Total No. of Questions : 10]

SEAT No. :

P3059

[Total No. of Pages :3

[5059]-501
B.E (Civil)
ENVIRONMENTAL ENGINEERING - II
(2012 Course) (Semester-I) (401001)

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 suitable data if necessary.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Define treatability index. Write wastewater treatment option with respect to treatability index. **[4]**

b) Write the procedure to determine total volatile solids and its significance in wastewater treatment. .**[6]**

OR

Q2) a) Explain pumping of sewage with respect to need, location and types of pumps. **[5]**

b) Design a mechanically cleaned radial flow circular settling tank for treating sewage from a population of 25000 persons. **[5]**

Given:

Maximum hourly flow = (1/14) of the daily flow

Volume of sludge = 1.19 1/c/d

Water consumption = 135 1/c/d

Q3) a) Write the difference between preliminary treatment and primary treatment.**[5]**

b) Write a short note on the self-purification of streams. **[5]**

OR

P.T.O.

Q4) a) Calculate the effluent BOD of a two stage trickling filter with the following data **[6]**

i)	Flow	= 2.30 m^3/min
ii)	BOD_5	= 300 mg/1
iii)	Volume of filter 1	= 900 m^3
iv)	Volume of filter 2	= 900 m^3
v)	Filter depth	= 2 m
vi)	Recirculation ratio for both the filter	= 1.5

Use NRC formula.

b) With the help of a neat sketch, explain the activated sludge process. **[4]**

Q5) a) What do you understand by oxidation pond? Where it is used? What is its principle? **[8]**

b) Explain aerated lagoon with respect to its working principle, design parameters and applications. **[8]**

OR

Q6) a) Write short note on phytoremediation for wastewater treatment. **[8]**

b) Design an oxidation pond for a colony of 3000 population. The sewage flow is 1001/p/d. BOD_5 is 300 mg/1. Assume necessary required data. **[8]**

Q7) a) Design a sludge digestion tank with the following data **[8]**

i)	Average flow of sewage	= 60 MLD
ii)	Total suspended solids in raw sewage	= 350 mg/1
iii)	Volatile suspended solids	= 250 mg/1
iv)	Moisture content in the digested sludge	= 87 %
v)	Removal from PST	= 65 %
vi)	Moisture content in fresh sludge	= 95 %

b) Draw a flowchart of package sewage treatment plant and explain its working principle. Write its advantages and disadvantages. **[8]**

OR

Q8) a) Design a gravity thickeners for thickening the combined primary and activated sludge from a treatment plant for 150000 population. **[8]**

b) Write working principle of UASB. Enlist design parameters of UASB and its limitations. **[8]**

Q9) a) Enlist different units used in preliminary, primary and secondary treatment in industrial wastewater treatment. Write its significance for which impurities to be removed. **[9]**

b) Explain equalization and neutralization unit process with respect to its working principle, need, factors affecting the process and application. **[9]**

OR

Q10)a) Draw a neat sketch showing the points where spent wash is generated in the distillery. **[6]**

b) Discuss the characteristics of dairy industry. **[4]**

c) Draw a flow chart showing various treatment units used to treat sugar industry wastewater. Explain the important units. **[8]**

✓ ✓ ✓

Total No. of Questions : 10]

SEAT No. :

P2143

[Total No. of Pages : 4

[5059]-502
B.E. (Civil)
TRANSPORTATION ENGINEERING
(2012 Course) (End Sem.) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Discuss briefly the development of roads since inception of Indian Road Congress. **[5]**

b) For economical road alignment shortest length is usually the best. What circumstances justify a deviation far from the principle? **[5]**

OR

Q2) a) Preventive measures for road accidents consists of Engineering, Enforcement and Education aids. Explain each briefly. Have you any suggestions to prevent road accident. **[5]**

b) Distinguish clearly between Camber and Super elevation. How super elevation is provided in the field. **[5]**

Q3) a) Define SSD. Assuming a brake efficiency of 50% and a total of perception and brake reaction time of 1.5 sec. Calculate the minimum required sight distance to avoid a collision with a car approaching from the opposite direction, if both the cars are assumed to be speeding at 60 kmph. **[5]**

b) Following test results were obtained by CBR test on a subgrade soil:

P.T.O.

Penetration (mm)	Load (Kg)	Penetration (mm)	Load (Kg)
0.00	0.00	3.00	58.00
0.50	5.00	4.00	70.00
1.00	17.00	5.00	78.00
1.50	29.00	7.50	92.00
2.00	42.00	10.00	102.00
2.50	50.00	12.50	108.00

Calculate CBR value at 2.5 mm and 5.00 mm penetration level. **[5]**

OR

Q4) a) Calculate warping stress at Interior and Longitudinal Edge region for concrete pavement of thickness 20 cm with transverse joint at **[5]**

15m spacing and having pavement width of 3.8 m.

Modulus of elasticity of concrete = 3.0×10^5 kg/cm^2

Poisson's ratio = 0.15

Modulus of subgrade reaction = 3.0 kg/cm^3

Temperature differential = 1.0° Celcius per cm

Thermal coefficient of concrete = 7.5×10^{-6} per °Celcius

Radius of loaded area 15 cm

Assume Cx = 1.03 and Cy = 0.60

b) Explain in brief the following: **[5]**

i) Tack coat ii) Prime coat

iii) VG-30 iv) CRMB

v) Cutback

Q5) a) Explain with a neat sketch, how three controls are used to monitor the aircraft movement. **[6]**

b) Explain stepwise procedure of construction of Wind Rose Type II diagram. **[6]**

c) State the various objects of carrying out survey for planning of a new airport. **[4]**

OR

Q6) a) What do you mean by Taxiway? Describe in brief the factors controlling layout of a Taxiway. **[2 + 4 = 6]**

b) Differentiate between Minimum Turning radius and Minimum circling radius. Also state the significance of each term. **[6]**

c) Explain in brief Head wind and Cross wind. **[4]**

Q7) a) Describe the methodology involved in the use of Rational Method for computation of maximum flood discharge from small catchment. **[6]**

b) Define waterway. State the various recommendations for fixing the waterway of different streams. **[4]**

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

i) Causeway ii) Aqueduct

iii) Viaduct

OR

Q8) a) A bridge has 4 spans of 8m each. When the flood water approaches the bridge, the difference of level of water on upstream and downstream side is 1.85m and the downstream depth is 6.8m. The bridge is located on a river with a slope of 1 in 500. The coefficient of losses due to friction because of bridge opening is 0.96. Chezy's coefficient is 50 and hydraulic mean depth for a river is 3.0m. Determine the flood discharge. **[8]**

b) Define Economic Span. Derive an equation for economical span. **[6]**

c) Distinguish between Alluvial and Qasi-alluvial stream. **[2]**

Q9) a) The catchment area of a stream is of sandy soil with light vegetation cover and the area of the catchment is 15000 hectares. The length of the catchment is 26 km and the fall in level from the critical point to the bridge site is 185m. Calculate peak runoff for designing the bridge if the severest storm recorded yielded 18 cm of rain in 4 hours. Assume value of area factor is equal to 0.70 and coefficient to account for losses due to absorption is 0.20. **[6]**

b) What do you understand by movable bridges? Explain any two types of movable bridges with the help of neat sketch. **[6]**

c) Discuss in brief the following: **[6]**

i) Live Load

ii) Wind Load

iii) Buoyancy Force

OR

Q10)a) State the various purposes of providing bridge bearings. Why are elastomeric bearings preferable to the usual steel bearings for highway bridges. **[4 + 2 = 6]**

b) Define Pier. Draw a neat sketch of the Hammer head shape pier and Multiple bent pier. **[6]**

c) Explain in brief the need of maintenance and strengthening of existing old bridges. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P2144

[Total No. of Pages : 3

[5059]-503
B.E. (Civil)
STRUCTURAL DESIGN AND DRAWING-III
(2012 Course) (Semester-I) (End Semester) (401003)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4; Q.5 or Q.6; Q.7 or Q.8; and Q.9 or Q.10.***
2) ***Figures in bold to the right, indicate full marks.***
3) ***IS 456, IS 1343, IS 3370 and IS 13920 are allowed in the examination.***
4) ***The designs should comply with the latest codal provisions.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain P-line and C-line with neat sketches. **[4]**

b) A simply supported prestressed concrete beam 350 mm × 800 mm has span of 10m and supports a live load of 25 kN/m. The beam is post tensioned by cable having cross sectional area 1200 mm^2. The cable eccentricity is zero at support and varies parabolically to 250 mm at the mid-span. The initial prestressing force is 1350 kN and loss ratio is 0.78 determine the stresses at transfer and service condition at mid span. Take unit weight of presressed concrete as 24 kN/m^3. **[6]**

OR

Q2) a) Explain the concept of prestressing a structural element. Also explain pretensioning and post tensioning methods with neat sketches. **[6]**

b) The overall dimension of an end block of a post tensioned beam is 400 mm × 800 mm. The girder is prestressed by a single cable comprising of 12 strands. The strands used are 12.7 mm; 7-ply strand with the nominal area of 92.9 mm^2 and breaking load of 160 kN as per IS 6006. Design the bearing plate given that f_{ck} = 35 MPa and f_{ci} = 28 MPa. **[4]**

Q3) a) Determine the ultimate moment of resistance of a post tensioned box section having bonded tendons. The box section has outer dimensions of 750 mm × 1200 mm and inner dimensions of 550 mm ×800 mm. The total cross sectional area of the tendons is 1000 mm^2 with the centroid at the distance of 100mm from the soffit. Take f_{ck} = 40 MPa, f_p = 1800 MPa and $f_{pe} = 0.7\ f_p$. **[4]**

P.T.O.

b) A four storey building has the following data: **[6]**

- Overall plan dimension = 20m × 16m
- Number of bays 4m each in X direction = 5
- Number of bays 4m each in Z direction = 4
- First storey height = 4m
- Height of 2^{nd}, 3^{rd}, and 4^{th} storey = 3.0m
- Size of beams = 300 mm × 600 mm
- Size of columns = 500 mm × 400 mm
- Slab thickness = 150 mm
- Live load = 3.5 kN/m^2 on floors and 2 kN/m^2 on roof
- External masonary walls of thickness 230 mm and internal walls of 115 mm thickness have been provided.
- Building located in Pune on hard strata with 5% damping evaluate the seismic weight of each floor and hence total seismic weight of building Calculate the base shear using seismic coefficient method.

OR

Q4) a) How are lateral loads analyzed in multistoried buildings? Explain any one method. **[4]**

b) Design the three span continuous beam PQRS for combined effect of lateral and gravity loads for flexure only. The three beams have equal span of 5m. The design data for the beam is $M_p(-)$ = 88.07 kNm; $M_Q(-)$ = 137.92 kNm; $M_{PQ}(+)$ = 84.41 kNm and $M_{QR}(+)$ = 61.45 kNm. Moments due to lateral load is 108 kNm. Draw the details of reinforcement as per IS 13920. **[6]**

Q5) A T-shaped retaining wall is to be provided to retain a horizontal leveled backfill of height 4.5m. The backfill has unit weight of 17 kN/m^3, angle of repose = 30°, coefficient of friction between concrete and soil = 0.55, SBC of soil = 180 kN/m^2, depth of foundation = 1.0m. Perform stability analysis and design the stem. Sketch the reinforcement along with curtailment of reinforcement. **[16]**

OR

Q6) Design an inverted L-shaped retaining having stem and toe to retain a backfill of 2.8m. The backfill is horizontal and the unit weight of the soil is 17 kN/m^3, angle of repose = 30°, SBC of soil = 180 kN/m^2, good foundation is available at a depth of 1.0m. Design and sketch the details of reinforcement in the wall and toe slab. **[16]**

Q7) Two columns C1 and C2 of size 400mm × 400mm are spaced at 3.0m apart carrying a service load of 650 kN and 800 kN respectively. C1 is boundary column, Design a slab beam type combined footing. Safe bearing pressure on soil is 180 kN/m^2. Use M30 grade of concrete and steel of grade Fe 500. **[16]**

OR

Q8) Design a slab type combined footing for two columns spaced 3m apart carrying a service load of 800 kN and 1000 kN each. The columns are 230 mm × 400mm and 230 mm × 500mm respectively. The SBC of soil is 180 kN/m^2. Use M30 grade of concrete and steel of grade Fe 500. **[16]**

Q9) Design a rectangular water tank resting on ground. The tank dimensions are 7m × 3m × 3m high. Use M30 and Fe 500 grade material. Sketch details of reinforcement. **[18]**

OR

Q10)a) Design the circular water tank of 10m diameter and 5m height with rigid base. Use M 30 and Fe 500 grade material. Sketch details of reinforcement. **[10]**

b) Explain step-by-step procedure of finding crack width for a wall of rectangular water tank. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2145

[Total No. of Pages : 3

[5059]-504
B.E. (Civil)
STRUCTURAL DESIGN OF BRIDGES
(2012 Pattern) (Elective-I) (Semester-I) (401004A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6; Q.7 or Q.8; and Q.9 or Q.10.***
2) ***Figures in bold to the right indicate full marks.***
3) ***IRC: 6, IRC: 112, IS 456, IS 800, IS 1343 and Steel table are allowed in the examination.***
4) ***Neat diagrams should be drawn wherever necessary.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) Give the classification of bridges according to material of construction and forms of super structure. **[10]**

OR

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

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

OR

Q4) An interior panel of a T beam deck slab bridge is 4.0m × 3.5m. Calculate the maximum bending moment developed due to placing of IRC class A loading. **[10]**

Q5) Design the member (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 = 0.50 kN/m,

b) Weight of check rail = 0.40 kN/m

c) Timber sleepers of size = (0.25 × 0.25 × 2.8) m@ 0.45 m c/c

P.T.O.

d) Unit weight of timber = 7.5 kN/m^3

e) Spacing of truss = 5.0 m c/c

f) Equivalent uniformly distributed load for BM and SF are 5831 kN and 6254 kN respectively

g) CDA = 0.255

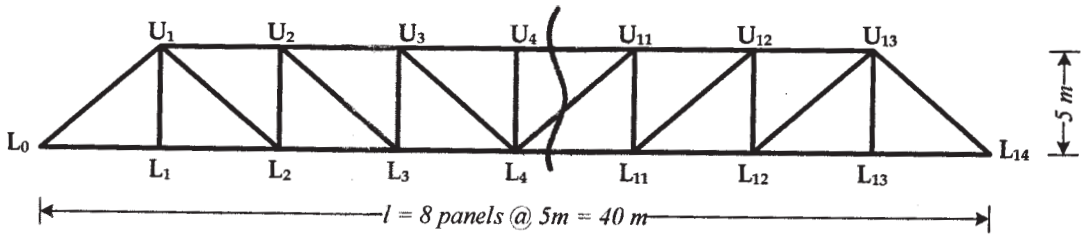

Fig. 1

OR

Q6) For the Problem given in Q. 5 design the members (L-3, L-4) and (L0-U1). **[18]**

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

a) Maximum Normal Load = 1200 kN

b) Minimum Normal Load = 350 KN

c) Lateral Load = 50 kN

d) Longitudinal Load = 80 KN

e) Total Longitudinal Translation = 10mm

f) Rotation at support = 0.001

g) Shear modulus of elastomer = 1.2 N/mm^2

h) Allowable Compressive stress of Concrete = 8 N/mm^2

i) Allowable Compressive stress of elastomer = 9 N/mm^2

Also sketch the details of the bearing.

OR

Q8) a) The vertical reaction at the end of a bridge girder is 2000 kN. The vertical reaction at each end of the girder due to overturning effect is 100 kN. Design a roller bearing if the least allowable perpendicular distance between the faces of adjacent roller after the revolved position may be taken as 4mm. The centers of the rollers travel 20mm. **[10]**

b) Explain the design procedure of Rocker and Roller bearing. **[6]**

Q9) a) Explain step-by-step procedure for design of an abutment. **[8]**

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

OR

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

a) Span = 40m

b) Width of carriageway = 7.5m

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

d) Dead weight of span = 10000 kN

e) Longitudinal force = 250 kN

f) RL of formation = 640.150m; RL of cg of girder = 638.100m; RL of center of bearing pin = 637.000m; RL of bed level = 629.800m

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

h) Allowable bearing pressure = 220 kN/m^2

i) $\mu = 0.32$, $\Phi = 30°$, Ground acceleration = 0.11 g

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

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Total No. of Questions : 10]

SEAT No. :

P3060

[Total No. of Pages : 5

[5059]-505
B.E. (Civil)
SYSTEMS APPROACH IN CIVIL ENGINEERING
(2012 Course) (End Semester) (Semester - 1) (Elective - I)
(401004B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are the scope and limitations of systems Approach? **[6]**

b) Explain with sketch. Global optima and local optima. **[4]**

OR

Q2) a) Using golden section method, solve following using 3 iterations Minimize $Z = x^2 - x + 2$ in the range (0,2) **[6]**

b) State any two applications of NLP. **[4]**

Q3) a) A company has one nob sharpening machine. The nobs required regrinding are sent from the companies tool crib to this machine which at present is operated one shift per day of 8 hrs duration. Arrival of the nobs at tool crib is random with an average time of 60 min between one arrival and next. The regrinding time of nob is distributed negative exponentially with the mean of 30 min. **[6]**

i) For what fraction of time, the machine is busy?

ii) How does a nob wait in the queue?

iii) What is the average length of queue that is formed from time to time?

iv) The management has decided to purchase another grinder and thereby start another shift on this machine, when the utilization of machine on single shift basis increases by 85%, what should be the arrival rate then?

b) Explain the process of sequencing of n jobs through 3 machines. **[4]**

OR

P.T.O.

Q4) a) Write algorithm for steepest gradient method. **[4]**

b) Interarrival and service time in a waiting line problem have the following frequency distribution based on 100 such iterations. **[6]**

Interarrival time (min)	3	6	9	12	15	18
frequency	6	9	25	37	16	7

Random numbers: 15,19,61,49,54,73,85,96,31,22

Service time (min)	4	6	8	10	12
frequency	4	10	18	44	24

Random numbers: 9,11,90,64,37,29,43,78,87,56

Calculate average waiting time and average idle time.

Q5) a) What is Dynamic programming? What sort of problems can be solved using it? **[5]**

b) Explain Bellman's Principle of optimality. **[5]**

c) A distance network consists of eleven nodes which are distributed as shown in following table. Find the shortest path from node 1 to node 11 and the corresponding distance. **[6]**

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

OR

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

b) An organization is planning to diversify its business with a maximum outlay of Rs 4 crores. Out of there identified locations of plants; it can invest in one or more of these plants subject to availability of funds. The different possible alternatives and their investment and present worth of returns (both in crores of rupees) during the useful life of each plant is given below. **[8]**

Alternatives	Plant 1		Plant 2		Plant 3	
	Cost	Returns	Cost	Returns	Cost	Returns
1	0	0	0	0	0	0
2	1	12	2	16	2	9
3	2	15	3	20	3	12
4	3	19	4	25	4	15

Find optimum allocation of the capital to different plants which will maximize the corresponding sum of present worth of returns.

Q7) a) Explain graphical method of solving Linear Programming problem. What are its limitations? **[6]**

b) An engineering company is planning to diversify its operations during the year 2016-17. The company has allocated capital expenditure budget equal to Rs 5.15 crore in year 2016 and Rs 6.5 Crores in year 2017. The company has five investment projects under considerations. The estimated net returns and expected cash expenditure are as follows. **[6]**

Project	Estimated net returns (in lakh of Rs)	Capital expenditure (in Lakh of Rs)	
		Year 2016	Year 2017
A	12.4	2.4	3.6
B	13.9	4.5	5.7
C	18.3	5.6	7.8
D	24.6	7.9	8.6
E	28.9	8.5	10.2

Formulate the capital budgeting problem as an LP model to maximize the net returns.

c) Solve using simplex method **[6]**

Maximize $Z = 20\ x_1 + 80\ x_2$

Subject to $4\ x_1 + 6\ x_2 \leq 90$

$8\ x_1 + 6x_2 \leq 100$

$5\ x_1 + 4\ x_2 \leq 80$

$x_1\ ,\ x_2 \geq 0$

OR

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

Minimize $Z = 2\ x_1 + 3\ x_2$

Subject to

$x_1 + x_2 \geq 6$

$7\ x_1 + x_2 \geq 14$

$x_1\ ,\ x_2 \geq 0$

b) What are the characteristics of Duality? **[6]**

c) Construct dual of the primal problem. **[4]**

Minimize $Z = 3\ x_1 - 2\ x_2 + 6\ x_3$

Subject to $4\ x_1 + 5\ x_2 + 4\ x_3 \geq 7$

$5\ x_1 + x_2 + 2\ x_3 \geq 5$

$7\ x_1 - 2\ x_2 - x_3 \leq 10$

$2\ x_1 - x_2 + 5\ x_3 \geq 6$

$4\ x_1 + 7\ x_2 - x_3 \geq 2$

$x_1, x_2, x_3 \geq 0$

Q9) a) Find initial solution of the transportation problem given in Que 10 c) using VAM. **[5]**

b) What is degeneracy in transportation problem? How is it resolved? **[5]**

c) Following are the details of processing time required for five jobs by five operators. Assign these jobs to operators to give minimum processing time. **[6]**

operators

Jobs	1	2	3	4	5
1	10	12	15	12	8
2	7	16	14	14	11
3	13	14	7	9	9
4	12	10	11	13	10
5	8	13	15	11	15

OR

Q10)a) Write short note on assignment problem and its applications. **[5]**

b) State the steps to handle following situations in assignment problem **[5]**

i) Maximization

ii) Unbalanced problem

c) Solve the following transportation problem to minimize total transportation cost using row maxima and column minima method. **[6]**

To warehouses

From plants		A	B	C	D	E	Plant capacity
	1	1	2	6	2	3	800
	2	3	4	5	8	1	600
	3	3	1	1	2	6	200
	4	4	7	3	5	4	400
demand		400	100	700	300	500	

Total No. of Questions : 10]

P4959

SEAT No. :

[Total No. of Pages : 3

[5059]-506

B.E. (Civil)

ADVANCED CONCRETE TECHNOLOGY

(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or 2,Q. 3 or 4 Q. 5 or 6 ,Q.7 or 8,Q.9 or 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answers will be valued as a whole.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***
7) ***Use of IS code 10262,456 is not allowed.***

Q1) a) What is heat of hydration? Explain the factors affecting heat of hydration. **[4]**

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

i) High strength concrete

ii) High performance concrete

OR

Q2) a) Write a short note on Green Concrete. **[4]**

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

Q3) a) Write a short note on Copper Slag as fine aggregate. **[4]**

b) Explain the step by step procedure involved in the design of self-curing concrete. **[6]**

P.T.O.

OR

Q4) a) What are the different types of industrial waste materials useful for construction industry? Explain any one waste material based concrete in detail. **[4]**

b) Write a short note on nondestructive testing methods **[6]**

i) Break off maturity method,

ii) Ground penetration radar

Q5) a) Write a short note on: Fibers with respect to volume, aspect ratio and orientation of firbers. **[4]**

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

i) Carbon fibers

ii) Metallic fibers

c) Explain in detail interaction between fiber matrix composite under cracked and uncracked condition. **[6]**

OR

Q6) a) Write a short note on: Fiber matrix interfacial bond. **[4]**

b) Enlist different metallic fibers. Explain their any two properties in brief. **[6]**

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]**

Q7) a) Write a short note on steel fiber reinforced concrete composite. **[4]**

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

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

OR

Q8) a) Write a short note on: Applications of fiber reinforced concrete. **[4]**

b) Which are the quality control tests conducted for steel fiber reinforced concrete composites? **[6]**

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

Q9) a) Define ferrocement? Write advantages of ferrocement? **[6]**

b) What are the different tests conducted on cement mortar as a ferrocement material? Explain any one in detail. **[6]**

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

OR

Q10)a) Explain how ferrocement differs than concrete? Write about tensile property of ferrocement. **[6]**

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

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

Total No. of Questions : 8] **SEAT No. :**

P1946 **[Total No. of Pages : 2**

[5059]-507

B.E. (Civil)

ARCHITECTURE AND TOWN PLANNING

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

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

Instructions to the candidates:-

1) ***Solve Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) What do you understand by user friendly Architecture and explain how an architect exhibits the same by using different principles? **[7]**

b) Draw a flow chart for "Urban Renewal Process". **[7]**

c) State the differences between structure plan and development plan. **[6]**

OR

Q2) a) Explain clearly the differences between the working strategies of an urban planner and an architect. **[7]**

b) What is "Sustainable Architecture"? Elaborate in detail the approaches for the same. **[7]**

c) Write a short note on ; "hierarchy of town planning." **[6]**

Q3) a) Explain the functioning of MMRDA. **[8]**

b) Explain in depth various objectives of urban roads and importance of traffic management. **[9]**

OR

P.T.O.

Q4) a) Explain the functioning of MIDC. **[8]**

b) Elaborate various types of surveys carried out for DP proposal with its significance. **[9]**

Q5) a) Explain the legislative support for DP through MRTP Act, 1966. **[9]**

b) Write a short note on CRZ. **[8]**

OR

Q6) a) Elaborate infrastructural planning as per UDPFI. **[8]**

b) Write a short note on SEZ and its impact. **[9]**

Q7) a) Write a short note of LARR Act. **[8]**

b) Describe the role of RS & GIS in town planning. **[8]**

OR

Q8) a) Write a short note on Special Townships. **[8]**

b) Elaborate applicability of modern tools in disaster management & traffic regulation. **[8]**

Total No. of Questions : 6] **SEAT No. :**

P1947 **[Total No. of Pages : 3**

[5059]-508

B.E. (Civil Engineering)

ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS (End Semester)

(2012 Pattern) (Elective - I)

Time : 2.30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:-

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

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

OR

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

Q2) a) Describe the engineering significance of Tachylytic Basalt. **[7]**

OR

b) What treatment is to be given to a dyke occurring at a Dam site. **[7]**

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

OR

b) Write a note on water bearing characters of Amygdaloidal Basalt. **[7]**

Q4) a) What are various mechanical properties of rocks **[8]**

P.T.O.

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

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

OR

a) Explain in detail electrical resistivity method in detail. **[8]**

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

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

Q5) a) Whether the tunnels are suitable through limestone and quartzite. **[10]**

b) Explain in brief safe bearing capacity during bridge construction. **[7]**

OR

a) Significance of fractures from tunneling point of view. **[10]**

b) Write note on location and depth of drill holes at foundation of bridge. **[7]**

Q6) a) Explain suitability of DTB as construction material. **[10]**

b) Give the geological reasons of earthquake occurrence. **[7]**

OR

a) Explain in detail influence of geology in planning. **[10]**

b) Write a note on foundation of monumental buildings with suitable examples. **[7]**

Total No. of Questions : 8] SEAT No. :

P1948 [Total No. of Pages : 4

[5059]-509
B.E. (Civil Engineering)
MATRIX METHODS OF STRUCTURAL ANALYSIS
(2012 Pattern) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:-

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

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

$x + y + z = 5$

$2x + 3y + 5z = 8$

$4x + 5z = 2$

b) Analyse the beam ABC shown in Figure 1 using flexibility matrix method. AB = 3 m and BC = 6 m. Take EI = constant **[6]**

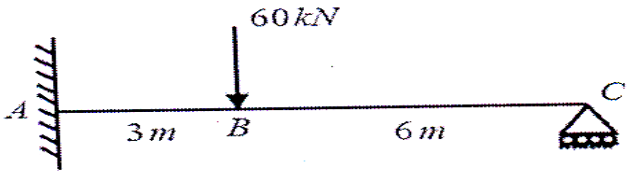


Figure 1

c) A rod is composed of an aluminum section rigidly attached between steel and bronze as shown in Figure 2. If the cross-section area of rod is 800 mm^2 determine nodal displacements. Take E_{st}= 210 GPa, E_{Al} = 70 GPa and E_{br} = 110 GPa. **[8]**

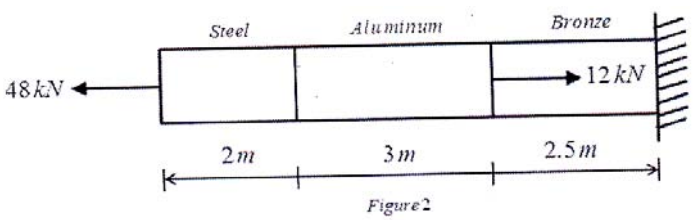


Figure 2

P.T.O.

OR

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

$$x + y + z = 5$$

$$2x + 3y + 5z = 8$$

$$4x + 5z = 2$$

b) Find the vertical and horizontal deflection at point C for the two member truss as shown in Figure 3. Area of inclined member is 2000 mm^2 whereas horizontal member is 1600 mm^2. Take E = 200 GPa **[6]**

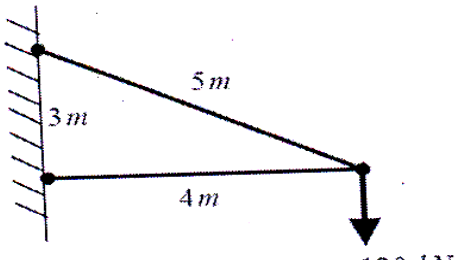


Figure 3

c) Analyse the beam ABC shown in Figure 4 using flexibility matrix method. Take EI = constant. **[8]**

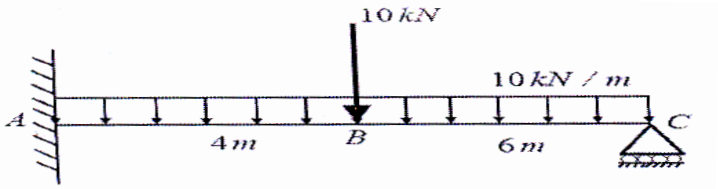


Figure 4

Q3) Analyze the continuous beam ABCD as shown in Figure 5 using stiffness matrix method. Take EI constant. Draw BMD **[18]**

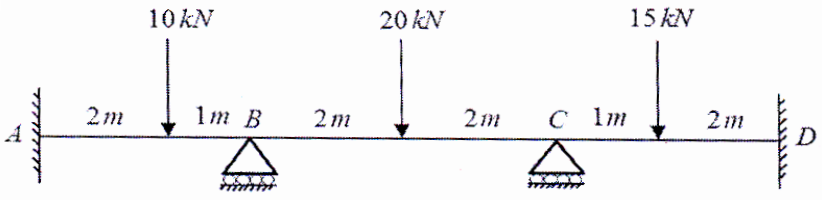


Figure 5

OR

Q4) Determine the unknown joint displacements of the portal frame as shown in Figure 6 using stiffness matrix method. Take EI constant. **[18]**

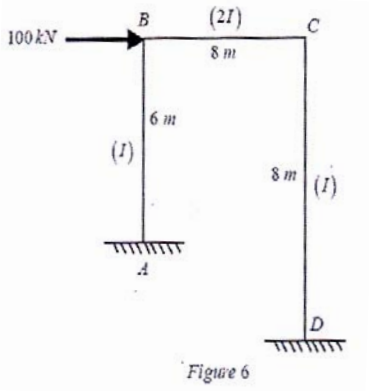


Figure 6

Q5) Derive the stiffness matrix and transformation matrix of two noded grid element of with 06 D.O.F., length L, flexural rigidity EI and torsional rigidity GJ. **[16]**

OR

Q6) Analyze the grid structure ABC as shown in Figure 7 using stiffness matrix method. Take EI=2×10^5 kN.m^2 and GJ= 1.2×10^5 kN.m^2. **[16]**

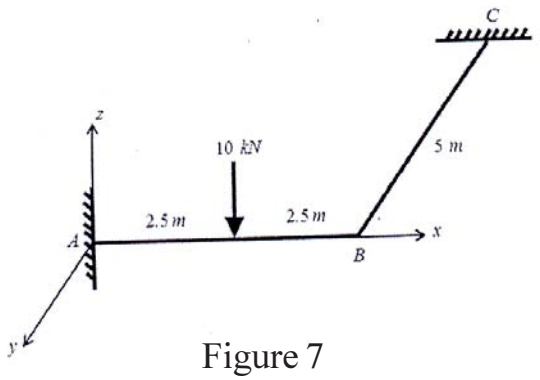


Figure 7

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

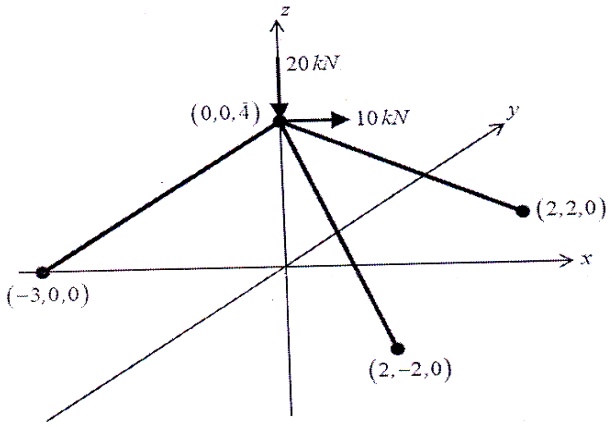


Figure 8

OR

Q8) a) A beam of span '8m' is fixed at both ends 'A' and 'B' and supports a uniformly distributed load of 10 kN/m over the entire span. Estimate the deflections of quarter span intervals using second order central difference formula. **[8]**

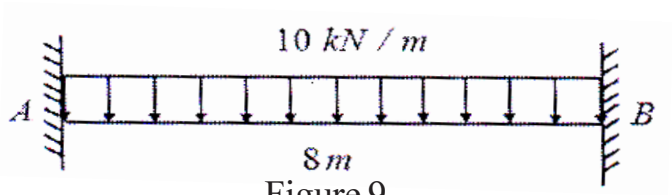
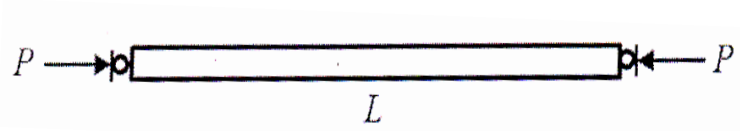


Figure 9

b) Estimate the lowest buckling load 'P' of a uniform pin ended column of length 'L = 10 m', cross-sectional area 100 × 100 mm and E = 200 GPa using three sub intervals. Apply finite difference method. **[8]**



Total No. of Questions : 12]

SEAT No. :

P2146

[Total No. of Pages : 2

[5059]-510
B.E. (Civil)
INTEGRATED WATER RESOURCES PLANNING & MANAGEMENT
(2012 Course) (Semester-I) (Elective-II) (End Sem)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

UNIT-I

Q1) a) Write a note on "Water resources in India". **[3]**

b) Water infrastructure-problems and perspectives, explain. **[3]**

OR

Q2) a) State and explain "National Water Policy". **[3]**

b) Write a note on "Ground water ownership". **[3]**

UNIT-II

Q3) a) "Principles of water pricing & water allocation", Explain. **[3]**

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

OR

Q4) a) What are the global and national perspectives of water crisis? **[3]**

b) Write in brief about the concepts of 'blue water', 'Green water', and 'virtual water' and their roles in water management. **[3]**

UNIT-III

Q5) a) Explain "inter basin water transfer". **[4]**

b) What are the measures to control-water logging, salinity & siltation of storage. **[4]**

OR

P.T.O.

Q6) a) Explain the following: **[4]**

i) Severity index.

ii) Drought forecasting.

iii) Damage assessment.

iv) Mitigation plan.

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

UNIT-IV

Q7) a) Write a note on-Consumptive & non consumptive demand of water. **[8]**

b) Explain in brief about water management in irrigation sector. **[8]**

OR

Q8) a) How to estimate & forecast "water demands of domestic & industrial sector". **[8]**

b) What are navigation and recreational water demands? **[8]**

UNIT-V

Q9) a) How to protect the vital ecosystem by Environmental management. **[8]**

b) Write a note on "aquaculture". **[8]**

OR

Q10)a) Explain direct/indirect benefits of water resources development. **[8]**

b) State and explain management of rehabilitation & resettlement. **[8]**

UNIT-VI

Q11)a) What is the use of - Decision support system for Integrated Water Resources Management. **[8]**

b) Explain the data driven techniques - Artificial Neural Networks, Genetic programming for Basin planning & Watershed management. **[10]**

OR

Q12)a) What is meant by Watershed? How it is classified? And explain in short "integrated approach for watershed management". **[8]**

b) What is the role of RS & GIS in watershed management? **[10]**

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Total No. of Questions : 10]

SEAT No. :

P3061

[Total No. of Pages : 2

[5059]-511
B.E.(Civil)
TQM&MIS IN CIVIL ENGINEERING
(2012 Course)(Elective-II)(Semester-I) (401005)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1or Q2,Q3or Q4,Q5or Q6,Q7or Q8, Q9or 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 the importance of Quality in construction field? **[4]**

b) State the contributions by Quality Guru Joseph Juran in the field of Quality management. **[6]**

OR

Q2) a) Explain following QC tools in short. **[6]**

i) Cause and effect diagram

ii) Histogram

b) Wrirte a short note on Quality Circle. **[4]**

Q3) a) What are the obstacles in implementing TQM on construction sites? **[4]**

b) What is Decision support system? What should be the characteristic of effective DSS? **[6]**

OR

Q4) a) Write steps of implementation of MIS. **[4]**

b) What are the common defects found after concreting? What are its probable causes? **[6]**

Q5) a) What are the contents of Quality Manual? Describe its structure. **[6]**

b) Prepare checklist of formwork activity at various stages of work. **[6]**

c) Differentiate between TQM and TQC. **[6]**

OR

P.T.O.

Q6) a) What is meant by conformity and non conformity? Explain with the help of suitable examples. **[6]**

b) Explain following Quality Management Principles w.r.t ISO 9001 **[6]**

i) Customer focused organization

ii) System Approach to Management

c) Write short notes on any one of the following. **[6]**

i) Importance of checklist

ii) External customers

iii) Leadership

Q7) a) What do you mean by 'Benchmarking'? How is it related to productivity? **[8]**

b) What is the 'Cost of Quality'? How can it be calculated? Explain with the help of suitable example. **[8]**

OR

Q8) a) Explain in detail the concept of Supply Chain Management **[8]**

b) What are the benefits of strategic planning? **[8]**

Q9) a) What are the applications of Data Base Management system in construction industry? **[8]**

b) What are the advantages of using ERP for human resource management and inventory management in constriction field? **[8]**

OR

Q10)a) How will you use GPS effectively while dealing with concreting activities at various locations? **[8]**

b) Explain any one ERP software available in market and discuss its applications for quality improvement on site. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2147

[Total No. of Pages : 3

[5059]-512
B.E. (Civil)
EARTHQUAKE ENGINEERING
(2012 Course) (Semester-I) (Elective-II) (401005-D) (ENDSEM)

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 and Q.11 or Q.12.***
2) ***Figures to the right indicate full marks.***
3) ***IS 456, IS 1893, IS 13920 are allowed in the examination.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Define: **[3]**

i) Soft Storey and Weak storey

ii) Epicenter

iii) Iso-seismal

b) Explain the causes and types of earthquake based on various parameters. **[3]**

OR

Q2) a) Classify and describe different types of waves generated during earthquake. **[3]**

b) What do you understand by Intensity of earthquake? Classify the earthquake based on magnitude. **[3]**

Q3) What are different types of vibrations? Explain the concept of 'Logarithmic Decrement'. **[6]**

OR

P.T.O.

Q4) a) Derive the equation of motion for a damped but free vibration of a SDOF system. **[3]**

b) A vibratory system is defined by following parameters-

Mass = 3 kg, spring stiffness = 100 kN/m, and damping coefficient = 3 N.sec/m.

Determine:

i) Damping factor

ii) Natural frequency of damped vibrations. **[3]**

Q5) Explain the following (Any Two): **[8]**

a) Seismic Zoning.

b) Vertical irregularity in buildings.

c) Tectonic Features of India.

OR

Q6) A three storeyed symmetrical RC School building situated at Bhuj with the following data.

a) Plan Dimensions: 7m × 7m,

b) Storey Height: 3.5m,

c) Total weight of beams/ storey = 130 kN,

d) Total weight of slab / storey = 250 kN,

e) Total weight of columns / storey = 50 kN,

f) Total weight of walls / storey = 530 kN,

g) Total Live Load = 130 kN. Additional weight on terrace floor is 655 kN. The structure is resting on hard rock. Determine seismic weight of building and hence find the total base shear and lateral loads at each floor levels using seismic coefficient method. **[8]**

Q7) A 500 mm × 500 mm column is supported on isolated footing. The load coming on the footing is 550 KN and a moment of 50 KN-m due to lateral loads. The SBC of the soil is 150 kN/m^2 using M25 grade of concrete and steel of grade Fe 415, design the footing. **[16]**

OR

Q8) a) Write types and effects of soil liquefaction. **[4]**

b) What are the different soil improvement techniques to reduce liquefaction? **[6]**

c) What type of forces generated due to earthquake and explain its effect on Foundation. **[6]**

Q9) a) What is disaster management? Explain various phases of disaster management? **[8]**

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

OR

Q10)a) What are the various methods available to control the lateral forces acting on a structure? Explain in details. **[8]**

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

Q11)a) What is retrofitting of structures? Explain its need for the buildings? **[8]**

b) Explain any three retrofitting techniques used for traditional buildings. **[10]**

OR

Q12)a) Explain the techniques used for strengthening RCC beams and Columns. **[8]**

b) Define and explain the RCC Shear Wall and its behavior. **[10]**

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Total No. of Questions : 10]

SEAT No :

P2148

[Total No. of Pages : 2

[5059]-513
B.E.(Civil)
ADVANCED GEOTECHNICAL ENGINEERING
(2012 Pattern) (401005E) (Semester - I) (End Sem.) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain how soils are classified according to IS soil classification system. **[3]**

b) Explain different clay minerals and their structural composition. **[4]**

c) Discuss the various primary and secondary bonds in respect of clay minerals. **[3]**

OR

Q2) a) Derive the relation for coefficient of lateral earth pressure at rest condition. **[3]**

b) Explain the steps for design of cantilever sheet pile wall. **[4]**

c) Write a note on anchored sheet pile wall. **[3]**

Q3) a) Differentiate between Rankine's and Coulomb theory of earth pressure. **[3]**

b) Explain Culman's graphical method. **[4]**

c) Determine the critical height of excavation of a vertical cut in cohesive soil if $C=20KN/m^2$ and $\gamma=15KN/m^3$ **[3]**

OR

Q4) a) Explain in short function of Geosynthetics. **[3]**

b) State the properties and functional requirements of Geosynthetics. **[3]**

c) Write a note on **[4]**

i) Mechanism of reinforced soil.

ii) Slope stabilization using soil nails.

P.T.O.

Q5) a) State the different properties relevant for dynamic loading and explain any one with detail. **[6]**

b) Describe elastic half space method in machine foundation. **[6]**

c) Write a note on 'Design criteria for machine foundation'. **[6]**

OR

Q6) a) Why is shear modulus a soil property of interest on soil dynamics? **[6]**

b) State the design procedure for a block foundation for cyclic loading. **[6]**

c) Define the following term. **[6]**

i) Natural Frequency

ii) Period

iii) Resonance

iv) Degree of Freedom.

Q7) a) What is the purpose of sand drain? And also explain function of vertical sand drain. **[8]**

b) State the procedure of vibro-flotation technique for ground improvement. **[8]**

OR

Q8) a) Explain in-situ ground improvement by compaction piles. **[8]**

b) Describe in short following terms in ground improvement. **[8]**

i) Grouting

ii) Deep mixing

Q9) a) What do you mean "Rheology" in respect of soil? **[5]**

b) What are the limitations of Rheological models? **[5]**

c) Explain Kelvin's rheological model with a neat sketch **[6]**

OR

Q10)a) Write a note on following soil phenomena. **[8]**

i) Secondary consolidation

ii) Creep

b) Explain Maxwell's Rheological model. **[8]**

✡ ✡ ✡

Total No. of Questions : 12] **SEAT No. :**

P1949 **[Total No. of Pages : 4**

[5059]-514

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

DAMS AND HYDRAULIC STRUCTURES

(2012 Pattern)

Time : 2 ½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:-

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

Q1) a) Discuss the possible social issues associated with dams. **[4]**

b) Enlist the types of dams based on hydraulic action and briefly explain any one type with sketch / sketches. **[4]**

OR

Q2) a) State and explain four instruments used for various measurements needed with reference to safety of dams. Draw suitable sketches wherever possible / necessary. **[4]**

b) Enlist the types of dams based on the purpose. Explain any one type with sketch. **[4]**

Q3) A gravity dam has base width 60m with upstream face vertical and downstream face with slope 2H:3V.

Knowing that total vertical force above the base is 63MN, overturning moment and resisting moment are 2.2×10^6 kN.m and 3.9×10^6kNm; determine

P.T.O.

maximum and minimum vertical stresses induced on the foundation. Also find major principal stress at the toe of the dam. Is the dam safe against overturning? **[6]**

OR

Q4) State the classification of arch dams. Briefly explain the constant angle arch dam with sketch / sketches. When are the arch dams suitable? **[6]**

Q5) What is meant by 'spillway'? State its purposes. Explain any one spillway with sketch. **[6]**

OR

Q6) Enlist various spillway gates. Give the classification of hydropower plants based on various criteria (considerations). **[6]**

Q7) a) Discuss various causes or modes of failure of earthen dams. Draw relevant sketches. **[4]**

b) Compare Lane's and Bligh's theories of seepage with suitable sketches. **[4]**

c) An earthen dam of homogeneous material has top width 5m with upstream slope 3H:1V and downstream slope 2H:1V.

Knowing that coefficient of permeability of the dam material is 0.6×10^{-3} cm/s, determine :

i) Phreatic line for the dam, and

ii) Rate of seepage per unit length of dam.

Assume various R.L.s as given below :

- R.L. of deepest river bed = 175 m
- R.L. of top of dam = 201.5 m
- H.F.L. for reservoir = 197 m

For calculating 'y' values, assume interval for 'x' as 15m **[10]**

OR

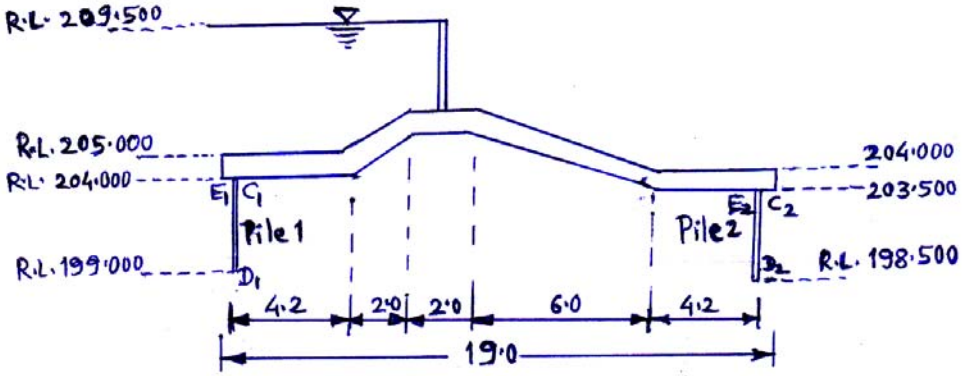
Q8) a) Discuss the 'Swedish slip circle method' for examining the stability of earth slopes. **[4]**

b) Explain <u>one method each</u> for seepage control through **[4]**

i) the embankments

ii) the foundations. (Relevant sketch should be drawn)

c) Figure shows section of a barrage. R.L.s of key points and horizontal distances are in meters. Calculate % pressure at points D_1, C_1, D_2 and E_2 if pressures at E_1 and C_2 are 100% and 0% respectively. Neglect slope corrections. **[10]**



(Fig. Not to scale, all dimensions in 'm')

Fig for Q.8(c)

Q9) a) Discuss basic three types of canal alignments with relevant sketch / sketches. **[4]**

b) State two requirements of a good canal module (outlet). State four types of canal falls and draw neat sketch of weir type of canal escape. **[4]**

c) Design an irrigation canal with side slopes 1H:2V to carry 40 cumecs discharge. Use kennedy's theory. Assume B:D ratio 2.50, critical velocity ratio (m) =1 and Kutter's rugosity coefficient = 0.023 Assume $s = \frac{1}{4000}$ for first trial. Take two trials. **[8]**

OR

Q10) a) State two advantages and two drawbacks / disadvantages of canal lining. **[4]**

b) What is the necessity of canal falls? Discuss various types of canal outlets (modules) briefly. **[4]**

c) Design a trapezoidal regime channel to carry a discharge of 50 cumecs using Lacey's theory. Assume side slopes 1H:2V and silt factor f = 1.10 **[8]**

Q11) a) State the types of cross - drainage works. Explain any one C.D. work with suitable sketch. **[4]**

b) On which factors the choice of C.D. work depends? Briefly discuss. **[4]**

c) Give classification of rivers based on the topography of river basin. Explain the types briefly. **[4]**

d) State four objectives of river training. With neat sketch explain briefly the levee (embankment) as a river training work. **[4]**

OR

Q12) a) With suitable sketches, explain various types of spurs (groynes). **[4]**

b) Briefly explain three basic types (classes) of river training. **[4]**

c) Explain Aqueduct and syphon Aqueduct with sketches. **[4]**

d) What is meant by 'super - passage'? Explain it clearly with sketches. **[4]**

Total No. of Questions : 12] **SEAT No. :**

P1950 **[Total No. of Pages : 5**

[5059]-515

B.E. (Civil)

QUANTITY SURVEYING, CONTRACTS AND TENDERS

(2012 Pattern)

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., Q.11 or Q.12.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket Calculator is allowed.***
4) ***Assume Suitable data f necessary.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Define Estimate. State various purposes of estimates. **[3]**

b) Explain following : **[3]**

i) Contingencies

ii) Work Charge Establishment

OR

Q2) a) Enlist any 6 of the items of work for estimation of building project and give their unit of measurement. **[3]**

b) State various methods of approximate estimate and explain any one. **[3]**

P.T.O.

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

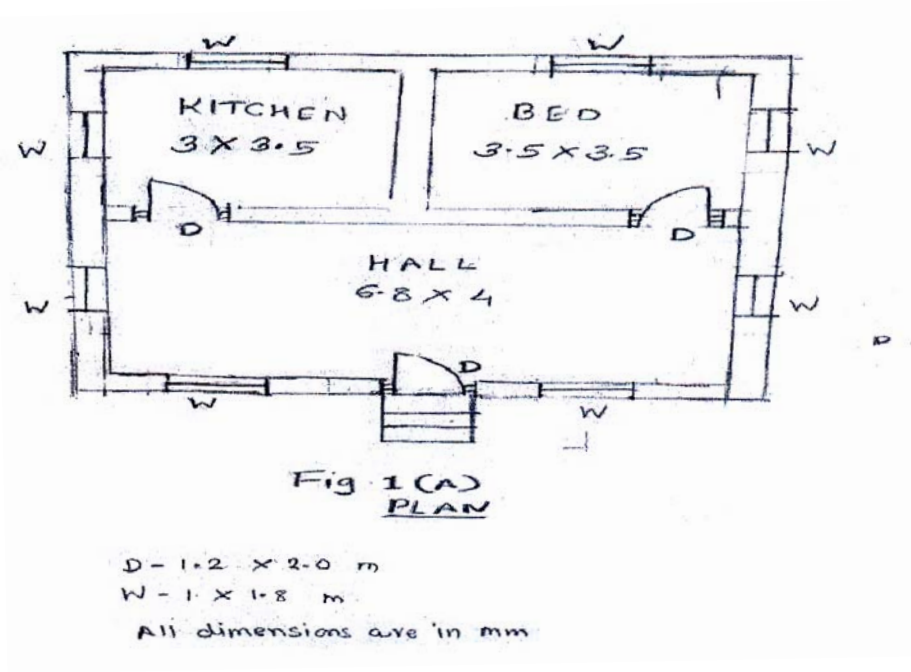


Fig 1(A)
PLAN

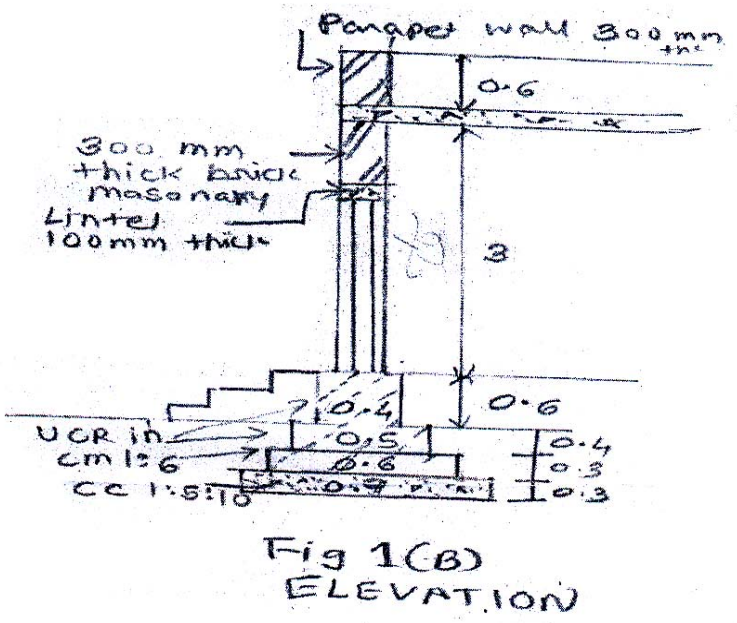


Fig 1(B)
ELEVATION

i) Excavation in foundation

ii) Cement Concrete (1:5:10) in foundation

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

OR

Q4) Prepare bar bending schedule for Fig 2(A) & 2(B) shows the L-section and cross section of RCC beam. Also determine the % steel in the beam (Assume Density of Steel is 7860 kg/m^3) **[8]**

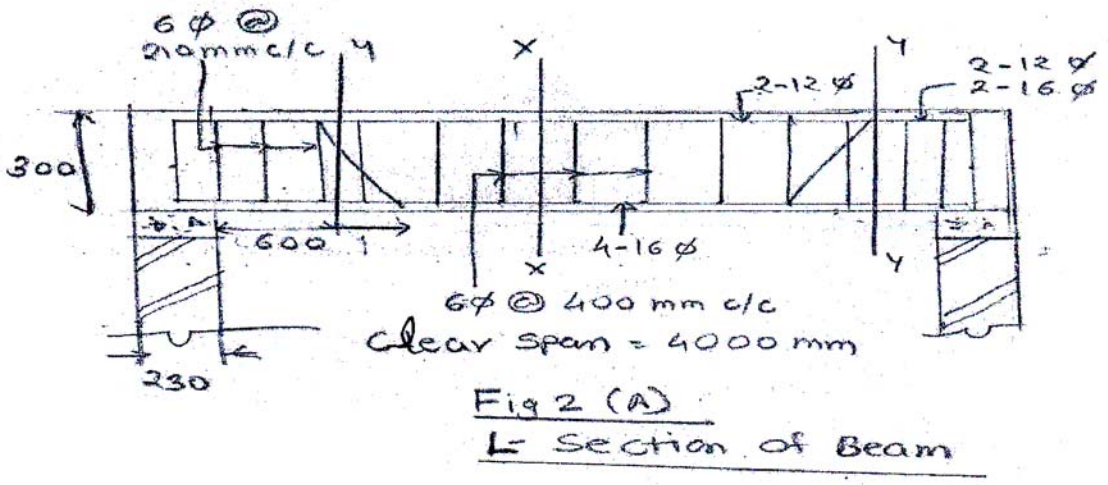


Fig 2 (A)
L Section of Beam

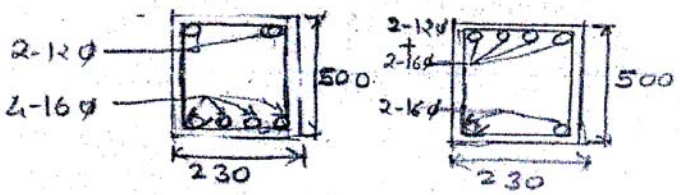


Fig 2 (B)
C/S of Beam

Q5) a) Define following : **[3]**

i) Market Value

ii) Book Value

iii) Distressed Value

b) Explain meaning of Price, Cost and Value and also discuss the purpose of valuation. **[3]**

OR

Q6) Define Depreciation and state the methods for its determination.

The estimated cost of a building is RS. 200000. It is 20 years old and well maintained. The life of the structure is assumed to be 80 years. Determine the depreciated value of the building. The fixed percentage of depreciation is unity. **[6]**

Q7) a) Draft a detailed specification for providing & laying RCC of M25 grade including form work & including steel reinforcement for a slab with all other standard requirements which are normally specified in BOQ. **[6]**

b) Explain how the various direct cost and indirect cost are considered in analysis of rate of building item. **[6]**

c) What is task work? Why does it vary? Explain its importance with an example. **[6]**

OR

Q8) a) Prepare rate analysis for providing and laying RCC of M25 grade for plinth and Foundation using basic rates as per the current DSR. **[6]**

b) Explain purpose of specifications and state its different types. **[6]**

c) Explain the terms overheads and sundries. **[6]**

Q9) a) Draft a specimen tender notice for the construction of a bridge assuming suitable details. **[6]**

b) Discuss merits, demerits of Open Tenders as against Negotiated Tender. **[6]**

c) Explain the purpose of taking Security Deposit in tender. **[4]**

OR

Q10) a) Explain the PWD procedure for execution of minor works. **[6]**

b) State true or false with justification: A lowest tender can be rejected. **[6]**

c) State and explain the prequalifications for tenders. **[4]**

Q11) a) Explain with an example the validity of statement "All contracts are agreements but all agreements are not necessarily contracts". **[6]**

b) Explain "3 Bid system" of submitting tenders. What is its advantage? **[6]**

c) Explain "Pre-Bid conference" stating its advantages. **[4]**

OR

Q12) a) Explain the following with examples : **[6]**

i) Detection of unbalanced bid

ii) Time is the essence of contract

b) Explain B.O.T. type of tender and quote any one field example wherein it is actually being utilized. **[6]**

c) Explain Arbitration. **[4]**

Total No. of Questions : 10]

SEAT No :

P2149

[Total No. of Pages : 2

[5059]-516
B.E.(Civil)
ADVANCED STRUCTURAL DESIGN
(2012 Course) (401009A) (Semester - II) (End Sem.)(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.5or Q.6, Q.7 or Q.8, 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) What is form factor? Explain with an example. **[10]**

OR

Q2) A 3.0m simply supported beam carries a uniformly distributed load of 4kN/m. Design the beam. **[10]**

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

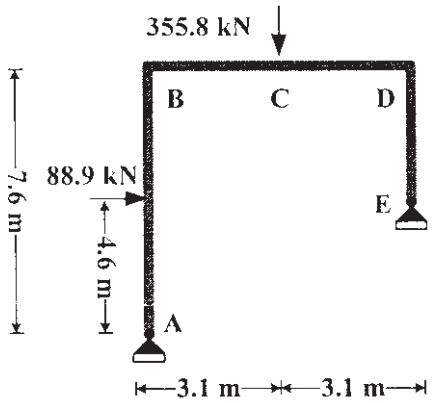


Fig. 1

OR

Q4) How are the dimensions of a steel chimney determined? Explain with an example. **[10]**

P.T.O.

Q5) Determine the uniformly distributed collapse load for the slab shown in Fig.2. **[16]**

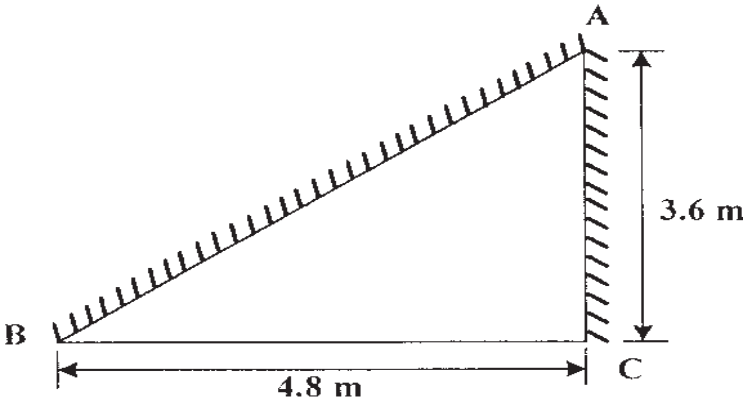


Fig. 2

OR

Q6) Explain the following: **[16]**

a) lower bound theorem.

b) upper bound theorem.

c) uniqueness theorem.

d) corner levers.

Q7) An elevated square water tank is 6m in size and 4 m high. It is supported on a concrete staging of 4 columns. The height of the staging is 9 m. Bracings are provided at a vertical spacing of 3 m. The circular columns of the staging are 450 mm in diameter. The structure is located in zone II. the preliminary dimensions of the elements of the water tank for the analysis may be suitably assumed and clearly mentioned. Assume suitable dimensions for various elements and mention them clearly. Analyze the tank for tank full condition. **[18]**

OR

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

Q9) a) Explain the modes of failure of a RC shear wall. **[8]**

b) Write a note on coupled shear wall system. **[8]**

OR

Q10) Explain step-by-step design procedure of a RC shear wall. Also explain how boundary elements are designed. **[16]**

✡ ✡ ✡

Total No. of Questions : 12]

SEAT No. :

P3062

[Total No. of Pages : 2

[5059]-517
B.E.(Civil)
ADVANCED FOUNDATION ENGINEERING
(2012 Course)(Elective-III)(Semester-II)(401009B)

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) ***Assume suitable data if necessary.***

Q1) Explain in brief the I.S code provisions for subsoil exploration of canals. **[6]**

OR

Q2) Explain any case study of failure of foundation reposted in literature. **[6]**

Q3) Explain the cyclic load test for design fo piles. Also, comment on seperation of point resistance and skin resistance with the help of cyclic load test. **[6]**

OR

Q4) Write a short note on 'Testing and design of piles subjected to tensite loads.**[6]**

Q5) Draw a neat sketch of under reamed pile foundation and Explain the design steps, when it is subjected to tensile loads **[8]**

OR

Q6) Draw a neat sketch of sand drains. Also, comment on design criterias of sand drains. **[8]**

Q7) a) What is raft foundation? Explain the conventional method for design of raft foundation **[8]**

b) What are the components of total settlement of Isolated footing? Explain how they are estimated. **[8]**

OR

P.T.O.

Q8) a) Explain the I.S code provisions for the design of raft foundations. **[8]**

b) Explain the skemptons equations for the estimation of net ultimate bearing capacity of shallow foundations. **[8]**

Q9) a) Explain how the depth of well foundation and ultimate bearing capacity is determined using Terzagh's analysis. **[9]**

b) Draw a typical section of a rockfill dam and state the advantages and disadvanatages of rockfill dam. **[8]**

OR

Q10)a) Explain the design guidelines for well foundation for the components **[9]**

i) well curb

ii) cuttings edge

iii) skin friction

iv) Bottom plug

b) Compare the IS code and FRC provisions for the design of well foundation. **[8]**

Q11)a) Explain the stress distribution in the vicinity of vertical shaft in an elastic equilibrium with respect to **[9]**

i) vertical stress

ii) horizontal radial stress and

iii) horizontal circumferencial stress

b) Explain how load on negative projecting conduit is estimated. **[8]**

OR

Q12)a) What are the various types of positive projecting conduits. Explain in detail with sketches. **[9]**

b) Write a short note on imperfect ditch conduit. **[8]**

Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 3

P3757

[5059] - 518

B.E. CIVIL ENGINEERING

HYDROPOWER ENGINEERING

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

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

Instructions to the candidates :

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

Q1) a) What is green house effect? Write a note on it. **[3]**

b) Write detail note about the conventional and non conventional power resources related to the hydropower development. **[4]**

OR

Q2) a) Write a note on India's cooperation with neighboring countries in hydropower sector. **[4]**

b) What are the opportunities and threats in hydropower development in India. **[3]**

Q3) a) Explain the classification of hydropower plants based on hydraulic features. **[4]**

b) What is run off river plants? Explain in detail. **[3]**

OR

Q4) a) Explain hydro plants based on quantity of water available. **[4]**

b) Give a note on preventive maintenance of hydro electric plant. **[3]**

P.T.O.

Q5) a) Write the significance of diversity factor on the cost of hydropower generation. **[3]**

b) Write a note on power duration curve related to high head and low head plants. **[3]**

OR

Q6) a) Elaborate the different methods to meet the demand of variable loads on power plants. **[3]**

b) Define : Plant capacity factor, plant use factor and connected load factor. **[3]**

Q7) a) Write notes on flowing types of intakes **[6]**

i) Run of river intake

ii) Canal intake

iii) Tower intake

b) Enlist the instrument to measure the power output. Explain any of them in detail. **[5]**

c) What are the types of underground power stations? Explain any one type with neat sketch. **[5]**

OR

Q8) a) Write note on pressure shafts and trash racks. **[6]**

b) Advantages and disadvantages of underground power plants. **[4]**

c) Classify various instruments that are generally used in hydro electric power plant. **[6]**

Q9) a) Write note on 'open type surge tanks' and 'restricted orifice type surge tanks'. **[5]**

b) What is cavitation and how can you minimize it? **[5]**

c) A power house is equipped with four units of vertical shafts pelton turbines to be coupled with'70000kVA, 3 phase, 50 Hz generators. The generators are provided with 10 pairs of poles. The gross design head is 505m and the transmission efficiency of headrace tunnel and penstocks together is to be 94 %. The four units together will provide power of 250000Kw with the efficiency of 90%. The nozzle efficiency is 0.98. Find the design discharge for the turbine, jet diameter and number of jets, the nozzle tip diameter and specific speed. **[6]**

OR

Q10)a) Explain the classification of turbines based on i) pressure ii) head **[4]**

b) What is draft tube? Enlist different functions of draft tube? What is efficiency of the draft tube? **[6]**

c) In a hydroelectric plant, Kaplan turbine is fixed with following specifications: Calculate speed ratio, flow ratio and overall efficiency. Operation Head = 22.5 m, Output power = 126MW, Discharge = 615m^3/s

Speed = 68.2 rpm, Runner tip to tip diameter = (D)= 9.3m, Hub diameter = (D_h) = 4.3m, Number of blades = 6 **[6]**

Q11)a) The cost of a small power plant is Rs 3×10^6 having the life expectancy of 25 years. The net annual installment to recover the cost is Rs. 30000. The interest is 10%. Using sinking fund method Find the salvage value of the plant after 20 years of service. **[6]**

b) Write a note on tariff for electrical energy and types of tariffs for hydropower plants. **[6]**

c) Write a detailed note on carbon credits and its implications on clean technology. **[6]**

OR

Q12)a) A power plant of 300 MW is installed when the capital cost is 20000/kW. The interest and depreciations are 10%. Annual load factor is 56%. Annual capacity factor is 45%.Annual running charges Rs 250×10^6. Energy consumed by power plant auxiliaries is 6 %. Calculate cost of power generation for KWh. **[6]**

b) What are the fixed and running charges in economic analysis of a hydropower plant? **[6]**

c) What is carbon credit? write long term plans to reduce the CO_2. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3748

[Total No. of Pages : 2

[5059]-519
B.E. (Civil)
Air Pollution and Control (Elective - III)
(2012 Pattern) (End Sem.)

Time : 2.5 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Stratosphere and Chemosphere. **[6]**

b) What are the limitations of Gaussian model? **[4]**

OR

Q2) a) Explain the following secondary meteorological factors influencing air pollution: **[6]**

i) Precipitation

ii) Humidity and

iii) Visibility

b) What is air cleaning system for control of indoor air pollution? **[4]**

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

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

OR

Q4) a) Explain stable and unstable atmosphere. **[6]**

b) Explain any one method to control odour pollution. **[4]**

Q5) a) What are the advantages and disadvantages of fabric filter? **[8]**

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

P.T.O.

OR

Q6) a) Explain working principle of Electrostatic Precipitator with a neat sketch. **[8]**

b) What are the objectives of air pollution control equipment? Explain with example control of air pollution at source. **[8]**

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

b) What are the advantages and disadvantages of a gravity settling chamber. **[8]**

OR

Q8) a) What is the purpose of environmental (protection) ACT 1986? Explain the powers and duties of central and state pollution control boards. **[8]**

b) Explain procedure of EIA. **[8]**

Q9) a) Write the environmental rules 1999 (sitting of industries) as per the notification of Ministry of Environment and forests. **[9]**

b) What is land use planning? Explain its importance in controlling air pollution. **[9]**

OR

Q10)a) Explain roles of different authorities in the EIA Process. **[9]**

b) What is a need of Environmental Impact Assessment (EIA)? Also write about Indian Policies requiring EIA. **[9]**

Total No. of Questions : 8]

SEAT No. :

P3063

[Total No. of Pages : 2

[5059]-520

B.E.(Civil Engineering)

FINITE ELEMENT METHOD IN CIVIL ENGINEERING

(2012 Course) (Elective-III)(5)(Semester-II)(End Sem.)(401009E)

Time :2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

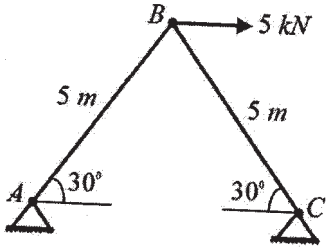
1) ***Answer Q1 or Q2,Q3 or Q4,Q5 or Q6 , Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

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

i) Discretization of structure

ii) Aspect ratio of element

b) Determine displacements at loaded joint of truss shown in figure using finite element method. Take A=1000 mm^2 and E=200 GPa **[8]**

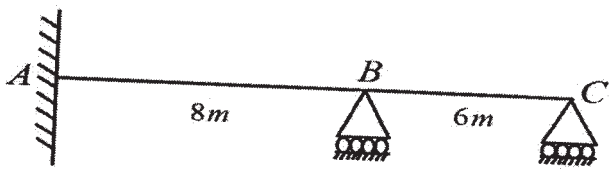


c) Derive the transformation matrix for two noded frame element having six degrees of freedom. **[6]**

OR

Q2) a) State the convergence criteria for the choice of the displacement function in FEM. **[6]**

b) Determine rotations at supports B and C of continuous beam ABC if support B sinks by 10mm. Take EI=6000kN.m^2. Use finite element method. **[8]**



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

P.T.O.

Q3) Write short note on: **[16]**

a) Principle of minimum potential energy.

b) Principle of virtual work.

c) CST and LST elements

d) 3D Tetrahedron and Hexahedron elements.

OR

Q4) Derive connectivity matrix[A], elasticity matrix[D], strain-displacement matrix[B] and stiffness matrix[K] for the four noded rectangular element in Cartesian coordinate system using finite element formulation. **[16]**

Q5) Derive shape functions for the following elements using Lagrange's interpolation function.

a) Two noded bar element **[4]**

b) Four noded rectangular element **[6]**

c) Nine noded rectangular element **[8]**

OR

Q6) a) Derive the area coordinates for the three noded CST element having Cartesian coordinates node 1 (1,2),node 2 (3,3) and node 3 (2,4). **[10]**

b) Drive shape functions for the eight noded serendipity element in natural coordinate (ξ,η) system. **[8]**

Q7) Write short note on:

a) Isoparametric, sub-parametric and super-parametric elements. **[5]**

b) Theorems of isoparametric formulations. **[5]**

c) Jacobian matrix **[6]**

OR

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

Total No. of Questions : 10] **SEAT No. :**

P1951 **[Total No. of Pages : 2**

[5059]-521
B.E. (Semester - II)
CONSTRUCTION MANAGEMENT
(2012 Pattern)

Time : 2.30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:-

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

Q1) a) Explain the role of construction industry in economic development of the country. **[5]**

b) Write short note on: Repetitive Project Management. **[5]**

OR

Q2) a) What are the aims of method study. Describe the procedure required to be followed in method study. **[5]**

b) What are the importance & need of labour laws in construction industry. **[5]**

Q3) a) Describe any five objectives justifying the need of finance for any construction project. **[5]**

b) Write short note on : Time study **[5]**

OR

Q4) a) Discuss in detail function of management. **[5]**

b) Write short note on : Working capital. **[5]**

Q5) a) Define Risk. Explain in detail various risk in road project. **[6]**

b) What are methods of Risk Management? Explain any one in detail. **[6]**

c) State the objectives of value engineering. **[6]**

OR

P.T.O.

