a) Explain the different types of timer used in PLC. **[8]**

b) Explain the different types of counter used in PLC. **[8]**

OR

P.T.O.

Q6) a) Explain the use of action qualifier in the SFC Programming. **[8]**

b) Explain the procedure for interfacing PLC with SCADA System using different communication protocol. **[8]**

Q7) a) Explain in detail the advance control function available in DCS. **[8]**

b) Explain main components of DCS System. **[8]**

OR

Q8) a) With the help of example explain what is third party interface **[8]**

b) Explain how DCS system will support to enterprise Resource Planning. **[8]**

Q9) a) What is HaZOP. Also explain the procedure of it. **[9]**

b) Write a short notes on Hazard and Operability study. **[9]**

OR

Q10)a) Explain with neat sketch Safety Instrumented System. **[9]**

b) Explain different protection layers in Safety Instrumented System. **[9]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. : ____

P3213

[Total No. of Pages : 2

[5461]-256

B.E. (Instrumentation & Control)
DIGITAL IMAGE PROCESSING
(2012 Pattern) (406269 A) (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, 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) What is the difference between Gray Scale Image and Color Image? Explain various Color Image models. **[6]**

b) Write short note on "Watershed Transform'. **[4]**

OR

Q2) a) Describe various statistical parameters used in Digital Image Processing. **[6]**

b) Explain Discrete Cosine Transform. **[4]**

Q3) a) How do you enhance the image by Contrast Intensification? Explain in detail. **[6]**

b) Explain Image Enhancement in the frequency domain. **[4]**

OR

Q4) a) Explain the following terms. **[6]**

i) Histogram Equalization

ii) Image sharpening

b) Write a note on "Homomorphic Filtering". **[4]**

Q5) a) Explain Edge Linking in Image Segmentation. **[8]**

b) Describe Region Growing and Region Splitting method of Image Segmentation. **[10]**

OR

P.T.O.

Q6) a) Define Thresholding. Explain the various types of Thresholding methods used in Image segmentation. **[10]**

b) Explain Regional Descriptors. **[8]**

Q7) a) What is the need of Image Compression? Explain Huffman Coding method of Image Compression with example. **[8]**

b) Explain the following terms with respect to Image Compression. **[8]**

i) JPEG 2000

ii) Run Length Encoding

OR

Q8) a) Explain Block Truncation Coding. **[8]**

b) Explain Vector Quantization method of image Compression. **[8]**

Q9) a) What is the use of DIP in Diagnostic field. Explain with one example. **[8]**

b) Explain the applications of DIP in Agriculture field. **[8]**

OR

Q10)a) Describe the applications of DIP in Space. **[8]**

b) Explain the applications of DIP in Military. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3214

[Total No. of Pages : 2

[5461]-257

B.E. (Instru. & Control)

BUILDING AUTOMATION - II

(2012 Course) (Semester - II) (Elective - III) (406269 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) List out various notification devices and suggest appropriate device for factory and office building. **[6]**

b) Explain stages of fire and suggest detectors for every stage. **[4]**

OR

Q2) a) Explain Fire signatures in detail. **[5]**

b) Give classification of FAS and explain any one in detail. **[5]**

Q3) a) Explain different types of cables used in FAS. **[5]**

b) Write short note on Ionization Smoke detector. **[5]**

OR

Q4) a) Give classification of Relay and explain any one type of relay which is used in Building Automation. **[5]**

b) Write short note on NFPA72. **[5]**

Q5) a) Explain Deluge sprinkler system and give its applications. **[10]**

b) Explain wet pipe sprinkler system with alarm check valve. **[8]**

OR

Q6) a) Give Comparison between wet pipe sprinkler system and dry pipe sprinkler system. **[10]**

b) Explain FM-200 and Novec based sprinkler system. **[8]**

P.T.O.

Q7) a) Which types of cables are used in Access control system and explain any two in detail. **[10]**

b) Explain principles : Antipassback, Forgiveness, Two man Rule, and Guard Tour. **[6]**

OR

Q8) a) Which type of protocols used in access control system and explain any one in detail? **[8]**

b) List out various technologies used in access cards. Explain any one. **[8]**

Q9) a) Explain CCTV architecture with diagram. **[8]**

b) Explain terms: CIF, Mpeg, MP4 & POE. **[8]**

OR

Q10)a) Explain technology used in Intrusion Detection System. **[8]**

b) Write short note on DVR and DVM. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3215

[Total No. of Pages : 2

[5461]-258

B.E. (Instrumentation and Control)

PROCESS MODELING AND OPTIMIZATION

(2012 Pattern) (End Sem.) (Semester-II) (Elective - III) (406269)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q2, Q.3 or Q4, Q.5 or Q6, Q.7 or Q.8, Q.9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of 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	1.1	1.3	1.6	2	2.7	3.4	4.1

Find the law of the form $y=a+bx+cx^2$.

OR

Q2) Derive mathematical model of binary distillation column. **[10]**

Q3) With an example explain subspace state space identification. **[10]**

OR

Q4) With an example explain the relationships among time Laplace and frequency do-main. **[10]**

Q5) a) Explain Doyle stein criterion. **[9]**

b) Skogestad and Morari method. **[9]**

OR

Q6) a) With an example explain the application of Inverse Nyquist array. **[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 $Z=10x_1+4x_2$. **[10]**

Subject to constraints

$$12x_1 + 6x_2 \leq 5,000$$
$$3x_1 + 5x_2 \leq 600$$
$$3x_1 + 4x_2 \leq 2,500$$
$$x_1, x_2 \geq 0$$

b) Explain direct methods for unconstrained multi-variable optimization.**[6]**

Total No. of Questions :10]

SEAT No. : ____

P3216

[Total No. of Pages : 2

[5461]-260

B.E. (Instrumentation and Control)

COMPUTER TECHNIQUES & APPLICATIONS

(2012 Pattern) (Semester - II) (Elective - III) (406269)

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) ***Use of scientific calculator is allowed.***
3) ***Figures in the bracket to the right indicate the full marks.***
4) ***Neat diagrams must be drawn whenever necessary.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain starvation problem occured in CPU scheduling and explain the solution to solve it. **[5]**

b) Design a Huffman code for a source that puts out symbols a_1, a_2, a_3 and a_4 with their respective probabilities of occurrence as 0.1, 0.3, 0.2 and 0.4. **[5]**

OR

Q2) a) Explain Flynns classification of Parallel computers. **[5]**

b) Write a note on: Demand Paging. **[5]**

Q3) a) What is Process Control Block? Discuss the information stored in it. **[5]**

b) Five processes (P1, P2, P3, P4, P5) arrive simultaneously with their CPU bursts of 8, 4, 9, 5 and 4 respectively. For SJF scheduling, draw the Gantt chart and determine the average turn around time and average waiting time, showing all the calculations in detail. **[5]**

OR

Q4) a) Explain the interrupts in real time operating systems. **[5]**

b) Write a note on: Systolic Arrays. **[5]**

P.T.O.

Q5) a) Explain the TCP/IP reference model with neat diagram. **[6]**

b) Write the difference between IEEE 802.1 and IEEE 802.4 **[6]**

c) List the configuration details of GPIB and its advantages. **[6]**

OR

Q6) a) Write a note on: Circuit Switching. **[6]**

b) What are the applications of Computer Networks? **[6]**

c) Explain the bus type topology and ring type topology networks. Compare their performance. **[6]**

Q7) a) Explain any four data processing instructions of ARM with it's syntax and example. **[8]**

b) Draw and explain in short ARM architecture with its core peripherals. **[8]**

OR

Q8) a) Explain seven operating modes of ARM. **[8]**

b) Explain how memory is organised in ARM processor. **[8]**

Q9) a) Explain white box and black box testing. Discuss the advantages and limitations of each. **[8]**

b) Write a note on: Software Development Life Cycle. **[8]**

OR

Q10)a) List different types of testing done during the software testing phase. Explain any two testing in detail. **[8]**

b) Write a note on: Software maintenance. **[8]**

Total No. of Questions :10]

SEAT No. :

P3217

[Total No. of Pages : 2

[5461]-260 A

B.E. (Instrumentation & Control)

SMART MATERIALS AND SYSTEMS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to candidates:

1) ***All questions are compulsory.***
2) ***Black figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Define any four smart material properties. **[4]**

b) What are ferroelectric materials? **[2]**

c) Mention application of ferroelectric materials. **[2]**

d) Mention engineering units of any two properties. **[2]**

OR

Q2) a) How development of mart materials takes place: Elaborate **[6]**

b) Discuss dielectric elastomers or electrostrictive elastomers with one application in brief. (application: one mark). **[4]**

Q3) a) Discuss shape memory effect. **[4]**

b) How Ionomeric polymer Metal composites (IPMC) or Carbon nanotubes behave as smart material: Elaborate. **[6]**

OR

Q4) a) What are varieties in piezo materials, elaborate. **[4]**

b) Discuss 'magneto striction' or super conductors in smart systems. **[6]**

Q5) a) Elaborate a sensor smart system with two applications (using conductometric sensor and / or piezo resistive sensors). (Figure if any carries three marks or include property change, application, features etc.) **[8]**

b) How accelerometers (smart) are used in novel application: for example healthcare, elaborate. (Figure if any carry 3 marks) **[8]**

OR

P.T.O.

Q6) a) Elaborate a sensor (smart) with system (either a product or research based application). **[8]**

(diagram carry if any 3 marks)

b) Discuss electro magnetic transducers or electro thermal actuators: Features (one or two), application, principle (or any significant properties). **[8]**

Q7) a) What is micro electro mechanical system ? Elaborate. **[4]**

b) Discuss various steps in manufacturing MEMS (deposition) technique in thin film, evaporation, sputtering, thermal oxydation for silicon dioxide etc). **[8]**

c) Enlist MEMS applications (any two). **[4]**

OR

Q8) a) Elaborate silicon micromachining process in brief. (any figure carry 3 marks).(Which different components are manufactured?) (Types: bulk micromachining and surface micromachining) (can we manufacture sensors and actuators using micromachining?) **[8]**

b) Enlist any four MEMS applications. **[8]**

Q9) a) Imagine elaborate Lab on chip for any one application in detail (Figure, features, area of application, keywords, advantages, limitations if any). (2 marks each). **[10]**

b) Elaborate application of smart system in health care. **[8]**

OR

Q10)a) Smart systems in automotive area elaborate in detail. **[10]**

b) Imagine your own application and elaborate. **[8]**

❖ ❖ ❖

Total No. of Questions :10]

SEAT No. :

P3218

[Total No. of Pages : 2

[5461]-260 B

B.E. (Instrumentation & Control)

INSTRUMENTATION IN AGRICULTURE AND FOOD PROCESSING

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

Time : 2:30Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagram must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Your answers will be valued as a whole.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) List and explain significance engineering properties of soil. **[5]**

b) Explain the Multi-effect evaporator stage along with related instrumentation involved in sugar manufacturing process. **[5]**

OR

Q2) a) Write a short note on active and passive earth pressures. **[5]**

b) Discuss different fruit peeling techniques involved in a juice extraction plant. **[5]**

Q3) a) Explain the use of SCADA system in water resource (DAM) management. **[5]**

b) Explain the factors affecting the irrigation efficiency. **[5]**

OR

Q4) a) Explain in brief various temperature control methods in a green house.**[5]**

b) Explain drip irrigation system. **[5]**

Q5) a) List different equipments used in Agrometrological weather station. Explain any one equipment in detail. **[9]**

b) List different farm equipments and explain the automation of one farm equipment. **[9]**

OR

P.T.O.

Q6) a) Explain the steps involved in pump installation. **[8]**

b) Explain control circuits for cotton pickers. **[10]**

Q7) a) Write a short note on codex international food standard. **[8]**

b) Explain the parameters considered while designing cold storage units. **[8]**

OR

Q8) a) Write a short note on Biosensor. **[8]**

b) Write a short note on Importance of food standards. **[8]**

Q9) a) Write a short note on recent trends in food processing. **[8]**

b) Explain the role of automation in food packaging process. **[8]**

OR

Q10)a) Develop a layout of SCADA screen for automation of milk packaging unit. **[8]**

b) List and explain various parameters which are maintained in a controlled atmosphere storage unit. **[8]**

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Total No. of Questions :10]

SEAT No. :

P3219

[Total No. of Pages : 2

[5461]-260-D

B.E. (Instrumentation & Control)

AUTOMOBILE INSTRUMENTATION

(Semester-II) (2012 Pattern) (406270D) (Elective-IV) (End Semester)

Time : 2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write short note on Electromagnetic Compatability. **[5]**

b) Describe the currents trends in automobile electronic engine management system. **[5]**

OR

Q2) Explain how the starting system works in automobile with neat diagram. **[10]**

Q3) Explain with neat diagram working of solid state Ignition system. State the advantage of Electronic ignition system over conventional one. **[10]**

OR

Q4) a) Explain the working of High energy ignition distributor system with neat diagram. **[6]**

b) Describe the various tests carried out on batteries. **[4]**

Q5) Explain the following with respect to automobile: **[16]**

a) Exhaust Temperature Measurements

b) Oxygen Sensor

OR

P.T.O.

Q6) a) Explain the working of Stepper Motor with neat diagram. **[7]**

b) Define sensor. Describe air mass flow for engine applications in automobile. **[9]**

Q7) Elaborate on: **[16]**

a) Direct current generator

b) Principle & Constructional aspects of Alternator

OR

Q8) Write Short note on: **[16]**

a) Compensated voltage regulators

b) Insulated & earth return system

Q9) a) Explain the electronic system for activating air bags in automobile. **[9]**

b) Write short note on Vehicle control & Environmental information system for safe driving. **[9]**

OR

Q10)Describe briefly: **[18]**

a) Rain sensor system in Automobile

b) Principle of operation of emission measuring instruments

❖ ❖ ❖

Total No. of Questions : 8]

SEAT No. :

P3220

[Total No. of Pages : 2

[5461]-261

B. E. (Computer Engineering)
DESIGN & ANALYSIS OF ALGORITHMS
(2012 Pattern) (End Sem.) (410441) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain amortized time complexity. **[4]**

b) Write a greedy algorithm for sequencing unit time jobs with deadline and profits(Job scheduling algorithm) **[8]**

c) Write and explain an algorithm to solve 8-queens problem. **[8]**

OR

Q2) a) Which are the advantages and disadvantages of divide and conquer approach. **[4]**

b) What is knapsack problem? Write an algorithm for 0/1 knapsack problem using dynamic programming. **[8]**

c) Explain sum of subset problem using backtracking. **[8]**

Q3) a) Show that 3-SAT problem is NP-Complete. **[8]**

b) Write deterministic and nondeterministic algorithm for searching a number from a list. **[8]**

OR

Q4) a) What are different approaches to write randomized algorithm? Explain randomized sort algorithm. **[8]**

b) What is deterministic and nondeterministic algorithms explain in detail with example. **[8]**

P.T.O.

Q5) a) Describe how parallel algorithms can be used to find minimum spanning tree? **[8]**

b) How complete binary tree is useful for parallel algorithms? Show parallel multiplication of following eight numbers: 9, 2, 8, 3,4, 5, 6, 1. **[8]**

OR

Q6) a) Which are different performance measures used for parallel algorithms? **[8]**

b) Which are different PRAM models? Explain with example. **[8]**

Q7) a) Write Bully algorithm to select coordinator dynamically in distributed system. **[9]**

b) Define Internet of Things (IoT). Explain elements of IoT. **[9]**

OR

Q8) a) Write Floyed-Warshall algorithm for all pair shortest path. **[9]**

b) Write short notes on : **[9]**

i) Software engineering algorithms

ii) Clustering used for data management

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3221

[Total No. of Pages : 3

[5461]-262

B.E. (Computer Engg.)

PRINCIPLES OF MODERN COMPILER DESIGN

(2012 Pattern) (Semester - I) (410442)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.No.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) ***Black figures to the right indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Why compilation phases are divided into front - end and back - end? What are the advantages? **[4]**

b) Give syntax directed definition for constructing syntax tree for arithmetic expression. **[6]**

OR

Q2) a) Explain the meaning of following symbols used in LEX. **[4]**

i) / ii) $

iii) ^ iv) {}

v) [] vi) .

vii) | viii) \

b) Write the syntax directed translation scheme of generating intermediate code for assignment statement. **[6]**

Q3) a) Define the phase and pass related to compiler. **[2]**

b) Check whether the following grammar LL(1) or not.

E TE

E *TE /

T FT

T ^T/

F (E)/id **[8]**

OR

P.T.O.

Q4) a) Explain the goto function used in LR parser design. **[2]**

b) Show that the following grammar is not SLR (1) **[8]**

S Aa Ab | B b Ba

A

B

Q5) a) Explain sources of code optimization. **[6]**

b) Show the steps involved on generating the code for the expression. **[6]**

k=(a+b)* c+d/ (a+b)+b

(Assuming there are only 2 registers available)

c) Explain the method for constructing DAG. Construct DAG for following code D = B*C

E = A + B

B = B* C

A = E-D **[6]**

OR

Q6) a) Discuss following optimizations with example **[6]**

i) Constant folding (compile time evaluation)

ii) Variable propogation

b) Discuss various issues in code generation phase. **[6]**

c) Explain the algorithm for simple code generation. **[6]**

Q7) a) Explain following related to Haskell program. **[6]**

i) Offside rule

ii) List

b) Explain following features of Object oriented languages related to compiler design.

i) Overloading

ii) Inheritance **[6]**

c) Explain how code is generated for control flow statements. **[4]**

OR

Q8) a) Discuss following with respect to Object oriented languages. **[6]**

i) Type checking

ii) Type coercion

b) Explain following with respect to Functional languages. **[6]**

i) Polymorphic typing

ii) Lazy evaluation

c) Discuss the structure of Java CC. **[4]**

Q9) a) Discuss following with respect to Parallel object oriented languages. **[6]**

i) Object location

ii) Object migration

b) Write short notes on. **[6]**

i) Dynamic compilation

ii) GCC

c) Explain following shared variable models. **[4]**

i) Locks

ii) Monitors

OR

Q10)a) Write short notes on. **[6]**

i) JIT

ii) nmake

b) Discuss the issues in Tuple Space implementation **[6]**

c) Explain cross compilation using XMLVM. **[4]**

Total No. of Questions :10]

SEAT No. :

P3222

[Total No. of Pages : 2

[5461]-263

B.E. (Computer Engineering)

SMART SYSTEM DESIGN & APPLICATIONS

(2012 Pattern) (Semester-I) (End Sem.) (410443)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the A* search algorithm with the help of suitable example. **[8]**

b) What is alpha beta pruning? Explain alpha beta search algorithm with suitable example. **[6]**

c) Explain the architecture of Goal Based agents. **[4]**

OR

Q2) a) Explain the environment types & PEAS properties of agent? **[8]**

b) Explain game theory and knowledge structure? **[6]**

c) Explain the unification algorithm and state its application. **[4]**

Q3) a) What is baye's rule? Write down its application. **[4]**

b) Explain the concept of uncertainty? Write down an example illustrating the behavior of an agent in an uncertain world. **[6]**

c) Compare and contrast propositional logic and FOL. **[4]**

OR

Q4) a) Explain Role of NLP in AL? **[4]**

b) What is Expert System shell? Why explanation is necessary in expert system? **[6]**

c) Explain support vector Machine with issues and applications. **[4]**

P.T.O.