Q6) a) Write short note on : **[8]**

i) Break Even Analysis

ii) Risk Mitigation

b) Explain with example, how value analysis can be applied to construction industry. **[6]**

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

Q7) a) Explain importance of material management in Construction sector. **[6]**

b) What do you mean by EOQ? Derive its expression. **[6]**

c) What are the aim & objectives of career planning. **[4]**

OR

Q8) a) What is ERP. State its importance in construction sector. **[4]**

b) Define Supply Chain management. Explain SCM in context with construction material management. **[4]**

c) Write short Note on : **[8]**

i) Job Evaluation

ii) Performance Appraisal

Q9) a) Define Artificial Intelligence (AI) and write down applications of AI in Civil engineering. **[6]**

b) Explain in detail characteristics of neural network. **[6]**

c) Explain the term Fuzzy Logic in detail. **[4]**

OR

Q10) a) Discuss in detail importance of Genetic Algorithm tool in construction Industry. **[6]**

b) Explain the concept of biological neural networks. **[6]**

c) State various application of fuzzy logic. **[4]**

Total No. of Questions : 10]

SEAT No. :

P3064

[Total No. of Pages :4

[5059]-522
B.E.(Civil)
ADVANCED TRANSPORTATION ENGG.
(2012 Pattern)(Semester-II)(Elective-IV)(401010-B)

Time :2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No1 or 2, Q.No3 or 4, Q.No 5 or 6, Q.No7 or 8 ,Q.No 9 or 10.***
2) ***All questions are compulsory.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logaritmic tables, sliderule, elelectronic pocket calculator is allowed.***

Q1) a) With a flow diagram only explain the comprehensive transport planning process and explain in detail **[6]**

b) Discuss the various factors affecting the trip generation within a study area. **[4]**

OR

Q2) a) Explain the home interview technique of carrying Origin Destination (O-D) survey **[5]**

b) Explain in brief PMGSY project. **[5]**

Q3) a) Explain how would you as a transportation planner integrate the Intelligent Transportation systems (ITS) to the present Smart city concept. **[5]**

b) Discuss the salient features of JNNURM scheme. **[5]**

OR

Q4) a) What do you mean by Pavement Management System? How are they useful in the management of highway projects. **[5]**

b) Explain **[5]**

i) Congestion cost

ii) Vehicle OPerating Cost.

P.T.O.

Q5) a) Explain in detail the necessity and procedure of conducting parking survey. **[10]**

b) With neat sketches explain the necessity of grade separated intersections. **[6]**

OR

Q6) a) During a traffic survey the following data was recorded on a particular road network **[10]**

i) Two wheelers- 1000 numbers

ii) Cars - 500 numbers

iii) Buses - 100 numbers

iv) Auto rickshaw - 200 numbers

v) Cycle - 50 numbers

1. Work out the PCU using IRC 106-1990.

2. How would you use the obtained data in planning the road network?

b) Write a short note on Automated Signals. **[6]**

Q7) a) Desing 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) Dual two lane carriageway.

ii) Initial traffic in the year of completion of construction =5600CVPD in both directions.

iii) Traffic growth rate per annum=8%

iv) Design life = 10 years.

v) CBR = 5%

vi) Terrain-Rolling

b) Discuss the advantages of flexible pavements over rigid pavements.**[6]**

OR

Q8) a) Explain the procedure and computation involved in the evaluation of pavement using Benkelmen Beam as per the IRC codal provisions.**[10]**

b) Write a note on skid resistance of a road. **[6]**

Q9) a) Explain the purpose of providing overlays and the design procedure for estimating the thickness of the overlay using IRC 81 **[10]**

b) Explain with neat sketches various types of distresses in rigid pavement. **[8]**

OR

Q10) With respect to rigid pavement, explain the following concepts **[18]**

a) Wheel Load Stresses

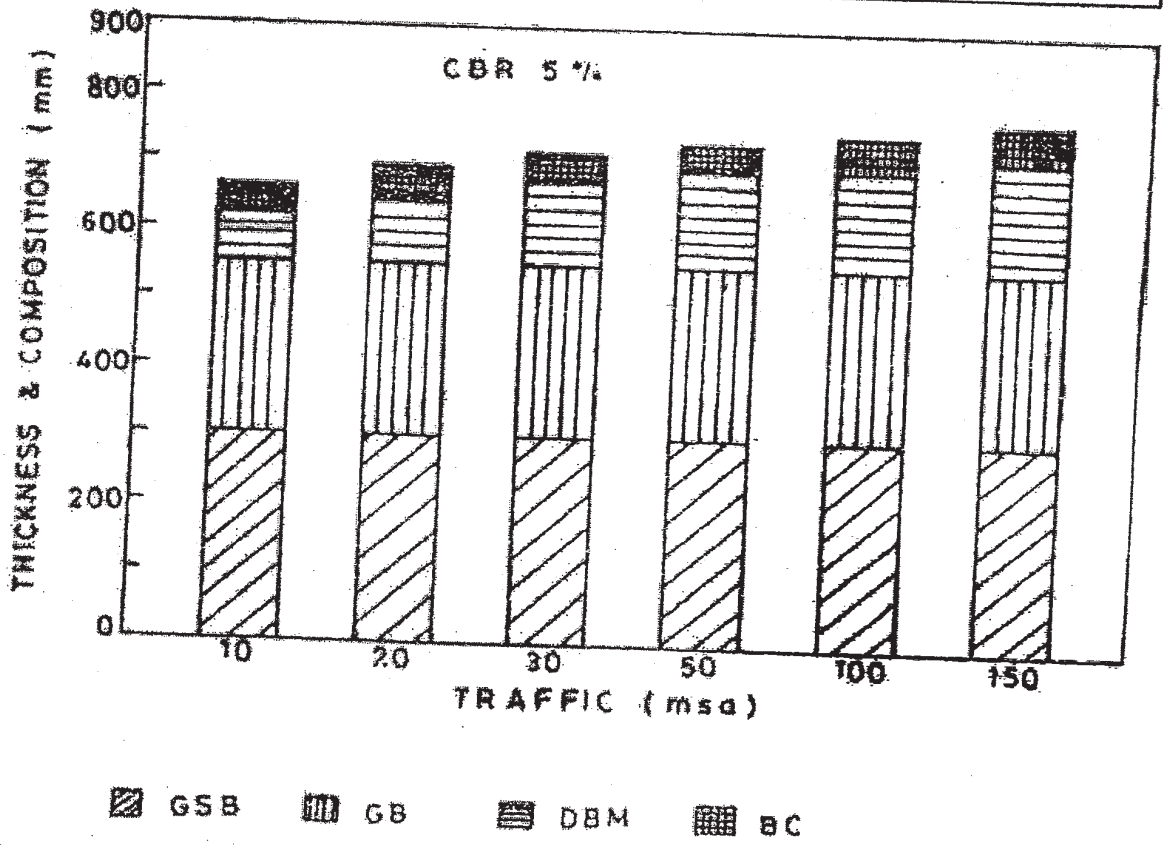
b) Temperature Stresses

c) Joints in the pavement

PAVEMENT DESIGN CATALOGUE

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

CBR 5%				
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION		
		Bituminous Surfacing		Granular Base & Sub-base (mm)
		BC (mm)	DBM (mm)	
10	660	40	70	Base = 250 Sub-base = 300
20	690	40	100	
30	710	40	120	
50	730	40	140	
100	750	50	150	
150	770	50	170	



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Total No. of Questions : 10]

SEAT No :

P2150

[Total No. of Pages : 5

[5059]-523
B.E.(Civil)
STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS
(2012 Course) (401010C) (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.5or 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) Evaluate 1/18 by Newton iteration Method. **[4]**

b) By using Regula falsi Method, find root of equation: $xe^x = \cos x$, correct to four decimal places. **[6]**

OR

Q2) a) A curve is drawn to pass through the points given by the following table. **[5]**

x	1	1.5	2	2.5	3	3.5	4
y	2	2.4	2.7	2.8	3	2.6	2.1

Estimate the area bounded by the curve x axis and the lines $x = 1$ and $x=4$

b) Evaluate $\int_0^2 \frac{x^2 + 2x + 1}{1 + (1 + x)^2}$ using Gaussian 3 point formula. **[5]**

Q3) a) A rocket is launched from the ground. Its acceleration is registered during the first 80 sec and is given in the table below. Using Simpson's 1/3rd rule, find the velocity of the rocket at t=80sec. **[5]**

t(sec)	0	10	20	30	40	50	60	70	80
f(cm/s^2)	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

P.T.O.

b) Find Inverse of following matrix by Gauss Jordan Method. **[5]**

$$\begin{matrix} 2 & 2 & 3 \\ 2 & 1 & 1 \\ 1 & 3 & 5 \end{matrix}$$

OR

Q4) a) Evaluate $\int_0^5 dx / \left(1+x^3\right)$ **[5]**

b) Solve by Gauss seidal method **[5]**

$20x_1+x_2-2x_3=17$

$3x_1+20x_2-x_3=-18$

$2x_1-3x_2+20x_3=25$

Q5) a) Write down limitations of statistics. **[3]**

b) from the following data calculate mode and median. **[7]**

Marks	10	20	30	40	50	60
Number of Students	8	23	45	65	75	80

c) Pollution levels of 10 cities are as under: **[6]**

240,260,290,245,255,288,272,263,277,255. Calculate standard deviation with the help of assumed mean.

OR

Q6) a) Write down limitations of sampling. **[3]**

b) The following table shows the monthly expenditures of 80 students of a university on morning breakfast expenditure in (Rs). **[7]**

780-820	2
730-770	6
680-720	7
630-670	12
580-620	18
530-570	13
480-520	9
430-470	7
380-420	4
330-370	2

Calculate arithmetic mean, standard deviation and coefficient of variation of the above data.

c) The scores of two batsmen A and B in ten innings during a certain season are **[6]**

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

Find using coefficient of variation which of the two batsmen A or B is more consistent in scoring.

Q7) a) A box contains 3 red and 7 white balls. One ball is drawn at random and in its place a ball of the other colour is put in the box, now, one ball is drawn at random from the box. Find the probability that it is red. **[6]**

b) In Mumbai with 100 companies each having approximately same employees, the distribution of machine tools in 2015 was as follows.**[7]**

No.of m/c tools	0	1	2	3	4
No.of companies	63	28	6	2	1

Fit Poisson Distribution for the above.

c) Write short notes on chi square distribution and its applications. **[4]**

OR

Q8) a) Out of 320 families with 5 children each, what percentage would be expected to have:

i) 2 boys and 3 girls

ii) Atleast one boy?

Assume equal probability for boys and girls. **[5]**

b) The life time of machine for a random sample of 10 from a large consignment gave the following data. **[5]**

Item	1	2	3	4	5	6	7	8	9	10
Life(hrs)	4.2	1.6	3.9	4.1	5.2	3.8	3.9	4.3	4.4	5.6

c) 200 digit are chosen at random from a set of tables. The frequencies of the digits are as follows. **[7]**

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

Use x^2 test to assess the correctness of the hypothesis that the digits were distributed in equal numbers in the tables from which they were chosen.

Q9) a) following table gives information about advertisement expenditure and sales. **[8]**

	Mean	SD	Correlation Coeff
Expenditure(x)	20	5	0.8
Sales(y)	120	25	0.8

b) Estimate the production for the year 2000 with the help of the following table: **[9]**

Year	Production in tonnes
1975	20
1980	22
1985	26
1990	30
1995	35
2000	?
2005	43

OR

Q10)a) The following table gives indices of industrial production of registered unemployed (in hundred thousand). Calculate the value of the coefficient of correlation. **[9]**

`

Year	2004	2005	2006	2007	2008	2009	2010	2011
Index of production	100	102	104	107	105	112	103	99
No.of unemployed	15	12	13	11	12	12	19	26

b) Calculate Pearson's coefficient of skewness. **[8]**

x	12.5	17.5	22.5	27.5	32.5	37.5	42.5	47.5
f	28	42	54	108	129	61	45	33

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Total No. of Questions : 10]

SEAT No. :

P3773

[Total No. of Pages : 2

[5059]-524
B.E. (Civil)
PLUMBING ENGINEERING
(Semester - II) (2012 Course) (Open Elective)

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

Q1) a) What are various plumbing codes enlist them and explain GPCS-I. **[5]**

b) Write a note on public health engineering and relate it with Swachha Bharat Abhiyan. **[5]**

OR

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

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

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

b) Explain plumbing necessary for solar water heating. **[5]**

OR

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

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

P.T.O.

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

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

OR

Q6) a) Explain drainage system for three star hotel building (G + 4), Include explanation of drainage from kitchen. **[8]**

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

i) Design of trap.

ii) Trap seal and trap seal protection.

iii) Trap setting and protection.

Q7) a) State requirements of a sanitary closet. Explain 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. Also explain ancient stone ware drainage of Mohenjo-Daro. **[10]**

b) Explain with neat sketch requirements for brick built inspection chamber and Gully trap for drainage line of G + 1 structure. **[6]**

OR

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

b) How does faulty plumbing system for multi-storey building affected many people in CHINA, (SARS, severe acute respiratory syndrome) **[8]**

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Total No. of Questions : 8] **SEAT No. :**

P1952 **[Total No. of Pages : 2**

[5059]-525
B.E. (Civil)
GREEN BUILDING TECHNOLOGY
(2012 Pattern) (Open) (Elective) (End Semester)

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 Q8.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Why and How indoor environmental quality depends upon the activities and materials in the room? **[7]**

b) Define thermal indices and mention the importance of them. **[6]**

c) Elaborate importance of "life cycle assessment" and its need. **[7]**

OR

Q2) a) Why today construction waste is categorize as a resource? **[7]**

b) What is the importance of site planning in relation with sun path and wind path? **[6]**

c) What is EIA? Elaborate the importance of the same. **[7]**

Q3) a) Explain the working and use of Fresnel lens. **[8]**

b) Explain various methods of composting. **[8]**

OR

Q4) a) Write a short note on water conservation. **[8]**

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

P.T.O.

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

b) Write a short note on ECBC. **[9]**

OR

Q6) a) Write a short note on KYOTO Protocol. **[8]**

b) Why the codes on energy conservation are important these days? Explain with example. **[9]**

Q7) a) Write a short note on importance of rating the buildings. **[9]**

b) Elaborate in detail "LEED- INDIA". **[8]**

OR

Q8) a) Elaborate in detail “BREEAM”. **[9]**

b) Elaboate the benefits offered to different rated buildings. **[8]**

Total No. of Questions : 8] **SEAT No. :**

P1953 **[Total No. of Pages : 3**

[5059]-526

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

FERROCEMENT TECHNOLOGY

(2012 Pattern) (Elective - IV)

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

Q1) a) Discuss 'Ferrocement as material of construction'. **[6]**

b) Discuss 'curing' & 'maintenance' for ferrocement structures. **[6]**

c) Compare the behavior of 'Beam' & 'Cable'. **[6]**

OR

Q2) a) Compare Ferrocement Technology with prestressed Technology. **[6]**

b) Write note on 'shrinkage & creep' of ferrocement. **[6]**

c) Explain following parameters : **[6]**

i) Specific surface

ii) Volume Fraction

Q3) a) Discuss earthquake resistant properties of Ferrocement. **[8]**

b) Determine quantities of materials required for a ferrocement partition wall, 25mm thick of size 5m×2m. **[10]**

P.T.O.

Skeletal steel → 8mm dia 500mm c/c

in both direction

Weld mesh → 150mm × 150mm ×12×12g

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

13×13mm×24×24g

Rich cement mortar - 1:3 mix by volume

OR

Q4) a) Discuss Ferrocement in 'Foundations' for buildings. **[8]**

b) Determine the quantities for a ferrocemnet hemispherical dome. **[10]**

Specifications as follows :

Dome → 40mm thick, base diameter 8.0m central height 2m

Skeletal steel cage → 8mm dia bars, 400mm c/c circumferentially and 500mmc/c radially at the base.

The mesh reinforcement consisting of 2 layers of weld mesh (one on each face) of size 100×100mm×10×l0g and 4 layers of chicken mesh 13×13mm×24×24g (two on each face) being tied tightly over the skeletan and impregnated with cement mortar of 1:2 mix by volume.

Q5) a) Why Ferrocement is suitable for water retaining structures. **[5]**

b) Discuss important issues while constructing ferrocement cylindrical tanks. **[6]**

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

OR

Q6) a) Discuss various types of water tanks those can be constructed with ferrocement. **[6]**

b) Write note on Ferrocement swimming Pools. **[5]**

c) Enlist various types of retaining walls & explain cantilever retaining wall. **[6]**

Q7) a) Discuss the factors, need to be considered in design of space structures. **[6]**

b) Write note on 'Design of Ferrocement Dome.' **[6]**

c) Enlist various ferrocement structures those can be casted precast. **[5]**

OR

Q8) a) Explain the factors which influence the choice of casting between precast and cast - in - situ method. **[6]**

b) Write note on 'Ferrocement shells'. **[6]**

c) Discuss precast ferrocement pipes in comparison with RCC pipes. **[5]**

Total No. of Questions : 10]

SEAT No : ____

P2151

[Total No. of Pages : 2

[5059]-527
B.E.(Civil)
SUBSEA ENGINEERING
(2012 Course) (Semester - II) (Open Elective - IV)

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

Instructions to the candidates:

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

Q1) Explain subsea oil and non subsea oil extraction. engineering challenges faced by each. **[10]**

OR

Q2) a) Sketch engineering components of subsea establishment for oil exploration. **[4]**

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

Q3) a) Explain role of Civil Engineer in sub sea oil establishment and exploration process. **[6]**

b) Differentiate technical aspects of shallow and deep water oil exploration. **[5]**

OR

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

b) State effect of shallow water and deep water oil exploration on production system. **[5]**

Q5) a) Enlist subsea systems with purpose/function of each in oil exploration process. **[8]**

b) Explain role of unmanned and manned intervention method for subsea oil exploration. **[7]**

OR

P.T.O.

Q6) a) Explain forces acting on deep sea, and shallow subsea pipe line system. **[9]**

b) Explain ROV and its application in subsea engineering. **[6]**

Q7) a) Explain with suitable illustration economic decision in field development. **8]**

b) Explain civil engineering risks at field development. **[9]**

OR

Q8) a) Classify foundations required at subsea establishments. **[9]**

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) Explain design steps, for pipe line under subsea to carry fluid. **[9]**

b) Explain the charismas tree and its functioning in subsea system. **[8]**

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Total No. of Questions : 12]

SEAT No :

P2152

[Total No. of Pages : 2

[5059]-528
B.E.(Civil)
WAVE MECHANICS
(2012 Course) (4e) (401010) (Open Elective) (Semester - II)

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 electronic pocket calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss the process of wave generation and draw a definition sketch of wave propagation. **[3]**

b) Write a short note on wave rider buoy. **[4]**

OR

Q2) a) What are the phase resolving and phase averaging models. Give suitable examples. **[4]**

b) Define finite amplitude wave, significant wave height, zero cross wave period. **[3]**

Q3) a) Short note on Stokes wave theory. **[3]**

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

OR

Q4) a) Derive expression for group wave velocity. **[4]**

b) Define celerity, group velocity, dynamic free surface boundary condition. **[3]**

Q5) a) What is wave breaking? **[2]**

b) A wave has 3m height and 7 seconds period in deep water. It travels towards shore over parallel bed contours. If its crest line makes an angle of 30 with the bed contour of 10m before refraction. Calculate the wave height after crossing this contour line. **[4]**

OR

P.T.O.

Q6) a) Draw sketches for wave refraction in different cases. **[3]**

b) Write a short note on shoaling. **[3]**

Q7) a) Write steps of Gumbel's extreme value distribution method. **[6]**

b) Define random process or stochastic process. What do you mean by weekly stationary process? **[4]**

c) Discuss JONSWAP wave Spectrum. **[6]**

OR

Q8) a) What is short term wave statistics and Long term wave statistics. **[5]**

b) Write short note on Tucker method. **[5]**

c) Explain Weibull Distribution and Log Normal Distribution. **[6]**

Q9) a) Draw a typical beach profile and explain surf zone. **[4]**

b) What are the natural causes of shore line erosion. **[6]**

c) Enlist the coastal protection methods and elaborate any one in detail. **[6]**

OR

Q10)a) Define the terms sea, currents, surges, tides and Tsunamis. **[5]**

b) Explain the near shore beach system with sketch **[5]**

c) Enlist the different dynamic beach responses to the sea and explain any one in detail **[6]**

Q11)a) Enlist different factors affecting the littoral process and explain any one in detail. **[6]**

b) Explain the changes in the littoral zones with respect to time and space. **[6]**

c) Write a note on classification of littoral materials. **[6]**

OR

Q12)a) Explain the effect of extreme events on littoral processes. **[6]**

b) Explain the effect of offshore wave climate on littoral transport. **[6]**

c) Explain all the consolidated rock materials in littoral processes. **[6]**

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Total No. of Questions : 10] **SEAT No. :**

P1954 **[Total No. of Pages : 6**

[5059]-531

B.E. (Mechanical)

REFRIGERATION & AIR CONDITIONING

(2012 Pattern)

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

Instructions to the candidates:-

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of refrigeration tables, friction chart, psychrometric chart, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Dense air refrigeration plant working on Belt Coleman cycle produces 6 tonn of ice at 0°C per day. Lowest pressure is 1 bar and suction temperature is 20°C. Pressure ration is 6 and adiabatic index of compression and expansion is γ =1.4. Temperature of air leaving condenser is 40°C. **[8]**

Find :

i) COP

ii) Mass flow rate of air - refrigerant

iii) Piston displacement

iv) If bore dia = stroke length and double acting compressor has speed 300 rpm.

Find dimensions of bore. Given = Cp_{water} = 4.187 kJ/kgK

Latent heat of fusion of ice = 335 kJ/kg

Water inlet temperature 15°C.

Draw P-V, T-S diagram.

b) Write short note = Air conditioning required in Hospital. **[2]**

P.T.O.

OR

Q2) a) Explain with neat block diagram working of domestic refrigerator. State important parameters. **[3]**

b) Reversible carnot heat engine absorbs heat at temperature T_{2E} and rejects heat to sink at temperature T_1. The power developed by engine is used to drive reversible carnot refrigerator which absorbs heat from reservoir at temperature T_{2R} and rejects heat at T_1. If T_{2E}= 600 K and T_{2R}= 300 K, Find **[7]**

i) T_1, such that heat supplied to heat engine is equal to heat absorbed by refrigerator.

ii) Find T_1, such that efficiency of Engine is equal to COP of refrigerator. Draw Block Diagram.

Q3) a) Ice factory produces 20 tonnes of ice per day from and at 0°C. The evaporator temperature is –8°C and condenser temperature of 30°C. Refrigerant R-12 is subcooled by 5°C before throttling. Suction vapors are superheated by 2 degree. If the single acting twin cylinder compressor has speed 1000 rpm, L:D ratio 1.5 **[8]**

Find

i) COP

ii) Condenser capacity including subcooling

iii) Stroke length, if volumetric efficiency of compressor = 0.945

Latent heat of fusion of ice = 335 kJ / kg.

* Use of Refrigerant chart - R - 12 is allowed. Draw p-h diagram with parameters.

b) List the desirable properties of refrigerant **[2]**

i) Thermo physical

ii) Chemical in one line - (minimum two each)

OR

Q4) a) Give important conditions of Monbeal protocol and Kyoto protocol. **[3]**

b) Refrigeration plant work on CO_2 refrigerant with compressor displacement 0.25 m^3/min. Evaporator and condenser temperatures are –15°C and 25°C respectively. Degree of subcooling 10°. If the isentropic compression is wet with volumetric efficiency 85% such that specific enthaly at the beginning of compression is 295.5 kJ / kg, **[7]**

Find

i) COP

ii) Capacity in TR

iii) Power required. Draw p-h, T-S diagram with parameters mentioned. Specific heat of CO_2 liq = 2.4 kJ/kgK. Use following table properties.

temp. °C	P bar	V_f	V_g	h_f	h_g	s_f	s_g
		m^3/kg		kJ/kg		kJ/kgK	
–15	22.88	0.00101	0.0166	49.62	322.86	0.1976	1.2567
15	50.92	0.00130	0.0063	127.75	308.08	0.4697	1.0959
25	64.32	0.00147	0.0042	164.17	283.63	0.5903	0.9912

Q5) a) Air is supplied to Room at - DBT = 22°C and RH = 55%. Hot air is passed through water spray section where water is sprayed at 10°C. Supply air has saturation temperature of 3°C is supplied over heater before water spray. **[6]**

Find

i) mass of water sprayed per m^3 of air

ii) temperature of air after heating. Show process on psychrometric chart. Use of psychrometric chart is allowed.

b) Describe thermodynamics of human body temperature control. **[5]**

c) Elaborate in detail factors contributing cooling load. **[5]**

OR

Q6) a) DBT of air 32°C and WBT is 20°C, is passed through cooling coil at 5°C saturation temperature. The heat extracted by coil is 14 kW; and air flow rate is 42.5 m^3/min. Using psy - chart find **[5]**

i) DBT and WBT of air leaving coil.

ii) By pass factor of cooling coil.

Show process on chart schematic.

b) Define : **[6]**

i) RSHF

ii) GSHF

iii) ESHF

with representation on schematic psychrometric chart. (All processes to be shown on single figure only). Explain their physical significance.

c) If the total barometric pressure is 97 kPa and DBT = 36°C and DPT=15°C, from fundamentals find properties of moist air. **[5]**

Q7) a) For cold storage plant, vegetable storage capacity is 450 tonnes. Inside design condition 19°C DBT, 60% RH. Outdoor conditions - 36°C DBT, 28°C WBT Infiltration - 180 m^3/hr., Fresh air supply - 4500m^3/hr. Number of operators working = 20. **[12]**

Heat gain through glass = 5.5 kW

Sensible heat gain through wall, ceiling = 10.8kW

Water content in vegetables = 74%

Loss of water content per hour = 0.01%

Heat from equipments etc = 3.1kW

System consist of cooling & dehumidifying and then re-heating (if required) such that air entry temperature should not exceed 16°C.

Determine

i) amount of air recirculated, if it is mixed with fresh air before entering the cooling coil.

ii) Capacity of heating coil. Use psychrometric chart. Show processes on schematic.

b) How the infiltration load are Estimated. Explain with example. **[5]**

OR

Q8) a) Explain the concept 'comfort'; the factors affecting the human comfort and use of comfort chart. **[6]**

b) For airconditioned space, **[8]**

RSH = 200 kW, RLH = 30 kW.

Supply air is 8 times the fresh air required.

Indoor conditions = 44°C DBT, 30% RH

Outdoor conditions = 26°C DBT 50% RH

By pass factor of coil = 0.15

Find

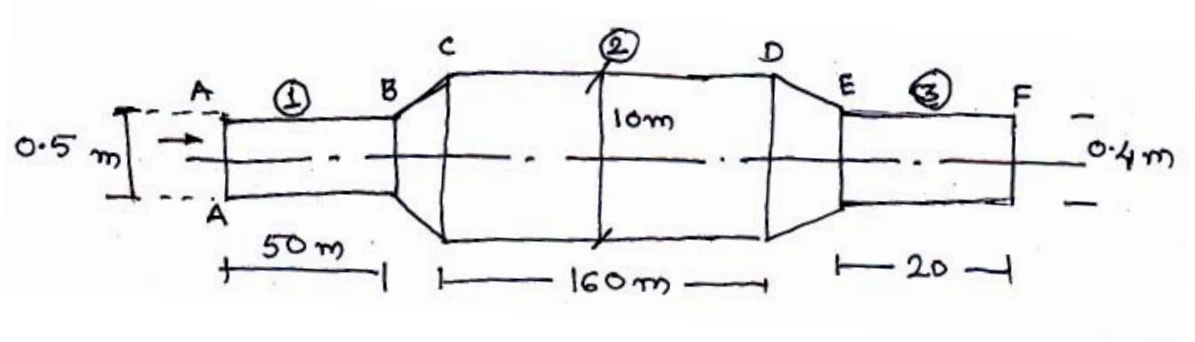
i) Temperature & sp. humidity at inlet to coil.

ii) If temperature of air leaving coil is 16°C find specific humidity at outlet.

iii) Supply air rate.

c) What are the advantages and limitations of capillary tube compared to other expansion devices. **[3]**

Q9) a)



For the above duct system inlet velocity of air at A-A is 540 m/min. Loss in $(B-C)=\frac{1}{2}\times$ velocity pressure in (A-B), Loss in $(D\text{-}E)\frac{1}{5}\times$Velocity pressure in (E-F) using friction loss equation $P_f=\frac{0.263\,C^{1.85}}{D^{1.27}}$, where

P_f = friction loss in mm of water per 100 m length of duct.

C = duct velocity (m/s)

D = duct diameter (m)

Calculate static pressure at 'A' **[8]**

b) Explain static regain method. its advantages and applicability, limitations. **[6]**

c) List the different types of fans used in air conditioning system. State applications. **[3]**

OR

Q10) a) Describe with sketch, physical working of humidity sensor and smoke sensors. **[6]**

b) What are different materials used for ducts. State their advantages and disadvantages applications. **[6]**

c) List minor losses and the methods of estimation of minor losses. **[5]**

Total No. of Questions : 10] SEAT No. :

P1955 [Total No. of Pages : 3

[5059]-532
B.E. (Mechanical Engineering)
CAD/CAM AND AUTOMATION
(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. No. 1 or Q. No. 2; Q. No. 3 or Q. No. 4; 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 triangle with vertices P (2, 2) Q (8, 2) and R (6,6) has undergone following transformation in sequence. **[10]**

a) Rotation through 45° anticlockwise.

b) Scaling by 2 times

c) Reflection about x axis

Find the concatenated matrix and new coordinate of triangle.

OR

Q2) a) Explain Isometric Projections. **[4]**

b) Write a short note on Bezier surface with neat sketch. **[6]**

Q3) a) Compare CSG and B-rep technique of solid modeling with neat sketch. **[6]**

b) Explain penalty approach of solving FEM problem. **[4]**

OR

P.T.O.

Q4) An axial step bar is shown in figure 1. Determine deflection and stresses in element and reaction force. **[10]**

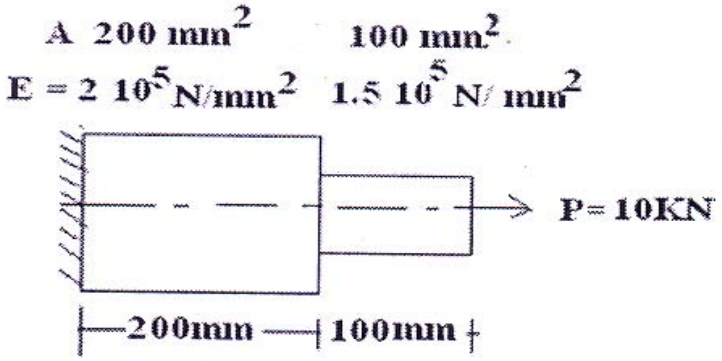


Figure 1

Q5) a) Explain the linear, circular CW and circular CCW interpolation with G code word address format for above interpolations. **[6]**

b) Write CNC part program for roughing and finishing using canned cycle for turned component as shown in figure. Assume Suitable cutting data. **[12]**

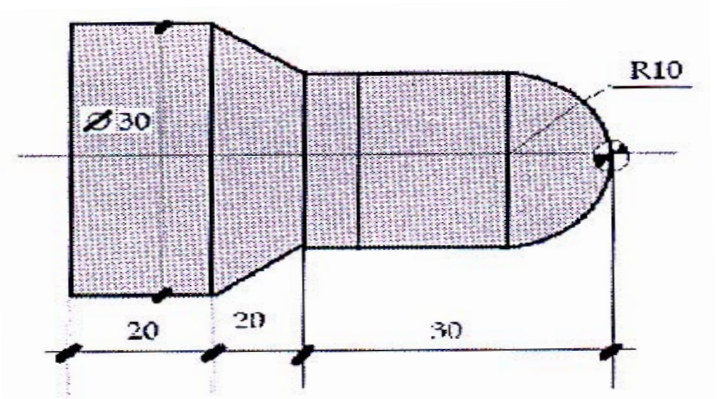


Figure 2

OR

Q6) a) Explain G28, G04, G40 and G41 code in part programming. **[6]**

b) Explain canned cycle for drilling and tapping in proper word address format. **[6]**

c) Explain the incremental and absolute method of program with G code. **[6]**

Q7) a) Classify various RP process. **[6]**

b) Explain 3-D printing process. **[10]**

OR

Q8) a) Explain Fused Deposition Modeling method of rapid prototyping with advantages and limitation. **[12]**

b) List application RP. **[4]**

Q9) a) Draw work envelope for Robot configuration. Explain the Spherical Configuration Robot with neat sketch. **[10]**

b) Explain Vacuum gripper with figure. **[6]**

OR

Q10)a) Explain the Group Technology layout in comparison to Process layout. **[8]**

b) Explain various Elements of FMS. **[8]**

Total No. of Questions : 10] **SEAT No. :**

P1956 **[Total No. of Pages : 5**

[5059]-533
B.E. (Mechanical)
DYNAMICS OF MACHINERY
(2012 Pattern) (End Semester)

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

Instructions to the candidates:-

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

Q1) a) A four cylinder vertical engine has cranks 150 mm long. The cylinders are spaced 200 mm apart. Mass of reciprocating parts of 1st, 2nd and 4th cylinders are 50 kg, 60 kg and 50 kg respectively. Find the reciprocating mass of the 3rd cylinder and relative angular positions of the cranks to achieve complete primary balance. **[6]**

b) Determine the expression for natural frequency of the system shown in Fig.1 **[4]**

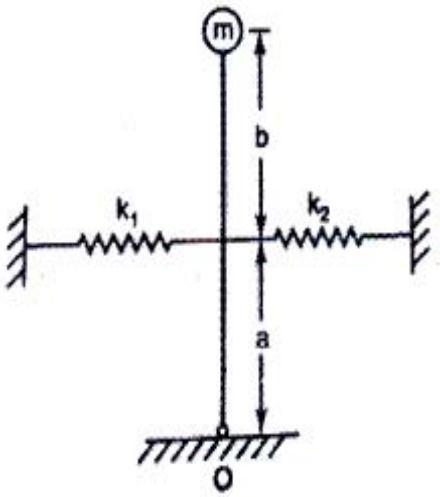


Fig. 1 (Q. 1b)

OR

P.T.O.

Q2) a) A shock absorber is to be designed so that its overshoot is 10% of the initial displacement when released. Determine the damping factor. Also find the overshoot if the damping factor is reduced to 50%. **[6]**

b) Explain the terms Static Balancing and Dynamic Balancing. **[4]**

Q3) a) A single cylinder vertical petrol engine of total mass 320 kg is mounted on a steel chassis and causes a vertical static deflection of 2 mm. The reciprocating parts of the engine have a mass of 24 kg and move through a vertical stroke of 150 mm with SHM. A dashpot attached to the system offers a resistance of 490 N at a velocity of 0.3 m/s. Determine :

i) the speed of driving shaft at resonance

ii) the amplitude of steady state vibrations when the driving shaft of the engine rotates at 480 rpm. **[6]**

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

i) Damping coefficient

ii) Critical damping coefficient

iii) Damping factor

iv) Logarithmic decrement

OR

Q4) a) A horizontal spring mass system with coulomb damping has a mass of 5 kg attached to a spring of stiffness 980 N/m. If the coefficient of friction is 0.25, calculate : **[6]**

i) The frequency of free oscillations

ii) The number of cycles corresponding to 50% reduction in amplitude if the initial amplitude is 5 cm

iii) Time taken to achieve this 50% reduction

b) Write a short note on Forced vibrations due to reciprocating unbalance. **[4]**

Q5) a) Find the natural frequencies of the system shown in Fig. 2. **[12]**

m_1 =10 kg, m_2 = 12 kg

r_1 = 0.10 m, r_2= 0.11 m

k_1= 40 × 10^3 N/m

k_2 = 50 × 10^3N/m

k_3 = 60 × 10^3 N/m.

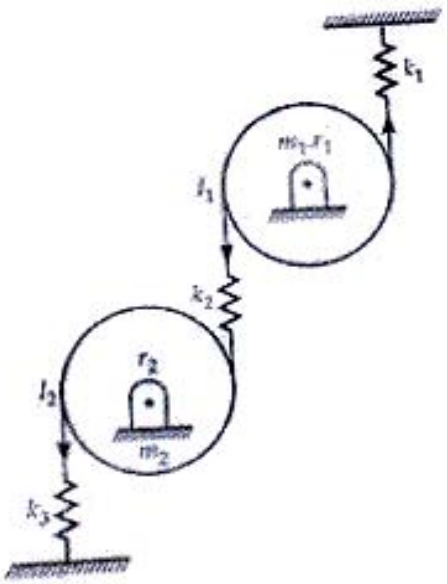


Fig. 2 (Q. 5 a)

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

i) Zero frequency

ii) Node point

OR

Q6) a) Find the natural frequencies and mode shapes for the torsional system shown in Fig. 3. Assume $J_1 = J_0$, $J_2 = 2J_0$ and stiffness for each spring as k_t. **[12]**

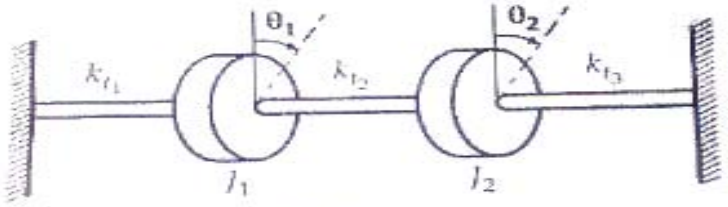


Fig. 3 (Q. 6a)

b) Explain the concept of torsionally equivalent shaft. **[4]**

Q7) a) An accelerometer has a suspended mass of 0.01 kg with a damped natural frequency of vibration of 150 Hz. It is mounted on an engine running at 6000 rpm and undergoes an acceleration of 1 g. The instrument records an acceleration of 9.5 m/s^2. Find the damping constant and the spring stiffness of the accelerometer. **[8]**

b) Write a short note on prediction of vibration failure using time and frequency domain analysis of vibration signals. **[8]**

OR

Q8) a) For finding vibration parameters of a machine running at 260 rpm, a seismic instrument is used. The natural frequency of the instrument is 7 Hz and the recorded displacement is 6 mm. Determine the displacement, velocity and acceleration of the vibrating machine assuming no damping. **[8]**

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

i) FFT analyzer

ii) Condition monitoring of machines

Q9) a) Determine the sound power level of a source generating **[8]**

i) 0.5 W

ii) 1.5 W

iii) 2.2 W

iv) 3 W of sound power

b) Explain the following terms : **[10]**

i) Wavelength

ii) Velocity of sound

iii) Decibel scale

iv) Sound power level

v) Sound pressure level

OR

Q10) a) Define the following terms : **[6]**

i) Reflection coefficient

ii) Absorption coefficient

iii) Transmission coefficient

b) Draw and explain the main components of human hearing mechanism. **[6]**

c) Show that if the sound pressure is doubled, the sound pressure level increases by six decibels. **[6]**

Total No. of Questions : 12]

SEAT No. :

P3065

[Total No. of Pages : 3

[5059]-534

B.E. (Mech. Engg.)

ENERGY AUDIT AND MANAGEMENT

(2012 Course) (End Sem.) (Semester - I) (Elective - I) (402044 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, Q11 or Q12.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Use of Scientific Calculators is allowed.***

Q1) a) Write a short note on Energy action Planning. **[5]**

b) Describe relation between Environment and Energy. **[5]**

OR

Q2) a) Explain Four Principles of Energy Management. **[5]**

b) Write short note on Energy conservation act 2001. **[5]**

Q3) a) Explain Energy Conservation opportunities in Boiler. **[5]**

b) Explain Need of Energy Audit in India. **[5]**

OR

Q4) a) Explain Energy Conservation opportunities in Compressed air system. **[5]**

b) Why Pre-audit and Post-audit is important during Energy audit. **[5]**

Q5) a) What is the NPV of a project, (life 2 year) which requires an investment of Rs. 70,000 and yield Rs. 50,000 in the 1st year and Rs. 50,000 in the next year, if the Interest rate is 10%. **[5]**

b) A sum of Rs. 1,20,000 is deposited in a bank at the beginning of a year. The bank pays 6% interest annually. How much money is in the bank account at the end of the fifth year, if no money is withdrawn? **[5]**

OR

P.T.O.

Q6) Explain following financial analysis methods: **[10]**

a) Net Present Value.

b) Return on Investment.

c) Internal rate of return.

d) Simple Payback period.

e) Time Value of Money.

Q7) a) Calculate Thermal Efficiency of boiler and Evaporation ratio by Direct method with the help of following data: **[6]**

Type of boiler : Coal fired.

Quantity of Steam generated: 11 TPH.

Quantity of Coal consumed: 1.6 TPH.

Steam Pressure and Temperature: 10 kg/cm^2 (gauge)/190ºC.

Feed water Temperature: 81 ºC.

GCV of Coal: 12500 KJ/kg.

Enthalpy of saturated steam at 10 Kg/cm^2 pressure: 1685 KJ/kg.

Enthalpy of feed water: 310 KJ/kg.

b) Explain the following parameters in the brief: **[6]**

i) Excess air ratio.

ii) Stochiometric air quantity.

iii) Balanced draught

OR

Q8) a) Explain different efficient steam distribution systems. **[6]**

b) List the energy saving opportunities in pumping system. **[6]**

Q9) a) Explain the term Copper losses and Luminous Efficiency. **[7]**

b) Write a short note on the Electricity Act 2003. **[7]**

OR

Q10)a) Explain the selection and location of Capacitors for improving power factor. **[7]**

b) Explain the term Color Rendering Index (CRI) and Igniters. **[7]**

Q11)a) What are the heat wheels? Explain with neat sketch. **[7]**

b) Write short note on Carbon Credit. **[7]**

OR

Q12)a) Describe cogeneration cycles with suitable practical examples. **[7]**

b) Explain CDM project with flow chart. **[7]**

Total No. of Questions : 10]

SEAT No. :

P1957

[Total No. of Pages : 3

[5059] - 535

B.E. (Mechanical)

TRIBOLOGY

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

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

Instructions to the candidates:

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

Q1) a) Explain the following terms in short: **[6]**

i) Boundary lubrication

ii) Extreme Pressure lubrication [EP]

iii) Reconditioning and Reprocessing of oil

b) Define friction and wear. List the minimum four means of wear measurement techniques. **[4]**

OR

Q2) a) Compare the sliding and rolling contact bearings in terms of the following : **[6]**

i) Magnitude of the load ii) Nature of the load

iii) Starting friction iv) Positional accuracy

v) Speed vi) Noise

b) Explain stick-slip motion and friction instabilities in short. **[4]**

Q3) a) State the laws of friction. **[2]**

b) What is hydrodynamic lubrication? List different types of hydrodynamic thrust bearings and Explain in short, tilting pad thrust bearing. **[8]**

OR

P.T.O.

Q4) a) What do you mean by 'Summerfield number'? **[2]**

b) Following data is given for a 360° hydrodynamic bearing. **[8]**

i) Length to diameter ratio = 1

ii) Minimum film thickness variable = 0.3

iii) Journal diameter = 100 mm

iv) Diametral clearance = 100 μm

v) External load = 9000 N

vi) Journal speed = 1350 rpm

Find:

i) The viscosity of oil that need to be used and

ii) The coefficient of friction

Given is table for Dimensionless parameter for 360° Hydrodynamic journal bearing

$\frac{L}{d}$	$\frac{ho}{C}$	$\in$	s	$\left(\frac{r}{c}\right)f$	$\frac{Qs}{Q}$	$\frac{Pmax}{P}$
1.0	0.2	0.8	0.0446	1.70	0.842	3.195
	0.4	0.6	0.121	3.22	0.680	2.409
	0.6	0.4	0.264	5.79	0.497	2.066

Q5) a) Following data is given for the hydrostatic step bearing: **[8]**

- Thrust load = 450 KN
- Shaft speed = 720 rpm
- Shaft diameter = 500 mm
- Recess diameter = 250 mm
- Viscosity of the lubricant = 170 SUS
- Specific gravity of the lubricant = 0.86
- Specific heat of the lubricant = 1.76 KJ/Kg °C
- Oil film thickness = 0.16 mm

Calculate:

i) Supply Pressure

ii) Oil flow rate in liters per min [*lpm*]

iii) Frictional power loss

iv) Pumping power loss

v) The temperature rise in bearing

Assuming the total power loss in the bearing is converted into the frictional heat.

b) Derive an expression for flow rate and pressure distribution in hydrostatic step bearing. What are the assumptions made while deriving the equation? **[8]**

OR

Q6) a) Derive the expression for the pressure distribution, load carrying capacity and time of approach for given instantaneous velocity of approach and film thickness in case of rectangular plate approaching a plane. **[8]**

b) A circular plate of diameter 150 mm is approaching a plane at a velocity of 12.5 cm/s at the instant, oil-film thickness is 0.25 mm. The viscosity of the oil is 0.035 Pa-s. Evaluate for squeeze film action. **[8]**

i) The maximum pressure

ii) Average pressure

iii) Load carrying capacity

iv) Time required to squeeze the oil film from 0.25 mm to 0.005 mm

Q7) a) Explain the stress distribution in Hertzian contacts with example of any one condition for contact surfaces. **[8]**

b) State the merits, demerits and four applications of gas lubricated bearings. **[8]**

OR

Q8) a) Explain the phenomenon of Elasto-Hydrodynamic lubrication and state its applications. **[8]**

b) What do you mean by gas lubrication? Explain its requirements for the successful operation of an aerodynamic bearing. **[8]**

Q9) a) Explain in detail the tribological behaviour of tyre-road interaction and road grip. **[10]**

b) Classify the surface engineering process in detail. Also explain electroplating process with neat sketch. **[8]**

OR

Q10) Write a note on following. [Any Three] : **[18]**

a) Surface coatings

b) Lubrication in Wire Drawing and Extrusion

c) Tribological interactions of wheel on rail road

d) Foil bearings

❖ ❖ ❖ ❖

Total No. of Questions : 10]

SEAT No :

P2153

[Total No. of Pages : 6

[5059]-536

B.E.(Mechanical Engineering)

RELIABILITY ENGINEERING

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

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.5or 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) Explain the delta star method to determine reliability of bridge network.**[4]**

b) Accelerometers of 350 numbers were tested for 120 hours and the number of failed accelerometers out of 350 accelerometers is tabulated as given below. Find the hazard rate and reliability and tabulate the results. **[6]**

Time interval (hrs.)	0-20	20-40	40-60	60-80	80-100	100-120
Number of failed accelerometers	157	73	55	33	20	12

OR

Q2) a) Explain the term product liability and state the most common basic causes of failures of engineering product. **[4]**

P.T.O.

b) For the system shown in Fig.1, find the reliability of the system using conditional probability approach. **[6]**

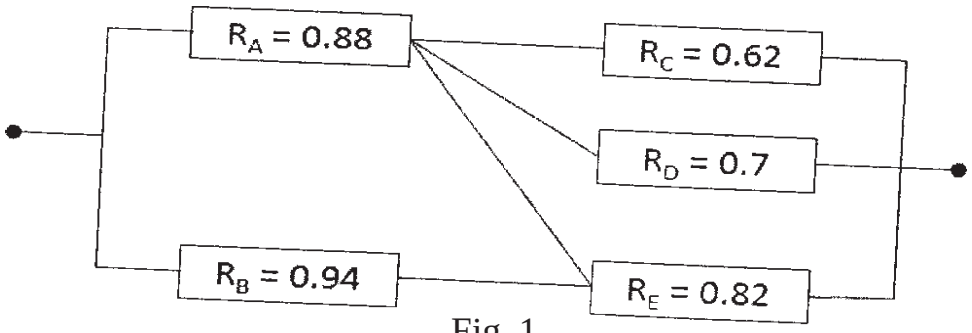


Fig. 1

Q3) a) explain the difference between discrete distributions and continuous distributions. Give two types of each distribution. **[4]**

b) A system consists of 4 subsystems in series. Each subsystem consists of some number of modules. Determine the minimum acceptable failure rates and reliabilities of various subsystems so as to have system reliability of 0.96 for 40 hours mission time using : "AGREE" method of allocation. The necessary information for subsystem is given below: **[6]**

Subsystem	Number of modules (in each subsystem)	Importance factor	Operating time (hours)
1	15	0.83	34
2	22	1.00	40
3	13	1.00	40
4	18	0.78	31

OR

Q4) a) What is reliability allocation? Write the advantages of reliability allocation method. **[4]**

b) Calculate the reliability of the system shown in Fig.2. The number in each block shows the reliability of each component. **[6]**

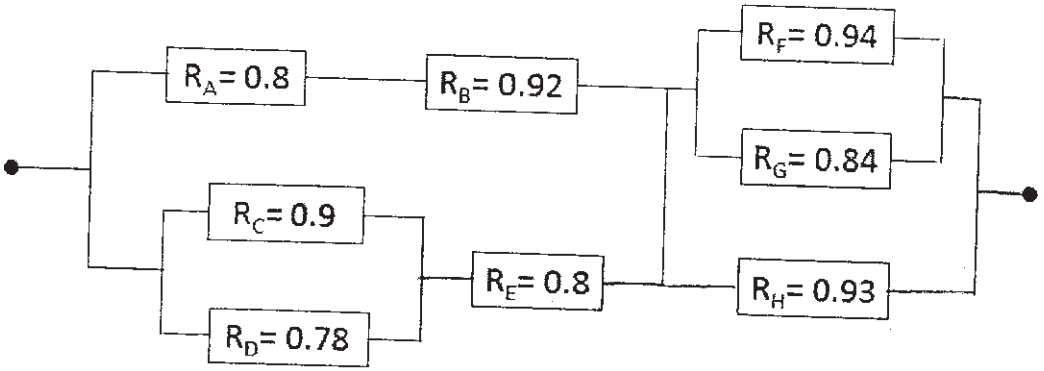


Fig. 2

Q5) a) Explain availability and maintainability. Show that mean time to repair (MTTR) is the reciprocal of repair rate, from the basic maintainability equation. **[8]**

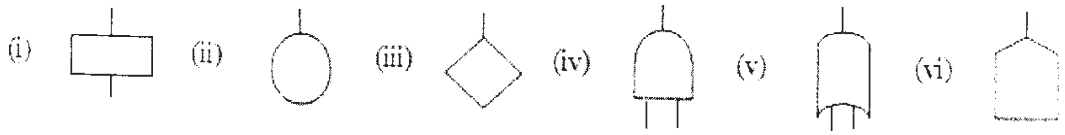
b) A robotic welding system has to be designed with a reliability value of 0.96 for 800 hours. Operational availability of robotic welding system is required to be 0.89 over the same period of time. consider the mean administrative and logistic time as 30% of mean time to repair Assuming a constant hazard rate for failure and ignoring the preventive maintenance downtime find the mean time to repair (MTTR), mean down time (MDT) and inherent availability. **[8]**

OR

Q6) a) write down the salient points of costs of unreliability and built in -testing (BIT) technique. **[8]**

b) It has been observed that a failure pattern of a fuel injectoer system follows an exponential distribution with the probability of survival for 600 hours as 0.925. Obtain the inherent availability of the system over the same period of time if maintainability of the whole system over the same period of time is 0.82 Also, obtain the operational availability if administrative and logistic time is 120 hrs. Assume that the repair time follows an exponential distribution. **[8]**

Q7) a) Write the names and meanings of symbols shown below and show its application. **[8]**



b) An electric travelling crane is mounted as shown in the figure 3. The operator gives the signal which is transmitted to the motor. The motor is located in the trolley which lifts load through the rope and hook. Construct a fault tree for the condition "load is not lifted" when operator gives signal. Assuming the probability of failure for each element as 0.08, find the reliability of the system. **[10]**

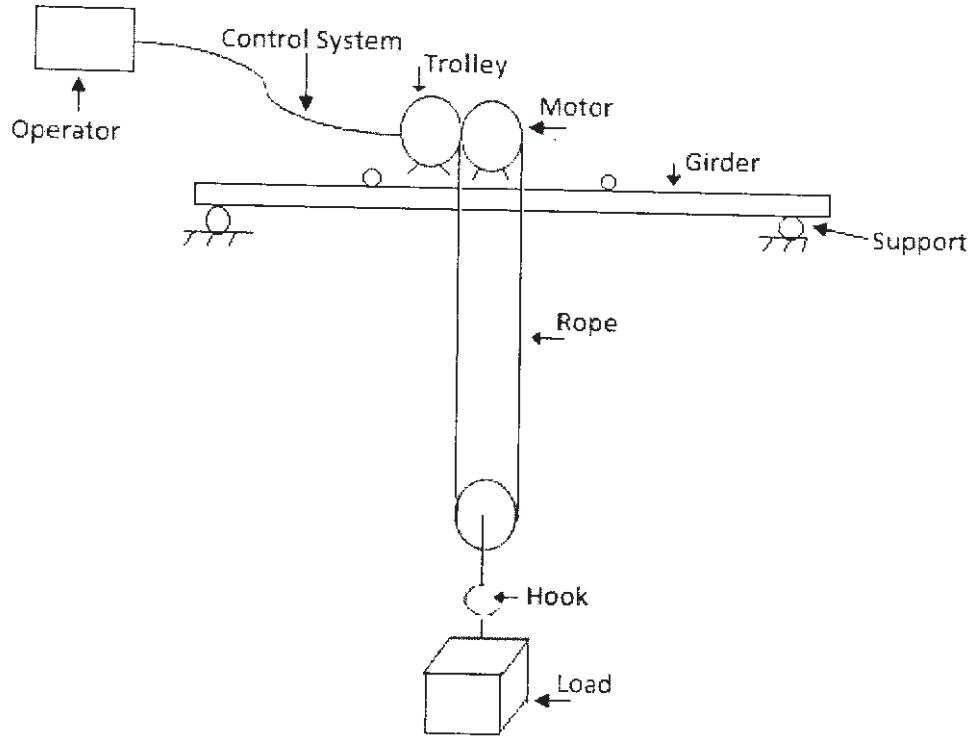


Fig. 3

OR

Q8) a) Carry out the failure mode and effect analysis of a bolt used for clamping an I.C. engine cylinder and head together. Tabulate any 4 probable failure modes, causes and effects for bolt. **[8]**

b) Draw the fault tree diagram for the system configuration shown in the Fig.4. Write minimum tie sets and find the reliability of the system from the reliability of individual elements shown in figure, assuming them to be independent. **[10]**

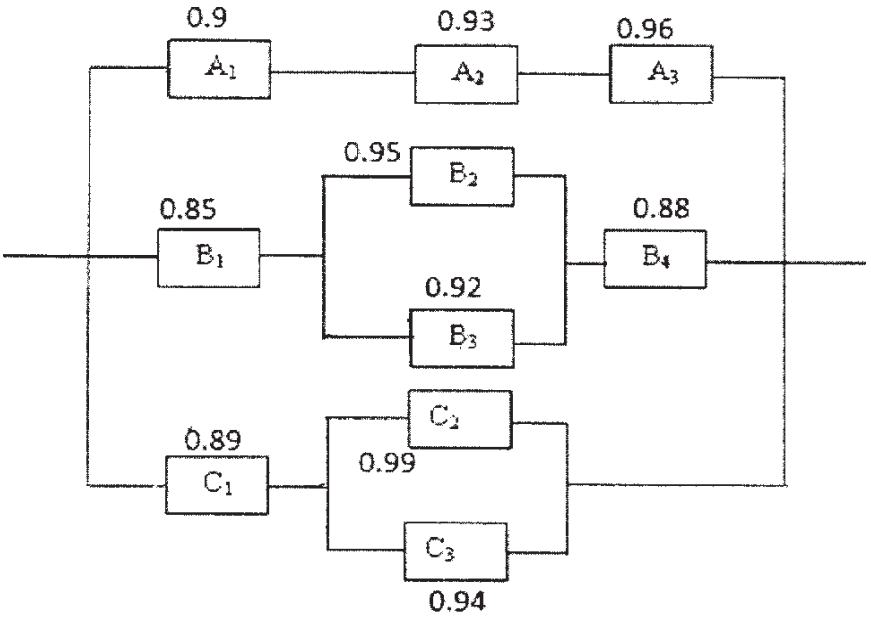


Figure 4

Q9) a) A machine shaft of 50 mm diameter is subjected to torsional mean stress of 220 MPa and standard deviation of 30 MPa. The shaft is made up of medium cabon steel with a mean yield strength of 400 MPa and standard deviation of 65MPa Assuming normal distribution, find the reliability of the shaft with the help of data from the standard normal table given below. How much is the central (average) factor of safety for the shaft? If the average factor of safety is required to be 2.5, suggest the modifications to be done. **[8]**

Z	2.47	2.48	2.49	2.50	2.51	2.52	2.53	2.54	2.55
Ø(Z)	0.9932	0.9934	0.9936	0.9938	0.9940	0.9941	0.9943	0.9944	0.9946

b) Explain in detail about the need of data acquisition and the points to be considered while doing it. **[8]**

OR

Q10)a) Failure data of 11 CFLs is given below. Use mean ranking and median ranking method to find reliability of CFls and plot the graph between failure time and reliability for both methods. **[8]**

CFL No.	1	2	3	4	5	6	7	8	9	10	11
Failure time Hrs	340	294	567	431	142	265	389	530	456	78	684

b) Classify the different tests carried out for Reliability testing and explain in brief about each type. **[8]**

✡ ✡ ✡

Total No. of Questions : 12]

SEAT No : ____

P2154

[Total No. of Pages : 2

[5059]-537
B.E.(Mechanical)
MACHINE TOOL DESIGN
(2012 Course) (402044D)

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

Instructions to the candidates:

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

SECTION - I

Q1) What are the regulations and range of speed based on preferred number series. **[10]**

OR

Q2) Explain with the schematic diagram design of Speed box with overlapping speed steps. **[10]**

Q3) What is the modern technique in design of Machine Tool Structures. **[10]**

OR

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

Q5) a) Discuss the operation of guideways under liquid friction condition. **[5]**

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

OR

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

SECTION - II

Q7) Explain the design procedure of rolling friction power screw. **[12]**

OR

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

b) Explain the effect of machine tool compliance on machining accuracy.**[6]**

P.T.O.

Q9) Explain the dynamic characteristics of the equivalent elastic system with the sketches. **[12]**

OR

Q10) What is stability analysis? Explain its effect on the cutting process on machine tools. **[12]**

Q11) a) Explain design considerations for SPM. **[8]**

b) Discuss the principle of self locking. **[8]**

OR

Q12) a) Explain PIV drive in brief. **[8]**

b) What are the aesthetic and ergonomics considerations applied to the design of control members. **[8]**

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Total No. of Questions :10]

SEAT No. :

P3066

[Total No. of Pages : 3

[5059]-538

B.E. (Mechanical)

GAS TURBINE & PROPULSION

(2012 Course) (End-Semester) (Semester-I) (Elective-II) (402045-A)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or 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 note on ideal and actual Brayton cycle. **[3]**

b) In a gas turbine plant, the suction occurs at 1 bar and 27°C. The air is compressed to 4 bar. Maximum temperature is 572°C. Find the air-fuel ratio. Assume isentropic efficiency of compressor & turbine, as 85%. Take C_p for air & gases as 1.005 and 0.97 kJ/kgK, respectively, C.V = 42 MJ/kg. **[7]**

OR

Q2) Write notes on: **[10]**

a) Rocket propulsion.

b) Polytropic efficiency of compressor & turbine.

Q3) a) Write a note on the various parameters affecting the flight performance. **[4]**

b) Explain the working of turbofan engine. **[6]**

OR

Q4) a) Discuss Nozzle & diffusser losses. **[5]**

b) What do you understand by the term air-breathing engines? How are they classified? **[5]**

P.T.O.

Q5) a) Explain the effect of nozzle angle on work output and effect of axial discharge in an axial flow turbine. **[6]**

b) In a single stage axial flow turbine (Impulse type), the expansion in the nozzle occurs from 4 bar, 650°C to a press of 1 bar. The discharge angle is 15°. The blade speed is 360 m/s and the gas leaves the rotor blade in axial direction with a speed of 300 m/s. Assuming a nozzle efficiency of 96%. Find: **[10]**

i) Rotor blade angles at inlet and outlet.

ii) Utilization factor.

iii) Power developed for 25 kg/sec of gas flow.

iv) Stage efficiency.

OR

Q6) a) Discuss the performance curves of gas turbines. **[6]**

b) Gas enters in an impulse turbine (1-stage) at a stagnation pressure of 4 bar while the exit static pressure is 1.18 bar. Stage exit velocity is 290 m/s (axial) & nozzle efficiency is 96%. The blade velocity is 320 m/s. The static head efficiency is 88%. The exit pressure from the nozzle is 1.25 bar. Find: **[10]**

i) W. D. per kg of air.

ii) Nozzle angle.

iii) Blade inlet and outlet angle.

iv) Energy utilization factor for the rotor.

Q7) a) Explain the processes involved in an axial flow compressor with the help of T-s diagram. **[6]**

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

i) Flow coefficient & stage efficiency.

ii) Degree of reaction and workdone factor.

OR

Q8) Write notes on: **[16]**

a) Radial & axial flow compressors.

b) Factors affecting pressure ratio.

c) Inlet & Outlet velocity triangle.

Q9) a) Explain the different types of combustion chambers used in gas turbines. **[9]**

b) Write notes on: **[9]**

i) Desirable features of combustion chamber of a gas turbine.

ii) Combustion chamber arrangements.

OR

Q10) Write notes on: **[18]**

a) Off-design characteristics of gas turbines.

b) Stability limits and combustion intensity.

c) Component characteristics of compressor & turbine.

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Total No. of Questions : 10]

SEAT No. :

P3774

[Total No. of Pages : 2

[5059]-539

B.E. (Mechanical)

PRODUCT DESIGN & DEVELOPMENT

(2012 Pattern) (Semester - I) (Elective - II) (402045 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) What is Product Design Team? Explain any Six Roles in Team in detail. **[10]**

OR

Q2) What are disadvantages of Traditional Design Process? Explain systematic procedure of Modern Product Development. **[10]**

Q3) a) Explain Product verification and validation in detail. **[6]**

b) What is necessity of Economic Analysis of Product? Elaborate. **[4]**

OR

Q4) a) Explain Pugh's concept selection chart with suitable example. **[6]**

b) What is necessity of Technology Forecasting? Explain. **[4]**

Q5) What is Forward and Reverse Engineering? Discuss the necessity and procedure of Product Tear Down. Explain Force Flow Diagram for Paper Punching Machine. **[18]**

OR

Q6) a) Explain the procedure for setting Product Specification. Describe Specification Sheet for suitable example with Functional Requirement and Constraints. **[10]**

b) Explain any Two Product Architectures. **[8]**

P.T.O.

Q7) a) Explain the guidelines for Design for Assembly. **[6]**

b) What are guidelines for Design for Robustness? Discuss. **[5]**

c) Explain the guidelines for Design for Welding. **[5]**

OR

Q8) a) Discuss in detail Function Form Diagram with suitable example. **[8]**

b) Discuss various Regional and Global issues of Environmental Pollution. **[8]**

Q9) a) Elaborate the concept of Product Life Cycle Management. Explain the role of People, Tools, Processes, Methods and Data in PLM. **[10]**

b) Discuss various phases of lifecycle and corresponding technologies applied in. **[6]**

OR

Q10)a) Discuss the Essential characteristics of PLM system. **[8]**

b) Discuss the concept of Product Data and Product Workflow. **[8]**

Total No. of Questions : 12] **SEAT No. :**

P1958 **[Total No. of Pages : 6**

[5059]-540
B.E. (Mechanical)
OPERATIONS RESEARCH
(2012 Pattern) (Semester - I) (Elective - II)

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

Instructions to the candidates:-

1) ***Draw neat diagrams wherever necessary.***
2) ***Use of electronic pocket calculator is allowed.***
3) ***Assume suitable data, if necessary.***

Q1) A firm manufactures pain relieving pills in two sizes A and B. Size A contains 4 grains of element X, 7 grains of element Y and 2 grains of element Z. Size B contains 2 grains of element X, 10 grains of element Y and 8 grains of element Z. It is found by users that it requires at least 12 grains of element X, 74 grains of element Y and 24 grains of element Z to provide immediate relief. It is required to determine the least number of pills a patient should take to get immediate relief. Formulate the problem as standard L.P.P. **[7]**

OR

Q2) a) What is Decision Making? Explain and differentiate this under the condition of certainty and uncertainty. **[4]**

b) State advantages and limitations of decision tree approach. **[3]**

Q3) Solve the following transportation problem using Stepping Stone Method. **[7]**

Plants	Destination				
	D1	D2	D3	D4	Supply
P1	20	30	50	17	7
P2	70	35	40	60	10
P3	40	12	60	25	18
Requirement	5	8	7	15	

OR

Q4) A team of 5 horses and 5 riders has entered a Jumping show contest. The number of penalty points to be expected when each rider rides any horse is shown below. **[7]**

P.T.O.

		Rider				
		R_1	R_2	R_3	R_4	R_5
Horse	H_1	5	3	4	7	1
	H_2	2	3	7	6	5
	H_3	4	1	5	2	4
	H_4	6	8	1	2	3
	H_5	4	2	5	7	1

How should the horses be allotted to the riders so as to minimize the expected loss of the team?

Q5) Two firms are competing for business under the conditions such that one firm's gain is another firm's loss. Firm A's payoff matrix is given below : **[6]**

		Firm B		
		No Advertising	Medium Advertising	Heavy Advertising
Firm A	No Advertising	10	5	–2
	Medium Advertising	13	12	15
	Heavy Advertising	16	14	10

Suggest optimal strategies for the two firms and the net outcome thereof.

OR

Q6) A ball bearing manufacturing company is planning to install an additional plant which will require leasing new equipment for monthly payment of Rs. 60,000. Variable cost would be Rs. 20 per item and each item would retail for Rs. 70. **[6]**

i) How many ball bearing units must be sold in order to break even?

ii) What would be profit or loss if 1,000 items are made & sold in a month?

iii) How many items must be sold to realize a profit of Rs. 40,000?

Q7) a) The cost of parameters and other factors for a production inventory system of automobile pistons are given below. **[8]**

Demand per year = 6,000 units Unit Cost = Rs. 40

Set-up Cost = Rs. 500, Production Rate per year = 36,000 units, Holding cost per unit per year = Rs. 8, Shortage cost per unit per year = Rs. 20

Find

i) optimal lot size.

ii) number of shortage and

iii) manufacturing time and time between set-ups.

b) The cost of machine is Rs. 6,100 and its scrap value is Rs. 100. The maintenance costs found from experience are as follows : **[8]**

Year	1	2	3	4	5	6	7	8
Mainteance Cost (Rs.)	100	250	400	600	900	1,200	1,600	2,000

When should the machine be replaced?

OR

Q8) a) A stockist has to supply 400 units of a product every Monday to his customers. He gets the product at Rs.50 per unit from the manufacturer. The cost of ordering and transportation from the manufacturer is Rs.75 per order. The cost of carrying inventory is 7.5% per year of the cost of product. **[8]**

Calculate:

i) Economic order quantity

ii) total optimal cost

iii) total weekly profit if the item is sold for Rs.55 per unit.

b) The following failure rates have been observed for a certain type of light bulbs : **[8]**

End of week	1	2	3	4	5	6	7	8
Probability of failure to date	0.05	0.13	0.25	0.43	0.68	0.88	0.96	1.00

The cost of replacing an individual failed bulb is Rs. 1.25. The decision is made to replace all bulbs simultaneously at fixed intervals, and also to replace individual bulbs as they fail in service, If the cost of group replacement is 30 paise per bulb, what is the best interval between group replacements? At what group replacement price per bulb would a policy of strictly individual replacement become preferable to the adopted policy?

Q9) a) In a factory, the machines breakdown on an average rate of 10 machines per hour. The idle time cost of a machine is estimated to be Rs. 20 per hour. The factory works 8 hours a day. The factory manager is considering 2 mechanics for repairing the machines. The first mechanic A takes about 5 minutes, on an average, to repair a machine and demands wages at the rate of Rs.l0 per hour. The second mechanic B takes about 4 minutes in repairing a machine and demands wages at the rate of Rs. 15 per hour. Assuming that the rate of machine breakdown is Poisson distributed and the repair rate is exponentially distributed, which of the two mechanics should be engaged? **[8]**

b) A machine operator has to perform three operations: turning, threading and knurling on a number of different jobs. The time required to perform these operations (in minutes) for each job is known. Determine the order in which the jobs should be processed in order to minimize the total time required to turn out all the jobs. Also find the idle times for the three operations. **[8]**

Job	Time for turning (minutes)	Time for threading (minutes)	Time for knurling (minutes)
1	3	8	13
2	12	6	14
3	5	4	9
4	2	6	12
5	9	3	8
6	11	1	13

OR

Q10) a) A super market has two sales girls at the sales counters. If the service time for each customer is exponential with a mean of 4 minutes. and if the people arrive in a Poisson fashion at the rate of an 10 hour, then calculate : **[8]**

i) Probability that a customer has to wait for being served?

ii) Expected percentage of idle time for each sales girl?

iii) If a customer has to wait, what is expected length of his waiting time?

b) A manufacturing company processes 6 different jobs on two machines A and B. Number of units of each job and its processing times on A & B are given in table. Find the optimal sequence. the total minimum elapsed

time and idle time for either machine. **[8]**

Job No	No. of Units of each job	Processing time	
		Machine A (minutes)	Machine B (minutes)
1	3	5	8
2	4	16	7
3	2	6	11
4	5	3	5
5	2	9	7.5
6	3	6	14

Q11) a) The utility data for a network are given below. Determine the total, free, independent and interfering floats and identify critical path. **[10]**

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration	2	8	10	6	3	3	7	5	2	8

b) A dentist schedules all her patients for 30 minutes appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work, their probabilities and the time needed to complete work. **[8]**

Category	Time required (minutes)	Probability of category
Filling	45	0.40
Crown	60	0.15
Cleaning	15	0.15
Extraction	45	0.10
Checkup	15	0.20

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well the idleness of the doctor. Assume that all the patients show up at the clinic at exactly their scheduled arrived times, starting at 8 am. Use the following random numbers for handling the above problem: 40, 82, 11, 34, 25, 66, 17 and 79.

OR

Q12) a) The time estimates (in weeks) for the activities of a PERT network are given below. **[12]**

Activity	T_o	T_m	T_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw the project network and identify all the paths through it.

ii) Determine the expected project length.

iii) Calculate the standard deviation and variance of the project length.

iv) What is the probability that the project will be completed?

1) At least 4 weeks earlier than expected time?

2) No more than 4 weeks later than expected time?

v) If the project due date is 19 weeks, what is the probability of not meeting the due date?

vi) The probability that the project will be completed on schedule if the scheduled completion time is 20 weeks.

vii) What should be the scheduled completion time for the probability of completion to be 90%?

b) What do you mean by Goal programming? Where is it applicable? **[6]**

Total No. of Questions : 10]

SEAT No. :

P1959

[Total No. of Pages : 3

[5059] - 541

B.E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

(2012 Pattern) (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 and Q.9 or Q.l0.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

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

Advanced Manufacturing Processes	Process characteristics and/or applications
i) Electromagnetic forming	A) Only female die is needed
ii) Flow forming	B) Magnetic pulse forming
iii) Electro Hydro forming	C) Vacuum in the die is prerequisite
iv) Roll forming	D) Capacitor bank
v) Shear spinning	E) Pivoted pointer
vi) High energy rate forming	F) Rollers with automated controlled movements
vii) Explosive forming	G) Hemispherical, hemi ellipsoidal profile forming
viii) Spinning	H) Flower design

b) State and explain the different parameters which affect the heat generation during Friction stir welding (FSW). **[6]**

OR

P.T.O.

Q2) a) State whether the following statements are true or false : **[4]**

i) Rolling, forging, drawing, extrusion are the bulk deformation processes wherein the work formed has a low surface area to volume ratio.

ii) Hydroforming is generally referred to manufacturing of hollow sections such as tubes and not applicable to from the planer surfaces such as angles, channels and sheets.

iii) High Energy Rate Forming (HERF) process is not suitable to form titanium and tungsten alloys under high strain rates.

iv) Flow stress is a critical parameter in metal forming process as it specifies the force and power requirements for the machinery to perform the process.

b) State the advantages in terms of metallurgical, environmental and energy benefits of friction stir welding (four each). **[6]**

Q3) a) State the advantages and applications of shaped tube electrolytic machining. **[4]**

b) Explain with a schematic the working principle of vacuum die casting process. **[6]**

OR

Q4) a) State the working principle of electrolytic in-process dressing with a neat sketch. **[4]**

b) State the advantages, limitations and applications of electrochemical grinding process (four each). **[6]**

Q5) a) With a schematic describe the five sub-systems (components) of a diamond turn machine tool. **[8]**

b) State different mechanisms which contribute in removal of material in ultrasonic micromachining process (USMM)? Also, state the factors which determine the type, size and hardness of abrasive particles during USMM. Name the abrasive particles used for cutting tungsten carbide and glass respectively when using USMM. **[8]**

OR

Q6) a) With a schematic of micro-electro discharge machining set-up describe the different peripherals of micro-EDM set-up. Also, state the applications of micro-EDM process (four each). **[8]**

b) Using cause and effect diagram state the various process parameters which affect the ultrasonic micromachining (USMM) process performance? Also, describe the effect of process parameters on material removal rate and tool wear when using USMM. **[8]**

Q7) a) What is additive manufacturing? Describe the different steps by which a part or component is build using additive manufacturing process. **[8]**

b) With a schematic state the principle of powder bed fusion (PBF) additive manufacturing process. Also, state the different fusion mechanisms used in PBF process. **[8]**

OR

Q8) a) With a schematic explain the working principle and process steps of extrusion based additive manufacturing process. **[8]**

b) With a schematic state the working principle of sheet lamination process. Also, state various methods to manufacture a component using this technique. **[8]**

Q9) a) Comment on importance of measuring techniques in micromachining. Also, classify measuring systems used for dimensional measurements and topographic inspection in micromachining. **[6]**

b) Explain with a neat sketch the working principle and applications of Interference comparators. **[6]**

c) With a schematic describe the functions of various components of Atomic force microscope (AFM). **[6]**

OR

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

a) Surface profilers.

b) Laser-based diffraction technique.

c) Optical and electron microscopes.

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Total No. of Questions : 10]

SEAT No. :

P1960

[Total No. of Pages : 3

[5059] - 542
B.E. (Mechanical)
POWER PLANT ENGINEERING
(2012 Pattern)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4 Q.5or Q.6, Q.7 or Q. 8, Q.9 or Q. 10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume data wherever necessary and mention it.***
5) ***Draw neat and suitable figures wherever necessary.***

Q1) a) Discuss the present scenario of power generation in India. **[4]**

b) During trial on steam condenser following observations were recorded.
Condenser vacuum = 680 mm of Hg
Barometer reading = 764 mm of Hg
Mean condenser temp. = 36.2°C
Hot well temp. = 30 °C
Condensate formed per hour = 1780 Kg
Circulating cooling water inlet temp. = 20°C
Circulating cooling water outlet temp. = 32°C
Quantity of cooling water = 1250 Kg/min.
Determine i) condenser vacuum corrected to standard barometer ii) vacuum efficiency iii) under cooling of condensate iv) condenser efficiency. **[6]**

OR

Q2) a) From following data calculate cost of generation per unit delivered from the power plant. **[6]**
Installed capacity of power plant = 200 Mw
Annual load factor = 0.4
Capital cost of power plant = Rs. 280 Lacks
Annual cost of fuel, Oil, Salaries & taxation = Rs. 60 Lacks
Interest & depreciation = 13%

b) With neat sketch explain ash handling system. **[4]**

P.T.O.

Q3) a) Write a note on Hydrograph and Flow duration curve. **[4]**

b) Explain with neat sketch CANDU reactor. Also state the merits and demerits. **[6]**

OR

Q4) a) Discuss the site selection, advantages & disadvantages for Hydroelectric Power Plant. **[6]**

b) Write a note on Nuclear waste disposal. **[4]**

Q5) a) Draw a typical layout of Diesel Power Station and Explain it. **[6]**

b) A Gas turbine unit has pressure ratio 6:1 & maximum cycle temperature of 610°C. The isentropic efficiency of the compressor and turbine are 0.80 and 0.82 respectively. Calculate power output in kilowatts of an electrical generator geared to the turbine when the air enters the compressor at 15°C at the rate of 16 Kg/Sec. Also calculate thermal efficiency and work ratio of the plant. Assume i) C_p = 1.005 Kj/Kg & γ = 1.4 for compression processes ii) C_p = 1.11 Kj/Kg & γ = 1.333 for expansion processes iii) C_p = 1.11 Kj/Kg for combustion processes. **[10]**

OR

Q6) a) Discuss the selection of engine size, advantages & disadvantages of Diesel engine power plant? **[6]**

b) In a Gas turbine the compressor takes in air at a temp. of 15°C and compresses it to four times the initial pressure with an isentropic efficiency of 82%. The air is then passed through heat exchanger heated by turbine exhaust before reaching combustion chamber. In the heat exchanger 78% of available heat is given to air. The maximum temp. after constant pressure combustion is 600°C and efficiency of turbine is 70%. Neglecting all losses except those mentioned and assuming working fluid throughout the cycle to have characteristics of air. Find the thermal efficiency of cycle. Assume : R=0.287 Kj/Kg.K and γ = 1.4 for air and constant specific heat throughout. **[10]**

Q7) a) Write a note on

i) Challenges in commercialization of Non-Conventional Power Plants. **[5]**

ii) Low & High Temperature Solar Power Plant. **[5]**

b) Explain single basin and double basin tidal power plant with neat diagrams. **[8]**

OR

Q8) a) With neat sketch explain the working of a fuel cell and list out its advantages over other nonconventional systems. **[10]**

b) Discuss the parameters to be consider for site selection of wind power plant. **[8]**

Q9) a) State the various protective equipments and explain the working of switch gear in power plant. **[8]**

b) Write a note on thermal pollution of water & its control. **[4]**

c) Write a note on Noise pollution by power plants. **[4]**

Q10)a) Draw the typical layout of electrical equipment & discuss the role of control room. **[8]**

b) What are different methods used to control SO_2 in the flue gases? Explain any two. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1961

[Total No. of Pages : 4

[5059] - 543
B.E. (Mechanical)
MECHANICAL SYSTEM DESIGN
(2012 Pattern) (Semester - VIII)

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

Instructions to the candidates:

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

Q1) a) Write the procedure for kinematic design of multispeed gear box for machine tools. **[6]**

b) How the standard normal distribution curve differ than normal distribution curve. **[4]**

OR

Q2) a) A machine tool requires six speed gear box. which having a 160 rpm minimum and 1000 rpm maximum speed, when the motor shaft speed is 1440 rpm. **[4]**

b) A particular type of rolling contact bearing has a normally distributed time to failure with a mean of 10,000 hours and a standard deviation of 750 h. If there are 100 such bearings fitted at a time, how many may be expected to fail within the first 11000h? **[6]**

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

Q3) a) Give the advantages, disadvantages and applications of conveyors as material handling equipment. **[4]**

b) A belt conveyor is to be designed to carry the bulk material at the rate of 350 ton/hour with the following detail's : weight density of material = 16700 N/m^3, Angle of repose = 15°, belt speed = 120 m/min, material factor for plies k_1 = 2.0, Belt tension and arc of contact factor k_2 = 70, No. of plies for the belt = 4, C = 0.075, S = 80 mm, determine i) width of belt ii) diameter and length of drive pulley. **[6]**

P.T.O.

OR

Q4) a) Describe with neat sketch the procedure to calculate the power requirement for belt conveyors. **[4]**

b) Following data refers to a horizontal belt conveyor used for transporting iron ore-capacity of conveyor = 300×10^3 kg/hour, belt speed = 180 m/minute, density of coal (ρ) = 7848 N/m^3, Number of plies for belt(Z_p) = 3, material factor for plies (k_1) = 2, Belt tension and arc of contact factor for belt (k_2) = 60, Electric motor speed = 1440 rpm, centre distance between snub pulleys, (d_1) = 200m, centre distance between drive and tail pulley (d_2) = 240m. Pitch of carrying run idlers, (t_c) = 1m, Pitch of return run idlers (t_r) = 2.5m. Surcharge factor = 0.0725 determine : **[6]**

i) Width of belt

ii) Reduction ratio of gear reducer

iii) The number of carrying and return run idlers.

Q5) a) i) What are the types of end closure for cylindrical pressure vessel? **[4]**

ii) What are the methods of prestressing the cylinder? **[4]**

b) i) Derive the Lame's equation. Explain under what conditions it is used? **[5]**

ii) An air receiver consisting of a 500 mm diameter cylinder closed by hemi-spherical ends, is made of steel FeE 200 and the factor of safety is 2.5. The operating pressure is limited to 3MPa. Treating the receiver as a thin cylinder, calculate the thickness of the cylinder wall and the hemispherical ends. Neglect the effect of welded joints. **[5]**

OR

Q6) a) The hydraulic cylinder 400 mm bore operates at a maximum pressure of 5 N/mm^2. The piston rod is connected to the load and the cylinder to the frame through hinged joints. Design (1) cylinder (2) piston rod (3) hinge pin. The allowable tensile stress for cast steel cylinder and end cover is 80 MPa and for piston rod is 60 MPa. Take τ = 45 N/mm^2 for hinge pin Draw the hydraulic cylinder with piston & piston rod. **[8]**

b) i) A high pressure cylinder consists of a steel tube with inner and outer diameters of 20 mm and 40 mm respectively. It is jacketed by an outer steel tube having an outer diameter of 60 mm. The tubes are assembled by a shrinking process in such a way that maximum principal stress induced in any tube is limited to 100 N/mm^2. Calculate the shrinkage pressure and original dimensions of the tube E = 207 kN/mm^2. **[5]**

ii) Explain with neat sketches the different types of formed heads used as end closures in cylindrical pressure vessels. **[5]**

Q7) a) Explain the step by step procedure for designing of piston of IC engine. **[6]**

b) Determine the dimension of the cross section of the connecting rod for a diesel engine with following data : **[10]**

σ_c = 275 N/mm^2

Cylinder bore = 100mm Maximum gas pressure = 4 MPa

Length of connecting rod = 350mm Factor of safety = 5

OR

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

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

Cylinder bore = 145mm Factor of safety = 5

Cylinder material = FG200 Poisson's ratio = 0.25

Maximum gas pressure = 3.5MPa Re boaring allowance = 3mm

Determine thickness of cylinder wall and calculate stresses in the cylinder wall. **[10]**

Q9) a) Differentiate between adequate and optimum design. Also explain different types of equations that are used in 'Johnson's method of optimum design'. **[6]**

b) A tensile bar of length 450mm is subjected to constant tensile force of 4000N. If the factor safety is 1.5, design the bar diameter, using Johnson's method, with the objective of minimizing material weight using optimum material from the list given in **Table 1**. **[10]**

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

Table 1

OR

Q10)a) Write a short note on design for manufacturing and assembly. **[6]**

b) In lightweight equipment, a shaft is required to transmit 45KW power at 480 RPM. Required stiffness of shaft is 90N-m/ Degree. Factor of safety based on S_{ys} is 2.

Using max shear stress theory of failure design the shaft with the objective of minimum weight by using optimum material from the list given in Table 1 above. **[10]**

Assume G = 70000 N/mm^2 for all materials.

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Total No. of Questions : 10]

SEAT No :

P2155

[Total No. of Pages : 3

[5059]-544

B.E.(Mechanical)

REFRIGERATION AND AIR CONDITIONING EQUIPMENT DESIGN

(2012 Course) (402049A) (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 logarithmc tables slide rule, Mollier charts, Electronic pocket calculator, steam tables and p-h chart is allowed.***
4) ***Assume suitable data if necessary.***

Q1) State advantages of CO_2 system over conventional system. Explain the following transcritical refrigeration cycle: **[10]**

a) Ejector-expansion type

b) internal heat exchange cycle.

OR

Q2) a) Explain the construction working of externally compensated regulating valve. **[6]**

b) Write a short note on : re-evaporator coils. **[4]**

Q3) a) List out the limitations of VCS for the production of low temperatures. **[5]**

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

OR

Q4) a) Discuss various applications of cryogenics. **[5]**

b) Explain the performance characteristic curves of reciprocating compressor. **[5]**

Q5) a) Explain the procedure of thermal design of shell and tube condensers. **[8]**

b) Write a short note on "Pump Circulation System". **[8]**

OR

P.T.O.

Q6) a) Design R-22 condenser to meet the following conditions: **[10]**

Refrigeration load	30 TR
Condensing temperature	55°C
Evaporating temperature	-15°C
Water inlet temperature	27°C
Water flow rate per TR	0.00757 m^3/min
Heat rejection factor	1.013
Maximum tube length & diameter	3.6576 m & 2.54cm
Fouling factor	0.001m^2K/W
HTC inner & outer side respectively	6000 W/m^2.K & 1500 W/m^2.K

State the selection basis of condenser

b) Write a short note on "Baudelot Cooler". **[6]**

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

Water flow rate : 12.67 kg/s

Air flow rate : 11.9 kg/s

Water entering temperature : 36.3°C

Water leaving temperature : 32.1°C

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

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

a) Value of the performance coefficient.

b) The wetted area of tower if air HTC is 83 W/m^2K.

c) Value of mass transfer coefficient.

d) Exit condition of air.

OR

Q8) a) Explain the performance curves of cooling tower. **[8]**

b) Discuss various types of contact type of cooling tower. **[8]**

Q9) a) What is heat pipe? Explain advantages of heat pipe over other heat transport material. **[8]**

b) Explain limitations to heat transport in a heat pipe. **[10]**

OR

Q10) Write a short note on: **[18]**

a) Magnetic Refrigeration.

b) Pulse Tube

c) Steam jet Refrigeration.

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Total No. of Questions : 10]

SEAT No. : ____

P1962

[Total No. of Pages : 2

[5059] - 545

B.E. (Mechanical)

ROBOTICS

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

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 with neat sketch derivation of link transformation. **[6]**

b) Explain sensor selection criteria for robotic applications. **[4]**

OR

Q2) a) Classify Robots and explain any one Robot configuration in detail. **[4]**

b) Explain the steps involved in DH notation process. **[6]**

Q3) a) Explain with suitable examples velocity ellipse and ellipsoids. **[6]**

b) Explain the working principle of vision sensor with neat sketch. **[4]**

OR

Q4) a) Write a short note on : **[6]**

i) Jacobian

ii) Singularities

b) Explain with neat sketch the construction of servo grippers. **[4]**

Q5) a) Derive an expression for torque at joint for 2R manipulator. **[10]**

b) Explain with neat sketch mass and inertia of single link model. **[6]**

P.T.O.

OR

Q6) a) Write down the steps involved in simulation of equations of motion for serial manipulator **[8]**

b) Explain dynamic model requirements of a spatial manipulator. **[8]**

Q7) a) An actuated joint of six axis robot is to be rotated from 20 to 80 in 6 seconds. Determine linear ,quadratic and cubic trajectories for the joint. **[8]**

b) Explain with neat sketch : **[10]**

i) Modelling of single joint

ii) Force control

OR

Q8) a) A spring mass system has m=2.2, b==7.5,k=3.5. If the gain in the velocity control is 2.5 determine the control law to make the system critically damped. Compare the behavior of the system without gains by plotting the graph assuming x(0) and velocity (0)=l.2. **[10]**

b) Explain with neat sketch PID controller. **[8]**

Q9) a) Explain AI with reference to various applications. **[8]**

b) Explain in detail various image processing techniques. **[8]**

OR

Q10)a) Write a short note on **[10]**

i) Linear Kalman filter

ii) Sampling

b) Explain various techniques of AI. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1963

[Total No. of Pages : 4

[5059] - 546
B.E. (Mechanical Engineering)
INDUSTRIAL ENGINEERING
(2012 Pattern) (Semester - II) (Elective - III)

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

Instructions to the candidates:

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

Q1) Explain briefly the productivity improvement techniques. **[6]**

OR

Q2) Write short note on : **[6]**

a) Organization chart
b) Delegation of Authority

Q3) Define method study. Explain procedure of method study. **[7]**

OR

Q4) Write short note on : **[7]**

a) Travel chart
b) String diagram

Q5) Write short notes on: (Any Two) **[7]**

a) Qualified worker.
b) Performance rating.
c) Work measurement.

OR

P.T.O.

Q6) Following are the element times of a machining operation. The corresponding rating and relaxation allowances are given in table as below:

Element	Observed Time (Min)	Frequency	Performance Rating	Relaxation Allowance (%)
1	0.15	1	100	12
2	0.12	1	90	15
3	0.08	1	75	11
4	10.00	1/50	80	11
5	6.00	1/55	90	13

Calculate normal time, standard time for this job. **[7]**

Q7) a) ABC Company uses exponential smoothing with $\alpha = 0.15$ for estimating a demand. Following table shows the demand for 6 months. The forecast for June is 500 units. Estimate the forecast for December. **[8]**

Month	Actual Demand	Forecast
June	450	500
July	505	
August	516	
September	488	
October	467	
November	554	

b) Explain briefly ABC analysis and VED analysis used in Industries.**[8]**

OR

Q8) a) Annual demand for an item is 5400 units, ordering cost is Rs 600 per order, inventory carrying cost is 12% of average inventory. Determine order size. **[8]**

Lot size	Unit Price(Rs)
0-2300	12
2400-2999	10
3000 and above	8

b) What is demand forecasting? Explain Moving Average Method for demand forecasting. **[8]**

Q9) a) In a company for one product assembly line requires 7 different tasks. Precedence information and task time is given below. If cycle time is 7 minutes find the minimum number of stations. Also calculate the line efficiency and smoothness index. **[9]**

Task, t	Task time, t	Precedence
1	3	None
2	4	1
3	1	1
4	4	1
5	3	2
6	1	3 and 4
7	2	5 and 6

b) Write short note on : **[8]**

i) Selection criterion for material handling.

ii) Supply chain network.

OR

Q10)a) Define plant location and plant layout. What are various factors involved in selection of site for good plant. **[9]**

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

i) Material flow patterns

ii) Line balancing

Q11)a) Write short note on Depreciation and causes for depreciation. **[8]**

b) A Company has given following information **[9]**

Data	Rs.
Sales	1,50,000/-
Variable Overheads	1,20,000/-
Gross Profit	60,000/-
Fixed Overheads	20,000/-
Net Profit	40,000/-

Determine-

i) P/V ratio

ii) BEP

iii) Net profit when sales are Rs. 4,00,000/-

OR

Q12)a) What is importance of standard costing? Explain different elements of costs. **[8]**

b) A factory producing only one item which it sells for Rs. 12.50 per unit has fixed cost Rs. 60,000 and variable cost is Rs. 7.50 per unit. Find out **[9]**

i) No. of units to be produced to break even

ii) No. of units to be produced to earn profit Rs. 12,000/-

iii) The profit if 25,000 units are produced and sold.

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Total No. of Questions : 10]

SEAT No. : ____

P1964

[Total No. of Pages : 4

[5059] - 547
B.E. (Mechanical)
COMPUTATIONAL FLUID DYNAMICS
(2012 Pattern) (Semester - II) (Elective - IV)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary. Figures to the right side indicate full marks.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain in detail the various flow models using an infinitesimal control volume. **[6]**

b) Write three fundamental physical principles upon which fluid dynamics is based on. **[4]**

OR

Q2) a) Explain any two possible errors in CFD analysis with examples. **[4]**

b) Write in detail with neat sketches **[6]**

i) hybrid grid
ii) multiblock grid
iii) body fitted grid

Explain the significance of each grid.

Q3) a) Derive the discretized form of the steady, one-dimensional, heat conduction equation and show that **[6]**

$$k\frac{\partial^2 T}{\partial x^2} = 0$$

can be expressed as

$$\frac{T_{i+1} + T_{i-1} - 2T_i}{(\Delta x)^2} = 0$$

Explain the order of accuracy of above equation.

b) Differentiate implicit methods over explicit methods. **[4]**

P.T.O.

OR

Q4) a) Explain in detail Dirichlet and Neumann boundary conditions with examples. Draw neat sketches. **[4]**

b) Consider one dimensional steady-state heat conduction in rectangular horizontal fin as shown in Fig. 1 The rectangular fin is subjected to the boundary conditions are shown in Fig.l. **[6]**

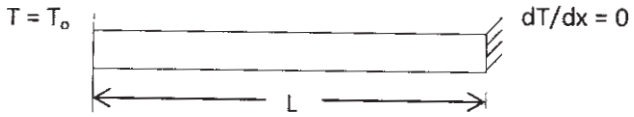

Fig.1 Rectangular fin

Above system results into following set of equations. Find the temperature distribution (temperatures, T_1 to T_4) in the fin using TDMA method.

$$\begin{bmatrix} 2.25 & -1 & & \\ -1 & 2.25 & -1 & \\ & -1 & 2.25 & -1 \\ & & -2 & 2.25 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

Q5) a) Show that for two dimensional convective-diffusive equation **[10]**

$$\frac{\partial \phi}{\partial t} + u\frac{\partial \phi}{\partial x} + v\frac{\partial \phi}{\partial y} = v\left[\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2}\right]$$

the CFL condition should be less than or equal to 0.5 for system to remain stable,

b) Explain Lax-Wendroff Method? Derive an expression for Lax Wendroff method and comment on the order of accuracy of the method. **[8]**

OR

Q6) a) Write first order wave equation. Discretize the wave equation with suitable numerical technique and find out the numerical solution at next time level. **[10]**

b) Derive and explain MacCormack's technique with predictor and corrector step. **[8]**

Q7) a) Explain the CFD simulation process for flow through pipe using SIMPLE numerical technique. Write stepwise algorithm to find out the numerical simulation using SIMPLE technique. **[10]**

b) Write a short note on finite volume method. Comment on preference of finite volume method over finite difference method. **[6]**

OR

Q8) a) Explain the necessity of the variation of SIMPLER algorithm from SIMPLE algorithm. Explain how the drawbacks encountered in SIMPLE algorithm are overcome in SIMPLER algorithm. Write all the steps in the algorithm. **[10]**

b) Explain the need of relaxation techniques in numerical solution process. Write in brief about under-relaxation. **[6]**

Q9) a) In an automobile industry, it is recommended to use CFD tool for analysis of heat dissipation in brake disc as shown in Figure 2. Write in detail, methodology to do the CFD analysis of the brake disc including three distinct processes pre-processing, solver and post-processing. Comment on the **[10]**

i) objective of the grooves made on the disc and give suggestion on number of the groove and its pattern.

ii) method to reduce the computational time.

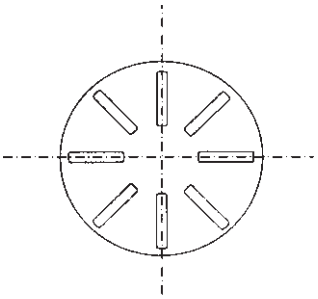

Fig.2 Brake disc

b) Explain in detail any two physical boundary conditions. Write in detail significance of physical boundary conditions in CFD analysis process. **[6]**

OR

Q10)a) CFD Post-processing is an important tool to study and analyze the fluid flow and heat transfer behavior. **[6]**

i) Write in detail the post-processing and its importance in CFD analysis process.

ii) Enlist the different tools in post processing in CFD to analyze the fluid flow and heat transfer.

b) A computational domain with different boundary conditions is shown in Figure 3. Show with neat sketch where fine mesh is appropriately located. Explain in brief the importance of fine mesh in the domain.**[4]**

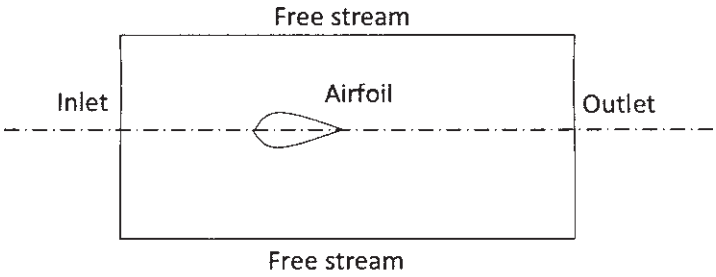

Fig.3 Computational Domain

c) What is turbulence modeling? Explain k - ε model in detail. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P3067

[Total No. of Pages :4

[5059]-548
B.E.(Mechanical)
FINITE ELEMENT ANALYSIS
(2012 Course)(Semester-II)(Elective-IV)(402050B)

Time :2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Draw suitable neat diagrams, wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if required.***

Q1) a) Explain step by step procedure for FEA and comment on convergence based on elemental size. **[6]**

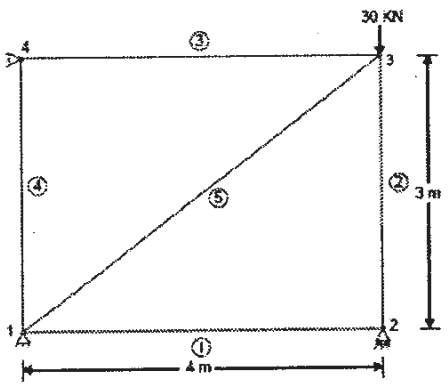
b) Explain concept of Plane Stress with appropriate example. **[4]**

OR

Q2) a) Write down the difference between Weighted Residual Method and Weak Formulations. **[6]**

b) Explain LST (Linear Strain Triangle Element) Element. **[4]**

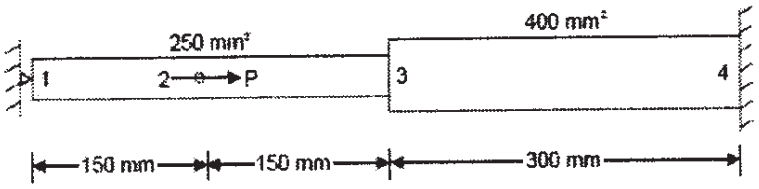
Q3) Determine the forces in the members of the truss shown in Fig.Take E= 200GPa. A=2000mm^2. **[10]**



OR

P.T.O.

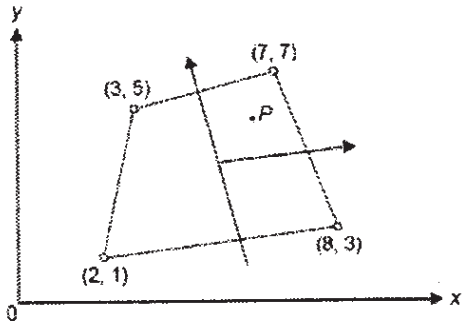
Q4) a) Determine the nodal displacement, element stresses and support reactions of the axially loaded bar as shown in Fig.Take E=200GPa and P=30kN **[6]**



b) Write a note on Lagrendge interpolation functions used in FEA formulations. **[4]**

Q5) a) Write a note on isoparametric formulations and how the geometric as well as field variable variation is taken into account? **[6]**

b) Determine the Cartesian coordinate of the point P (ζ ? 0.5,η ? 0.6) shown in Fig. **[4]**



c) Write short notes on **[4]**

i) Uniqueness of mapping of isoparametric elements.

ii) Jacobian matrix

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

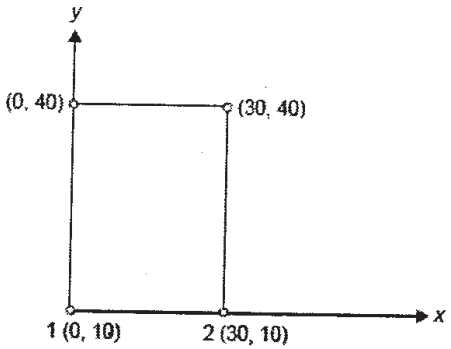
OR

Q6) a) Write short notes on **[8]**

i) Uniqueness of mapping of isoparametric elements.

ii) Jacobian matrix

b) For the element shown in Fig, assemble Jacobian matrix and strain displacement matrix for the Gaussian point(0.7,0.5). **[10]**



Q7) a) Write down governing equation of steady state heat transfer and also write down elemental stiffness matrix and compare with Bar element.**[6]**

b) Consider a brick wall of thickness 0.6m, k=0.75 W/m°K. The inner surface is at 15°C and the outer surface is exposed to cold air at-15°C. The heat transfer coefficient associated with the outside surface is 40W/m^2°K. Determine the steady state temperature distribution within the wall and also the heat flux through the wall. Use two elements and obtain the solution. **[10]**

OR

Q8) a) Heat is generated in a large plate(K=0.5W/m°C) at the rate of 2000W/m^3.The plate is 10 cm thick. Outside surface of the plate is exposed to ambient air at 30°C with a convective heat transfer coefficient of 40W/m^2 °C. Determine the temperature distribution in the wall. **[10]**

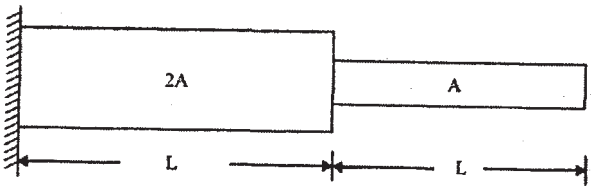
b) Derive FEA stiffness matrix for Pin Fin Heat Transfer problem. **[6]**

Q9) a) Write down Consistent Mass and Lumped Mass Matrix for **[6]**

i) Bar Element

ii) Plane Stress Element

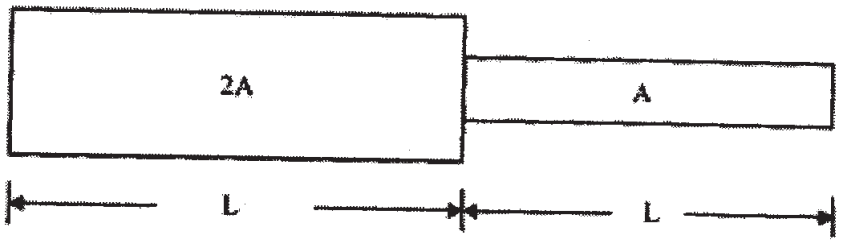
b) Find the natural frequencies of longitudinal vibrations of the same stepped shaft of areas A=1200 mm^2 and 2A=2500mm^2 and of equal lengths (L=1m), when it is constrained at one end, as shown below. **[10]**



OR

Q10)a) Explain difference between consistent and lumped mass matrix technique for modal analysis of structure. **[6]**

b) Find the natural frequencies of longitudinal vibrations of the unconstrained stepped shaft of areas A and 2A and of equal lengths(L), as shown below. **[10]**



Total No. of Questions : 10]

SEAT No. :

P1965

[Total No. of Pages : 4

[5059] - 549

B.E. (Mechanical Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2012 Pattern) (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 diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the basic equation of Energy Transfer between fluid and rotor **[6]**

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

i) Pump ii) Fan and Blower

iii) Compressor iv) Turbine

OR

Q2) a) Explain performance characteristics of Pump, fan, blower and compressor. **[6]**

b) A small compressor has the following data: **[4]**

Air flow rate = 1.5778 kg/s Pressure Ratio = 1.6

Rotational Speed = 54,000 rpm Efficiency = 85%

State of air at entry: Po1 = 1.008 bar, To1 = 300 K, Cp = 1.009 kJ/kg K

Calculate the power required to drive the compressor?

Q3) a) What is slip ? Explain the negative slip with neat sketch. **[5]**

b) The cylinder bore diameter of a single acting reciprocating pump is 150 mm and its stroke length is 300 mm. The pumps runs at 50 r.p.m. and lifts water through a height of 25 m. The delivery pipe is 22 m long and 100 mm in diameter. Find the theoretical discharge and the theoretical power required to run the pump. If the actual discharge is 4.2 liters/s. Find the percentage slip .Also determine the acceleration head at the beginning and middle of the delivery stroke. **[5]**

P.T.O.

OR

Q4) a) Explain the Air vessel in Reciprocating Pumps? **[5]**

b) A single acting reciprocating pump has piston diameter 12.5 cm and stroke length 30 cm. The center of the pump is 4 m above the water level in the sump. The diameter and length of suction pipe are 7.5 cm and 7 m resp. The separation occurs if the absolute pressure head in the cylinder during suction stroke falls below 2.5 m of water. Calculate the maximum speed at which the pump can run without separation. Take atmospheric pressure head = 10.3 m of water. **[5]**

Q5) a) Explain the different Mechanical losses in fans and blowers? **[8]**

b) A Centrifugal fan has the following data : **[8]**

Inner diameter of the impeller	18 cm
Outer diameter of the impeller	20 cm
Speed	1450 rpm

The relative and absolute velocities respectively are

At entry	20 m/s, 21 m/s
At exit	17 m/s, 25 m/s
Flow rate	0.5 kg/s
Motor efficiency	78%

Determine i) Stage Pressure rise ii) Degree of reaction iii) the power to drive the fan

Take density of air as 1.25 kg /m^3

OR

Q6) a) Discuss the various applications of fans & blowers. **[8]**

b) A centrifugal blower with a radial impeller produces a pressure equivalent to 100 cm column of water. The pressure and temperature at its entry are 0.98 bar and 310 K. The electric motor driving the blower runs at 3000 rpm. The efficiencies of the fan and drive are 82% and 88% respectively. The radial velocity remain constant and has a value of 0.2 u_2. The velocity at the inlet eye as 0.4u_2. If the blower handles 200 m^3/min of air at the entry condition determine :- **[8]**

i) power required by the electric motor

ii) impeller diameter

iii) inner diameter of the blade ring

iv) air angle at entry

Q7) a) Explain design procedure & selection, optimization of blower. **[8]**

b) An axial fan stage consisting of only a rotor has the following data **[8]**

Rotor blade air angle at exit	10°
Tip diameter	60 cm
Hub diameter	30 cm
Rotational speed	960 rpm
Power required	1 kW
Flow coefficient	0.245

(Inlet flow conditions P1 = 1.02 bar and T1 = 3.16 K)

Determine the rotor blade angle at the entry, the flow rate, stage pressure rise, overall efficiency, degree of reaction, and specific speed.

OR

Q8) a) What are main cause for noise generation? What are methods for reducing the fan noise? **[8]**

b) The velocities for upstream and downstream of an open propeller fan (d = 50 cm) are 5 and 25 m/s respectively. If the ambient conditions are P = 1.02 bar, t = 37°C determine: **[8]**

i) Flow rate through the fan

ii) Total pressure developed by the fan and

iii) The power required to drive the fan assuming the overall efficiency of the fan as 40%

Q9) a) Explain performance characteristics curves of an Axial flow Compressor? **[8]**

b) An Axial compressor stage has the following data **[10]**

i)	Temperature and Pressure at Entry	300 K, 1.0 bar
ii)	Degree of Reaction	50%
iii)	Mean Blade ring diameter	36 cm
iv)	Rotational Speed	18000 rpm
v)	Blade Height at entry	6 cm
vi)	Air angles at rotor and stator exit	25°
vii)	Axial velocity	180 m/s
viii)	Work done factor	0.88
ix)	Stage Efficiency	85%
x)	Mechanical Efficiency	96.7%

Determine:-

1) Air angles at the stator and rotor entry.
2) The mass flow rate of air.
3) The power required to drive the compressor.
4) The loading coefficient.
5) The pressure ratio developed by the stage.
6) Mach number at the rotor entry.

OR

Q10)a) Explain performance characteristics curves of a Centrifugal flow Compressor? **[8]**

b) Air enters the inducer of centrifugal compressor at Po1 = 1.02 bar, Tol = 335 K. The hub and tip diameters of the impeller eye are 10 and 25 cm respectively. If the compressor runs at 7200 rpm and delivers 5.0 kg/s of air. Determine the air angle at the inducer blade entry and the relative Mach number. If IGVs are used to obtain a straight inducer section, determine the air angle at IGVs exit and the new value of the relative Mach number. **[10]**

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Total No. of Questions : 12]

SEAT No. :

P1966

[Total No. of Pages : 3

[5059] - 550

B.E. (Mechanical Sandwich)

AUTOMOBILE ENGINEERING

(2012 Pattern) (Semester - I) (Self Study - III)

Time : 3 Hours] ***[Max. Marks :100***

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain history and development of automobile. **[8]**

b) What do you mean by chassis of automobile? What are various types of chassis? Explain with advantages & disadvantages. **[8]**

OR

Q2) a) What are the various layouts of automobile? Explain following layout with advantage & disadvantage. **[8]**

i) Front wheel drive, Front Engine.

ii) Front Engine Rear wheel drive.

b) Describe with neat sketch constructional detail of front axle used in automobile. **[8]**

Q3) a) What is role of clutch in transmission? Describe with neat sketch working of single plate clutch used in automobile. **[8]**

b) Explain necessity of gear box in vehicle? How gear box helps to overcome various gradients, Explain. **[8]**

OR

P.T.O.

Q4) a) Describe with neat sketch construction of tyre. What is role of tread design? Explain. **[8]**

b) What is differential? Why it is necessary? Describe construction of differential used in case of rear wheel drive. **[8]**

Q5) a) Explain with neat sketch outline of steering mechanism used in automobile. Describe various parts used in it. **[8]**

b) Explain following concept used in suspension system. **[5]**

i) Sprung and unsprung mass

ii) Roll centre

c) What are various factors those affect braking performance? Explain. **[5]**

OR

Q6) Write short note on the following (any three) : **[18]**

a) ABS

b) Hydrogas suspension

c) Power steering

d) Wheel balancing

e) Fluid flywheel

SECTION - II

Q7) a) How is vehicle structure made safety for crashworthiness? Explain in brief. **[8]**

b) Explain role of seat belt arrangement in vehicle safety. **[8]**

OR

Q8) a) Explain purpose of head restraint used to seat with a neat sketch. **[8]**

b) Describe head lamp assembly with a neat sketch. **[8]**

Q9) a) Describe road performance curves with a neat sketch. **[8]**

b) Explain free acceleration test with a neat sketch. **[8]**

OR

Q10)a) Explain power requirement for propulsion. **[8]**

b) Explain testing of vehicle on chassis dynamometer. **[8]**

Q11)a) Explain hydraulic dozers with neat sketch. **[6]**

b) Write function of heavy wheeled tractors. **[6]**

c) Explain application of multi-axle vehicles. **[6]**

OR

Q12)a) Explain multi buckets tankers. **[6]**

b) Explain dump truck loaders with neat sketch. **[6]**

c) Write short note on “Bulldozers”. **[6]**

❖ ❖ ❖ ❖

Total No. of Questions : 12]

SEAT No. :

P1967

[Total No. of Pages : 3

[5059] - 551
B.E. (Mechanical-Sandwich)
POWER PLANT ENGINEERING
(2012 Pattern)

Time : 3 Hours] ***[Max. Marks :100***

Instructions to the candidates:

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

SECTION - I

Q1) a) Explain with neat sketch the concept of fluidised bed combustion system. **[8]**

b) A steam turbine receives steam at 20 bar and 350°C and exhaust to condenser at 0.06 bar .Determine the thermal efficiency , Specific steam consumption and work ratio- of ideal Rankine cycle. **[8]**

OR

Q2) a) Why flue gas analysis is required? Explain any one method of analysing the flue gases. **[8]**

b) Fuel is supplied to engine has following composition on mass basis 85% carbon,13% hydrogen, 2% oxygen. The air supplied is 60% in excess of that theoretically required for complete combustion. Estimate volumetric composition of dry flue gas. **[8]**

Q3) a) Explain with neat sketch Lamont boiler. What are the advantages of Lamont boiler. **[8]**

b) Compare induction draught and forced draught. **[8]**

OR

P.T.O.

Q4) a) What are different flue gas cleaning devices? Explain pulse jet cleaning method with neat sketch. **[8]**

b) What is necessity of feed water treatment? What are different methods of feed water treatment. Explain any one method. **[8]**

Q5) a) Discuss the parameters on which the selection of site for a hydraulic power plant depend. **[8]**

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

i) headrace ii) tailrace

iii) tunnel iv) penstock

OR

Q6) a) Classify the hydro turbines according to head,power,size and specific speed. **[6]**

b) What do you mean by : **[6]**

i) Hydrograph

ii) Flow duration curve

c) Explain with neat sketch Francis turbine. **[6]**

SECTION - II

Q7) a) Explain the working of CANDU reactor. **[6]**

b) Discuss various factors while selecting a site for nuclear power plant. **[6]**

c) Explain what is heat rate and incremental heat rate. **[6]**

OR

Q8) a) Draw the layout of diesel power plant and explain. **[6]**

b) Differentiate between BWR and PWR. **[6]**

c) Explain heat balance sheet of diesel power plant. **[6]**

Q9) a) Why thermal efficiency of gas turbine is high at high altitude. Compare open cycle and closed cycle gas turbine. **[8]**

b) With the help of neat sketch discuss the working principle of **[8]**

i) MHD plant

ii) Bio mass plant

OR

Q10)a) What are various methods used to improve the efficiency and output of gas turbine explain with layout and T-S diagram. **[8]**

b) Explain the working principle of fuel cell. Explain with neat sketch Ion exchange membrane cell. **[8]**

Q11)a) Explain **[8]**

i) Load factor ii) Utility factor

iii) Plant operating factor iv) capacity factor

v) Demand factor vi) Diversity factor

b) List cost elements of thermal power plant and nuclear power plant. **[8]**

OR

Q12)a) Explain the method of drawing load duration curve using load curve. What is 'ideal and realised load curve. **[8]**

b) A consumer has following connected load 10 lamps of 60 Watt each. 2 heaters of 1000 Watt each. Maximum demand is 1500 Watt. On the average he uses 8 lamps for 5 hrs a day and each heater for 3 hrs a day: Find his average demand, load factor and monthly energy consumption. **[8]**

Total No. of Questions :10]

P3068

SEAT No. :

[Total No. of Pages :3

[5059]-552

B.E.(Mechanical- Sandwich)

MECHANICAL VIBRATIONS

(2012 Course) (Semester-II) (End Semester) (402066)

Time :2 ½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data wherever necessary.***
5) ***Figures to the right side indicate full marks.***

Q1) A 5 cylinder inline engine working on a four stroke cycle has firing order 1-3-5-4-2, the reciprocating masses per cylinder being 10 kg, crank radius is 0.1 m and connecting rod is 0.4 m. The spacing between the cylinder center lines is 0.3 m. The engine runs at 1000 rpm. Determine the maximum values of primary and secondary unbalance about the central crank and the position of central crank at which these occur. **[10]**

OR

Q2) a) Discuss the effect of damping on vibratory system. What is meant by under damping, over damping & critical damping? **[4]**

b) An unknown mass 'm' is attached to one end of a spring of stiffness 'k' having natural frequency of 6 Hz. When 1 kg mass is attached with m' the natural frequency of the system is lowered by 20 % . Determine the value of unknown mass m and stiffness k. **[6]**

Q3) a) Define logarithmic decrement. Derive an expression for logarithmic decrement in terms of damping ratio. **[4]**

b) Determine suitable expression for equation of motion of the damped vibratory system as shown in following fig1. Find the critical damping coefficient when a = 0.10 m,b = 0.13 m, k = 4900 k/m and M = 1.5 kg. **[6]**

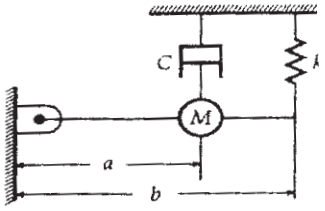

Fig. 1

OR

P.T.O.

Q4) a) Find the natural frequency of the system shown in following fig.2 Take k= 2×10^5 N/m and m = 20 kg. **[4]**

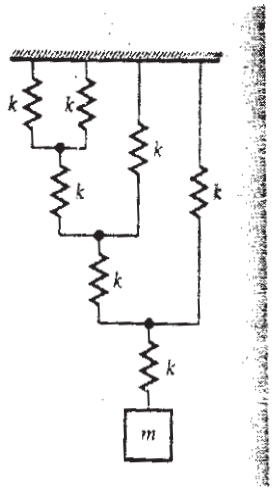

Fig. 2

b) A horizontal spring mass system with coulomb damping has a mass of 5.0 kg attached to a spring of stiffness 980 N/m. If the coefficient of friction is 0.025, calculate

i) the frequency of free oscillations,

ii) the number of cycles corresponding 50 % reduction in amplitude, if the initial amplitude is 50 mm and

iii) the time taken to achieve 50 % reduction. **[6]**

Q5) a) Explain frequency response curves with neat diagram. **[8]**

b) The springs of an automobile trailer are compressed 0.1 m under its own weight . Find the critical speed, When the trailer is passing over a road with a profile of sine wave whose amplitude is 80 mm and its wavelength is 14 m. Find the amplitude of vibration at a seed of 60 km/hr. **[8]**

OR

Q6) a) Explain the following terms: **[6]**

i) Quality factor

ii) Whirling speed of shaft

iii) Magnification factor

b) Derive, using vector approach. the expressions for **[10]**

i) Amplitude of steady state vibrations and

ii) Phase angle for a spring mass damper system subjected to an external periodic force F_o.Sin (ω t)

Q7) Find the frequencies of the system shown in following fig.3 **[16]**

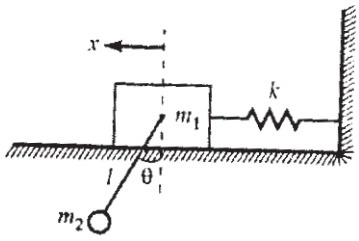

Fig. 3

OR

Q8) a) Explain with neat diagram mathematical model of a motorbike. **[6]**

b) Two equal masses of weight 400 N each and radius of gyration 40 cm are keyed to the opposite ends of a shaft of 60 cm long. The shaft is 7.5 cm diameter for the first 25 cm of its length, 12.5 cm diameter for the next 10 cm and 8.5 cm diameter for the remaining of its length. Find the frequency of free torsional vibrations of the system and position of node. Assume $G = 0.84 \times 10^{11}$ N/m^2. **[10]**

Q9) a) Explain with neat diagram the working principle of seismic instrument. **[6]**

b) Explain the construction and working of piezoelectric accelerometer with neat diagram. **[6]**

c) A machine of 100 kg mass has a 20 kg rotor with 0.5 mm. Eccentricity. The mounting springs have $k = 85 \times 10^3$ N/m. damping factor = 0.02.The operating speed of machine is 600 rpm and the unit is constrained to move vertically.Find the force transmitted to the supports. **[6]**

OR

Q10 a) Explain various methods of vibration control? **[6]**

b) Explain the principle and working of undamped dynamic vibration absorber with neat diagram. **[6]**

c) A vibrometer having the amplitude of vibration of the machine part as 4mm and damping factor as 0.2 performs harmonic motion. If the difference between the maximum and minimum recorded value is 10 mm, determine the natural frequency of vibrometer, if the frequency of vibration part is 12 rad/sec. **[6]**

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Total No. of Questions : 08]

SEAT No. : ____

P1968

[Total No. of Pages : 2

[5059] - 554
B.E. (Mechanical Sandwich)
INDUSTRIAL HYDRAULICS & PNEUMATICS
(2012 Pattern) (End Semester)

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

Instructions to the candidates:

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

Q1) a) Write a short note on "Fluid Power Applications". **[10]**

b) What are the diff. between "Hydraulic & Pneumatic Systems". **[10]**

OR

Q2) a) Write a short note on "classification of pumps". **[8]**

b) Explain with neat sketch working of "weight loaded type accumulator. **[12]**

Q3) a) Draw and explain "Regnerative ckt". **[8]**

b) Draw and explain "Synchronization ckt". **[8]**

OR

Q4) a) Write a short note on "Types of Direction Control Valves". **[8]**

b) Write a short note on "Types of Flow Control Valves". **[8]**

Q5) a) Explain with neat sketch working of "Pneumatic clamp". **[8]**

b) What are the applications of "Pneumatics for Industrial Automation". **[8]**

OR

P.T.O.

Q6) a) Differentiate between "Pneumatic and Electropneumatic systems". **[8]**

b) Explain with neat sketch "Compressed Air Generation and Distribution System". **[8]**

Q7) a) What are the factors considered for designing of a "Hydraulic System". **[9]**

b) What are "Trouble shooting & Maintenance procedures for Hydraulic system". **[9]**

OR

Q8) a) What is manufactures catalogue? How does the designer select components through it? **[9]**

b) What are the factors considered for designing of a "Pneumatic System". **[9]**

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Total No. of Questions : 10]

SEAT No :

P2156

[Total No. of Pages : 5

[5059]-555

B.E.(Mechanical S/W)

REFRIGERATION AND AIR CONDITIONING

(2012 Course) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) An Ice Plant produces 100kg of ice per hour at 0^oC from water at 25^oC. Find the capacity of the plant in TR when h_{fg} ice is 335 kJ/kg. **[4]**

b) A refrigerator using Carnot cycle requires 1.25 kW per tonne of refrigeration to maintain a temperature of -30^oC. Find: **[6]**

i) COP of the Carnot refrigerator

ii) Temperature at which heat is rejected

iii) Heat ejected per tonne of refrigeration

OR

Q2) a) Explain the effect of : **[4]**

i) increase in condensing temperature and

ii) increase in evaporator temperature on COP of vapour compression refrigeration system with Ph diagram.

b) An air refrigerator working on Bell - Coleman cycle takes air into compressor at 1 bar and -5^oC. It is compressed to 5 bar and then cooled to 25^oC before entering to the expander. Air is expanded to 1 bar. Assuming isentropic compression and the expansion, Find **[6]**

i) Refrigeration capacity of the system in TR. If the air circulation rate is 60kg/min.

ii) Power required to drive the system.

iii) COP of the system.

P.T.O.

Q3) a) Explain ODP and GWP of refrigerants. **[4]**

b) A vapour compression cycle using R-134a operates between -10°C and 36°C. The liquid refrigerant is sub cooled to 30°C. The vapour leaving evaporator is dry saturated. Assuming isentropic compression calculate:

i) Refrigeration effect in kJ/kg. **[6]**

ii) Work of Compression in kJ/kg.

iii) COP

Temperature	Specific Enthalpy kJ/kg		Specific entropy kJ/kgK	
°C	hf	hg	Sf	Sg
-10	186.7	392.66	0.9506	1.7334
30	241.72	414.82	1.1435	1.7145
36	250.48	417.65	1.1717	1.7124

OR

Q4) a) Derive equation for maximum COP of vapour absorption system from first law & second law of thermodynamics. **[6]**

b) What are the advantages of compound compression with intercooling over single stage compression? **[4]**

Q5) a) In an air conditioning unit 3.5 m^3/s of air at 27°C dry bulb temperature, 50% relative humidity and standard atmospheric pressure enters the unit. The leaving condition of the air is 13°C dry bulb temperature and 90% relative humidity. Using properties from psychrometric chart, calculate :

i) Refrigeration capacity **[8]**

ii) Rate of water removal from the air

iii) SHF of the process

iv) Bypass factor of cooling coil

b) What is human thermal comfort? Explain the six primary factors affecting human thermal comfort. **[6]**

c) Explain following terms: **[4]**

i) Dew point temperature

ii) Humidity ratio

OR

Q6) a) What is SHF? Define RSHF, GSHF & ESHF. Explain the procedure of drawing the corresponding lines on psychrometic chart. Show these lines on hand drawn psychrometric chart. **[8]**

b) What is total heat of the moist air? Derive mathematical expression for total heat of moist air. Explain humid specific heat. **[6]**

c) Explain following terms: **[4]**

i) Relative humidity

ii) Wet bulb temperature

Q7) a) Explain working of summer air conditioning system, winter air conditioning system & all year air conditioning system with the help of hand drawn psychrometric chart. **[8]**

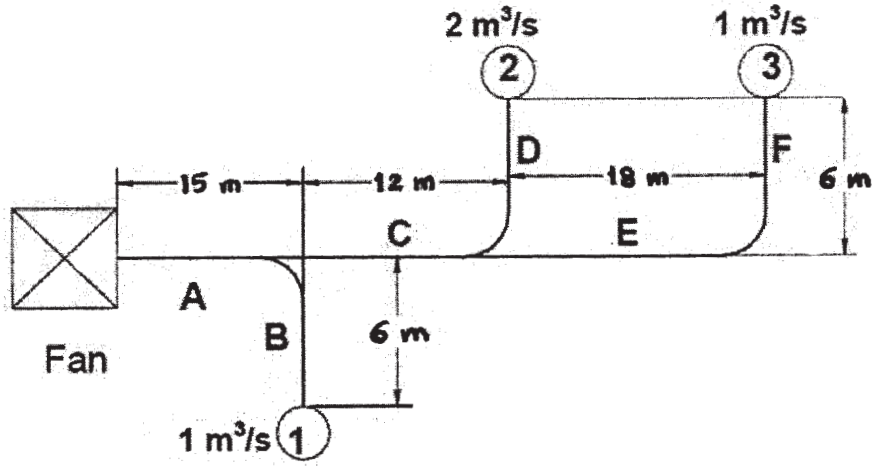
b) What are the different ways of classifying refrigeration compressors? Explain constructional difference between open type compressor and hermetically sealed compressor. Why hermetically sealed compressors are preferred for domestic appliances? **[8]**

OR

Q8) a) What different type of expansion devices are used in refrigeration systems? Explain working of Thermostatic Expansion valve with neat sketch. What are the advantages of Thermostatic expansion valve over constant pressure expansion valve? **[8]**

b) What are the different types of condensers used in refrigeration systems? Explain working of evaporative condenser with neat sketch. Compare performance of refrigeration systems using air cooled & water cooled condensers. **[8]**

Q9) a) The following figure shows a typical duct layout. Design the duct system using equal friction method. Take the velocity of air in the main duct(A) as 8 m/s. Assume dynamic loss coefficient of 0.3 for upstream to downstream airflow and 0.8 for upstream to branch and the elbow. The dynamic loss coefficient for outlets may be taken as 1. Velocity of air from outlets may be taken as 3m/s. Find the FTP required and the amount of dampening required at each outlet. **[12]**



b) List different types of fans used in AHU. Why forward curved blowers are preferred for domestic and commercial air conditioning applications? **[4]**

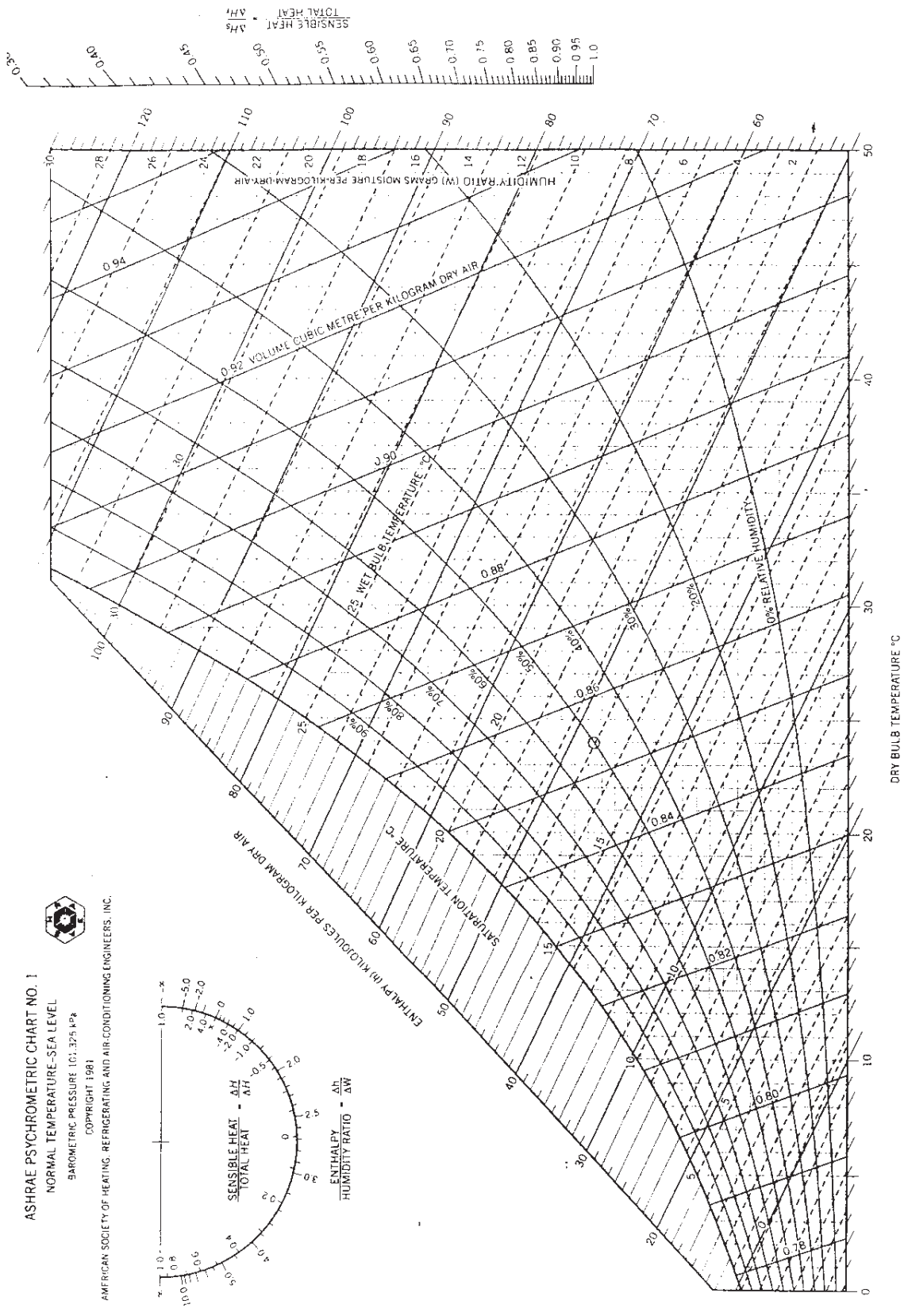
OR

Q10)a) Derive equation for circular equivalence of rectangular duct for the two alternatives **[8]**

i) Velocity of air in both the ducts should be maintained.

ii) Quantity of air flowing through both the ducts should be same.

b) What are the different types of pressure losses in duct systems ? Write a short note on duct friction chart. **[8]**


ASHRAE PSYCHROMETRIC CHART NO. 1
NORMAL TEMPERATURE-SEA LEVEL
BAROMETRIC PRESSURE 101.325 kPa
COPYRIGHT 1981
AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
DRY BULB TEMPERATURE °C
HUMIDITY RATIO (W) GRAMS MOISTURE PER KILOGRAM DRY AIR
ENTHALPY (h) KILOJOULES PER KILOGRAM DRY AIR
SATURATION TEMPERATURE °C
WET BULB TEMPERATURE °C
VOLUME CUBIC METRE PER KILOGRAM DRY AIR
RELATIVE HUMIDITY
SENSIBLE HEAT / TOTAL HEAT = ΔH_s / ΔH_t
ENTHALPY / HUMIDITY RATIO = Δh / ΔW

Total No. of Questions : 10]

SEAT No. :

P3069

[Total No. of Pages : 2

[5059]-556

B.E.(Mechanical Sandwich)

COMPUTATIONAL FLUID DYNAMICS

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

Time :2 ½Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No1 or 2, Q.No3 or 4, Q.No 5 or 6, Q.No7 or 8 ,Q.No 9 or 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logaritmic tables, sliderule, elelectronic pocket calculator is allowed.***
5) ***All questions are compulsory.***

Q1) a) Explain the models used to analyze the fluid flow and state the kind of equations resulting from these models. **[7]**

b) Explain the term substantial derivative along with local derivative and convective derivative and their relevance in the CFD. **[7]**

OR

Q2) a) Give steps used in CFD simulation process to solve any engineering problem. **[7]**

b) Discuss CFD technique as a design tool and research tool **[7]**

Q3) a) What is the need of discretization? State what is consistency in discretization. **[7]**

b) Explain the Lax Windroff technique. **[7]**

OR

Q4) a) Compare the implicit and explicit method of obtaining solution in CFD methodology. **[7]**

b) Explain the stability criteria concept. **[7]**

Q5) a) Explain the Dirichlet and Neumann, and mixed type of boundary conditions. **[7]**

b) Write your brief comments on Lax Windroff& MacCormack techniques. **[7]**

OR

P.T.O.

Q6) Considering an unsteady 2dimensional heat conduction equation as model equation as given below, explain how ADI technique is used to obtain the solution. Also give advantages of ADI techinque. **[14]**

$$\frac{\partial T}{\partial t} = \alpha\left(\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2}\right)\cdots$$

Q7) a) Solve following Tridigonal Matrix system using Thomas algorithm to compute the temperatures **[7]**

$$\begin{bmatrix} 2.25 & -1 & 0 & 0 \\ -1 & 2.25 & -1 & 0 \\ 0 & -1 & 2.25 & -1 \\ 0 & 0 & -2 & 2.25 \end{bmatrix} \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \end{bmatrix} = \begin{bmatrix} 40.8 \\ 0.8 \\ 0.8 \\ 200.8 \end{bmatrix}$$

b) Give example of each type of boundary given below **[7]**

i) NoSlip

ii) Slip wall

iii) Rotating

iv) Symmetry

v) Cyclic boundary

OR

Q8) Explain SIMPLE algorithm used in CFD solutions **[14]**

Q9) a) Write a note on finite volume method. **[7]**

b) Why relaxation techniques are needed in numerical calculations, explain how underrelaxation and over relaxation works in numerical calculations. **[7]**

OR

Q10) Write short notes on any two of the following: **[14]**

a) Monitoring Convergence and solution control

b) Post processing in CFD

c) Use of CFD technique in Aerospace industry.

Total No. of Questions : 10]

SEAT No. :

P1969

[Total No. of Pages : 4

[5059] - 557

B.E. (Mechanical Sandwich Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2012 Pattern) (Elective - I) (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 diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

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

i) Compressible flow machines

ii) Incompressible flow machines

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

i) Pump ii) Fan and Blower

iii) Compressor iv) Turbine

OR

Q2) a) What is Specific Speed? Explain it's significance. **[6]**

b) A small compressor has the following data: **[4]**

Air flow rate = 1.5778 kg/s Pressure Ratio = 1.6

Rotational Speed = 54,000 rpm Efficiency = 85%

State of air at entry: Pol = 1.008 bar, Tol = 300 K, Cp = 1.009 kJ/kg K

Calculate the power required to drive the compressor?

Q3) a) Explain the different components of reciprocating pump with neat sketch. **[5]**

b) The cylinder bore diameter of a single acting reciprocating pump is 150 mm and its stroke length is 300 mm. The pumps runs at 50 r.p.m. and lifts water through a height of 25 m. The delivery pipe is 22 m long and 100 mm in diameter. Find the theoretical discharge and the theoretical power required to run the pump. If the actual discharge is 4.2 liters/s. Find the percentage slip. Also determine the acceleration head at the beginning and middle of the delivery stroke. **[5]**

OR

P.T.O.

Q4) a) Explain the indicator diagram in reciprocating pumps. **[5]**

b) A single acting reciprocating pump has piston diameter 12.5 cm and stroke length 30 cm. The center of the pump is 4 m above the water level in the sump. The diameter and length of suction pipe are 7.5 cm and 7 m resp. The separation occurs if the absolute pressure head in the cylinder during suction stroke falls below 2.5 m of water. Calculate the maximum speed at which the pump can run without separation. Take atmospheric pressure head = 10.3 m of water. **[5]**

Q5) a) Explain the different Mechanical losses in fans and blowers? **[8]**

b) A Centrifugal fan has the following data : **[8]**

Inner diameter of the impeller	18 cm
Outer diameter of the impeller	20 cm
Speed	1450 rpm
The relative and absolute velocities respectively are	
At entry	20 m/s, 21 m/s
At exit	17 m/s, 25 m/s
Flowrate	0.5 kg/s
Motor efficiency	78%

Determine i) Stage Pressure rise ii) Degree of reaction iii) the power to drive the fan

Take density of air as 1.25 kg /m^3

OR

Q6) a) Discuss the various types of fans & blowers. **[8]**

b) A centrifugal blower with a radial impeller produces a pressure equivalent to 100 cm column of water. The pressure and temperature at its entry are 0.98 bar and 310 K. The electric motor driving the blower runs at 3000 rpm. The efficiencies of the fan and drive are 82% and 88% respectively. The radial velocity remain constant and has a value of 0.2 u_2. The velocity at the inlet eye as 0.4u_2. If the blower handles 200 m^3/min of air at the entry condition determine :- **[8]**

i) power required by the electric motor

ii) impeller diameter

iii) Inner diameter of the blade ring

iv) air angle at entry

Q7) a) Explain design procedure & selection, optimization of blower. **[8]**

b) An axial fan stage consisting of only a rotor has the following data **[8]**

Rotor blade air angle at exit	10°
Tip diameter	60 cm
Hub diameter	30 cm
Rotational speed	960 rpm
Power required	1 kW
Flow coefficient	0.245

(Inlet flow conditions P1 = 1.02 bar and T1 = 3.16 K)

Determine the rotor blade angle at the entry, the flow rate, stage pressure rise, overall efficiency, degree of reaction, and specific speed.

OR

Q8) a) What are main cause for noise generation? What are methods for reducing the fan noise? **[8]**

b) The velocities for upstream and downstream of an open propeller fan (d = 50 cm) are 5 and 25 m/s respectively. If the ambient conditions are P = 1.02 bar, t = 37°C determine: **[8]**

i) Flow rate through the fan

ii) Total pressure developed by the fan and

iii) The power required to drive the fan assuming the overall efficiency of the fan as 40%

Q9) a) Explain the terms degree of reaction & slip factor? **[8]**

b) An Axial compressor stage has the following data **[10]**

i)	Temperature and Pressure at Entry	300 K, 1.0 bar
ii)	Degree of Reaction	50 %
iii)	Mean Blade ring diameter	36 cm
iv)	Rotational Speed	18000 rpm
v)	Blade Height at entry	6 cm
vi)	Air angles at rotor and stator exit	25°
vii)	Axial velocity	180 m/s
viii)	Work done factor	0.88
ix)	Stage Efficiency	85 %
x)	Mechanical Efficiency	96.7 %

Determine:- 1) Air angles at the stator and rotor entry 2) The mass flow rate of air 3) The power required to drive the compressor 4) The loading coefficient 5) The pressure ratio developed by the stage 6) Mach number at the rotor entry.

OR

Q10)a) Draw the velocity triangles at the entry and exit for the following axial compressor stage : **[8]**

i) R = ½

ii) R < ½

iii) R > ½

b) Air enters the inducer of centrifugal compressor at Po1 = 1.02 bar, Tol = 335 K. The hub and tip diameters of the impeller eye are 10 and 25 cm respectively. If the compressor runs at 7200 rpm and delivers 5.0 kg/s of air. Determine the air angle at the inducer blade entry and the relative Mach number. If IGVs are used to obtain a straight inducer section, determine the air angle at IGVs exit and the new value of the relative Mach number. **[10]**

Total No. of Questions : 10]

SEAT No. :

P1970

[Total No. of Pages : 3

[5059] - 558

B.E. (Mechanical Engineering-Sandwich)

CAD/CAM AND AUTOMATION

(2012 Pattern) (Elective - I)

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

Instructions to the candidates:

1) ***Answer QNo. 1 OR QNo. 2; QNo. 3 OR QNo. 4; QNo. 5 OR QNo. 6; QNo. 7 OR QNo. 8; QNo. 9 OR QNo. 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) Line A(5,5) B(10,10) is to be rotated about point a by 90° in CW direction and then scaled by 0.5 in *x* and *y* direction about origin find the new position of point A and B of Line after this transformation. **[6]**

b) Explain steps with neat sketches to mirror about line $y = mx+c$. **[4]**

OR

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

b) Compare the curve as Analytical and Synthetic curve and parametric and parametric curves. **[4]**

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

b) Derive the expression for stiffness matrix for 1-D element. **[4]**

OR

Q4) An axial step bar is shown in figure 1. It is subjected to axial pull P of 15 kN. If material of bar is uniform and having a modulus of elasticity as 200 GPa, determine nodal deflection and elemental stresses in each element and reaction force. **[10]**

P.T.O.

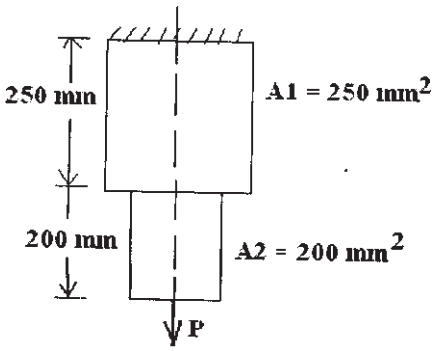


Figure 1

Q5) a) Explain the linear, circular CW and circular CCW interpolation with G code format for above interpolations. **[6]**

b) Write CNC part program for roughing and finishing using canned cycle for turned component as shown in figure. Assume Suitable cutting data. **[12]**

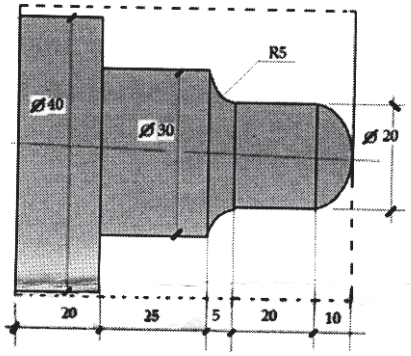


Figure 2

OR

Q6) a) Explain Pocketing cycle for Rectangular pocketing. **[6]**

b) Write CNC part program for Milling the component as shown in figure use concept of sub programming so that depth of cut per pass is 1 mm. Assume Suitable cutting data for feed and depth of cut. **[12]**

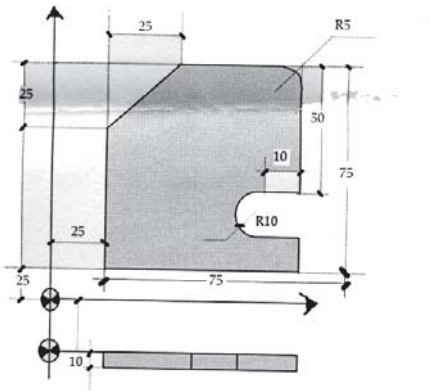


Figure 3

Q7) a) Explain the various steps of preprocessing in Rapid prototyping. **[6]**

b) Explain Fused Deposition Modeling method of rapid prototyping with advantages and limitation. **[10]**

OR

Q8) a) Explain Laminated object manufacturing method of RP. **[12]**

b) Classify various Rapid prototyping Methods. **[4]**

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

b) Explain Magnetic gripper with sketch. **[6]**

OR

Q10)a) Explain the Group Technology layout in comparison to Process layout. **[8]**

b) Compare three types of Automation system. **[8]**

Total No. of Questions :12]

SEAT No. :

P3070

[Total No. of Pages :3

[5059] - 559

B.E. (Mechanical Sandwitch Engineering)

ENERGY AUDIT AND MANAGEMENT

(2012 Course) (Semester - II) (Elective II) (402069 A)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to candidates:

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

Q1) a) Discuss responsibilities of Energy Auditor. **[5]**

b) Explain Energy Management with its principles. **[5]**

OR

Q2) a) State the importance of energy policy in Indian industries. **[5]**

b) Describe Energy and Environment with neat sketch. **[5]**

Q3) a) Discuss world energy scenario in context of natural gas, oil and coal. **[5]**

b) What are the Energy conservation opportunities in Boiler? **[5]**

OR

Q4) a) Write Standard Energy Audit Report Format. **[5]**

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

i) Energy action planning

ii) Energy Security

P.T.O.

Q5) a) What is the NPV of a project, (life 2 year) which requires an investment of Rs. 60000 and yield Rs. 40000 in the 1st year and Rs. 50000 /- in the next year, if the Interest rate is 10%. **[5]**

b) A sum of Rs. 20,000 is deposited in a bank at the beginning of a year. The bank pays 6% interest annually. How much money is in the bank account at the end of the fifth year, if no money is withdrawn? **[5]**

OR

Q6) a) Write Short notes on

i) IRR (Internal Rate of Return) with formula. **[3]**

ii) Time Value of Money **[2]**

b) Calculate net present Value of a project at a discount rate of 16% with an Investment of Rs. 50,000 at the beginning of the first year, & saving of Rs. 23,000 & Rs. 36000 at the end of the first & second year respectively. **[5]**

Q7) a) Calculate the efficiency and Evaporation Ratio of Boiler By direct Method.

i) Type of Boiler : Coal Fired

ii) Quantity Of Steam (Dry) Generated: 8 TPH

iii) Steam Pressure (Gauge) / Temp: 10 Kg/ Cm^2 (G) / 180° C

iv) Quantity of Coal Consumed: 1.6 TPH

v) Feed Water Temperature: 85° C

vi) GCV of Coal: 4000 KJ / Kg

vii) Enthalpy Of Steam At 10 Kg/ Cm^2 Pressure: 665 KJ/Kg (Saturated)

viii) Enthalpy Of Feed Water: 85 Kcal/ Kg **[6]**

b) Energy Performance Assessment Steam Distribution System, Explain with Neat Sketch. **[7]**

OR

Q8) a) List the energy saving opportunities in pumping system. **[7]**

b) Explain the following parameters in the brief. **[7]**

i) Excess air ratio

ii) Stochiometric air quantity

iii) Balanced draught

Q9) a) What are the types of lamps used in lighting system? Write down their features with typical applications. **[7]**

b) The connected load for Bungalow are as below. **[7]**

i) 10 Bulbs of 60w each

ii) 08 Fluorescent tubes of 50w each

iii) 1 old Refrigerator 100 w each

It is decide to replace the bulbs and tubes with 11 CFL of 15w each and old Refrigerator by Energy Efficient Refrigerator 175w.

Considering usage of 08 hrs per day and an electrical tariff of Rs. 4 per kWh. Calculate energy saving of Bulds, Fluorescent tubes and Refrigerator replacement.