Q5) a) What are the basic axioms of probability? Explain how to derive the useful facts from the basics axioms with suitable example. **[6]**

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

i) Information Retrival

ii) Information Extraction

OR

Q6) a) How to represent and Evaluate decision problem with a decision network. **[8]**

b) What is prior probability and posterior probability? Explain with suitable example. **[6]**

Q7) a) What is supervised learning? Explain any one. **[6]**

b) What is Artificial Neural Network? Explain its types. **[6]**

OR

Q8) a) Write a short note on Wumpus world environment. **[6]**

b) Write a note on Robotics software architecture. **[6]**

Q9) a) Explain in details the components that help in reconstructing the world in 3D. **[6]**

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

i) Dynamic Bayesian Network

ii) Kalman Filters

OR

Q10)a) List application domains of robotics. Explain any one in detail. **[6]**

b) How to represent and evaluate decision problem with a decision network. **[6]**

Total No. of Questions : 8]

SEAT No. :

P3223

[Total No. of Pages : 2

[5461]-264

B.E. (Computer Engineering)

IMAGE PROCESSING

(2012 Course) (Semester - I) (End Sem.) (Elective - I) (410444A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Que.1 or Que.2, Que.3 or Que.4, Que.5 or Que.6, Que.7 or Que.8.***
2) ***Neat diagram should be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Nyquist rate, aliasing effect and fold over frequencies in case of two dimensional sampling. **[6]**

b) Explain

i) image Negative

ii) contrast stretching

iii) gray level slicing and

iv) bit plane slicing in image enhancement. **[8]**

c) List and explain any three region based shape descriptor? **[6]**

OR

Q2) a) Explain elements of image processing in detail. **[6]**

b) Define histogram?Discuss how histogram equalization helps in image enhancement. **[8]**

c) Explain median filtering and average filtering.Give its applications. Compare median filter with averaging filter. **[6]**

Q3) a) Define compression ratio. Explain how we can achieve image compression using run length coding and arithmetic coding. **[8]**

b) Define feature and pattern. Explain in brief relationship between image processing and object recognition. **[8]**

OR

P.T.O.

Q4) a) Explain different approaches for object recognition. **[8]**

b) Distinguish between scalar and vector quantization. **[8]**

Q5) a) Write a short note on (any two) **[10]**

i) Images from X-rays and its application.

ii) Does and risk.

iii) RBC image processing.

b) Explain picture archives and communication systems (PACS). **[8]**

OR

Q6) a) Explain how 3D visualization is used in Medical Imaging. **[10]**

b) How could the contrast of a displayed X-ray computed to mammography image be increased? Explain. **[8]**

Q7) a) What is interpretation key? Explain elements of visual interpretation. **[8]**

b) Discuss Thermal and Radar image interpretation. **[8]**

OR

Q8) a) Explain remote sensing process and state advantages and limitation of remote sensing? **[8]**

b) Explain different pre-processing steps required in remote sensing application. **[8]**

♦ ♦ ♦

Total No. of Questions : 12]

SEAT No. :

P3224

[Total No. of Pages : 2

[5461]-265

B.E. (Computer Engineering)
COMPUTER NETWORK DESIGN AND MODELLING
(2012 Pattern) (Semester - I) (Elective - I) (410444B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Explain network analysis and design process of a network with example. **[6]**

OR

Q2) What is requirement mapping? Explain the process of development of RMA can be carried out? **[6]**

Q3) a) Explain Environment-specific thresholds and limit in detail. **[4]**

b) What is the importance of requirement specification and mapping in computer network designing explain with example. **[4]**

OR

Q4) Write a short note on:

a) Development of service metrics **[4]**

b) Performance characteristics of network **[4]**

Q5) Explain in detail addressing mechanisms of network architecture. **[8]**

OR

Q6) What is routing? Explain routing mechanisms of network management system. **[8]**

P.T.O.

Q7) a) Write a note on performance mechanism in network design. **[4]**

b) What is importance of design traceability and design metrics for analyzing network performance? **[8]**

OR

Q8) a) What is the use of development of goals for network design and performance measurement? **[8]**

b) Explain service provider evaluation in network performance. **[4]**

Q9) a) State and explain role of architectural considerations of network management. **[10]**

b) Explain Network layout in detail with respect to network performance. **[8]**

OR

Q10)a) What are the developing goals for network performance and design? **[8]**

b) What are the roles of design traceability and design metrics for analyzing network performance? **[10]**

Q11)a) What are smart pointers? Explain the use of smart pointer and network packets in network modeling and analysis. **[8]**

b) What is the process of network compilation and running the simulation in network analysis? **[6]**

c) Enlist the tools used for network simulation and elaborate any one of them. **[4]**

OR

Q12)a) What is Object aggregation? Explain overview of OMNet with respect to network design. **[6]**

b) Write a short note on :

i) Scalability with distributed simulation **[12]**

ii) Events in ns-3

iii) Animation in ns-3

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3225

[Total No. of Pages : 2

[5461]-266

B.E. (Computer Engineering)
ADVANCED COMPUTER PROGRAMMING
(2012 Pattern) (Elective - I) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, 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 examples Object Transfer service using Path Reversal. **[5]**

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

i) A Single-copy Distributed Shared Memory

ii) A Multi-copy Distributed Shared Memory

OR

Q2) a) What are the different types of connectionless channel? Explain any one in brief. **[5]**

b) Explain the Producer-Consumer lock program. **[5]**

Q3) a) What do you mean collection in JAVA? Explain list and set in detail. **[5]**

b) What is auto-boxing and unboxing? When does it happen in java? **[5]**

OR

Q4) a) What is string tokenizer and observable in java? Explain string tokenizer in detail. **[5]**

b) What is Reflection in Java? What are its drawbacks and practical uses? **[5]**

Q5) a) What are document oriented databases? Give MongoDB database example for hospital application. **[8]**

b) What is Ajax? What are Ajax applications? What are the advantages and disadvantages of Ajax? Also write difference between AJAX and Javascript. **[9]**

OR

P.T.O.

Q6) a) What is the real difference between HTML and HTML5? Write short notes on HTML and Java Script Programming. **[8]**

b) Explain the following JDBC API components :- **[9]**

DriverManager, SQL Exception, Connection, Statement, Result Set

Q7) a) Write a short notes on RDBMS verses Hadoop. **[8]**

b) Explain Shared Nothing Architecture (SNA) with advantages and disadvantages. **[8]**

OR

Q8) a) Write a short notes on Hadoop Ecosystem. Also explain Features and Advantages of Hadoop. **[8]**

b) Explain with examples : **[8]**

i) HDFS Daemons

ii) Hadoop YARN

iii) Word-Count Program

Q9) a) Write a short notes on Execution modes of Pig and ETL Processing. **[8]**

b) Explain with examples Hadoop, MongoDB and MapReduce function. **[9]**

OR

Q10)a) Explain the functionalities of Mapper, Reducer, Combiner, Partitioner. Also write Searching and Sorting using MapReduce. **[8]**

b) Explain with examples Data types and Complex data types in Pig. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P3226

[Total No. of Pages : 2

[5461]-267

B.E. (Computer)

DATA MINING TECHNIQUES AND APPLICATIONS

(2012 Pattern) (Semester - I) (End Sem.) (Elective - I) (410444D)

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

Q1) a) Use the two methods below to normalize the following group of data : **[6]**

200, 300, 400, 600, 1000

i) min-max normalization by setting min = 0 and max = 1

ii) z-score normalization

b) A database has five transactions. Let min sup = 60% and min conf = 80%. **[6]**

TID	Items
T100	{M, O, N, K, E, Y}
T200	{D, O, N, K, E, Y}
T300	{M, A, K, E}
T400	{M, U, C, K, Y}
T500	{C, O, O, K, I, E}

Calculate all frequent item sets using Apriori algorithm.

c) Write short note on : **[8]**

i) Extracting Rules from decision trees.

ii) KNN approach

OR

Q2) a) Explain data preprocessing steps in short. **[8]**

b) Explain performance metrics : Accuracy, Precision, Recall and F-Measure with required equations. **[8]**

c) What do you mean by frequent patterns? Explain constraint based association rule based mining frequent item sets. **[4]**

P.T.O.

Q3) a) Write equations defining Manhattan, Minkowski and Euclidean distance measures. **[6]**

b) Explain AGNES and DIANA (Agglomerative and Divisive Hierarchical Clustering). **[5]**

c) Write and explain K-means clustering algorithm. **[6]**

OR

Q4) a) Explain k-Medoid Clustering algorithm. **[8]**

b) Explain how k-Medoid is extended to CLARANS for handling large data sets. **[4]**

c) What are typical requirements of clustering in data mining (explain any five)? **[5]**

Q5) a) Explain basic measures for text retrieval like Precision, Recall etc. in the terms of retrieved and relevant documents. **[8]**

b) Compare: Web content mining and Web usage mining. **[6]**

c) What are methods for Dimensionality Reduction of Text in text mining? List the methods. **[3]**

OR

Q6) a) Compare different text mining approaches. **[5]**

b) Write and explain Hyperlink-Induced Topic (HITS) algorithm. **[6]**

c) Explain these terms in short: Feature vector, Bag of words, Tf-Idf. **[6]**

Q7) a) Write notes on **[10]**

i) Reinforcement learning,

ii) Systematic Learning

b) Write a note on multi-perspective learning along with diagram for multi-perspective learning. **[6]**

OR

Q8) a) What is Big Data? How it is characterized? What are the challenges in Big data Analysis? **[8]**

b) What are techniques for big data mining? Explain in short. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3227

[Total No. of Pages : 2

[5461]-268

B.E. (Computer Engineering)
PROBLEM SOLVING WITH GAMIFICATION
(2012 Course) (Semester - I) (Elective - II) (410445A)

Time : 2¼ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 and Q10.***
2) ***Assume suitable data, if necessary.***

Q1) a) Define Fun Quotient. What fun do players derive while playing cricket game? **[5]**

b) Transportation is a competitive industry. Loyalty programs are used to engage frequent travelers. Comment on how that gives rise to Travel agency politics. **[5]**

OR

Q2) a) How playfulness has entered into culture say in banking and at modern work places? **[5]**

b) What is gamification? How gamification can be incorporated with respect to the MAGIC ARTS? **[5]**

Q3) a) Give examples of gamification related to retail industry How big data is collected and used by Shopping APPS? **[5]**

b) What is importance of game elements? Comment on platforms, Social aspect, competition, leadership with respect to popular game of POKEMAN GO? **[5]**

OR

Q4) a) Define games and gamification. What is role of government agencies to encourage buyers? **[5]**

b) Discuss how Choice architecture influences item buying patterns in a Shopping mall. **[5]**

Q5) a) How do you mean by game mechanics and dynamic? How these are essential building blocks of any gamified system? Give suitable examples. **[9]**

b) Describe how game mechanics like Surprise, unexpected delight and gifting can be useful for gamified system? **[9]**

OR

P.T.O.

Q6) a) List and explain any four game mechanics that can be useful and interesting for gamified system. **[9]**

b) How effectively game mechanics can be applied with respect to following. **[9]**

i) Encouragement to collect stamps

ii) Collection of karma points

iii) Collection of loyalty cards and air miles

Q7) a) Why do people like collecting badges. For a simple game of your choice identify four different types of badges for player activities. Write a pseudo code for awarding the first badge. **[8]**

b) How Nike Plus - a social running game. employs sophisticated game mechanics to encourage casual and hardcore runners? **[8]**

OR

Q8) a) How wining a trophy is different than badges or other achievement in a game? Draw a simple screen shot for a trophy case. **[8]**

b) What are challenges in motivating people to ask and answer questions on social sites like yahoo and Quora? **[8]**

Q9) a) What meaning of defining desired behavior of a player? What are few behaviors to implement for an initial launch of a website? (Hint : like Skumo) **[8]**

b) What is the role play for following types of players during game design with respect to mambio platform? **[8]**

i) Reviewers

ii) Commenter

iii) Raters

iv) Power promoter

v) Model member

OR

Q10)a) What are badge design recommendations? **[8]**

b) What are the steps for developing a Badgeville reward program? **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3228

[Total No. of Pages : 2

[5461]-269

B.E. (Computer Engineering)
PERVASIVE COMPUTING
(2012 Pattern) (Semester - I) (End Sem.) (Elective - II) (410445B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Human-to-Human Interaction(HHI) applications. **[6]**

b) Explain location management principles and techniques in mobile computing. **[4]**

OR

Q2) a) What are the core properties of Ubicom systems? Draw a Ubicom System model. **[6]**

b) Explain dynamic adaptation in IBM's transcoding application. **[4]**

Q3) a) How the brain computer interface is facilitated? Explain with example. **[6]**

b) Explain mobile middle ware with example. **[4]**

OR

Q4) a) Explain application aware adaptation architecture. **[6]**

b) Discuss any one application of hidden UI in wearable computing. **[4]**

Q5) a) Explain mobile and wireless security issues. **[10]**

b) Write short notes on **[8]**

i) Embodied Reality

ii) Virtual Reality

OR

Q6) a) Explain experimental comparison of collaborative defense strategies for network security. **[10]**

b) Write a short note on GSM security. **[8]**

P.T.O.

Q7) a) Explain smart Human-Device Interaction in detail. **[10]**

b) Differentiate between security and privacy in Ubicom. **[6]**

OR

Q8) a) Write notes on : **[10]**

i) Eco friendly Ubicom Devieces.

ii) Increased virtual social interaction versus local social interaction.

b) Explain "Man in the middle" attack in detail. **[6]**

Q9) a) Explain device interaction in smart devices with suitable examples. **[8]**

b) What are the different challenges in Ubicom? How they can be overcome. **[8]**

OR

Q10)a) Differentiate between machine intelligence and human intelligence. **[8]**

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

i) Smart boards, Pads, Tabs

ii) Smart meeting Rooms

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3229

[Total No. of Pages : 2

[5461]-270

B.E. (Computer)

EMBEDDED SECURITY

(2012 Course) (End Sem.) (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) ***Draw neat diagram wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain EPID(Enhanced Privacy Indentification)? **[4]**

b) Explain three pillars of Mobile Computing. **[6]**

OR

Q2) a) Explain in brief Target Data Breach. **[4]**

b) Explain PAVP with neat diagram? **[6]**

Q3) a) Explain in brief Open SSL Heartbleed? **[4]**

b) Explain the embedded security and management engine. **[6]**

OR

Q4) a) Explain the boot integrity. **[4]**

b) Explain in detail the working of SIGMA protocol? **[6]**

Q5) a) Explain features of Trusted Platform Module(TPM). **[8]**

b) Explain any two boot attack **[8]**

i) Evil maid

ii) BIOS Alteration attack

iii) Rooting

OR

Q6) a) Differentiate between Field Programmable Fuses vs Flash Storage. **[8]**

b) Explain how software can use a trusted platform module(TPM) to authenticate hardware devices. **[8]**

P.T.O.

Q7) a) Explain in detail Digital Right Management(DRM). **[8]**

b) What are Dynamic Application Loader security considerations? **[8]**

OR

Q8) a) Explain block diagram of Intel's Hardware-Based Content Protection in detail. **[8]**

b) Write short notes on **[8]**

i) Intel Wireless Display(WiDi)

ii) HDCP (High bandwidth Digital Content Protection) Protocol

Q9) a) Write a short note on : **[9]**

i) Protected Input and Output

ii) Anonymous Authentication

iii) DAL

b) Explain in detail IOT reference architecture. **[9]**

OR

Q10)a) Explain the Security-Hardening Measures in details. **[9]**

b) Explain Firmware components of security and management engine using neat block diagram? **[9]**

♦ ♦ ♦

Total No. of Questions : 7]

SEAT No. :

P3230

[Total No. of Pages : 2

[5461]-271
B.E. (Computer Engineering)
MULTIDISCIPLINARY NLP
(2012 Course) (Semester - I) (End Sem.) (Elective - II) (410445D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6.***
2) ***Q. No. 7 is compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat diagram wherever necessary.***
5) ***Make suitable assumptions wherever necessary.***

Q1) a) Explain Lexical Knowledge Networks in detail. **[10]**

b) Describe Finite state Machine based morphology in detail. **[10]**

OR

Q2) a) What is Rule based & probabilistic parsing? **[10]**

b) Comment on Unsupervised Methods in NLP. **[10]**

Q3) a) Explain Probabilistic similarity measures and clustering with example. **[8]**

b) Explain Maximum Entropy Model for Text Categorization. **[8]**

OR

Q4) a) Describe psychology of speech production in detail. **[8]**

b) Explain the concepts perception of Speech, Speech Disorders & Speech Synthesis. **[8]**

P.T.O.

Q5) a) Discuss Graphical Models for Sequence Labeling in NLP? **[8]**

b) Explain the machine translation application in detail. **[8]**

OR

Q6) a) Describe Cross Lingual Information Retrieval. **[8]**

b) Explain NLP applications in Web Mining and Text Mining with example. **[8]**

Q7) Write short note on : (any three) **[18]**

a) Forward Backward probability

b) Parsing Algorithms

c) Robust and Scalable Machine Translation

d) Multilingual Dictionaries

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3231

[Total No. of Pages : 2

[5461]-272

B.E. (Computer Engineering)

SOFTWARE DESIGN METHODOLOGIES AND TESTING

(2012 Pattern) (Semester - II) (End Sem.) (410449)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) What are "include relationship" in use cases? Explain with suitable example and use case diagram. **[5]**

b) Draw a sequence diagram for Online feedback system by a student for a teacher. **[5]**

OR

Q2) a) What is the role designing in any system or project implementation? Explain model based software deisgn and development. **[5]**

b) Explain different degrees of multiplicity of association between classes with suitable example. **[5]**

i) One-to-One Association

ii) Many-to-Many Association.

Q3) a) Explain the real time software architecture with suitable example. **[5]**

b) Explain the intent, motivation, applicability, implementation and consequences of observer pattern? **[5]**

OR

Q4) a) What is singleton pattern? Explain one example scenario where you will singleton pattern to get applied. **[5]**

b) Explain Web Service Protocols in brief. **[5]**

P.T.O.

Q5) a) What is defect management? Discuss the generic steps in defect management process? **[8]**

b) What is validation? Explain various levels of validation? **[8]**

OR

Q6) a) Explain V test model with suitable block diagram? State is significance in software development process. **[8]**

b) Discuss the essential features of modern defect management tool? **[8]**

Q7) a) Explain top down and bottom integration testing. **[6]**

b) What is unit testing? List the benefits of unit testing. **[6]**

c) Briefly explain different types of functional system testing. **[6]**

OR

Q8) Write short notes on: **[18]**

a) Performance Testing.

b) Alpha beta Testing.

c) Cyclomatic Complexity.

Q9) a) What are different challenges in mobile testing? Explain MonkeyTalk tool. **[6]**

b) What is functional testing? Explain its types? **[6]**

c) What is the purpose of JUnit? **[4]**

OR

Q10)a) What is automated testing? What are the selection criteria of automated testing tool? **[6]**

b) What are different components of selenium testing tool? **[6]**

c) Explain GUI Testing. **[4]**

Total No. of Questions : 8]

SEAT No. :

P3232

[Total No. of Pages : 2

[5461]-273

B.E. (Computer Engineering)
HIGH PERFORMANCE COMPUTING
(2012 Pattern) (Semester - II) (410450) (End Semester)

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 wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain MIMD and SIMT architecture. **[4]**

b) Explain Granularity, concurrency and dependency graph. **[6]**

Q2) a) Write a short note on Exploratory and Speculative Decomposition. **[6]**

b) Explain Non Blocking Communication using MPI. **[4]**

Q3) a) Why synchronization is important? Enlist Thread API's for mutex synchronization. **[8]**

b) Differentiate between thread and process. For multithreading implementation there is implicit support of architecture. Justify. **[7]**

OR

Q4) a) Implement MergeSort using synchronization primitives in Pthreads. **[8]**

b) Explain OPENMP : a Standard for Directive Based parallel programming. **[7]**

P.T.O.

Q5) a) How pivot selection is crucial factor for algorithm performance? Explain. **[7]**

b) Explain Cannon's Algorithm for matrix multiplication with suitable example. **[8]**

OR

Q6) a) How latency hiding is different than latency reduction. **[8]**

b) Explain the concept of distributed Shared Memory. **[7]**

Q7) a) Write a short note on : (Any Two) **[14]**

i) Petascale Computing

ii) Recent Developments in Nanotechnology

iii) Optical Computing

b) Explain speedup and efficiency attribute of performance analysis of parallel algorithms. **[6]**

OR

Q8) a) Write a short note on : (Any Two) **[14]**

i) Quantum Computers

ii) Parallel Depth First Search

iii) Power Aware Processing

b) Explain in short Bubble Sort and its variants. **[6]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3233

[Total No. of Pages : 2

[5461]-274

B.E. (Computer Engineering)

MOBILE COMPUTING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Describe mobility management with suitable diagram. **[5]**

b) Explain functioning of cellular network. How the given set of frequencies are used to increase capacity of a netwrok? **[5]**

OR

Q2) a) Explain using block diagram the process of authentication in a GSM service. **[5]**

b) Explain the purpose and IEEE standards for WPAN, WLAN, Wimax, Bluetooth. **[5]**

Q3) a) Explain DSSS with one example. **[5]**

b) Explain the multiple access efficiency of FDMA systems. **[5]**

OR

Q4) a) What is handover? When handover in mobile communication takes place. **[5]**

b) Why CSMA/CD is not used in wireless networks? **[5]**

Q5) a) Explain working of Mobile IP. What are the limitations of traditional IP to support mobility? **[6]**

b) Explain Snooping TCP. Give the advantages and disadvantages of Snooping TCP. **[6]**

c) Explain what is MANET. What are the security threats to a MANET? **[6]**

OR

P.T.O.

Q6) a) What do you mean by tunneling, encapsulation and de-capsulation? How does a tunnel differ from a route? **[6]**

b) List the entities of Mobile IP and describe data transfer from mobile node to a fixed node and vice versa. **[6]**

c) What is reactive routing protocol in MANET? Describe DSR and AODV routing protocols. **[6]**

Q7) a) What are the different types of data synchronizations in mobile computing systems? Describe synchronization usage models in mobile applications. **[8]**

b) Explain in detail classification of data delivery mechanism in mobile computing. **[8]**

OR

Q8) a) Explain the reason for Communication asymmetry in mobile network. Give examples of asymmetric communication architecture for data dissemination. **[8]**

b) Describe Pull-based data-delivery mechanism. What are the advantages and disadvantages of Pull-based data-delivery? **[8]**

Q9) a) Describe function of mobile agent. Why does an agent move from tier to tier during an application? Distinguish between an agent and a server.**[8]**

b) Explain basic characteristics of mobile operating systems and write difference between IOS and Android OS. **[8]**

OR

Q10)a) Explain the role of gateway in connecting networks using different protocols. Describe transcoding gateway and its applications in mobile computing system. **[8]**

b) Write short note on **[8]**

i) Service discovery and device management in mobile O.S.

ii) Mobile-agent-based architecture.

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 2

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B.E. (Computer Engineering)
WEB TECHNOLOGY (End Sem.)
(2012 Pattern) (Semester - II) (Elective-III) (410451 B)

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 the Innovation Matrix of IERC – Internet of Things European Research Cluster. **[6]**

b) Elaborate challenges faced by IoT industry application. **[4]**

OR

Q2) a) Serialized identifiers are the keys to building an Internet of Things- Explain with help of example. **[6]**

b) Describe the architectural components of a typical smart city information system. **[4]**

Q3) a) Explain the Capability - based authorization architectural components and their interactions. **[6]**

b) How Retail industry can be benefited by using IoT? **[4]**

OR

Q4) a) Write short note on IoT strategic research and innovation directions. **[6]**

b) Explain GAMBAS Adaptive Middleware. **[4]**

Q5) Write short note on: **[18]**

a) Eternal Interoperability

b) OGC Sensor Web for IoT

c) ITU-T

OR

P.T.O.

Q6) a) Explain the Research Roadmap for IoT Testing Methodologies. **[6]**

b) Describe the challenges of semantic interoperability in IoT. **[6]**

c) Explain importance of Economic Dimension. **[6]**

Q7) a) Explain Identity Portrayal through different phases. **[8]**

b) Write Advantages and disadvantages of Local Identity. **[6]**

c) Write short note on: Network Identity Management Model. **[4]**

OR

Q8) a) Explain Different federation topologies. **[6]**

b) Explain the User-centric identity management. **[6]**

c) Describe Identity Management in IoT. **[6]**

Q9) a) Write Short Note on Identity Trust Paradigms wrt: **[8]**

i) Third Party Approach

ii) Web services security

b) Explain the difference between Attribute certificate and public key certificate. **[6]**

OR

Q10)a) Discuss the factors used for calculation of trust in IoT. **[8]**

b) Explain the Authentication and Access control policies wrt to IoT. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3235

[Total No. of Pages :2

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B.E. (Computer Engineering)

CLOUD COMPUTING

(2012 Pattern) (Semester - II) (End Sem.) (410451 C) (Elective - III)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicates full marks.***
3) ***Neat diagram must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Write short note on open Nimbus architecture. **[4]**

b) Explain cloud deployment models in detail. **[6]**

OR

Q2) a) Explain essential characteristic of cloud computing. **[4]**

b) Write short note on EUCALYPTUS. **[6]**

Q3) a) Explain in detail GFS (Google File system). **[6]**

b) Write short note on **[4]**

i) Full virtualization.

ii) Para virtualization.

OR

Q4) a) Explain HDFS in detail. **[6]**

b) Write short note on virtual machin component. **[4]**

Q5) a) Explain virtual machin provisioning process in detail. **[8]**

b) Elaborate anatomy of cloud infrastructure. **[8]**

OR

P.T.O.

Q6) a) Explain scheduling techniques in cloud computing. **[8]**

b) Explain virtual machin migration techniques in detail. **[8]**

Q7) a) Explain key component of SLA. **[6]**

b) Explain in detail traditional approaches of SLA. **[6]**

c) Differentiate SOAP V_5 REST. **[6]**

OR

Q8) a) Write short note on fedrated cloud computing. **[6]**

b) Explain in detail work flow monitoring. **[6]**

c) Explain performance related issues for HPC in cloud computing. **[6]**

Q9) a) Explain in detail identity management and access control in cloud computing. **[8]**

b) Explain in detail threats in cloud computing. **[8]**

OR

Q10) a) Explain information security concern associated with data stored in cloud. **[8]**

b) Explain virtualization software security in detail. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3236

[Total No. of Pages :2

[5461] - 277

B.E. (Computer Engineering)

CYBER SECURITY

(2012 Pattern) (Semester - II) (Elective - III) (End Sem)(41045ID)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
2) *Figures to the right indicate full marks.*

Q1) a) List and explain various security techniques is detail. **[5]**

b) What is polyalphabetic cipher? Explain operation of polyalphabetic cipher with suitable example. **[5]**

OR

Q2) a) Draw and explain operational model of network security. **[5]**

b) Explain various execution steps in 3DES algorithm. **[5]**

Q3) a) Explain operation of Cipher Feedback mode block cipher. **[5]**

b) Describe linear and differential cryptanalysis. **[5]**

OR

Q4) a) Describe operation of Elliptic curve cryptography? **[5]**

b) Explain Digital Signature Standard (DSS). **[5]**

Q5) a) What security services S/MIME provides in email communication? **[9]**

b) Explain the operation of Secure Socket Layer protocol in detail. **[8]**

OR

P.T.O.

Q6) a) Describe IPsec protocol with its components in detail. **[9]**

b) Explain operation of OAKLEY Key determination protocol in detail. **[8]**

Q7) a) What are the challenges in intrusion detection system? **[9]**

b) What is a Trusted System? Explain its operation in detail. **[8]**

OR

Q8) a) Explain various firewall architectures with its applications. **[9]**

b) What is access control? What are its types? **[8]**

Q9) a) How VoIP hacking is done by attackers? What are the Counter Measures for it? **[8]**

b) Explain various hacking techniques in wireless network and its countermeasures? **[8]**

OR

Q10) a) What is War-dialing for remote-connectivity? Explain with suitable example. **[8]**

b) Explain various hacking devices used for hacking. **[8]**

Total No. of Questions :8]

SEAT No. :

P3237

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B.E. (Computer)

OPERATIONS RESEARCH FOR ALGORITHMS IN SCIENTIFIC APPLICATIONS

(Elective-IV) (Open Elective) (2012 Course) (410452B) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Illustrate significant applications of Linear Programming in different domain. **[7]**

b) Solve following system of Linear Programming problem using Simplex method. **[8]**

Maximize $Z=2x_1 + x_2 – 3x_3 + 5x_4$

Subject to constraints

$x_1 + x_2 + 2\,x_3 + 4x_4 <=40$

$2x_1 – x_2 + x_3 + 2x_4 <=8$

$4x_1 – 2x_2 + x_3 – x_4 <=10$

such that $x_1, x_2, x_3, x_4 > 0$

OR

Q2) a) Perceive the generic mathematical formulation of Linear Programming problem. **[7]**

b) Solve following two variable linear programming problem with graphical method. **[8]**

Maximize $Z= 5\,x_1 + 4\,x_2$

Subject to constraints

$6x_1 + 4x_2 <=24$

$x_1 + 2x_2 <= 6$

$–x_1 + x_2 <=1$

$x_2 <= 2$

such that $x_1, x_2 >0$

P.T.O.

Q3) a) Obtain an initial basic feasible solution, using the north -west corner rule for the following transportation problem. **[7]**

	Demand 1	Demand 2	Demand 3	Demand 4	Availability
Source 1	6	8	8	5	30
Source 2	5	11	9	7	40
Source 3	8	9	7	13	50
Demand	35	28	32	25	120

b) Analyze various methods of finding an initial basic feasible solution to transportation problem. **[8]**

OR

Q4) a) What are different types of transportation problem? How they are handled? **[7]**

b) In a company three workers are assigned to three jobs, these works get paid based on their abilities. Following table gives payment details. Solve assignment problem using Hungarian method. Find optimal cost of assignment and worker - Job combination. **[8]**

	JOBS			
Workers		A	B	C
	1	15	10	9
	2	9	15	10
	3	10	12	8

Q5) a) Describe following terms with respect to game theory. **[10]**

i) Strategy
ii) Pay-off matrix
iii) Saddle point
iv) Pure strategy
v) Mixed strategy
vi) Two person game
vii) Two person zero sum game
viii) Value of a game
ix) 2xn game
x) Mx2 game

b) Vehicles are passing through a toll gate at the rate of 70 per hour. The average time to pass through the gate is 45 seconds. The arrival rate and service rate follow Poisson distribution. There is a complaint that the vehicles wait for a long duration. The authorities are willing to install one more gate to reduce the average time to pass through the toll gate to 35 seconds if the idle time of the toll gate is less than 9 % and the average queue length at the gate is more than 8 vehicle, check whether the installation of the second gate is justified? **[10]**

OR

Q6) a) A Supermarket has two salesman at sales counter. People arrive according to Poisson fashion at the rate of 10 per hour. If the service time is exponential with mean of 4 minutes, Find **[10]**

i) Expected numbers of customers in the super market.
ii) The average waiting time for a customer for getting service.
iii) Probability for a customer has to wait for service.
iv) Percentage of idle time for salesman.
v) Mean queue length.

b) The following details are available regarding a project:

Activity	Predecessor Activity	Duration (Weeks)
A	-	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D, E	4

Determine the critical path, the critical activities and the project completion time. **[10]**

Q7) a) Draw the network diagram and determine the critical path for the following project: **[10]**

Activity	Time estimate (Weeks)
1-2	5
1-3	6
1-4	3
2-5	5
3-6	7
3-7	10
4-7	4
5-8	2
6-8	5
7-9	6
8-9	4

b) Explain the principle of dominance in the theory of games. How a game can be solved through sub games. Solve the following game by the principle of dominance. **[10]**

Player A Strategies		Player B Strategies			
		I	II	III	IV
	1	8	10	9	14
	2	10	11	8	12
	3	13	12	14	13

OR

Q8) a) Consider a Match Problem of Dynamic Programming. Suppose that there are 15 matches originally on the table, and you are challenged by your friend to play this game. Each player must pick up either 1, 2, 3 or 4 matches, with the player who picks up the last match paying $1.

Define F (i) to be the minimal cost to you (either $ 1 or $ 0) if

i) It is your turn to pick up matches, and

ii) i matches remain on the table.

Answer following

Thus, F(1) = 1, since you are forced to pick up the last match; F (2) = 0 (since you can pick up one match, forcing your opponent to pick up the last match), etc.

i) What is the value of F (1)?

ii) What is the value of F (2)?

iii) What is the value of F (3)?

iv) What is the value of F (4)?

v) If you are allowed to decide whether you or your friend should take the first turn, what is your optimal decision?

vi) What is the value of F (6)?

vii) What is the value of F (15)? **[10]**

b) Explain Recent development in Operations Research with perspective of Bio-Technology and Nano Technology. **[10]**

Total No. of Questions :10]

SEAT No. : ____

P3238

[Total No. of Pages : 2

[5461]-279

B.E. (Computer Engineering)

MOBILE APPLICATIONS

(2012 Pattern) (Semester-II) (End Sem.) (410452C) (Elective-IV)

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) ***Assume suitable data if necessary.***

Q1) a) Write a short note on WAP1 and WAP2? **[6]**

b) What is mobile web browser, and why user prefer to use them? **[4]**

OR

Q2) a) Define and explain the Architecture of WAP1? **[6]**

b) Why we need and develop a mobile Apps? Give example of mobile Apps? **[4]**

Q3) a) Explain different types of Navigation methods used for web developments? **[6]**

b) Why we need Web servers? Explain any one in brief. **[4]**

OR

Q4) a) What is HTML? Differentiate between HTML 4 and HTML 5? **[6]**

b) Explain Native and Hybrid Apps. **[4]**

Q5) a) Explain Scalar Vector Graphics (SVG)? Which are the predefined shapes supported by SVG? **[8]**

b) Write a short note on HTTP Live streaming? **[8]**

OR

P.T.O.

Q6) a) Explain how the performance factor in web Technology can be optimized. **[8]**

b) Explain different JAVA script fallback? **[4]**

c) Explain different JAVA script based UI framework? **[4]**

Q7) a) Explain different JAVA script libraries? **[6]**

b) What is DOM, Explain in detail? **[6]**

c) Why cloud based browsers are faster than direct browsers? **[5]**

OR

Q8) a) Write a short note on Jquery ? **[8]**

b) Explain Enyo and Montage framework? **[9]**

Q9) a) Write a short note on Advantages of application cache? **[7]**

b) How to get the cell location without the carrier's assistance? **[10]**

OR

Q10)a) Explain mobile SEO in detail ? **[8]**

b) Explain mobile tiny URL and QR codes? **[4]**

c) Write short note on G.P.S.? **[5]**

Total No. of Questions :8]

SEAT No. :

P3239

[Total No. of Pages : 2

[5461]-280

B.E. (Computer Engineering)

PROGRAMMING PARADIGMS FOR COMPLEX PROBLEM SOLVING - CASE STUDIES IN PYTHON

(2012 Course) (Open Elective - 410452) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Compare references and exceptions as constructs of imperative programming language. **[8]**

b) Summarize the importance of pure type system? **[7]**

OR

Q2) a) Write a Python program that prompts the user to enter a list of words and stores it in another list only those words whose first letter occurs again within the word (for example, 'Tomato'). The program should display the resulting list. **[8]**

b) Describe following terms with suitable examples. **[7]**

i) Predicates

ii) Abstract data type

Q3) a) Using list comprehension write python code for creating list. **[8]**

$S = \{x^2 : x \text{ in } \{0 ...9\}\}$

$V = \{1, 2, 4, 8, ...2^{12}\}$

$M = \{x \mid x \text{ in S and x even}\}$

b) Explain Implicit and Explicit functions with respect to lambda calculus.**[7]**

OR

P.T.O.

Q4) a) Write a python program for sorting students marks. Explain the step-wise working with suitable input data. **[8]**

b) Explain the Inverse function with suitable example. What do you understand by Currying functions? **[7]**

Q5) a) Give a recursive definition of factorial calculation. Write a python program fo the same. **[6]**

b) Explain following terms with reference to functional programming. **[10]**

i) Lazy Evaluation

ii) Higher Order Functions

iii) Namespace

iv) Type Calculus

c) Write a recursive python program for matching of two strings. **[4]**

OR

Q6) a) Write a python program for traversing a link list. **[8]**

b) Analyze importance of abstract data types. **[5]**

c) State and explain key features of Object Oriented Programming. **[7]**

Q7) a) Analyze Atomic types, Composite types, Product types and function types. **[10]**

b) What is significance of polymorphic Inference. **[10]**

OR

Q8) a) What is significance of Co routines with respect to Programming? **[10]**

b) How Systems management principles are supported by Scripting? **[10]**

❖ ❖ ❖

Total No. of Questions :10]

SEAT No. :

P3240

[Total No. of Pages : 2

[5461]-280-A

B.E. (Computer Engineering)

CONCURRENCY ON OPEN SOURCE SYSTEMS

(Open Elective) (410452-DC) (Semester-II) (2012 Pattern) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain what's the difference between Parallelism and Concurrency. **[5]**

b) Explain how to identify possible concurrency in analysis phase software life cycle? **[5]**

OR

Q2) a) Operating systems schedule threads in a nondeterministic way, so Explain how concurrent programs are interleavings of atomic statements from two or more threads. **[5]**

b) Explain the role of operating system in handling activities with respect to processes management. **[5]**

Q3) a) Consider one android application in which user allows to navigate from multiple entry points explain with the help of suitable example how it could be done? **[5]**

b) What are advantages of distributed object over RPC? What is data shipping? **[5]**

OR

Q4) a) Explain in detail the libraries used in android architecture? **[5]**

b) Write the pseudo code for solution to dining philosophers problem using semaphore. How semaphore is useful for solving the deadlock? **[5]**

P.T.O.