OR

Q10)a) Define the terms in short

i) Lux

ii) Ballast

iii) Luminance

iv) Colour rendering index **[8]**

b) Justify why efficiency of Energy efficient motor is motor than conventional motor. **[6]**

Q11)a) Describe concept of cogeneration with sketch. **[6]**

b) Explain the operating principle of a heat pump with examples. **[7]**

OR

Q12)a) What are the direct and indirect benefits of waste heat recovery? **[6]**

b) Explain the operation of an economizer with diagram. **[7]**

Total No. of Questions : 12] **SEAT No. :**

P1971 **[Total No. of Pages : 5**

[5059]-560

B.E. (Mechanical Sandwich Engineering)

OPERATIONS RESEARCH

(2012 Pattern) (End - Semester)

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

Instructions to the candidates:-

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

Q1) a) A firm is engaged in producing two products A and B. Each unit of product A requires 2 kg of raw materials and 4 labour hours whereas product B requires 3 kg of raw material and 3 labour hours. Every week the firm has an availability of 60 kg of raw material and 96 labour hours. One unit of product A sold yields Rs. 40 and one unit of product B sold yields Rs. 35 profit to the firm. How many units of A and B should be manufactured to get. **[4]**

b) Write a note on Dual of LPP. **[4]**

OR

Q2) a) Explain Criterion of Optimism. **[4]**

b) Write note on Decision Making Environments. **[4]**

Q3) a) Solve and optimize following transportation problem to minimize transportation cost. **[8]**

	W1	W2	W3	W4	Supply
F1	2	3	11	7	6
F2	1	0	6	1	1
F3	5	8	15	9	10
Demand	7	5	3	2	

OR

P.T.O.

Q4) Solve following **Maximization** type Assignment problem. **[8]**

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

Q5) Find the Game Value of following problem. **[6]**

B's Strategies

A's Strategies		B1	B2	B3	B4
	A1	–5	16	13	15
	A2	20	–5	60	–70
	A3	–5	9	12	10
	A4	20	2	50	–80

OR

Q6) The initial investment for a project is Rs. 12,000. If the cash inflows during its 5 year period are Rs. 4000, Rs. 5600, Rs. 5000, Rs. 6000, Rs. 5000 respectively, would you accept the project if the maximum desired payback period is 4 years? Assume that money has a value 10%. **[6]**

Q7) a) A manufacture is offered two machines A and B. A is priced at Rs. 2500 and running cost are estimated at Rs. 400 for each of the first five years. increasing by Rs. l00 per year in the sixth and subsequent years. Machine B, which has the same capacity as A cost Rs. 1250 but will have running cost of Rs. 600 per year for six years. increasing by Rs 100 per year thereafter. If money is worth 10% per year. which machine should be purchased? Consider scrap value negligible. **[8]**

b) A stockiest has to supply 12000 units of a product per year to his customer. The demand is fixed and known and the shortage cost is assumed is to be infinite. The inventory holding cost is Rs. 0.2 per unit per month and the ordering cost per order is Rs. 350. Determine EOQ, Time between two orders, minimum total variable yearly cost. **[8]**

OR

Q8) a) The cost of new machine is Rs 5000. The maintenance cost during the n^{th} year is calculated as 500(n-l) where n = 1, 2, 3 ..... If the discount rate per year is 0.05, after how many years will it be economical to replace the machine by a new one? **[8]**

b) A manufacture has to supply his customer 3600 units of his product per year. Shortages are not permitted. Inventory carrying cost amount Rs.1.2/ unit/annum. The set up cost per run is Rs. 80/-. Find EOQ, Optimum no. of order/annum, Variable cost and total cost if cost of each unit is Rs2. **[8]**

Q9) a) Assumes a single channel service system of a library in a school. On an average 10 students visit per hour and book issue rate is 14 students/ hour. Determine **[8]**

i) Probability of librarian being idle.

ii) Probability that at least 4 students in the system.

iii) Expected time that student is in queue

b) Find the sequence that minimizes the total time required for performing the following jobs on three machines in order ABC. Processing time in minute is given below. **[8]**

Jobs →	I	II	III	IV	V
Machine A	8	10	6	7	11
Machine B	5	6	2	3	4
Machine C	4	9	8	6	5

OR

Q10) a) The arrival at telephone booth are consider to be following Poisson Law of distribution with an average time of 9 minutes between one arrival and the next. Length of phone call is assumed to be distributed exponentially with a mean of 3 minutes. Calculate **[8]**

i) Probability that a person arriving at booth will have to wait.

ii) Average length of queue

iii) The telephone department will install a second booth when convinced that an arrival would expect to wait at least 4 minute for the phone, by how much the flow of arrival must be increased in order to justify the second booth.

b) Using Graphical method, determine the minimum time needed to process the two jobs on six machines. The information about the machine sequence and the required by each job on each machine is as below.**[8]**

Job 1	Machine Sequence	A	C	D	B	E	F
	Machining Time (Min)	20	10	10	30	25	15
Job 2	Machine Sequence	A	C	B	D	F	E
	Machining Time (Min)	10	30	15	10	15	20

Q11) a) Explain Monte Carlo Simulation. **[4]**

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

Activity	1-2	1-3	1-4	3-5	4-5	2-6	5-6	5-7	6-8	7-8	8-9
NT	8	5	13	12	6	6	7	9	8	2	6

OR

Q12) a) Explain Goal Programming. **[4]**

b) A small project is composed of scrap activities whose time estimates are listed below. **[12]**

Activities		To	Tm	Tp
I	J			
1	2	1	2	3
2	3	1	4	7
2	4	1	3	5
2	5	1	2	3
3	6	1	2	9
4	7	1	2	3
5	8	2	4	6
6	7	5	7	9
7	9	3	5	7
8	9	2	3	4

i) Draw network diagram, calculate expected time for each activity and find critical path.

ii) Calculate the length and variance of the critical path.

iii) What is the approximate probability that the job on critical path will be completed in 25 days?

Z	1.06	1.66	2.06	2.66
ψ (Z)	0.8554	0.9515	0.9803	0.9961

Total No. of Questions : 10]

SEAT No. :

P1972

[Total No. of Pages : 2

[5059] - 560-A
B.E. (Mechanical-Sandwich)
ROBOTICS
(End Semester) (Elective - II)

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

Instructions to the candidates:

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

Q1) a) Explain SCARA robot configuration. **[5]**

b) Explain sensor selection criteria for robotic applications. **[5]**

OR

Q2) a) What is D-H parameter? Obtain an expression for D-H parameter matrix **[5]**

b) Write a short note on algebraic approach. **[5]**

Q3) a) Explain the following notations used to describe robot system **[5]**

i) LLR

ii) RLR

b) Suggest configuration of robot suitable for following application and justify. **[5]**

i) Spray Painting

ii) Pick & Place

iii) Fastening a screw to car body

OR

Q4) a) What are homogeneous transformation, explain its importance **[5]**

b) Explain properties of Jacobian matrix of a manipulator. **[5]**

P.T.O.

Q5) a) Explain why inverse kinematics is preferred in robotics, explain the advantage of inverse kinematics over other. **[10]**

b) For the vector, V = 25i+10j+20k, Perform a translation by a distance 6 in the X direction, 4 in y direction and 2 in the Z direction **[8]**

OR

Q6) a) Determine the position and orientation of the cup with respect to the gripper. If the position and orientation of the gripper with respect to base co-ordinate frame is given by T_3 and the position & orientation of cup w.r.t the base co-ordinate is given by T_4 **[10]**

$$T_3 = \begin{bmatrix} 1 & 0 & 0 & 10 \\ 0 & 1 & 0 & 15 \\ 0 & 0 & 1 & 20 \\ 0 & 0 & 0 & 1 \end{bmatrix}, \quad T_4 = \begin{bmatrix} 0 & 1 & 0 & 16 \\ -1 & 0 & 0 & -30 \\ 0 & 0 & 1 & 5 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

b) (UVW) is obtained from (XYZ) by rotation of 90° about Z- axis followed by rotation of 90° about X axis . Then (UVW) locates a point P at U = 20, V = 30, W = 40. Determine its co ordinate with respect to (XYZ). **[8]**

Q7) a) Explain different types of controllers used in industrial robots. **[8]**

b) Explain general block diagram of robot control system. **[8]**

OR

Q8) a) Explain Cartesian space trajectory planning. **[8]**

b) What are general considerations in trajectory planning? **[8]**

Q9) a) Describe the elements of the Artificial intelligence. **[8]**

b) Explain the different steps involved in Segmentation. **[8]**

OR

Q10)a) Explain the steps in Image processing & Analysis. **[8]**

b) Explain with neat block diagram of machine vision system. **[8]**

❖ ❖ ❖ ❖

Total No. of Questions :10]

SEAT No. :

P3071

[Total No. of Pages :3

[5059] - 560 - B

B.E. (Mechanical Sandwitch)

TRIBOLOGY

(2012 Course) (Semester - II) (Elective - II) (402069 D)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarithmic tables and electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) State and explain applications and importance of tribology in industries. **[6]**

b) Define friction. Explain basic modes of lubrication. **[4]**

OR

Q2) a) What are the additives. Explain the different types of additives used in lubricating oils. **[6]**

b) What are the methods of controlling wear. **[4]**

Q3) Derive from basic principles two dimensional Reynolds equation taking usual notations. **[10]**

OR

Q4) a) Show that the volume of abrasive wear per unit sliding distance with conical abrasive particles is given by- **[6]**

$$Q = \left[\frac{2k_w \cot \alpha}{\pi}\right]\frac{W}{P}$$ with usual notations

b) Differentiate between long journal bearing and short journal bearing. **[4]**

P.T.O.

Q5) a) State and explain different types of energy losses in hydrostatic bearing. **[8]**

b) State the assumptions and derive expression for flow rate through rectangular slot. **[8]**

OR

Q6) a) A rectangular plate is approaching an oily fixed plane surface with velocity 'V' at the instant, the film thickness is h1, if both the surfaces are separated by a lubricant of viscosity 'μ'. Derive the expression for the time 't' taken to reduce the film thickness from h1 to h2. **[10]**

b) Explain the phenomenon of squeeze film lubrication with example. **[6]**

Q7) a) Explain the phenomenon of Elastohydrodynamic lubrication and state its applications. **[6]**

b) Explain the phenomenon of Hydrostatic and Hydrodynamic bearing with air lubrication. **[10]**

OR

Q8) Using modified Reynold's equation for elastohydrodynamic lubrication, derive Ertel-Grubin equation as- **[16]**

$$\frac{h_o}{R} = 1.19\left(\frac{ELR}{W}\right)^{1/11}\left(\frac{\mu_o U\alpha}{R}\right)^{8/11}$$

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

a) Lubrication in Forging with neat sketches.

b) Surface engineering

c) Porous bearing

d) Foil bearing

OR

Q10) Write a short note on the following (Any Three): **[18]**

a) Tribological aspects of wheel on rail road

b) Hybrid bearing

c) Lubrication in Rolling with neat sketches

d) Selection parameters of coatings

Total No. of Questions : 10]

SEAT No. :

P1973

[Total No. of Pages : 4

[5059] - 561

B.E. (Automobile Engineering)

AUTOMOTIVE REFRIGERATION & AIR CONDITIONING

(2012 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) With the help of T-S diagram, distinguish between wet compression and dry compression. What are disadvantages of wet compression? **[4]**

b) An ice plant produces 30 tons of ice at 0°C per day from water at 0°C. The condensation and evaporation takes place at 20°C and -20°C respectively. There is no under cooling of liquid and vapour drawn by compressor are dry and saturated. C_p of vapour = 1.1 kJ/Kg K. **[6]**

Estimate:

1. Rate of circulation of refrigerant in kg/min
2. Theoretical C.O.P
3. Compressor work if actual C.O.P is 80% of theoretical.

Properties of refrigerants are :

Sat. Temp. °C	h_f (kJ/Kg)	h_g (kJ/Kg)	s_f (kJ/kg K)
20	275	1462	1.043
-20	89.6	1419	0.368

Take heat of fusion of ice as 335 kJ/kg.

OR

Q2) a) Write a short note on Temperature control systems. **[5]**

b) Explain the ideal properties of refrigerants. **[5]**

P.T.O.

Q3) a) Write a short note on Future refrigerants. **[5]**

b) With neat sketch explain Reverse Carnot cycle. **[5]**

OR

Q4) Explain in detailed with neat sketch: **[10]**

a) flow control devices

b) receiver driers & desiccants

Q5) a) Write a short note on : **[8]**

i) By Pass Factor

ii) Sensible heat factor

b) Air at 10°C dry bulb temperature and 90% relative humidity is to be heated and humidified to 35°C dry bulb temperature and 22.5°C wet bulb temperature. The air is preheated sensibly before passing to the air washer in which water is re-circulated. The relative humidity of air coming out of the air washer is 90%. This air is again reheated sensibly to obtain the final desired condition. Find: **[8]**

i) The temperature to which the air should be preheated

ii) The total heating required

iii) The make up water required in the air washer

iv) The humidifying efficiency of the air washer

OR

Q6) a) With neat sketch explain **[8]**

i) Combination of process used in winter air conditioning

ii) Adiabatic mixing of two air streams

b) $300m^3$ of air is supplied per minute from out-door conditions of 40°C dry bulb temperature and 26°C wet bulb temperature to an air conditioned room. The air is dehumidified first by a cooling coil having BPF 0.32 and dew point temperature 15°C and then by a chemical dehumidifier. Air leaves the chemical dehumidifier at 30°C dry bulb temperature. Air is then passed over a cooling coil whose surface temperature is 15°C and BPF 0.26. Calculate the capacities of the two cooling coils and dehumidifier. **[8]**

Q7) a) Write a short note on **[8]**

i) Air conditioning electrical & electronic control.

ii) Outside & inside design consideration for Load Analysis in psychometric.

b) An air conditioned cabin is to be maintained at 27°C dry bulb temperature and 60% relative humidity. The ambient condition is 40°C dry bulb temperature and 30°C wet bulb temperature. The total sensible heat load is 100000kJ/h and the total latent heat load is 40000 kJ/h. 60% of the return air is recirculated and mixed with 40% of make up air after the cooling coil. The condition of air leaving the cooling coil is at 80°C: Determine: **[10]**

i) Room sensible heat factor

ii) The condition of air entering the cabin

iii) The amount of make up air

iv) Apparatus dew point

v) BPF on cooling coil

Show the process on psychometry chart.

OR

Q8) a) The following data supply to an air conditioning system. **[10]**

Room sensible heat = 5.8kW

Room latent heat = 5.8kW

Inside design consideration = 25°C DBT and 50% RH

Outside design consideration=35°C DBT and 28°C WBT

An inside air within the vehicle is mixed with outside air before entering the cooling coil in the ratio 4:1. The coil BPF is 0.1 and ADP is 10°C. The vehicle inside air is again mixed with the air leaving the cooling coil in the ratio 1:4 and the mixture is then allowed to enter the reaheater before being supplied into the vehicle. Determine:

i) Supply air condition to the vehicle cabin

ii) Reheater capacity

iii) Refrigeration capacity of cooling coil

iv) Quantity of fresh air supplied

b) Define: **[8]**

i) Room sensible heat factor

ii) Effective room sensible factor

If a room has a sensible heat gain of 24kW and a latent heat gain of 5.2kW and it has to be maintained at 26°C DBT and 50% RH. 180m^3/min of air is delivered to the room. Determine the state of supply air.

Q9) a) Write a short note on: **[10]**

i) sight glass

ii) refrigerant handling

b) What is system flushing? Explain flushing method. **[6]**

OR

Q10)a) What is system oil? Explain following system oils: **[10]**

i) lubricant

ii) mineral and PAG

iii) polyol ester oil

b) Explain pressure gauge reading and its cycle testing. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P1974

[Total No. of Pages : 2

[5059] - 562
B.E. (Automobile)
AUTOMOTIVE CHASSIS AND SYSTEMS
(2012 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.***

Q1) a) What sprung and unsprung mass? **[4]**

b) Draw and explain layout of steering system in detail. **[6]**

OR

Q2) a) What is need of suspension system? What are its types? **[4]**

b) Explain Ackerman steering linkages. **[6]**

Q3) a) Enlist types of suspension systems used in automobile? **[2]**

b) What are the factors affecting tyre performance? **[8]**

OR

Q4) a) Explain function of dampers in suspension systems? **[2]**

b) Explain in detail Tyre sizes and designation. **[8]**

Q5) a) What are the Functions and requirements of braking system? **[8]**

b) Explain hydraulic brake system and its components? **[8]**

OR

Q6) a) Explain Regenerative brake system. **[8]**

b) Explain Engine exhaust brake. **[8]**

P.T.O.

Q7) a) Explain Electronic stability program system operation? **[9]**

b) What are the latest trends in traffic system for improved road safety? **[9]**

OR

Q8) a) Differentiate active safety and passive safety? **[9]**

b) List out mirrors used in automobile and specify their location? **[9]**

Q9) a) Explain manufacturing processes for chassis? **[8]**

b) What are the causes of chassis failure? **[8]**

OR

Q10)a) Explain Chassis frame in detail? **[8]**

b) Enlist the vehicle components located on the chassis? Write there functions? **[8]**

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Total No. of Questions : 9]

SEAT No :

P2157

[Total No. of Pages : 3

[5059]-563

B.E.(Automobile Engg)

MACHINE AND VEHICLE DYNAMICS

(2012 Course) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) A four cylinder inline engine has firing order 1-4-2-3 and their individul reciprocating masses are 1.5kg. The distance between cranks is 150mm respectively. The crank radius is 60mm and the length of connecting rod is 240mm. The crank rotates at 1800rpm. If the engine is to be in complete primary balance find the magnitude of other forces and couples. **[10]**

OR

Q2) a) Explain over damped, Under damped and critically damped system in brief. **[6]**

b) Write a short note on Spring, mass damper system. **[4]**

Q3) Machine having mass of 4Kg, with spring stiffness 10,000N/m, and damping coefficient 400 N-sec/m. If initial displacement is 2cm and velocity of 20m/s. then,

a) find out equation of motion for the system in terms of time.

b) Find displacment and velocity at 0.01 sec. **[10]**

OR

Q4) a) Explain Magnification factor in brief. **[3]**

b) A mass of 1kg is suspended by a spring passing over the pulley, as shown in fig 1. The system is supported horizontally by spring of stiffness 1 KN/m. Determine the natural frequency of vibration of a system using

P.T.O.

following data:

- Mass of pulley, M=10Kg
- radius of pulley, R=50mm
- Distance of spring from centre of pulley r=35mm **[7]**

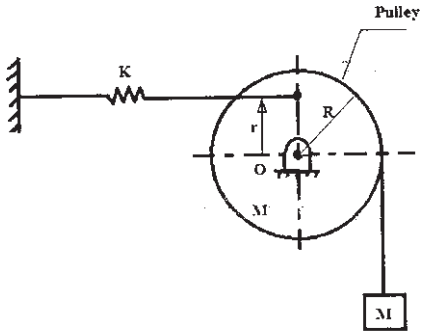

Fig. 1

Q5) a) Differentiate earth fixed co-ordinate system and vehicle fixed co-ordinate system. **[8]**

b) What is the relation between tractive effort and power available from the engine? **[8]**

OR

Q6) a) Explain vehicle loading for following cases (No derivation expected),

i) Vehicle having trailer

ii) Vehicle without trailer

iii) No gradient

iv) Speed is 20 Km/Hr **[8]**

b) Describe the effect of following component on vehicle performance. **[8]**

i) Flywheel

ii) Equivalent mass

iii) DBP

Q7) a) Derive the expression for power limited acceleration to find out tractive effort available at the wheel in terms of engine torque. **[8]**

b) The information of the drive line of passenger car is as follows. **[10]**

Engine Inertia : 1.1N max engine Torque: 210 Nm at 4500 rpm

Transmission Data,	Gear1	Gear2	Gear3	Gear4	Gear5	GearR
Inertia	1.3	0.9	0.7	0.5	0.3	1.5
Ratio	4.18	2.59	1.88	1.46	1.00	6.0

Efficiency : 0.97 for all gears

Final Drive, Inertia : 1.2N Ratio : 2.80 Efficiency : 0.99

Wheel inertia : 12N Wheel radius : 30cm.

From the above data calculate:

i) Effective inertia of the vehicle,

ii) Maximum tractive effort available at wheel

iii) Actual tractive effort available at the wheel for 1st and 3rd gear.

OR

Q8) a) Explain brake factor and brake efficiency in brief. **[8]**

b) Consider a light truck weighing 4500kg applied brake to stop the vehicle from 75Km/hr, which develop brake force 2500N. Determine deceleration, stopping distance, stopping time energy dissipated during braking and power at initial brake point of brake application. **[10]**

Q9) Write a short note on any four from following: **[16]**

a) Mathematical model of ride.

b) Excitation sources for ride.

c) Under steer and over steer.

d) Shock absorber.

e) Constant speed test for vehicle handling.

f) Effects of damping the vibration.

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Total No. of Questions : 10]

SEAT No. :

P1975

[Total No. of Pages : 2

[5059] - 564

B.E. (Automobile Engineering)

FUNDAMENTALS OF COMPUTATIONAL FLUID DYNAMICS

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

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 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 full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain CFD as a third dimension of engineering. **[4]**

b) Explain flow modeling using finite control volume. **[6]**

OR

Q2) a) Derive Navier-stroke equation and its significance. **[6]**

b) Explain crank Nicolson method in brief. **[4]**

Q3) a) Explain body fitted structured grids in detail. **[6]**

b) Explain the need of domain discretization. **[4]**

OR

Q4) Explain implicit approach with one example. **[10]**

Q5) a) Explain solution of first order wave equation by any one scheme. **[8]**

b) Explain significance of CFL number. **[8]**

P.T.O.

OR

Q6) a) Explain solution of convection diffusion system using central difference approach. **[8]**

b) Assess the upwind differencing scheme with different criterias. **[8]**

Q7) a) Explain the steps involved in simpler algorithm with its advantages. **[8]**

b) Explain finite volume method. **[8]**

OR

Q8) a) Explain the need for a staggered grid. **[8]**

b) Describe the pressure correction method. **[8]**

Q9) a) Explain turbulance models in detail. **[8]**

b) Explain preprocessing and solver setting in CFD solution procedure. **[10]**

OR

Q10)a) Explain the selection of physics and fluid properties in detail. **[8]**

b) Explain k-w model equation in detail with its advantages & disadvantages. **[10]**

Total No. of Questions : 8]

SEAT No. : ____

P1976

[Total No. of Pages : 4

[5059] - 565

B.E. (Automobile Engineering)

FUNDAMENTALS OF FINITE ELEMENT ANALYSIS

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

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

Instructions to the candidates:

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

Q1) a) Describe in detail the steps involved in solving structural problem. **[6]**

b) Determine the nodal displacement and support reactions of the axially loaded bar as shown in Figure 1.1. Force P = 100 kN. **[8]**

E_1 = 200 GPa E_2 = 100 GPa

L_1 = 800 mm L_2 = 500 mm

D_1 = 60 mm D_2 = 40 mm

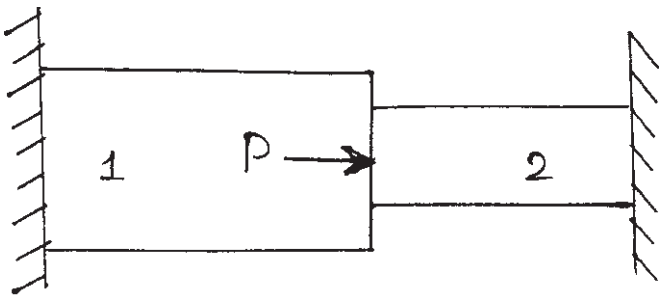


Figure 1.1

c) Using area coordinate derive the shape function for CST element. **[6]**

OR

P.T.O.

Q2) a) Describe in detail the concept of Cholesky's decomposition, and banded skyline solutions to solve the simultaneous equations in matrix from. **[6]**

b) Determine the displacement of nodes 1 and 2 in the spring system shown in Figure 2.1. Use minimum potential energy principle to assemble equation of equilibrium. **[8]**

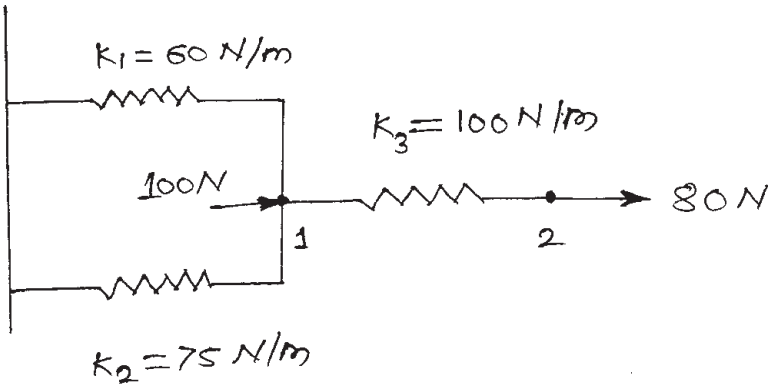


Figure 2.1

c) Evaluate the shape function N_1, N_2 and N_3 at the interior point P for the triangular element shown in Figure 2.2 **[6]**

Table 2.1

Point	X-Coordinate	Y-Coordinate
1	1.5	2
2	7	3.5
3	4	7
P	3.85	4.8

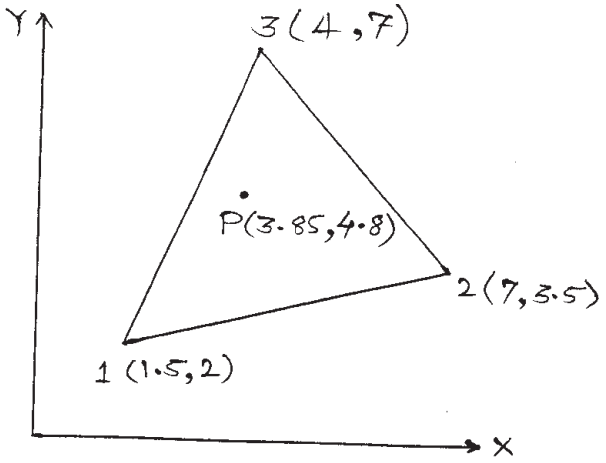


Figure 2.2

Q3) a) Explain the terms iso-parametric, sub-parametric & super-parametric, Jacobian matrix. **[8]**

b) Evaluate the integrals using two point and three point Gaussian quadrature. Also find the exact solution. **[10]**

$$I = \int_{-2}^{3} [x^2 + 11x - 32]dx$$

OR

Q4) a) Explain Newton-Cotes and Gauss quadrature in brief. **[8]**

b) Determine the element stresses, assume the plane stress condition. Let E = 210 GPa, ν = 0.25. Assume the element nodal displacements have been determined to be $u_1 = 0$, $v_1 = 0.05$ mm, $u_2 = 0.025$, $v_2 = 0$, $u_3 = 0$ and $v_3 = 0.05$. **[10]**

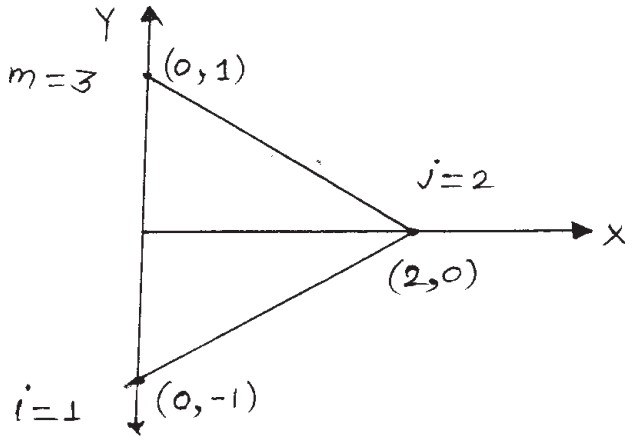
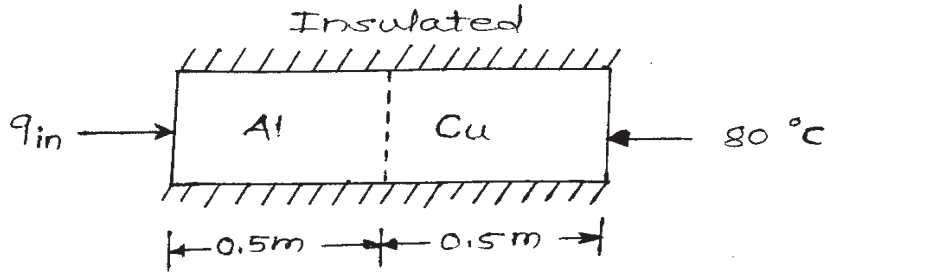


Figure 4.1

Q5) a) Formulate the one - dimensional heat transfer equations using a variational method. **[8]**

b) Using finite element with two elements, find out the temperature distribution with in the rod. **[8]**



$K_{al} = 200$ W/m°C $K_{cu} = 389$ W/m°C

Figure 5.1

OR

Q6) The fin shown in Figure 6.1 is insulated on the perimeter. The left end has a constant temperature of 100°C. A positive heat flux of q_2 = 5000W/m^2 acts on the right end. Let K_{xx} = 6 W/m°C and cross-sectional area A = 0. 1m^2. Determine the temperatures at L/4, L/2, 3L/4, and L; where L = 0.4m.**[16]**

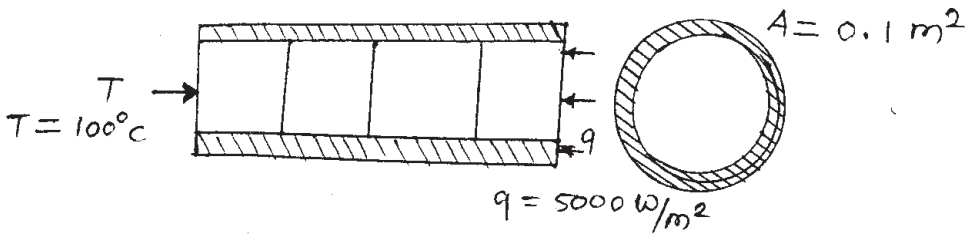


Figure 6.1

Q7) a) Explain the difference between lumped mass matrix and consistent mass matrix. **[8]**

b) For the bar shown in Figure 7.1 with length L, modulus of elasticity E, mass density ρ, and cross sectional area A, determine the first two natural frequencies using lumped mass matrix. **[8]**
Given: L = 2.5m, ρ = 7850kg/m^3, E = 210 GPa.

$$[m^e] = \frac{\rho AL}{2}\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

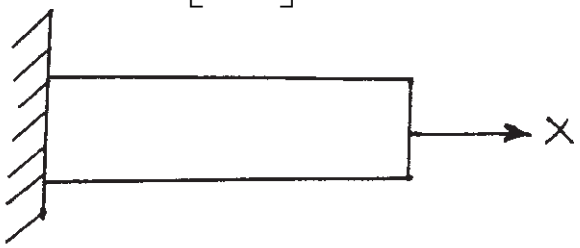


Figure 7.1

OR

Q8) a) Types of error in FEA & explain mesh refinement used in adaptive mesh refinement process. **[8]**

b) Obtain the expression for the first non-zero natural frequency of vibration for a uniform free-free (both ends free) rod by FEM with two elements & consistent mass matrix. **[8]**

$$[m^e] = \frac{\rho AL}{6}\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

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Total No. of Questions : 10]

SEAT No. :

P1977

[Total No. of Pages : 4

[5059]-566
B.E. (Automobile)
CAE & AUTOMATION
(2012 Pattern) (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 and Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) A circle is passing through two end point A (6,4) and B(10,10) where AB is the diameter of the circle. Find the co-ordinates of centre point, radius and parametric equation of circle. Find the co-ordinates of points on the circle $\theta = 30^o$ and $\theta = 90^o$. **[6]**

b) Explain, with neat sketches, the following two dimensional mapping and obtain the mapping matrices. **[4]**

i) Translational mapping

ii) Rotational mapping

OR

Q2) a) Calculate the concatenated transformation matrix for following operations performed in the sequence given below. **[6]**

i) Translation by 4 & 5 units along X & Y axes respt.

ii) Change of scale by 2units in X direction & 4units in Y direction.

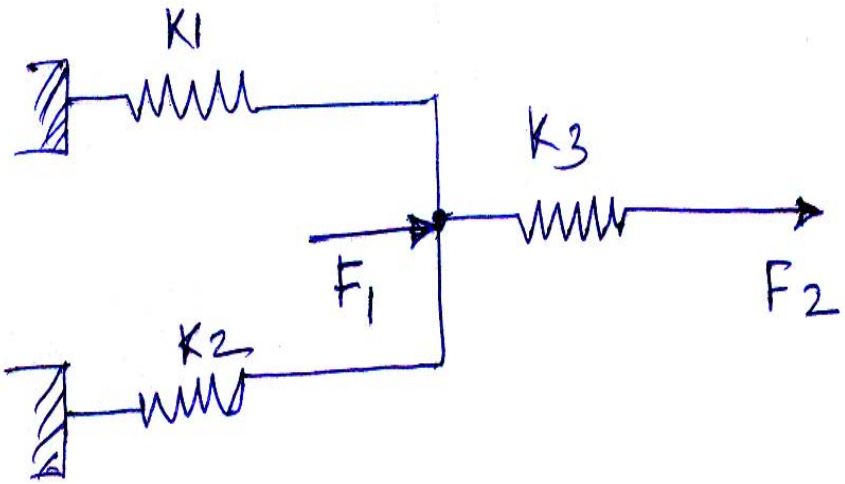
What is the effect of the transformation on Δ ABC having vertices A(4,4), B(8,4) and C(6,8)?

b) State the advantages & limitations of surface modelling. **[4]**

P.T.O.

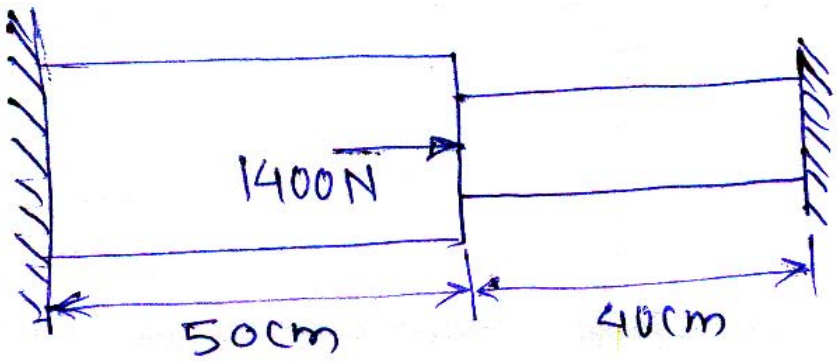
Q3) a) What is the significance of homogenous co-ordinates in geometric transformation? **[4]**

b) A three spring system, shown in figure, has stiffnesses K_1 = 40 N/mm, K_2 = 50N/mm & K_3 = 80N/mm. The load applied are F_1 = 100N and F_2 = 50N using Finite element method, calculate the displacement of nodal points. **[6]**



OR

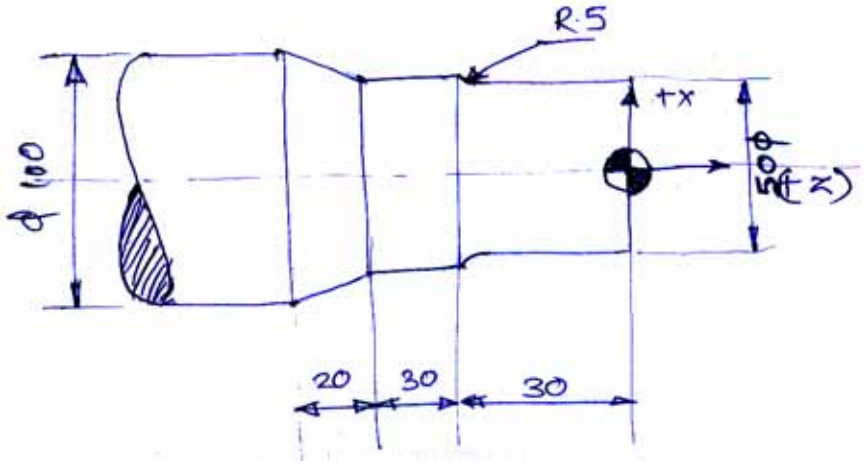
Q4) Calculate deflection at nodes and stress, strain in member of the structural system shown in figure E = 20×10^6 N/cm^2. Use elimination approach. **[10]**



A1 = 10 cm^2

A2 = 5 cm^2

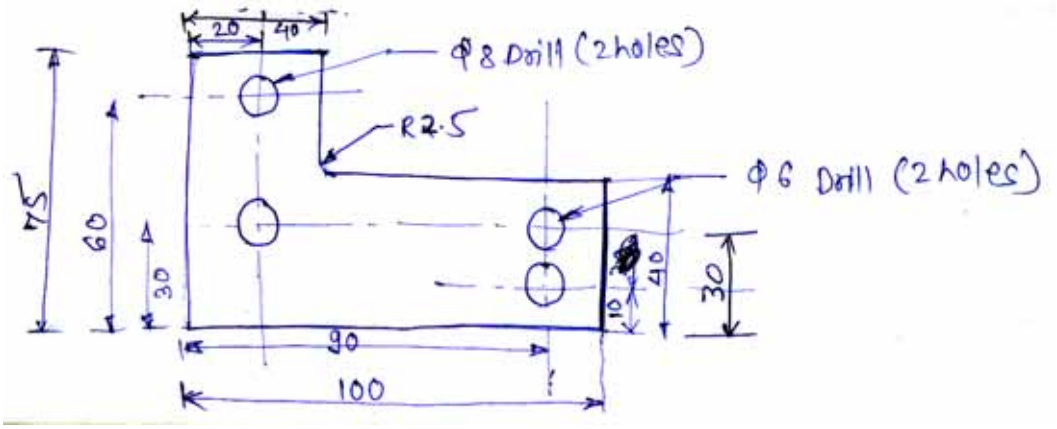
Q5) a) Write a manual part program for finishing a forged component as shown in fig. Assume speed & feed on the turning centre are 400 rpm and 0.35 mm/revolution respectively. Assume 1mm material is to be removed radially from external diameter (Raw material - MS $\phi 100 \times 80$mm) **[12]**



b) Explain the concept of CIM. **[6]**

OR

Q6) a) Write a manual part program for drilling & milling an L bracket as shown in fig. Assume a 5mm diameter milling cutter and necessary drill size for drilling operation. The tool position in the Z direction is manually controlled. Feed rate 480 mm/min & spindle speed 1600rpm. **[12]**



b) Explain the steps in NC manufacturing. **[6]**

Q7) a) Following table shows the operations required to complete the respective parts. **[8]**

Part	1	2	3	4	5	6	7	8
Operations Required	1,3	2,4	1,3	2	1,3	2,4	5,6	5,6

Prepare the part-operation incidence matrix and group the parts with respect to operations required to complete the respective parts.

b) What is FMS? With the help of neat sketch, explain the different elements of FMS. **[8]**

OR

Q8) a) Write a short note on : **[8]**

i) AGV pallet truck

ii) AGV fork lift trucks

iii) AGV unit load vehicles

iv) AGV assembly line vehicles

b) What is automation and explain different types of automation. **[8]**

Q9) a) Write short notes on different types of grippers used in Robot with neat sketch. **[8]**

b) Describe end effectors in details. **[8]**

OR

Q10)a) Explain degrees of freedom for Robot with neat sketch. **[8]**

b) Explain the following terms related to Robots. **[8]**

i) Work volume

ii) Accuracy & repeatability

iii) Wrist motion

iv) Control resolution

Total No. of Questions : 10]

P1978

SEAT No. :

[Total No. of Pages : 2

[5059]-567
B.E. (Automobile) (Semester - I)
HYBRID & FUEL CELL VEHICLES
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Describe the Regenerative Braking in a Hybrid Vehicle with neat sketch. Also give the advantages of the same. **[8]**

b) Explain the configuration and operating modes of Parallel Hybrid Electric Vehicle. **[8]**

OR

Q2) a) Which are the vehicle performance parameters that are used to predict the fuel economy of an vehicle? Discuss each one in brief. **[8]**

b) What is mean by Hybrid Architecture? Give the types of Hybrid Electric Vehicles with its layout. **[8]**

Q3) Enlist the various applications of the Electric Vehicle. **[4]**

OR

Q4) With neat sketch explain the working of Synchronous motor. **[4]**

Q5) a) Enlist the different types of the batteries used for the Automotive application. Explain any one of them in detail. **[8]**

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

i) Battery Ratings

ii) Battery Parameters

P.T.O.

OR

Q6) a) What are the advantages of the Alkaline batteries over the conventional Lead acid batteries. **[6]**

b) Write a note on Nickel Metal Hydrid Batteries. **[6]**

c) Describe the matching of Electric Drive & ICE. **[4]**

Q7) a) Give the Comparison of five popular Fuel Cell Technologies. **[9]**

b) Describe the Alkaline Fuel Cell in detail. **[9]**

OR

Q8) a) Describe the Phosphoric Acid Fuel Cell in detail. **[9]**

b) Enlist the Applications, Advantages & Disadvantages of the Fuel Cells. **[9]**

Q9) a) Write a note on Accumulator. Describe the Spring Loaded Accumulator with neat sketch. **[8]**

b) Give the symbolic representation of various types of hydraulic motors. **[4]**

c) Enlist the different types of Separator Accumulators. Explain any one of them in brief. **[4]**

OR

Q10) a) With neat sketch explain the construction and working of External Gear Motor. **[8]**

b) A hydraulic motor has a volumetric displacement of 123 cm^3, operating at a pressure of 60 bars and speed of 180 rpm. If the actual flow rate consumed by the motor is 0.004 m^3/sec and the actual torque delivered by the motor is 100 N.m. Find the Volumetric, Mechanical and Overall Efficiency. Also determine the actual power delivered by the motor. **[8]**

Total No. of Questions : 12]

SEAT No. :

P1979

[Total No. of Pages : 2

[5059]-568
B.E. (Automobile)
AUTOMOTIVE MATERIALS
(2012 Pattern) (Semester - I) (Elective - II)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Assume suitable data, if necessary.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Your are advised to attempt not more than 6 questions.***

Q1) a) Explain significance of material property chart and its application for material selection. **[3]**

b) Explain selection criteria for bending & twisting with application in automobiles. **[3]**

OR

Q2) a) Write down the difference between bending & twisting. **[3]**

b) Draw material property chart for modulus fracture and explain in detail. **[3]**

Q3) a) Explain in brief about MEMS materials. **[4]**

b) What are the applications of super conductors & justify the answer. **[4]**

OR

Q4) a) Write down the difference between soft & hard magnetic materials? **[4]**

b) Write a short note on Nano materials. **[4]**

Q5) a) Give the applications of ceramic materials in automobile. **[3]**

b) Explain the different types of plastics with there their applications. **[3]**

OR

Q6) a) What are the characteristics of ceramic materials? **[3]**

b) Explain the characteristics of composite materials. **[3]**

Q7) a) Explain in detail conversion coating with example. **[8]**

b) Explain thermal facing with help of neat sketch & also write advantages & disadvantages. **[8]**

OR

Q8) a) Explain the difference between case hardening & hard facing. **[8]**

b) Explain in detail vapour deposition & diffusion coating. **[8]**

P.T.O.

Q9) a) Explain composition of Nano crystalline material. **[8]**

b) Explain the applications of smart materials in automobiles. **[8]**

OR

Q10)a) Explain in brief about shape memory alloy. **[8]**

b) Explain the modern material metallic glass with its advantages & applications for automotive purpose. **[8]**

Q11)a) Write applications of non metallic material composite for automotive purpose. **[9]**

b) Write the applications of non-metallic material polymer for automotive purpose. **[9]**

OR

Q12)a) Explain the material selection criteria for piston & justify the answer. **[9]**

b) What is the selection criteria for the automotive material & give example for crank shaft. **[9]**

Total No. of Questions : 10]

SEAT No. :

P1980

[Total No. of Pages : 2

[5059]-569

B.E. (Automobile) (Elective - II)

AUTOMOTIVE HYDRAULIC AND PNEUMATICS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer five questions.***
2) ***Figures to the right indicates full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain basic components of Hydraulic and pneumatic system. **[6]**

b) Explain flared fittings. **[4]**

OR

Q2) a) Explain different seals used in hydrallic. **[6]**

b) Describe construction and working of vane pump. **[4]**

Q3) a) A hydralic pumps delivers 12 lit of fluid per minute against a pressure of 200 bar calculate **[4]**

i) Hydraulic power

ii) Overall pump efficiency

b) Draw and explain tondem cylinder. **[6]**

OR

Q4) a) Explain advantages and disadvantage of poppet valve. **[4]**

b) Draw graphical symbol for **[6]**

i) Shuttle valve

ii) Telescopic cylinder

iii) Four way DCV

Q5) a) A hydraulic system consists of two cylinders the cylinders required to be operated as per following sequence. **[8]**

i) Cylinder ‘A’ extends

ii) Cylinder ‘B’ extends

iii) Cylinder ‘A’ retracts

iv) Cyclinder ‘B’ retracts

Develop a hydraulic circuit for above requirements.

b) With the help of neat sketch explain pump unloading circuit. **[8]**

P.T.O.

OR

Q6) a) Explain hydraulic clamping circuit using pressure sequencing valve. **[8]**

b) Analyse the given circuit. **[8]**

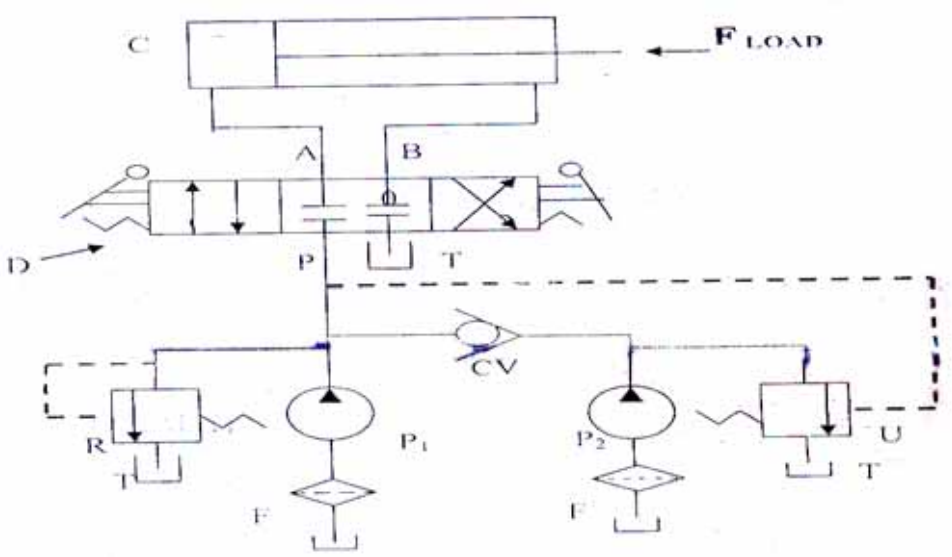


Fig.(1)

Q7) a) Classify compressor based on operating principal and name two types of dynamics air compressor that are commonly used in industry. **[8]**

b) Two cylinders hydraulic system operated in following sequence. cylinders A and B extends and cylinder A and retracts sequencially develop pneumatic circuit using poilet operated 4/2 DCV and roller operated valve. **[8]**

OR

Q8) a) Draw the pneumatic circuits consisting of following components

i) Shuttle valve

ii) Quick exhaust-valve

Draw the seperate circuit and explain their working **[8]**

b) Write shorts notes on 'lubrications mufflers and dryers for pneumatics system. **[8]**

Q9) a) Draw and explain power steering circuits used in air. **[10]**

b) Explain the construction and working of bladder type accumulator. **[8]**

OR

Q10)a) Discuss accumulator used as shock absorver. **[8]**

b) Discuss clutch actuating system used in automobile applications. **[10]**

Total No. of Questions : 9]

SEAT No. :

P1981

[Total No. of Pages : 2

[5059]-570
B.E. (Automobile) (Semester - II)
VEHICLE PERFORMANCE AND TESTING
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

Figures to the right side indicate full marks.

Q1) a) Enlist the different vehicle performance parameter and explain in briefly. **[5]**

b) Draw the simple layout of EGR system and Explain effect of EGR on vehicle performance. **[5]**

OR

Q2) a) What is function of catalytic converter? Enlist types of catalytic converter. **[5]**

b) Explain tyre wear pattern in details. **[5]**

Q3) a) What are the causes and remedies of transmission noise? **[5]**

b) Enlist the types of testing track and write the technical specification of each track. **[5]**

OR

Q4) a) Explain chassis dynamometer with help of neat sketch. **[5]**

b) Compare laboratory test and on road test. **[5]**

Q5) a) Draw the layout of adaptive cruise control system and explain the working. **[8]**

b) Explain the concept of driver information system and its advantages. **[8]**

OR

Q6) a) Define active safety and passive safety with four examples of each. **[8]**

b) What are the ergonomics considerations for the driver and passenger safety? **[8]**

P.T.O.

Q7) a) What is crash testing? Explain the dummies use in crash testing. **[10]**

b) What is mean by Data acquisition system? Explain with the help of neat sketch. **[8]**

OR

Q8) a) Explain the different types of impact test with the help of neat sketch. **[10]**

b) What is need of vehicle testing and enlist the different vehicle testing. **[8]**

OR

Q9) Write short note:(any four) **[16]**

a) Noise. vibration and Harshness.

b) Wind tunnel Testing.

c) Engine noise.

d) Transmission noise.

e) Effect of suspension system on vehicle performance.

Total No. of Questions : 10]

SEAT No. :

P1982

[Total No. of Pages : 3

[5059]-571
B.E. (Automobile Engineering) (Semester - II)
AUTOMOTIVE SYSTEM DESIGN
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve question 1 or 2, 3 or 4, 5or 6, 7 or 8, 9or 10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Use electronic pocket calculator.***
5) ***Assume suitable data if necessary.***

Q1) a) Answer the followings: **[2 × 3 = 6]**

i) What causes the clutch to slip?

ii) What are the drawbacks with metallic lining?

iii) Why centrifugal clutch is more suitable for heavy duty applications.

b) What are the advantages of increasing the number of gear ratio steps in automobile gearbox? **[4]**

OR

Q2) a) A centrifugal clutch is to be designed to transmit 20HP at 900 rpm. The shoes are four in number. The speed at which the engagement begins is $\frac{3}{4}^{th}$ of the running speed. The inside radius of the pulley rim is 15 cm. The shoes are lined with ferodo for which the coefficient of friction may be taken as 0.25, Determine: **[6]**

i) Weight of the shoes.

ii) Size of the shoes.

b) Explain gear boxes with different speed gears. **[4]**

Q3) a) A four speed gear box is to be constructed for providing the ratio's of 1,1.46,2.28 and 3.39 to 1 as nearly as possible .the diametric pitch of each gear is 3.25mm and the smallest pinion is to have at least l5teeth .determine the suitable number of the different gears. **[6]**

b) Explain the selection of gearboxes bearing in gearboxes **[4]**

P.T.O.

OR

Q4) Solve Any Two **[2 × 5 = 10]**

a) Why tubular section propeller shaft is normally used

b) What are the merits of cross type joint?

c) Explain the general design procedure of front axle.

Q5) 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 4 cm^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 followings:**[16]**

a) Front to rear brake ratio

b) Total force ratio

c) Distance moved by output

d) Cylinder movement ratio

e) Total movement ratio.

OR

Q6) Solve Any Four **[4 × 4 = 16]**

a) Properties of friction lining.

b) Brake fade.

c) Brake torque.

d) Components used in hydraulic brake system.

e) Why is disc brake preferred for front wheel and the drum brake for rear wheel.

Q7) a) A vehicle spring of semi elliptic type has leaves of 75 mm width and 10 mm thickness, effective length is 900 mm. If the stress is not to exceed 220725 kPa, when the spring is loaded to 4905 N, estimate the required number of leaves and the deflection under this condition. If the spring is just flat under load, what is the initial radius take E=196.2x 106 kPa. **[12]**

b) Discuss general design considerations of suspension system. **[6]**

OR

Q8) Solve Any three. **[3 × 6 = 18]**

a) What is nipping in leaf spring? Write a note on air spring

b) Define -

i) camber angle

ii) Scrub radius

c) 'What are the characteristics of over —steer and under steer?

d) State and explain any one steering gear Mechanism.

Q9) A tensile bar of length 200mm is subjected to the constant tensile force of 5000N.Design the bar with the objective of minimizing the material cost, out of the following materials: **[16]**

Consider factor of safety is 1.

Material	Mass Density ρ Kg/m^3	Material cost Per Unit Mass C,Rs/kg	Yield strength S_{yt} N/mm^2
plain Carbon Steel	7500	16	130
Aluminum Alloy	3000	32	50
Titanium Alloy	4800	480	90
Magnesium Alloy	2100	32	20

OR

Q10) Solve any Four: **[16]**

a) Discuss 'Adequate and optimum Design'.

b) Explain aspects of Aesthetic Design

c) Define Mechanical reliability

d) Write note on statistical considerations in design

e) Significance of free variable, and constrained variable in Johnson's method of optimum design.

Total No. of Questions : 10]

SEAT No. :

P2158

[Total No. of Pages : 2

[5059]-572

B.E.(Automobile Engineering)

AUTOMOTIVE NVH

(2012 Course)(Elective-III)(Semester-VIII) (416498 A)

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) ***Figures to the right side indicat full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of logarithmic tables, sliderule, electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What is of noise, vibration and harshness and role in vehicle design? **[6]**

b) What are the causes of noise and vibration in vehicle? **[6]**

OR

Q2) a) What are the advantages and disadvantages of noise and vibration? **[6]**

b) What are the different Physiological effect of NVH? Explain remedies for it. **[6]**

Q3) What are the types of vibration? Explain any two in details. **[8]**

OR

Q4) Explain mathematical model. Draw the mathematical model for car. **[8]**

Q5) a) What are the types of sound propagation? Effects of reflecting surfaces on sound propagation. **[10]**

b) Explain mechanism of hearing loudness in details. **[8]**

OR

Q6) a) Draw the Anatomy of Human Ear and explain Mechanism of hearing. **[8]**

b) Derive the equation that shows relation between sound power, sound intensity and sound pressure level. **[10]**

P.T.O.

Q7) a) Explain pass by noise test with the help of neat sketch. **[8]**

b) Explain Fast Fourier Transform with neat sketch. **[8]**

OR

Q8) 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]**

Q9) Write a short note(Any four): **[16]**

a) Transmission noise

b) Aerodynamics noise

c) Tyre noise

d) Noise control methods

e) Vibration control Techniques.

OR

Q10)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]**

Total No. of Questions : 10]

SEAT No. :

P1983

[Total No. of Pages : 2

[5059]-573
B.E. (Automobile) (Semester - II)
OFF ROAD VEHICLES
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer FIVE questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data jf necessary.***

Q1) a) What is an off road vehicle? Give the construction layout of an off road vehicle. **[4]**

b) Write down the applications of off road vehicles based on the capacity in Indian industries. **[6]**

OR

Q2) a) Give the applications of dozer. **[4]**

b) Explain the construction and working of any power plant used in road construction. **[6]**

Q3) a) Explain the construction and working of dipper shovel. **[4]**

b) Explain the construction and working of dragline with a neat sketch. **[6]**

OR

Q4) a) Explain the construction layout of a scraper with a neat sketch. **[4]**

b) Differentiate between crawler mounted tractors and wheel mounted tractors. **[6]**

Q5) a) Distinguish between Continuous running drive P.T.O and Independent drive P.T.O. **[8]**

b) Explain with a neat sketch disc plough & rotary plough. **[8]**

P.T.O.

OR

Q6) Explain any Two **[16]**

a) Design Aspects of Dumper body

b) Types of Farm Equipments with neat sketch.

c) Gun carriers.

d) Pulverizers& rollers.

Q7) a) Explain OCDB and dry disc calliper brake system of vehicle with neat sketch. **[8]**

b) Describe the hydraulic components of the system in Off-road vehicles with neat sketch. **[8]**

OR

Q8) a) Explain Power steering system of vehicle in brief. **[8]**

b) What are the safety features and safe warning systems in Dumpers? **[8]**

Q9) a) Explain the Layers of soil diagramatically with all horizons. **[10]**

b) Discuss the types of soils with its characteristics. **[8]**

OR

Q10) Explain any Three. **[18]**

a) Mean maximum Pressure.

b) Mobility Index (MI).

c) Vehicle Cone Index (VCI) and Rated Cone Index (RCI).

d) Soil Properties (Minimum 5 Properties).

Total No. of Questions : 10]

SEAT No. :

P3072

[Total No. of Pages : 2

[5059]-574

B.E.(Automobile)

ALTERNATIVE FUELS AND EMISSION CONTROL

(2012 Course)(Semester-II)(End Sem.)(Elective-III)(416497C)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) How SI and CI engine fuels are rated? **[4]**

b) Discuss fuel additives for SI and CI engines. **[6]**

OR

Q2) a) Explain storage, handling and dispensing process of Hydrogen? **[6]**

b) Write a note on CNG 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

Q4) a) Write note on alcohol as fuel for IC engine **[4]**

b) Explain Syngas with its properties, advantages, disadvantages & handling? **[6]**

Q5) a) What is charcoal canister control for evaporative emission control? **[8]**

b) Describe the sources and causes of soot and particulet formation? **[8]**

OR

P.T.O.

Q6) a) What is positive crankcase ventilation? Explain? **[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 exhaust gas recirculation is used in automobile engines, explain effects of exhaust gas recirculation on emission? **[8]**

b) Explain Chemical delay, intermediate compound formation& pollutant formation on incomplete combustion? **[8]**

Q9) Write a note on:

a) Explain the remedies for engine emission. **[6]**

b) Indian emission norms. **[6]**

c) Ambient air quality monitoring **[6]**

OR

Q10)a) Effect of NOx emission on human as well as on environment. **[9]**

b) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? **[9]**

Total No. of Questions : 10]

SEAT No. :

P1984

[Total No. of Pages : 2

[5059]-575
B.E. (Automobile) (Elective - IV)
TRANSPORT MANAGEMENT AND MOTOR INDUSTRIES
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Detail out responsibility of driver in case of accident. **[5]**

b) State particulars that have to be collected for the purpose of preparing a accident report. **[5]**

OR

Q2) a) Write offences related to license and corresponding penaulty. **[6]**

b) Explain motor vehicle act. **[4]**

Q3) a) Why road tax is levied on vehicle. **[5]**

b) Who are the exempted from tax payment & why? **[5]**

OR

Q4) a) Explain types of motor vehicle insurance. **[5]**

b) What are duties of surveyor and loss assessor. **[5]**

Q5) a) State four functions of an automobile engineer in running transport organisation. **[8]**

b) Differentiate between state transport (MSRTC) & private bus services. **[8]**

OR

Q6) a) State the purpose and function of ARAI. **[8]**

b) Write advantages and disadvantages of LPG. **[8]**

Q7) a) Explain the basic element of transport system. **[8]**

b) State which record are essential in transport organisation. **[8]**

P.T.O.

OR

Q8) a) What are the rules for import, transport and storage of petrolium. **[8]**

b) What are the emission standards prescribed under the M.V. rules to control pollution. **[8]**

Q9) a) Explain the stages in history and development of motor industry in India. **[10]**

b) Write short note on alternative fuel for vehicle. **[8]**

OR

Q10) a) Explain various research organisation in motor industry. **[10]**

b) Write short note on global position system. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1985

[Total No. of Pages : 4

[5059]-576
B.E. (Automobile Engineering)
OPERATION RESEARCH
(2012 Pattern) (Semester - VIII) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Logarithmic tables, Sliderule, Electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) Solve the following LPP by Simplex Method **[10]**

Max $Z = 30X_1 + 20X_2$ Subjected to the following constraints

$30X_1 + 20X_2 \leq 1500$

$X_1 + X_2 \leq 1000$

OR

Q2) Solve the following assignment problem to minimize the total cost of production. **[10]**

Machines

Jobs

	A	B	C	D
I	5	7	11	6
II	8	5	9	6
III	4	7	10	7
IV	10	4	8	3

Q3) Solve the following Transportation Problem involving three sources and four destinations. The cell entries represents the cost of transportation per unit. Obtain solution by VAM Method. Find optimum solution by using MODI Method. **[10]**

Destinations

Sources

	A	B	C	D	Supply
1	3	1	7	4	300
2	2	6	5	9	400
3	8	3	3	2	500
Demand	250	350	400	200	

P.T.O.

OR

Q4) a) Define Operation Research? Also discuss the scope of OR. **[6]**

b) Why Transportation Model is used in industries? **[4]**

Q5) a) A project Schedule has the following characteristics. **[12]**

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.

b) Enlist the different types of the floats. Explain each one in short. **[4]**

OR

Q6) a) There are five jobs each of which must go through two machines A and B in the order AB. Processing times are given below. Determine a sequence for five jobs that will minimize the elapsed time and also calculate ideal time. **[10]**

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

b) Explain the graphical procedure for processing of Two jobs through M machines. **[6]**

Q7) a) Explain the general structure of the following Queuing service system. **[8]**

i) Single service facility

ii) Multiple parallel facilities with single queue

iii) Multiple parallel facilities with multiple queues

b) A self service store employs one cashier at its counter. Nine customers arrive at an average every 5 min. While the cashier can serve 10 customers in 5 minutes. Assuming poisson distribution for arrival rate and exponential distribution for service time, find: **[8]**

i) Average number of customers in the system.

ii) Average number of customers in the queue or Average queue length.

iii) Average time a customer spends in the system.

iv) Average time a customer waits before being serviced.

OR

Q8) a) Solve following 2 × 5 game by graphical method and find the optimum strategies and value of the game. **[10]**

		Player B				
		1	2	3	4	5
Player A	1	-5	5	0	- 1	8
	2	8	-4	- 1	6	-5

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

i) Player

ii) Strategy

iii) Saddle Point

iv) Maximin & Minimax

Q9) a) A firm is thinking of replacing a particular machine whose cost price is Rs. 12,200. The scrap value of the machine is Rs. 200. The maintenance costs are found to be as follows. **[10]**

Year	1	2	3	4	5	6	7	8
Maintenance Cost	220	500	800	1200	1800	2500	3200	4000

Determine when machine should get replaced?

b) Explain how the theory of replacement is used in following problems: **[8]**

i) Replacement of items that fail completely

ii) Replacement of items whose maintenance cost varies with time.

OR

Q10)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) Find the cost of the individual replacement policy of an installation of 300 bulbs, given the following: **[8]**

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

Total No. of Questions : 10]

SEAT No. :

P1986

[Total No. of Pages : 3

[5059]-581
B.E. (Electrical Engineering) (Semester - I)
POWER SYSTEM OPERATION AND CONTROL
(2012 Pattern) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

SECTION - I

Q1) a) Draw and explain the loading capability curve of a synchronous generator. **[5]**

b) Explain the concepts of steady state, transient, dynamic stability? **[5]**

OR

Q2) a) Enlist the reasons for reactive power control. **[5]**

b) Explain TCSC in details with different operating modes. **[5]**

Q3) a) Explain the equal area criterion of transient stability studies for sudden rise in mechanical input. **[8]**

b) Explain the use of synchronous machine for reactive power generation. **[2]**

OR

Q4) Explain the working of any Two of FACTS devices **[10]**

a) SVC

b) STATCOM

c) UPFC

Q5) a) Explain the necessity of automatic generation control. Also explain the concept of control error in case of single area and two area case. **[6]**

b) Explain with block diagram and frequency response, proportional plus integral load frequency control of single area case for exact model. **[10]**

P.T.O.

OR

Q6) a) With neat block diagram and response, explain two area load frequency control. **[10]**

b) Explain the droop characteristic of speed governor system. **[6]**

Q7) a) Using priority list method, prepare unit commitment table for three thermal generating units, for load values such as 400 MW, 600MW and 900MW.**[6]**

The Incremental fuel cost of three thermal units and other details are as follows;

IC1= (0.0035*P1 + 6) * 10^3 k-cal/MW-hr

IC2= (0.0025*P2 + 6.5) *10^3 k-cal/MW-hr

1C3= (0.0045*P3 + 7)* 10^3 k-cal/MW-hr

The minimum and maximum generation limits are

50MW $\leq$ Pl $\leq$ 500MW

40 MW $\leq$ P2 $\leq$ 400MW

20MW $\leq$ P3 $\leq$ 300MW

Fuel costs are in Rs/ k-cal

CP1=1.2 Rs/k-cal

CP2=1 Rs/k-cal

CP3= 0.95 Rs/k-cal

b) Explain with mathematical formulation, Lagrange multiplier method of economic load dispatch with transmission loss and no constraint of generation limit, while meeting load. **[12]**

OR

Q8) a) Explain the recursive function of dynamic programming of Unit Commitment. **[8]**

b) Write short note on three following concepts; **[10]**

i) Cost curve of thermal unit.

ii) Equality and inequality constraints applied to economic load dispatch task.

iii) Constraints on unit commitment task

iv) Necessity of unit commitment and economic load dispatch

Q9) a) Explain the advantages of interchange of power among interconnected areas. Also explain the operational complexities. **[4]**

b) What is the Power Pool and Energy Banking? Explain the benefits of each. **[6]**

c) With Mathematical formula, explain any THREE reliability indices. **[6]**

i) SAIFI

ii) SAIDI

iii) CAIDI

iv) LO LP

v) LOLE

OR

Q10)a) Explain the situations when the Emergency power interchange is allowed between interconnected areas. **[6]**

b) What is reliability of power system? Explain following models required to evaluate the reliability indices of generation system; **[10]**

i) Generator Model

ii) Load Model

iii) Risk Model

Total No. of Questions : 8]

SEAT No. :

P1987

[Total No. of Pages : 2

[5059]-582
B.E. (Electrical)
PLC AND SCADA APPLICATIONS
(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw and explain block diagram of Programmable Logic Controller. **[8]**

b) What is programming equipment? State their types. **[7]**

c) Explain input analog devices. **[7]**

OR

Q2) a) State advantages and disadvantages of PLC. **[8]**

b) Draw the ladder diagram for the following function table **[7]**

Inputs - I1, I2 Outputs - Q1, Q2, Q3, Q4

I1	I2	Q1	Q2	Q3	Q4
0	0	1	1	1	0
0	1	0	1	1	1
1	0	1	0	1	1
1	1	1	1	0	1

c) What is the difference between ON/OFF and analog devices? Explain output analog devices. **[7]**

Q3) a) Explain any two types of transducers. **[8]**

b) Explain how temperature is measured and controlled by PLC. **[8]**

OR

Q4) a) Draw and explain AC motor overload protection. **[8]**

b) Explain variable frequency drive for AC motor. **[8]**

P.T.O.

Q5) a) Explain SCADA architecture in detail. **[8]**

b) State advantages and disadvantages of SCADA systems. **[8]**

OR

Q6) a) Explain how SCADA is implemented in water purification system. **[8]**

b) Explain SCADA generations. **[8]**

Q7) a) Explain DNP3 SCADA protocol. **[8]**

b) Explain Flexible Function Block (FFB). **[8]**

OR

Q8) a) Explain Control and Information Protocol (CIP). **[8]**

b) Explain Open System Interconnection (OSI) model. **[8]**

Total No. of Questions : 8]

P1988

SEAT No. :

[Total No. of Pages : 3

[5059]-583
B.E. (Electrical)
CONTROL SYSTEM - 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.***
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) Design a suitable compensator for a unity feedback system with open loop transfer function $G(s) = K / s^2 (0.2s + 1)$ to satisfy the following specifications **[10]**

i) Acceleration error constant, Ka = 10

ii) PM = 35^o.

b) State the advantages of state space modeling over transfer function modeling. **[6]**

c) Ascertain the condition for controllability for a LTI system described by the state equation **[4]**

$$\dot{x} = \begin{bmatrix} 3 & 1 & 0 & 0 \\ 0 & 3 & 1 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 4 \end{bmatrix} x(t) + \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \\ b_{31} & b_{32} \\ b_{41} & b_{42} \end{bmatrix} u(t)$$

OR

Q2) a) For the system, defined by **[10]**

$$\dot{x} = \begin{bmatrix} 1 & 1 & -1 \\ 4 & 3 & 0 \\ -2 & 1 & 10 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$y = [20 \quad 30 \quad 10]\, x$

By using state feedback control u = –Kx, it is desired to have the closed loop poles at s = –2 ± j2 & s = –5. Determine the state feedback gain matrix K.

P.T.O.

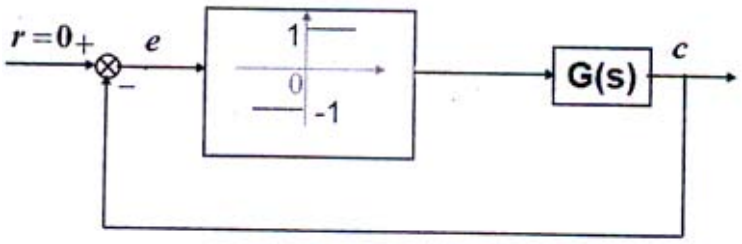
b) Realize the lead-lag compensator with active electrical network. **[4]**

c) Obtain the state model using Phase variables if a system is described by the differential equation: **[6]**

$$\frac{d^3y(t)}{dt^3}+8\frac{d^2y(t)}{dt^2}+14\frac{dy(t)}{dt}+4y(t)=10u(t)$$

Q3) a) Explain the common types of non- linearities observed in physical systems. **[6]**

b) A non -linear control system shown below, has Relay as a non linearity with describing function N(X) = 4/πX, **[10]**



The transfer function of the plant is $G(s)=\frac{10}{s(1+5s)(1+10s)}$

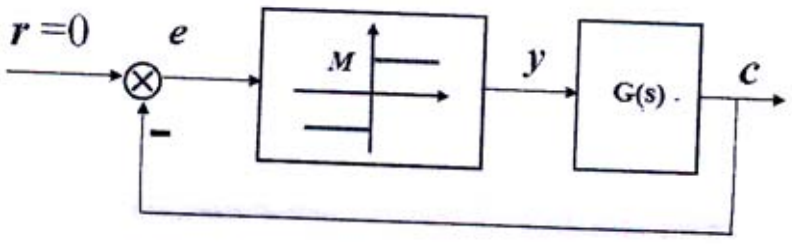
Determine frequency and amplitude of limit cycle if it exists by using Describing function method.

OR

Q4) a) Explain Jump Resonance phenomenon observed in non-linear control systems. **[6]**

b) A non linear control system shown below is applied with unit step input.

The transfer function of the plant is $G(s)=\frac{4}{s(1+s)}$. Assuming system is initially at rest & M = 1. Draw the phase trajectory using method of Isocline. Comment on the system's stability. **[10]**



Q5) a) Draw the block diagram of digital control system & explain the function of each block in short. **[8]**

b) Given the z transform $X(z) = \dfrac{(1-e^{-aT})z}{(z-1)(z-e^{-aT})}$

where a is a constant and T is the sampling period, determine the inverse *z* transform X(kT) by use of the partial-fraction-expansion method. **[8]**

OR

Q6) a) What is Zero Order Hold (ZOH)? Derive its transfer function. **[8]**

b) Solve the following difference equation by use of the z transform method: **[8]**

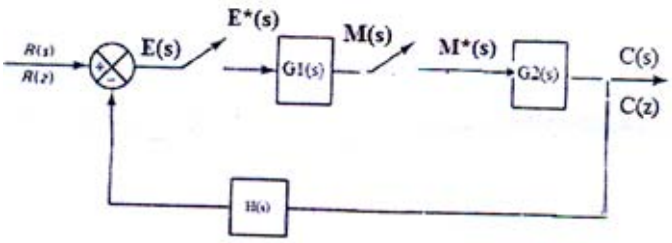
x(k + 2) + 6x(k + 1) + 5x(k) = 0, x(0) = 0, x(1) = 1

Q7) a) Explain the following methods of realizing digital controller **[8]**

i) direct

ii) cascade

b) Obtain the closed loop pulse transfer function C(z)/R(z) for the system. **[10]**



OR

Q8) a) Define Pulse transfer function. State General procedure for obtaining Pulse- transfer function. **[8]**

b) A digital filter is defined by **[10]**

$$G(z) = \frac{Y(z)}{X(z)} = \frac{4(z-1)(z^2+1.2z+1)}{(z+0.1)(z^2-0.3z+0.8)}$$

Obtain the series & parallel block diagram realization.

Total No. of Questions : 11]

SEAT No. :

P1989

[Total No. of Pages : 2

[5059]-584
B.E. (Electrical) (Semester - I) (Elective - I)
SPECIAL PURPOSE MACHINES
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Fgures to the right indicate lull 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) Explain process of development of force and torque in a system employing permanent magnets with suitable mathematical expressions **[7]**

OR

Q2) Discuss development of magneto motive force produced by a three phase balanced and distributed winding. **[7]**

Q3) Derive necessary mathematical expressions for torque developed in PMSM machine. [7]

OR

Q4) Discuss operational differences between sinusoidal and trapezoidal machine.**[7]**

Q5) Explain with block diagram unity power fictor operation of PMSM. **[6]**

OR

Q6) Develop mathematical model of PMSM. **[6]**

Q7) a) How does rotor saliency affect the performance of the machine? Explain different ways to improve saliency. **[8]**

b) What are different control methods of reluctance motor? Explain any one in detailed. **[8]**

P.T.O.