Q5) a) Explain in detail centralized symmetric shared memory architecture. **[10]**

b) Explain how the drawback of maintaining directory at central server for locating remote data can be overcome in distributed directory. **[8]**

OR

Q6) a) Write a note on communication of processes in concurrent system. **[6]**

b) To design and implement distributed object, explain how client server systems is useful? **[6]**

c) Explain request reply mechanism in client server systems. **[6]**

Q7) a) What are the different model of computation for concurrent processing? Explain any one in detail? **[8]**

b) Explain in details the steps involved in graph theoretical algorithm. **[8]**

OR

Q8) a) Explain Fixpoint Theory & Type theory with respect to framework for statically detecting deadlocks in core. **[8]**

b) Draw and explain the terms **[8]**

i) Holding a resource

ii) Requesting a resource

iii) Deadlock for Resource allocation graphs.

Q9) a) Explain with suitable diagram, how to build free of deadlock and livelock for message passing ring? **[10]**

b) Write the deadlock rule 2 and prove it for node ordering. **[6]**

OR

Q10)a) What are the flavours of semantics to describe CSP, and how they complement to each other. **[6]**

b) Explain Pi Calculus syntax. Also explain which Pi notation will be used to show hidden process. **[5]**

c) Explain and illustrate the theory of data-independence, to prove facts about processes of the type by showing they hold for a particular finite data type. **[5]**

Total No. of Questions :10]

SEAT No. :

P3241

[Total No. of Pages : 2

[5461]-280B

B.E. (Computer Engineering)

FUNDAMENTALS OF SOFTWARE DEFINED NETWORKING

(Semester-II) (Open Elective - IV) (2012 Pattern) (410452 DD)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain ARP and RARP protocol. **[6]**

b) What are the limitations of traditional network? **[4]**

OR

Q2) a) Explain SDN consistency in term of access control violation and configuration management. **[6]**

b) What is the limitation of Open Flow? **[4]**

Q3) a) Explain need for a new network architecture. **[4]**

b) What are different OpenFlow Messages? **[6]**

OR

Q4) a) Explain TCP/IP protocol suit. **[6]**

b) Explain different open flow actions. **[4]**

Q5) a) Explain component of virtual Network. **[6]**

b) What is role of NAT device in the network? **[6]**

c) What are the Benefits of Naas? **[4]**

OR

Q6) a) What is Naas in cloud computing? **[6]**

b) Explain abstraction of physical network **[6]**

c) Are SDN and network virtualization the same? **[4]**

Q7) a) How SDN use for network service chaining? **[9]**

b) Explain following SDN based network application. **[9]**

i) Updating data center networks

ii) Cloud data scalability

OR

Q8) a) What is impact of SDN in Research and Industry? **[6]**

b) Discuss role of SDN in bandwidth calendaring **[6]**

c) Explain SDN Future? **[6]**

Q9) a) What are SDN open source controllers? Explain in Detail. **[8]**

b) Write a short note on **[8]**

i) SDN controller security

ii) SDN controller application

OR

Q10)a) What is Mininet? Explain basic commands of Mininet **[8]**

b) Write a short note on **[8]**

i) NOX

ii) POX

❖ ❖ ❖

Total No. of Questions :10]

SEAT No. :

P3242

[Total No. of Pages : 2

[5461]-280C

B.E. (Computer Engineering)

BIG DATA AND DATA ANALYTICS

(Semester-II) (410452DE) (2012 Course) (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, 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 Business Intelligence with suitable diagram. **[5]**

b) Explain following terms in the context of data warehouse **[5]**

i) Subject oriented

ii) Non-volatile

OR

Q2) a) Explain Decision Support System with its limitations. **[5]**

b) What is Big data analytics? **[5]**

Q3) a) Draw and explain typical analytical architecture. **[5]**

b) What are the applications of Big data analytics? **[5]**

OR

Q4) a) Explain "Model Building" as the phase of data analytic lifecycle. **[5]**

b) Explain "Operationalization" as the phase of data analytic lifecycle. **[5]**

Q5) a) What is Machine Learning? **[6]**

b) Explain linear regression with suitable example. **[5]**

c) Describe support vector machine with suitable example. **[6]**

OR

P.T.O.

Q6) a) What are the applications of machine learning? **[6]**

b) Explain logistics regression with suitable example. **[5]**

c) Describe time series analysis with suitable example. **[6]**

Q7) a) What is the classification problem? **[6]**

b) Describe classification tree with suitable example. **[5]**

c) Explain the hierarchical method of clustering. **[6]**

OR

Q8) a) What are various classification models? **[6]**

b) Describe Bayesian method with suitable example. **[5]**

c) Explain the partition method of clustering. **[6]**

Q9) Write short note on:

i) Basic Features of R **[6]**

ii) Data Frames and Lists **[5]**

iii) Reading Data Sets and Exploring Data from R **[5]**

OR

Q10)Write short note on:

i) Exploring R GUI **[6]**

ii) Handling Data in R Workspace **[5]**

iii) Manipulating and Processing Data in R **[5]**

Total No. of Questions : 10]

SEAT No. :

P3243

[Total No. of Pages : 2

[5461]-281

B. E. (I.T.)

INFORMATION AND CYBER SECURITY

(2012 Course) (Semester - I) (End Sem.) (414453)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is the purpose of S-boxes in DES? Explain the steps in detail. **[6]**

b) Calculate using Euclidean algorithm **[4]**

GCD (55,22)

GCD (1970, 1066)

OR

Q2) a) Describe the steps to generate a Digital certificate. **[6]**

b) Describe the different types of cryptanalytic attacks based on what is known to the attacker. **[4]**

Q3) a) Describe any two modes of operation (ECB, CBC, CFB, OFB) with the help of diagram. **[6]**

b) Distinguish between symmetric and asymmetric cipher. **[4]**

OR

Q4) a) Calculate the shared symmetric key using Diffie Hellman algorithm. **[6]**

$a = 7, q = 11, X_a = 3, X_b = 6$

b) What are the steps to generate and verify a Digital signature. **[4]**

Q5) a) List and state the purpose of different protocols of SSL. What are the steps in SSL Record protocol? **[8]**

b) Explain IDS and its types? **[8]**

OR

P.T.O.

Q6) a) What services are provided by AH and ESP. List and describe the different fields of AH and ESP header. **[8]**

b) Discuss : **[8]**

i) IKE protocol

ii) Transport vs Tunnel mode

Q7) a) What is cyberstalking? Explain its working. **[8]**

b) Discuss Indian legal perspective on cybercrimes. **[8]**

OR

Q8) a) Describe any two cybercrimes and their respective penalties. **[8]**

b) How social engineering plays wide role in cybercrime? Discuss with the help of example. **[8]**

Q9) Write a short note on following **[18]**

a) DOS and DDOS

b) Key-loggers and Spywares

c) Phishing

OR

Q10) Write a short note on following **[18]**

a) Proxy servers and Anonymizers

b) Viruses and Worms

c) SQL injection

♦ ♦ ♦

Total No. of Questions :10]

SEAT No. : ____

P3244

[Total No. of Pages : 2

[5461]-282
B.E. (I.T.)
SOFTWARE MODELING & DESIGN
(2012 Pattern) (Semester - I)

Time : 2½ Hours] ***[Max. Marks :*** *70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Use UML2 notations for drawing UML diagrams.***

Q1) a) Draw a sequence diagram for booking a ticket of a movie. Assume that the tickets are available. **[6]**

b) Draw a class diagram for generalization relationship using the keywords Reading material, Magazine, Book, CD, duration in time, ISBN, month of year, price, title. **[4]**

OR

Q2) a) Write the significance of fork, join and object flow in the context of activity diagram. **[6]**

b) Show asynchronous, synchronous, create object and return message notations in the context of sequence diagram. **[4]**

Q3) a) For the following description identify which nouns can go as class and which cannot.
A bank isssues many credit cards. The credit card has maximum credit limit and year of expiry. Each credit card gets a statement every month. The statement has a statement date, minimum amount to pay and list of transactions. Each transaction has transaction date and amount. **[6]**

b) Elaborate the concept of composite state in the context of state diagram. **[4]**

OR

Q4) a) An ATM has a card insertion slot, a display panel and a cash dispensing slit. At start, ATM machine is in IDLE state. Being into IDLE state, when the card is inserted in the card insertion slot, it goes to active state. It first validates the customer, and then asks for choice of operation. The user chooses to deposit money, draw the state diagram which shows the transitions and the change in the state of ATM using UML 2.0 notations.**[6]**

b) Elaborate the steps to identify use cases of a system. **[4]**

P.T.O.

Q5) a) Write a note on Making a reuse plan using libraries and patterns. **[8]**

b) What is a procedure driven software control and event driven software control, elaborate. **[8]**

OR

Q6) a) Describe the ways of splitting a system into subsystems. **[8]**

b) Describe process of selecting hardware resources for a software system. **[8]**

Q7) a) Elaborate the need of design patterns. **[4]**

b) Explain the use of adapter design pattern with example. **[6]**

c) Apply strategy design pattern to the following and draw the class diagram. A company has many employees. Each employee has a name and a performance index in the range of 1 to 5. When the index is 2 increment is 5 percent of the previous year salary, 3 the increment is 10 percent of the previous year salary, 4 the increment is 15 percent of the previous year salary and when it is 5 the increment is 20 percent of the previous year salary. Indicate the role of each class in the class diagram. **[8]**

OR

Q8) a) Write the types of design pattern. Give one example of each type. **[4]**

b) Explain the use of state design pattern with example. **[6]**

c) Weather station supplies information about the temperature, pressure & humidity to three display devices named statistics display, Graph display & Forecast display. Draw the class diagram of the system with appropriate design pattern. Write clearly the role of each class in the class diagram. **[8]**

Q9) a) Define verification and validation. **[4]**

b) What is test driven development? Explain in brief. **[4]**

c) Given three inputs as integer numbers to check whether it represents a triangle, equilateral triangle, a right angled triangle and an isosceles triangle write one test case for each. **[8]**

OR

Q10)a) Explain white box testing in brief. **[4]**

b) Explain black box testing in brief. **[4]**

c) A mail sign up UI is to be tested; it should have name, email id, password and a secret question, write four test cases to test this UI. **[8]**

Total No. of Questions :10]

SEAT No. : ____

P3245

[Total No. of Pages : 3

[5461]-283
B.E. (Information Technology)
MACHINE LEARNING
(2012 Course) (End Semester) (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 Calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Why sometimes algorithms fail to produce correct results? Explain it with help of examples. **[4]**

b) Define Accuracy, True positive rate, True negative rate for binary classification tasks. **[6]**

OR

Q2) a) Draw and describe how machine learning is used to address a given task. **[6]**

b) What is a contingency table/ Confusion Matrix? What is the use of it? **[4]**

Q3) a) Define and explain model for classification. Also explain the same with respect Binary classification. **[4]**

b) Show that how the values of θ_0 and θ_1 are estimated in a linear regression model of $Y_i' = \theta_0 + \theta 1.X_i$ **[6]**

OR

Q4) a) What is a multivariate linear regression? **[4]**

b) What is overfitting ? Specify the reasons for overfitting. **[6]**

P.T.O.

Q5) a) List and explain various distance fuctions. **[8]**

b) Consider the following dataset: **[10]**

X	Y
–1	0.0319
0	0.8692
1	1.9566
2	3.0343

We want to learn a function f(x) = ax+b which is parametrized by a = 1 and b= 1, Considering squared error as the loss fuction, calculate the loss function.

OR

Q6) a) Define and explain single linkage, complete linkage and average linkage with neat diagram. **[8]**

b) Consider the following dataset: **[10]**

X_1	X_2	Y
2	1	4
6	3	2
2	5	2
6	7	3
10	7	3
4	4	2
7	6	3

Model this function using the K- nearest neighbor regression. What will be the value of Y for the instance $(X_1,X_2)=(3,5)$ and K=3

Q7) a) Write a note on Compression based model. **[6]**

b) A patient takes a lab test of Cancer and the result is positive. The test returns a correct positive result only in 98% of the cases, in which the disease is actually present, and a correct negative result in only 97% of the cases in which the disease is not present. Further, 0.008 of the entire population have this cancer. What is the probability that the patient has Cancer? **[10]**

OR

Q8) a) What is a normal distribution? Describe properties of normal distribution. **[8]**

b) What is the Naïve Bayes assumption. Define and explain Bayes Optimal Classifier. **[8]**

Q9) a) What is an Ensemble Model. Explain Bagging in detail. **[8]**

b) What is multi-task learning ? Explain various applications of it. **[8]**

OR

Q10)a) Explain Sequence Prediction model. What are the different measure to decide the goodness of the sequence prediction model. **[8]**

b) How does On-line learning differ from batch learning algorithms. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P3246

[Total No. of Pages : 2

[5461]-284

B.E. (I.T.)

SOFT COMPUTING

(2012 Pattern) (Semester - I) (Elective - I) (414456A)

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 tpye of problems solved with soft computing. **[6]**

b) List and explain performance issues in EBP algorithm. **[8]**

c) Explain resonance in ART networks. **[6]**

OR

Q2) a) Comment on types of solutions obtained with soft computing. **[6]**

b) List out the strength and weaknesses of EBP algorithm. **[8]**

c) Explain the steps involved in KNN algorithm for clustering. **[6]**

Q3) a) What is meant by fuzzy logic? Illustrate it with proper example. **[8]**

b) Explain the Alpha-cut method for discrete fuzzy sets to perform arithmetic operations. **[8]**

i) Addition

ii) Division

OR

Q4) a) List out the characteristic features of fuzzy logic. **[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) Differentiate between evolutionary strategy and evolutionary programming? **[8]**

b) Explain operations in simple genetic algorithms. **[8]**

OR

Q6) a) Explain how genetic algorithms are different from evolutionary programming. **[8]**

b) Explain operations in genetic programming. **[8]**

Q7) a) Describe application of soft computing in semantic web. **[9]**

b) Describe application of fuzzy logic for character recognitions. **[9]**

OR

Q8) a) Describe how soft computing can be used in information retrieval. **[9]**

b) Describe how evolutionary computing is used in image processing. **[9]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3247

[Total No. of Pages : 2

[5461]-285

B.E. (I.T.)

USABILITY ENGINEERING

(2012 Course) (End Sem.) (Semester - I) (Elective - I) (414456B)

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) List & explain Disciplines contributing to HCI. **[8]**

b) Define "Usability". **[2]**

OR

Q2) a) Why user interface should be based on the user's language & not on system oriented term. **[6]**

b) Explain usability slogan "users are not designers" with example. **[4]**

Q3) a) Explain with example importance of short cut keys in user interface. **[6]**

b) Write a short note on : Subjective satisfication with interface. **[4]**

OR

Q4) a) Write a short note on : Storyboarding and Wireframes. **[6]**

b) List vairous issues related to interaction design. **[4]**

Q5) a) Explain usability evaluation methods beyond testing. **[10]**

b) Explain Test Budget in detail. **[8]**

OR

P.T.O.

Q6) a) Explain different stages of usability testing with example. **[10]**

b) What are the attributes of usability performance measurement? **[8]**

Q7) a) How message box & Dialog box standards are helpful to provide information about user interface. **[8]**

b) Explain principle of good UI design. **[8]**

OR

Q8) a) List & explain guidelines for Internationalization. **[8]**

b) How user & Vendor Benefited from Consistency and Standards. **[8]**

Q9) a) Explain the role of user interface designer & developer. **[8]**

b) Describe Simulation process with example. **[8]**

Q10) Write a short note on (Any 2) **[16]**

a) Intelligent User Interface

b) Theortical Solutions

c) CAUSE tools

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P3248

[Total No. of Pages : 2

[5461]-286

B.E. (Information Technology)
MODERN COMPILERS
(2012 Pattern) (Semester - I) (End Sem.) (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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe tree operators for intermediate representation. **[6]**

b) Define Basic Block. What are the steps for converting a long sequence of statements into basic blocks? **[6]**

c) Explain copying garbage collection with a neat diagram. Write Cheney's algorithm and comment on its cost. **[8]**

OR

Q2) a) Define callee-save and caller-save registers. How do the use of registers save time for programming languages? **[6]**

b) What are the various traces covering for the given program? **[6]**

Prologue statements

JUMP (NAME test)

LABEL (test)

CJUMP (>, i, N, done, body)

LABEL (body)

Loop body statements

JUMP (NAME test)

LABEL (done)

Epilogue statements

c) Explain reference counting for garbage collection. Discuss the problems with this technique using suitable example. **[8]**

P.T.O.

Q3) a) Define inline expansion. Explain the rules for inline expansion. **[6]**

b) What is Closure? How it can be implemented using Heap-allocation? **[6]**

c) What is meant by private field in programming language? What are various ways to support it in programming language? **[6]**

OR

Q4) a) Explain Higher-order functions and Functional programming language in brief. What are three flavors of Functional programming language? **[6]**

b) Explain call-by-name and call-by-need with respect to lazy evaluation. **[6]**

c) Explain tail position with suitable example. Write the steps to implement tail call. **[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) Differentiate between register allocation and assignment? Discuss different approaches for the same. **[8]**

b) What is inter-procedural optimization? Describe different kinds of inter-procedural optimizations. **[8]**

Q7) a) What is explicit and implicit parametric polymorphism? Explain with suitable diagram. **[8]**

b) What is reaching expressions and available expressions? Explain with suitable code. **[8]**

OR

Q8) a) Explain transformations using dataflow analysis using suitable examples. **[8]**

b) How to avoid repeated computation of dataflow information? **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3249

[Total No. of Pages : 2

[5461]-287

B.E. (Information Technology)
PARALLEL ALGORITHMS AND DESIGN
(2012 Course) (Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write Bitonic merge sort algorithm. Explain the order of comparators being used in a bitonic merge sort algorithm for 'n' data values. **[5]**

b) What are the various performance measures of parallel algorithm? Discuss with example. **[5]**

OR

Q2) a) Design the parallel algorithm to construct merging networks and use the same for merge sort. **[5]**

b) What is PRAM model for parallel algorithms? What is the impact of eliminating shared write from PRAM? **[5]**

Q3) a) Explain a sequential model of computation. Discuss its advantages and disadvantages. **[5]**

b) What is the difference between data parallel computation and task parallel computation? What is parallel efficiency? **[5]**

OR

Q4) a) Write a short note on any 2 with respect to parallel computational model: **[8]**

i) Perfect shuffle computers
ii) Tree model
iii) Pyramid model
iv) Fuly connected model

b) What is cost of Parallel algorithm? **[2]**

Q5) a) Implement a parallel computing structure for matrix multiplication using mcc. **[10]**

b) Explain Conjugate Gradient Method-Parallel Algorithm. **[8]**

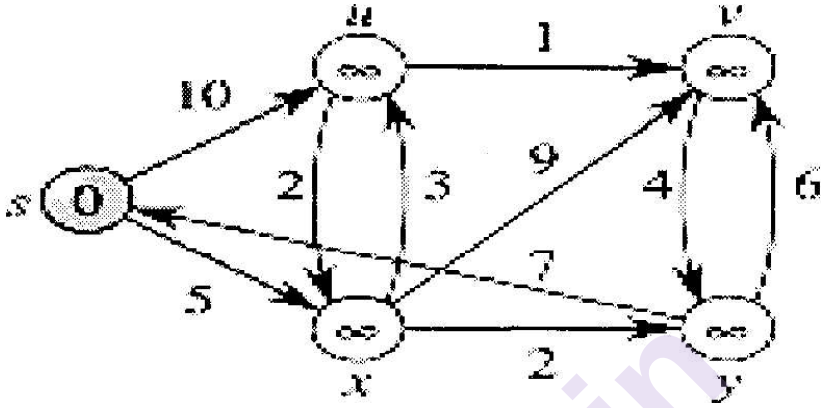
OR

P.T.O.

Q6) a) Analyse Cube connected Transpose. Check algorithm for optimality. **[10]**

b) Explain vector matrix multiplication. Write a suitable example. **[8]**

Q7) a) What is Shortest Path method in parallel computing? Solve given problem using Dijkstra method of parallel computing. **[10]**



b) Explain the Graph Algorithm in parallel computing? **[6]**

OR

Q8) a) Explain the difference between BFS and DFS in Parallel Computing. **[6]**

b) Write short note on : **[10]**

i) Combination in parallel computing

ii) Derangements in parallel computing

Q9) a) What is dynamic programming? Explain parallel dynamic programming algorithms? **[8]**

b) What is computer algebra system? Draw and explain its framework. **[8]**

OR

*Q10)*a) Explain parallel implementation of the finite element method for sparse and stiffness matrix. **[8]**

b) Explain linear and non-linear pipelines stages in parallel computing? **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3250

[Total No. of Pages : 2

[5461]-288

B.E. (I. T.)

CLOUD COMPUTING

(2012 Course) (Semester - I) (End Sem.) (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.***
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 cloud service models in brief. **[6]**

b) Explain in brief Infrastructure cloud economics. **[4]**

OR

Q2) a) Compare cloud deployment models. **[6]**

b) Enlist Pros and Cons of Cloud Computing. **[4]**

Q3) a) Draw and explain in brief RESERVOIR architecture. **[6]**

b) What is Hypervisor? Explain. **[4]**

OR

Q4) a) Describe any 3 types of Virtualization. **[6]**

b) Enlist cloud monitoring tools and explain the function of Amazon Cloud Watch. **[4]**

Q5) a) Enlist and explain traditional threats of Web Site. **[8]**

b) Enlist and describe security risks posed by shared images. **[8]**

OR

Q6) a) Discuss 4 widely accepted information practices complied by consumer oriented commercial web sites. **[8]**

b) Write short note on Virtual Machine Security. **[8]**

P.T.O.

Q7) Write short note on **[18]**

a) Open Nebulla

b) Cloud Stack

OR

Q8) Write short note on **[18]**

a) Google Application Engine

b) Eucalyptus

Q9) a) Explain in brief any two Ubiquitous Computing Applications. **[8]**

b) Draw and explain UbiCom system model. **[8]**

OR

Q10)a) Write short note on Calm Computing. **[8]**

b) Compare Virtual Reality with Augmented Reality. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3251

[Total No. of Pages : 2

[5461]-289

B.E. (I.T.)

BUSINESS INTELLIGENCE

(2012 Course) (Semester - I) (End Sem.) (Elective - II) (414457A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) The finance department of ABC Motor Company Ltd. relied on multiple applications running on regular documentation software to produce its annual plans and develop the key financial milestones for the company's operations. The documentation, reports, accounts are maintained in simple flat files. The systems were judged to be inflexible, disconnected and unsecured, each requiring a great deal of very time-consuming and error-prone manual processing and integration. Each planning process cycle required many hours of work on those manual processes that often could contain deviations on numerical calculations. Such manual processes could introduce costly errors: subsequently leading to confusion and potentially inaccurate premises for the company's planning cycles and KPIs. Suggest how Business Intelligence solution for adoption of ETL process. Data warehouse design. Analysis. Visualization, Reporting, security will help ABC Motor Company's finance department to improvise their annual planning process and decide the financial milestones for the company's operations. **[10]**

OR

Q2) a) Explain transaction and recurring snapshot types of dimensional modeling. Highlight two main differences between these two modeling types. **[6]**

b) Explain measures of data quality and its significance. **[4]**

Q3) a) Describe what are the different challenges involved in ETL's Extraction and cleaning phase and how are they handled? **[6]**

b) Explain following operations of OLAP with suitable examples: **[4]**

i) Dice

ii) Pivot

OR

P.T.O.

Q4) a) What is Clickstream source data? Explain Clickstream data using Google Analytics. **[6]**

b) What are screens? State its significance. **[4]**

Q5) a) How does the metadata layer, presentation layer, and data layer support the reporting architecture of data warehouse? **[8]**

b) What is Materialized view? Explain with example. What are the advantages of it? **[8]**

OR

Q6) a) Write short note on **[8]**

i) Dashboards as Reporting tool

ii) Adhoc Reporting

b) Explain ETL scheduling. How data level security is handled in ETL process. **[8]**

Q7) a) What is cluster analysis? Suppose the data for clustering- {2, 4, 10, 12, 3, 20, 11, 25}. Given. K= 2. And Cl = 3. C2 = 11. Cluster the given data with K-means algorithm. **[8]**

b) Compare and contrast ln-DB and In-memory analytics. How Google analytics works? **[8]**

OR

Q8) a) State the difference between supervised and unsupervised learning? Explain how decision trees can be used for predictive analytics. **[8]**

b) Explain the process of text-mining. What is the role of inverted index in text mining? **[8]**

Q9) Write short notes on following: (Any 3) **[18]**

a) Embedded BI

b) Log based change data capture

c) Real time BI

d) PIG

OR

Q10)a) Describe any scenario where agile business intelligence can be used? How does it support and enhance business operations? **[8]**

b) Explain cloud business intelligence architecture with the help of neat diagram. **[10]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3252

[Total No. of Pages : 2

[5461]-290

B.E. (I.T.)

SERVICE ORIENTED ARCHITECTURE

(2012 Course) (Semester - I) (End Sem.) (Elective - II) (414457B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) With neat diagram explain anatomy of service oriented architecture. **[6]**

b) Write brief notes on messaging with SOAP. **[4]**

OR

Q2) a) Compare SOA with client server architecture. **[4]**

b) Explain in detail about service descriptions(WSDL) and its types. **[6]**

Q3) a) Explain how contemporary SOA increases quality of service. **[4]**

b) With neat diagram explain business activity coordinator service model. **[6]**

OR

Q4) a) Explain the fundamental service roles played by service descriptions. **[4]**

b) With neat diagram explain in detail about service compositions. **[6]**

Q5) a) What are the objectives of Service Oriented Analysis? **[9]**

b) Discuss benefits of a business centric SOA. **[9]**

OR

Q6) a) Explain in detail about classifying Service Model Logic. **[9]**

b) Enlist and explain Service Modeling guidelines. **[9]**

P.T.O.

Q7) a) Write brief notes on Service Oriented design process. **[8]**

b) Give the syntactical implementation of all the elements in WSDL. **[8]**

OR

Q8) a) Explain in detail about SOA language basics. **[8]**

b) Explain with neat diagram steps for composing SOA. **[8]**

Q9) a) Explain briefly about WS-Coordination. **[8]**

b) Explain different service design guidelines in detail. **[8]**

OR

Q10)a) Define SOA governance and explain QoS compliance in SOA governance. **[8]**

b) Explain following elements of WS-BPEL language basics. **[8]**

i) Variables element

ii) Invoke element

iii) Receive element

iv) Reply element

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3253

[Total No. of Pages : 2

[5461]-291

B.E. (Information Technology)
E & M GOVERNANCE
(2012 Course) (Semester - I) (End Sem.) (Elective - II) (414457C)

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) Compare the three approaches for analyzing the business effects of e-Business and write down the pros and cons of each approach. **[6]**

b) What is the key difference between e-Commerce and e-Business? **[2]**

OR

Q2) a) Imagine that you are the manager of a small e-bookshop. Describe what 'e-business strategy' you would prefer to compete with large competitors like Amazon.com and Bol. com. Include the following terms: long term planning, corporate objectives and environment. **[6]**

b) What is meant by the terms front-office and bank-office systems? **[2]**

Q3) a) Discuss the four key elements of the strategic planning process and explain how they are interrelated. **[6]**

b) How would you define Business - IT alignment? Explain why it is important. **[4]**

OR

Q4) An insurance company wants to engage in a large BPR project in order to dramatically increase its efficiency and to keep up with competition. Before giving a 'go' decision to the project, the board wants to have a good view on the potential benefits. Their consultant presents Davenport's framework of how business processes can benefit from IT. For each of the possible effects of IT on a business process, listed below, you are invited to give examples and potential benefits: **[10]**

a) Transactional
b) Geographical
c) Automated
d) Analytical
e) Informational

P.T.O.

Q5) a) Pick a governance structure you have experience with (through work, study etc.) Describe the following : **[8]**

i) Type of value exchange;

ii) For 3 transactions analyse characteristics of products or services, parties involved, how trust is established etc.;

iii) Coordination mechanisms used.

b) E-markets is more efficient than traditional markets. Discuss. **[8]**

OR

Q6) a) Describe three factors contribute to the success of e-markets? Give one example for each factor. **[8]**

b) List the key advantages of an e-procurement solution. **[8]**

Q7) a) List and explain the various types of mobile services in detail. **[8]**

b) Write a short note on m-commerce life cycle. Discuss advantages and disadvantages of 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) Distinguish between : m-commerce services for Consumers & m-Commerce services for Businesses. **[8]**

Q9) a) The mobile devices of the future will be more powerful, less heavy, and comprise new interfaces to the user and to new networks. Describe the special technologies used in m-commerce. **[6]**

b) What are the emerging live issues in mobile commerce? **[6]**

c) What are various e-commerce services for business? Explain. **[8]**

OR

Q10)a) Explain the five major m-commerce applications, and provide a specific example of how each application can benefit a business. **[6]**

b) Explain how m-commerce can expand the reach of e-business. **[6]**

c) List and explain various mobile commerce services for consumer? Explain. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3254

[Total No. of Pages : 2

[5461]-292

B.E. (Information Technology)
GEO INFORMATICS SYSTEM
(2012 Pattern) (Semester - I) (End Sem.) (Elective - II) (414457D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain different components of GIS in short. **[4]**

b) Explain Electromagnetic Remote Sensing process. **[6]**

OR

Q2) a) What are different approaches to the study of GIS. **[4]**

b) Explain classification of remote sensing according to imaging sensor system. **[6]**

Q3) a) What are the reasons for using computers in the process of making maps. **[4]**

b) Explain pre-processing methods used for digital image processing in short. **[6]**

OR

Q4) a) Enlist main four families used for grouping of map Projection. **[4]**

b) Explain basic elements of image interpolation & its role in image processing. **[6]**

Q5) a) What are different data sources that can be used to create new geospatial data. **[8]**

b) What are different transformation methods? Explain affine transformation in detail. **[8]**

OR

P.T.O.

Q6) a) What is geometric transformation? Explain map-to-map and map-to-image transformation. **[8]**

b) Explain location errors in details. **[8]**

Q7) a) Explain local operations used in raster data analysis. **[8]**

b) What is overlay? Explain different methods used in overlay. **[8]**

OR

Q8) a) What is data attribute query? Explain how expression query is interpreted by a GIS. **[8]**

b) Compare vector & raster based data analysis with respect to overlay and buffering. **[8]**

Q9) a) Explain role of project initiation, system planning methodology and project proposal with respect to GIS project planning. **[9]**

b) Explain methodology used to implement urban and municipal application. **[9]**

OR

Q10)a) What are the steps used for structured approach to GIS software bench marking? **[9]**

b) What are the factors that need to be considered when choosing windows based GIS workstation? **[9]**

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P3255

[Total No. of Pages : 2

[5461]-293

B.E. (Information Technology)
NATURAL LANGUAGE PROCESSING
(2012 Pattern) (Semester - I) (End Sem.) (Elective - II) (414457E)

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) State and explain applications of Natural Language Processing. **[6]**

b) Consider the following CFG **[8]**

$S \rightarrow NP\ V$

$S \rightarrow NP\ AUX\ V$

$NP \rightarrow ART\ N$

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) Write note on Logic programming used to build parser. **[6]**

OR

Q2) a) Explain evaluation methods of Natural Language Processing System. **[6]**

b) Consider the following CFG : **[8]**

i) $S \rightarrow N\ PVP$

ii) $NP \rightarrow ART\ ADJ\ N$

iii) $NP \rightarrow ART\ N$

iv) $NP \rightarrow ADJ\ N$

v) $VP \rightarrow AUX\ VP$

vi) $VP \rightarrow V\ NP$

P.T.O.

Use top down chart parser and Show every step of the parse, giving the parse stack, and drawing the chart each time a nonterminal constituent is added to the chart for following sentence

"The large can can hold the water."

the: ART
large: ADS
can: N,AUX,V
hold: N,V
water: N, V

c) Why augmented transition networks are used in NLP? Explain with suitable example. **[6]**

Q3) a) How does Shift Reduce Parser encode uncertainity to improve the efficiency while parsing? Explain with proper example. **[9]**

b) Explain human preferences in encoding uncertainity during parsing. **[9]**

OR

Q4) a) How does Context dependant Best-First parser works? Explain with suitable example. **[9]**

b) What is Probabilistic Context-Free Grammar? Explain with suitable example. **[9]**

Q5) a) How does the relative scoping of the quantifiers and operators add to the complexity of ambiguity in the Logical form? Justify with appropriate examples? **[8]**

b) Write a short note on description logic. **[8]**

OR

Q6) a) Describe Semantic Ambiguity? Explain any two linguistic tests to define the notion of Semantic Ambiguity. **[8]**

b) Describe lexical resource wordnet used in natural language processing. **[8]**

Q7) a) Explain the use of NLP in Information Extraction. **[8]**

b) Write a detail note on Automatic Text Summarization. **[8]**

OR

Q8) a) What is Semantic Web Search? How does it improve the accuracy of the search contents? **[8]**

b) Explain the use of WER metric used in assessing the quality of Machine translation? **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3256

[Total No. of Pages : 3

[5461]-294

B.E. (Information Technology)

DISTRIBUTED SYSTEM

(2012 Course) (Semester - II) (End Sem.) (414461)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) If a client and a server are placed far apart, we may see network latency dominating overall performance. How can we tackle this problem? **[5]**

b) List the various challenges during the construction of Distributed systems. Describe the challenges while designing of scalable distributed system.**[5]**

OR

Q2) a) Explain in brief, software and hardware service layers in Distributed Systems with neat diagram. **[5]**

b) Give the difference between Synchronous & Asynchronous Distributed System. Explain Event ordering with suitable example. **[5]**

Q3) a) What are Sockets? Explain the connection-oriented communication pattern using sockets with neat diagram. **[5]**

b) Explain two main characteristics of distributed event-based systems.**[5]**

OR

P.T.O.

Q4) a) Why MPI standard is needed? Explain MPI along with it's core message primitives to support transient communication. **[5]**

b) Why Web Services are used? Explain SOAP and REST based Web Services in a nutshell. **[5]**

Q5) a) Explain the need to observe the global state of a distributed system with respect to: **[8]**

i) Distributed Garbage Collection

ii) Distributed deadlock detection

iii) Distributed termination detection

b) Explain in brief, the need of multicast communication and consensus in distributed system. Also explain the system model for Consensus process with neat diagram. **[8]**

OR

Q6) a) Explain the following essential requirements with respect to Mutual Exclusion: **[8]**

i) Safety

ii) Liveness

iii) Ordering

Also Mention the criteria to evaluate the performance of algorithms for mutual exclusion.

b) What is the significance of Replication? Mention the sequence of events when a client requests an operation to be performed in Passive replication.**[8]**

Q7) a) Explain the Coda Architecture alongwith the disconnected operation and replication strategy. **[8]**

b) What is meant by directory services? What are directory service Operations? **[8]**

OR

Q8) a) Explain how the following is achieved in Network File System: **[8]**

i) Access Transparency

ii) Location Transparency

iii) Mobility Transparency

b) What is *quality of service management* in multimedia applications? Describe the QoS manager's two main subtasks in brief. **[8]**

Q9) a) Explain the Record Protocol Layer and Handshake Layer with respect to SSL. **[10]**

b) Explain the design of the cryptographic algorithm using confusion and diffusion to conceal the content of a ciphertext block. **[8]**

OR

Q10)a) Explain the concepts of Resource Management and Stream Management with respect to Distributed Multimedia System. **[10]**

b) What do you mean by public-key Cryptography? Explain Digital Signatures with public keys. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3257

[Total No. of Pages : 2

[5461]-295

B.E. (Information Technology)
ADVANCED DATABASES
(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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Compare Homogeneous and Heterogeneous databases? **[5]**

b) Explain the concept of Concurrency control in distributed databases. **[5]**

OR

Q2) a) Explain concept of Parallel Query Evaluation and its different issues. **[5]**

b) What are different structured data types explain with example. **[5]**

Q3) a) Explain with example concept of efficient evaluation of XML Queries? **[5]**

b) Explain the concept of Data Access and Indexing in DynamoDB? **[5]**

OR

Q4) a) Explain the concept of Data caching in NoSQL Databases. **[5]**

b) Explain in detail CQL Data model and Indexing? **[5]**

Q5) a) What is stream data management system explain its issues and solutions. **[8]**

b) What is a Social Network? Explain concept of mining on social networks. **[8]**

OR

P.T.O.

Q6) a) Write a short note on following **[8]**

i) Graph Databases

ii) Neo4j

b) Explain methods for mining frequent sub-graphs. **[8]**

Q7) a) Explain different Text categorization methods in detail. **[6]**

b) Describe recommender systems and collaborative filtering in detail. **[6]**

c) Explain content based recommendation in detail. **[6]**

OR

Q8) a) Explain problem definition in Text characterization method in detail. **[6]**

b) Explain Information Retrieval and Information extraction in detail. **[6]**

c) What is web mining? Explain web mining Taxonomy in detail. **[6]**

Q9) a) Explain Query Evaluation in Deductive databases. **[8]**

b) Write a short note on Temporal Databases. **[8]**

OR

Q10)a) Compare Spatial and Temporal Databases. **[8]**

b) What is Semantic? Explain semantic in deductive Database. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3258

[Total No. of Pages :2

[5461] - 296

B.E. (Information Technology)

MOBILE COMPUTING

(2012 Course) (End Sem.) (Semester - II) (414463 A) (Elective - III)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain any one strategy of Handoff detection. **[4]**

b) Explain Mobile device classification. **[5]**

OR

Q2) a) Explain 3 Tier Mobile computing architecture with diagram. **[4]**

b) Explain 1G, 2G, 2.5G and 3G. **[5]**

Q3) a) Explain SMS Architecture with diagram. **[5]**

b) Explain different types of databases used in GSM architecture. **[5]**

OR

Q4) a) Explain VLR Identification algorithm to identify the exact VLRs to be identified by HLR after HLR failure. **[5]**

b) Explain in detail Mobile prepaid service? Name different solutions to implement Mobile Prepaid service? **[5]**

P.T.O.