OR

Q8) a) What are axial and radial gap reluctance machines? Derive equation for mechanical torque developed in plain reluctance machine. **[8]**

b) Discuss construction and operation of switched reluctance machine. **[8]**

Q9) a) Explain constructional features of different stepper motors. Which is the most common type? Why? **[9]**

b) With suitable diagram explain control of stepper motor by using micro stepping method. **[9]**

OR

Q10) a) What are figure of Merits of stepper motor? With block diagram explain control of stepping motor by using micro stepping method. **[9]**

b) Compare VRM with PM type stepper motors. Also explain dynamic characteristics of stepper motor. **[9]**

Q11) Solve any two of the following **[16]**

a) Explain process of torque production in linear induction motor.

b) Why thrust is very important in Liner induction machine? Also explain factors affecting performance of linear induction machine.

c) Explain different requirements of liner induction machines for specific applications.

⊖⊖⊖

Total No. of Questions : 10]

P1990

SEAT No. :

[Total No. of Pages : 2

[5059]-585
B.E. (Electrical) (Semester - I)
POWER QUALITY
(2012 Pattern) (Elective - I)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Ql0.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Define power quality issues like voltage variations, voltage imbalance and voltage flicker. **[5]**

b) State and explain the relationship between immunity, emission and compatibility. **[5]**

OR

Q2) a) Explain various grounding practices as per IEEE standards. **[5]**

b) Explain over voltage mitigation techniques. **[5]**

Q3) a) Define sag? Explain any two voltage sag mitigation methods. **[5]**

b) What are the various sources of transient overvoltages? **[5]**

OR

Q4) a) Explain area of vulnerability concept related with voltage sag. **[5]**

b) Define flicker? What are the various sources of voltage flickers? **[5]**

Q5) a) What are the various sources of harmonics and their effects on the operation of various power system equipments? **[9]**

b) Explain the following terms related with waveform distortion **[9]**

i) Harmonics
ii) Interharmonics
iii) Subharmonics
iv) Triplen harmonics

P.T.O.

OR

Q6) a) What are different harmonic indices used? Explain their use. **[9]**

b) Explain power system quantities like active power, reactive power, displacement and true power factor under non-sinusoidal conditions. **[9]**

Q7) a) Discuss Concept of point of common coupling and its significance. **[8]**

b) Explain various computer tools used for harmonics analysis. **[8]**

OR

Q8) a) Explain passive filter design procedure for harmonic reduction. **[8]**

b) Explain in detail different principles of controlling harmonics. **[8]**

Q9) a) What are the requirements of power quality monitor to monitor various power quality parameters? Explain power quality analyzer used for PQ measurements. **[10]**

b) Write note on choosing PQ monitoring location and its duration. **[6]**

OR

Q10)a) Explain instrument setup and various guidelines to be followed for monitoring power quality. **[10]**

b) Explain the role of oscilloscopes, data loggers in PQ measurements. **[6]**

Total No. of Questions : 8]

P1991

SEAT No. :

[Total No. of Pages : 4

[5059]-586
B.E. (Electrical Engineering)
RENEWABLE ENERGY SYSTEMS
(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Draw neat diagram wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Define any two: (i) Solar constant (ii) Global radiation (iii) Zenith angle (iv) Declination angle **[4]**

b) A photovoltaic system for supplying drinking water has been installed in a village. The water is pumped from well having a depth of 48 m. The solar array consists of 24 modules having specification as given below. Calculate water discharge rate when global radiation incident normally on the cells is 945 W/m^2. Given: inverter efficiency is 85%, pump-motor set efficiency is 45%, density of water is 1000 kg/m^3, Specifications of a module: cell size is 10.4*10.4 cm, number of cells are 36, Conversion efficiency is 12.8%? **[8]**

c) Explain P-V characteristics of a wind turbine generator unit with necessary terminologies. **[8]**

OR

Q2) a) Calculate the hour angle at sunrise and sunset on June 21 and December 21 for a surface inclined at an angle of 10° and facing due south (r=0°). The surface is located in Bombay (19°07'N, 72°51'E)? **[8]**

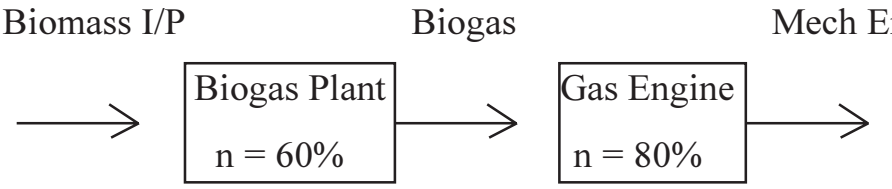
b) Define any two: (i) nacelle (ii) Pitch angle (iii) Pitch control (iv) Power coefficient of a wind turbine? **[4]**

c) Derive the expression for maximum efficiency of a wind turbine? **[8]**

P.T.O.

Q3) a) Which equipment / plant is used for Biomass Gasification under Thermo Chemical conversion process? What are the types of such equipment according to bed & power? Explain one of the bed types in detail with neat diagram? **[2+2+5=9]**

b) If Biomass input to the biogas plant is 130208 kg, each kg of biomass contains energy of 0.064 kWh/kg, and biogas plant efficiency is 60%. (i) What is the total kWh energy contained in biogas received from biogas plant. (ii) If Energy density of biogas is 200 kWh/Nm^3, what is the total volume of Biogas output in Nm^3 (Normal Meter Cube)? (iii) If the engine efficiency is 80%, what is the mechanical energy output of Gas Engine in kWh? **[2+2+3=7]**



OR

Q4) a) What are the sources of Biomass energy? What are the advantages and disadvantages of Biomass energy utilisation? **[3+6=9]**

b) 10 kg of water having initial temperature of 20°C is to be converted to steam of 100°C temperature. Specific heat of water is 4.2 kJ/kg.°C, Latent heat of water is 2260 kJ/kg. Find...

i) Total heat energy required in kJ? **[4]**

ii) Total weight of wood required as a fuel energy source, if specific energy of wood is 12 MJ/kg? **[3]**

Q5) a) What is SMES? What are its features? Explain any two? **[2+2+5=9]**

b) A 1.5 V dry (AA) battery costs Rs. 34 each. It is rated for 2850 mAh, if such batteries have to supply to the load having voltage rating of 6 V and power rating of 8 watt. (i) How many minimum batteries will be required at a time to supply to the load? (ii) What is the total cost of the batteries? (iii) How much duration in hours those batteries will last? (iv) What is the total energy supplied by the batteries in kWh to the load throughout their life? (v) What is the energy cost per kWh? **[1+1+2+2+1=7]**

OR

Q6) a) Name different energy storage systems? Explain in detail any one energy storage system? **[3+6=9]**

b) A method of pumped energy storage is used and pumped the water from lower reservoir to upper reservoir to use it for generating electricity to cater extra demand of 15 MW for 2 hours during peak hours every day. Given : Turbine efficiency is 82%, Generator efficiency is 92%, Water density is 1000 kglm^3, g is 9.81 m/s^2, net head is 180 m.

i) How much water flow rate q in m^3/s is required through nozzle to generate extra demand of electricity? **[3]**

ii) How much water volume shall be pumped back from lower reservoir to upper reservoir everyday to fulfil the electricity demand during peak hours? **[3]**

iii) What is overall pumping and generating cycle efficiency, if pump efficiency is 82%? **[1]**

Q7) a) What is mean by Time Value of money? Why it should be considered? What is Net Present Value (NPV)? **[2+2+2=6]**

b) Define and Explain with an example about Internal Rate of Return? **[4]**

c) Using NPV analysis technique determine NPV of each proposed project shown in table and find which project shall be chosen for implementation, if the annual discount rate is 9% for each project? **[8]**

	Project 1	Project 2
Capital cost Rs.	20000	20000
Year	Net Annual saving at the end of the Year Rs.	Net Annual saving at the end of the Year Rs.
1	+ 6000	+ 6400
2	+ 6000	+ 6200
3	+6000	+ 6000
4	+ 6000	+ 5800
5	+ 6000	+ 5600
Total Net Saving at end of 5 Years	+ 30000	+ 30000

OR

Q8) a) Define and state limitations of (i) Payback Period Method (ii) Initial rate of return / Return on Investment (ROI)? **[3+3=6]**

b) Define and Explain with an example about Life Cycle Costing? **[4]**

c) A co-generation system installation is expected to reduce the company's annual energy bill by Rs. 23 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. (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)? **[4+4=8]**

Total No. of Questions : 9]

SEAT No. :

P1992

[Total No. of Pages : 2

[5059]-587
B.E. (Electrical) (Elective - I)
DIGITAL SIGNAL PROCESSING
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Your answers will be valued as a whole.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and stream tables is allowed.***
4) ***Assume suitable data, if necessry.***

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

b) State and prove any two property of z-transform. **[5]**

OR

Q2) a) Find the z-transform of following with ROC. **[5]**

i) $x(n) = \{1,2,3,4\}$ (↑ under 1)

ii) $x(n) = \{1,2,3,4\}$ (↑ under 4)

b) State and prove any two properties of DTFT. **[5]**

Q3) a) Find the inverse z-transform of

$$x(z) = \frac{1+3z^{-1}}{1+3z^{-1}+2z^{-2}} \text{ for } |z| > 2$$

b) Give the classification of discrete time system. **[5]**

OR

Q4) a) Find linear convolution of $x(n) = \{2,3,2,3\}$ and $h(n) = \delta(n+1) + \delta(n) + \delta(n-1)$ **[5]**

(↑ under 2)

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

Q5) a) Explain Radix 2 DIT FFT algorithm for N = 4. **[8]**

b) State and prove any two properties of DFT. **[8]**

P.T.O.

OR

Q6) a) Find DFT of signal x(n) = {1,1,1} with n = 4 **[8]**

b) Explain the relation of DFT with z-transform. **[8]**

Q7) a) Explain design of butterworth filter using BLT. **[8]**

b) Determine the direct form-II structure of $y(n) = \frac{1}{2}\, y(n-1) - \frac{1}{4}y(n-2) + x(n) + x(n-1)$ **[8]**

OR

Q8) a) Write differences between analog and digital filters. **[6]**

b) For given specification design an analog butterworth filter $0.9 \leq |H| \leq 1$ for $0 \leq \Omega \leq 0.2\pi$, $|H| \leq 0.2$ for $0.4\pi \leq \Omega \leq \pi$. **[10]**

Q9) Write short note on any three **[18]**

a) Design of FIR filter using window.

b) DSP for induction motor control

c) DSP for measurement of frequency

d) DSP based protective relaying.

Total No. of Questions : 8]

SEAT No. :

P1993

[Total No. of Pages : 2

[5059]-588
B.E. (Electrical) (Semester - VII)
RESTRUCTURING AND DEREGULATION
(2012 Pattern) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6. Q7 or Q8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Explain the institutional structure of Indian power sector before and after restructuring opted. **[6]**

b) Explain following economic terms of power sector. **[8]**

i) Fixed cost and variable cost.

ii) Capital cost.

iii) Depreciation.

iv) Interest and finance charges.

c) Explain the role of State Electricity Regulatory Commission and Central Electricity Regulatory Commission. **[6]**

OR

Q2) a) Explain the key objectives of 'Electricity Act 2003' with reference to generation, transmission and distribution sector. **[6]**

b) Explain following methods of regulations: **[8]**

i) Rate of return regulation.

ii) Performance based regulation.

c) Describe the desirable characteristics of tariff of electricity. **[6]**

Q3) a) Explain the following models in details **[8]**

i) Pool model.

ii) Bilateral trades.

b) Compare between 'competition for the market' and 'competition in the market'. **[8]**

P.T.O.

OR

Q4) a) Explain the working of ISO ISO (Independent System Operator) models. **[8]**

b) Explain wholesale competition & retail competition model based on industry structure. **[8]**

Q5) a) Specify pecularities of electricity as a commodity. Explain rules that govern the electricity markets. **[8]**

b) Compare integrated trading model and decentralized trading model. **[8]**

OR

Q6) a) Explain Power Exchanges in India. Also explain the concept of market clearing price. **[8]**

b) Explain the impact of market reform on regulation & Externalities. **[8]**

Q7) a) Explain in detail congestion issue and management. **[9]**

b) What is the importance of transmission pricing under open access condition? State and explain major components of transmission costs. **[9]**

OR

Q8) a) Explain the various transmission pricing methods briefly. [**9]**

b) Write a short note on. Availability based tariff.(ABT) **[9]**

Total No. of Questions : 10]

SEAT No. :

P1994

[Total No. of Pages : 3

[5059]-589
B.E. (Electrical) (Semester - I) (Elective - II)
ELECTROMAGNETIC FIELDS
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6. Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier Charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Obtain the expression for E and D due to infinite line charge ρ_1 C/m using Gauss's law. **[6]**

b) A current distribution gives rise to vector magnetic potential **[4]**

$$\bar{A} = x^2 y\hat{a}_x + y^2\hat{a}y - 4xyz\hat{a}_z \; Wb/m.$$

Calculate B at (1,2-5).

OR

Q2) a) Find the energy stored in free space for the region $2 < r < 3$ mm, $0 < \theta < 90^o$, $0 < \varphi < 90^o$, given the potential field $V = \frac{200}{r}V$. **[6]**

b) Derive Poisson's equation $\nabla^2 V = -\frac{\rho_v}{\varepsilon}$ from Gauss's law. Explain its physical significance. **[4]**

Q3) a) Obtain the H (magnetic field intensity) due to a finite long straight conductor carrying current I at any point P using Biot Savart's law. **[6]**

b) Two point charges $Q_1 = 3$ nC and $Q_2 = -2$ nC are placed at (0,0,0) and (0,0,–1) respectively. Assuming zero potential at infinity, find the potential at (0,1,0). **[4]**

P.T.O.

OR

Q4) a) Derive an expression for the point form of Ampere's circuital law, **[6]**

$$\nabla \times \bar{H} = \bar{J}$$

b) If $\bar{J} = \frac{100}{\rho^2}\hat{a}_p$ A/m^2, find the total current I passing through surface defined by $\rho = 2, 0 < z < 1, 0 < \varphi < 2\pi$ **[4]**

Q5) a) Region 1 described by $3x + 4y \geq 10$, is free space, whereas region 2 described by $3x + 4y \leq 10$, is a magnetic material for which $\mu = \mu_0$. Assuming that the boundary between the material and free space is current free, find $\bar{B}_2 \; if \; \bar{B}_1 = 0.1\hat{a}_x + 0.4\hat{a}_y + 0.2\hat{a}_z Wb/m^2$ **[8]**

b) Explain the concept of magnetization and permeability. **[8]**

OR

Q6) a) Derive an expression for energy in magnetostatic field. **[8]**

b) The point charge Q = 18nC has velocity of 5×10^6 m/s in the direction $\hat{a}_v = 0.60\hat{a}_x + 0.75\hat{a}_y + 0.30\hat{a}_z$. Calculate the magnitude of force exerted on charge by the field. **[8]**

i) $\bar{B} = -3\hat{a}_x + 4\hat{a}_y + 6\hat{a}_z mT;$

ii) $\bar{E} = -3\hat{a}_x + 4\hat{a}_y + 6\hat{a}_z KV/m;$

iii) B and E acting together

Q7) a) State Lenz's law. Using Faraday's law, derive an expression for transformer emf. **[8]**

b) Find the amplitude of the displacement current density in a metallic conductor at 60Hz if $\varepsilon = \varepsilon_0$, $\mu = \mu_0$, $\sigma = 5.8 \times 10^{-7}$. S/m and

$$\bar{J} = \sin(377t - 117 \cdot 1z)\hat{a}_x MA/m^2$$ **[8]**

OR

Q8) a) Write Maxwell's equation in point form for static electromagnetic fields and time varying fields. **[8]**

b) Explain motional electromotive force. **[8]**

Q9) a) What is poynting vector? What is its significance? Derive the expression of Poynting vector? **[10]**

b) Define uniform plane wave. Explian the significance of propagation constant and attenuation constant with respect to uniform plane wave.**[8]**

OR

Q10)a) State and explain Maxwell's equation in phasor form for time harmonic electromagnetic fields in a linear, isotropic and homogenous medium.**[10]**

b) Write the wave equations in phasor form for conductor. Explain skin effect. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1995

[Total No. of Pages : 2

[5059]-590
B.E. (Electrical) (Semester - II) (Elective - II)
EXTRA HIGH VOLTAGE TRANSMISSION
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Use of non programmable calculator is allowed.***
2) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 Or Q8, Q9 Or Q10.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) A power of 2000 MW is to be transmitted over 800 km. distance. Use 400 kV three phase ac line. Suggest the number of circuits required. With 50 percent series capacitor compensation, calculate power loss in a circuit and % power loss. Phase difference between sending end and receiving end voltage is 30°. The resistance and reactance of conductor are 0.031 ohm/km and 0.327 ohm/km respectively. **[5]**

b) Explain the need for EHV transmission lines. **[5]**

OR

Q2) a) Explain the significance of bundled conductor in EHVAC transmission system. **[5]**

b) What is effect of temperature on overhead conductors? Discuss in detail. **[5]**

Q3) a) Write a note on mechanical considerations in line performance. **[5]**

b) Explain the field of a point charge and its properties. **[5]**

OR

Q4) a) Explain the field of a sphere gap. **[5]**

b) A charge of 10 μC is placed at a distance of 2 metres from the centre of a sphere of radius 0.5 metre .Calculate the magnitude, polarity, and location of a point charge Q_2 which will make the sphere at zero potential. **[5]**

P.T.O.

Q5) a) Explain the concept of insulated ground wire and explain the purposes served by insulated ground wires. **[8]**

b) Derive the expression for electrostatic Field of Double-Circuit 3-phase A.C line. **[8]**

OR

Q6) a) Write effects of magnetic field on human health. **[8]**

b) Write note on primary and secondary shock currents. **[8]**

Q7) a) State and explain the mechanism of corona formation. **[8]**

b) From charge voltage diagram derive an expression for corona loss for ac voltage of conductor and compare it with Ryan Hen line formula. **[8]**

OR

Q8) a) State and explain at least 4 formulae for power loss due to corona. **[8]**

b) Write a note on 'measurement of audible noise produced by corona'. **[8]**

Q9) a) State the design factors considered under steady state condition of transmission line. Also state their limits for satisfactory performance **[9]**

b) Write note on various properties of XLPE used in EHV cables. **[9]**

OR

Q10)a) List the materials used for insulation in E.H.V cables; and state the properties of SF_6 gas as an insulating material used in cables. **[9]**

b) Explain detail classification of cables and mention typical insulation thickness for E.H.V cables. **[9]**

Total No. of Questions : 8]

P1996

SEAT No. :

[Total No. of Pages : 2

[5059]-591
B.E. (Electrical)
INTRODUCTION TO ELECTRICAL TRANSPORTATION SYSTEMS
(End Sem.) (2012 Pattern) (Elective - II)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is the role of AC machines in Electric Vehicle? Explain in detail. **[8]**

b) What is meant by Electric Traction? Mention the different voltage level used in Electric Traction and explain the various types of Electric traction. **[12]**

OR

Q2) a) What are the various performance criteria of battery used in transportation system? **[10]**

b) Explain the working of DC- AC converter in Hybrid vehicle. **[10]**

Q3) a) What are the components of motion control? Explain them in detail with a neat diagram. **[9]**

b) What are the factors affecting the road traffic crashes? What is traffic monitoring? Why traffic monitoring control is required? **[9]**

OR

Q4) a) With help of neat diagram explain Mechanical Power Steering. **[9]**

b) With help of neat diagram explain the speed control and acceleration characteristic related with one transportation system. ? **[9]**

P.T.O.

Q5 a) Explain the application of AC traction in high speed rail. **[8]**

b) Explain in detail one of the configurations of hybrid cars with a neat diagram. **[8]**

OR

Q6) a) Compare AC and DC type of traction. **[6]**

b) Write the performance of AC traction under various operating condition and its control scheme. **[10]**

Q7) a) With neat diagram explain the control scheme used in traction type of elevators. **[10]**

b) What are the considerations of energy efficient systems? **[6]**

OR

Q8) a) What is elevator? Explain the different types of elevator. **[10]**

b) Define the following related with elevator **[6]**

i) Handling capacity

ii) Average trip time

iii) Waiting time

Total No. of Questions : 10]

SEAT No. :

P1997

[Total No. of Pages : 3

[5059]-592
B.E. (Electrical) (End Sem.)
SWITCHGEAR & PROTECTION
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q2, Q.No.3 or Q4, Q.No.5 or Q6, Q.No.7 or Q8, Q.No.9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain low resistance principle of are interruption in case of circuit breaker. **[4]**

b) In a 220kv system, the reactance & capacitance upto the location of circuit breaker is 8Ω and 0.025 μf respectively. A resistance of 600Ω is connected across the contacts of the circuit breaker. **[6]**

Determine-

i) Natural frequency of oscillations

ii) Damped frequency of oscillations

iii) Critical value of resistance which will give no transient oscillations.

OR

Q2) a) A Vacuum circuit breaker is rated as 3 phase 1500 Amp, 2000 MVA, 33 kv, 3 seconds. Determine - **[4]**

i) the breaking current

ii) Making current

iii) Short time current

iv) Rated normal current

P.T.O.

b) In case of circuit breaker, explain following ratings. **[6]**

i) Making current

ii) Breaking current

iii) Short time current rating

Q3) a) Write a short note on 'zones of protection' **[4]**

b) Explain important properties of SF_6 gas used in case of SF_6 CB **[6]**

OR

Q4) a) Classify relays on the basis of operating time. **[4]**

b) Explain following essential qualities of protective relaying - **[6]**

i) Stability

ii) Adequatness

iii) Discrimination

Q5 a) Draw a block diagram of static relay & explain its working. State advantages & limitations of static relay. **[10]**

b) Explain the construction & working of metal oxide arresters state its advantages & disadvantages. **[8]**

OR

Q6) a) Draw a block diagram of numerical relay. & explain its working state its advantages over conventional & static relays. **[10]**

b) Write a short note on - **[8]**

i) Sampling theorem

ii) PMU (phasor measurement unit)

Q7) a) Explain with neat diagram protection scheme of transformer against incipient faults. **[8]**

b) With neat diagram explain working of single phasing preventer in case of 3phase induction motor. **[8]**

OR

Q8) a) Explain the protection of alternater against **[10]**

i) Loss of prime-mover

ii) Interturn faults

iii) Loss of excitation

b) A 3phase 66kv/11kv, star-delta connected transformer is protected by merz price-system. The CTs on LT side have ratio of 420/5. Calculate the CT ratio on HT side draw this protection scheme also. **[6]**

Q9) a) Explain the effect of arc resistance and power swing on the performance of distance relay. **[8]**

b) With neat sketch, explain three step distance protection scheme for transmission lines. **[8]**

OR

Q10)a) Explain how impedance relay is used for transmission line protection. Derive its torque equation. Draw its characteristics on R-x plain. **[8]**

b) Draw & explain block schematic of carrier aided protection. **[8]**

Total No. of Questions : 10]

P1998

SEAT No. :

[Total No. of Pages : 3

[5059]-593
B.E. (Electrical)
POWER ELECTRONIC CONTROLLED DRIVES
(2012 Pattern) (Semester - II)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) What are the main factors which decide the choice of electrical drive for a given application? **[6]**

b) A drive has the following parameters: **[4]**

T= 150- 0.1 N, N-m, where N is the speed in rpm.

Load torque T_L= 100, N-m

Initially the drive is operating in steady-state.

The characteristics of the load torque are changed to T_L= - 100 N-m.

Calculate initial and final equilibrium speeds

OR

Q2) a) Explain the working of a single phase Fully controlled rectifier fed separately excited dc motor with armature voltage control, with neat circuit diagram. In which quadrants the motor can be operated assuming rated flux? **[6]**

b) Draw speed torque characteristics and explain Regenerative braking in Induction motor. **[4]**

Q3) A 220V, 20 kW dc shunt motor running at rated speed of 1200 rpm is braked using rheostatic braking. The armature resistance is 0.lohm and motor efficiency 88 %. Calculate resistance required to be added in armature circuit to limit braking current to twice the rated value. Also calculate initial braking torque. **[10]**

P.T.O.

OR

Q4) a) A star connected squirrel cage induction motor has following ratings and parameters: 400V, 50 Hz, 4 pole 1370 rpm, R_s =2 Ω, $R_{r'}$ = 3 Ω, $X_s = X_{r'}$ = 3.5 Ω For regenerative braking Assuming motor speed torque characteristics from full load motoring to full load braking to be parallel straight lines, calculate Speed for a frequency of 30 Hz and 80% of full load torque. **[5]**

b) With a neat diagram, explain V/f control of 3 phase induction motor. What is the range of speed control? **[5]**

Q5 a) How speed control is achieved using Vector control of induction motor? Draw vector diagram and explain. **[10]**

b) Compare and comment on relative merits and demerits of VSI and CSI for induction motor drives. **[6]**

OR

Q6) a) Explain the Principle of vector control. **[8]**

b) Write in brief about topology, control and applications of AC Servo Drives. **[8]**

Q7) a) Draw neat diagram to explain vector control of PM Synchronous Motor (PMSM). **[8]**

b) Explain variable DC link converter topology for PM BLDC Half wave drives for motoring and Regenerative operating modes. **[8]**

OR

Q8) a) What are the Control Strategies used for Permanent Magnet Brushless DC Motor? How constant torque angle control is used? **[8]**

b) Comment on use of Sensorless control of PM BLDC drives. **[8]**

Q9) Solve any Three

a) What is the selection criterion for motors? How rating of a motor subjected to variable load duty is decided? **[6]**

b) What are the requirements of drive for rolling mill operations? **[6]**

c) Why controlled torque starting is necessary in Textile machinery drives? How is it achieved? **[6]**

d) What are the requirements of drive in sugar mills? Explain duty cycle of sugar centrifuge. **[6]**

OR

Q10)Solve any Three

a) What are various motor duty patterns ? how are motors classified based on duty? **[6]**

b) What motors are suitable for Sugar mill drive applications? **[6]**

c) How motor duty and heating and cooling cycle affects the temperature of motor? **[6]**

d) Why 4 quadrant operation of drive is needed for rolling mill drive? **[6]**

Total No. of Questions : 8]

SEAT No. :

P3073

[Total No. of Pages : 2

[5059]-594
B.E.(Electrical)
HIGH VOLTAGE ENGINEERING
(2012 Course)(Elective-III)(Semester-II)(End Semester) (403149)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Answer Q1 or Q2, Q3 or Q4,Q5 or Q6,Q7 or Q8.***
3) ***Neat 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) Define Townsend first and second ionization coefficients How is the condition for breakdown obtained in Townsend discharge? **[8]**

b) What is the stress oil volume theory and how does it explain breakdown in large volume of commercial liquid dielectrics **[8]**

c) Describe the various factors that influence breakdown in a gas. **[4]**

OR

Q2) a) What is thermal breakdown on solid dielectrics and how it is practically more significant then other mechanisms? **[8]**

b) Describe the phenomenon of lightning and explain the terms pilot streamer, stepped leader, return streamer and dart leader. **[8]**

c) Explain the various factors that influence breakdown in pure liquid dielectrics and commercial liquid dielectrics **[4]**

Q3) a) Give the different circuits that produce impulse wave and explain clearly their merit and demerits. **[8]**

b) Explain one method of controlled tripping of impulse generator why is controlled tripping necessary. **[8]**

OR

P.T.O.

Q4) a) With neat circuit diagram , describe the construction principle of operation and application of Marx's impulse generator. **[8]**

b) Draw the standard wave shape of impulse voltage wave and specify the values of the wave front and wave tail. **[8]**

Q5) a) Explain sphere gap measurement of high voltages. **[8]**

b) Explain the method of measurement of partial discharge using Schering Bridge. **[8]**

OR

Q6) a) Explain current transformer with electro-optical signal converter for EHV system. **[8]**

b) Explain Generating voltmeter for measurement of high voltages. **[8]**

Q7) a) What are the different power frequency tests done on insulator? Mention the procedure for testing? **[9]**

b) Classify the different high voltage laboratories and give salient features of each of them **[9]**

OR

Q8) a) Explain the partial discharge tests on high voltage cables. How is the fault in the insulation located in this test? **[9]**

b) Explain earthing and safety measures used in high voltage laboratory **[9]**

Total No. of Questions : 11]

P1999

SEAT No. :

[Total No. of Pages : 2

[5059]-595
B.E. (Electrical) (Elective - III)
HVDC & FACTS
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right 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 steamt tables is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) Explain 12 pulse configuration of HVDC system. Also state advantages of this configuration. **[7]**

OR

Q2) Explain CIA and CEA control for 6 pulse HVDC system. **[7]**

Q3) Explain multi-terminal HVDC systems. **[7]**

OR

Q4) Explain protection schemes employed in HVDC systems. **[7]**

Q5) Compare HVDC Light system with conventional HVDC transmission systems. **[6]**

OR

Q6) Explain structure of VSC based HVDC system and its characteristics. **[6]**

Q7) Solve any two of the following **[16]**

a) Explain AC controller structure.

b) Explain Power Converter Structures

c) Explain role of dc link in power converter. Also explain control mechanisms for the same.

P.T.O.

Q8) a) With suitable diagram explain various configurations of SVC. **[9]**

b) Compare SSSC and TCSC. **[9]**

OR

Q9) a) Explain principle of operation of SSSC. Draw relevant phasor diagrams. **[9]**

b) State applications of SSSC. Also state limitations of SSSC. **[9]**

Q10)a) Draw schematic diagram of UPFC and explain its operation. **[8]**

b) Explain applications of UPFC. **[8]**

OR

Q11)a) Explain modes of operation of UPFC with relevant phasor diagrams. **[8]**

b) Derive relationship of active and reactive power in presence of UPFC. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2159

[Total No. of Pages :3

[5059]-596
B.E.(Electrical)
DIGITAL CONTROL SYSTEM
(2012 Course)(Elective-III)(Semester-II)(End Sem)

Time :2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.***
2) ***Assume suitable data, if necessary.***

Q1) a) Derive the transfer function of ZOH. **[6]**

b) Discuss the mapping between S-plane and Z-plane. **[8]**

c) If $A=\begin{bmatrix} 0 & 0 & -2 \\ 0 & 1 & 0 \\ 1 & 0 & 3 \end{bmatrix}$

then compute the state transition matrix using, Caley Hamilton Theorem. **[6]**

OR

Q2) a) Explain the sampling & reconstruction process, state the sampling theorem & give its importance. **[6]**

b) Explain the concept of stability of discrete time control system & explain Routh's stability criterion. **[6]**

c) A state variable model of a discrete time system is given by **[8]**

$x(K+1) = Gx(K)+H\,u(K)$

$y(K) = C\,x(K)+D\,u(K)$

Derive the expression for the pulse transfer function.

P.T.O.

Q3) a) What is full order observer? With the help of proper block diagram explain it. **[8]**

b) Given

$$x(k+1)=\begin{bmatrix}0.1 & 0.1 & 0\\ 0.3 & -0.1 & -0.2\\ 0 & 0 & -0.3\end{bmatrix}x(k)+\begin{bmatrix}1\\ 1\\ 0\end{bmatrix}$$

&

$$y(k)=\begin{bmatrix}1 & 0 & 1\end{bmatrix}x(k)$$

Determine controllability & observability of the system. **[8]**

OR

Q4) a) Define controllability & observability for discrete time control system. Explain any one method to determine it **[6]**

b) Explain relationship between controllability observability & stability, Effect of pole-zero concellation. **[10]**

Q5) a) Define Euler's forward, backward method & trapezoidal method with suitable example. **[8]**

b) Consider the system defined by $\frac{Y(z)}{V(z)}=\frac{4Z^2-3Z+0.5}{Z^3+Z^2-Z-0.75}$

Determine state space representation in controllable canonical form & observable canonical form. **[8]**

OR

Q6) a) Explain transformation of state -space model to controllable, observable & diagonal forms. **[6]**

b) Consider the pulse transfer function of discrete time system given as

$$\frac{Y(Z)}{V(Z)}=\frac{b_0Z^n+b_1Z^{n-1}+b_2Z^{n-2}+\ldots+b_n}{Z^n+a_1Z^{n-1}+a_2Z^{n-2}+\ldots+a_n}$$

Derive its Jordan canonical form **[10]**

Q7) a) Explain Hybrid simulation with block diagram & their applications **[10]**

b) Explain position control using stepper motor with proper block diagram. **[8]**

OR

Q8) a) Draw a neat block diagram of digital temperature control scheme & explain. **[10]**

b) Explain computer program structure for simulation of discrete time control system with algorithm & flow charts. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2000

[Total No. of Pages : 2

[5059]-597

B.E. (Electrical) (Elective - IV)

INTELLIGENT SYSTEMS AND IT'S APPLICATION IN ELECTRICAL ENGINEERING

(2012 Pattern) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Give Histrocal views on ANN. **[6]**

b) Explain perceptron model with neat sketch. **[6]**

c) Explain ART in brief. **[8]**

OR

Q2) a) Explain brain vs artificial neuron model. **[6]**

b) Explain supervised vs unsuperivised learning. **[6]**

c) Explain BAM with neat sketch. **[8]**

Q3) a) Explain fuzzy rule base system. Also explain how it is implemented? **[9]**

b) Explain various properties of fuzzy set. **[9]**

OR

Q4) a) Explain in detail about fuzzy vs crisp set. **[9]**

b) What are the different fuzzy relations? **[9]**

Q5) a) Write short note on "DEFUZZI FICATION" **[8]**

b) Explain fuzzy rule base system. **[8]**

P.T.O.

OR

Q6) a) Explain sugeno inference system. **[8]**

b) Interpret predicate logic formula and give it's inference. **[8]**

Q7) a) What is rule based systems? **[8]**

b) What is encoding used in genetic operator. **[8]**

OR

Q8) a) Explain biological back ground of GA. **[8]**

b) Explain cromosome of genetic algorithm. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2001

[Total No. of Pages : 2

[5059]-598

B.E. (Electrical Engineering) (Elective - IV) (Semester - II)

SMART GRID

(2012 Pattern)

Time : 2.½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define Smart grid concept and explain its necessity. **[5]**

b) Explain the concept of Resilient and Self Healing Grid. **[5]**

OR

Q2) a) Write a note on, "Real time prizing". **[5]**

b) Describe substation automation. **[5]**

Q3) a) Explain how the reliability of smart grid can be enhanced by integrating Intelligent Electronic Devices (IEDs) in to it. **[5]**

b) Explain how automatic meter reading can make the system smarter. **[5]**

OR

Q4) a) List different smart appliances and describe an integration of smart appliances into grid for Home and Building Automation. **[5]**

b) What is Geographic Information System (GIS) ? **[5]**

Explain the components of GIS.

Q5) a) Explain concept of micro grid, and its need and applications. **[8]**

b) State and explain the issues of interconnecting the micro grid with the utility grid. **[8]**

OR

Q6) a) Write a note on 'protection & control of Microgrid'. **[8]**

b) Compare Microgrid and Smart Grid. **[8]**

P.T.O.

Q7) a) Describe Power Quality Issues of grid connected Renewable Energy Sources. **[8]**

b) Explain the concept of Power Quality and EMC in Smart Grid. **[8]**

OR

Q8) a) Explain importance of power quality in smart grid & how it can be improved. **[8]**

b) Write a note on 'Web based Power Quality Monitoring'. **[8]**

Q9) a) Write a note on, 'IP based protocols'. **[9]**

b) Explain cloud computing and its need. **[9]**

OR

Q10)a) Why cyber security is of prime importance in Smart grid & how it can be achieved? **[9]**

b) Explain the role HAN in smart grid. **[9]**

Total No. of Questions : 12]

SEAT No. :

P2002

[Total No. of Pages : 2

[5059]-599
B.E. (Electrical)
ROBOTICS AND AUTOMATION
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

UNIT - I

Q1) Define Degree of freedom and spatial resolution. **[6]**

OR

Q2) Write the concept of yaw, pitch and roll. **[6]**

UNIT-II

Q3) Explain translational transformation with example. **[6]**

OR

Q4) Explain rotational transformation with example. **[6]**

UNIT-III

Q5) What are the different rules for establishing link coordinate frames. **[8]**

OR

Q6) Show how to add two vectors represented in homogeneous coordinates with different scale factors. What is the scale factor of the result? **[8]**

UNIT-IV

Q7) a) A point $[1; 2; 3]^T$ is desired to rotate around z axis by 60° and then around y axix by -90°. Find the resultant point after rotation. **[8]**

b) Derive the rotation formula using vector technique. **[8]**

OR

Q8) a) Explain multiple reference frames in space. Draw sketches if necessary. **[8]**

b) Derive rotation in the y-z plane and the z-x plane using the geometric approach. **[8]**

P.T.O.

UNIT-V

Q9) a) Explain joint position controls (JPC) with neat sketch. **[9]**

b) Explain Jacobian for prismatic and revolute joint for manipulator design. **[8]**

OR

Q10) a) Explain resolved motion position controls (RMPC) with neat sketch. **[9]**

b) Explain relationship between transformation matrix and angular velocity. **[8]**

Q11) a) Explain parts sorting robot with neat sketch. **[8]**

b) Explain selection criteria for sensors, drives and actuators used in manipulator design. **[9]**

OR

Q12) a) Explain servo-control system in detail. **[8]**

b) Explain underwater robot design with neat sketch. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2003

[Total No. of Pages : 2

[5059]-600

B.E. (Electrical Engineering)

ILLUMINATION ENGINEERING (Elective - IV) (Semester - VIII)

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) With suitable diagram explain working of high pressure mercury vapour lamp **[4]**

b) Explain following concepts; **[3]**

i) Vision

ii) Visual Acuity

iii) Contrast

c) Explain role of igniters in metal halide lamps. **[3]**

OR

Q2) a) Compare artificial light with natural light (minimum 4 points) **[4]**

b) Explain any three mechanical factors to be considered for designing luminaries. **[3]**

c) Compare fluorescent lamp with filament lamp. **[3]**

Q3) a) Explain various luminance and non-luminance substances to produce light. **[4]**

b) With suitable diagram explain working of Neon lamp **[4]**

c) What are the expected characteristics of good luminaries? **[2]**

OR

Q4) a) With suitable diagram explain working of AC arc lamp **[4]**

b) With suitable diagram explain working of Halogen lamp **[4]**

c) Explain any two properties of light **[2]**

P.T.O.

Q5) a) Write short note on any Three; **[8]**

i) Zonal cavity method

ii) Coefficient of Utilization (COU)

iii) Uses of Polar curves

iv) Energy conservation in illumination design

v) Factors affecting visibility in commercial complex

b) Explain following special purpose lighting schemes; **[8]**

i) Decorative lighting

ii) Swimming Pool lighting

OR

Q6) a) A hall measuring 30m × 13m with ceiling height of 5 meters is to be illuminated with an illumination level of 120 lux. Taking coefficient of utilization as 0.5 and depreciation factor of 1.4, determine the number of fluorescent tubes required. Take luminous efficiency of fluorescent tube as 40 lumens/watt for 80 watt tube. Use – twin tube fitting arrangement and show the disposition of these twin-tubes in plan. **[8]**

b) Explain in details the factors to be considered while designing the lighting scheme for health care centers or hospitals. **[8]**

Q7) a) Explain how following methods are used in outdoor lighting? **[8]**

i) Beam lumen method

ii) ISOLUX diagram

b) Explain the illumination designs for stadium and sport complex **[8]**

OR

Q8) a) Explain the factors to be considered for designing the outdoor lighting schemes **[8]**

b) Write a short note on —Lighting for advertisement and hoardings. **[8]**

Q9) a) Explain working principal and working of Organic light emitting diodes (OLED) **[8]**

b) Compare LED and LASER **[5]**

c) State various applications of LASER **[5]**

OR

Q10)a) State the two types of optical fiber cable and explain each in brief. **[8]**

b) With suitable diagram, explain any two methods of natural light conduiting. **[5]**

c) State the features of fiber optic light guides **[5]**

Total No. of Questions : 10]

SEAT No. :

P2004

[Total No. of Pages : 2

[5059]-600-A
B.E. (Electrical) (Elective - IV)
VLSI DESIGN
(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw State diagram, State table & Implement 1011 detector using mealy or Moore model. **[6]**

b) Define Function, Procedure, Configuration & Package **[4]**

OR

Q2) a) Explain Any three data types and three data objects **[6]**

b) Differentiate combinational and sequential circuits with examples. **[4]**

Q3) a) Write VHDL code for 8:1 Multiplexer. **[6]**

b) Differentiate concurrent & sequential statements in VHDL. **[4]**

OR

Q4) a) Explain with example procedure in VHDL **[6]**

b) Explain different types of Architectures with one example of each. **[4]**

Q5) a) Compare ASIC with general purpose processor. **[8]**

b) Explain limitations of FPGA & CPLD **[8]**

OR

Q6) a) List the features, specifications and applications of CPLD. **[8]**

b) Explain in detail the Architecture of FPGA **[8]**

P.T.O.

Q7) a) Explain CMOS inverter and its transfer characteristics in detail. **[8]**

b) Implement basic gates using CMOS **[8]**

OR

Q8) a) Compare TTL, ECL & CMOS **[8]**

b) Define 1 .Noise margin 2.F.O.M. 3.Velocity saturation 4. Body effect **[8]**

Q9) a) Explain in detail and also write VHDL code for Barrel shifter **[10]**

b) Write Algorithm & VLSI design for Ahead address generator **[8]**

OR

Q10)a) Explain in detail signed & unsigned comparator along with its design. **[10]**

b) Explain seven segment Display with diagram. **[8]**

Total No. of Questions : 08]

SEAT No. :

P2005

[Total No. of Pages : 2

[5059] - 601
B.E. (Electronics) (End-Semester)
VLSI DESIGN
(2012 Pattern)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain different architectural modeling types in VHDL give examples of each. **[8]**

b) Compare CPLD with FPGA. **[6]**

c) Draw FSM diagram and write VHDL code for 1100 Moore sequence. **[6]**

OR

Q2) a) Write a VHDL code for 4 bit Up down counter. Also write test bench for it. **[8]**

b) Draw block diagram and explain architecture of CPLD. **[6]**

c) Draw CMOS inverter and explain voltage transfer curve in detail. **[6]**

Q3) a) Explain read write operation of 6T SRAM cells with help of timing diagram. **[8]**

b) Give Classification of memories with application of each **[8]**

OR

Q4) a) Draw and explain DRAM in detail (any two schematics). **[8]**

b) Explain refresher circuit and sense amplifier. **[8]**

P.T.O.

Q5) a) Explain global and switch box routing. **[8]**

b) Explain off chip connections and I/O pad architecture **[8]**

OR

Q6) a) Explain power and ground distribution in detail. **[8]**

b) Explain floor planning. Purpose and rules? **[8]**

Q7) a) With reference to BIST explain BILBO, LFSR, CUT, scan chain for flipflops. **[10]**

b) What are the different faults in chip design? What are the techniques to minimize them. **[8]**

OR

Q8) a) Explain TAP controller with its state diagram. **[10]**

b) What is need of boundary scan? Explain Boundary scan technique in detail. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P2006

[Total No. of Pages : 2

[5059] - 602
B.E. (Electronics)
ELECTRONICS SYSTEM DESIGN
(2012 Pattern) (End Semester)

Time : $2\frac{1}{2}$ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain electrical, mechanical and environmental specifications of electronic product with example. **[8]**

b) Explain the need of Vref in ADC. Explain the factors to be considered while selecting Vref. Discuss on error budget depending on Vref and no. of output bits. **[6]**

c) Design and explain interfacing of LCD and LED with microcontroller. **[6]**

OR

Q2) a) Discuss in detail the different stages of an electronic product development. Explain the implications of skipping a particular stage in development. **[8]**

b) What are the specifications of DAC? Explain resolution with example. **[6]**

c) Explain the factors affecting on choice of Microcontroller for particular application with case study of one application. **[6]**

P.T.O.

Q3) a) Explain different phases of software design. List the common bugs and how to overcome these bugs? **[8]**

b) List the features of ICE & IDE simulators. **[8]**

OR

Q4) a) Explain the factors affecting on the choice of assembly language and high level language with example. **[8]**

b) Write a short notes on assembler and cross compilers. **[8]**

Q5) a) What are the different PCB design issues for high speed integrated circuits. Explain in detail. **[10]**

b) Explain the importance of shielding and grounding. **[8]**

OR

Q6) a) What is the signal integrity? Justify the significance of SI. How can it be ensure in high speed circuits? **[10]**

b) Explain different types of EMI? How it can be minimized? **[8]**

Q7) a) Why environmental testing is necessary? How it is carried out? Explain different factors in detail. **[8]**

b) Explain with suitable example of vibration testing. **[8]**

OR

Q8) a) What are the features & limitations of analog CRO and DSO for fault findings? **[8]**

b) Carried out DC analysis of any circuit, comment on the stability. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

P2007

[Total No. of Pages : 2

[5059] - 603
B.E. (Electronics)
ADVANCED POWER ELECTRONICS
(2012 Pattern) (End Semester)

Time : $2\frac{1}{2}$ ***Hours]*** ***[Max. Marks : 70***

Instructions to the candidates :-

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

Q1) a) Write down the causes and effects of EMI problems in controlled rectifiers. **[6]**

b) A single phase dual converter is operated from a 120 V, 60 Hz supply and load resistance is R = 10Ω. The circulating inductance is Lr = 40 mH, delay angles are α_1 = 60° and α_2 = 120°. Calculate the peak circulating current and the peak current of converter 1. **[7]**

c) Explain following power factor improvement (any one) techniques for single phase converters with suitable waveforms and equations. **[7]**

i) Extinction Angle Control (EAC)

ii) Symmetrical Angle Control (SAC)

iii) Pulse Width Modulation Control (PWM)

OR

Q2) a) Compare Circulating and non-Circulating current type dual converters. **[6]**

b) Explain three phase IGBT based PWM rectifiers along with its advantages. **[7]**

c) With the help of neat circuit diagram and waveforms explain the operation of single phase bridge Diode Clamped Multilevel inverter. State its features, advantages and disadvantages. **[7]**

Q3) a) What is braking? Explain Regenerative braking of DC machine. Mention its advantages and disadvantages. **[6]**

P.T.O.

b) A DC drive system uses a full converter in armature circuit and second full converter in field circuit in the case of separately excited dc motor. Calculate percentage change in the speed of the motor, if armature converter delay angle is changed from 600 to 500. Input supply voltage is 220 V, 60 Hz, armature resistance Ra = 0.27 Ω, motor armature current is 15 A, motor voltage constant Kb = 1.2 V/A rad /sec. **[6]**

c) Draw transfer function block diagram of DC motor. **[4]**

OR

Q4) a) Explain and draw the curve torque and power versus speed separately excited dc motor. **[6]**

b) Draw and explain the power circuit of single phase semi-converter feeding a separately excited DC motor. Explain with typical waveforms, the operation in continuous and discontinuous armature current modes. **[6]**

c) Compare converter fed and chopper fed drive. **[4]**

Q5) a) Explain variable square wave VSI Drives along with block diagram and application. **[8]**

b) What is the need of vector control in Induction Motors? Briefly explain Vector control of induction motors. **[10]**

OR

Q6) a) Explain different types of braking of induction motor. **[8]**

b) With the help of suitable circuit diagram and waveforms explain the working of Variable frequency PWM VSI Drives. **[10]**

Q7) a) Compare variable reluctance motor with permanent magnet stepper motor. **[8]**

b) Explain block diagram of volts/hertz control of synchronous motor drive along with the torque slip characteristics and the applications. **[8]**

OR

Q8) a) Explain the working principle of permanent magnet BLDC motor drive with constructional diagram. **[8]**

b) Explain the operation of a switched reluctance motor drive. **[8]**

Total No. of Questions : 10]

SEAT No. :

P 3074

[Total No. of Pages :2

[5059] - 604
B.E. (Electronics)
IMAGE PROCESSING & MACHINE VISION
(2012 Course) (Semester - I) (Elective - I) (404204 A)

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) With reference to relation between pixel explain. **[6]**
i) 4 Connectivity
ii) 8 Connectivity
iii) Mixed connectivity

b) Explain image formation in Human visual system in detail. **[4]**

OR

Q2) a) Explain spatial domain image sharpening in detail. **[5]**

b) What is mean by smoothing filter. Explain with the help of averaging filter. **[5]**

Q3) a) A 2×2 block of an image is given. Determine DCT coefficients.

$$\begin{bmatrix} 4 & 4 \\ 4 & 4 \end{bmatrix}$$ **[6]**

b) Write note on 2D - DFT and state its properties. **[4]**

OR

Q4) a) Explain the necessity of image transformation. Write short note on Haar transform. **[6]**

P.T.O

b) Justify the following with example & reasoning.

i) If all the pixels in an image are shuffled, will there be any change in the histogram.

ii) Can two different images have same histogram. **[4]**

Q5) a) Explain exactly point, line and edge detection. Which are the different edge detection algorithms. Explain any two in detail. **[10]**

b) How the edge linking is carried out using 4 and 8 connectivity for boundary detection. **[8]**

OR

Q6) a) Explain canny edge detector in detail. **[8]**

b) What thresholding? How histogram is useful for thresholding. What are the other techniques of thresholding, explain. **[10]**

Q7) a) Explain, how DCT is useful in image compression Explain zonal coding & threshold coding techniques. **[8]**

b) What is coding redundancy? How it is removed using variable length coding. Hence explain Huffman coding in detail with example. **[8]**

OR

Q8) a) Explain MPEG encoder in detail. **[8]**

b) Compare lossy & loss - less compression. Explain the methods used in this compression. **[8]**

Q9) a) Explain the image degradation model in detail. **[8]**

b) Explain fingerprint Recognition application in detail with blockdiagram. **[8]**

OR

Q10)a) Explain linearing filtering approach for image restoration. **[8]**

b) Write short note on following.

i) Electron Microscopy.

ii) Acoustic Imaging. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P 3075

[Total No. of Pages :2

[5059] - 605

B.E. (Electronics Engg.)

EMBEDDED SYSTEMS AND RTOS

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

Time : 2 Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) What do you mean by Design metric? Explain following design metrics Time to market power and NRE cost. **[5]**

b) Explain steps involved in designing Embedded system from memory selection point of view. **[5]**

OR

Q2) a) Explain different stages of embedded development process in waterfall model. **[5]**

b) What are the typical characteristics of Embedded System? What are the applications of Embedded System. **[5]**

Q3) a) Define inter-process communication and synchronization. **[5]**

b) Explain any three scheduling algorithm. **[5]**

OR

Q4) a) Explain classification of embedded system. **[5]**

b) Explain the concept of context switching? **[5]**

Q5) a) What is difference between Task,ISR and Function. **[8]**

b) Define semaphore and write use of mutex along comparison with semaphore. **[8]**

OR

P.T.O.

Q6) a) Define - **[8]**

i) interrupt latency
ii) interrupt response
iii) recovery
iv) Clock tick.

b) What do you mean by shared resource? Explain Deadlock and Priority inversion. **[8]**

Q7) a) What are the features of RTOS? **[8]**

b) Write down the functions of TCB and ECB? **[8]**

OR

Q8) a) Define Kernel, Task, Critical session and ready list. **[8]**

b) Explain different functions related to semaphore and mailbox in μcos-II **[8]**

Q9) a) Explain boot-loader challenges. **[8]**

b) Explain the mechanism of driver methods in Linux kernel. **[10]**

OR

Q10)a) Write difference between BIOS and Bootloader. **[8]**

b) Explain linux file system concept? **[10]**

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Total No. of Questions : 8]

SEAT No. :

P2008

[Total No. of Pages : 2

[5059] - 606

B.E. (Electronics) (End Semester)

BIOMEDICAL INSTRUMENTATION

(2012 Pattern) (Elective - I)

Time : $2\frac{1}{2}$ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) List out different Bio-medical physical sensor with their Bio-medical application and explain sensor performance characteristics. **[8]**

b) Explain the block diagram of typical ECG machine. **[6]**

c) Explain in detail different types of continuous rhythmic sinusoidal EEG activity. **[6]**

OR

Q2) a) Write short note on ECG amplifier with input protection & isolation circuit. **[8]**

b) Explain in detail about Bio-potential electrode. **[6]**

c) Explain 10-20 electrode placement system for EEG. **[6]**

Q3) a) What are the objectives of patient monitoring system? With block diagram explain bed side monitoring system. **[8]**

b) What is systolic and diastolic pressure? Explain non-invasive blood pressure measurement technique. **[8]**

OR

P.T.O.

Q4) a) Explain electromagnetic blood flow meter with its salient features. **[8]**

b) Write short note on stress test system. **[8]**

Q5) a) Discuss various issue of noise pollution around hospital. **[8]**

b) Explain blood gas analyzer for measurement of PH, PO2 & PCO2. **[8]**

OR

Q6) a) Explain patient safety consideration in equipment design. **[8]**

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

Q7) a) What is basic principle of MRI? Explain merits & demerits of MRI system. **[10]**

b) Explain application of Telemetry in patient caring. **[8]**

OR

Q8) a) Gives advantages & disadvantages of LASER in medicine. Explain general LASER safety guideline. **[10]**

b) Describe different technique for ultrasonic imaging. **[8]**

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Total No. of Questions : 08]

SEAT No. :

P2009

[Total No. of Pages : 2

[5059] - 607
B.E. (Electronics) (Semester - I)
Advanced Measurement Systems
(2012 Pattern)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) State and explain electrical validation and debug with arbitrary waveform generators. **[8]**

b) Draw & Explain the architecture and operation of network analyzer. **[6]**

c) Explain design issues and role of electronic measurements for debugging in automotive electronics. **[6]**

OR

Q2) a) Explain DSO trigger modes with examples. What are the limitations of different types of analysis. **[6]**

b) What is the need & techniques of interfacing. Explain the interfacing of touch screen. **[8]**

c) Explain serial bus decode test instruments of USB and PCI express. **[6]**

Q3) a) Explain measurement of microwave power bridge circuit using thermisters and barraters. **[8]**

b) Explain single line cavity coupling system for wavelength measurement. **[8]**

OR

P.T.O.

Q4) a) What are microwave enclosures and electronomagnetic compatibility? Explain EMI and EMC measurements. **[8]**

b) Explain transmission cavity wave meter & reaction wave meter. **[8]**

Q5) a) Explain hardware and software role in virtual instrumentation. **[8]**

b) Explain the application of FDM and ASK in instrumentation. **[8]**

OR

Q6) a) Explain application of counter for frequency and capacitance meter. **[8]**

b) Explain test system development using virtual instrumentation. **[8]**

Q7) a) Explain voltage of frequency converter. State its applications. **[6]**

b) What are the types of ADC and DAC? Enlist the specifications of ADC and DAC. **[6]**

c) Explain automation in digital instruments. **[6]**

OR

Q8) Write short note on any three **[18]**

a) Data loggers

b) Universal Counter

c) Lab view based data acquisition system.

d) Sample and Hold.

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Total No. of Questions : 10]

SEAT No. :

P2160

[Total No. of Pages :2

[5059]-608
B.E.(Electronics)
DSP PROCESSORS
(2012 Pattern)(Elective-II)(Semester-I) (404205A)

Time :2½Hours] *[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 the sources of error in DSP implementations **[6]**

b) Explain the number formats for signals and coefficients used in DSP system. **[4]**

OR

Q2) a) What is meant by overflow and underflow in arithemetic computation? How is an overflow condition detected? **[6]**

b) Write a note on **[4]**

i) Dynamic range

ii) Precision

Q3) a) For the IIR filter, $H(z)=\frac{z-1}{(z-0.25)(z-0.5)}$ **[5]**

Determine:

i) Impulse response

ii) Difference Equation.

b) What is role of the interrupt pins of a DSP device? Are these the only means of interrupting a DSP program? How do you prevent a signal on an interrupt pin from interrupting a time critical program being executed by DSP? **[5]**

OR

P.T.O.

Q4) a) Draw and discuss the genetic diagram of host port interface (HPI) **[5]**

b) Write note on: on chip peripherals

i) Hardware Timer

ii) Serial I/O Port **[5]**

Q5) a) Discuss the memory organization for matrix multiplication of a 3×4 matrix with a 4×3 matrix. **[8]**

b) Draw the block schematic of an adaptive filter and explain. Write the mathematical equation for updating the filter coefficient. **[8]**

OR

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

b) Write a note on 2D signal processing on a DSP processor **[8]**

Q7) a) What is bit reversed indexing in FFT algorithm? Explain the procedure of bit reversed index generation. **[8]**

b) Explain the butterfly computation is FFT algorithm. **[8]**

OR

Q8) a) Explain the overflow and scaling in FFT algorithm. How it is overcome **[8]**

b) Discuss the 2-point DFT computation using butterfly algorithm for DIF & DIT methods. **[8]**

Q9) a) What are the various classifications of interrupts for the TMS320 C5416 processor. **[6]**

b) How does the interrupt handling in the TMS320C54XX DSP differ from a software & hardware interrupt? **[6]**

c) How does DMA help in increasing the processing speed of a DSP processor **[6]**

OR

Q10)a) Explain the programmed I/o interface with suitable examples **[6]**

b) Write a note on **[12]**

i) Multichannel Buffered serial port(McBSP)

ii) CODEC

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Total No. of Questions :10]

SEAT No. :

P3076

[Total No. of Pages : 3

[5059]-609
B.E. (Electronics)
ROBOTICS AND AUTOMATION
(2012 Course) (Elective-II) (Semester-I) (404205-B)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) What are the various components in robot drive system Hydraulic/ Pneumatic system. **[5]**

b) What are the specification of robot? Write any 3 specifications in detail? **[5]**

OR

Q2) a) Explain CNC, NC and DNC machines. **[5]**

b) What are the different actuators are used in robotics system. **[5]**

Q3) a) What is SCARA robot? Explain the application in which it is most suitable. **[4]**

b) Differentiate the following: **[4]**

i) Reach & Stroke.

ii) Hard and Soft Automation.

c) Explain the terms. **[2]**

i) Workspace.

ii) Manipulator.

OR

P.T.O.

Q4) a) Given data for telescope arm of an industrial robot. **[6]**

i) Total range of rotation = 180°.

ii) Bit storage capacity for the axes = 8

iii) Arm fully extends to maximum reach for extension = 1800 mm.

iv) Arm fully retracts to minimum reach for retraction = 800 mm.

Determine the robot control resolution for

1) Rotation 2) Translation

b) Write a note on: **[4]**

i) Proximity sensor ii) Vision Sensor

Q5) a) Explain Direct and inverse kinematics for industrial robots for position and orientation redundancy? **[8]**

b) What is D-H convention? What are the dynamics considerations in robotics application? **[8]**

OR

Q6) a) Sketch neat joint & link diagram and define the terms: **[8]**

i) Joint angle

ii) Joint distance

iii) Link length

iv) Link twist angle

Name the variable parameters for the revolute and prismatic joints.

b) It is desired to above a joint of six robot go from initial angle of 20° to a final angle of 80° in 5 second. Using third degree polynomial calculates the joint angles at interval of 1 second. **[8]**

Q7) a) Explain the role of fuzzy controllers in robotics applications? **[8]**

b) What is Jacobian control? Discuss the Jacobian in terms of D-H matrices. **[8]**

OR

Q8) a) State and explain Newton-Eular dynamics of robots. Also explain the Newton-Eular Formulations for manipulators. **[8]**

b) Discuss Kane's Method used for formulation of dynamical equations? **[8]**

Q9) a) Draw the block diagram of fuzzy controller and explain. **[9]**

b) Explain with neat block diagram how vision system is used in complex control system. **[9]**

OR

Q10)a) With the help of neat block diagram explain neural controller. **[9]**

b) Draw block diagram of trajectory tracking controller and explain. How vibrations can be minimized. **[9]**

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Total No. of Questions : 08]

SEAT No. :

P2010

[Total No. of Pages : 2

[5059] - 610
B.E. (Electronics) (End-Sem)
Electronics in Agriculture
(2012 Pattern) (Semester - I)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define virtual instrumentation & explain role of virtual instrumentation in the field of agriculture. **[8]**

b) Compare different methods for measurement of soil moisture. **[8]**

c) Write a short note on: Use of field bus used for agriculture applications. **[4]**

OR

Q2) a) Enlist the factors affecting the reflectance properties of a leaf and explain the mechanism of leaf reflectance. **[8]**

b) Explain the principle of chemical reaction gas sensors, carbon dioxide sensor, ammonia sensor & NDIR gas sensors. **[8]**

c) Write a note on SCADA & State its uses in agriculture. **[4]**

Q3) a) What are conventional temperature and pressure sensing techniques? Explain difference with advantages & disadvantages. **[6]**

b) What do you mean by Yield Monitoring & Mapping? **[6]**

c) What is GIS? Explain data organization in GIS? **[4]**

OR

Q4) a) Explain method of sampling farm fields. **[6]**

b) What is precision agriculture and what are its perceived benefits? **[6]**

c) What are the constraints for farmers to adopt precision agriculture? **[4]**

P.T.O.

Q5) a) Explain the components of crop production forecasting systems by remote sensing techniques. **[6]**

b) List the types of Spraying Equipment and explain any one in detail. **[6]**

c) Compare weed activated spraying & site-specific spraying. **[4]**

OR

Q6) a) What is the utility of soil moisture measurement for crop productivity improvement? **[6]**

b) Compare conductivity & capacitance methods for grain moisture measurement. **[6]**

c) Write short note on: Instruments and systems used for crop handling and storage. **[4]**

Q7) a) What role can agri instrumentation play in productivity improvement of agriculture? **[6]**

b) Draw & explain web based polyhouse system. **[6]**

c) What are the limitations for growth of agricultural productivity in India? **[6]**

OR

Q8) a) What problems are being faced in Indian Agriculture after green revolution? **[6]**

b) State the advantages & disadvantages of Greenhouse automation. **[6]**

c) Explain in brief E-governance. **[6]**

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Total No. of Questions : 8]

SEAT No. :

P2011

[Total No. of Pages : 2

[5059] - 611
B.E. (Electronics)
MOBILE COMMUNICATION
(2012 Pattern) (End Sem.)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates :-

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

Q1) a) Describe with neat diagram techniques of improving coverage and capacity of cellular system. **[10]**

b) Explain in detail with diagram all proposition mechanism in Mobile radio. **[10]**

OR

Q2) a) With neat diagram, explain Direct RF pulse system for small scale multipath measurement. List types of small scale fading. **[10]**

b) Classify constant Envelope modulation. Draw and explain with neat diagram MSK Transmitter and receiver. **[10]**

Q3) a) Explain in brief following characteristics of speech signals: **[8]**

i) Probability density function

ii) Auto correlation function

iii) Power spectral density function

b) Compare uniform and non - uniform Quantisation techniques. **[8]**

OR

Q4) a) Draw and explain with block diagram, working of sub - band coder and decoder. **[8]**

b) Compare multiple access techniques for mobile radio. **[8]**

P.T.O.

Q5) a) Describe with block diagram the operation of a cellular radio network. **[8]**

b) Explain SSI protocol model for signalling between interconnected networks. **[8]**

OR

Q6) a) Define UMTS. With diagram explain network architecture for UMTS. **[8]**

b) What is the objective of PCS / PCN? List out the factors influencing use of packet switching in PCS/ PCN. **[8]**

Q7) a) Draw and explain the significance of various interfaces in GSM. **[9]**

b) Classify and explain GSM logical channels. **[9]**

OR

Q8) a) With neat block diagram, describe reverse IS - 95 channel modulation process for a single user. **[9]**

b) Explain with neat diagram the working of Quadrature modulation in IS - 95. **[9]**

Total No. of Questions : 08]

SEAT No. :

P2012

[Total No. of Pages : 2

[5059] - 612
B.E. (Electronics)
COMPUTER NETWORK
(2012 Pattern) (Semester - II)

Time : $2\frac{1}{2}$ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Compare TCP/IP with OSI Model. **[7]**

b) What is optical fiber? What are the different propagation modes of optical fiber? Explain the graded index optical fiber with suitable diagram. **[6]**

c) What is the drawback of ARQ protocol? Explain selective repeat request protocol with flow diagram. **[7]**

OR

Q2) a) Explain the network software designing issues for the layer **[7]**

b) What are the factors that affect the maximum data rate limit? Explain the maximum data rate limit for noiseless and noisy channel. **[6]**

c) Explain with suitable diagram the virtual LANs **[7]**

Q3) a) What is traffic shaping? Explain leaky bucket algorithm. **[6]**

b) What is routing? Explain shortest path routing algorithm. **[6]**

c) Explain the use of UDP protocol **[4]**

OR

P.T.O.

Q4) a) Explain the process to process delivery through client/server paradigm. **[6]**

b) Compare IPv4 and IPv6. **[6]**

c) Explain connectionless versus connection oriented services provided by transport layer. **[4]**

Q5) a) What is Cryptography? What are its types? Explain the symmetric key and Asymmetric key cryptography. **[6]**

b) Explain the RSA algorithm. **[6]**

c) Explain the various network security services **[4]**

OR

Q6) a) Compare symmetric key and Asymmetric key cryptography. **[6]**

b) Explain the various network security attacks. **[6]**

c) Explain UTP cabling for PC to PC communication. **[4]**

Q7) a) What is the role of DNS? Explain the DNS with suitable diagram. **[8]**

b) Explain the telnet and FTP protocol using suitable diagram. **[10]**

OR

Q8) Write short notes

a) SMTP **[6]**

b) BOOTP **[6]**

c) P2P File sharing **[6]**

✦✦✦✦

Total No. of Questions : 10]

SEAT No. :

P2013

[Total No. of Pages : 3

[5059] - 613
B.E. (Electronics)
PROCESS AUTOMATION
(2012 Pattern) (Semester - II)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates :-

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

Q1) a) Draw the following instrument line symbols.

i) Pneumatic Signal

ii) Electric Signal

iii) Hydraulic Signal

iv) Electromagnetic or sonic signal (guided)

v) Electric binary signal. **[5]**

b) Enlist different process loop tuning methods and explain any one method in detail. **[5]**

OR

Q2) a) State the equation for a proportional integral controller. Draw a circuit diagram for a proportional integral (PI) mode controller. **[5]**

b) State different control valve selection criteria. **[5]**

Q3) a) Explain with suitable example process control block diagram. **[4]**

b) A temperature control system inputs the controlled variable as a range from 0 to 4V. The output is a heater requiring 0 to 8V. A PID controller is to be used with Kp=2.4%/%, Ki=9%(%-min), Kd=0.7%/(% min). The period of the fastest expected change is estimated to be 8 seconds. Develop the PID circuit. **[6]**

P.T.O.

OR

Q4) a) State the following control system evaluation criteria.

i) Minimum Area Criteria

ii) Quarter Amplitude Criteria **[4]**

b) A proportional derivative controller has a 0.4 to 2.0 V input measurement range, a 0 to 5V output , Kp = 5%/% and Kd = 0.08 % per (%/min).The period of the fastest expected signal change is 1.5 sec. Implement this controller with an op-amp circuit. **[6]**

Q5) a) Explain with neat diagram architecture of a PLC? Give important specifications of a PLC. **[9]**

b) Develop the physical ladder diagram for a motor with the following.

NO START button, NC STOP button, thermal overload limit switch opens on high temperature, green light when running, red light for thermal overload. **[8]**

OR

Q6) a) Explain the PLC operation with respect to

i) I/O scan mode

ii) Execution mode

iii) Scan time **[9]**

b) Develop physical ladder diagram for the tank system to satisfy following automation sequence.

i) Fill the tank

ii) Heat and stir the liquid for 30 minutes.

iii) Empty the tank

iv) Repeat frorn step i. **[8]**

Q7) a) Explain feed forward 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) Strip Chart recorder **[8]**

b) Direct Digital Control **[8]**

OR

Q10)a) Explain with suitable block diagram architecture of a typical Distributed Control System (DCS). **[8]**

b) State applications of SCADA. Explain the functions of RTU and MTU. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3077

[Total No. of Pages : 2

[5059]-614

B.E. (Electronics Engineering)

SPEECH AND AUDIO SIGNAL PROCESSING

(2012 Course) (Semester - I) (Elective - III) (End Sem.) (Theory) (404211A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8, Q.9 OR Q.10.***
2) ***Right side figures indicate marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Classify Vowels and the Consonants. **[5]**

b) Explain characteristics & nature of speech signal. **[5]**

OR

Q2) a) Explain simplified model of cochlea with neat diagram. **[5]**

b) Describe LTI model for speech production. Write assumptions clearly. **[5]**

Q3) a) Write expression for short time energy? How it is used for calculation of pitch frequency? **[5]**

b) How speech signal is classified as voiced and unvoiced using ZCR and short time energy? **[5]**

OR

Q4) a) Write a short note on spectral features. **[5]**

b) Explain spectrogram & there their types. Explain its significance and applications in speech processing. **[5]**

Q5) a) Explain the method to find the LPC coefficients using auto correlation method. **[8]**

b) Explain Levinson-Durbin recursive algorithm for calculation of predictor coefficients. **[8]**

OR

P.T.O.

Q6) a) Explain Frequency domain interpretation of LPC analysis. **[8]**

b) Explain relation between formants & LPC. **[8]**

Q7) a) Explain long term complex Cepstrum & short term complex cepstrum. Explain the properties of complex Cepstrum. **[8]**

b) Explain the method to calculate MFCC using block diagram. **[8]**

OR

Q8) a) Explain the method to evaluate the formants of speech signal using cepstrum Analysis. What is importance of formants in speech processing? **[8]**

b) Explain the homomorphic processing system for convolution with a block schematic. Justify the use of LTI filter for a convolved signal. **[8]**

Q9) a) Explain different issues and challenges for speaker recognition system. What will be the probable solutions to resolve issues, Explain. **[10]**

b) Explain Text to Speech conversion system with block schematic? State different applications of TTS. **[8]**

OR

Q10)a) State different distortion measures used for Automatic Speech Recognition System. **[8]**

b) Compare speaker identification system with speaker verification system. **[10]**

Total No. of Questions : 8]

SEAT No. :

P2014

[Total No. of Pages : 2

[5059] - 615
B.E. (Electronics)
AUDIO AND VIDEO ENGINEERING
(2012 Pattern) (Semester - II) (Elective - III - B)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates :-

1) ***Answer any one question from Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams should be drawn wherever necessary.***

Q1) a) Calculate the horizontal resolution and video bondwidth for CCIR - B standards in India. **[7]**

b) Explain the function of digital camera with neat diagram. **[7]**

c) Explain composite and component coding video signals. **[6]**

OR

Q2) a) Give comparision of PAL, NTSC and SECAM TV standards. **[7]**

b) What are the merits and demerits of DTH. **[7]**

c) Explain MPEG - 2 Video compression technique. **[6]**

Q3) a) Write short note on any two: **[10]**

i) IP / Web TV

ii) WiFi TV

iii) Smart TV

b) Explain the working of 3DTV. **[8]**

OR

Q4) a) Write short note on any two. **[10]**

i) Digital surveillance

ii) H.264 TV Standards

iii) Camcorders

b) Explain the prospective of TV white spaces. **[8]**

P.T.O.

Q5) a) Write short note on : **[10]**

i) Types of Microphones

ii) Types of Speaker

b) Explain the working of various components in PA system. **[6]**

OR

Q6) a) Write short note on : **[10]**

i) Reverberations

ii) Digital representation of sound wave

b) Explain the term studio acoustics in speech system. **[6]**

Q7) a) Write short note on : **[10]**

i) Blu ray DVD

ii) CD / DVD players

b) Explain the ITV - T(G) standards. **[6]**

OR

Q8) a) Explain the multichannel / Dolby 5% sound system **[6]**

b) Write short note on : **[10]**

i) Digital sound recording techniques

ii) MP3 players

Total No. of Questions : 8]

SEAT No. :

P2161

[Total No. of Pages : 3

[5059]-616

B.E.(Electronics Engg.)

OPTICAL AND MICROWAVE COMMUNICATION

(2012 Course)(Elective-III)(Semester-II) (End Sem.)(404211)

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.***
3) ***Neat diagrams must be drawn where ever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Compare the following terms **[8]**

i) step index fiber and Graded index Fiber.

ii) Pin photodiode and Avalanche photodiode.

b) An optical Fiber has a core refractive index of 1.49 and a cladding refractive index of 1.45. **[6]**

Determine:

i) the critical angle

ii) NA of the fiber

iii) Acceptance angle.

c) Explain the working of LASER diode. Compare LASER with LED. **[6]**

OR

Q2) a) Explain the concept of Wavelength Division Multiplexing along with neat diagram. state the key features of the same. **[8]**

b) What is dispersion? Explain intermodal dispersion and intra modal dispersion **[6]**

c) Draw and explain the working principle of SOA optical amplifier. **[6]**

P.T.O.