Q5) a) Explain significance of SGSN and GGSN in GPRS architecture? Draw GPRS Architecture diagram with interfaces. **[8]**

b) What are design considerations for WAP? It is not recommended to implement TCP/IP directly over mobile network. Justify your answer. **[9]**

OR

Q6) a) Write short notes on WCDMA and CDMA 2000. **[9]**

b) How GPRS is evolved from GSM? Explain in detail. **[8]**

Q7) a) Explain different phases of mobile application development with diagram. **[9]**

b) Describe in detail the factors responsible to select Mobile Application Architecture. **[8]**

OR

Q8) a) What is major difference between wireless internet, smart client, and messaging mobile application architectures? **[9]**

b) What is application to application messaging architecture? Explain advantages and disadvantages of same. **[8]**

Q9) a) Explain application Life Cycle of Android with flowchart. **[9]**

b) Which are testing methodologies for mobile applications? Explain. **[8]**

OR

Q10) a) Explain Android OS architecture and its components in detail. **[9]**

b) List and describe application components of android. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3259

[Total No. of Pages :2

[5461] - 297

B.E. (Information Technology)

ADVANCED GRAPHICS AND ANIMATION

(2012 Pattern) (Semester - II) (414463 B) (Elective - III) (End Sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, 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 Quadratic Bézier curves in detail. **[5]**

b) Give the plane parameters A,B,C,D for all surfaces of an object, derive an expression to determine whether any specified point is inside or outside the object. **[5]**

OR

Q2) a) Explain Surface Rendering and polygon surfaces in detail. **[5]**

b) Explain primitive instancing method for solid modeling. **[5]**

Q3) a) Explain constructive solid modeling in detail. **[5]**

b) IIIustrate "Basic Ray tracing Algorithm". **[5]**

OR

Q4) a) What is texture mapping? Explain with suitable example. **[5]**

b) List all different types of shading techniques. Explain Phong shading in detail. **[5]**

P.T.O.

Q5) a) List all Culling algorithm. How Culling performed in OpenGL? **[8]**

b) Does OpenGL support shadows implementation directly? Explain how it is implemented? **[8]**

OR

Q6) a) How Fog stage is implemented in OpenGL pipeline? **[8]**

b) What is OPenGL extension? Explain how these extensions used in OPenGL with sample code. **[8]**

Q7) a) What is meant by Animation Language? Explain the types of animation languages with appropriate examples. **[8]**

b) What is meant by key-framing, tweening and morphing? **[8]**

OR

Q8) a) What are the methods of controlling animation? Explain. **[8]**

b) Write short note on: **[8]**

i) Frame-by-Frame Animation Techniques.

ii) Real Time Animation Techniques.

Q9) a) What is virtual reality? Explain various forms of virtual reality. **[8]**

b) Describe any two special devices that are used for man machine interaction in virtual reality systems. **[10]**

OR

Q10) a) What is a haptic texturing? Why is it so important in virtual reality? **[8]**

b) Explain the use of Virtual Reality in Civil Engineering. **[10]**

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Total No. of Questions : 10]

SEAT No. :

P3260

[Total No. of Pages :2

[5461] - 298

B.E. (Information Technology)

INFORMATION STORAGE AND RETRIEVAL

(2012 Course) (End Sem.)(Semester - II) (414463 C) (Elective - III)

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) a) Write difference between Data retrieval and Information Retrieval. Define Index term. **[5]**

b) Let **[5]**

Document 1 = {CPU, Keyboard, RAM, VGA, SMPS, USB, CD-ROM, Printer}

Document 2 = {CPU, VGA, Simulator, OS, Video, USB, Printer, Scanner, Compiler}.

Find the similarity between two documents using

i) Simple matching function

ii) Dice's Coefficient

iii) Jaccard's coefficient

iv) Cosine coefficient

v) Overlap coefficient.

OR

Q2) a) Explain Riccho's algorithm. **[5]**

b) What is clustering? Explain the use of clustering in IR. **[5]**

P.T.O.

Q3) a) Explain Vector model in detail. **[5]**

b) Explain ontology and ontology life cycle. **[5]**

OR

Q4) Discuss cluster based retrieval strategy. Also explain how to define cluster representative. **[10]**

Q5) a) How queries are processed in distributed IR? **[8]**

b) Explain GEMINI approach for multimedia IR. **[8]**

OR

Q6) a) Write a short note on MULTOS. **[8]**

b) What are the issues in distributed IR computing? Explain techniques used to address these issues. **[8]**

Q7) a) What are meta crawlers? Explain with example. **[8]**

b) Explain centralized crawler indexer and harvest distributed architecture of search engine. **[10]**

OR

Q8) a) What is meant by web crawling? Explain processing steps in web crawling. **[6]**

b) Write a short note on web data mining. **[6]**

c) What is robo exclusion? Explain structure of robo.txt. **[6]**

Q9) a) Define recommender system? Explain in brief collaborative filtering. **[8]**

b) Explain the method for extracting data from text. **[8]**

OR

Q10) a) Discuss trends and research issues involved in web. **[8]**

b) Explain in details web usage mining. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3261

[Total No. of Pages :2

[5461] - 299

B.E. (Information Technology)

IT ENABLED SERVICES

(2012 Course) (Semester - II) (Elective - III) (414463D)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Describe IT Application Strategy in brief. **[6]**

b) Enlist Characteristics of Business Strategy. **[2]**

OR

Q2) a) Discuss three important factors of framework of business and IT alignment. **[6]**

b) Describe reasons for formulation of IT strategy. **[2]**

Q3) a) Explain Botton-up evaluative approach of Strategic IT plan. **[6]**

b) What is program management? How it is different from project management? **[6]**

OR

Q4) a) Explain SITP overall planning process with the help of diagram. **[6]**

b) What are the advantages of defining EITA? **[6]**

P.T.O.

Q5) a) Describe ITIL version and their coverage. **[8]**

b) Explain in brief service level management. **[8]**

OR

Q6) a) What are the IT management layers and considerations for outsourcing? **[8]**

b) Describe '*Insourcing*' in brief. **[8]**

Q7) a) How to define Object in object oriented PHP? Explain with suitable example. **[8]**

b) Describe custom error handler function in PHP with suitable PHP program. **[8]**

OR

Q8) a) Write short note on WSDL document structure. **[8]**

b) Describe methods to send information to PHP file through HTML form. **[8]**

Q9) a) Describe 'Outlook of the IT and ITES Industry'. **[9]**

b) Discuss current employment in IT/ITES industry. **[9]**

OR

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

b) Write a case study on Internet banking. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P3262

[Total No. of Pages :2

[5461] - 300

B.E. (Information Technology)

ADVANCED COMPUTER NETWORKS

(2012 Course) (414463E) (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) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is the need of detection of errors at various layers of OSI? **[6]**

b) Explain ISDN services. **[4]**

OR

Q2) a) Describe architecture of network. **[6]**

b) Explain the logical layers of ISO/OSI model. **[4]**

Q3) a) Explain inter-domain routing Protocol as BGP? **[6]**

b) Differentiate IPv4 and IPv6. **[4]**

OR

Q4) a) Explain IGRP in detail. **[6]**

b) Describe VPN in brief. **[4]**

Q5) a) State various issues in resource allocation. **[8]**

b) Explain any one queuing discipline in detail. **[10]**

OR

P.T.O.

Q6) a) What are the techniques of TCP congestion control? Explain Fast retransmit and Fast recovery. **[10]**

b) How to transmit MPEG over network? Explain. **[8]**

Q7) a) Explain Traffic Engineering with VPN. **[8]**

b) State and explain various attributes of QoS. **[8]**

OR

Q8) a) Explain any one routing protocol for QoS routing. **[8]**

b) Describe Traffic Engineering with IP/MPLS. **[8]**

Q9) a) Explain basic architectural stack of IEEE 802.16. **[8]**

b) What are the research trends in wireless networks? **[8]**

OR

Q10) a) List the differences between various 802.11 standards. **[10]**

b) Explain QoS in wireless networks. **[6]**

Total No. of Questions :10]

SEAT No. : ____

P3264

[Total No. of Pages : 2

[5461]-300B
B.E. (IT)
REAL TIME & EMBEDDED SYSTEMS
(Elective-IV) (414464B) (2012 Course) (End Semester) (Semester-II)

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, 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) Discuss the advantages and disadvantages of top-down and bottom-up design process in embedded system design. **[6]**

b) Explain Architecture of CAN controller. **[4]**

OR

Q2) a) What is embedded system? How it is different from other systems? Explain with examples. **[6]**

b) Comment on 'Networking buses in embedded system'. **[4]**

Q3) a) List the key features of SHARC processor and discuss the targeted application areas for this processor. **[6]**

b) Explain 12C bus architecture and its operation in detail. How many devices can be connected on 12 C bus? **[4]**

OR

Q4) a) Draw general architectural block diagram of ARM processor. List main features of ARM processor. **[6]**

b) Compare and contrast 12 C, CAN serial buses with respect to features, data rates wire length and no of devices it can connect. **[4]**

Q5) a) Use Cyclic scheduler for scheduling a periodic task set of T1 (4,1), T2 (5, 1. 8), T3 (20,1), T4 (20,2), Find utilization and hyper period and give possible schedule for the same. Comment on whether schedule produced is feasible. **[10]**

b) Give the classification of the scheduling algorithms, compare and contrast static vs. dynamic algorithms with examples. **[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) Write a note on ‘ classification of task’. **[8]**

Q7) a) Explain resource reclaiming algorithm. **[8]**

b) What is deadlock & explain how to avoid deadlock with priority ceiling protocol. **[8]**

OR

Q8) a) What is resource reclaiming? State needs of resource reclaiming algorithm. **[8]**

b) Explain algorithm for scheduling aperiodic tasks & periodic tasks. **[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. : ____

P3265

[Total No. of Pages : 2

[5461]-300C

B.E. (Information Technology)

GREEN IT PRINCIPLES AND PRACTICES

(Semester-II) (414464C) (2012 Course) (Elective-IV)

Time : 2:30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, and 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) For enterprises, do green initiatives and green IT present a burden or an opportunity to leverage their benefits? **[6]**

b) Describe the 3Rs of green IT **[4]**

OR

Q2) a) What do you mean by Software Sustainability? Explain process-related attribute of same. **[6]**

b) Distinguish between 'green' and 'sustainable'. **[4]**

Q3) a) Why it is necessary to include software development and maintenance as part of an organization's green IT strategy? **[6]**

b) Write a note on: Server Farm and Service Orientation. **[4]**

OR

Q4) a) What are various Strategies to Reduce Carbon Emissions? **[6]**

b) What are the Objectives of Green Networking? **[4]**

Q5) a) What are the four Stages of Life-Cycle assessment (LCA) w.r.t. Product Level Information? **[8]**

b) How to Measure the Maturity of Sustainable information and communication technology (ICT)? **[6]**

OR

P.T.O.

Q6) a) Write a note on: Sustainability Hierarchy Models. **[8]**

b) Write a note on: Regional/City Level Information. **[6]**

Q7) a) What are the driving factors for the development of green and sustainable IT? **[9]**

b) Discuss the primary sustainability dimensions of IT. **[9]**

OR

Q8) a) Discuss activities of inter organizational Enterprise and Green Issues. **[9]**

b) Write a note on: Sustainable IT Services (SITS). **[9]**

Q9) a) What are Enterprise architecture planning levels of Enterprise Architecture planning (EAP)? **[9]**

b) Initiating green IT management involves which four key components. **[9]**

OR

Q10)a) What is the difference between strategic thinking and strategic planning? **[9]**

b) What is Information Assurance? Explain six steps of Risk assessment. **[9]**

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Total No. of Questions :10]

SEAT No. : ____

P3266

[Total No. of Pages : 2

[5461]-300-D

B.E. (Information Technology)

INTERNET OF THINGS

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

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***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 IoT Architecture with neat diagram. **[6]**

b) Write in detail Applications of Internet of Things. **[4]**

OR

Q2) a) Explain EPC Global Architecture framework. **[4]**

b) What is Internet of Things (IoT)? List which things are connected to IoT. **[6]**

Q3) a) What are the challenges and issues in RFID system. **[5]**

b) Discuss various components of RFID system. **[5]**

OR

Q4) a) What is sensor network? What are basic components of sensor network? **[5]**

b) Explain Environment, Traffic characteristics of IoT. **[5]**

Q5) a) Explain in detail design guidelines for Internet of Things. **[8]**

b) Why Identity management needed in Internet of Things? Explain any 2 Identity management techniques of Internet of Things. **[10]**

OR

P.T.O.

Q6) a) Explain in detail clustering principle in Internet of Things. How clustering is used in IoT? **[8]**

b) Explain in detail data synchronization techniques in Internet of Things.**[10]**

Q7) a) Why security required in IoT? Explain in detail various security model in Internet of Things. **[10]**

b) What is threat analysis in Internet of Things ? Explain in detail. **[8]**

OR

Q8) a) What is Internet of Things security tomography? Explain in detail layered attacker model? **[10]**

b) Explain in detail access control and message integrity of Internet of Things. **[8]**

Q9) a) Write short note on: Business model in Internet of Things. **[5]**

b) Explain in detail application of Internet of Things in city automation and e-health body area network. **[9]**

OR

Q10)a) How Internet of Things used for home automation. **[6]**

b) Explain in detail business model and business innovation in Internet of Things. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3267

[Total No. of Pages : 3

[5461]-301

B. E. (Chemical)

PROCESS DYNAMICS & CONTROL

(2012 Course) (End Sem.) (Semester - I) (409341)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

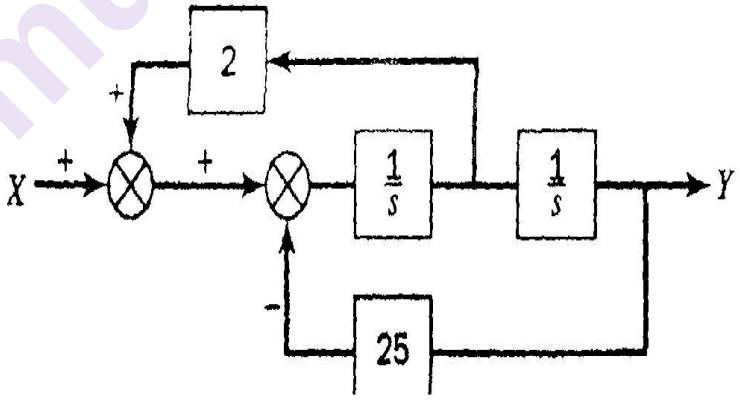
1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) In an open liquid level tank system, the out flow rate q_0 is related to the head h by the relation $q_0 = 0.05\ h^{½}$. Assume that at the inlet flow rate $q_i = 0.05 m^3/s$, the head stays constant. At t = 0, the inlet flow valve is closed. Linearize the above equation and find the time necessary to empty the tank to half the original head. Take tau = 2 s, area = 2sqm. **[10]**

OR

Q2) a) What are servo and regulator problems? Explain with a typical example in a chemical process and differentiate between them. **[5]**

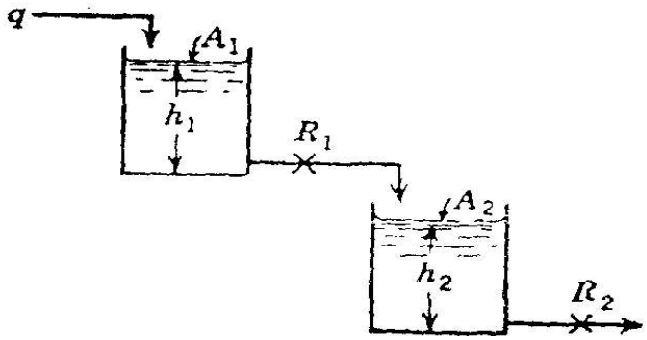
b) Derive the transfer function Y/X for the control system shown in figure. **[5]**



Q3) The two-tank liquid-level system shown in Fig is operating at steady state when a step change is made in the flow rate to tank 1. The transient response is critically damped, and it takes 1.0 min for the change in level of the second tank to reach 50 percent of the total change. If the ratio of the cross- sectional

P.T.O.

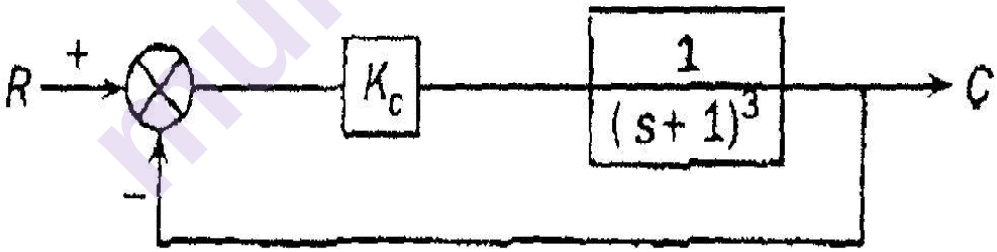
areas of the tanks is $A_1/A_2 = 2$, calculate the ratio R_1/R_2. Calculate the time constant for each tank. How long does it take for the change in level of the first tank to reach 90 percent of the total change? **[10]**



OR

Q4) Draw block diagram of a simple feedback control loop used to control the temperature in a stirred heating tank. Describe all the components of such a control loop. Derive closed loop transfer function for such a loop. **[10]**

Q5) a) In the control system shown in Figure, find the value of Kc for which the system is on the verge of instability. The controller is replaced by a PD controller, for which the transfer function is Kc(tau_Ds + 1). If Kc = 10, determine the range of tau_D for which the system is stable. **[8]**



b) Write a short note on Time integral performance criteria by ITAE. **[8]**

OR

Q6) a) Draw Bode Plots for $G(s) = \dfrac{s}{(10s+1)(0.1s+1)}$. Comment on its stability. **[8]**

b) Write a note on Ziegler Nichols controller setting. **[8]**

Q7) a) Describe Scheduled / Predictive adaptive control scheme in details. Also describe its use in any chemical process control. **[8]**

b) What is dead time compensator? Explain with neat block diagram Smith predictor. **[8]**

OR

Q8) a) What is a ratio control? Draw and describe a ratio control scheme for a typical heat exchanger system. **[8]**

b) Draw general structure / scheme for a cascade control system. Also explain a cascade control control scheme used for a typical distillation column. **[8]**

Q9) a) Explain the role of a digital computer in chemical industry process control. **[9]**

b) What is a centralized control system? Describe architecture of a distributed centralized control system. **[9]**

OR

Q10)a) How a digital approximation of a typical control action is done? Explain its importance in the context of a control action in a control loop. **[9]**

b) What are zero order holds? Where they are used in a control loop and explain their functioning. **[9]**

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Total No. of Questions :10]

SEAT No. :

P3268

[Total No. of Pages : 2

[5461]-302
B.E. (Chemical)
CHEMICAL REACTION ENGINEERING - II
(2012 Course) (Semester-I) (409342)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of Electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Consider a situation where the size mixture of particles of unchanging size with uniform gas composition is a feed for mixed flow. Derive the equation for overall mean fractional conversion for all resistances. Draw suitable sketch to represent the system with feed and exit streams distribution. **[10]**

OR

Q2) Consider the reaction A(liquid)+B(gas) $\rightarrow$ C(Liquid)+D(Gas) is a slow, elementary, irreversible and occurs in the liquid between dissolved gas B and A. By considering suitable assumptions derive the equation to evaluate height of tower as a function of the variables of system. **[10]**

Q3) Explain step wise procedure for slurry reaction kinetics and derive rate equation with concentration profile. **[10]**

OR

Q4) Explain in detail the mechanism of catalytic reactions. **[10]**

Q5) a) Derive equations for the effectiveness factor for a first order reversible reaction A$\leftrightarrow$B at isothermal conditions, for a spherical catalyst pellet. **[8]**

b) Explain in detail experimental and calculated effectiveness factor. **[8]**

OR

Q6) a) Derive the equation to express Knudsen diffusivity in a long capillary for gaseous diffusion in single cylindrical pores. **[8]**

b) What do you understand by mass transfer with reaction? Define effectiveness factor. **[8]**

P.T.O.