Q3) a) Explain the following parameters of directional coupler. **[8]**

i) Coupler factor

ii) Directivity

iii) Isolation

iv) Insertion loss

b) Determine the cut off wavelength for the dominant mode in a rectangular wave guide of breadth 10 cm For a 2.5 GHz signal propagated in this waveguide in dominant mode, calculate guide wavelength, group velocity phase velocity and wave impedance. **[10]**

OR

Q4) a) Explain the construction and working of gyrator based on Faraday's rotation principle. **[6]**

b) State and explain the properties of scattering matrix. **[6]**

c) A power source of 90w is connected to the input port of a directional coupler with coupling factor 20dB and directivity 35 dB. Neglecting the insertion loss, find the power at coupled, isolated and output ports. **[6]**

Q5) a) Explain the construction and working of TWT(Travelling Wave Tube) in detail. **[8]**

b) Enlist the different types of magnetron. Explain how mode jumping is avoided in magnetron. **[8]**

OR

Q6) a) A reflex klystron operates at the peak mode of n=2 with V_0=300V, I_0=20 MA and a signal voltage of V_1=40V. Determine **[8]**

i) Input power

ii) output power

iii) Efficiency.

b) Explain the construction and working of multi cavity klystrone Amplifier. **[8]**

Q7) a) Explain the principle of operation, IV characteristic of microwave tunnel diode. **[8]**

b) Explain with neat diagram construction and working of MESFET. **[8]**

OR

Q8) Write short notes on the following along with applications. **[16]**

a) Varactor diode

b) Microwave transistor

c) Schottky diode

d) PIN diode

Total No. of Questions : 8]

SEAT No. :

P2015

[Total No. of Pages : 2

[5059] - 618
B.E. (Electronics)
BIOMEDICAL SIGNAL PROCESSING
(2012 Pattern) (End Semester)

Time : $2\frac{1}{2}$ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) State the applications of microelectrodes, skin surface electrodes and needle electrodes. **[8]**

b) Discuss most important factors to be considered in the design of medical instrumentation. **[6]**

c) Explain various heart sounds generated in the pumping activity of heart. **[6]**

OR

Q2) a) Explain fourier analysis of EEG signal. **[8]**

b) Write a note on direct and indirect blood pressure measurement. **[6]**

c) Draw and explain unipolar and bipolar arrangement of ECG acquisition. **[6]**

Q3) a) Draw & explain structure of brain. **[8]**

b) Write a short note on "Use of EEG to diagnose various Brain disorders". **[8]**

OR

Q4) a) Explain adaptive cancellation of maternal ECG from fetal ECG of interest. **[8]**

b) Write a short note isolation amplifier, grounding and shielding techniques. **[8]**

P.T.O.

Q5) a) Explain how fourier transform is used in EEG signal analysis. **[8]**

b) State the differences between FIR filtering and IIR filtering. **[8]**

OR

Q6) a) State the Weiner Hope equation. Explain the with equations the least mean square approach to find the filter coefficients. **[8]**

b) Explain the concept of low pass filtering and high pass filtering with respect to biosignals. **[8]**

Q7) a) Explain in context with EEG-Epilepsy, sleep disorders. **[10]**

b) Describe a method for adaptive cancellation of noise from biosignals to achieve appropriate filter coefficients. **[8]**

OR

Q8) a) State the difference between stationary and non-stationary signals. Support the answer with relevant application to biomedical domain. **[10]**

b) State the PCA algorithm and its significance. **[8]**

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Total No. of Questions : 08]

SEAT No. :

P2016

[Total No. of Pages : 2

[5059] - 619
B.E. (Electronics)
NANO ELECTRONICS AND MEMS
(2012 Pattern)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) List out the limitations of semiconductor material. **[7]**

b) What are the different types of carbon nanotube. **[7]**

c) Explain application of nano technology in drug and drug delivery. **[6]**

OR

Q2) a) "Biosystem is nothing but complex nano systems", justify the statement. **[7]**

b) Write useful properties CNTs. **[7]**

c) Write a short note on Nano-sensors. **[6]**

Q3) a) What is MEMS? Write its advantages and applications. **[9]**

b) What are the process steps used in fabrication of MEMS. **[9]**

OR

Q4) Explain following micromaching techniques (any 3). **[18]**

a) Bulk micromaching

b) Surface micromaching

c) LIGA

d) DRIE of BSOI

P.T.O.

Q5) a) Write different compounds which are used in MEMS. Explain any one of them. **[8]**

b) What do you mean by the piczoresistance? Can be used silicon for the same? Write down mathematical expression for it **[8]**

OR

Q6) a) What is "Conductive polymers"? Write methods how polymers can be made conductive **[8]**

b) Write a short note on use of "Quartz in MEMS." **[8]**

Q7) a) What are the major technical issues in bio MEMS products? **[8]**

b) Explain how biosensor is used for glucose concentration measurement. **[8]**

OR

Q8) a) Explain basic working principal of MEMS microphone. Give its specifications. **[8]**

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

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Total No. of Questions : 10]

SEAT No. :

P3078

[Total No. of Pages : 2

[5059]-620
B.E.(Electronics)
SYSTEM ON CHIP
(2012 Course)(End Sem)(Semester-II) (404212C)(Elective-IV)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt from Section-I Q1 or 2, Q3 or 4, Q5 or 6, Q7or 8, Q9 or 10.***
2) ***Draw neat diagrams.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain STA in detail. What are limitations of STA? **[6]**

b) What are challenges for bus synchronization? **[4]**

OR

Q2) a) In which HDL system race took place? Do VHDL have this problem. **[6]**

b) Draw and explain flow chart used for microsystem development. **[4]**

Q3) a) Which factors affect the delay and slew? **[6]**

b) In which conditions System Verilog may arise race problem? **[4]**

OR

Q4) a) How synchronizer is used to aviod metastability in clock domain crossing? **[6]**

b) Explain in detail RTL based chip design flow. **[4]**

Q5) a) Explain working of CVD? Which CVD process is used in SoC design? **[8]**

b) Explain surface micromachining steps in MEMS fabrication. What are its limitations. **[8]**

OR

P.T.O.

Q6) a) Which fundamental steps one has to follow while etching MEMS SoC based designs. **[8]**

b) What do you mean by scaling in electromagnetic force? Justify:electromagnetic force is $F \propto l^4$ for cross section area ofconductor. **[8]**

Q7) a) Explain dry etching process used for micromachining. **[8]**

b) Explain various technologies used in MEMS fabrication and compare their features. **[8]**

OR

Q8) a) Explain design methodology for semicustom components. **[8]**

b) Explain abstraction levels of hardware descriptions used in synthesis. **[8]**

Q9) a) Explain system-level heterogeneous modeling. **[9]**

b) Draw a flowchart for generic test generation procedure and explain in detail. **[9]**

OR

Q10) a) Explain features of co-design tool with an example. **[9]**

b) Explain Analog in-circuit test with an example. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2017

[Total No. of Pages : 2

[5059] - 620 - A
B.E. (Electronics)
MECHATRONICS
(2012 Pattern) (Elective - IV)

Time : $2\frac{1}{2}$ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) List the phases in mechatronics design process. Explain with diagram. **[6]**

b) Explain functions of mechatronics system. **[4]**

OR

Q2) Write short on (any two) **[10]**

a) Switches

b) MMF (Mechatronics Function Module)

c) AMS (Autonomous Mechatronics System)

Q3) a) Explain V-model of designing of self optimizing system. **[6]**

b) Differentiate conceptual design fetch at system level and module level. **[4]**

OR

Q4) a) Design mobile robot with neat diagram. **[6]**

b) Explain key elements of control mechatronics system. **[4]**

Q5) a) Explain in detain IEEE 488-The General purpose Interface bus. **[10]**

b) Explain Universal Asynchronous Receiver Transmitter (UART) in detail. **[8]**

OR

P.T.O.

Q6) Write short note on following (Any Three) **[18]**

a) Unbalanced Vs. balanced transmission.

b) Point to point Vs. multipoint communication system.

c) Asynchronous serial data format

d) Simplex, Half-Duplex, Full-Duplex.

Q7) a) Explain in detailed functional requirement of data loggor. **[10]**

b) What are the hardware options available in data logging system. Explain **[6]**

OR

Q8) a) Explain case study of any one application of data logging system in mechatronics. **[10]**

b) Write short on online analysis and offline analysis. **[6]**

Q9) a) Explain in detailed X-ray based fabrication of MEMS. **[10]**

b) What are the mechanical properties of MEMS. Explain. **[6]**

OR

Q10)Write short note on (Any Two) **[16]**

a) Inertial sensors (MEMS)

b) Micromachinel Pressure Sensor.

c) Microchannel heat sink

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Total No. of Questions : 08]

SEAT No. :

P2018

[Total No. of Pages : 2

[5059] - 621
B.E. (E & TC)
VLSI DESIGN & TECHNOLOGY
(2012 Pattern) (Semester - I)

Time : 2 1/2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams should be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) State the difference between **[6]**

i) Signal and variable

ii) Functions and procedures **[8]**

b) Draw and explain the following for FPGA

i) Logic cell

ii) CLB

iii) Programmable switch matrix

iv) I/O block

c) What is the need of clock distribution? Explain techniques of clock distribution. **[6]**

OR

Q2) a) Write VHDL code and test bench for D FLIP FLOP using function for clock event. **[8]**

b) Explain with diagram SRAM and anti-fuse programming techniques used in FPGA? **[6]**

c) What is floor planning? Explain in detail. **[6]**

P.T.O.

Q3) a) Draw and explain CMOS transfer characteristics in detail showing all regions in the characteristics. **[8]**

b) Design CMOS logic for $Y = \overline{AB+CD+E}$. 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]**

b) Explain the following. **[8]**

i) Velocity saturation

ii) Body effect

iii) Hot electron effect

iv) Channel length modulation

Q5) a) Explain common source amplifier with the help of circuit diagram. Draw AC equivalent circuit and expression for voltage gain, output resistance. **[8]**

b) Explain device parasitic and their limitation on the performance of CMOS circuits. **[8]**

OR

Q6) a) Draw and explain difference amplifier using MOS transistors. **[8]**

b) Draw and explain current sink and source circuits. **[8]**

Q7) a) Explain the need of design for testability. Explain scan path testing. **[8]**

b) Explain stuck-at-0 and stuck-at-1 faults with example. **[8]**

OR

Q8) Write short note on. **[16]**

a) TAP controller with state diagram.

b) Built In Self Test (BIST)

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Total No. of Questions : 10]

SEAT No. :

P2019

[Total No. of Pages : 2

[5059] - 622
B.E. (E & T/C)
COMPUTER NETWORKS
(2012 Pattern) (Semester - I)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Classify different transmission media. Give advantages and disadvantages of fiber cable? **[6]**

b) Explain communication in Datagram Network? **[4]**

OR

Q2) a) State and explain stop and wait ARQ protocol? **[6]**

b) Write a short note on Gigabit Ethernet? **[4]**

Q3) a) Explain and correlate any four connecting devices with OSI reference model? **[4]**

b) Explain flow control in data link layer? **[6]**

OR

Q4) a) Compare Bluetooth with Zigbee? **[4]**

b) What characteristics can be used to group stations in VLAN? **[6]**

Q5) a) Explain IPv6 protocol? **[5]**

b) Explain unicast and multicast routing? Give one application of multicasting. **[6]**

c) Explain remote and mobile host communication in mobile IP? **[6]**

OR

P.T.O.

Q6) a) What is ICMPv4? Explain general format of ICMPv4 messages? **[5]**

b) Explain different performance parameters of Network layer? **[6]**

c) Explain different network layer services? **[6]**

Q7) a) Explain various transport layer protocols? **[7]**

b) List the services provided to upper layers by transport layer. Explain any one in detail. **[6]**

c) Explain what is socket? **[4]**

OR

Q8) a) Explain port numbers and socket addresses? **[7]**

b) Explain the features of SCTP? **[4]**

c) Explain connection establishment and connection termination with respect to the transport layer? **[6]**

Q9) a) Compare symmetric key cryptography with asymmetric key cryptography. Explain RSA algorithm. **[8]**

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

i) WWW

ii) HTTP

OR

*Q10)*a) Explain FTP and TELNET in detail with respect to Server and Client communication? **[8]**

b) How does electronic mail system work? What is the role of SMTP and POP-3 server in E-mail system? **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

P2020

[Total No. of Pages : 3

[5059] - 623
B.E. (E & TC)
MICROWAVE ENGINEERING
(2012 Pattern) (End Sem.)

Time : $2\frac{1}{2}$ ***Hours]*** ***[Max. Marks : 70***

Instructions to the candidates :-

1) ***Answers any one Questions out of Q1 & Q2, Q3 &Q4, Q5& Q6, Q7& 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) What is a waveguide? Distinguish between the rectangular waveguide and circular Waveguide. **[6]**

b) Draw and explain the two hole directional coupler, Also represent it in terms of S -matrix. **[6]**

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

i) Microstrip line

ii) Shielded strip line and

iii) Parallel strip line

OR

Q2) a) For an air filled rectangular waveguide of dimensions a = 2 cm and b = l cms calculate the cut off wavelength for TE_{10} and TM_{11} modes. Also calculate the guide wavelength at 10GHz. **[6]**

b) Explain the Impedance and Admittance Matrices for n-port microwave network. **[4]**

c) What is a cavity resonator? Explain in detail the quality factor of cavity resonator. **[6]**

d) Explain with the help of neat diagram proprieties of E-plane Tee. **[4]**

Q3) a) Distinguish between TWTA and Klystron tube. **[8]**

b) Explain in detail the phase focusing effect in cavity magnetron. **[8]**

OR

P.T.O.

Q4) a) Explain the voltage, power and frequency characteristics of reflex klystron tube. **[8]**

b) A travelling tube operates under the following parameters, **[8]**

Beam voltage V_o = 3KV

Beam Current = I_o = 30 mA

Characteristics impedance of the helix = $Z_o = 10\Omega$

Circuit length N = 50

Frequency f = l0GHz

Determine:

i) gain parameter 'c'

ii) the output power gain 'A_p' in decibels and

iii) all the propagation

Q5) a) With the help of two valley theorem explain the working of Gunn diode. **[8]**

b) Write a note on: TRAPTT Diode. **[4]**

c) Explain the working of Microwave field effect transistor (FET). **[4]**

OR

Q6) a) Explain the working principle of tunnel diode. **[8]**

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

i) IMPATT Diode

ii) Schottky barrier diode

Q7) a) TE10 wave is transmitting inside a transmission system operating at 10GHz. Dimensions of waveguide are 4cm × 2.5cm. Distance measured between the twice minimum power point is 1mm on a slotted line. Calculate the standing wave ratio of transmission system. **[6]**

b) Explain reflectometer method for measurement of impedance. **[6]**

c) Write a note on Measurement of quality factor. **[6]**

OR

Q8) a) Two identical directional coupler are used in waveguide to sample incident and reflected powers. The output of two couplers is 2.5mw and 0.15mw respectively. Find the value of VSWR in waveguide. **[6]**

b) Explain the phase shift measurement using double minimum method at microwave frequency. **[6]**

c) Write a short note on VSWR meter. **[6]**

Total No. of Questions : 12]

SEAT No. :

P2021

[Total No. of Pages : 3

[5059] - 624

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

DIGITAL IMAGE PROCESSING

(2012 Course)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
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 the Human Visual system in detail. **[4]**

b) Explain in brief & with example three distance measures between pixels. **[3]**

OR

Q2) a) What is image subtraction? How the pixels are scaled between 0 to 255 after image subtraction. Give application of image subtraction operation. **[4]**

b) Explain HSI color model of an image **[3]**

Q3) a) Filter the following image using 3×3 neighbourhood averaging by assuming zero padding. **[4]**

$$\begin{bmatrix} 1 & 2 & 3 & 2 \\ 4 & 2 & 5 & 1 \\ 1 & 2 & 6 & 3 \\ 2 & 4 & 6 & 7 \end{bmatrix}$$

b) Explain any three noise models in short. **[5]**

P.T.O

OR

Q4) a) Explian following operations of image enhancement. **[4]**

i) Power law transformation.

ii) Contrast streching.

b) Explain the concept of Homomorphic filtering. **[3]**

Q5) a) Compute the entropy of the image given by **[4]**

$$f(x,y)=\begin{bmatrix}0 & 1 & 0 & 0\\ 0 & 1 & 2 & 2\\ 0 & 1 & 2 & 3\\ 1 & 2 & 2 & 3\end{bmatrix}$$

b) Explain the concept of bit plane coding. **[3]**

OR

Q6) a) Draw the block diagram of JPEG base line encoder. Explain each block in short. **[4]**

b) Define Lossless & Lossy compression. Explain with example how Runlenght coding technique is used for Lossless Compression. **[3]**

SECTION - II

Q7) a) What is edge detection? Compare the performance of first order & second order derivative w.r.t. an image? Which one would you prefer for detecting edges? Why? **[9]**

b) Define image segmentation. What is Region based approach for image segmentation Explain Region growing & Region splitting and merging technique in detail. **[9]**

OR

Q8) a) Explain the following in detail. **[10]**

i) Hough transform

ii) Hit or Miss transform

b) Explain Global, adaptive and otsu's method of thresholding. **[8]**

Q9) a) What is the need of boundary descriptor. Explain 4-directional & 8-directional chain code with example. Hence obtain the object shape represented by 8-directional chain code (clock wise)

{0, 1, 5, 0, 6, 6, 4, 4, 4, 4, 2, 2} **[8]**

b) Explain the following Regional descriptors

i) Topological Descriptors **[4]**

ii) Texture descriptors **[4]**

OR

Q10)a) Explain in detail the concept of Fourier descriptor based boundary representation. What are its advantages **[8]**

b) Explain in detail the following **[8]**

i) Statistical moments

ii) Principle component Analysis

Q11)a) What is Pattern? Explain the representation of different pattern classes.**[8]**

b) Explain Biometric based Authentication system using image processing. **[8]**

OR

Q12)a) Explain Minimum distance classifiers and correlation based classifier in detail **[8]**

b) Explain Medical application of image processing in detail. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2022

[Total No. of Pages : 2

[5059] - 625

B.E. (E&TC)

EMBEDDED SYSTEM AND RTOS

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any one Question out of Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6, Q No. 7 or 8, Q No.9 or 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tahles, slide mollics charts, electronic pocket calculator and steam tables is alloud.***
5) ***Assume suitable data, if necessary.***

Q1) a) Design the medium scale embedded system. **[6]**

b) With example explain how design metrics are depend on each other **[4]**

OR

Q2) a) Compare foreground/Background system with RTOS. **[5]**

b) What is difference between Spiral and V model? **[5]**

Q3) a) What is the need of semaphore? How do you create counting semaphore? **[4]**

b) Write algorithm/ program for reading ADC data using Q services of RTOS. **[6]**

OR

Q4) a) Why mutual exclusion is necessary while using shared resources ? **[4]**

b) Write algorithm / program to use semaphore for shared resources. **[6]**

P.T.O

Q5) a) Compare Bootloader and BIOS. **[6]**

b) What are storage consideration in case of embedded linux? **[5]**

c) What are the features of embedded linux? **[5]**

OR

Q6) a) Explain cross development tools for Embedded linux target. **[4]**

b) What does the root file system contain? **[2]**

c) Compare NOR and NAND flash memories for embedded linux environment. **[4]**

d) What are processor and memory requirement of embedded linux. **[6]**

Q7) a) Explain Linux kernel configuration steps. **[6]**

b) Explain different file system used in linux. **[5]**

c) Explain features of Universal bootloaders. **[5]**

OR

Q8) a) Draw and explain linux kernel architecture. **[5]**

b) What are the bootloader challenges. **[5]**

c) What is device driver ? What is use of device driver in embedded linux system? Explain different types of device driver used in embedded system. **[6]**

Q9) a) Explain software and hardware codesign in embedded system. **[4]**

b) Compare simple IDE with sophisticated IDE. **[4]**

c) Explain mobile phone as embedded system with software and hardware requirements. **[10]**

OR

*Q10)*a) Explain software development tools for embedded system. **[8]**

b) What are hardware and software requirement of Automatic chocolate vending machine ? **[6]**

c) What are the features of IDE? **[4]**

Total No. of Questions : 8]

SEAT No. :

P2162

[Total No. of Pages :2

[5059]-626
B.E.(E&TC)
SOFTWARE DEFINED RADIO
(2012 Course)(Elective-I)(Semester-I)

Time :2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8.*
2) *Assume suitable data, if necessary.*

Q1) a) What is software Defined Radio(SDR)? How SDR is different than conventional Radio. **[8]**

b) Compare homodyne and heterodyne architecture of radio receiver. **[6]**

c) Explain the role of DUC and DDC in SDR **[6]**

OR

Q2) a) State and explain the Friis equation for total noise figure. **[8]**

b) Explain the design principles using FPGAs **[6]**

c) What is multirate signal processing. State its need **[6]**

Q3) a) Explain vector channel Modeling **[9]**

b) Define MIMO. State types of MIMO and its advantages **[9]**

OR

Q4) a) Compare smart antenna with MIMO. **[9]**

b) Define diversity. State its types and explain anyone. **[9]**

Q5) a) Define cognitive radio. Explain its benefits over SDR **[9]**

b) Draw and explain OFDM transmitter **[9]**

OR

Q6) a) State the need of dynamic spectrum accers. **[9]**
Explain spectrum sensing techniques.

b) Draw and explain OFDM receiver. **[9]**

P.T.O.

Q7) a) Explain any one application of SDR in advance Communication system. **[7]**

b) Explain operating modes of PSCR **[7]**

OR

Q8) Write a short note on following: **[14]**

a) GNU Radio

b) Vertical and horizontal handoff

◀▶ ◀▶ ◀▶

Total No. of Questions : 8]

SEAT No. :

P2023

[Total No. of Pages : 2

[5059] - 627

B.E. (E&TC Engineering) (Elective - I)

INDUSTRIAL DRIVES AND CONTROL

(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain torque-speed & armature current-speed characteristics of a separately excited dc motor. **[7]**

b) Explain torque-speed characteristics of an induction motor. **[7]**

c) Explain working of Switched Reluctance motor drive. Why is it preferred for Variable speed drive? **[6]**

OR

Q2) a) Explain V / F control method of an induction motor. **[6]**

b) Explain various modes of operation in separately excited DC motor with neat diagrams. **[8]**

c) Explain synchronous reluctance motor drive. **[6]**

Q3) a) Explain with neat diagram brushless DC (BLDC) motor drive. **[8]**

b) What is stepper motor? What are different types? Explain operation of any one type of stepper motor. **[8]**

P.T.O

OR

Q4) a) Explain with neat diagram permanent magnet AC synchronous motor drive. **[8]**

b) What are types of servo motor drives? Explain any one in detail. **[8]**

Q5) b) Explain various system components in a wind power system. Also write specifications of wind turbine. **[8]**

a) What are different types of batteries used for solar application? Explain Float cum Boost charging method for lead acid batteries. **[10]**

OR

Q6) a) Draw equivalent circuit of a basic solar cell, explain each component. What is the reason of reduction in solar output with increase in temperature? **[8]**

b) Explain fixed speed and variable speed operation in a wind power system. **[10]**

Q7) a) What are fuzzy sets? Explain various properties of fuzzy set with an example. **[8]**

b) Explain fuzzy logic based induction motor speed control. **[8]**

OR

Q8) a) Explain any one AI Application in electrical machines and drives. **[8]**

b) Explain the operation of neural network based PWM controller. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2163

[Total No. of Pages : 4

[5059]-628
B.E.(E&Tc)
MULTIRATE AND ADAPTIVE SIGNAL PROCESSING
(2012 Pattern)(Elective-II)

Time :2½Hours] *[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) Verify Parsevals theorem for $x(t) = e^{-6t}. u(t)$ **[6]**

b) For a given signal, x(t)

$x(t) = 1+t \quad -1 \leq t \leq 0$

$= 1-t \quad 0 \leq t \leq 1$

find- i) average time **[2]**

ii) energy in x(t) **[2]**

iii) variance in time domain **[4]**

iv) Energy in $\frac{d}{dt}x(t)$ **[2]**

v) Variance in frequency domain **[4]**

OR

Q2) a) Design at a block diagram level, a two stage decimator that down samples an audio signal by a factor 30 and satisfies the following specifications-

i) ilp sampling frequency fs $\rightarrow$ 240 KHz

ii) Highest frequency fo interest in the $\rightarrow$ 3.4KHz data

iii) Pass band ripple, $\delta_p \rightarrow 0.05$

iv) Stop band ripple, $\delta_s \rightarrow 0.01$

$$\text{filter length, } N = \frac{-10\log(\delta_p \delta_s) - 13}{14.6\,\Delta f} + 1$$

WhereΔf= normalized transistion width assume decimation factors of 10&3 for stages 1&2 respectively. **[16]**

b) For the decimator in part (a), calculate the total number of multiplications per second (MPS) and the total storage requirements(TSR) **[4]**

P.T.O.

Q3) a) Derive the conditions of alias cancellation for a Harr 2 band filter bank structure **[8]**

b) Find out the magnitude and phase response of the systems represented by following i/p o/p relations

i) $Y(n)=\frac{1}{2}\left[x(n)+x(n-1)\right]$ **[5]**

ii) $Y(n)=\frac{1}{2}\left[x(n)-x(n-1)\right]$ **[5]**

OR

Q4) For the signal, y(t) shown in fig-1

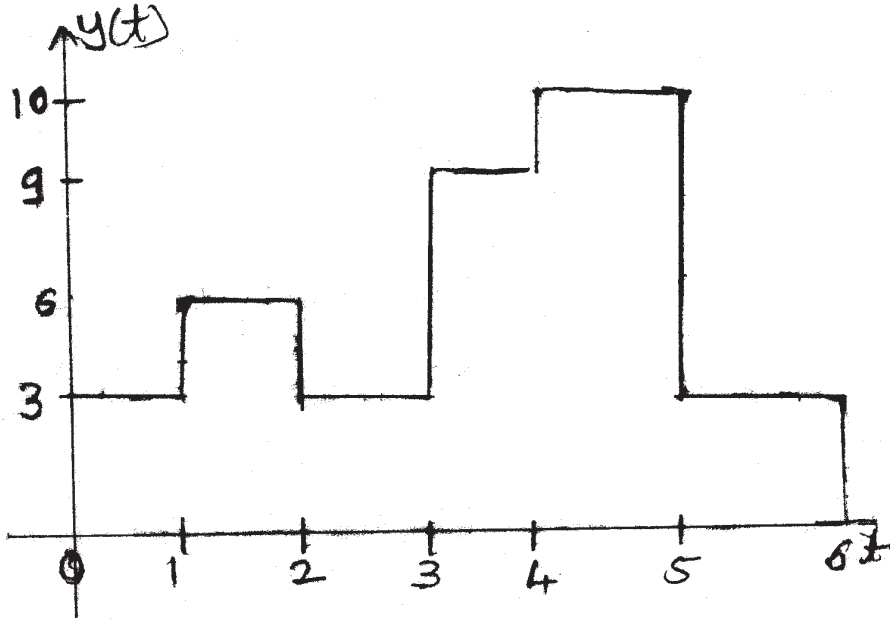

fig (1)

a) State which V subspace Y(t) belongs to and why **[2]**

b) Calculate the piecewise constants such that y(t) belongs to V-1 & W-1 subspace **[6]**

c) Using Harr $\phi\left(t/2\right)$, plot projections and span of y(t) on V-1 and using Harr $\psi\left(t/2\right)$,plot projections & span as y(t) on W-1 **[4]**

d) Reconstruct the original signal. Show that **[6]**

$V_0=V_{-1} \oplus W_{-1}$

Q5) For an adaptive filter, inputs $X_1 = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$ and $X_2 = \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix}$ have target(desired) values, $Y_1 = -1$ $Y_2 = 1$ respectively.

The convergence factor $\mu = 0.3$. The initial weights of the filter are W=[0 0 0].

The filter is trained using LMS algorithm, for four iterations. The inputs applied to the filters follow the sequence, $X_1, X_2, X_1 \& X_2$.

Find-

a) Find the weight vector at the end of each iteration **[8]**

b) Also find the error at the end of each iteration **[4]**

c) Find mean square error at the end of second and fourth iteration **[4]**

OR

Q6) a) Prove that cost function of an adaptive filter is given by

$$J(W) = E\left[d^2(n)\right] - 2W^T P_{dx} + W^T R_x W$$

Where d(n) is the desired signal

P_{dx} is the cross correlation vector

R_x is the auto correlation matrix

W is the weight vector. **[8]**

b) For an adaptive filter is

$$R_X = \begin{bmatrix} 1 & 0.5 \\ 0.5 & 1 \end{bmatrix} P_{dx} = \begin{bmatrix} -1 & 1 \end{bmatrix}^T \& E\left[d^2(n)\right] = 4$$

Find-

i) Optimum weight vector by solving wiener hoff equation **[6]**

ii) minimum value of the cost function **[2]**

Q7) X[n]={40, 10, 36, 4, 48, 2, 10, 0} $\in V_3$

a) Show smoothing effect **[8]**

b) Reconstruct after suppressing coefficients in Wj subspaces **[8]**

OR

Q8) Write a notes on: **[16]**

a) Wavelet lifting scheme

b) Any one application of Adaptive filters

Total No. of Questions : 8]

SEAT No. :

P2024

[Total No. of Pages : 3

[5059] - 629

B.E. (Electronics and Telecommunication Engineering)
(Elective - II(B))
ELECTRONIC PRODUCT DESIGN
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain different types of Energy coupling mechanisms in brief. **[8]**

b) Explain how mapping of functions to hardware is done in architectural design. **[6]**

b) List and explain different commonly identifiable limitations of software. **[6]**

OR

Q2) a) Explain filtering actions by frequency selective filters, common mode filters and amplitude selective filters. **[7]**

b) Explain the concept of coupling and cohesion with respect to partitioning of a system. **[6]**

c) Discuss about the development plan of risk abetment in software development. **[7]**

Q3) a) Explain with neat diagrams, the different considerations for effective image planes. **[8]**

b) Explain the need of functional partitioning on PCB. Also explain how it is effectively done? **[8]**

P.T.O

OR

Q4) Define/Explain the following terms associated with PCB design. **[16]**

a) Containment

b) Electromagnetic interference (EMI)

c) Electromagnetic compatibility (EMC)

d) Immunity

e) Susceptibility

f) Suppression

g) Electrostatic discharge (ESD)

h) Transmission modes of RF energy

Q5) a) With the help of suitable examples explain how the equipment are important for effective troubleshooting and debugging. **[8]**

b) Discuss tips for troubleshooting of analog circuits and digital circuits. Also discuss the check list for powering circuits during troubleshooting and debugging. **[8]**

OR

Q6) a) With respect to debugging process, explain the different ways of characterization of component or problem. **[8]**

b) Explain how simulation, prototyping and parametric testing support the engineering development, system integration and training. **[8]**

Q7) a) List types of documents, their specific subtypes. Also explain their specific use and format. **[12]**

b) Discuss about records, accountibility and liability with respect to documentation. **[6]**

OR

Q8) a) Explain role of audience in documentation. **[8]**

b) Write short notes on following documents.

i) Engineering notebook. **[5]**

ii) Drawing and schematic. **[5]**

Total No. of Questions : 12]

SEAT No. :

P2025

[Total No. of Pages : 3

[5059] - 630

B.E. (E&TC)

PLC'S & AUTOMATION

(2012 Pattern) (Elective - II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Draw the architecture of Automation and discuss its advantages & limitations. **[8]**

OR

Q2) a) Explain the impact of Automation on society. **[4]**

b) Explain how Automation system improve industrial profitability. **[4]**

Q3) A measurement of temperature using a sensor that outputs 6.5mv/ºC must measure to 100ºC. A 6-bit ADC with a 10V reference is used. **[6]**

a) Develop a circuit to interface the sensor and the ADC.

b) Find the temperature resolution.

OR

Q4) What is Linearization? Explain different approaches for linearization. **[6]**

P.T.O

Q5) Explain microprocessor based flow control system. **[6]**

OR

Q6) Explain role of servomotors in automation. **[6]**

Q7) a) Explain following term w.r.t. PLC **[8]**

i) I/O scan mode

ii) Execution mode

iii) Scan time

iv) Soft PLC.

b) Draw and explain bottle filling plant. construct Ladder diagram for the same. **[10]**

OR

Q8) Write a short note on **[18]**

a) IEC 61131

b) Networking of PLC

c) RFID

Q9) a) What is SCADA. Explain the functions of Master Terminal unit in detail. **[8]**

b) Explain elements of DCS with block diagram. **[8]**

OR

Q10)a) What are the characteristics of processes make them potential candidate for SCADA? **[8]**

b) Explain any two specifications of DCS in detail. **[8]**

Q11)a) What are the basic components of numerical control system? Briefly discuss the function of each component. **[8]**

b) What is field bus? Explain important features of field bus. **[8]**

OR

Q12)a) Discuss the advantages of employing CNC machines over manual machines. **[8]**

b) Write a short note on Panel Engineering for automation. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3079

[Total No. of Pages : 2

[5059]-631

B.E. (Electronics and Telecommunication)

ARTIFICIAL INTELLIGENCE

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Give any three examples of agent types and their PAGE descriptions. **[6]**

b) Define pruning. Explain alpha beta pruning with its effectiveness. **[8]**

c) Explain backward chaining algorithms with suitable example. **[6]**

OR

Q2) a) Explain different uninformed searching strategies with respect to different parameters. **[6]**

b) Explain back tracking search and local search of CSP with algorithm. **[8]**

c) What is knowledge engineering? Explain knowledge engineering Vs. Programming. **[6]**

Q3) a) What is reinforcement learning? Explain passive & active reinforcement learning in details. **[10]**

b) How performance of learning algorithm is assessed? **[8]**

OR

P.T.O.

Q4) a) What are the different learning method? Explain any one in detail. **[10]**

b) Explain statistical learning methods with example. **[8]**

Q5) a) Explain expert system constituents with an example of "Medical Diagnosis System". **[8]**

b) Explain Perception confined to Vision and Speech recognition. **[8]**

OR

Q6) a) Explain Waltz algorithm with example. What are its limitations? **[8]**

b) Give detailed architecture of Expert system. **[8]**

Q7) a) What is Natural Language Understanding? Explain in detail. **[8]**

b) Explain the Syntactic analysis with suitable Example. **[8]**

OR

Q8) a) Explain in details "Probabilistic language models". **[8]**

b) Explain the Semantic interpretation with suitable example. **[8]**

●●●●●

Total No. of Questions : 8]

SEAT No. :

P2026

[Total No. of Pages : 2

[5059] - 632

B.E. (E&TC) (End semester)

MOBILE COMMUNICATION

(2012 Patten)

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) Explain the timing sequence of signals exchanged & signal exchange diagram for local call. **[8]**

b) Distinguish between in band and out band signaling. **[6]**

c) Explain different Channel Assignment Strategies. **[6]**

OR

Q2) a) With neat diagrams explain evolution of message switching.. **[8]**

b) Design two stage switching network for connecting 100 incoming trunks to 100 outgoing trunks & find number of cross point. **[6]**

c) Explain the factors influencing Small scale fading. **[6]**

Q3) a) State and explain different types of channels used in AMPS. **[4]**

b) Draw a neat diagram of GSM Architecture and explain the function of each block in it. **[8]**

c) With a proper diagram explain MS registration in GSM network. **[6]**

OR

P.T.O

Q4) a) Explain the Handover mechanism in AMPS. **[6]**

b) With a neat diagram explain **[6]**

i) Intra-cell Handover

ii) Inter-cell Handover

c) Compare between GSM900 and DCS 1800. **[6]**

Q5) a) Draw a neat diagram & explain block scheme of GSM Half Rate encoder. **[6]**

b) Write short note on Radio Link Protocol (RLP). **[6]**

c) State and explain different logical channels used in GPRS. **[4]**

OR

Q6) a) Explain data transmission in GSM network. **[6]**

b) Draw and explain the GSM network architecture for SMS service. **[6]**

c) Write short note on GPRS services. **[4]**

Q7) a) Draw & explain the basic transmitter structure for DS-CDMA. **[6]**

b) Compare between technical parameters of WCDMA & IS-95 **[6]**

c) Given that the IS-95 CDMA digital cellular systems require 3 dB < Sr < 9 dB which employs QPSK modulation scheme and convolution coding technique. The bandwidth of the channel is 1.25 MHz and the transmission data rate is Rb = 9.6 kbps. Determine the capacity of a single IS-95 cell. **[4]**

OR

Q8) a) Explain the disadvantages of FDMA & TDMA system & motivation for CDMA as a potential multiple access method. **[8]**

b) Draw the block diagram of Rake receiver & explain its operation. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2027

[Total No. of Pages : 4

[5059] - 633

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

BROADBAND COMMUNICATION SYSTEMS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Compare and contrast LED and ILD as light source for optical fiber communication. **[6]**

b) A multimode step index fiber with a core diameter of 80 μm and a relative index difference of 1.5% is operating at a wavelength of 0.85 μm. If the core refractive index is 1.48, estimate: **[4]**

i) the normalized frequency for the fiber

ii) the number of guided modes.

OR

Q2) a) Define the following terms with respect to single mode fiber **[6]**

i) Cut off Wavelength

ii) Mode field diameter

b) A multimode step index fiber has a relative refractive index difference of 1% and a core refractive index of 1 .5. The number of modes propagating at a wavelength of 1.3 μm is 1100. Estimate the diameter of the fiber core. **[4]**

P.T.O

Q3) a) The following parameters are established for a long-haul single-mode optical fiber system operating at a wavelength of 1.3 μm :

Mean power launched from the laser transmitter: – 3 dBm

Cabled fiber loss: 0.4 dB km^{-1}

Splice loss: 0.1 dB km^{-1}

Connector losses at the transmitter and receiver: 1 dB each

Mean power required at the APD receiver:

When operating at 35 Mbit s^{-1} (BER $l0^{-9}$): – 55 dBm

Required safety margin: 7 dB

Estimate the maximum possible link length without repeaters when operating at 35 Mbit s^{-1} (BER $l0^{-9}$). It may be assumed that there is no dispersion- equalization penalty at this bit rate. **[6]**

b) Write a short note on (ANY ONE) **[4]**

i) SOA

ii) EDFA

OR

Q4) a) Explain working principle of FBG and explain its usage as WDM de-multiplexor. **[6]**

b) What is need of WDM? Hence compare Dense WDM and Coarse WDM. **[4]**

Q5) a) State and explain Kepler's three laws of planetary motion. **[6]**

b) The apogee and perigee distance of a satellite orbiting in an elliptical orbit are, respectively, 45000 km and 7000 km. Determine the following **[6]**

i) Semi-major axis of the elliptical orbit

ii) Orbital eccentricity

iii) Distance between the center of Earth and the center of elliptical orbit.

c) A satellite is in an elliptical orbit with a perigee of 1000 km and an apogee of 4000 km. Using a mean earth radius of 6378 km, find the period of the orbit in hours, minutes and seconds, and the eccentricity of the orbit. **[6]**

OR

Q6) a) Compare and contrast use of LEO, MEO and GEO satellite earth orbits for the purpose of communication. **[6]**

b) The difference between the farthest and the closest points in a satellite's elliptical orbit from the surface of the Earth is 30000 km and the sum of the distances is 50000 km. If the mean radius of the earth is considered to be 6378 km, determine the orbit eccentricity. **[6]**

c) An earth station is located at 30° W longitude and 60° N latitude. Determine the earth station's azimuth and elevation angles with respect to a geostationary satellite located at 50° W longitude. The orbital radius is 42164 km. Assume radius of earth to be 6378 km. **[6]**

Q7) a) Explain with help of block diagram typical tracking, telemetry command and monitoring system. **[8]**

b) What are different types of antennas used in satellite systems? Explain importance of each. **[8]**

OR

Q8) a) Explain the following with respect to satellite **[8]**

i) Attitude Control System

ii) Orbit Control System

b) Explain double conversion transponder for 14/11 GHz band. Support your answer with suitable diagram and specify frequencies of local oscillators and IF amplifiers. **[8]**

Q9) a) A satellite at a distance of 40,000 km from a point on the earth's surface radiates a power of 10 W from an antenna with a gain of 17 dB in the direction of the observer. Find the flux density at the receiving point, and the power received by an antenna at this point with an effective area of 10 m^2. **[8]**

b) Explain the following terms and hence explain their significance in satellite communication **[8]**

i) G/T Ratio for the Earth station

ii) Antenna Noise Temperature for the Earth station antenna

OR

Q10)a) Explain procedure for satellite Communication link design. **[8]**

b) A C-band earth station has an antenna with a transmit gain of 54 dB. The transmitter output power is set to 100 W at a frequency of 6.100 GHz. The signal is received by a satellite at a distance of 37,500 km by an antenna with a gain of 26 dB. The signal is then routed to a transponder with a noise temperature of 500 k, a bandwidth of 36 MHz and a gain of 110 dB. **[8]**

i) Calculate the path loss at 6.1 GHz

ii) Calculate the power at the output port (output waveguide flange) at the satellite antenna in dBW.

iii) Calculate the noise power at the transponder input, in dBW, in a bandwidth of 36 MHz.

iv) Calculate the C/N ratio in the transponder.

Total No. of Questions : 10]

SEAT No. :

P2028

[Total No. of Pages : 2

[5059] - 634

B.E. (E&TC)

SPEECH AND AUDIO SIGNAL PROCESSING

(2012 Pattern) (Endsem)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q1. OR Q.2, Q.3 OR Q.4 , Q.5.OR Q.6, Q.7 OR Q.8, Q.9 OR Q.1O.***
2) ***Right side figures indicate marks.***
3) ***Assume suitable data.***

Q1) a) Explain voiced and unvoiced speech signal? Explain its significance in speech processing **[6]**

b) What is Pitch of speech signal? What is formant frequencies in speech signal **[4]**

OR

Q2) a) Explain LTV model of speech signal **[5]**

b) Explain the concept of critical band and auditory systems as a filter bank? **[5]**

Q3) a) What is spectrogram? What are their types? Explain its significance and applications in speech processing **[5]**

b) Explain Mel Scale and Bark Scale **[5]**

OR

Q4) a) How Short time energy, short time average magnitude short time average zero crossing rate is useful in speech processing? **[4]**

b) Explain the concept of Spectral entropy and Spectral Roll-off. **[6]**

P.T.O

Q5) a) Explain basic principal of Linear Predictive Analysis? Explain autocorrelation method for formant analysis **[8]**

b) Explain the Cholesky Decomposition method for solution of LPC equations. **[8]**

OR

Q6) a) Explain frequency domain interpretation of LP analysis? **[8]**

b) Explain Durbin algorithm in LPC analysis **[8]**

Q7) a) Explain how pitch is estimated using cesptrum analysis? **[8]**

b) Explain in detail estimation of formant and pitch parameters using cepstrum **[8]**

OR

Q8) a) What is cepstrum? Explain in detail computation of Mel Frequency Cepstral Coefficients (MFCC). **[8]**

b) What is long term complex cepstrum? What is short term complex cepstrum? Explain the properties of the complex cepstrum. **[8]**

Q9) a) Explain in detail automatic speech recognition system with suitable example **[9]**

b) What is the difference between speaker identification and speaker verification? What are the features used for speaker recognition/verification system and how? **[9]**

OR

Q10)a) What is DTW? Explain with suitable example. **[4]**

b) What are the techniques of speech enhancement spectral subtraction method? **[10]**

c) What are the various methods used for TTS. **[4]**

Total No. of Questions : 10]

SEAT No. :

P2029

[Total No. of Pages : 2

[5059] - 635

B.E. (E&TC) (Elective - III)

RF CIRCUIT DESIGN

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q1. OR Q.2, Q.3 OR Q.4 , Q.5.OR Q.6, Q.7 OR Q.8, Q.9 OR Q.1O.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Discuss the method of open circuit time constants to estimate the bandwidth **[5]**

b) Discuss the design of Shunt Peaked amplifier with suitable diagram. **[5]**

OR

Q2) a) Describe with suitable example, relation between Rise time and Bandwidth **[5]**

b) What is the standard recipe for computing bandwidth? **[5]**

Q3) a) Describe Neutralization and unilateralization. **[5]**

b) List out Key components of a mobile phone with respect to RF Processing. **[5]**

OR

Q4) a) Describe in brief stabilization methods. **[5]**

b) Explain Bandwidth enhancement techniques. **[5]**

P.T.O

Q5) a) Differentiate between Single ended and differential ended LNA. **[8]**

b) With the help of schematic in detail, explore the design steps of single ended LNA **[8]**

OR

Q6) a) Explain LNA Topologies with suitable diagrams. **[8]**

b) Design LNA to operate at 500 MHz Design suitable bias. Compute device width degenerating inductance, noise figure & Lg. Assume suitable data. **[8]**

Q7) a) Describe describing function model and start up model of Colpitts Oscillator. **[6]**

b) How we can use describing functions to analyze oscillators? **[6]**

c) Explain with appropriate diagram basic LC Feedback Oscillator. **[6]**

OR

Q8) a) What is describing function? Explain with suitable examples. **[6]**

b) Discuss Negative resistance oscillator. **[6]**

c) Illustrate how Function generator is used to analyze oscillators. **[6]**

Q9) a) Explain with respect to Mixer following Characteristics. **[8]**

i) Noise Figure

ii) Spur

b) With schematic & mathematical expressions explain multiplier & square law MOSFET mixers in detail. **[8]**

OR

*Q10)*a) Explain Single diode mixer and double diode mixer. **[8]**

b) Derive an expression for conversion gain of single ended MOSFET mixer. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2030

[Total No. of Pages : 2

[5059] - 636

B.E. (Electronics & Telecommunication) (Semester - II)

AUDIO VIDEO ENGINEERING

(2012 Pattern) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q 7 or Q8, Q9 or Q 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) In analog PAL TV system, justify the total channel bandwidth (VSB) is 7 MHz with suitable sketch. **[5]**

b) Compare high level and low level TV transmitters. **[5]**

OR

Q2) a) Explain the use of Wobbuloscope in TV receiver alignments. **[5]**

b) Discuss Digital TV signals and Digitized Video parameters along with bandwidth requirements. **[5]**

Q3) a) Discuss the necessity of video compression techniques with various steps involved in the compression. **[5]**

b) Explain Set Top box used in Direct to Home TV. **[5]**

OR

Q4) a) Discuss HDTV standards and main features of HDTV. **[5]**

b) Explain the terms in brief: i) Video on Demand, ii) CAS **[5]**

P.T.O

Q5) a) Explain in detail the IPTV technology. **[8]**

b) Explain the working of Video Door Phone systems. **[8]**

OR

Q6) a) Discuss 3G Mobile TV systems. **[8]**

b) Explain the working of Video Projector with neat diagram.

State the typical specifications for it. **[8]**

Q7) a) Discuss the various methods of optical recording of sound.

Explain optical recording on CD in detail. **[10]**

b) Explain the terms: **[8]**

i) Blue Ray DVD and HD DVD

ii) Audio standards for recording

OR

Q8) a) Explain the principle of operation for CD/ DVD Player.

Discuss specifications for CD and DVD. **[10]**

b) Explain the terms : **[8]**

i) Stereo Sound System

ii) Dolby Digital sound System

Q9) a) Discuss the technology of Satellite Radio reception with necessary block diagram. **[8]**

b) With block diagram, explain cordless microphone based PA System. State four important specifications for it. **[8]**

OR

Q10)a) Explain in brief, typical PA System installation plan for an auditorium having large capacity. **[8]**

b) Discuss Acoustic Chamber in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2164

[Total No. of Pages : 2

[5059]-637

B.E.(Electronics&Telecommunication)

SOFT COMPUTING

(2012 Pattern)(End Semester)(Semester-II) (404191)(Elective-III)

Time :2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Using Mc-Culloch Pitts neuron, implement a bipolar AND function. Assume initial weights to be[1 1]. **[8]**

b) Explain unsupervised learning mechanism in contrast with a supervised learning mechanism. **[6]**

c) State the algorithm and essential processes in a Self Organized Feature Map network. **[6]**

OR

Q2) a) State the perceptron learning rule. Also explain its limitation and solution for the same. **[8]**

b) State and explain the popular topologies of neural networks. **[6]**

c) Explain the RBF network and state its learning mechanism. **[6]**

Q3) a) Explain any one fuzzy membership function with its transfer characteristics. Describe the possible use of the same with a suitable example. **[8]**

b) Using max-min composition find relation between R and S. **[8]**

$$R = \begin{array}{c} \\ x_1 \\ x_2 \\ x_3 \end{array} \begin{array}{c} \begin{array}{ccc} y_1 & y_2 & y_3 \end{array} \\ \begin{bmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix} \end{array}, \quad S = \begin{array}{c} \\ x_1 \\ x_2 \\ x_3 \end{array} \begin{array}{c} \begin{array}{cc} z_1 & z_2 \end{array} \\ \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 1 & 1 \end{bmatrix} \end{array}$$

OR

P.T.O.

Q4) a) State the Characteristics of Neuro-fuzzy and soft computing. **[8]**

b) Consider two fuzzy sets A and B, calculate $A \cap \bar{B}$ *and* $B \cap \bar{A}$. **[8]**

$$A = \left\{ \frac{0.1}{2}, \frac{0.6}{3}, \frac{0.4}{4}, \frac{0.3}{5}, \frac{0.8}{6} \right\}$$

$$B = \left\{ \frac{0.5}{2}, \frac{0.8}{3}, \frac{0.4}{4}, \frac{0.6}{5}, \frac{0.4}{6} \right\}$$

Q5) a) Explain the procedure for designing a simple fuzzy control system. **[8]**

b) Draw and explain the architecture of a typical FLC. **[8]**

OR

Q6) a) State the fuzzy compositional rules used for fuzzy relationship computation. **[8]**

b) Give a rule: IF x is A, THEN y is B, where

$$A = \left\{ \frac{0.2}{1}, \frac{0.5}{2}, \frac{0.7}{3} \right\} and B = \left\{ \frac{0.6}{5}, \frac{0.8}{7}, \frac{0.4}{9} \right\}$$

Infer B' for another rule:IF x is A' ,THENyis B' ,where

$A' = \left\{ \frac{0.5}{1}, \frac{0.9}{2}, \frac{0.3}{3} \right\}$ using Zadeh implication rule. **[8]**

Q7) a) Draw and explain the architecture of a typical FLC. **[10]**

b) State the Architecture of ANFIS. **[8]**

OR

Q8) a) State the various applications of FLC. **[10]**

b) Write a short note on "Hybrid Learning Algorithm employed in ANFIS" **[8]**

Total No. of Questions : 8]

SEAT No. :

P2031

[Total No. of Pages : 2

[5059] - 638
B.E. (E & TC)
BIOMEDICAL SIGNAL PROCESSING
(2012 Pattern) (End-Semester)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates :-

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

Q1) a) Explain the meaning of action potential, polarization, depolarization and repolarization of cell with necessary diagram. **[8]**

b) What is systolic and diastolic pressure? Explain non-invasive blood pressure measurement technique. **[6]**

c) Explain following term in brief : **[6]**

i) Reflex action

ii) Receptors

OR

Q2) a) Write short note on active and passive transducers used in biomedical system. **[6]**

b) Explain the function of central nervous system. **[8]**

c) Write a short note on STFT. **[6]**

Q3) a) Explain with block EEG data acquisition system. **[8]**

b) What is Electroencephalogram? Explain structure of brain. **[8]**

OR

Q4) a) Explain EEG rhythms and waveforms. **[8]**

b) List out the applications of EEG and explain in brief sleep disorder. **[8]**

P.T.O.

Q5) a) Write short note on ECG amplifier with input protection and isolation circuit. **[8]**

b) Propose an adaptive noise cancellation filter to remove the maternal ECG signal from the Fetal ECG of interest. **[8]**

OR

Q6) a) Draw input protection circuit for ECG recorder and describe its working with complete block schematic. **[8]**

b) What are the advantages of an adaptive filter? Explain least mean squares adaptive filter. **[8]**

Q7) a) State sampling theorem and how it is used in data acquisition of ECG. **[10]**

b) Write brief notes on characterization of non-stationary signal. **[8]**

OR

Q8) a) What is Digital signal processing? Explain the use of Digital Signal Processing in Biomedical Applications. **[10]**

b) Explain the selection criteria of filter for biomedical application. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2032

[Total No. of Pages : 2

[5059] - 639
B.E. (E & TC)
NANO ELECTRONICS AND MEMS
(2012 Pattern) (Semester - II)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates :-

1) ***Answer any one question out of Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
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 are the advantages and disadvantages of Silicon as a material for semiconductor? **[7]**

b) Explain why contamination should be taken very seriously while fabrication of IC? **[7]**

c) What is single Electron Transistor (SET)? Draw the circuit model of a SET. **[6]**

OR

Q2) a) What is the importance of silicon from semiconductor point of view? **[7]**

b) Write various levels of contaminations. **[7]**

c) Write applications of semiconducting quantum dots. **[6]**

Q3) a) What are the important intrinsic characteristics of MEMS? Enlist them. **[9]**

b) What do you mean by sensor, actuator and tranducer? **[9]**

OR

Q4) a) Enlist six major energy domain of interest for MEMS description. **[9]**

b) What are three major sources of noise in MEMS that needs to be considered by designers? **[9]**

Q5) a) Explain Basic Principle of Electrostatic sensors and actuators. **[8]**

b) Explain working principle of Electrostatic motor with necessary diagrams. **[8]**

P.T.O.

OR

Q6) a) What are the major advantages of electrostatic sensors and actuators? **[8]**

b) Explain operation principle of scratch drive actuator with suitable sketches. **[8]**

Q7) a) Write down different methods of measurement of parameters of silicon wafer. **[8]**

b) Explain hot probe method of measurement with neat diagram. **[8]**

OR

Q8) a) Explain sheet Resistance method of measurement with neat diagram. **[8]**

b) Explain principle of working of contact type profilometer. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2033

[Total No. of Pages : 2

[5059] - 640
B.E. (E & TC)
DETECTION AND ESTIMATION THEORY
(2012 Pattern) (Semester - II) (Elective - IV)

Time : $2\frac{1}{2}$ *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) ***Assume suitable data if necessary.***

Q1) a) Write short note on Composite Hypothesis testing. **[5]**

b) Explain the concept of Sequential detection detector in brief. **[5]**

OR

Q2) a) Explain Recursive Least Square Estimation. **[5]**

b) Explain how decision rule is framed in case of multiple hypothesis tests. **[5]**

Q3) a) Write a short note on Minimum Variance Unbiased Estimator. **[5]**

b) State and explain Cramer-Rao inequality for a Random Parameter. **[5]**

OR

Q4) a) Write short note on Neyman - Pearson Detector. **[5]**

b) Explain Bays estimator, least square estimator in detail. **[5]**

Q5) a) Find maximum likelihood estimator of power of WGN with variance $\sigma 2$ unknown with hypothesis H0 and H1 with K no. of samples producing zero and m output respectively. **[8]**

b) Explain Kalmans filter in context of estimation theory. **[8]**

OR

Q6) a) Write a note on Wiener Filters. **[8]**

b) Write a note on Best Linear Unbiased Estimator. **[8]**

P.T.O.

Q7) a) Derive the Likelihood Ratio Test (LRT), under the Neyman Pearson (NP) criterion for a binary hypothesis problem. **[8]**

b) A ternary communication system transmits one of the three amplitude signal{ 1, 2, 3 } with equal probabilities. The independent received signal samples under each hypothesis are

H1 : Yk = 1 + N K = l,2..K

H2 : Yk = 2 + N K = 1,2...K

H3 : Yk = 3 + N K = 1,2... K

The additive noise N is Gaussian with mean zero and variance $\sigma 2$. The costs are Cii = 0 and Cij = 1 for i $\neq$ j . Ij, j = 1, 2, 3 determine the decision regions. **[8]**

OR

Q8) a) In a binary detection problem, the transmitted signal under hypothesis H1 is either s1(t) or s2(t), with respective probabilities P1 and P2. Assume P1 = P2 = 1/2, and sl(t) and s2(t) orthogonal over the observation time t€[0, T]. No signal is transmitted under hypothesis H0. The additive noise is white Gaussian with mean zero and power spectral density N0/2. Obtain the optimum decision rule, assuming minimum probability of error criterion and P(H0) = P(H1) = 1/2. **[8]**

b) Explain Best Linear Unbiased Estimator (BLUE)? **[8]**

Q9) a) Explain the Radar Elementary concepts- Range, Range Resolution and Unambiguous Range. **[9]**

b) Give a Review of Some CFAR Detectors. **[9]**

OR

Q10)a) What is CFAR Detection and state the Principles of Adaptive CFAR Detection. **[9]**

b) Write short note on Mini-max detector. **[9]**

Total No. of Questions : 8]

SEAT No. :

P2034

[Total No. of Pages : 2

[5059] - 640 - A

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

WIRELESS NETWORKS (Theory)

(2012 Pattern) (Elective - IV(d))

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates :-

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

Q1) a) What is OFDM? Discuss advantages and disadvantages of OFDM for wireless networks. **[7]**

b) Explain in detail different protocols for WiFi. **[7]**

c) With the help of suitable diagram explain in detail 3GPP release 4 network architecture. **[6]**

OR

Q2) a) List in tabular form mobile data supported by 2G and 3G technologies **[6]**

b) Describe with neat diagram basic components of WLAN with their characteristics. **[7]**

c) Explain speech and data services supported by UMTS. **[7]**

Q3) a) Describe downlink and uplink LTE channels. **[9]**

b) What is Handover? With suitable diagram explain X2 Handover mechanism. **[9]**

OR

Q4) a) Explain the function of LTE scheduler. **[9]**

b) Write notes on : **[9]**

i) Self Organizing Networks (SONs)

ii) Hetrogeneous Networks (HetNET)

P.T.O.

Q5) a) Give the functions of ASN, ASN - GW, CSN and different interfaces used in WiMAX. **[8]**

b) Explain 802.16m FDD and TDD frame formats. **[8]**

OR

Q6) a) What is meant by Interface mitigation? With suitable diagram explain frequency planning with fractional frequency Reuse (FFR). **[8]**

b) Explain Mesh network for WiMAX technology. **[8]**

Q7) a) What are challenges of VoIP? Explain VoIP protocol layers. **[8]**

b) Explain the process of SIP call establishment and release. **[8]**

OR

Q8) a) With neat diagram describe H.323 network architecture. **[8]**

b) Write short note on SS7 protocol stack. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2035

[Total No. of Pages : 2

[5059] - 640(B)
B.E. (E & TC)
ADVANCED AUTOMOTIVE ELECTRONICS
(2012 Pattern) (Semester - II) (Open Elective - IV)

Time : $2\frac{1}{2}$ Hours] *[Max. Marks : 70*

Instructions to the candidates :-

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

SECTION - I

Q1) Write a short note on following:

a) Application of electronic systems in modem automobiles. **[4]**

b) Automotive supply chain. **[3]**

OR

Q2) a) Explain V-Model development cycle related to development of automotive product development. **[3]**

b) Explain how electronically controlled power steering works. **[4]**

Q3) Explain in detail Throttle plate angular positioning is done in automobile system. **[7]**

OR

Q4) Explain working principle of solenoid & how it is used in fuel injection system. **[7]**

Q5) Explain the use of lnterrupts Watchdog timers and PWM of a microcontroller in automotive system. **[6]**

P.T.O.

OR

Q6) a) How engine can be controlled using Fuel maps/tables and Ignition maps/tables. **[6]**

SECTION - II

Q7) a) Explain in detail how Infotainment Systems are useful in automotive systems. **[8]**

b) Explain CAN & Flex Ray automotive communication protocols in detail. **[10]**

OR

Q8) a) Compare MOST & LIN Protocol. **[8]**

b) Write a short note on following:

i) Global positioning systems (GPS) **[5]**

ii) General packet radio service (GPRS) **[5]**

Q9) a) Explain Control system approach in Automotive Electronics in Automotive Electronics. **[8]**

b) Write short notes on MATLAB and Simulink tool boxes. **[8]**

OR

Q10) a) What is Model-Based Design? Explain with an example. **[8]**

b) Explain Real time simulations on a simple target (e.g. Arduino). **[8]**

Q11) a) Explain OFF board diagnostic system in automotive. **[8]**

b) Explain in detail Safety process for product life cycle in automotive. **[8]**

OR

Q12) a) What is Diagnostic tools and Diagnostic protocols explain in detail? **[8]**

b) Enlist the various comfort & safety features incorporated in modern Automotive systems. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P2036

[Total No. of Pages : 2

[5059]-641

B.E. (Computer Engineering)

DESIGN & ANALYSIS OF ALGORITHMS

(2012 Course)

Time : 2.30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) Which Algorithm strategy used by quick sort? Write recurrence relation for quick sort & solve it. **[6]**

b) Compare following Algorithm strategies **[6]**

i) Divide & Conquer

ii) G ready approach

iii) Dynamic programming

c) Solve following job sequencing problem using G ready approach. **[8]**

N = 7, Profit (P_1 .... P_7) = (3, 5, 20, 18, 1, 6, 30)

dead: ne (d_1 .... d_7) = (1, 3, 4, 2, 3, 2, 1)

OR

Q2) a) Explain the following for dynamic programming. **[12]**

i) Principle of optionalizing with example.

ii) Matrix multiplication problem

b) Given n = G and weight (w_1 w_2 w_3 w_4 w_5) = (7, 11, 13, 24, 10). Find all subset whose sum is 41, using sum of subsets Algorithm. **[8]**

P.T.O.

Q3) a) Which are different approaches of writing Randomized Algorithm? Write Randomized sort Algorithm. **[8]**

b) Explain following with relations with each other. **[8]**

i) Polynomial Algorithms

ii) Non-Polynomial Hard Algorithms

iii) Non-polynomial complete Algorithms

OR

Q4) a) What is 0-1 Knap sack problem? Explain the Algorithm as deterministic & non-deterministic versions. **[10]**

b) What NP– complete Algorithm? How do we prove that algorithm is NP compiler? (Give example) **[6]**

Q5) a) What is mean by parallel Algorithms? What are way by which we can achieve parallelism is Algorithm? **[6]**

b) Explain sequential & parallel Algorithm for merge sort for the following arrays. **[10]**

A[8] = [11, 4, 30, 11, 20, 5, 8, 2]

OR

Q6) a) How parallel Algorithm can be used to solve graph problem? **[8]**

b) How complete binary tree is useful for parallel algorithms? Give any example you are familiar with. **[8]**

Q7) a) What is clustering? How clustering is used in data management? Explain with any Algorithm used in clustering. **[12]**

b) Explain various elements of IOT (Internet of things). **[6]**

OR

Q8) a) State & explain different software engineering algorithms. **[9]**

b) Write KMP algorithm for string matching Algorithm. **[9]**

Total No. of Questions : 8]

SEAT No. :

P2037

[Total No. of Pages : 3

[5059]-642

B.E. (Computer Engineering)

PRINCIPLES OF MODERN COMPILER DESIGN

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Discuss the action taken by every phase of compiler on following string A = B*C+D/E **[6]**

b) For the following grammar : **[8]**

S - > Aa | bAc |Bc | bBa

A - > d

B - > d

i) Compute First & Follow set

ii) Construct LR(1) parsing table

c) Explain following terms with suitable examples (any 2) : **[6]**

i) S - Attributed Grammar

ii) L - Attributed Grammar

iii) Type Expression

OR

Q2) a) Explain following storage allocation schemes with proper examples :**[6]**

i) Stack Storage Allocation

ii) Static Storage Allocation

iii) Heap Storage Allocation

P.T.O.

b) Generate SLR parsing table for the given grammar and parse the string id1 + id2 + id3 * id4 **[8]**

$E \rightarrow E + T / T$
$T \rightarrow T * F / F$
$F \rightarrow id$

c) What is mean by 'Syntax Directed Definitions'? Give syntax directed definition for any example arithmetic expression. **[6]**

Q3) a) Explain following optimizations with examples : **[8]**

i) Common sub expression elimination
ii) Strength reduction
iii) Code movement
iv) Variable propagation

b) Compare Quadruples and Triples. Generate indirect triples for following : **[6]**
a = b * c – d – e

c) What is Register Allocation and Assignment problem? **[4]**

OR

Q4) a) What is code optimization? Differentiate among local, global and loop optimization. **[6]**

b) What is DAG? Explain its use in code generation. Generate DAG for **[6]**
T1 = A + B
T2 = C + D
T3 = E – T2
T4 = T1 – T3

c) Explain with example: **[6]**

i) Basic blocks and flow graph
ii) Peephole optimization

Q5) a) Write a note on importance of source language data representation. **[6]**

b) Explain the row major and column major representation of arrays. **[6]**

c) Explain type checking with respect to context handling. **[4]**

OR

Q6) a) Explain structure of a functional compiler. Discuss various issues related to compilation of functional languages. **[6]**

b) Write short note on Java CC. **[6]**

c) What is lazy evaluation in functional languages? **[4]**

Q7) a) Write short note on NVidia CUDA compiler. **[6]**

b) What is interpreter? Explain JVM as an example of interpreter. **[4]**

c) How tuple space can be implemented on distributed memory systems. **[6]**

OR

Q8) a) Explain following points for parallel Object Oriented languages : Object location, object migration, object replication **[6]**

b) Write short notes : **[6]**

i) Tuple spaces

ii) XML VM

iii) JIT

c) Discuss issues related to parallel compiler. Explain with respect to NVCC. **[4]**

Total No. of Questions : 10]

SEAT No. :

P2038

[Total No. of Pages : 2

[5059]-643

B.E. (Computer Engineering)

SMART SYSTEM DESIGN AND APPLICATIONS

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat Diagrams must be drawn wherever necessary.***
2) ***Assume suitable data, if necessary.***
3) ***Justify your answer with an example wherever necessary.***

Q1) a) Explain the architecture of a learning agent and its components. **[8]**

b) Explain AO* algorithm with an example. **[6]**

c) Explain the procedure for conversion of FOL to CNF with example. **[6]**

OR

Q2) a) Define search problem. Solve 8 queen problem as a state space search problem. **[8]**

b) Explain MINI-MAX search algorithm for solving any game. **[6]**

c) Write a short note on planning graphs. **[6]**

Q3) a) Explain the Baye's rule with a suitable example. **[4]**

b) What is Bayesian Networks? What we are achieving through it? Explain it's at least **TWO** areas of application. **[8]**

OR

Q4) a) How to compute an inference in temporal model and Hidden Markov Model? Explain in brief. **[6]**

b) Explain the construction of Dynamic Bayesian Networks with a suitable example. **[6]**

P.T.O.

Q5) a) Differentiate supervised unsupervised, semi-supervised models in learning approach. **[6]**

b) Explain any **ONE** learning approach in building smart system. **[6]**

OR

Q6) a) Write a short note on Artificial Networks. **[6]**

b) Explain Non-parametric models. **[6]**

Q7) a) Explain different techniques for speech recognition and object recognition. **[6]**

b) Explain the method for object recognition by appearance. **[6]**

OR

Q8) a) What is meant by augmented grammar and semantic interpretation? Explain with example. **[6]**

b) How Robot will perceive the information? Explain with example. **[6]**

Q9) a) Describe the basis of Utility Theory with utility functions. **[6]**

b) How knowledge can be representation? Explain with example. **[8]**

OR

Q10) a) What is Ontology? How it is used to represent the information? Explain with example. **[6]**

b) Explain 'Internet Shopping World' example with various agents and their usage. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2039

[Total No. of Pages : 2

[5059]-644

B.E. (Computer Engineering)

IMAGE PROCESSING

(2012 Pattern) (Semester - I)

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 the steps involved in Image digitization in detail. **[8]**

b) What do you mean by Image file format? Mention the name and use of frequently used file format. **[6]**

c) Discuss how the point and mask processing operation helps in image enhancement? **[6]**

OR

Q2) a) What is the role of image segmentation in image processing? What are meant by global, local and adaptive thresholds? What approach of thresholding should be used in case of non-uniform illumination? **[8]**

b) Explain in brief Human Visual system in relation with Image Processing. **[6]**

c) Explain region split and merge technique with example and draw its quad tree representation. **[6]**

Q3) a) What is the need for Image compression? Explain Huffman code with example. **[8]**

b) What is the need of Object recognition. State and explain automated object recognition system. **[8]**

P.T.O.

OR

Q4) a) Explain any two object recognition method. **[8]**

b) What is mean by lossless and lossy image compression? Discuss any method from lossy image compression. **[8]**

Q5) a) What are the medical Imaging modalities? Explain in brief. **[10]**

b) How could the contrast of a displayed X-ray computed to mammography image be increased? Explain. **[8]**

OR

Q6) Write a short note on any three : **[18]**

a) Images from X-rays and its application.

b) Images from r-rays.

c) Image enhancement in mammography.

d) PACS.

Q7) a) Explain different stereo imaging concepts from satellites. **[8]**

b) Explain in brief elements of visual image interpretation. How these elements help us to interpret remote sensing imagery? **[8]**

OR

Q8) Write shorts note on any two : **[16]**

a) Remote sensing process and it's application.

b) Photogrammetric Imaging devices.

c) Block triangulation.

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Total No. of Questions : 12]

SEAT No. :

P2040

[Total No. of Pages : 2

[5059]-645

B.E. (Computer Engineering)

COMPUTER NETWORK DESIGN AND MODELING

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulory.***
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 RMA. **[4]**

b) Explain network supportability. **[3]**

OR

Q2) a) What are the application groups? **[4]**

b) Explain Network requirements. **[3]**

Q3) a) Explain service metrics for delay. **[4]**

b) What do you mean developing RMA requirement "Availability"? **[3]**

OR

Q4) a) Given an MTBCF requirement of 8000 hours and an MTTR requirement of 4 hours, calculate an availability requirement. **[4]**

b) Environment Specific Thresholds and Limit. **[3]**

Q5) What are the different flow models? Explain any two : **[6]**

OR

P.T.O.

Q6) Explain the concept of Flow map. **[6]**

Q7) What are addressing mechanisms in computer network? Explain classful addressing, subnetting, variable-length subnetting, and supernetting. **[16]**

OR

Q8) What do you mean by routing strategies? Explain **[16]**

a) Evaluating routing protocols.

b) Choosing and Applying Routing Protocols.

Q9) a) Explain the following performance mechanisms. **[10]**

i) Quality of Service

ii) Prioritization, Traffic Management, Scheduling and Queuing

b) What are the network design products? Enlist all and explain any two. **[8]**

OR

Q10) a) Explain following network layouts. **[10]**

i) Logical Diagrams

ii) Network Blueprints

b) What are the major components of the evaluation process for vendors, service providers, and equipment? **[8]**

Q11) Write notes on : **[16]**

a) Smart Pointers.

b) Modeling network elements.

c) Network Simulators.

d) Object aggregation.\

OR

Q12) a) Explain network simulator -ns3. **[8]**

b) OMNet++ **[8]**

Total No. of Questions : 10]

SEAT No. :

P2041

[Total No. of Pages : 2

[5059]-646

B.E. (Computer Engineering)

ADVANCED COMPUTER PROGRAMMING

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

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

Instructions to the candidates:

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

Q1) a) Explain with examples Distributed Lock using Timestamps. **[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) Explain with examples Object Transfer service using Path Reversal. **[5]**

b) What is JVM? Why Java is called the "Platform Independent Programming Language"? What is the Difference between JDK and JRE? **[5]**

Q3) a) What is a thread? Describe the complete life cycle of thread? **[5]**

b) What are the Data Types supported by Java? What is Autoboxing and Unboxing. **[5]**

OR

Q4) a) What are the main benefits of SOA? How to achieve loose coupling in a SOA? **[5]**

b) Write an applet for each of following graphics methods. **[5]**

drawoval(), drawrect(), drawline(), filloval()

P.T.O.

Q5) a) What's the real difference between HTML and HTML5? Write short notes on HTML and Java Script Programming. **[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

Q6) a) What are document oriented databases? Give MongoDB database example for hospital application. **[8]**

b) Explain the following JDBC API components: **[9]**

- DriverManager, SQLException, Connection, Statement, ResultSet.

Q7) a) Write a short notes on Hadoop Ecosystem. Also explain features and advantages of Hadoop. **[8]**

b) Explain Shared Nothing Architecture (SNA) with advantages and disadvantages. **[8]**

OR

Q8) a) Write a short notes on RDBMS verses Hadoop. **[8]**

b) Explain with examples: **[8]**

i) HDFS Daemons

ii) Hadoop YARN

iii) Word-Count Program

Q9) 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]**

OR

Q10) a) Write a short notes on Execution modes of Pig and ETL Processing. **[8]**

b) Explain with examples Hadoop, MongoDB and MapReduce function. **[9]**

Total No. of Questions : 8]

SEAT No. :

P2042

[Total No. of Pages : 3

[5059]-647

B.E. (Computer Engineering)

DATA MINING TECHNIQUES AND APPLICATIONS

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) In real-world data, tuples with missing values for some attributes are a common occurrence. Describe various methods for handling this problem. **[6]**

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

i) Constraint-based rule mining.

ii) Closed and maximal frequent itemsets.

c) Consider the following data for a binary class problem **[8]**

A	B	Class
T	F	P
T	T	P
T	T	N
T	F	P
T	T	P
F	F	N
F	F	N
F	F	N
T	T	P
T	F	N

P.T.O.

i) Compute the information gain for A1 and A2.

ii) What is the best split between A1 and A2 according to Information gain?

iii) Compute the Gini index for A1 and A2.

iv) What is the best split between A1 and A2 according to Gini index?