Q7) The catalytic reaction A→4R is studied in a plug flow reactor using various amounts of catalyst and 25 lit/hr of pure A feed at 3.5 atm and 120°C. The concentration of A in the effluent stream is recorded for the various runs as follows. **[16]**

Run	1	2	3	4	5
Catalyst used, kg	0.020	0.040	0.080	0.120	0.160
$C_{A,\,out,}$ mol/lit	0.074	0.060	0.044	0.035	0.029

Find the rate equation to represent this reaction by using integral method of analysis with $\varepsilon_A=3$.

OR

Q8) a) The catalytic reaction A→4R take place in a plug flow reactor, the following rate concentration data are available **[8]**

C_A, mol/lit	0.039	0.0575	0.075	0.092
$-r_A'$ mol A/hr.kg cat	3.4	5.4	7.6	9.1

Directly from data, without using rate equation, find the amount of catalyst bed needed to treat 2500 mol/hr of pure A at 150°C (C_{A0}=0.12 mol/lit, ε_A=3) to 45% conversion, all at 3.5 atm.

b) Explain in detail differential reactor and integral reactor with governing equation. **[8]**

Q9) a) Explain construction and operation of isothermal fixed bed reactor in detail with suitable schematic diagram. **[6]**

b) Explain design procedure in case of slurry reactor. **[6]**

c) Explain in detail Michaelis-Menton Kinetics. **[6]**

OR

Q10)a) Explain fluidized bed reactor in detial with suitable schematic diagram. **[6]**

b) Write a short note on enzyme fermentation. **[6]**

c) What are the various parameters responsible for effective design of biochemical reaction systems? **[6]**

Total No. of Questions : 10]

SEAT No. :

P3269

[Total No. of Pages : 2

[5461]-303
B.E. (Chemical)
CHEMICAL ENGINEERING DESIGN - II
(2012 Pattern) (Semester-I) (409343) (End semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Explain the downcomer back up calculations for a sieve plate column with necessary expressions. **[10]**

OR

Q2) a) State the difference between choice of plates or Packings. **[5]**

b) Explain in brief murphree plate efficiency and overall column efficiency. **[5]**

Q3) Using Onda's method estimate height of gas film transfer unit, liquid film transfer unit and height of an overall gas phase transfer unit to absorb So_2 in water at 20ºC produced by the combustion of Sulphur in Air.

Data :-

R = 0.08314 bar m^3/Kmol.K

Surface tension of liquid = 70×10^{-3} N/m

For Intalox saddles packing of ceramic material

Packing size = 38 mm Actual area of packing per unit volume = 196m^2/m^3

Surface tension of packing material = 60×10^{-3}N/m

Density of water = 1000 kg/m^3 L*w = 17 kg/sm^2

Viscosity of water = 0.98×10^{-3} Ns/m^2 9 = 9.81 m/s^2

Flow rate of gas = 1.40 kg/s

Actual diameter of column = 1.5 m

K_5 = 5.23

Viscosity of gas = 0.019×10^{-3} Ns/m^2

Density of gas = 1.24 kg/m^3

Gas diffusivity = 1.43×10^{-5} m^2/s

Liquid diffusivity = 1.71×10^{-9} m^2/s

Molar flow rate of gas per unit C.S.A. of column = Gm = 0.025 Kmol/m^2s

Molar flow rate of liquid per unit C.S.A. of column = 0.94 Kmol/m^2s. **[10]**

Take $\frac{mGm}{Lm} = 0.8$

OR

P.T.O.

Q4) a) Explain equations in Cornell's method for prediction of HTU in design of a packed absorption column. **[5]**

b) State stepwise procedure for design of sieve tray fractionating column. **[5]**

Q5) a) Water is flowing through a pipeline at a rate of 1.5 kg/s. The internal diameter of pipeline is 30 mm and length of pipe is 2.5 Km. Estimate the pressure drop in the pipeline. **[10]**

b) State desirable properties of a piping material. **[6]**

OR

Q6) a) Explain in brief with necessary expressions and various parameters design of pipeline for transportation of natural gas. **[10]**

b) Write a short note on Pipe fittings materials. **[6]**

Q7) a) Describe in brief various types of gaskets with material selection. **[10]**

b) Explain treatment techniques used for boiler feed water. **[8]**

OR

Q8) a) Explain in brief different types of boiler mountings with neat diagrams. **[12]**

b) Write a short note on : Uses of thermic fluids. **[6]**

Q9) a) Explain in brief types of plant Maintenance. **[8]**

b) Explain in brief : Lubrication. **[8]**

OR

Q10)a) Explain in brief regarding maintenance of a centrifugal pump. **[8]**

b) Describe in brief : HAZAN studies. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3270

[Total No. of Pages : 1

[5461]-304

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(2012 Course) (End Sem.) (Semester - I) (Elective - I) (409344A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) Define air pollution standards and discuss effect of fly ash on materials. **[10]**

OR

Q2) Discuss the environmental impact of Nuclear energy. **[10]**

Q3) Explain the MPCB standards for PM. **[10]**

OR

Q4) Explain Bubler with neat diagram. **[10]**

Q5) Explain the Centrifugal Spray Tower with neat figure. **[16]**

OR

Q6) Explain the removal of Nox by wet method with neat labeled figure. **[16]**

Q7) Explain the effect of oil pollution. **[18]**

OR

Q8) Discuss Oxygen Sag curve and derive Streeter Phelps Equation. **[18]**

Q9) What is Photo catalytic reactor? Explain the industrial use of it. **[16]**

OR

Q10)How to recover materials from waste? Explain with suitable example. **[16]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3271

[Total No. of Pages : 2

[5461]-305

B.E. (Chemical Engg.)

MEMBRANE TECHNOLOGY

(2012 Course) (Semester - I) (End Sem.) (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.***
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 details selection criteria needed for membrane selection for industrial separation. **[6]**

b) Define following terms **[4]**

i) Molecular weight cut off

ii) Separation factor

iii) Percentage rejection

OR

Q2) a) Explain in details about characterization of membrane. **[6]**

b) Give short notes on polymeric membranes materials and its properties. **[4]**

Q3) a) Explain in details with neat sketches phase inversion process of membrane casting. **[5]**

b) Give short note on tubular membrane module with suitable sketches. **[5]**

OR

Q4) a) Explain in details about Knudsen diffusion and surface diffusion through microporous membrane. **[6]**

b) Give short notes on solution diffusion theory for dialysis. **[4]**

Q5) a) Explain in details methods of membrane cleaning. **[8]**

b) Explain in details fouling of the membrane and give the methods of reducing the it. **[8]**

OR

P.T.O.

Q6) a) What is concentration polarization? And give the methods to reducing concentration polarization. **[8]**

b) Explain in details about gel layer model. **[8]**

Q7) a) Define reverse osmosis? And explain in details with suitable sketches application of reverse osmosis for waste water treatment. **[10]**

b) Give the application of microfiltration membranes for sterile filtration of pharmaceuticals. **[6]**

OR

Q8) a) Describe in details application of ultrafiltration membranes in clarification of fruit juice. **[10]**

b) Give application of Nano filtration membranes for separation of organic solvent. **[6]**

Q9) a) Describe in details with suitable sketches and reactions application of membrane for separation of natural gas. **[10]**

b) Explain in details application of membrane for olefin separation. **[8]**

OR

Q10)a) Explain in details with neat sketches about membrane distillation. **[8]**

b) Describe in details application membrane for recovery of metals from dilute solution. **[10]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3272

[Total No. of Pages : 2

[5461]-306

B.E. (Chemical)

CORROSION ENGINEERING

(2012 Course) (Semester - I) (End Sem.) (Elective - I) (409344C)

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 ruler, Mollier Charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Write note on erosion. **[5]**

b) How much rust (Fe_2O_3, H_2O) will be formed when 10 kg iron completely rusted. **[5]**

OR

Q2) a) Discuss the different types of corrosion that we commonly come across. **[5]**

b) Explain electrochemical corrosion. **[5]**

Q3) a) Explain the two important factors that influence the corrosion of metals? **[5]**

b) Mention the theories of corrosion and explain any one of them. **[5]**

OR

Q4) a) Distinguish between wet and dry corrosion. **[5]**

b) What are the differences between EMF and Galvanic Series. **[5]**

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]**

P.T.O.

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

a) Pilling-Bedworth rule

b) concentration cell corrosion

OR

Q8) Write note on **[16]**

a) pitting corrosion

b) inter-granular corrosion

Q9) a) Discuss about the use of inhibitors in corrosion control. **[9]**

b) Explain the process of electroplating with a suitable example. Mention the uses of electroplating. **[9]**

OR

Q10)a) Discuss various methods of corrosion control. **[9]**

b) Give difference between galvanizing and tinning. **[9]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3273

[Total No. of Pages : 2

[5461]-307

B.E. (Chemical Engg.)

PETROLEUM REFINING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, 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 are the scientific methods for exploration of crude reserve? **[5]**

b) What are the types of hydrocarbon compounds present in crude oil? **[5]**

OR

Q2) a) Define and briefly explain various properties of specific types of crude oil. **[5]**

b) Why is crude oil conditioning required? **[5]**

Q3) a) With the help of diagram explain vaccum crude oil distillation unit. **[5]**

b) Distinguish between petroleum coke and bitumen with respect to their chemical properties. **[5]**

OR

Q4) a) Explain in brief various pre-refining operations. **[5]**

b) Why is desalting of crude necessary? **[5]**

Q5) a) Distinguish between a thermal cracking unit and a catalytic cracking unit. **[10]**

b) What are the effects of nickel, vanadium and sodium present in the feedstock on an FCC unit? What are the necessary precautions required in an FCC unit in case feed contains all these metals? **[7]**

OR

P.T.O.

Q6) a) How is petroleum coke manufactured? Explain it with flow sheet. **[10]**

b) What is hydro-cracking? Explain with the help of flow diagram. **[7]**

Q7) a) Discuss various components required to manufacture lubricating oils and greases. **[10]**

b) Explain recovery of Hydrogen in the refinery with the help of diagram. **[7]**

OR

Q8) a) What are the air pollution sources in refining operations? Discuss different ways to reduce air pollution in refineries. **[10]**

b) With the help of flow diagram, explain recovery of sulphur in refinery. **[7]**

Q9) a) How the petroleum products are transported? Explain with examples. **[8]**

b) Why the blending of refinery products is done? Explain with suitable examples. **[8]**

OR

Q10)a) Describe various methods for the storage of petroleum products. **[8]**

b) Discuss Marketing strategies of petroleum and petroleum products. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3274

[Total No. of Pages : 2

[5461]-308

B.E. (Chemical)

CHEMICAL PROCESS SYNTHESIS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Concept of Onion model. **[5]**

b) What do you mean by retrofit or revamping of new design. **[5]**

OR

Q2) Discuss idealized reactor model. **[10]**

Q3) Benzene is to be produced from toluene according to following reaction:

$C_6H_5CH_3 + H_2 \rightarrow C_6H_6 + CH_4$

toluene hydrogen benzene methane

Some of the benzene formed undergoes a number of secondary reactions in series to unwanted by products that can be characterized by the reaction to diphenyl, according to reaction : **[10]**

$2C_6H_6 \rightleftharpoons C_{12}H_{10} + H_2$

benzene diphenyl hydrogen

Table gives the composition of the reactor feed and effluent streams

Component	Inlet flow rate(kmol.h^{-1})	Outlet flow rate(kmol.h^{-1})
H_2	1858	1583
CH_4	804	1083
C_6H_6	13	282
$C_6H_5CH_3$	372	93
$C_{12}H_{10}$	0	4

Calculate the conversion, selectivity and reactor yield with respect to the:

a) Toluene feed

b) Hydrogen feed

OR

P.T.O.

Q4) a) Draw three possible arrangements for a three stage evaporator. **[5]**

b) Discuss the foremost cases where distillation is not well suited for the separation. **[5]**

Q5) Explain with sketches the concept of heat integration of sequences of simple distillation column. **[16]**

OR

Q6) a) Discuss thermal coupling for direct and indirect distillation sequencing. **[8]**

b) Discuss optimization of a reducible structure. **[8]**

Q7) a) What are composite curves discuss in detail. **[8]**

b) What is integration of heat pumps. **[8]**

OR

Q8) a) Explain concept of Pinch technology. **[8]**

b) Explain graphically heat recovery pinch. **[8]**

Q9) a) Explain in detail the intensification of hazardous materials and attenuation of hazardous materials. **[12]**

b) Discuss major hazards in process plants. **[6]**

OR

Q10)a) Write short note on

a) Fire and explosion **[9]**

b) Quantitative measures of inherent safety **[9]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3275

[Total No. of Pages : 2

[5461]-309

B.E. (Chemical)

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

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

OR

P.T.O.

Q6) a) Explain Business communication and communication process. **[8]**

b) Explain the Hierarchy of needs given by Abraham Maslow. **[8]**

Q7) 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. :

P3276

[Total No. of Pages : 2

[5461]-310

B.E. (Chemical Engineering)

PIPING DESIGN AND ENGINEERING

(2012 Course) (Semester-I) (Theory) (End Sem.) (409345C) (Elective-II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) Explain restriction orifice and Pipe fittings. **[10]**

OR

Q2) Explain Pipe network analysis. **[10]**

Q3) a) Discuss in brief chemical and mechanical properties of piping materials. **[4]**

b) Write note on the material selection of piping components. **[6]**

OR

Q4) a) Discuss the coefficient of discharge method (k_ρ) for sizing of rupture disk. **[5]**

b) Write note on safety valve characteristics. **[5]**

Q5) Explain line sizing of Surge drum and Slurry Pipelines. **[17]**

OR

Q6) Explain design principle and line sizing of vacuum piping and pneumatic conveying of solids. **[17]**

P.T.O.

Q7) a) What are the design parameters considered for thermal insulation of piping. **[8]**

b) Derive a relation for the critical radius of insulation for circular cross-section having length L and Radius R. **[8]**

OR

Q8) a) What are criteria for selection of the insulating material. **[8]**

b) Calculate the critical radius of insulation for asbestos (k = 0.17 W/(m.K)) surrounding a pipe and exposed to a room air at 293 K with h = 3.0 W/(m^2.K). Calculate the heat loss from a 473 K, 50 mm diameter pipe when covered with the critical radius of insulation and without insulation. Would any fibre glass insulation having a thermal conductivity of 0.04 W/(m.K) cause decrease in heat transfer? **[8]**

Q9) Explain: **[17]**

a) Piping isometrics.

b) Piping Layout.

c) Bill of Material.

d) Equipment Layout.

OR

Q10)Explain piping layout considerations for : **[17]**

a) Pipe Rack and

b) Pumps.

Total No. of Questions : 10]

SEAT No. :

P3277

[Total No. of Pages : 2

[5461]-311

B.E. (Chemical)

ADVANCED SEPARATION PROCESSES

(2012 Course) (End Sem.) (409345D) (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) ***Assume suitable data, if necessary.***

Q1) Explain Thiele-Geddes and Maddox methods in detail. **[10]**

OR

Q2) Explain homogeneous and heterogeneous azeotropic distillation in detail. **[10]**

Q3) a) Explain reactive extraction in detail. **[5]**

b) Explain reactive crystallization in detail. **[5]**

OR

Q4) Explain the working principle of separation based on reversible chemical complexation and also explain its industrial application. **[10]**

Q5) Write short notes on: **[18]**

a) Reverse osmosis.

b) Ultra filtration.

c) Pervaporation.

OR

P.T.O.

Q6) a) Give the advantages of membrane technology over the traditional separation technologies. **[6]**

b) Give the industrial applications of membrane separation techniques. **[6]**

c) Explain with neat diagram 'Liquid emulsion membranes'. **[6]**

Q7) a) Explain the basic concept and industrial application of liquid chromatography. **[8]**

b) Explain the characteristics of solids and their selection in chromatography separation system. **[8]**

OR

Q8) a) Explain pressure swing adsorption process in detail with neat diagram. **[8]**

b) Explain the types of chromatography. **[8]**

Q9) Write short notes on: **[16]**

a) Molecular sieves.

b) Foam formation.

OR

Q10) Write short notes on: **[16]**

a) Collapse and drainage phenomena.

b) Zone electrophoresis.

Total No. of Questions : 10]

SEAT No. :

P3278

[Total No. of Pages : 3

[5461]-312

B.E. (Chemical)

PROCESS MODELING AND SIMULATION

(2012 Course) (End Sem.) (409349) (Semester-II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) Consider a particular industry sector such as food, minerals, chemicals or pharmaceuticals and review where and how models are used in those industry sectors. What forms of models are typically used? Is there any indication of the effort expended in developing these models against the potential benefits to be derived from their use? **[10]**

OR

Q2) Give some reasons for doing mathematical modeling in chemical engineering. And explain why the model development often becomes an iterative procedure. **[10]**

Q3) Describe the continuum concept. **[10]**

OR

Q4) At what scale is Darcy's law formulated? Are there alternatives that describe flow in porous materials? **[10]**

Q5) Develop a model for Triple effect evaporator. **[16]**

OR

Q6) Discuss the assumption for mixing process and develop a model for it. **[16]**

P.T.O.

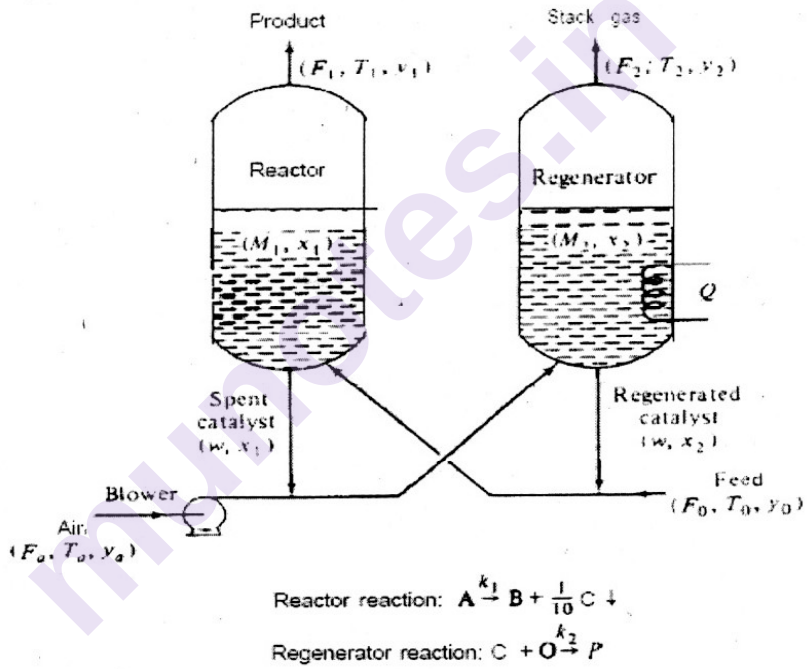
Q7) Write the equations describing a simple version of the petroleum industry's important catalytic cracking operation. There are two vessels as shown below. Component A is fed to the reactor where it reacts to form product B while depositing component C on the solid fluidized catalyst. **[16]**

$$A \rightarrow B + 0.1C$$

Spent catalyst is circulated to the regenerator where air is added to burn off C.

$$C + O \rightarrow P$$

Combustion products are vented overhead, and regenerated catalyst is returned to the reactor. Heat is added to or removed from the regenerator at a rate Q.



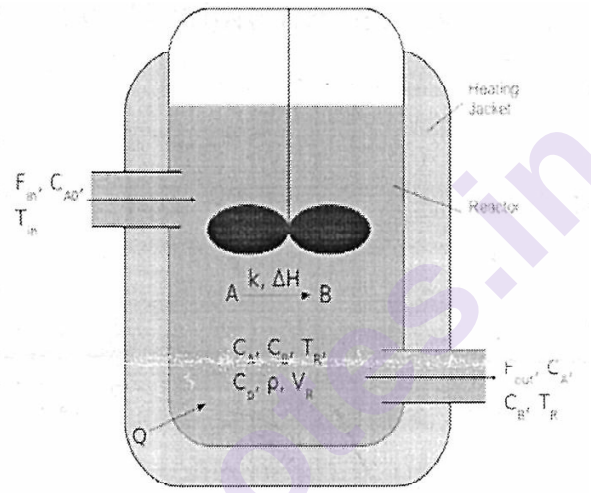
OR

Q8) Develop a mathematical model for absorption column. Use notations as usual. Write assumptions. Draw neat figure. **[16]**

Q9) Develop a mathematical model for Bioreactor. **[18]**

OR

Q10) Consider a CSTR where an irreversible, first-order endothermic reaction of the form $A \xrightarrow{k} B$ takes place. Let CA denote the concentration of the species A in the reactor, TR and Tin denote the temperatures of the reactor and of the inlet stream, respectively, Q, is the heat added to/removed from the reactor, CA0 is the concentration of A in the inlet stream, V is the volume of the reactor, $k0$, E, ΔH are the pre-exponential constant, the activation energy, and the enthalpy of the reaction and Cp and ρ are the heat capacity and fluid density in the reactor. Develop a model that describes the evolution of the concentration and temperature in the reactor, using a systematic modeling approach that also outlines all assumptions made. **[18]**



Total No. of Questions : 10]

SEAT No. :

P3279

[Total No. of Pages : 4

[5461]-313

B.E. (Chemical)

PROCESS ENGINEERING COSTING AND PLANT DESIGN

(2012 Course) (Semseter - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) What are the significances of plant layout in any chemical industries? **[10]**

OR

Q2) Explain the Faulty tree analysis in details. **[10]**

Q3) The Original value of piece of equipment is Rs. 4,500, completely installed and ready for use. Its salvage value is estimated to be Rs. 300 at end of service life estimate be 20 years. Determine the asset value of equipment at the end of 11 years using : **[10]**

a) Straight line method

b) Declining balance method

c) Double declining balance(200%)

OR

Q4) What are the different methods for profitability evaluation? Explain any two in details. **[10]**

Q5) a) Explain the break even chart for the production of goods with its significances. **[8]**

b) Find the values of X, Y, Z that minimize the function $X + 2Y_2 + Z_2$ subject to that $X + Y + Z = 1$, making use of the Langrangian Multitier. **[8]**

OR

P.T.O.

Q6) a) Explain the general procedure to determine the optimum condition for analytical method. **[8]**

b) An organic chemical is being produced by a batch operation in which no product is obtained until the batch is finished. Each cycle consists of the operating time necessary to complete the reaction plus a total time of 1.4 hr for discharging and charging. The operating time per cycle is equal to $1.5P_b^{0.25}$hr, where P_b is the kilograms of product produced per batch. The operating costs during the operating period are \$20 per hour, and the costs during the discharge charge period are \$15 per hour. The annual fixed costs for the equipment vary with the size of the batch as follows :

$$C_F = 340P_b^{0.8} \text{ dollars per batch}$$

Inventory and storage charges may be neglected. If necessary, the plant can be operated 24 hr per day for 300 days per year. The annual production is 1 million kg of product. At this capacity, raw-material and miscellaneous costs, other than those already mentioned, amount to \$260,000 per year. Determine the cycle time for conditions of minimum total cost per year. **[8]**

Q7) a) Write a note on optimum flow rate of cooling water in condenser. **[8]**

b) Draw the composite curve for following systems. **[8]**

Stream Number	Stream type	Heat capacity flow, rate (KW/°C)	Source Temperature, °C	Target Temperature, °C
1	Hot	2.5	150	60
2	Hot	8	90	60
3	Cold	3	20	125
4	Cold	3	25	100

OR

Q8) a) Enlist the points and write a note for preparation of techno economic feasibility report. **[8]**

b) Calculate in details the design cost of Heat exchanger. **[8]**

Q9) a) Draw a network diagram for the construction of small pilot plant with the following activities. **[9]**

Activity	Event	Sub Event
A	1	2
B	1	3
C	3	4
D	2,4	5
E	4	6
F	5	7
G	7	8
H	6	9
I	5	10
J	8	11
K	10,11	12
L	9,12	13
M	13	14
N	14	15

b) Differentiate between the PERT and CPM methods. **[9]**

OR

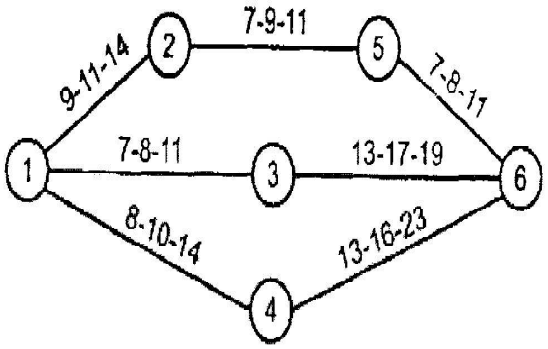
Q10)a) Following network diagram shows the three estimates for various activities. Find the critical path considering **[9]**

i) Optimistic time

ii) Pessimistic time

iii) Critical path using PERT

Also evaluate the Earliest Expected Time (EST)



b) Explain the HAZOP study in details showing its importance in chemical plants. **[9]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3280

[Total No. of Pages :2

[5461] - 314

B.E. (Chemical)

ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Black figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Describe the scope of energy conservation and its importance in Chemical industries. **[10]**

OR

Q2) Explain the benefit of energy efficiency towards industry, nation & globe.**[10]**

Q3) Define energy audit. Write down its need and types of energy audit. **[10]**

OR

Q4) Explain the role optimization in conservation of input requirements, fuel and energy Substitution. **[10]**

Q5) a) Discuss the selection of heat exchangers and its effect on energy Consumption. **[10]**

b) Define insulations and write down its in detail **[6]**

OR

Q6) a) Enlist three basic types of steam traps. Explain thermo static trap in detail. **[10]**

b) What is co-generation? Explain the importance co-generation in sugar industries. **[6]**

P.T.O.

Q7) a) Write in details waste heat utilization for energy conservation in Chemical industries. Give suitable examples. **[10]**

b) Enlist activities for promoting energy conservation in present status. **[8]**

OR

Q8) a) Enlist the checklist for energy conservation in water heaters and coolers. **[9]**

b) How and where the energy losses can be minimized in Evaporators. **[9]**

Q9) a) Draw the sketch of compressors and explain its principle and working. **[10]**

b) Explain the model role of equipment manufacturer in the development and future prospects for a process industries. **[6]**

OR

Q10) a) Explain waste minimization and its classification, housekeeping, process change, recycling, product modification, waste minimization methodology steps, benefits of waste minimization in Plastic industry. **[10]**

b) Explain waste minimization in fertilizer industry during the production different fertilizers. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3281

[Total No. of Pages :2

[5461] - 315

B.E. (Chemical Engineering)

CHEMICAL PROCESS SAFETY

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

(409351 B) (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 diagram must be drawn wherever necessary.***

Q1) a) Discuss in detail safety culture and storage of dangerous materials. **[7]**

b) Describe in short notes on relative toxicity. **[3]**

OR

Q2) a) Estimate in detail worker exposures to dust. **[6]**

b) Expalin evaluation phase in industrial hygiene. **[4]**

Q3) a) Discuss in short minimum oxygen concentration (MOC) and inerting. **[5]**

b) Explain in detail flammability characteristics of liquids and vapors. **[5]**

OR

Q4) Explain in detail fire triangle and distinction between fires and explosion. **[10]**

Q5) a) Discuss in detail relief system risk and hazards management. **[8]**

b) Describe in brief design to prevent fires and explosions. **[8]**

OR

Q6) a) Explain in detail storage and handling of flammable and toxic chemicals. **[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 hazard and operability studies (HAZOP). **[10]**

OR

Q8) a) Describe in details revealed and unrevealed failure. **[10]**

b) Describe Review of probability theory for risk assessment. **[8]**

Q9) a) Explain in detail safety versus production, hazard models and risk data. **[10]**

b) Discuss in detail about the concept of risk assessment. **[6]**

OR

Q10) Write a short notes on: **[16]**

a) Technology and process selection.

b) Prevention of hazard human element.

c) Role of a Computer in safety.

Total No. of Questions : 10]

SEAT No. :

P3282

[Total No. of Pages :2

[5461] - 316

B.E. (Chemical Engineering)

FOOD TECHNOLOGY

(2012 Course) (Semester - II) (End Semester)

(409351C) (Elective - III)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.***
2) ***Assume suitable data wherever necessary.***
3) ***Draw neat figures wherever necessary.***
4) ***Use of Scientific Calculator is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) What are various factors that control the growth of microorganism in the fermentation bed? **[5]**

b) What is lactic acid fermentation? Give its examples. **[5]**

OR

Q2) a) What are various factors due to which extrusion is gaining popularity. **[5]**

b) Write short note on single screw extruder and twin screw extruder. **[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) What do you mean by homogenization? Explain the process of it by using neat diagram and suitable. Example. **[5]**

b) What are various types of storage techniques used for preservation of fruits and vegetables? Explain any two with suitable examples. **[5]**

P.T.O.

Q5) a) What is lyophilisation? Explain theory and equipment used for it. Describe the effect of it on the food with suitable examples. **[8]**

b) What is freeze concentration? Explain theory of it and describe any one equipment used for it with neat diagram. **[8]**

OR

Q6) a) Differentiate between shallow and deep frying. Also explain the effect of it on quality of food. **[4]**

b) What is distillation? Explain the use of distillation process for preservation of food. **[6]**

c) What is Evaporation? Explain the use of evaporation for preservation of food. **[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) Explain the use of paper and board for preparation of food packs along with their advantages and disadvantages. Explain any two of them in detail. **[8]**

b) What are various container manufacturing methods? Explain blow moulding and injection moulding in detail. **[8]**

Q9) a) What are rigid and semirigid containers. Enlist advantages and disadvantages of them. Mention one or two examples of it. **[9]**

b) What is a scenario of food safety and adulteration in India and foreign countries? Explain the steps to control it. **[9]**

OR

Q10) Write short note on: **[18]**

a) Codex Alimentarious.

b) HACCP.

c) US food and drug administration.

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Total No. of Questions : 10]

SEAT No. :

P3283

[Total No. of Pages : 2

[5461]-317
B.E. (Chemical)
ADVANCED MATERIALS
(2012 Pattern) (Semester-II) (409351D) (Elective-III) (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) ***Draw neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right side indicate full marks.***

Q1) Explain VHMWPE and fiber technology. **[10]**

OR

Q2) Explain the advantages and application of advanced polymeric material. **[10]**

Q3) What is advanced ceramic materials? Explain the advanced processing methods. **[10]**

OR

Q4) Explain the advanced metallic systems and applications of steel material. **[10]**

Q5) What is composite material? Explain the factors affecting on the properties of composite materials in detail. **[16]**

OR

Q6) Give the phase selection criteria and reinforcing mechanism along with advantages and disadvantages of composite material. **[16]**

P.T.O.

Q7) a) Give the types of reinforcement and chemical compatibility of metal composite materials. **[8]**

b) Explain the matrices and reinforcement of ceramic composite materials. **[8]**

OR

Q8) a) Explain the difference between metal composite and ceramic composite materials. **[8]**

b) Explain fabrication method of ceramic composite. **[8]**

Q9) a) Explain carbon composite with properties in detail. **[9]**

b) Explain fabrication method of carbon composite material with application. **[9]**

OR

Q10)a) Explain ablative polymer with application in detail. **[9]**

b) Give the application of nanomaterial in detail. **[9]**

Total No. of Questions :10]

SEAT No. : ____

P3284

[Total No. of Pages : 2

[5461]-318
B.E. (Chemical)
CATALYSIS
(Semester-II) (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, and 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) Explain the different types of catalysis. **[10]**

OR

Q2) Explain the mechanism of catalyst with suitable example. **[10]**

Q3) The following data were obtained at 110 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)
5×10^{-4}	2.6×10^{-5}
1×10^{-3}	4.5×10^{-5}
2×10^{-3}	7.8×10^{-5}
5×10^{-3}	17×10^{-5}
1×10^{-2}	27×10^{-5}
2×10^{-2}	40×10^{-5}

Establish the values of Cm and Kc

OR

Q4) Discuss the major engineering problems associated with heterogeneous reaction (catalytic). **[10]**

P.T.O.

Q5) a) Derive an effectiveness factor for cylindrical pore. **[8]**

b) Explain mechanism of catalyst poising. **[8]**

OR

Q6) An 5.67 gm sample of Glaucosil is studied with N_2 adsorption at - 195.8° C. The following data were obtained. **[16]**

Pressure, mm Hg	6	25	140	230	285	320	430	505
Volume adsorbed cm^3 (at 0°C and 1 atm)	61	127	170	197	215	230	277	335

The vapour pressure of N_2 at - 195.8 °C is 1 atm. Estimate the surface area (square meters per gram) of the sample. Density of liquid N_2 at - 195.8 °C is 0.808 gm/cm^3.

Q7) a) Discuss industrial applications of zeolites. **[8]**

b) Explain frame structure of zeolites. **[8]**

OR

Q8) a) Describe ZSM 5. **[8]**

b) Explain the industrial applications of Molecular sieves. **[8]**

Q9) a) Discuss the various methods used for determination of V_{max} and K_m **[9]**

b) Derive MM Kinetics. **[9]**

OR

Q10)a) Derive Kinetic equation for Non 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/1/min)	0.001875	0.002609	0.002727	0.002791	0.002857	0.002885	0.002913

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Total No. of Questions :10]

SEAT No. :

P3285

[Total No. of Pages : 2

[5461]-319
B.E. (Chemical Engineering)
NANOTECHNOLOGY
(2012 Pattern) (Elective-IV)

Time : 2:½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, and 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) Define and explain Nanoscience, Nanotechnology and Nanomaterials. **[5]**

b) Explain in detail electrical, magnetic, optical, thermal, and mechanical properties of nano-structured materials. **[5]**

OR

Q2) a) Explain the advantage of decrease in particle diameter in the contex of material properties. **[5]**

b) Give detailed classification of nanostructures. **[5]**

Q3) a) Explain Top down approach with advantages and disadvatages. **[5]**

b) What is lithographic process? Explain in detail. **[5]**

OR

Q4) a) Explain Sol-gel technique for nano-material synthesis. **[5]**

b) Give detailed classification of characterization techniques for the nano-materials. **[5]**

Q5) a) Write the working principle of Tunneling Electron Microscope. **[7]**

b) Give the working principle of p-type and n-type semiconductors with suitable examples. **[10]**

OR

P.T.O.

Q6) a) Derive Schrödinger's equation for subatomic particles. **[10]**

b) Describe in detail Pauli's exclusion principle. **[7]**

Q7) a) Enlist and Explain colloidal properties of nano-particles. **[10]**

b) Explain Self assembly and catalysis of nano-particles. **[7]**

OR

Q8) a) Explain in detail the uses of nanotechnology in water purification. **[7]**

b) What are the different forces acting on colloidal nano-particles? Explain Van der Waals forces between colloidal particles. **[10]**

Q9) a) Explain in detail the use nano-clay and nano-composites. **[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) Describe uses of nano-materials as nanomachines & nanodevices. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3657

[Total No. of Pages : 2

[5461]-320
B.E. (Chemical)
FUEL CELL TECHNOLOGY
(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 side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Note and explain the Faraday's Law of Electrolysis. **[8]**
b) Describe the physio-chemical principle of a fuel cell. **[6]**
c) Write a short note on Hydrogen rich gas air fuel cell. **[6]**

OR

Q2) a) Describe Classification of Electrodes. **[8]**
b) Note the construction and working of Regenerative Fuel Cell. **[6]**
c) Write a short note on Molten Carbonate Fuel Cell (MCFC). **[6]**

Q3) a) Write in brief on performance of a Fuel Cell. **[8]**
b) Describe various sources of Hydrogen for Fuel Cells. **[8]**

OR

Q4) Note the classification, operating temperatures and reactions involved in fuel cells. **[16]**

Q5) Write in details on classification of Losses in an actual Fuel Cell. **[16]**

OR

Q6) Write in brief on treatment of electrolyte interface in Solid Oxide Fuel Cells. **[16]**

P.T.O.

Q7) A Fuel Cell system uses multiple reactors and sorbents as Fuel Processor. Discuss its nature and advantages over single processor system. **[18]**

OR

Q8) To enhance the energy efficiency of a Fuel Cell, heat integration is quite vital. Describe the system. **[18]**

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Total No. of Questions : 10]

SEAT No. :

P3286

[Total No. of Pages :2

[5461] - 320 A

B.E. (Chemical)

PETROCHEMICAL ENGINEERING

(2012 Course) (Semester - II) (409352D) (Elective - IV) (End Sem.)

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) What are the main basic building blocks of petrochemical industry explain with suitable examples? **[10]**

OR

Q2) Explain the flow sheet for preparation of Xylene and the details of petrochemical products from benzene? **[10]**

Q3) What are basic principle sources of aromatics? Describe the BTX aromatic separation by suitable diagram. **[10]**

OR

Q4) Write short note on the various separation and purification techniques used in Petrochemical industry. **[10]**

Q5) a) With neat sketches explain in detail about production Methylene glycol as a second generation intermediates. **[12]**

b) List out the various types and uses of seond generation intermediates in petrochemicals **[6]**

OR

Q6) With neat schematic diagram describe about the production of maleic anhydride from benzene? And also discuss the major engineering problems? **[18]**

P.T.O.

Q7) a) Write short notes on bulk, emulsion and suspension with example. **[10]**

b) Explain classification of different polymerization process along with its advantages and Disadvantage. **[6]**

OR

Q8) a) With neat sketches explain in detail about production of Nylon along with its engineering Problems. **[10]**

b) What are various polymeric products? Explain the polyester materials. **[6]**

Q9) a) Explain recent trends in petrochemical plants & refineries in India. **[10]**

b) Major petrochemical plants in India as well as in world. **[6]**

OR

Q10) Write a note on following. **[16]**

a) How to control pollution in Petrochemical industries.

b) Safety consideration in petrochemical plants.