OR

Q2) a) Consider the market basket transactions shown below : **[6]**

Transaction ID	Items bought
T1	{M, A, B, D}
T2	{A, D, C, B, F}
T3	{A, C, B, F}
T4	{A, B, D}

Assuming the minimum support of 50% and minimum confidence of 80%

i) Find all frequent itemsets using Apriori algorithm.

ii) Find all association rules using Apriori algorithm

b) What are the major tasks in data preprocessing? Explain them in brief. **[6]**

c) Explain with suitable example : **[8]**

i) k-Nearest-Neighbor Classifier

ii) Scalable decision tree

Q3) a) Consider the following points six points : **[8]**

P1(0.40, 0.53), P2(0.22, 0.38), P3(0.35, 0.32), P4 (0.26, 0.19), P5(0.08, 0.41) and P6(0.45, 030).

Perform the single link hierarchical clustering and show your reults by drawing a dendrogram.

b) Explain with suitable example the k-medoids algorithm **[6]**

c) What are the requirements of clustering in data mining? **[3]**

OR

Q4) a) What is meant by cluster analysis? **[4]**

b) Explain with suitable example the K-means algorithm. **[5]**

c) Differentiate between following clustering methods **[8]**

i) Single and complete link

ii) Hierarchical and partitioning

Q5) a) Precision and recall are two essential quality measures of an information retrieval system. **[6]**

i) Why it is usual practice to trade one measure for the other? Explain.

ii) Why F-score is a good measure for trade between precision and recall.

b) Compare the different text mining approaches. **[5]**

c) Explain the following terms : **[6]**

i) Bag of words

ii) Feature vector

OR

Q6) a) What is Web usage mining? Explain in brief. **[6]**

b) Differentiate between document selection and document ranking methods of information retrieval. **[5]**

c) Explain the following terms : **[6]**

i) Authoritative Web pages

ii) Hub pages

iii) Document Object Model (DOM) structure

Q7) a) What is meant by machine learning? Differentiate between supervised and unsupervised machine learning. **[6]**

b) What are the similarities and differences between reinforcement learning and artificial intelligence algorithms? **[5]**

c) Write short note on mining of big data. **[5]**

OR

Q8) a) What is meant by wholistic learning? **[4]**

b) Briefly explain the reinforcement learning. **[6]**

c) What is meant by multi-perspective decision making? Explain. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2043

[Total No. of Pages : 2

[5059]-648

B.E. (Computer Engineering)

PROBLEM SOLVING WITH GAMIFICATION

(2012 Pattern) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 and Q9 or Q10.***
2) ***Assume suitable data, if necessary.***

Q1) a) Explain the significance of the phrase "House always wins" in the context of Gamification. **[5]**

b) How Gamification could be employed to improve the efficiency of an individual? **[5]**

OR

Q2) a) Can brand awareness be generated using Gamification? Justify with an example. **[5]**

b) Why the Gamification design has to be agile? **[5]**

Q3) a) Why people play games? **[2]**

b) What are the different types of Players? **[8]**

OR

Q4) a) What is motivation? Why is it required? **[2]**

b) Explain Intrinsic and Extrinsic motivation in detail. **[8]**

Q5) a) How the engagement or participation of user can be increased in social networking? **[10]**

b) How would you use gamification to track the progress of any activity you are performing? **[5]**

c) What do you mean by game dynamics? **[3]**

OR

P.T.O.

Q6) a) Which game mechanics would you suggest in any activity for the prosperity of the nation? **[10]**

b) How feedback mechanism is helpful? Justify with an example. **[5]**

c) Explain any three game mechanics of your choice. **[3]**

Q7) a) How computer technology can be used in employing gamification in the field of education. **[10]**

b) How would you realize the game mechanics to develop gamification based system for encouraging aspirants for innovations. **[6]**

OR

Q8) a) Explain the available guidelines for coding game mechanics. **[10]**

b) Explain the scope of gamification in the improvement of any day to day activity. **[6]**

Q9) a) What are the facilities available on mambo platform to improve e-learning and training activity? **[8]**

b) List and explain required features of any gamification tool for discussion forum. **[8]**

OR

Q10) a) How the customers' loyalty can be increased using the features provided by Bigdoor? **[8]**

b) List the advantages of any Gamification tool. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

P2044

[Total No. of Pages : 2

[5059]-649

B.E. (Computer Engineering)

PERVASIVE COMPUTING

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

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

Instructions to the candidates:

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

Q1) a) Define HCI. Explain explicit and implicit HCI. **[6]**

b) Explain Human-to-Human Interaction (HHI) applications. **[4]**

OR

Q2) a) Explain wearable computer interaction. **[6]**

b) Explain Pervasive games and social physical spaces. **[4]**

Q3) a) Explain Context aware computing and types of contexts with example. **[6]**

b) Explain mobile middleware with example. **[4]**

OR

Q4) a) Explain the types of context aware applications and steps for developing context aware applications. **[6]**

b) Explain application aware adaptation architecture. **[4]**

Q5) a) Explain mobile and wireless security issues. **[10]**

b) Explain in detail : **[8]**

i) Replay attacks

ii) Traffic analysis

OR

P.T.O.

Q6) a) Explain the concept of 'Agent' related to mobile middleware and services offered by Agent. **[10]**

b) Explain the various problems with GSM security. **[8]**

Q7) a) Explain smart Human-Device Interaction in detail. **[10]**

b) Explain Human intelligence versus machine intelligence. **[6]**

OR

Q8) Write notes on : **[16]**

a) Eco friendly Ubicom Devices

b) Cyber Physical Systems

Q9) a) Explain the Social Networking for smart interactions with examples. **[10]**

b) How distributed systems interaction to be more intelligent? Explain. **[6]**

OR

Q10) a) Explain various security issues in Ad Hoc Networks. **[10]**

b) Explain Wearable computers in detail. **[6]**

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Total No. of Questions : 10]

SEAT No. : ____

P2045

[Total No. of Pages : 2

[5059]-650

B.E. (Computer)

EMBEDDED SECURITY

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

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagram wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain in brief eBay dato breach. **[6]**

b) Explain the need for Trusted Execution environment. **[4]**

OR

Q2) a) Explain the pros and cons of embedded security and management engine. **[6]**

b) Explain the Boot Integrity. **[4]**

Q3) a) Explain in detail memory protection control for threat analysis and mitigation in security and management engine. **[6]**

b) Explain any Digital Signature Algorithm. **[4]**

OR

Q4) a) Explain in detail the working of SIGMA protocol. **[6]**

b) Explain the building blocks of the security and the management engine. **[4]**

Q5) a) Explain the different types of boot attacks. **[8]**

b) Explain in detail EPID with its working and components. **[8]**

OR

P.T.O.

Q6) a) Explain how software can use a Trusted platform module to authenticate hardware devices. **[8]**

b) Compare Integrated Vs. Discrete TPM. **[8]**

Q7) a) Explain in detail the closed-Door Model. **[6]**

b) Explain DAL architecture with neat diagram. **[6]**

c) Explain in brief BIOS alteration. **[6]**

OR

Q8) a) Explain in detail HDCP (High bandwidth digital contention protection)? **[6]**

b) Explain dynamic Application loader with neat diagram. **[6]**

c) Explain field programmable fuses. **[6]**

Q9) a) Explain the High level security requirements for IoT? **[8]**

b) Explain the security framework for embedded security in IoT. **[8]**

OR

Q10) a) Explain in detail IoT reference architecture. **[8]**

b) Explain the building blocks for Embedded Security. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2046

[Total No. of Pages : 2

[5059] - 651
B.E. (Computer Engineering)
MULTIDISCIPLINARY NATURAL LANGUAGE PROCESSING
(2012 Pattern) (Elective - II) (Semester - I)

Time :2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:-

1) ***Answer Q1 or Q2 , Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full makrs.***
3) ***Assume suitable data if necessary.***

Q1) a) Define the following terms: **[6]**

i) Parsing ii) Robust Parsing

b) Explain Automatic Stochastic Tagging of natural language texts. **[4]**

OR

Q2) a) Explain the significance of Lexical Knowledge Networks in NLP. **[6]**

b) Write a short note on : Viterbi algorithm of FSM process. **[4]**

Q3) a) Illustrate the Basic steps of EM algorithm alongwith it's Analysis. **[6]**

b) Explain in short : Forward Backward probability.. **[4]**

OR

Q4) a) Define HMM. Draw the diagram that shows Ergodic and non-ergodic models **[6]**

b) What is Conditional Random Field (CRF)? How it is advantages than HMM? **[4]**

Q5) a) Explain the following levels of Speech chain: **[8]**

i) Linguistic level

ii) Physiological level

iii) Acoustic level

b) What is Speech Disorders ? Give it's Causes. **[8]**

OR

Q6) a) Explain Sentence-level Phenomena. Explain how it differs from adaptation level phenomenon. **[8]**

b) Define Speech Perception. Explain it's role in recognition of speech. **[8]**

Q7) a) What do you mean by Multilingualism? Differentiate between Multilingualism and bilingualism, **[8]**

b) Explain in short the following approaches of Word Sense Disambiguation. **[8]**

i) Knowledge-Based

ii) Supervised

iii) Unsupervised

OR

Q8) a) Explain Multilingual Dictionary. Also Explain automatic detection of Multilingual Dictionaries on the Web. **[8]**

b) Write a note on: Semantic role **[8]**

Q9) a) Explain the following terms of NLP applications: **[10]**

i) Web mining

ii) Text mining

b) What is Cross Lingual Information Retrieval ? Explain it. **[8]**

OR

Q10) Write a Note on: **[18]**

a) Robust and Scalable Machine Translation

b) Question Answering in Multilingual Setting

c) Sentiment Analysis

Total No. of Questions : 8] **SEAT No. :**

P2047 **[Total No. of Pages : 2**

[5059] - 652
B.E. (Computer Engineering)
SOFTWARE DESIGN METHODOLOGIES & TESTING
(2012 Pattern)

Time :2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:-

1) ***Q 1 and Q 2 are compulsory. Solve Q 3 or Q 4, Q 5 or Q 6, and Q 7 or Q 8.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***

Q 1) a) Explain different views of Software Architecture? What is 4+1 Architecture View Model? Explain with suitable diagram? **[5]**

b) Explain Activity diagram for ATM System? **[5]**

Q 2) a) Explain the Broker pattern for design of service oriented architecture? **[5]**

b) Explain intent, motivation, structure & consequences of Observe pattern. **[5]**

Q 3) a) Explain the modified V-model? **[6]**

b) Discuss the generic steps in defect management process. **[6]**

c) Is complete testing possible? When to stop testing? What are the test resumption criteria? **[6]**

OR

Q 4) a) Discuss the test defect metrics. Provide the sample metrics for priority& severity of defects? **[6]**

b) State and explain different software testing principles? **[6]**

c) Discuss the essential features of modern defect management tools? **[6]**

Q 5) a) Explain integration testing .What are different types of integration testing? **[8]**

b) What is performance testing? Explain performance testing process? **[8]**

OR

Q 6) a) Explain graph based testing with suitable example. **[8]**

b) Consider the following program segment. **[8]**

```
s:= 0
a:=0
while (a< = b) {
a: = a+2;
b: = b-4;
if(a+b<20)
s := s+a+b
else
s: = s+a-b
}
```

i) Draw the control flow graph for the program.

ii) Calculate the cyclomatic complexity of the program.

Q7) a) Explain the generalized architecture of automation tool. Draw the suitable diagram to show different components. **[8]**

b) What are different components of selenium testing tool? **[8]**

OR

Q 8) a) Write a short note on Monkey Talk & highlight its features. **[8]**

b) Explain different methods of mobile testing. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2048

[Total No. of Pages : 2

[5059] - 653
B.E. (Computer Engineering) (Semester - VIII)
HIGH PERFORMANCE COMPUTING
(2012 Pattern)

Time :2.30 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, and Q 7 or Q 8.)***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q 1) a) What are applications of Parallel Computing? **[4]**

b) Explain Granularity, Concurrency, and Dependency Graph. **[6]**

Q2) a) What are principles of Message Passing Programming. **[6]**

b) Explain Non-Blocking communications using MPI. **[4]**

Q3) a) Describe Logical Memory Model of a Thread. **[7]**

b) Why synchronization is important? Enlist Thread APIs for Mutex Synchronization. **[8]**

OR

Q4) a) Implement Merge sort using synchronization primitives in Pthreads. **[7]**

b) Illustrate importance of read-write lock for Shared address space Model. **[8]**

P. T. O.

Q5) a) What are different partitioning techniques used in Matrix-Vector Multiplication. **[7]**

b) Describe Cannon's Algorithm for Matrix multiplication with suitable example. **[8]**

OR

Q6) a) Describe different techniques for Latency Hiding. **[7]**

b) How Latency Hiding is different than Latency Reduction? **[8]**

.

Q7) a) Write a short note on (Any Two) **[15]**

i) Parallel Depth-First-Search

ii) Search Overhead Factor

iii) Power Aware Processing

b) Define term HPC and Elaborate its use to Indian Society. **[5]**

OR

Q 8) a) Write a short note on (Any Two) **[15]**

i) Distributed Memory

ii) Optical Computing

iii) Green Computing

b) Share your thoughts about how HPC will help to promote "MAKE IN INDIA" initiative. **[5]**

Total No. of Questions : 10]

SEAT No. :

P2049

[Total No. of Pages : 2

[5059] - 654
B.E. (Computer Engineering) (End Semester)
MOBILE COMPUTING (Elective - III)
(2012 Pattern)

Time :2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:-

1) ***Q 1 and Q 2 are compulsory. Solve Q 3 or Q 4, Q 5 or Q 6, and Q 7 or Q 8.Q9 or Q 10.***
2) ***Figures to the right indicate full makrs.***
3) ***Assume suitable data if necessary.***
4) ***Neat diagrams must be brawn wherever necessary.***

SECTION - I

Q 1) a) Explain different wireless switching Techinques. **[5]**

b) Draw and explain Mobile computing architecture for a mobile device. **[5]**

OR

Q2) a) Differentiate between CDMA and TDMA. **[5]**

b) Explain using block diagram the process of authentication in a GSM Service. **[5]**

Q3) a) What is Hand over? Explain various types of Hand over. **[5]**

b) Explain the purpose and IEEE standards for WPAN. WLAN, WiMAX, Bluetooth. **[5]**

OR

Q4) a) Explain mobility management with neat diagram. **[5]**

b) Compare 1G, 2G, 3G, and 4G. **[5]**

Q5) a) What do you mean by tunneling, encapsulation and decapsulation? **[6]**

b) List the entities of mobile IP and describe data transfer from a 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]**

OR

Q6) a) Explain the role of Agent Discovery. Agent advertisement and Agent Solicitation during location Management in GSM Network. **[6]**

b) Explain working of mobile IP? What are the limitations of traditional IP to support mobility? **[6]**

c) Explain Snooping TCP. Give the advantages and disadvantages of Snooping TCP. **[6]**

.

Q7) a) Show architecture of data dissemination and broadcast. Explain the reason for communication asymmetry in mobile network. **[8]**

b) Explain in detail different data delivery mechanisms. **[8]**

OR

Q8) a) Describe Push-based data-delivery mechanism. What are the advantages and disadvantages of Push-based data-delivery? **[8]**

b) What are the different types of data synchronizations in mobile computing systems? Describe synchronization usage models in mobile applications. **[8]**

Q9) a) Explain basic characteristics of mobile operating systems and differentiate between iOS and Android OS. **[8]**

b) What is mobile agent? What are advantages of using a mobile agent. **[8]**

OR

Q10) a) Explain the role of a gateway in connecting networks using different protocols. Describe a Residential Gateway architecture. **[8]**

b) Write short note on.

i) Architecture of Android application development platform.

ii) Service discovery and device management in mobile O.S. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2050

[Total No. of Pages : 2

[5059] - 655
B.E. (Computer Engineering) (Semester - II)
WEB TECHNOLOGY (Elective - III)
(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 and Q9 or Q10***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Write on IOT Applications. **[6]**

b) Elaborate on Security Challenges in IOT. **[4]**

OR

Q2) a) Write the four Aspects in your Business to Master IOT. **[8]**

b) Write Economic Significance of IOT. **[2]**

Q3) a) Elaborate the contribution from FP7 Projects in IOT. **[6]**

b) Write short note on “Smartie Approach”. **[4]**

OR

Q4) a) Discuss the Design Issues and technological Challenges in IOT. **[6]**

b) Write on Smart Objects in lOT. **[4]**

Q5) a) Explain M2M Service Layer Standardisation, **[6]**

b) Why is the OGC involved in Sensor Webs for IOT? **[6]**

c) Write short note on: “Semantic Interoperability” and “Organizational interoperability”. **[6]**

OR

Q6) a) Explain the need of Standardization in IOT. **[6]**

b) Describe the challenges of semantic interoperability in IOT. **[6]**

c) Write short note on: Research Roadmap for lOT Testing Methodologies. **[6]**

Q7) a) Explain different web Identity management models. **[8]**

b) Describe the challenges for a Secure Internet of Things. **[6]**

c) Write short note on: Hybrid Identity Management. **[4]**

OR

Q8) a) Write short note on: Local Identity and Global Web Identity. **[6]**

b) Explain the vulnerabilities of IOT. **[6]**

c) Describe the limitations of different identification schemes. **[6]**

Q9) a) Explain Trust Management Life Cycle. **[6]**

b) Describe SAML components with a neat diagram. **[4]**

c) Explain Access Control Policies Modeling. **[4]**

OR

Q10) a) Describe the different Access Control Schemes in IOT. **[8]**

b) Explain the challenges of authentication in IOT. **[6]**

Total No. of Questions :10]

SEAT No. : ____

P2051

[Total No. of Pages : 2

[5059] - 656
B.E. (Computer Engineering) (Semester - II)
CLOUD COMPUTING (Elective - III)
(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 and Q 9 or Q 10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data is necessary.***

Q1) a) Write a short note on openstank architecture. **[4]**

b) Explain cloud deployment models in detail. **[6]**

OR

Q2) a) Elaborate characteristics of cloud computing. **[6]**

b) Explain cloud computing reference model. **[4]**

Q3) a) Explain characteristics of virtuailized environments in detail. **[4]**

b) Explain in detail KVM architecture. **[6]**

OR

Q4) a) How does virtual provisioning simplifies cloud storage management? **[6]**

b) Write a short note on Dynama. **[4]**

Q5) a) Explain virtual mochine migration techniques in detail. **[10]**

b) Elaborate process of SLA commitment. **[6]**

OR

Q6) a) How opennebula cloud models and manages VMS in virtualized infrastructure. **[8]**

b) Explain scheduling techniques in cloud computing. **[8]**

P.T.O.

Q7) a) Explain the model for federated cloud computing. **[6]**

b) Explain performance related issues for HPC in cloud computing. **[6]**

c) What do you mean by SLA? Elaborate various types of SLA. **[6]**

OR

Q8) a) Write a short note on. **[9]**

i) SOAP versus REST.

ii) Work flow modeling

b) Explain traditional approaches of SLA. **[9]**

Q9) a) Write a short note on following offering on saas segment to improve information security. **[12]**

i) Email filtering

ii) Web content filtering

iii) Vulnerability management

iv) Identity management - as - a - service (Ioaas)

b) What are data security risks? How will you mitigate these risks. **[4]**

OR

Q10) a) Explain in detail IAM architecture. **[8]**

b) Explain information security concerns associated with data stored in cloud. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2052

[Total No. of Pages : 2

[5059] - 657
B.E. (Computer Engineering)
CYBER SECURITY (Elective - III)
(2012 Pattern) (End - Sem)

Time :2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:-

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

Q1) a) What are the categories of computer security. **[5]**

b) Illustrate the cryptanalysis with Dictionary attack. **[5]**

OR

Q2) a) Explain various active attacks in detail. **[5]**

b) What is transposition cipher? Encrypt plain text "WE ARE THE BEST" using transposition cipher use key - " HEAVEN" **[5]**

Q3) a) Explain feistel cipher in detail. **[5]**

b) Describe elliptic curve cryptography. **[5]**

OR

Q4) a) Compare between symmetric key encryption and asymmetric key encryption. **[5]**

b) Explain digital signature algorithm. **[5]**

Q5) a) Explain working of PGP in detail. **[9]**

b) Describe IPsec protocol with its components & security services. **[8]**

OR

Q6) a) Explain ISAKMP protocol for IP sec. **[6]**

b) What is VPN? Explain types of VPN. **[6]**

c) Explain secure socket layer handshake protocol in brief. **[5]**

P.T.O.

Q7) a) Explain types of Intrusion detection systems (IDS). **[6]**

b) List and explain any two password management practices. **[6]**

c) What are the various characteristics of firewall? **[5]**

OR

Q8) a) Describe types of firewall in detail. **[6]**

b) Explain methods for intrusion detection system (IDS) **[6]**

c) What is Access control security service? **[5]**

Q9) a) How VoIP hacking is done by attackers? What are the counter measures for it? **[7]**

b) Identifying wireless network defenses & counter measures. **[7]**

c) What is hacking? Explain mobile hacking. **[2]**

OR

Q10) a) How various wireless devices targeted by hackers in hacking the wireless network ? **[7]**

b) Explain operation of various hacking devices. **[7]**

c) What is input validation Attack? **[2]**

Total No. of Questions : 10] **SEAT No. :**

P2053 **[Total No. of Pages : 2**

[5059]-658

B.E. (Computer)

BUSINESS ANALYTIC AND INTELLIGENCE

(2012 Pattern) (Elective - IV) (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) ***Assume Suitable data if necessary***
4) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***

Q1) a) Describe the role of Business Intelligence in making a business successful. **[5]**

b) Explain the process of Decision making in Business Intelligence System. **[5]**

OR

Q2) a) Explain various data visualization techniques in Decision Support System. **[5]**

b) What are the obstacles to Business Intelligence in an Organization? **[5]**

Q3) a) Explain "Predictive Business Analytics" in detail. **[5]**

b) What is concept hierarchy? Explain its importance in multidimensional cube. **[5]**

OR

Q4) a) Explain the distributed data warehouse architecture with suitable diagram. **[5]**

b) Explain "Fact constellation schema" with suitable example. **[5]**

Q5) a) What is the need of data pre-processing? Explain various data cleaning techniques. **[5]**

b) Explain the methods of measuring central tendency of data with example. **[6]**

P.T.O.

c) What is data normalization in data pre-processing? Explain following data normalization methods with example: **[6]**

i) Min-Max normalization

ii) Z-score normalization

OR

Q6) a) What are outliers? Explain various types of outliers with suitable example. **[6]**

b) Explain clustering based methods of outlier detection with examples. **[6]**

c) What is OLAP'? Explain Roll-up and Slice operations with example. **[5]**

Q7) a) Explain Business Intelligence Infrastructure with suitable diagram. **[6]**

b) Explain the need of Scalability in Business Intelligence infrastructure. **[6]**

c) What is business continuity? Explain various operations involved in it. **[5]**

OR

Q8) a) What is Business Intelligence System? Explain various steps of designing It. **[6]**

b) Explain the concept and importance of maintaining Business Intelligence systems. **[6]**

c) What are the challenges involved in implementing BI infrastructure? **[5]**

Q9)a) Explain the need and role of BI in improving various business functionalities. **[6]**

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

i) Business Analytic

ii) CRM

c) Explain the application of business intelligence for detection of intrusion in network system. **[4]**

OR

Q10)a) Explain the application of Business Intelligence in banking. **[8]**

b) Consider the database of an online retail Shoppe like Big Bazar. Use suitable business intelligence techniques and derive discount s for various items in the shop, for a particular week, to increase the profitability. Explain the techniques used for the same. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2054

[Total No. of Pages : 2

[5059]-659

B.E. (Computer Engineering) (Endsem)

OPERATIONS RESEARCH FOR ALGORITHMS IN SCIENTIFIC APPLICATIONS

(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***AnswerQ1) 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) What are the applications of Operations in Engineering? Explain the scope of the same. **[6]**

b) Explain the various steps in the O.R. development process? **[6]**

c) Define Origin of Operations Research? Describe the relationship between the manager and Operation Research specialist? **[8]**

OR

Q2) a) Explain the reasons for analyzing optimal linear programming problem in terms of dual form. **[6]**

b) Explain the Transportation and Transshipment problems. **[6]**

c) Suppose an industry is manufacturing two types of products P1 and P2. The profits per Kg of the two products are Rs.30 and Rs.40 respectively. These two products require processing in three types of machines. The following table shows the available machine hours per day and the time required on each machine to produce one Kg of P1 and P2. Formulate the problem in the form of linear programming model. **[8]**

Profit/Kg	P1 Rs. 30	P2 Rs.40	Total Available Machine hours/day
Machine 1	3	2	600
Machine 2	3	5	800
Machine 3	5	6	1100

P.T.O.

Q3) a) 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 than9% and the average queue length at the gate is more than 8 vehicles, check whether the installation of the second gate is justified? **[8]**

b) Explain the Graphical Method for solving a Game. **[6]**

c) Define Slack and surplus variables with suitable example. **[3]**

OR

Q4) a) Show that assignment model is a special case of transportation model. **[4]**

b) Discuss the travelling salesman problem. **[5]**

c) What is queuing system? Explain queuing systems transient state and steady state. **[8]**

Q5) a) Explain the iterative method of getting an approximate solution to a game problem and non-zero sum game. **[5]**

b) Explain kendall's notation for single-channel Poisson arrivals with exponential service. Infinite population model [M/M/l : FCFS | ∞ | ∞]. **[12]**

OR

Q6) a) What is the meaning of critical path in project management? Why it is the longest path. **[6]**

b) What is mean by Nano technology? Explain in details? **[5]**

c) Explain in details perspective of Bio-Technology. **[6]**

Q7) a) What is dynamic programming? State and explain Bellman's principle of optimality in dynamic programming. **[6]**

b) Write difference between PERT and CPM. **[5]**

c) Explain types of floats. [5]

OR

Q8) a) Explain important characteristics of dynamic programming. **[4]**

b) Explain single additive constraints, additively separable return model of dynamic programming. **[6]**

c) Write down algorithms of PERT and CPM techniques. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2055

[Total No. of Pages : 3

[5059]-660

B.E. (Computer Engineering)

MOBILE APPLICATIONS

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Attempt the following :

a) Why do we need mobile app? Describe the development process of mobile apps. **[6]**

b) What's the best way to test my mobile site before launch? **[4]**

c) Explain Tool for Debugging Web Services. **[5]**

OR

Q2) Attempt the following :

a) What are various mobile web development option explain with example. **[6]**

b) What is WAP push explain with example? **[4]**

c) Explain Different third-party frameworks for mobile development? **[5]**

Q3) Attempt the following :

a) What is the purpose of Socket.readyState atribute of WebSocket? **[5]**

b) What are the different types of web engines? Explain any one? **[5]**

c) What is Mobile Web 2.0? **[5]**

P.T.O.

OR

Q4) Attempt the following :

a) Differentiate between HTML 4 and HTML5? **[5]**

b) What is HTML5? Name some of the new features of HTML5? **[5]**

c) Explain WML with Suitable example? **[5]**

Q5) Attempt the following :

a) What are different fallback mechanism on the client side? **[4]**

b) Difference between native apps, web apps and hybrid apps with examples. **[6]**

c) Explain Marquee WAP CSS attributes? **[5]**

OR

Q6) Attempt the following :

a) Explain different JAVA script fallback. **[4]**

b) Explain OMA download standard? **[6]**

c) Difference between XHTML and HTML? **[5]**

Q7) Attempt the following :

a) Why cloud base browsers are faster than direct browsers? **[4]**

b) What are different JAVA Script based UI framework. **[6]**

c) How do you detect device type in a web application? Support with coding? **[5]**

OR

Q8) Attempt the following :

a) What are different JAVA Script libraries? **[4]**

b) Explain with example CSS Selectors. **[5]**

c) What is Sencha Touch? Explain Sencha Touch Features? **[6]**

Q9) Attempt the following :

a) Explain Mobile SEO in details? **[4]**

b) The W3C Geolocation API? How it work **[6]**

OR

Q10) Attempt the following :

a) How to get the Cell Location Without the Carrier's Assistance. **[4]**

b) What are different location techniques to determine the geographical location of the device? **[6]**

Total No. of Questions : 10] **SEAT No. :**

P2056 **[Total No. of Pages : 2**

[5059]-661

B.E. (Information Technology)

INFORMATION AND CYBER SECURITY

(2012 Pattern) (Semester - I)

Time : 2.30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answers Question 1 or 2, 3 or 4, 5 or 6, 7 or 8 and 9 or 10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) List and briefly define types of cryptanalytic attacks based on what is known to the attacker. **[6]**

b) Determine gcd (24140, 16762). **[4]**

OR

Q2) a) Using the extended Euclidean algorithm, find the multiplicative inverse of **[6]**

i) 1234 mod 4321

ii) 24140 mod 40902

b) What is the difference between a monoalphabetic cipher and a polyalphabetic cipher? **[4]**

Q3) a) What characteristics are needed in a secure hash function? **[6]**

b) In what order should the signature function and the confidentiality function be applied to a message, and why? **[4]**

OR

Q4) a) What are the properties a digital signature should have? **[6]**

b) What four requirements were defined for Kerberos? **[4]**

P.T.O.

Q5) a) Give examples of applications of IPSec. What services are provided by IPSec? What is the difference between transport mode and tunnel mode in IPSec? **[8]**

b) What protocols comprise SSL.Draw a neat diagram? What is the difference between an SSL connection and an SSL session? **[8]**

OR

Q6) a) What services are provided by the SSL Record Protocol? What steps are involved in the SSL Record Protocol transmission? **[8]**

b) What are three benefits that can be provided by an intrusion detection system? What is the difference between statistical anomaly detection and rule-based intrusion detection? **[8]**

Q7) a) What is cybersquatting. Who are cybersquatters and how does it work. **[8]**

b) What are social engineering attacks and classify and explain them? **[8]**

OR

Q8) a) What is cyberstalking. Explain cyberstalking and explain how it works. **[8]**

b) Classify and explain cybercrimes against property. **[8]**

Q9) Write notes on : **[18]**

a) Viruses

b) Worms and logic bombs

c) Botnets

OR

Q10 Write notes on : **[18]**

a) Cloud computing and cybercrimes

b) Indian legal perspective on cybercrimes

c) Software Piracy

● ● ●

Total No. of Questions : 10]

SEAT No. :

P2057

[Total No. of Pages : 3

[5059]-662

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

SOFTWARE MODELING & DESIGN

(2012 Pattern)

Time : 2.30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Qi or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Use UML2.O notations to draw the UML diagrams.***

Q1) a) In the context of class diagram show a generalization and aggregation relationship with the help of one example each. **[6]**

b) In the context of state diagram, define state, trigger, guard and effect. **[4]**

OR

Q2) a) Convert the following description into a class diagram. Show classes, relationships and multiplicities. **[6]**

In a university there are different classrooms, offices and departments. A department has a name and it contains many offices. A person working at the university has a unique ID and can be a professor or an employee. A professor can be an associate or assistant professor and he/she is enrolled in one department. Offices and classrooms have a number ID, and a classroom has a number of seats. Every employee works in an office.

b) Draw a use case diagram with appropriate relationships and notations for the following description

A software is to be developed for an alarm clock simulation. User can choose a display mode of 12 hour display or 24 hour display. User can set time, user can set alarm, turn off alarm or snooze. **[4]**

P.T.O.

Q3) a) With the context of activity diagram, elaborate fork and join with the help of an example. **[6]**

b) The use case login accepts the userid and password from the user. The system validates them and displays the message that 'Userld or password is invalid'. Draw a sequence diagram for this. **[4]**

OR

Q4) a) Draw a state diagram for a fax machine and show entry, exit and do behavior. Initially, the machine is in the idle state. It displays the date and time in this state. When the user dials a fax number, the machine remains in the idle state till the number dialing is complete. After the number is completely dialed, it goes into the faxing state. Being in this state, it prints the fax on the page, it pulls the page out, it paginates, puts a date, time and owner stamp at the end of the fax message which it prints. After the fax printing is complete, it goes back to idle state. **[6]**

b) Draw a use case diagram with appropriate relationships and notations for the following description.

Consider an online travel planner software. Through this software, the user can book bus tickets, provide payment information, provide address, book a car on rent, book a hotel room. It is mandatory to provide payment information and provide address for booking of bus tickets, car on rent and a hotel room. **[4]**

Q5) a) Write a note on Making a Reuse Plan from the context of system design. **[8]**

b) Which are the boundary conditions & how they are handled? **[8]**

OR

Q6) a) Describe one way of breaking a system into subsystems. **[8]**

b) Describe allocation of subsystems in System Design. **[8]**

Q7) a) Write the classification, motivation, class diagram and uses of adapter design pattern. **[8]**

b) Write the classification, motivation, class diagram and uses of observer design pattern. **[8]**

OR

Q8) a) Write the classification, motivation, class diagram and uses of strategy design pattern. **[8]**

b) Write the classification, motivation, class diagram and uses of state design pattern. **[8]**

Q9) a) Draw a flow chart of test driven development. **[8]**

b) Features of printer are to be tested & its specification is as follows. **[10]**

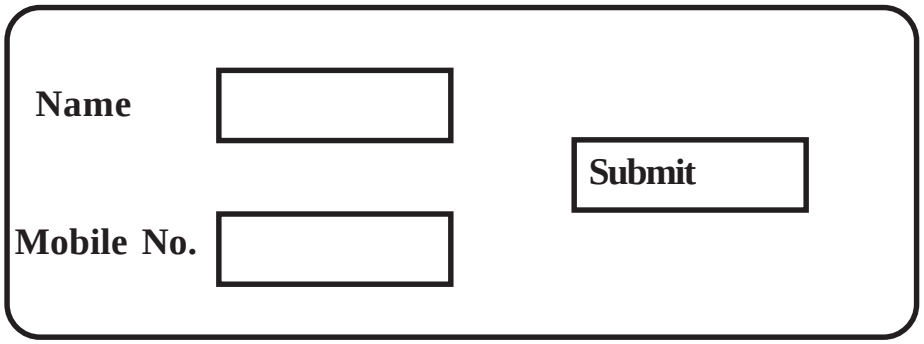
It prints the document in black & white , colour. It has an on/off button. It accepts A4 paper one at a time for printing. It has two LED lights. Green light shows normal printing operation & red light shows problem with printing. It has two cables. One is power cable & other is data cable, which is connected to the CPU.

Write at least five test cases to check that the Printer machine works properly.

OR

Q10 a) Differentiate Black box testing and white box testing on the basis of definition, levels of testing, basis for test cases, responsibility of testing.**[8]**

b) Write at least five test cases for following Screen. **[10]**



Total No. of Questions : 10]

SEAT No. :

P2058

[Total No. of Pages : 2

[5059]-663

B.E. (I.T.)

MACHINE LEARNING

(2012 Pattern) (End Semester)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain logical models. State examples. **[5]**

b) What is a perceptron? Explain with the help of an example. **[5]**

OR

Q2) a) With an example, explain feature as a split and feature as a predictor. **[5]**

b) Calculate accuracy, precision and recall for the following : **[5]**

	Predicted +	Predicted –
Actual +	60	15
Actual –	10	15

Q3) a) When is it suitable to use linear regression over classification? **[5]**

b) State formulae for calculating accuracy, true positive rate, true negative rate, false positive rate and false negative rate for binary classification tasks. **[5]**

OR

Q4) a) Explain training dataset, test dataset and supervised learning. **[5]**

b) Why do we need to regularize in regression? Explain. **[5]**

P.T.O.

Q5) a) Explain four distance function. Name any machine learning task which uses distance functions. **[9]**

b) Write a note on clustering trees. **[9]**

OR

Q6) a) Write a note on subgroup discovery. **[9]**

b) Explain single linkage, complete linkage and average linkage. **[9]**

Q7) a) Is Naïve Bayes algorithm supervised or unsupervised task? Explain how it achieves the task you specified. **[8]**

b) Write a note on normal distribution. **[8]**

OR

Q8) a) What is multivariate Bernoulli distribution? **[8]**

b) Using the following data, find 2-item-itemsets which have minimum support = 2. **[8]**

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

Q9) a) Write a note on reinforcement learning. **[8]**

b) Write a note on On-line learning. **[8]**

OR

Q10 a) Write a note on Deep Learning. **[8]**

b) Write a note on ensemble learning. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2059

[Total No. of Pages : 2

[5059]-664

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

SOFT COMPUTING

(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Comment on the nature of problems solved with soft computing. **[6]**

b) List and explain performance issues of EBP. **[8]**

c) What do you understand by resonance in ART networks. **[6]**

OR

Q2) a) Comment on the nature of solutions obtained with soft computing. **[6]**

b) List out the strength and weaknesses of EBP. **[8]**

c) Explain the steps involved in clustering by KNN. **[6]**

Q3) a) What is meant by fuzzy logic system? Illustrate it with proper examples. **[8]**

b) Explain the Alpha-cut method for discrete fuzzy sets to perform arithmetic operations. i) Addition ii) Division **[8]**

OR

Q4) a) List out the characteristics features of fuzzy logic. **[8]**

b) Explain following fuzzy set operations with example. **[8]**

i) Normal fuzzy set ii) Product of fuzzy set

P.T.O.

Q5) a) What is difference between evolutionary strategy and evolutionary programming. **[8]**

b) With the neat flowchart explain operation of simple genetic algorithms. **[8]**

OR

Q6) a) Explain how genetic algorithms are different from evolutionary programming. **[8]**

b) With the neat flowchart explain operation of genetic programming. **[8]**

Q7) a) Describe an application how soft computing can be used in semantic web. **[9]**

b) Describe an applications of fuzzy for character recognitions. **[9]**

OR

Q8) a) Describe an application how soft computing can be used in information retrieval. **[9]**

b) Describe an applications of evolutionary computing in image processing. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2060

[Total No. of Pages : 2

[5059] - 665
B.E. (I.T.) (Semseter - I)
USABILITY ENGINEERING
(2012 Pattern) (Elective - I)

Time : 2½ Hour] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define Usability? Explain the importance of Usability Trade-offs. **[6]**

b) Explain Usability Principle : Consistency. **[4]**

OR

Q2) a) Explain the advantages of parallel user interface design. **[4]**

b) Explain levels of Human computer Interaction. **[6]**

Q3) a) What is the benefit of good interface design? **[4]**

b) Explain the concept of Gulf of evaluation. **[6]**

OR

Q4) a) Write a short note : Meta Methods **[4]**

b) Explain Gestalt principles **[6]**

Q5) a) What is importance of test goals and test plans in Usability testing? **[8]**

b) Explain the importance of Observations, Questionnaires and interviews in usability assessment. **[10]**

OR

Q6) a) What is the concept of focus groups? Explain in detail. **[8]**

b) Explain different stages of usability testing with example. **[10]**

P.T.O.

Q7) a) How Multilocale interfaces are more useful to the users. **[8]**

b) Explain any four user interface standards. **[8]**

OR

Q8) a) How information in the interface useful for users while interacting with interface. **[8]**

b) How user & Vendor Benefits from Consistency and Standards. **[8]**

Q9) a) Explain Theoretical solutions for user interfaces. **[8]**

b) Write a short note on (Any 2) : **[8]**

i) Simulation

ii) Collaborative Systems

iii) Software Agent

OR

Q10)a) Explain Organizational role and structure in usability. **[8]**

b) Write a short note on (Any 2) : **[8]**

i) Ethics of Usability

ii) Virtual Reality

iii) Technological solutions in User Interface

Total No. of Questions : 8]

P2061

SEAT No. :

[Total No. of Pages : 2

[5059] - 666
B.E. (Information Technology) (Semester - I)
MODERN COMPILERS (Elective - I)
(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define callee-save and caller-save registers. How do the use of registers save time for programming languages? **[6]**

b) Draw control-flow graph for the given code. Find the live ranges of a, b,c. **[6]**

```
a =0
L 1 : b=a+1
c=c+b
a=b*2
if a <N goto L1
return c
```

c) Explain reference counting for garbage collection. Discuss the problems with this technique using suitable example. **[8]**

OR

Q2) 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]**

Q3) 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]**

P.T.O.

OR

Q4) 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]**

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 are reasons for variable aliases? Explain variable aliases based on type and based on flow. **[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. :

P2062

[Total No. of Pages : 2

[5059] - 667
B.E. (Information Technology) (Semseter - I)
PARALLEL ALGORITHMS AND DESIGN
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Ql or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q1O.***
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]**

P.T.O.

Q5) a) Implement a parallel computing structure for matrix multiplication using mcc. **[10]**

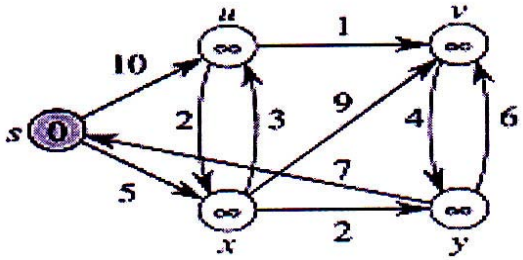
b) Explain Conjugate Gradient Method-Parallel Algorithm. **[8]**

OR

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:

i) Combination in parallel computing

ii) Derangements in parallel computing **[10]**

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. :

P2063

[Total No. of Pages : 2

[5059] - 668
B.E. (Information Technology)
CLOUD COMPUTING
(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) ***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 in brief the services offered by cloud computing? **[6]**

b) Enlist the essential characteristics of cloud computing. **[2]**

OR

Q2) a) Explain in brief advantages and limitations of cloud computing. **[6]**

b) Compare Public cloud and Private cloud. **[2]**

Q3) a) Explain the virtualization techniques in cloud computing. **[6]**

b) Enlist features of federation types. Explain any one in brief. **[6]**

OR

Q4) a) Discuss in brief following basic principles of cloud computing **[6]**

i) Federation

ii) Independence

iii) elasticity

b) Compare KVM, Xen and HyperV. **[6]**

P.T.O.

Q5) a) Describe in brief 'Operating System Security'. **[8]**

b) Enlist & describe security risks posed by shared images. **[8]**

OR

Q6) a) Discuss the top security concerns for cloud users. **[8]**

b) Discuss two ways of determining trust. **[8]**

Q7) a) Explain Google App Engine with diagram. **[8]**

b) Write short note on 'Open Nebulla'. **[8]**

OR

Q8) a) Explain the storage services offered by Amazon EC2 cloud. **[8]**

b) State and explain any two cloud computing applications. **[8]**

Q9) a) Describe Context Aware operational life cycle. **[10]**

b) Discuss any four common myths about ubiquitous computing. **[8]**

OR

Q10) a) Describe methods to acquire user Inputs related to human centered design. **[8]**

b) Explain the following service architectural models : **[10]**

i) Multi tier client service model

ii) Service oriented computing model

Total No. of Questions : 10]

SEAT No. :

P2064

[Total No. of Pages : 2

[5059] - 669
B.E. (Information Technology)
BUSINESS INTELLIGENCE
(2012 Pattern) (Elective - II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Question 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.***

Q1) a) What is OLAP? Explain the guidelines for implementation of OLAP. **[6]**

b) Define Business Intelligence. Explain the role of data warehouse in Business Intelligence. **[4]**

OR

Q2) a) What are facts? Explain additive, semi-additive and non-additive facts with the help of example. **[6]**

b) Differentiate between OLAP and OLTP. **[4]**

Q3) a) Explain different types of schema used for data warehouse design. **[4]**

b) Explain components of ETL architecture with the help of neat diagram. **[6]**

OR

Q4) a) Explain data mart in detail. **[4]**

b) Write short note on: (Each 3 Marks) **[6]**

i) Slowly Changing Dimensions (SCD)

ii) Conformed Dimensions

P.T.O.

Q5) a) What are the various types of Reports? Explain Ad-hoc reporting in detail. **[8]**

b) What is data aggregation? Explain use of data aggregation. **[8]**

OR

Q6) a) Explain the importance of security while creating Business Intelligence reports. Explain different types of securities in reporting. **[8]**

b) What is materialized view and Snapshot materialized view? Explain with proper example. **[8]**

Q7) a) Explain cluster analysis with real world example. Also list out its applications. **[8]**

b) Compare and contrast In-DB and In-memory analytics. **[8]**

OR

Q8) a) What is time-series analysis? Explain the ways to identify the patterns in time-series data. **[8]**

b) Explain hierarchical clustering algorithm along with different methods to calculate the distance between clusters. **[8]**

Q9) a) Explain with neat diagram the architecture of Business Intelligence on cloud. **[10]**

b) Explain the components of Teradata with the help of diagram. **[8]**

OR

Q10) Write short notes on (any 3) **[18]**

a) Map-Reduce

b) HDFS

c) PIG

d) HIVE

Total No. of Questions : 10]

SEAT No. :

P2065

[Total No. of Pages : 2

[5059] - 670
B.E. (I.T.)
SERVICE ORIENTED ARCHITECTURE
(2012 Pattern) (Elective - II) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Question Q.1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q.10.***
2) ***Neat Diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) List and Explain Common Tangible benefits of SOA **[4]**

b) Compare SOA with n tier client server architecture. **[6]**

OR

Q2) a) Explain SOAP messaging format in detail. **[6]**

b) Explain the service description document in detail **[4]**

Q3) a) Explain correlation with respect to web services and contemporary SOA? **[5]**

b) Difference between abstract description and concrete description in detail **[5]**

OR

Q4) a) Explain Eventing Framework related to web services **[5]**

b) What is service reusability and service contract? Explain how service reusability interrelates with other service orientation principles? **[5]**

Q5) a) Explain the basic phases of SOA delivery lifecycle **[8]**

b) What are the benefits of a business centric SOA? Differentiate between task centric and entity centric business services. **[8]**

OR

P.T.O.

Q6) a) Explain in brief the steps involved in service modeling process **[8]**

b) Explain set of guidelines for service modeling **[8]**

Q7) a) What are the overall goals of performing a service-oriented design. Explain the steps for service oriented design process **[8]**

b) Discuss SOAP language basics. **[8]**

OR

Q8) a) What is meant by service-oriented design? Discuss the WSDL language basics. **[6]**

b) What are the considerations for choosing service layers & SOA standards? Explain. **[10]**

Q9) a) Distinguish between application business service design and task centric business service design. **[10]**

b) Explain the WS- BPEL process definition structure **[8]**

OR

Q10) Write short notes on: **[18]**

a) WS coordination

b) QOS Compliance in SOA governance

c) Benefits of SOA in Cloud Computing

Total No. of Questions : 10] **SEAT No. :**

P2066 **[Total No. of Pages : 3**

[5059]-671

B.E. (Information Technology)

E & M GOVERNANCE (Elective - II)

(2012 Pattern) (Semester - I)

Time : 2.30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:-

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q1O.***
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 back-office systems? **[2]**

Q3) a) Describe 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

P.T.O.

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:

f) Sequential:

g) Knowledge management:

h) Tracking:

i) Disintermediation:

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) Why are e-markets more efficient than traditional markets? **[8]**

OR

Q6) a) Which 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) Explain different types of mobile services in detail. **[8]**

b) Differentiate between: m-Commerce services for Consumers & m-Commerce services for Businesses. **[8]**

OR

Q8) a) Define m-commerce and explain how an e-government could use it to increase its efficiency and effectiveness. **[8]**

b) Write a short note on m-commerce life cycle. Discuss advantages and disadvantages of m-commerce. **[8]**

Q9) a) The mobile devices of the future will be more powerful, less heavy, and comprise new interfaces to the user and to new networks. Describe the special technologies used in m-commerce. **[6]**

b) What are the emerging live issues in mobile commerce? **[6]**

c) What are various mobile commerce services for business? Explain. **[8]**

OR

Q10) a) Discuss the five major m-commerce applications, and provide a specific example of how each application can benefit a business. **[6]**

b) Discuss how m-commerce can expand the reach of e-business. **[6]**

c) What are various mobile commerce services for consumer? Explain. **[8]**

Total No. of Questions : 10] **SEAT No. :**

P2067 **[Total No. of Pages : 2**

[5059]-672

B.E. (Information Technology)

GEO INFORMATICS SYSTEM (End Semester)

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

Time : 2 ½Hours] ***[Max. Marks : 70***

Instructions to the candidates:-

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

Q1) a) Explain Spatial referencing system. **[5]**

b) Explain the framework for GIS. **[5]**

OR

Q2) a) Explain linkage of GIS to remote sensing. **[5]**

b) Explain Electromagnetic remote sensing process in detail. **[5]**

Q3) a) Explain the comparison between Active sensor & passive sensor. **[5]**

b) Explain basic elements of image interpretation. **[5]**

OR

Q4) a) Explain different sensor parameters. **[5]**

b) Explain process of spatial filtering technique. **[5]**

P.T.O.

Q5) a) Explain conversion of existing data. **[8]**

b) Write short note on : **[8]**

i) Location error

ii) Topological error

OR

Q6) a) Explain geometric transformation. **[8]**

b) Explain existing GIS data with example. **[8]**

Q7) a) Explain the comparison of raster & vector based data analysis. **[8]**

b) Explain the concept of data exploration. **[8]**

OR

Q8) a) Explain basic elements of GIS model. **[8]**

b) Explain different type of operation in raster data analysis. **[8]**

Q9) a) Explain the components of ITS & its integration with GIS. [9]

b) Explain concept of software engineering as applied to GIS. **[9]**

OR

Q10)a) Describe different application of GIS. **[9]**

b) Explain integration of GPS & GIS. **[9]**

Total No. of Questions : 10] **SEAT No. :**

P2068 **[Total No. of Pages : 2**

[5059]-673
B.E. (Information Technology)
NATURAL LANGUAGE PROCESSING
(2012 Pattern) (Elective - II) (End Semester)

Time : 2 ½Hours] ***[Max. Marks : 70***

Instructions to the candidates:-

1) ***Solve any 1 out of Q.1or Q.2 and any 1 out of Q.3 or Q.4 and***
2) ***Solve any 1 out of Q.5 or Q.6 and any 1 out of Q.7 or Q.8 and any 1 out of Q.9 or Q.l0.***
3) ***Draw neat diagrams and assume suitable data wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) Explain with a diagram organization of a natural language understanding system. **[10]**

OR

Q2) Describe all the levels of language understanding in natural language processing system. **[10]**

Q3) a) Differentiate between the depth-first and breadth-first top down parsing **[5]**

b) Describe simple top-down parsing algorithm. **[5]**

OR

Q4) a) Describe augmented grammar use in natural language processing? **[5]**

b) Describe the Person and Number features used in natural language processing. **[5]**

Q5) a) Describe lexical probabilities and techniques of obtaining them in natural language processing. **[10]**

b) Describe logical form as an intermediate representation in natural language processing with a diagram. **[8]**

OR

P.T.O.

Q6) a) Draw and explain shift-reduce parsing in natural language processing. **[10]**

b) Explain the human preferences in encoding uncertainty during parsing. **[8]**

Q7) a) Explain lexical resource wordnet used in natural language processing. **[8]**

b) Describe probabilistic parsing in natural language processing . **[8]**

OR

Q8) a) Explain the use of semantic web ontology. **[8]**

b) Explain word sense disambiguation in natural language processing. **[8]**

Q9) a) Explain semantic web search with an example. **[8]**

b) How is natural language processing useful in an automatic text clustering problem? **[8]**

OR

Q10) a) Describe automatic machine translation problem. **[8]**

b) Explain the machine translation system evaluation tools. **[8]**

Total No. of Questions : 10] **SEAT No. :**

P2069 **[Total No. of Pages : 3**

[5059]-674
B.E. (Information Technology)
DISTRIBUTED SYSTEM (Semester - II)
(2012 Pattern)

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 Q1O.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the concept of Heterogeneity in Distributed System in detail. How it deals with Heterogeneity? **[6]**

b) List the various challenges during the construction of Distributed systems. Describe the challenges while designing of scalable distributed system. **[4]**

OR

Q2) a) What are Sockets? Specify Socket primitives. Draw a diagram specifying TCP stream communication. **[6]**

b) What are various forms of Transparency in Distributed System? Illustrate Network Transparency with an example. **[4]**

Q3) a) What are web services? Explain SOAP and REST based Web Services in a nutshell. **[6]**

b) Explain two main characteristics of distributed event-based systems. **[4]**

OR

P.T.O.

Q4) a) What is Publish-Subscribe system of Communication? **[4]**

b) Explain RMI software with respect to: **[6]**

i) Proxy

ii) Dispatcher

iii) Skeleton

Q5) a) What are NTP's chief design aims and features? An NTP server B receives server A's message at 16:34:23.480 bearing a timestamp 16:34:13.430 and replies to it. A receives the message at 16:34:15.725, bearing B's timestamp 16:34:25.7. Estimate the offset between B and A and the accuracy of the estimate. **[9]**

b) Explain the Chandy-Lamport 'snapshot' algorithm for determining global states of distributed systems. **[7]**

OR

Q6) a) Describe implementation of ordered multicast in a non-overlapping group. **[8]**

b) What do you understand by logical time and logical clocks? Explain Lamport's contribution for it. **[8]**

Q7) a) With a neat labeled diagram of architecture explain communication in NFS. **[8]**

b) Write note on: Global Name Service. **[8]**

OR

Q8) a) Explain following terms with respect to naming entities: **[8]**

i) Names

ii) Identifiers

iii) Addresses

iv) Name Spaces

b) How does the client side caching is used in NFS? Discuss the role of RPC in NFS. **[8]**

Q9) a) Explain process architecture of KERBEROS with security objects namely tickets, authentication and Session key. **[9]**

b) How is a host protected from mobile code using Java sandbox? **[9]**

OR

Q10) a) What do you meant by public-key Cryptography? Explain Digital Signatures with public keys. **[6]**

b) Write short notes on the following (Any 2) : **[12]**

i) Applications of Cryptography and political obstacles

ii) Peer-to-peer middleware systems

iii) Protection and Access Control in Distributed System applications.

Total No. of Questions : 10] SEAT No. :

P2070 [Total No. of Pages : 3

[5059]-675
B.E. (Information Technology)
ADVANCED DATABASES
(2012 Pattern) (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 indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) How concurrency control and recovery is done in distributed database? **[6]**

b) Describe query optimization in parallel databases. **[4]**

OR

Q2) a) Define I/O Parallelism? Explain Speedup and Scale-up parallelism. **[5]**

b) Compare RDBMS, OODBMS and ORDBMS. **[5]**

Q3) a) Consider the following nested relational schema. **[6]**

Emp= (ename, childrensetsetoff (children), skillset setoff (skills))

Children = (name, birthday), Birthday= (day, month, year)

Skills = (type, Examsetsetoff (Exams)), Exams = (year, city)

Answer the following :

i) Write DTD and XML file

ii) Write a query in XPath to list all skill types in Emp.

iii) Find the name of all the employees who have a child who has a birthday in March.

b) Explain concept of improving data access with secondary Indexes in DynamoDB. **[4]**

OR

P.T.O.

Q4) a) What is Cassandra Query Language? Explain in detail. **[5]**

b) Write short notes on Transient and Persistent objects. **[5]**

Q5) a) How stream data management system works? Explain its issues and solutions. **[8]**

b) What is Graph Mining? Explain with example frequent subgraph mining methods. **[8]**

OR

Q6) a) What is a social Network? Explain different characteristics of social networks. **[8]**

b) Write a short note on following : **[8]**

i) Apache Flume NG

ii) Tasks in Link Mining

Q7) a) Which are the various text characterization methods? Explain any two of them. **[6]**

b) Explain concept of data modeling for web usage mining. **[6]**

c) Explain concept of collaborative filtering using kNN Algorithm. **[6]**

OR

Q8) a) Explain recommender systems. Which are the problems associated with it? **[6]**

b) Describe Collaborative Filtering :Matrix factorization in detail. **[6]**

c) Describe most common types of pattern discovery and Analysis techniques employed in the web usage mining. **[6]**

Q9) a) Write short note on : **[8]**

i) Multimedia Databases

ii) Cloud databases

b) What is deductive database? Explain query evaluation technique in deductive databases. **[8]**

OR

Q10) a) Compare Spatial and Temporal databases. **[8]**

b) What is semantics? Explain semantics in deductive database in detail. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3080

[Total No. of Pages : 2

[5059]-676

B.E.(Information Technology)

MOBILE COMPUTING

(2012 Course)(Elective-III)(End Sem.)(Semester-II) (414463A)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1or Q2,Q3or Q4,Q5or Q6,Q7or Q8, Q9or 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 1st, 2nd, and 3rd generation of network. **[4]**

b) Explain difference between Soft handoff and Hard Handoff **[5]**

OR

Q2) a) w.r.t. mobile computing Explain various aspects of mobility **[4]**

b) Draw and explain Mobile computing architecture. **[5]**

Q3) a) Which are different types of databases avilable in GSM architecture? Explain their functionality. **[5]**

b) Explain with diagram Mobile-Originated Messaging and Mobile-Terminated Messaging. **[5]**

OR

Q4) a) Explain the following terms with their significance: MSISDN, IMSI, MSRN, TMSI **[5]**

b) Explain the functionality Authentification Centre and Equipment Identity Register and Subscriber Identity module in GSM Architecture. **[5]**

Q5) a) How GSM architecture is modified to support GPRS? Explain in detail. What are the benefits of GPRS. **[9]**

b) Write short note on CDMA 2000. **[8]**

OR

Q6) a) Explain WAP Architecture with diagram. **[9]**

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

P.T.O.

Q7) a) Explain the significance of application to application messaging architecture along with its limitations **[9]**

b) Draw and explain any 3 phases of mobile application development. **[8]**

OR

Q8) a) Explain in details smart client Development Process **[9]**

b) Explain smart Client architecture **[8]**

Q9) a) Describe Android OS architecture specific to role of Application framework and Dalvik VM **[9]**

b) Describe Testing methodologies for Mobile Applications **[8]**

OR

Q10)a) Explain all features of Android OS in details **[9]**

b) Explain 4G and 5G future mobile Generations. **[8]**

Total No. of Questions : 10] **SEAT No. :**

P2071 **[Total No. of Pages : 3**

[5059]-677

B.E. (Information Technology)

ADVANCED GRAPHICS AND ANIMATION

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

Time : 2.30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:-

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q1O.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are the different Spline specification methods? Explain with suitable diagram and examples. **[5]**

b) Explain with mathematical model Bezier surface and B-Spline surface. **[5]**

OR

Q2) a) Explain the issues related to three dimensional display methods. Compare parallel projection and perspective projection method for 3-D objects. **[5]**

b) Explain Regularized Boolean set operations with examples. **[5]**

Q3) a) Explain desirable properties in solid representation. **[5]**

b) What is rendering? Explain Monte-Carlo method for rendering. **[5]**

OR

P.T.O.

Q4) a) Explain Phong's illumination model in detail. **[5]**

b) What is tracing? Compare and Contrast Beam tracing and pencil tracing. **[5]**

Q5) a) What is blending? Explain in detail different blending operations performed in OpenGL. **[8]**

b) Write a short note on "OpenGL primitives". **[8]**

OR

Q6) a) What is texture mapping? Explain any one texture mapping technique with implementation in OpenGL. **[8]**

b) Explain any one Culling algorithm in detail. **[8]**

Q7) a) Explain briefly various real time animation techniques used in computer assisted animation. **[8]**

b) Which are the different animation software's? Explain any one animation software in detail. **[8]**

OR

Q8) a) Why control hierarchy is required in animation? Explain various methods of controlling animation. **[8]**

b) List and explain different animation languages. Explain features of animation languages. **[8]**

Q9) a) Explain virtual environment. How virtual reality help in good interactive design? **[8]**

b) Enumerate different usability evaluation and testing techniques with respect to Virtual Reality. **[10]**

OR

Q10) a) What is Virtual Reality Modeling Language? List and explain different types of Virtual Reality? **[8]**

b) What is the need of Virtual Reality? Explain in detail with real life example. **[10]**

Total No. of Questions : 10]

SEAT No. : ____

P2072

[Total No. of Pages : 3

[5059] - 678

B.E. (Information Technology)

INFORMATION STORAGE AND RETRIEVAL

(2012 Pattern) (Elective - III)

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) Why single pass algorithm is better than Rocchio's Algorithm? Form the document cluster of following document term matrix using single pass clustering algorithm. Consider **[10]**

Membership Function: Sum of product

Centroid calculation Function: Average

Threshold = 11

	Dl	D2	D3	D4	D5
T1	1	1	0	1	1
T2	2	1	2	3	0
T3	3	0	1	0	1
T4	2	2	0	3	0
T5	2	2	1	2	1

OR

Q2) a) Explain working of suffix tree. Construct suffix tree for following example. **[6]**

"This is a text. A text has many words. Words are made from letters."

b) Write a short note on matching coefficients. **[4]**

P.T.O.

Q3) a) Write a note on "Ontology languages for semantic web". **[5]**

b) Write a note on "cluster based retrieval". **[5]**

OR

Q4) Consider a reference collection and its set of example information request. If q is the information request and a set **[10]**

Rq=(d3, d5, d9, d25, d39, d44, d50, d70, d80, dl20). Now consider new retrieval algorithm has been designed and has been evaluated for information request q returns, ranking of the documents in the answer set as.

1.	d120	6.	d9	11.	d38
2.	d84	7.	d58	12.	d48
3.	d50	8.	d129	13.	d230
4.	d6	9.	d143	14.	d113
5.	d8	10.	d25	15.	d3

The documents that are relevant to the query q are underlined. Calculate precision and recall for the documents that are relevant to the query q

Q5) a) Describe the query processing in Distributed IR. **[8]**

b) Explain Data models used for Multimedia IR. **[8]**

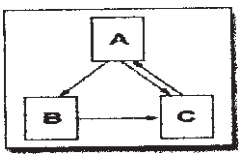
OR

Q6) a) What do you mean by collection partitioning & source selection in Distributed IR? **[8]**

b) Explain the generic multimedia Indexing Approach. **[8]**

Q7) a) What is Metasearcher? **[6]**

b) What is importance of page ranking? Calculate page rank of following web pages. **[12]**



OR

Q8) a) What are the challenges while searching the web? **[12]**

b) What is the role of crawler in web searching? Explain the strategies used by web crawler. **[6]**

Q9) a) Define Recommender System? Explain in brief collaborative filtering. **[8]**

b) Explain the method of extracting data from text. **[8]**

OR

Q10)a) Explain the concept of semantic web .How it is useful in web searching? **[8]**

b) Explain in detail content based recommendation of documents. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2073

[Total No. of Pages : 3

[5059] - 679

B.E. (Information Technology)

IT ENABLED SERVICES

(2012 Pattern) (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 side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What is IT Strategy? Describe reasons for formulation of IT Strategy? **[4]**

b) Enlist Characteristics of Business Strategy. **[2]**

c) Describe in brief 'IT Management Strategy'. **[2]**

OR

Q2) a) Describe challenges of Business & IT alignment. **[6]**

b) Draw the diagram of Three levels of Business & IT alignment. **[2]**

Q3) a) Describe three questions that can be asked for Strategic Business Planning stating proper example. **[6]**

b) Describe Project Management Organization at various stages of maturity. **[6]**

OR

Q4) a) Describe the SITP approach: Nolan's Stages of Growth. **[6]**

b) Draw and explain Technology management strategic framework based on the available technology, past successes and experiences. **[6]**

P.T.O.

Q5) a) Enlist ITIL service support processes. Explain Problem Management process in detail. **[8]**

b) Define following terms with reference to Service Level Management **[5]**

i) Service catalog

ii) Service level agreement

iii) Operation level agreement

iv) Underpinning contract

v) Service level requirement

c) Describe three Critical Success Factors for Service Level Management Success. **[3]**

OR

Q6) a) Enlist different measures for quick restoration from failure of critical business processes. **[8]**

b) Write short note on 'Insourcing'. **[8]**

Q7) a) Describe different types of arrays in PHP with example. Create an associative array called $months that contains the months of the year and the number of days in the months. Display the $months array. Use for each loop. **[8]**

b) Describe methods to send information to PHP file through HTML form. **[8]**

OR

Q8) a) Write a short note on : **[8]**

i) UDDI

ii) SOAP

b) Describe custom error handler function in PHP with suitable PHP program. **[8]**

Q9) a) Explain Barriers to trade in ITES and explain role of WTO & UNCTAD in ITES. **[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]**

Total No. of Questions : 10]

SEAT No. :

P2074

[Total No. of Pages : 2

[5059] - 680

B.E. (Information Technology)

ADVANCED COMPUTER NETWORKS

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

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 jf necessary.***

Q1) a) Describe architecture of WiMAX. **[6]**

b) What are different network elements? **[4]**

OR

Q2) a) What are ATM traffic descriptor? Explain. **[6]**

b) What is Network address translation? **[4]**

Q3) a) Draw header structure of ATM cell at U-N interface. **[6]**

b) What is multiprotocol label switching? **[4]**

OR

Q4) a) Describe in detail VoIP. **[6]**

b) What is multirate circuit switching? **[4]**

Q5) a) What do you mean by lossless compression? State different lossless compression techniques. Explain any one detail. **[10]**

b) Describe various components of TCP congestion control? **[8]**

OR

P.T.O.

Q6) a) What are different strategies to avoid congestion? Explain any one in detail. **[10]**

b) Define QoS? How RSVP supports to improve the overall QoS of network? **[8]**

Q7) a) Explain characteristics of Mobile IP. **[8]**

b) What is MPLS? Explain the operations of MPLS in detail. **[8]**

OR

Q8) a) What is GMPLS? Where it is used? Justify your answer. **[8]**

b) Discuss the challenges of traffic engineering in IP/MPLS network. **[8]**

Q9) a) Explain basic architectural stack of IEEE 802.16. **[8]**

b) Explain Cluster-Based wireless networks. **[8]**

OR

Q10)a) Describe high rate and low rate WPAN. **[8]**

b) Explain in detail MAC implementation of IEEE 802.16. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2075

[Total No. of Pages : 2

[5059] - 681

B.E. (Information Technology)

BIOINFORMATICS

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

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) What is the scope of bioinformatics? Explain why Bioinformatics is a multidisciplinary field. **[5]**

b) Explain Protein Structure Classification databases. **[5]**

OR

Q2) a) Differentiate structural and functional genomics. **[5]**

b) Explain how central dogma is an information science. **[5]**

Q3) a) Compare visualization tools and classify them with examples. **[5]**

b) Explain how statistical analysis can be helpful in reducing variability. **[5]**

OR

Q4) a) Explain microarray and spotting with the help of process flow diagram for microarray analysis. **[5]**

b) Explain clustering of gene expression data. **[5]**

P.T.O.

Q5) a) Explain Sequence alignment. What is a Scoring matrices? **[8]**

b) Describe data mining methods and their usefulness with the help of a neat diagram. **[8]**

OR

Q6) a) Heuristic Methods for Sequence Alignment. **[8]**

b) Explain working with FASTA and working with BLAST Algorithms. **[8]**

Q7) a) Explain Phylogenetic analysis. Explain Multiple Sequence Alignment Problem with example. **[8]**

b) Explain Prediction algorithms for Genes and Phylogenetic. **[8]**

OR

Q8) a) Explain Methods for Protein Modeling with applications. **[8]**

b) Explain comparative Modeling Process with a diagram. **[8]**

Q9) a) When do we say the alignment score is high enough to suggest homology? **[6]**

b) State and explain Tools for Modeling and Simulation. **[6]**

c) Explain Structural Bioinformatics in Drug Discovery. **[6]**

OR

Q10)a) Simulation and Statistical Protocols of Markov Chain and Hidden Markov Model. **[6]**

b) Explain System Biology in Human Health and Disease. **[6]**

c) Explain Future of Medicine and trends in bioinformatics. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2165

[Total No. of Pages : 2

[5059]-682
B.E.(IT)
REAL TIME& EMBEDDED SYSTEMS
(2012 Course)(Elective-IV)(End Semester) (414464B)

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

Instructions to the candidates:

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

Q1) a) List the challenges of design and development of embedded system and discuss relevant toolset, technology to meet them. **[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) Comment on Instruction pipelining in the SHARC processor. **[6]**

b) Explain I2C bus architecture and its operation in detail. How many devices can be connected on I2C bus? **[4]**

OR

Q4) a) Explain exception handling process in ARM processors. What are exception vectors in ARM discuss in brief. **[6]**

b) Explain following with respect to CAN bus **[4]**

i) ID Filtering

ii) Error handling

iii) Overload frames

iv) Wired AND logic.

P.T.O.

Q5) a) Use 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) What are the assumptions for priority driven scheduling of periodic tasks? Explain weighted round robin scheduling algorithm. What are the advantages over simple round robin scheduler? **[8]**

OR

Q6) a) Use EDF scheduler for scheduling a periodic task set of T1 (1, 3, 3)& T2(4, 6, 6). Perform schedulability check & comment on whether given task set is schedulable& schedule produced is feasible. **[10]**

b) Compare RMS & EDF schedulers. **[8]**

Q7) a) What is deadlock & explain how to avoid deadlock with priority ceiling protocol. **[8]**

b) What is resource reclaiming? State needs of resource reclaiming algorithm. **[8]**

OR

Q8) a) What is priority inversion? Explain algorithm to solve the problem of priority inversion. **[8]**

b) State & explain algorithm for scheduling aperiodic tasks. **[8]**

Q9) a) What is Real Time Operating system? Explain features & characteristics of Real Time Operating System(RTOS). **[8]**

b) Explain in detail any one commercial RTOS. **[8]**

OR

Q10)a) What is Real Time Database? Explain features & characteristics of Real Time Databases. **[8]**

b) Explain in detail any one commercial Real Time Database. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2076

[Total No. of Pages : 2

[5059] - 683

B.E. (Information Technology)

GREEN IT - PRINCIPAL AND PRACTICES

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

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

Instructions to the candidates:

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

Q1) a) What are P and C states of processor? How does processor C-states save energy? **[7]**

b) What key IT infrastructure is used in Data Centers. **[7]**

OR

Q2) a) How server farm and server virtualization helps in saving energy. **[7]**

b) Explain the life cycle of an electronic device. Also based on your view discuss the environmental impact of each stage. **[7]**

Q3) a) How storage virtualization and cloud storage help in saving energy. **[6]**

b) What are the major elements of the value chain within an organization, and how does 'closing the loop' relate to the value chain? **[8]**

OR

Q4) a) What are challenges of Next-Generation Networks with respect to green communication. **[6]**

b) Discuss the drivers for businesses to implement green IT strategy. **[8]**

P.T.O.

Q5) a) What is Life Cycle Assessment (LCA) of a product? Explain the four stages of LCA. **[7]**

b) Explain the hierarchy of sustainability models. What is the role of sustainability frameworks, Principles and tools? **[7]**

OR

Q6) a) Explain the business dimensions for green IT transformation. **[7]**

b) What is Sustainable ICT? Explain the framework for measuring the maturity of SICT capabilities. **[7]**

Q7) a) What are the driving factors for the development of green and sustainable IT? **[7]**

b) What are the pros and cons of green practices within an organization. **[7]**

OR

Q8) a) How a green organization can compel its suppliers and agents to adopt green practices **[7]**

b) What are the sustainability dimensions of information technology? Explain any four dimensions. **[7]**

Q9) a) How an organization can formulate, implement and manage its green practices. **[7]**

b) In what way Industry Associations and Standards Bodies impact enterprise greening. **[7]**

OR

Q10)a) What are some of the highest risks when implementing green IT project and how they can be mitigated? **[7]**

b) How greening an enterprise boosts return on investments. **[7]**

Total No. of Questions : 10]

SEAT No. :

P2078

[Total No. of Pages : 2

[5059] - 685

B.E. (IT, Computer Engg. & E & TC)

Unified Communications and Contact Center Applications

(2012 Pattern) (Open Elective)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 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.***

Q1) a) Brief introduction to SIP's layered Architecture. **[5]**

b) What is the purpose of signalling protocol. **[5]**

OR

Q2) a) Draw and explain basic SIP registration example. **[5]**

b) Explain how is the speed of 1.544 mbps derived for a T1 circuit derived. **[5]**

Q3) a) Explain in detail UAS. **[5]**

b) Explain the Call forward feature. **[5]**

OR

Q4) a) Explain in detail presence feature. **[5]**

b) Explain in detail UAC. **[5]**

Q5) a) What is an Email MIME? Explain how MIME headers play a role in Email management in a Contact Center. **[8]**

b) What are the features and functions of an Inbound Contact Center application? **[8]**

OR

P.T.O.

Q6) a) Explain in brief the functionalities of PABX, ACD, Self Service and CTI in an Inbound Call Center. **[8]**

b) What are agent states? Explain typical states of a contact center agent. **[8]**

Q7) a) Explain the core components of workforce optimization with a brief description and advantage of each. **[8]**

b) Explain the different phases of campaign management and execution. **[8]**

OR

Q8) a) What is blending? How does it work? **[8]**

b) Explain the different types of call recording with a brief description of each. **[8]**

Q9) Write notes on: **[18]**

a) Virtualization and the role of hypervisor in the same context.

b) DevOps and Continuous Integration.

c) STUN protocol.

OR

Q10) Write notes on: **[18]**

a) TURN protocol.

b) WEBRTC.

c) Challenges ahead of Speech Analytics.

Total No. of Questions : 12]

SEAT No. :

P2166

[Total No. of Pages : 2

[5059]-691

B.E.(Instrumentaion& control)

PROCESS INSTRUMENTATION-I

(2012 Course)(End-Semester) (406261)

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,Q.11 or Q.12.***
2) ***Figures to the right indicat full marks.***
3) ***Neat diagrams should be drawn where ever necessary.***
4) ***Use of electronic pocket calcualtor is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain incentivies of process control. **[7]**

b) Explain degree of freedom.

OR

Q2) a) Explain Dead time process with an example **[7]**

b) Also explain Interacting & Non-interacting processes with an example.

Q3) Explain SLPC & MLPC features faceplate & functions **[7]**

OR

Q4) Explain- **[7]**

a) steady state gain

b) process gain

c) Process time constant

d) Variable time constant

e) Transmitler gain

f) Variable pressure drop

g) Valve gain

P.T.O.

Q5) a) Explain elements of feedback loop **[6]**

b) Explain factors in controllce tuning

OR

Q6) a) Explain control performance measures. **[6]**

b) Find gain coefficient for PID controller for following FOPDT model where $G_p(s) = \frac{1.2\, e^{-40.1s}}{(1375+1)}$

Q7) Explain cascade control system w.r.t. Basic principles, design criteria, controller Algorithm & Tuning issues. **[16]**

OR

Q8) a) Explain Ratio control system with on example **[8]**

b) Explain split range control system with an example **[8]**

Q9) a) Explain tqultivariable control system. Explain Interaction & its effects. **[9]**

b) Explain RGA and Interaction effect on stability. **[9]**

OR

Q10) Explain tuning enhancement through Decampling & Loop pairing **[18]**

Q11) Explain segnence of design steps with an example. **[16]**

OR

Q12) a) Explain process decomposition. **[8]**

b) Explain key guidelines for process control design. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3081

[Total No. of Pages : 2

[5059]-692

B.E. (Instrumentation and Control Engineering)
PROJECT ENGINEERING &MANAGEMENT
(2012 Pattern) (406262) (End-Semester) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams should be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) What are the various types of organization structures, Explain in detail? Draw an organizational structure for manufacturing firm. **[10]**

OR

Q2) a) Explain interaction between Electrical, mechanical & safety departments with instrumentation department. **[6]**

b) Enlist the skills required for Project Manager. **[4]**

Q3) a) Explain project life cycle stages in brief. **[5]**

b) Write note on Computers in project Management Engineering. **[5]**

OR

Q4) a) Define Optimistic Time, Most Likely Time, Pessimistic Time, Expected time the following w.r.t. PERT. **[4]**

b) Compare & Contrast between PERT & CPM. **[6]**

Q5) a) Explain Kick-off meeting and state its importance in relation with Project Engineering. **[6]**

b) Define Project statement & P&T diagram. Also give its importance. **[10]**

OR

P.T.O.

Q6) a) Explain Cable identification schemes, Cable trays. **[6]**

b) What is FAT, CAT, SAT? Write the importance of the same. Also prepare CAT report for any typical instrumentation item. **[10]**

Q7) a) Give Hazardous area classifications & elaborate its effect on design. **[10]**

b) Draw the loop diagram for flow control loop. **[6]**

OR

Q8) a) Explain Tendering and bidding process in detail. What is the need of Bid evaluation? Explain. **[9]**

b) Explain Project Estimation, Project Planning, Project Commissioning, Project Hardware w.r.t. Instrumentation & Control, **[7]**

Q9) Explain following terms in connection with design of Panel. **[18]**

a) MBOM

b) Types of installation Details

c) Ergonomic considerations

OR

Q10)a) Explain Vendor registration, Vendor Liaison, in relation with industrial purchases. **[10]**

b) Write Notes on **[8]**

i) Intelligent operator interface

ii) Calibration report of I/P converter

x x x

Total No. of Questions : 10]

SEAT No. :

P2079

[Total No. of Pages : 4

[5059] - 693

B.E. (Instrumentation and Control)

DIGITAL CONTROL

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Discuss different advantages of Digital control over Analog control. **[6]**

b) Obtain the final value of for the sequence whose Z transform is

$$F(z)=\frac{z^2(z-a)}{(z-1)(z-b)(z-c)}$$

What can you conclude concerning the constants b and c if it is known that the limit exists? **[4]**

OR

Q2) a) Find the equivalent sampled impulse response sequence and the equivalent z-transfer function for the cascade of the two analog systems with sampled input. **[6]**

$$H_1(s)=\frac{1}{s+6} \text{ and } H_2(s)=\frac{10}{s+1}$$

i) If the systems are directly connected.

ii) If the systems are separated by a sampler.

b) Explain the term impulse sampling. **[4]**

P.T.O.

Q3) State the equations of velocity and position form of digital PID controller. Explain the advantages of velocity form. **[10]**

OR

Q4) Determine stability of system shown with below closed loop transfer function.

Use Jury's stability test. $\frac{Y(z)}{X(z)}=\frac{z^{-3}}{1+0.5z^{-1}-1.34z^{-2}+0.24z^{-3}}$. **[10]**

Q5) a) Obtain state transition matrix $\psi(k)$ for following discrete time system using Cayley-Hamilton theorem. **[8]**

$$x(k+1)=\begin{bmatrix}-4 & 3\\ -6 & 5\end{bmatrix}\begin{bmatrix}x_1(k)\\ x_2(k)\end{bmatrix}$$

b) Determine Pulse transfer function of system for following system, **[8]**

$$\begin{bmatrix}x_1(k+1)\\ x_2(k+1)\\ x_3(k+1)\end{bmatrix}=\begin{bmatrix}-1 & 0 & 0\\ 0 & -2 & 0\\ 0 & 0 & -3\end{bmatrix}\begin{bmatrix}x_1(k)\\ x_2(k)\\ x_3(k)\end{bmatrix}+\begin{bmatrix}1\\ 1\\ 1\end{bmatrix}u(k) \text{ and } y(k)=[-1\ \ 2\ \ 1]\begin{bmatrix}x_1(k)\\ x_2(k)\\ x_3(k)\end{bmatrix}+u(k)$$

OR

Q6) a) Find Eigen Values and Eigen vectors for following state matrix. **[10]**

$$G=\begin{bmatrix}0 & 0 & 1\\ 2 & 0 & 0\\ 8 & 2 & -5\end{bmatrix}$$

b) Obtain state space representation of following pulse transfer function of system in canonical forms. **[6]**

$$\frac{Y(z)}{U(z)}=\frac{3-z^{-1}-3z^{-2}}{1+\frac{1}{3}z^{-1}-\frac{2}{3}z^{-2}}.$$

Q7) a) A discrete time regulator system has the plant **[12]**

$$x(k+1)=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -4 & -2 & -1\end{bmatrix}x(k)+\begin{bmatrix}0\\0\\1\end{bmatrix}u(k)$$ Design a state feedback controller which will place the closed loop poles at $-\frac{1}{2}\pm j\frac{1}{2},0$.

b) Write the Transformation matrix required if system state model is to be transforming in its standard controllable and observable forms. **[6]**

OR

Q8) a) A discrete time regulator system has the plant **[10]**

$$x(k+1)=\begin{bmatrix}-1 & 1\\ 1 & 2\end{bmatrix}x(k)+\begin{bmatrix}0\\1\end{bmatrix}u(k)\text{ and}$$

$y(k)=[1\ 0]x(k)$. Design a full order state observer such that system has closed loop poles at $\mu_1=-5;\mu_2=-5$.

b) Investigate the controllability and observability of system whose state model is; **[8]**

$$x(k+1)=\begin{bmatrix}0 & 0 & 1\\ -2 & -3 & 0\\ 0 & 2 & -3\end{bmatrix}x(k)+\begin{bmatrix}0\\2\\0\end{bmatrix}u(k)\text{ and }y(k)=[1\ 0\ 0]x(k).$$

Q9) Write short note on: **[16]**

a) Steady State Quadratic Optimal Control.

b) Optimal regulator system based on quadratic performance Index.

OR

Q10) Consider following discrete time control system defined by **[16]**

$$x(k+1)=\begin{bmatrix}0 & 0\\ 1 & 1\end{bmatrix}x(k)+\begin{bmatrix}1\\ 0\end{bmatrix}u(k)\text{ and }x(0)=\begin{bmatrix}1\\ 1\end{bmatrix}.$$

Determine the optimal control law to minimize the performance index. Also determine minimum value of J.

$$\mathrm{J}=\frac{1}{2}\sum_{k=0}^{\infty}x^{*}(k)\mathrm{Q}x(k)+u^{*}(k)\mathrm{R}u(k)$$

$$\mathrm{Q}=\begin{bmatrix}1 & 0\\ 0 & 0\end{bmatrix},\mathrm{R}=1.$$

Total No. of Questions : 10]

SEAT No. :

P2080

[Total No. of Pages : 2

[5059] - 694

B.E. (Instrumentation & Control) (Semester - I)

Advanced Biomedical Instrumentation

(2012 Pattern)

Time : 2½ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is an Biotelemetry? Enlist various applications of biotelemetry. **[4]**

b) What is radionuclide imaging? Explain how it is advantageous than other mode of imaging. **[6]**

OR

Q2) a) Explain the in vivo type pulse oximeter with the help of suitable diagram. **[6]**

b) Explain with neat diagram different modulation techniques used in telemetry system. **[4]**

Q3) a) Elaborate the various methods of image reconstruction in CT machine. **[5]**

b) What is X-ray Fluoroscopy and its applications? **[5]**

OR

Q4) a) Explain M mode of ultrasound with any one application of it. **[5]**

b) Explain the working of PET scanner. **[5]**

P.T.O.

Q5) a) What is electrosurgical diathermy? What do you mean by bipolar and unipolar modes of ESU? Explain, why patient plate is having more area active electrode is pointed tip type in ESU. **[8]**

b) Draw and explain the Heart-Lung Machine. State the type of Pump that is used in Heart-Lung Machine. **[8]**

OR

Q6) a) What is pacemaker? Explain, briefly the types of pacemaker. **[8]**

b) Explain the functioning of cardioverter with a neat diagram. Why it is necessary to apply defibrillator shock in synchronization with ECG? **[8]**

Q7) a) What is an endoscope? Explain the construction with the help of a neat diagram. **[8]**

b) Explain thermal and non thermal interaction of tissue with LASER. **[8]**

OR

Q8) a) Describe different types of lasers used in Biomedical applications. **[8]**

b) Describe applications of lasers in Dermotology. **[8]**

Q9) a) Explain in brief various types of dialysers used for haemodialysis. **[10]**

b) Define orthotic and prosthetic devices. **[8]**

OR

Q10) a) Draw and explain the structure of a nephron. **[8]**

b) Draw and explain the setup used for Lithotripsy. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2081

[Total No. of Pages : 2

[5059] - 695

B.E. (Instrumentation & Control) (Semester - I)

Building Automation - I

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the architecture of Intelligent Building with neat sketch. **[6]**

b) Define the following term: **[4]**

i) Gauge Pressure.

ii) Vacuum Pressure.

iii) Absolute Pressure.

iv) Sealed Pressure.

OR

Q2) a) Explain working principle of Psychrometer with neat sketch. **[6]**

b) Difference between Facilities Management and Intelligent building. **[4]**

Q3) a) List various types of AHU explain any one types of AHU with neat sketch. **[6]**

b) Write a short notes on Turbine flow meter. **[4]**

OR

Q4) a) Explain Heat Recovery Technique with neat sketch. **[6]**

b) Write a short notes on Parallel blade damper. **[4]**

P.T.O.

Q5) a) Explain single duct constant volume single zone air conditioning system with neat sketch. **[10]**

b) Explain VAV system with neat sketch. **[8]**

OR

Q6) a) What is Vapour Compression Cycle? Explain any one type of condenser used in Vapour Compression cycle with neat sketch. **[10]**

b) Explain absorption chiller with neat sketch. **[8]**

Q7) a) Explain CRAC unit with neat sketch. **[8]**

b) Difference between series fan powered and parallel fan powered. **[8]**

OR

Q8) a) List Different Types of Boiler, Explain water tube boiler with neat sketch. **[8]**

b) Explain Steam Heating System with neat sketch. **[8]**

Q9) a) What is BAS System, State different Hierarchy level in BAS System with neat sketch. **[8]**

b) Explain Architecture of DDC with neat sketch. **[8]**

OR

Q10) a) Explain MODBUS RTU with neat sketch. **[8]**

b) Explain in Detail Profibus PA & Profibus DP protocol with neat sketch. **[8]**

Total No. of Questions :10]

SEAT No. :

P3775

[Total No. of Pages : 2

[5059]-696
B.E. (Instrumentation)
ADVANCED CONTROL SYSTEM
(2012 Course) (Semester-I) (Elective-I)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) What is describing function? State steps to find describing function. Find same for backlash. **[10]**

OR

Q2) What is phase plane plot? How stability of system can be obtain form phase plane plot. **[10]**

Q3) The second order system is given by. **[10]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Check whether system is asymptotically stable or not and find the Lyapunov function $v(x) = x^T Px$

OR

Q4) A NL system has $G(s) = \dfrac{30}{s(1+0.3s)}$ as a linear part and $N(x,jw) = \dfrac{1}{x}\angle -75^o$ **[10]**

as the describing function for it's NL part where x is sinusoidal input to the NL element, find the amplitude and frequency of the possible periodic solution.

Q5) a) Explain parameter estimation method in self tuning regulator. **[8]**

b) Explain implicit self tuning regulator. **[8]**

OR

P.T.O.

Q6) a) Explain self tuning regulator. **[8]**

b) Fit the second order polynomial using least square method for following data. **[8]**

i	1	2	3	4	5	6
X	0	0.5	1.0	1.5	2.0	2.5
Y	0	0.25	1.0	2.25	4.0	6.25

Q7) a) Explain application of adaptive control pulp digester. **[9]**

b) Explain first loop adaptive controller. **[9]**

OR

Q8) a) Explain application of adaptive control to rolling mill. **[9]**

b) Explain Fisher control DPR 900. **[9]**

Q9) Consider the system. **[16]**

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 2 \\ 4 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Determine the optimal feedback control gain matrix K such that the following performance index is minimized.

$$j = \int_0^{\infty} \left(x^T Q x + u^2 \right) dt$$

Also draw the block diagram of resulting optimal control system.

OR

Q10)a) Explain infinite time regulator. **[8]**

b) Explain model matching based on linear quadratic optimal regulator. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2082

[Total No. of Pages : 2

[5059] - 697

B.E. (Instru. & Control Engg.) (Semester - I)

Advanced Sensors

(2012 Pattern) (Elective - I (D))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain static characteristics of sensor with examples. **[5]**

b) Give detail classification of level sensor with their operating principles. **[5]**

OR

Q2) a) Explain dynamic characteristics of sensor with examples. **[5]**

b) Give detail classification of temperature sensor with their ranges and operating principles. **[5]**

Q3) a) Discuss design considerations and selection criteria for sensor fabrications. **[5]**

b) With neat block diagram explain manufacturing process of sensor. **[5]**

OR

Q4) a) Enlist different techniques used for sensor fabrication. Explain any one. **[5]**

b) Explain recent trends in sensor fabrication. **[5]**

P.T.O.

Q5) a) List different chemical sensing mechanisms. **[8]**

b) Explain working of fibre optic sensor with block diagram. **[8]**

OR

Q6) a) Give different types of gas sensors. Explain any one in detail. **[8]**

b) Give classification of biosensors. **[8]**

Q7) a) Write short note on smart sensor. **[8]**

b) Explain selection criteria for smart sensor. **[8]**

OR

Q8) a) Explain signal conditioning and signal conversion in smart sensors. **[8]**

b) Enlist smart temperature IC sensors. Explain any one in detail. **[8]**

Q9) a) Explain any applications of Chemical sensors in detail. **[9]**

b) Explain any application of biosensors. **[9]**

OR

Q10) a) Explain application of fiber optic sensor with neat sketch. **[9]**

b) Discuss application gas sensors in industry. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2167

[Total No. of Pages : 2

[5059]-698

B.E.(Instrumentation and Control)

ADVANCED DIGITAL SIGNAL PROCESSING

(2012 Course)(Semester-I) (406264E)(Elective-I)

Time :2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Assume suitable data, if necessary.***
2) ***Use of calculators, log tables, charts is allowed.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain TFD with suitable applications. **[5]**

b) Explain STFT with its properties. **[5]**

OR

Q2) Explain aliasing phenomenon in down sampling. How to overcome it? **[10]**

Q3) a) Explain multirate signal processing with suitable example. **[5]**

b) Discuss decimation with suitable diagrams. **[5]**

OR

Q4) Decrease the sampling frequency of 100 Hz signal from 4000 Hz to 1000Hz. **[10]**

Q5) a) Explain Welch method of PSD estimation State its features. **[10]**

b) Define Mean, Variance and Bias for PSD estimator. **[6]**

OR

Q6) a) Explain MA parametric PSD estimation with suitable diagram. **[10]**

b) Discuss the applications of PSD estimation. **[6]**

Q7) a) Derive the filter updating relation for adaptive filter using LMS algorithm. **[10]**

b) Explain system identification using adaptive filtering. **[8]**

OR

P.T.O.

Q8) a) Define cepstral coefficients. State properties of complex spectrum. **[10]**

b) Explain homomorphic signal processing with suitable example. **[8]**

Q9) Explain architecture of ADSP21xx DSP processor with suitable diagram. **[16]**

OR

Q10) Explain various status registers in DSP processors. **[16]**

Total No. of Questions : 10]

SEAT No. :

P2168

[Total No. of Pages : 2

[5059]-699

B.E.(Instrumentation & Control)

OPTO-ELECTRONICS INSTRUMENTATION

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the role of laser in holographic application. **[7]**

b) Explain the fiber attenuation measurement techniques in short. **[3]**

OR

Q2) a) Explain the frequency stabilization and mode-locking techniques in lasers **[7]**

b) Define total internal reflection and Brewster's angle in optical fibers with neat diagram. **[3]**

Q3) a) Determine the critical angle and Brewster's angle for a optical fiber having refractive indices of core and cladding regions as 1.5 and1.49 respectively. **[4]**

b) Explain the types of optical fiber connectors in detail. **[6]**

OR

Q4) a) Determine the numerical aperture and acceptance angle for a optical fiber having refractive indices of core and cladding regions as 1.5 and 1.49 respectively. **[4]**

b) What are the requirements of optical detectors in fiber optics **[6]**

P.T.O.

Q5) a) What are the types of optical amplifier? Explain the semiconductor optical amplifier in detail. **[8]**

b) Explain the simple strip phase modulator and Y-junction interferometric modulator with the help of neat diagram. **[8]**

OR

Q6) a) What are the basic requirements of the fiber and waveguide amplifiers? Explain various configurations of optical amplifiers. **[8]**

b) Explain the following components of integrated optics with neat diagram:

1) Beam splitter

2) Directional coupler **[8]**

Q7) a) What are the advantages of optical fiber sensors? Explain the basic optical fiber sensor system with the help of neat schematic. **[8]**

b) Explain the design of two-fiber optical seonsr for displacement measurment the help of neat diagram. **[8]**

OR

Q8) a) Explain the wavelength- modulated optical fiber sensor with the help of neat schematic. **[8]**

b) List out the applications of optical fiber sensors. Classify the optical fiber sensors based on sensing region and modulation mechanism. **[8]**

Q9) Write short notes on: **[9]**

a) Fiber optic gyroscope. **[9]**

b) Laser interferometer, Explain any one in detail.

OR

Q10) Explain the following with neat diagrams: **[9]**

a) Electronic Speckle Pattern Interferometry. **[9]**

b) Laser doppler velocimeter and its time-domain signal processing.

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Total No. of Questions : 10]

SEAT No. :

P2083

[Total No. of Pages : 2

[5059] - 700

B.E. (Instrumentation & Control) (Semester - I)

ENVIRONMENTAL INSTRUMENTATION

(2012 Pattern) (Elective - II)

Time : 2½ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the role of instrumentation & control for environment. **[5]**

b) Explain the role of sensor in environmental analysis. **[5]**

OR

Q2) a) Write a short note on : Photo Ionization. **[5]**

b) Explain the stationery analytical instruments. **[5]**

Q3) a) Explain opacity Monitors. **[5]**

b) Discuss water quality standards for raw and treated water. **[5]**

OR

Q4) a) Explain the pH analyser with their applications. **[6]**

b) Explain the design criteria of settling tank. **[4]**

Q5) a) Write short notes on Coagulation. **[8]**

b) What is floating? Explain its types. **[8]**

OR

P.T.O.

Q6) a) Define flow monitoring system. Explain open channel waste water flow measurement system. **[8]**

b) Explain the role of NGOs & municipal corporation in Rain water harvesting. **[8]**

Q7) a) Define air pollution. Explain air pollution from thermal power plant and their characteristic. **[10]**

b) Discuss the waste water measurement techniques. **[8]**

OR

Q8) a) Draw and explain the Instrumentation set up for waste water treatment plant. And list out the Latest methods of waste water treatment plants. **[10]**

b) Compare Non-open channel flow measurement and open channel waste water flow measurement. **[8]**

Q9) a) Explain the necessity of Rain water harvesting. List the methods of same. **[8]**

b) Define Sound pollution. Explain its effect to environment. **[8]**

OR

Q10) Write short notes on: **[2 x 8 = 16]**

a) Virtual Instruments Environmental Engineering laboratory.

b) Barometer.

Total No. of Questions : 10]

SEAT No. :

P2169

[Total No. of Pages : 2

[5059]-701
B.E.
Instrumentation & Control Engineering
ROBOTICS AND AUTOMATION
(2012 Pattern) (End Semester) (406265 C)

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

Instructions to candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Enlist different companies that manufacture robots. **[6]**

b) Give any four important specifications of robot. **[4]**

OR

Q2) a) Explain how robots are classified. **[6]**

b) Which challenges robot manipulators faces? **[4]**

Q3) a) Enlist different controllers used for robots. **[6]**

b) What is edge detection? **[4]**

OR

Q4) a) Enlist different materials used for manipulators. **[4]**

b) Explain image segmentation. **[6]**

Q5) a) Write a short note on homogeneous transformations. **[4]**

b) Why robot kinematics and dynamics are important; explain. **[10]**

c) What is path planning; explain. **[4]**

OR

P.T.O.

Q6) a) Explain present industrial robot control schemes. **[9]**

b) Explain position and force control schemes for robots. **[9]**

Q7) a) How is programming done for robots? Which different languages were used? **[10]**

b) Which problems might occur in programming of robots, explain. **[6]**

OR

Q8) Explain in detail with example: control of industrial robots using PLCS is achieved. **[16]**

Q9) a) Explain a case study of robots. **[8]**

b) Explain a non- manufacturing application of robot. **[8]**

OR

Q10)a) Explain points to be considered while selecting a robot. **[8]**

b) How robot cell design is achieved? **[8]**

Total No. of Questions : 10]

SEAT No. :

P2084

[Total No. of Pages : 2

[5059] - 702

B.E. (Instrumentation and Control) (Semester - I)

SENSOR NETWORKS

(2012 Pattern) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain a communication in a wireless sensor networks. **[5]**

b) Explain field programmable gate array (FPGA) in detail. **[5]**

c) Compare traditional networks and wireless sensor networks. **[5]**

OR

Q2) a) Explain basics of sensor classifications in WSN with examples. **[5]**

b) Explain XYZ node architecture. **[5]**

c) Explain IMote Node Architecture in detail. **[5]**

Q3) a) Write a short note on precision agriculture. **[5]**

b) Compare Serial Peripheral Interface (SPI) and Inter Integrated circuits(I^2C). **[5]**

c) Explain magnetic sensors of structural health monitoring. **[5]**

OR

Q4) a) Explain motivation of structural health monitoring also explain global and local inspection techniques in detail. **[5]**

b) Describe prototype of pipeline monitoring in detail. **[5]**

c) Describe architecture of a wireless sensor node. **[5]**

P.T.O.

Q5) a) Explain pulse code modulation and delta modulation with suitable diagrams. **[7]**

b) Describe signal propagation using the relationship between the transmitted power and the received power. **[8]**

OR

Q6) a) Explain different types of channels in detail of channel encoding. **[7]**

b) Explain source encoding with calculations of efficiency of a source encoder in detail. **[8]**

Q7) a) Explain sensor MAC of contension based MAC protocols. **[7]**

b) Explain the MAC protocols and its control layers in details. **[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 optimized link state routing of proactive routing. **[5]**

b) Explain destination sequenced distanced vector. **[5]**

OR

Q10) a) Explain Hierarchical routing with suitable diagrams. **[5]**

b) Write a short note on SPIN-PP of data centric Routing. **[5]**

Total No. of Questions :10]

P3082

SEAT No. :

[Total No. of Pages :2

[5059]-704

B.E.(Instrumentation & Control)

PROCESS INSTRUMENTATION -II

(2012 Pattern) (Semester-II) (406267)

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.***
5) ***Use of caculator is allowed***

Q1) What are the objectives of developing process models? Explain in brief dynamic behaviour of first order system. **[10]**

OR

Q2) Explain with neat sketch override control of Heat Exchanger. **[10]**

Q3) List components of boiler. Explain in brief safety interlocks in boilers. **[10]**

OR

Q4) Discuss in brief optimization of boilers. **[10]**

Q5) a) Explain with neat sketch end point detection control of batch reactors. **[10]**

b) Explain typical pH control system used in continuous reactors. **[8]**

OR

Q6) a) Explain in detail batch production management. **[12]**

b) Comment on stability of reactors. **[6]**

Q7) a) With neat sketch explain reflux control in distillation operation. **[8]**

b) State and explain different lags in distillation control. **[8]**

OR

P.T.O.

Q8) a) Explain mathematically steady state material and energy balance equations for distillation column. **[8]**

b) Explain in brief control strategy for distillation column pressure control. **[8]**

Q9) a) Explain override control in compressors considering the protection of the equipment. **[8]**

b) Explain use of anti-surge control system used in compressors. **[8]**

OR

Q10 a) Explain in brief ON-OFF control for reciprocating compressor. **[8]**

b) Explain with neat sketch basic control in pumps. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2085

[Total No. of Pages : 2

[5059] - 705

B.E. (Instrumentation & Control) (Semester - II)

Industrial Automation

(2012 Pattern)

Time : 2½ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Explain the general objectives of automation. **[6]**

OR

Q2) List & Explain any two classical approaches for plant automation. **[6]**

Q3) With respect to OSI model compare HART and foundation fieldbus protocols. **[7]**

OR

Q4) Write short note on profibus. **[7]**

Q5) Develop ladder diagram for mixing of two liquids as per given sequence: **[7]**

When the start push button is pressed, the inlet valve A switches ON till the middle level sensor has not sensed the liquid. When middle level is sensed inlet valve B switches ON till the high level sensor has not sensed the liquid. Then the motor spins the stirrer for 10 seconds for mixing of both the liquids. After this drain valve switches ON and remains on till the low level is not reached.

OR

P.T.O.

Q6) Explain the PID block used in PLC system. **[7]**

Q7) a) Explain in detail about structured text and functional block diagram of PLC programming. **[8]**

b) Explain the procedure for interfacing a PLC with SCADA system using different communication protocols. **[8]**

OR

Q8) a) With an example explain the role of PLC in a SCADA system. **[8]**

b) With some suitable example explain the "Sequential function chart". **[8]**

Q9) a) Explain the need of security and user access management in a DCS system. **[8]**

b) Write short note on third party interfaces in automation. **[8]**

OR

Q10) a) Describe how DCS supports ERP. **[8]**

b) Explain different logical function blocks available in any DCS system. **[8]**

Q11) a) With the help of block diagram explain "ESD Systems". **[8]**

b) What are IEC 61511 standards for functional safety. **[10]**

OR

Q12) a) Write short note on "Safety Integrity Level". **[8]**

b) Explain the importance of Process Hazard Analysis (PHA) & Hazard and operability study (HaZOP)? **[10]**

Total No. of Questions : 10]

SEAT No. :

P2086

[Total No. of Pages : 2

[5059] - 706

B.E. (Instrumentation and Control) (Semester - II)

DIGITAL IMAGE PROCESSING

(2012 Pattern) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain digital image representation. **[6]**

b) Explain Fourier transform. **[4]**

OR

Q2) a) Explain image sharpening filters. **[6]**

b) Explain statistical parameters with respect to DIP. **[4]**

Q3) a) Explain difference between RGB and CMY color image models. **[6]**

b) Explain multi resolution property of wavelet transform. **[4]**

OR

Q4) a) Explain spatial filtering in image enhancement. **[6]**

b) Explain Radon transform. **[4]**

Q5) a) Explain detection of discontinuities in image segmentation. **[10]**

b) Explain image representation schemes. **[8]**

OR

P.T.O.

Q6) a) Explain image regional descriptors. **[10]**

b) Explain pattern and pattern classes. **[8]**

Q7) a) Explain lossy and lossless compression. **[8]**

b) Explain vector quantization. **[8]**

OR

Q8) a) Explain LZW and RLE coding. **[8]**

b) Explain transform based image compression. **[8]**

Q9) a) Explain applications of DIP in Biometrics and Agricultural. **[8]**

b) Explain applications of DIP in Biomedical and Space. **[8]**

OR

Q10) Write short note on applications of DIP in (Any Two): **[16]**

a) Biometrics.

b) Agricultural.

c) Military.

d) Biomedical.

Total No. of Questions : 10]

SEAT No. :

P2087

[Total No. of Pages : 2

[5059] - 707

B.E. (Instrumentation and Control) (Semester - II)

BUILDING AUTOMATION II (Elective - III)

(2012 Pattern)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Enlist types of FAS architecture. Explain any one. **[6]**

b) Explain cause and effect matrix of fire alarm system. **[4]**

OR

Q2) a) What are components of FAS? State application area of FAS. **[6]**

b) What is fire? Explain fire modes. **[4]**

Q3) a) Explain SLC wiring and its classification. **[6]**

b) Explain FAS power supply requirement and its designing parameters. **[4]**

OR

Q4) a) Explain working principles of different fire alarm devices and its application in building safety. **[6]**

b) Explain BS 5839 FAS standard. **[4]**

Q5) a) Explain different components of sprinkler system **[10]**

b) Explain manual pull type of devices. **[8]**

P.T.O

OR

Q6) a) Explain basics of fire suppression system. Explain fire hydrants. **[10]**

b) What is FM-200? Explain Novec based gas suppression system. **[8]**

Q7) a) What are the components of access control systems? Explain various categories of access control. **[8]**

b) Explain LON and Modbus protocols for access control system. **[8]**

OR

Q8) a) What is the need of access control system? Explain basic components of access control system. **[8]**

b) Explain difference between straight cable and cross cable. **[8]**

Q9) a) Explain system architecture of CCTV system.Describe selection criteria of camera. **[8]**

b) Explain CIF, MPEG, MP4, POE terminologies for cameras. **[8]**

OR

Q10)a) Explain applications of intrusion system. **[8]**

b) Explain DVR, DVM, NVR video management systems. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3083

[Total No. of Pages : 2

[5059]-708

B.E. (Instrumentation and Control)

PROCESS MODELING AND OPTIMIZATION

(2012 Pattern) (Elective- III) (Semester-II) (406269)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to candidates:

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

Q1) a) With an example explain Least square fitting. **[5]**

b) Derive a transfer function model of any mechanical system. .**[5]**

OR

Q2) Derive mathematical model of tanks in series system. **[10]**

Q3) Explain the relationships among time, Laplace and frequency domain.**[10]**

OR

Q4) a) Explain advantages and limitations of step testing. **[5]**

b) Explain the ATV identification method. **[5]**

Q5) a) Calculate the Niederlinski index for the system **[10]**

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} \frac{3e^{-2.2s}}{5.5s+1} & \frac{-0.51e^{-1.3s}}{11s+1} & \frac{-0.419e^{-s}}{12.8s+1} \\ \frac{8.17e^{-3.5s}}{37.5s+1} & \frac{-4.5e^{-2.5s}}{13s+1} & \frac{-0.118e^{-2.2s}}{18.9s+1} \\ \frac{41.18e^{-13.6s}}{5.5s+1} & \frac{36.6e^{-12.5s}}{10.6s+1} & \frac{1.27e^{-1.5s}}{4.8s+1} \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$$

b) Write an advantages and limitation of Skogestad and Morari method.**[8]**

OR

P.T.O.

Q6) a) Calculate the RGA for the system represented by transfer function matrix **[10]**

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} \dfrac{3e^{-2.2s}}{5.5s+1} & \dfrac{-0.51e^{-1.3s}}{11s+1} & \dfrac{-0.419e^{-s}}{12.8s+1} \\ \dfrac{8.17e^{-3.5s}}{37.5s+1} & \dfrac{-4.5e^{-2.5s}}{13s+1} & \dfrac{-0.118e^{-2.2s}}{18.9s+1} \\ \dfrac{41.18e^{-13.6s}}{5.5s+1} & \dfrac{36.6e^{-12.5s}}{10.6s+1} & \dfrac{1.27e^{-1.5s}}{4.8s+1} \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$$

b) With an example explain multivariable Nyquist plot. **[8]**

Q7) a) With an example explain how to compute Internal Rate of Return. **[8]**

b) With an example explain classification of optimization problem based on nature of design variables. **[8]**

OR

Q8) a) With an example explain the how to compute payback period. **[8]**

b) With an example explain classification of optimization problem based on Number of objective functions. **[8]**

Q9) a) With an example explain the scanning and bracketing procedures. **[8]**

b) With an example explain the Simplex method. **[8]**

OR

Q10)a) With an example explain the Quasi-Newton method. **[8]**

b) With an example explain the algorithm of Secant method. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3084

[Total No. of Pages : 2

[5059]-709

B.E. (Instrumentation and Control)

VIRTUAL INSTRUMENTATION

(2012 Pattern) (Semester-II) (Elective- III) (406269-D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to candidates:

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

Q1) a) With an example explain block diagram and architecture of a virtual and con-ventional Instruments. **[5]**

b) Explain the difference between flat and stack sequence structures. **[5]**

OR

Q2) a) With an example explain VIs and sub VIs. **[5]**

b) With an example explain the clusters. **[5]**

Q3) a) With an example explain the local and global variables. **[5]**

b) With an example explain the issues related in selection of Data acquisition cards. **[5]**

OR

Q4) a) With an example explain data acquisition with USB communication using Lab-VIEW **[5]**

b) What are advantage of USB cards PCI cards? **[5]**

Q5) a) List and explain various blocks used in developing VI to obtain power spectrum of signals. **[8]**

b) List and explain various blocks used in developing VI for digital oscilloscope. **[8]**

OR

P.T.O.

Q6) a) With an example explain the various PID function blocks. **[8]**

b) List and explain various windowing function blocks used in Lab VIEW. **[8]**

Q7) a) With an example explain the various function blocks used in optimization toolset. **[8]**

b) Write an example explain concept of hybrid programming. **[8]**

OR

Q8) a) With an example explain the use of elementary and special functions in Lab-VIEW. **[8]**

b) Write an example explain concept of hybrid programming. **[8]**

Q9) a) With an example explain the application of distributed I/O. **[9]**

b) Write a VI code to interface with any third party HMI system. **[9]**

OR

Q10)a) With an example explain the motion control application. **[9]**

b) Explain the various function blocks used in Vision Module. **[9]**

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Total No. of Questions :10]

P3085

SEAT No. :

[Total No. of Pages :2

[5059]-711

B.E.(Instrumentation & Control)

SMART MATERIALS AND SYSTEM

(2012 Course) (End sem.) (Semester-II) (Elective-IV) (406270 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, Q9or Q10.***
2) ***Neat diagrams msut drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of lograithmic tables, slide rule, electronic pocket calculator is allowed.***

Q1) a) List out the name of different smart material and its application. **[5]**

b) Explain in detail the different component of smart system. **[5]**

OR

Q2) a) What are different steps involved in development of smart materials. **[5]**

b) Explain in detail Piezoresistivity effect of material. **[5]**

Q3) a) Explain in detail what is piezoelectricity & give its scope. **[5]**

b) What is Electro Rheological fluids and list out its applications. **[5]**

OR

Q4) a) What is self-healing material & how it works. **[5]**

b) Explain in detail working of shape Memory alloy. **[5]**

Q5) a) Explain with neat sketch working of accelerometer sensor. **[8]**

b) Explain with neat sketch working of canductometric sensor. **[8]**

OR

P.T.O.

Q6) a) Explain with neat sketch principle of Electromagnetic transducers. **[8]**

b) Explain with neat sketch electrostrictive transducer. **[8]**

Q7) a) Explain with neat sketch sputtering process. **[8]**

b) Explain with neat sketch thermal oxidation process. **[8]**

OR

Q8) a) Explain with neat sketch chemical vapor deposition technique. **[8]**

b) Explain in detail with neat sketch surface micromaching process. **[8]**

Q9) a) What is role of biosensor and Microdispensor in Microfludic system. **[9]**

b) Explain with neat sketch any sensor used as impact sensor. **[9]**

OR

Q10 a) Explain with neat sketch the important component of dosing system. **[9]**

b) Explain in detail any two fabrication process used in lab on chip system. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P2088

[Total No. of Pages : 2

[5059] - 712

B.E. (Instrumentation)

INSTRUMENTATION IN AGRICULTURE AND FOOD PROCESSING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the Role of Instrumentation in Agriculture engineering. **[5]**

b) Discuss the index properties of Soil. **[5]**

OR

Q2) a) Write a note on Hygrometer. **[5]**

b) Write a note on Bio sensor. **[5]**

Q3) Explain the dairy industry instrumentation set up. **[10]**

OR

Q4) a) Explain concept of irrigation scheduling. **[5]**

b) Explain Role of Instrumentation in Green House. **[5]**

Q5) a) Write a note on: Agrometrological instrumentation weather stations **[8]**

b) Write a note on : soil water content measurement using time-domain reflectrometery(TDR) **[8]**

P.T.O.

OR

Q6) a) Explain selection criteria for pump in detail. Explain installation of pump. **[8]**

b) Explain implementation of hydraulic control circuit use in harvesters cotton pickers. **[8]**

Q7) a) Explain different standards in Food processing. **[8]**

b) Define the recommended international code of hygiene for various products in food processing. **[8]**

OR

Q8) a) Design considerations for cold storage system. **[8]**

b) Define Food quality measurement? Explain in short norms in food safety. **[8]**

Q9) a) Explain in detail Application of PLC in food packing industry. **[10]**

b) Write a note on : Equipments for creating and maintaining controlled atmosphere. **[8]**

OR

Q10)a) Explain in detail Application of SCADA in food packing industry. **[10]**

b) Discuss the Trends in modern food processing. **[8]**

Total No. of Questions :10]

SEAT No. :

P3086

[5059]-714

[Total No. of Pages :2

B.E.(Instrumentation & Control Engineering)
AUTOMOBILE INSTRUMENTATION
(2012 Course) (End-Semester) (Sememster-II) (Elective-IV)

Time : 2.½ Hours] *[Max. Marks :70*

Instructions to candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 Q7 or Q8, Q9 or Q10.***
2) ***Neat circuit diagrams should be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Write short notes on: **[10]**

a) Automotive electronic dashboard instruments.

b) principle and construction of lead acid battery.

OR

Q2) Elaborate on Common rail and unit injector system, its construction and principle of operation. **[10]**

Q3) What is earth return system? How is it achieved in automobile instrumentation? **[10]**

OR

Q4) a) Explain various flow sensors used automobile instrumentation. **[6]**

b) State use of solenoids in engine. **[4]**

Q5) Explain the following with respect to automobile: **[17]**

a) Altitude sensor

b) Fuel metering

c) Oxygen sensor

d) Exhaust sensor

OR

Q6) Write short note on air mass flow for engine application. **[17]**

P.T.O.

Q7) Write short notes on : **[16]**

a) LED lighting system

b) Compensated voltage regulator.

OR

Q8) Explain in detail the ventilation and air conditioning systems used in automobiles. **[16]**

OR

Q9) Explain horn, wiper system and trafficator used in automobiles: **[17]**

OR

Q10) Write short notes: **[17]**

a) Automatic seat belt tightener system.

b) Alternators and bridge rectifiers.

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Total No. of Questions : 10]

SEAT No. :

P2089

[Total No. of Pages : 3

[5059] - 721

B.E. (Chemical)

PROCESS DYNAMICS & CONTROL

(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answr Q1. OR Q.2, Q.3 OR Q.4 , Q.5.OR Q.6, Q.7 OR Q.8, Q.9 OR Q.1O.*
2) *Neate diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Discuss briefly the objectives of chemical process control. **[5]**

b) Consider a second order system with the following transfer function: **[5]**

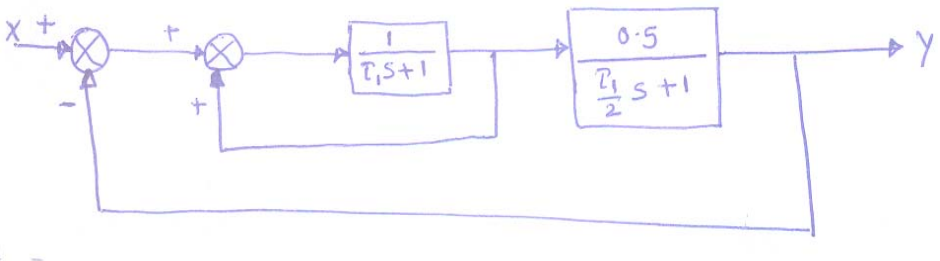
$$G(s)=\frac{Y(s)}{X(s)}=\frac{1}{s^2+s+1}$$

Introduce a step change of magnitude 5 into the system and find percent overshoot, decay ratio and ultimate value of Y(t).

OR

Q2) a) With the help of a neat sketch explain the proportional, derivative and integral modes of a PID controller. **[5]**

b) Find the transfer function Y (s)/X(s) of the system shown below: **[5]**



P.T.O

Q3) a) Write a short note on ISE, IAE and ITAE. **[5]**

b) The characteristic equation for a control system is

$s^3 + 6s^2 + 11s + 6(1 + K) = 0$ **[5]**

Using Routh test

i) Determine the value of K above which the system is unstable.

ii) Determine the value of K for which two of the roots are on the imaginary axis and determine the values of these imaginary roots.

OR

Q4) Sketch the root locus for the following transfer function **[10]**

$$G(s) = \frac{K}{(s+1)(s+2)(s+3)}$$

Q5) a) Sketch the Nyquist diagram for PD controller. **[8]**

b) Sketch the Bode plot for an open loop transfer function with the following dynamic components : **[10]**

$$G_p(s) = \frac{10}{s+2} \quad G_c(s) = 10\left(1 + \frac{1}{0.1s}\right) \quad G_m(s) = 0.95 \quad G_f(s) = 1$$

OR

Q6) a) Explain gain margin and phase margin. **[6]**

b) Using Bode stability criterion, find whether the following open loop transfer function is stable. **[12]**

$$G_{OL} = \frac{5e^{-5s}}{(2s+1)(s+1)}$$

Q7) a) Explain the processes with large dead time. **[8]**

b) Explain control of system with inverse response. **[8]**

OR

Q8) Disucss in detail with a neat sketch of the following : **[16]**

a) Split range control of chemical reactor.

b) Override control to protect a boiler system.

Q9) a) Write a short note on **[10]**

i) Centralized control systems

ii) Digital approximation of classical controllers

b) Explain reconstruction of continuous time signals from their discrete time signal. **[6]**

OR

Q10) What is plant wide control? Explain with suitable example. **[16]**

Total No. of Questions : 10]

SEAT No. :

P2090

[Total No. of Pages : 3

[5059] - 722

B.E. (Chemical)

CHEMICAL REACTION ENGINEERING - II

(2012 Pattern) (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) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Spherical particle of zinc blend of size R = 1mm are roasted in an 8% oxygen stream at 900°C and 1 atm pressure. The reaction is $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$. Assuming that the reaction proceeds by shrinking core model. Calculate the time needed for complete conversion of particle for chemical reaction is controlling step. **[6]**

Data : ρ_B = 4.139 m/cm^3 = 0.0425 mol/cm^3,

K_s = 2 cm/s

D_e = 0.08cm^2/s.

b) Explain the film conversion parameter used in fluid reaction. **[4]**

OR

Q2) a) Derive the time and conversion relation for chemical reaction control for spherical shrinking core particle. **[6]**

b) Explain kinetic regimes in case of instantaneous reaction. **[4]**

Q3) a) Give the major steps involved in the preparation of the catalyst. **[6]**

b) Explain the pore volume and solid density in detail. **[4]**

P.T.O.

OR

Q4) a) Explain regeneration of catalysts. **[4]**

b) Derive the equation of Lagmuier adsorption isotherm. **[6]**

Q5) a) What is Thiele modulus? Give the significance of Thiele modulus in pore resistance. **[8]**

b) Derive the expression for diffusion in single cylindrical pore of the catalyst. **[10]**

OR

Q6) a) Derive the effectiveness factor of cylindrical pallet. **[9]**

b) Explain the selectivity of porous catalyst in parallel reaction with strong pore resistance and negligible pore resistance. **[9]**

Q7) a) Explain the steps involved in solid-catalysed reaction in detail. **[6]**

b) The following mechanism has been proposed for catalytic reaction :

$A_{(q)} + B_{(q)} \rightarrow C_{(q)}$

i) $A_{(q)} + X \rightleftharpoons AX$

ii) $AX + B_{(q)} \rightleftharpoons CX$

iii) $CX \rightleftharpoons C_{(q)} + X$

Where, X indicates an active site on the catalyst. Derive an expression for the rate of reaction if the surface reaction step is a rate controlling. **[10]**

OR

Q8) The following kinetic data on the solid catalysed reaction $A \rightarrow 3R$ are obtained in a basket type MFR 960 cm^2 in volume and containing lgm of catalyst, by conducting runs at 8 atm and 700°C using pure A as feed. Find the rate equation for this reaction. **[16]**

Data :

Feed rate, 1/hr :	100	22	4	1	0.6
Pa_{out} / Pa_{in} :	0.8	0.5	0.2	0.1	0.05

Q9) a) Explain in detail design of fluidized bed reactor . **[10]**

b) Give the features of M-M Kinetics. **[6]**

OR

Q10)a) Derive the M-M kinetic equation. **[8]**

b) Explain the staged adiabatic reactor in detail. **[8]**

Total No. of Questions :10]

P2170

SEAT No. :

[Total No. of Pages : 2

[5059]-723

B.E. (Chemical)

CHEMICAL ENGINEERING DESIGN-II

(2012Pattern) (409343) (End -Semester) (Semester-I)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) What is the O' Conell's correlation? Using O' Conell's method, find the overall column efficiency for the following system. **[5]**

Component	Mole Fraction	Viscosity mNs/m^2
Propane	0.10	0.03
i-butane	0.10	0.12
i-pentane	0.20	0.14
n-butane	0.25	0.12
n-pentane	0.35	0.14

b) Explain the Procedure for downcomer design. Give the relevant equations. **[5]**

OR

Q2) a) Discuss the plate design parameters. **[5]**

b) What are the important considerations for choice between plate and packed columns. **[5]**

Q3) a) Find the column diameter for a packed column operating at 20°C and atmospheric pressure, if mG_m/L_m=0.8,gas flow rate is 1.39 kg/s, mol. Wt. of gas 29, slope of the equilibrium line 27.4, F_p=170 m^{-1},density of liquid =1000 kg/m^3,viscosity of solvent =10^{-3} Ns/m^2,K_4 = 0.35, K_4 at flooding = 0.8. **[6]**

P.T.O.

b) What is the function of distributor and re-distributor in a packed column? **[4]**

OR

Q4) a) What are the considerations for condensate piping design? **[4]**

b) What are the fluid dynamic parameters considered for pipe line design? Explain any one in detail. **[6]**

Q5) a) How is the total pressure drop calculated when a pipeline consists of a valve,an elbow and a reducer? **[6]**

b) What are the considerations for selection of appropriate piping material? **[6]**

c) Give the classification of gaskets. **[6]**

OR

Q6) a) What are the difficulties faced when hydrates are formed in a natural gas pipeline? **[6]**

b) A liquid is flowing through a pipeline with 25 mm I.D for a distance of 2.5 km.The pressure drop = 12m of water. Density of liquid = 1100 kg/m^3, viscosity of liquid=1.1 mNs/m^2. Estimate the flow rate of liquid through the pipeline. **[8]**

c) What are the important features to be considered if a pipeline is to be lain underground? **[4]**

Q7) a) What are the disadvantages if the water used in boilers is not treated? **[6]**

b) What is the need for treating water for use in a boiler? **[6]**

c) What are the considerations for selecting material for pipes carrying corrosive fluids? **[4]**

OR

Q8) a) Does the source of water affect the method of water treatment adopted? **[5]**

b) Write a note on boiler mountings and accessories. **[7]**

c) Whta are thermic fluids? **[4]**

Q9) a) What are hazards? Explain in detail. **[8]**

b) Write about the importance of regular maintenance. **[8]**

OR

Q10)a) What are the various types of plant maintenance? **[10]**

b) Write a note on chemical hazards. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P2171

[Total No. of Pages : 1

[5059]-724

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(2012 Course) (End Semester) (Elective- I) (409344 A)

Time : 2.5 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers any 5 question.***
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) Explain Kyoto Protocol in detail. **[10]**

OR

Q2) Discuss the environmental impact of Hydro energy with example. **[10]**

Q3) Discuss the Effects of Air Pollutants on Human Health. **[10]**

OR

Q4) Draw neat figure of Electrostatic Precipitator. Explain its working and advantages. **[10]**

Q5) Discuss the types of water pollutants, their sources and effects. **[16]**

OR

Q6) What is Oxygen Sag curve? Discuss the significance of Oxygen Sag Curve. **[16]**

Q7) Discuss th Activated Sludge Process in detail with neat figure and its working. **[18]**

OR

Q8) Explain the Trickling Filter Process in detail with neat figure and its working. **[18]**

Q9) Explain adsorption process for the removal of Heavy Metals. **[16]**

OR

Q10) Write Short notes on. **[16]**

a) Composting

b) Incineration

❖ ❖ ❖

Total No. of Questions : 10]

SEAT No. :

P2091

[Total No. of Pages : 2

[5059] - 725

B.E. (Chemical) (Elective - I)

MEMBRANE TECHNOLOGY

(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 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) Define membrane. Explain isotropic and anisotropic membranes with examples. **[5]**

b) What are the types of polymeric materials used for membrane separation explain with structures. **[5]**

OR

Q2) a) What are the benefits and drawbacks of membrane processes over conventional separation processes? **[5]**

b) Explain solution casting technique used for preparation of isotropic nonporous membranes with neat figures. **[5]**

Q3) a) Explain how to repair membrane defects with example. **[5]**

b) Explain solution diffusion theory for RO. **[5]**

OR

Q4) a) Write on plate & frame membrane module. **[5]**

b) Derive Ferry Rankin equation for transport through surface filters. **[5]**

P.T.O

Q5) a) Explain gel layer model. **[10]**

b) Write on types of membrane fouling and membrane cleaning **[8]**

OR

Q6) a) Explain boundary layer film model. **[10]**

b) Explain methods used to reduce concentration polarization. **[8]**

Q7) a) Describe NF with basic transport theory, membrane materials, modules used, fouling and system designs. **[8]**

b) What are the different applications of MF? Explain any one in detail with neat flow sheet. **[8]**

OR

Q8) a) Describe application of reverse osmosis, in sea water desalination with neat flow sheet. **[8]**

b) Describe application of UF in food industry with neat flow sheet. **[8]**

Q9) a) Explain membrane distillation in detail. **[8]**

b) Explain basic transport theory, membrane materials and modules for electro dialysis with application. **[8]**

OR

Q10)a) Write on membrane reactors and bioreactors. **[8]**

b) Describe gas separation application in hydrogen separation using metal membranes. **[8]**

Total No. of Questions : 10]

SEAT No. : [ ]

[Total No. of Pages : 2

P2092

[5059] - 726

B.E. (Chemical)

CORROSION ENGINEERING

(2012 Pattern) (Elective - I)

Time : 2.5 Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6, Q. No. 7 or 8. Q, No. 9 or 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide ruler, Mollier Charts, electronic pocket calculator and steam tables allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Define the term corrosion and differentiate it from erosion. **[5]**

b) How much corrosion product will be formed when 100g Zn completely corroded. **[5]**

OR

Q2) a) Explain the different types of corrosion that we commonly come across. **[5]**

b) Write note on conditions required for electrochemical corrosion. **[5]**

Q3) a) Explain the important factors that influence the corrosion of metals? **[5]**

b) Mention the theories of corrosion and explain any one of them. **[5]**

OR

Q4) a) Distinguish between wet and dry corrosion. **[5]**

b) What are the differences between EMF and Galvanic Series. **[5]**

P.T.O.

Q5) a) How does the corrosion product influence further corrosion. **[8]**

b) What are the factors that influence corrosion rate. **[8]**

OR

Q6) a) Explain electrochemical theory of corrosion with suitable example. **[8]**

b) Explain the control of corrosion by the use of sacrificial anode. **[8]**

Q7) Write note on : **[16]**

a) Pilling - Bedworth rule

b) Galvanic corrosion

c) Concentration cell corrosion

OR

Q8) Explain following types of corrosion : **[16]**

a) Pitting corrosion

b) Passivity

c) Inter-granular corrosion

Q9) a) Discuss about the use of inhibitors in corrosion control. **[9]**

b) Explain the process of electroplating with a suitable example. Mention the uses of electroplating. **[9]**

OR

Q10)a) Discuss various methods of corrosion control. **[9]**

b) Give difference between galvanizing and tinning. **[9]**

Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 2

P2093

[5059] - 727

B.E. (Chemical Engineering) (Semester - VII)

PETROLEUM REFINING

(2012 Pattern) (Elective - I)

Time : 2.5 Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) What are different types of crude oils? Give specifications of Indian crude oil. **[5]**

b) What is the composition of crude oil? Explain various components present in crude oil. **[5]**

OR

Q2) a) Define and briefly explain various properties of specific types of crude oil. **[5]**

b) How exploration of crude oil is carried out? Explain the stages involved. **[5]**

Q3) a) With the help of diagram explain atmospheric crude oil distillation unit. **[5]**

b) What are the products of crude oil refininng? Explain their uses. **[5]**

OR

Q4) a) Explain in brief various pre-refining operations. **[5]**

b) What purpose does vacuum serve in crude distillation? List different products obtained in vacuum distillation of crude oil. **[5]**

P.T.O.

Q5) a) List and explain various unit processes associated with refining of crude oil. **[10]**

b) What are light ends? Give process description for recovery of light ends. **[7]**

OR

Q6) a) Explain the lube oil de-asphalting by Kellogg - Tower Process. **[10]**

b) Explain the desired properties of lube oil. What role do additives play? **[7]**

Q7) a) Explain in detail house-keeping practices in petroleum refining. **[10]**

b) How is bitumen manufactured? Explain it with process block diagram.**[7]**

OR

Q8) a) Why sulphur is undesirable in refining? Explain the process of sulphur recovery from the crude. **[10]**

b) Explain reforming of gasoline? State advantages of gasoline reforming. **[7]**

Q9) a) What are pollution sources in refining operations? Discuss different ways to reduce pollution in refineries. **[8]**

b) How petroleum products are stored? Discuss various methods. **[8]**

OR

Q10)a) Why the blending of refinery products is done? Explain with suitable examples. **[8]**

b) Discuss safe practices followed in refinery operations to ensure safety of plant and personnel. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2172

[Total No. of Pages : 2

[5059]-728

B.E. (Chemical)

CHEMICAL PROCESS SYNTHESIS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to candidates:

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

Q1) a) Discuss hierarchy of chemical process design. **[5]**

b) What are the different steps involved in process design. **[5]**

OR

Q2) Benzene is to be produced from toluene according to reaction.

$C_6H_5CH_3 + H_2 \rightarrow C_6H_6 + CH_4$

Some of the benzene formed undergoes a number of secondary reactions in series to unwanted byproducts that can be characterized by the reaction to diphenyl, according to reaction

$2\,C_6H_6 \rightleftharpoons C_{12}H_{10} + H_2$

Table gives the compositions of the reactor feed and effluent streams.

Component	Inlet flow rate Kmol/h	Outlet flow rate Kmol/h
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

P.T.O.

Calculate the conversion, selectivity and reactor yield with respect to

a) Tolune feed

b) Hydrogen feed **[10]**

Q3) a) Explain the Rotary Vacuum filter with neat sketch. **[5]**

b) Explain Spray dryer with neat sketch. **[5]**

OR

Q4) a) Write note on absorption for the separation of low molar mass materials. **[5]**

b) Draw three possible arrangements for a three stage evaporator. **[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) Explain distillation sequencing using optimization of a super structure. **[8]**

Q7) a) Explain heat recovery problem with one hot and one cold stream with suitable example. **[8]**

b) What are threshold problems. **[8]**

OR

Q8) a) Explain heat recovery pinch. **[8]**

b) Discuss integration of heat pump schematically. **[8]**

Q9) a) Explain in detail the intensification of hazardous materials and attenuation of hazardous materials. **[12]**

b) What are major hazards in process plants. **[6]**

OR

Q10) Write note on: **[18]**

a) Quantitative measures of inherent safety

b) Utility selection.

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Total No. of Questions : 10]

SEAT No. :

P3087

[Total No. of Pages : 2

[5059]-729

B.E.(Chemical)(New)

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

(2012 Pattern)(End Semester)(Semester-I)(Elective-II)(409345B)

Time :2 ½Hours] *[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 distinguishing points between. **[10]**

a) Entrepreneur and Intrapreneur.

b) Entrepreneur and Manager.

OR

Q2) Role of Entrepreneur in Indian economy. **[10]**

Q3) a) Explain the detail procedure to be followed for applying for an entrepreneurship venture to a Government funding agency. **[6]**

b) Explain various commercial schemes offered for Entrepreneurial Venture. **[4]**

OR

Q4) Explain in details **[10]**

a) District Industries Centres(DIC)

b) National Entrepreneurship Development Board(NEDB)

Q5) Write an explanatory note of Team Role Theory by Belbin. **[16]**

OR

Q6) a) Explain Business communication and communication process. **[8]**

b) Explain the Hierarchy of needs given by Abraham Maslow. **[8]**

P.T.O.

Q7) Elaborate on Six Sigma concept, Enlist its requirements and advantages. **[16]**

OR

Q8) a) Explain the following **[8]**

i) Adding resources to the model,

ii) Resource management &crashing.

b) Elaborate a case study of a project involving various resources, timeline & costs **[8]**

Q9) Explain in detail marketing and marketing management. What is the various marketing research for new product marketing. **[18]**

OR

Q10) Explain the following (Any three): **[18]**

a) Channel of Distribution

b) Promotion and pricing

c) Integrated marketing communications

d) Product and brand management.

Total No. of Questions : 10]

SEAT No. :

P3776

[Total No. of Pages : 2

[5059]-730

B.E. (Chemical)

PIPING DESIGN AND ENGINEERING

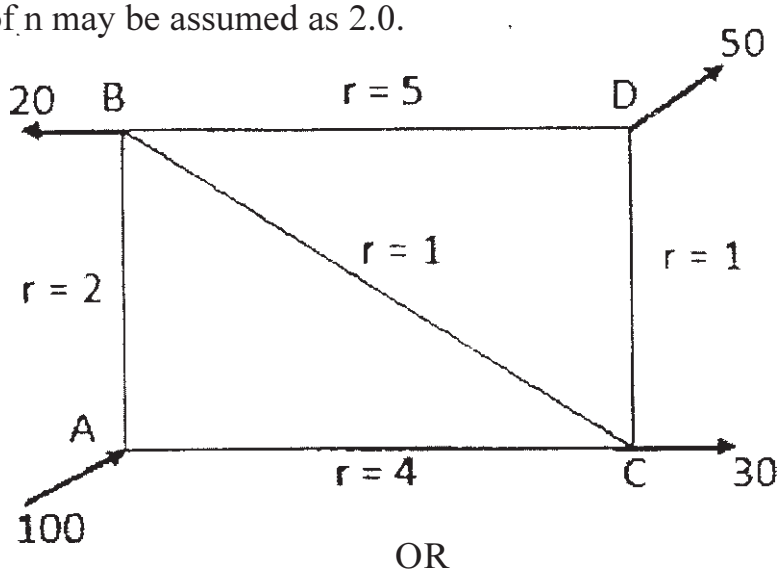
(2012 Pattern) (Semester - I) (End Sem.) (Elective - II) (409345)

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) For a pipe network shown in figure. Determine the flow in each pipe. The value of n may be assumed as 2.0. **[10]**



OR

Q2) List out the major standards providing engineering bodies in piping. Explain most commonly used piping components and their dimensional standards.**[10]**

Q3) Explain Gasket selection criterion, properties of gasket, and different types of gaskets used in Industry with suitable example. **[10]**

OR

Q4) What are the steps followed during sizing of control valve. **[10]**

P.T.O.

Q5) a) Water at 15° C flows through a 25 cm diameter riveted steel pipe of length 450 m and roughness ε = 3.2 mm. The head loss is known to be 7.30 m. Find the volumetric flow rate of water in the pipe. **[8]**

b) Find the head loss due to the flow of 2,500 gpm of oil ($\nu = 1.15 \times 10^{-4}$ ft^2/s) through 1,600 feet of 8" diameter cast iron pipe. If the density of the oil ρ = 1.75 kg/ft^3. **[8]**

OR

Q6) a) Explain NPSHA and NPSHR. **[8]**

b) Explain the pressure loss in slurry pipeline with heterogeneous pipe flow. **[8]**

Q7) a) A steam pipe with 100 mm ID and 110 mm OD is covered with an insulating material having thermal conductivity of 1.0 (W/m.K). The steam temperature is 473 K and ambient temperature is 293 K. Taking the convective heat transfer coefficient between the insulation surface and air as 8.0 ($W/m^2.K$), find the critical radius of insulation. For this value (r_c), calculate the heat loss per meter of pipe and outer surface temperature. Neglect the resistance of pipe wall. **[8]**

b) Explain optimum thickness of insulation. **[8]**

OR

Q8) Write a short note on: **[16]**

a) Hot & cold insulation in piping.

b) Critical thickness of insulation.

Q9) a) What are factors considered when the designer is locating equipment in the plot plan? **[8]**

b) Explain the concept of PFD, P & ID and utility diagram. **[10]**

OR

Q10) Write short note on: **[18]**

a) Piping Isometrics.

b) Equipment layout.

c) Pipe Rack.

Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 2

P2094

[5059] - 731

B.E. (Chemical)

ADVANCED SEPARATION PROCESSES

(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer QNo. 1 or QNo. 2, QNo.3 or QNo.4, QNo.5 or QNo. 6, QNo.7 or QNo.8, QNo.9 or QNo. 10***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of logarithmic tables slide rule, Mollier Charts, Electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Explain the concept of K values and its application in design of multicomponent distillation column. **[10]**

OR

Q2) Explain the working principles of Azeotropic and extractive distillation process in detail. **[10]**

Q3) Explain reactive distillation and its applications. **[10]**

OR

Q4) Explain reactive crystallization and its industrial applications. **[10]**

Q5) a) Explain the mechanism of electro dialysis and its applications in detail. **[8]**

b) Explain membrane fouling in RO process. **[8]**

OR

Q6) a) Explain in detail 'Pervaporation'. **[8]**

b) Explain the details of mass transfer in pervaporation process. **[8]**

P.T.O.

Q7) Explain 'Temperature swing adsorption' and 'pressure swing adsorption' in detail with neat diagram. **[16]**

OR

Q8) a) Give the industrial applications of chromatography. **[8]**

b) Explain in detail 'liquid chromatography. **[8]**

Q9) Write short notes on the following : **[18]**

a) Zone electrophoresis.

b) Molecular sieves.

c) Zone refining.

OR

Q10)Write short notes on the following : **[18]**

a) Collapse and drainage phenomena

b) Froth flotation

c) Properties of foam

Total No. of Questions : 10]

SEAT No. :

P2173

[Total No. of Pages : 1

[5059]-732

B.E. Chemical

PROCESS MODELING AND SIMULATION

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

Time : 2.5 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Explain the application of mathematical modeling and its scope of coverage. **[10]**

OR

Q2) What is the difference between the steady state system & unsteady state system? Explain with examples. **[10]**

Q3) Derive model for Flow through Packed bed column. **[10]**

OR

Q4) Derive the model for double pipe heat exchanger. **[10]**

Q5) Develop a model for Flash distillation. **[16]**

OR

Q6) Develop a dynamic model for absorption column. **[16]**

Q7) Develop a dynamic model for slurry reactor. **[18]**

OR

Q8) Develop a dynamic model for Trickle Bed Reactor. **[18]**

Q9) What is process simulation? Write approaches for simulation. Explain each with suitable example. **[16]**

OR

Q10) a) What are the limitations of mathematical models? **[16]**

b) Explain the simulation scheme for effluent treatment palnt .

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Total No. of Questions : 10]

SEAT No. :

P2174

[Total No. of Pages : 2

[5059]-733

B.E. (Chemical Engineering)

PROCESS ENGINEERING COSTING & PLANT DESIGN

(2012 Course)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to candidates:

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

Q1) Explain the necessity of pilot plant data requirement even laboratory data is available. **[10]**

OR

Q2) Explain the importance of following factors considered for plant design: **[10]**

a) Material of Construction

b) Equipment design & Specification

c) Safety factor

Q3) A batch reactor was procured at Rs.80,000 with a service life of 10 years. Its salvage value is estimated to be Rs.7000. Evuluate the reactors value of the equipment at the end of its service life of five years using. **[10]**

a) Straight line method

b) Textbook declining - balance method

c) Double declining method (200 %)

Declining balances method using a fixed % factor giving a depreciation tare Equivalent to twice the minimum rate with the (SLM).

OR

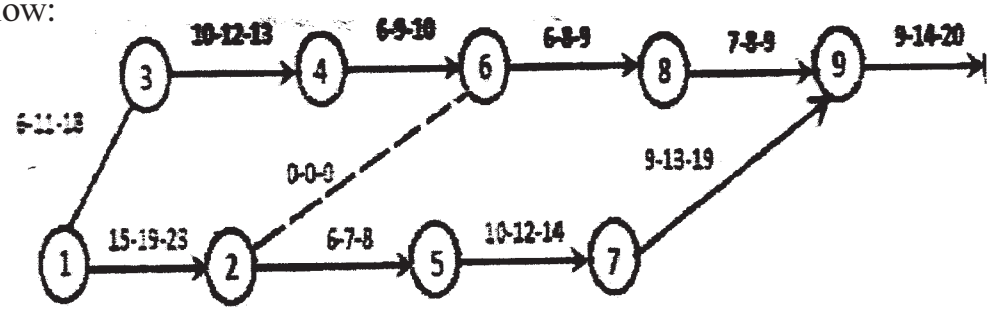
Q4) Explain the factors used for selection of process. **[10]**

P.T.O.

Q5) Explain various factors considered for plant location. **[18]**

OR

Q6) Determine expected time & variances for each activity in network shown below: **[18]**



Q7) Draw & explain the layouts & name of the parts. **[18]**

OR

Q8) Find the values of X,Y,Z that minimize the function X+2Y+Z subjected to the Constraint that X+Y+Z=1, making use of the Lagrangian multipliers. **[18]**

Q9) Explain step wise procedure for the role of project engineer. **[14]**

OR

Q10)State differences between CPM & PERT with suitable examples. **[14]**

❖ ❖ ❖

Total No. of Questions : 10]

SEAT No. :

P2175

[Total No. of Pages : 2

[5059]-734

B.E. (Chemical)

ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES

(2012 Course) (End Semester) (Semester II)(409351 A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket, calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Explain the power generation by wind and Geothermal energy. **[10]**

OR

Q2) Explain the benefit of energy efficiency towards industry, nation & globe.**[10]**

Q3) Define Energy Management & State its objectives, Explain the principles of energy management. **[10]**

OR

Q4) Define energy audit as per the energy conservation Act 2001. Explain detailed energy audit mathodology. **[10]**

Q5) Discuss the importance of nuclear option for power generation in India? **[10]**

OR

Q6) Enlist the ideas for improvement of a Boiler efficiency? **[10]**

Q7) a) Write in deatails waste heat utilization for energy conservation in process industries. Give suitable examples. **[10]**

b) Enlist activites for promoting energy conservation in present status.**[10]**

OR

Q8) a) Enlist the checklist for energy conservation in lighting system. **[10]**

b) How and where the energy losses can be minimized in a Mixing Vessel. **[10]**

P.T.O

Q9) a) Draw the sketch of heat pump 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. **[10]**

OR

Q10)a) Explain waste minimization and its classification, housekeeping, process change, recycling, product modification, waste minimization methodology steps, benefits of waste minimization in Petroleum industry. **[10]**

b) Explain waste minimization and its classification, housekeeping, process change, recycling, product modification, waste minimization methodology steps, benefits of waste minimization in Sugar industry. **[10]**

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Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 2

P2095

[5059] - 735

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

CHEMICAL PROCESS SAFETY

(2012 Pattern) (Elective - III)

Time : 2.½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8. Q.9 or Q.10.***

2) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain safety program with a neat diagram. **[6]**

b) Define Threshold Limit Values. **[4]**

OR

Q2) a) Estimate in detail worker exposures to toxic vapors. **[6]**

b) Explain evaluation phase in Industrial hygiene. **[4]**

Q3) a) Discuss in short various legislations on safety control in chemical process plants. **[7]**

b) Explain in short Dose versus Response curves. **[3]**

OR

Q4) Explain in detail about Unconfined Vapor Cloud Explosion (UVCE). **[10]**

Q5) a) Discuss in detail storage and handling of toxic and flammable materials. **[8]**

b) Describe in brief Relief systems those are using in Chemical industry. **[8]**

OR

Q6) a) Explain pressure versus time curves for Runaway reactions. **[8]**

b) Describe the ventilation and sprinkler systems to prevent fires and explosions. **[8]**

P.T.O.

Q7) a) Write a short note on Event trees and fault trees. **[8]**

b) Discuss in detail the concept for preventing the fire and explosion. **[10]**

OR

Q8) a) Describe hazards Identification and state process hazards checklists. **[10]**

b) Describe Review of probability theory for Risk Assessment. **[8]**

Q9) a) Explain in detail Emergency Shutdown System. **[8]**

b) Discuss types of safety reviews and concept of risk assessment. **[8]**

OR

Q10) Write a short notes on : **[16]**

a) Tackling of Disaster

b) Plan for Emergency

c) Role of a Computer in safety

d) Hazard models and risk data

Total No. of Questions : 10]

SEAT No. :

P3088

[Total No. of Pages : 3

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B.E (Chemical Engineering)

FOOD TECHNOLOGY

(2012 Course) (Semester -VIII) (409351) (Elective-III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Assume suitable data, if necessary.***
2) ***Neat Figures to the right indicate full marks.***
3) ***Use of scientific calculator is allowed.***
4) ***Attempt Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8 and Q.9 or 10.***

Q1) a) Explain the theory of drying along with its equipment used in food processing. Also explain how it affects on food. **[5]**

b) Explain how following techniques are used in food preservation with suitable examples. **[5]**

i) Freeze drying

ii) Microwave processing

OR

Q2) a) Enlist and differentiate between dairy and non dairy products with suitable examples. **[5]**

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

i) Dielectric heating of food

ii) Radiation Processing

iii) Hydrostatic pressure cooking of food

Q3) a) Explain natural and ventilated low temperature storage used for fruits and vegetables storage. **[5]**

b) Enlist various chemical properties of fruits and vegetables, Explain them in detail with suitable examples. **[5]**

OR

Q4) a) What are various tests to be performed on raw milk before its approval for further processing? **[3]**

b) Enlist various fruit and vegetable products. **[2]**

c) Explain theory and process of Paneer and Khoa making. **[5]**

P.T.O.

Q5) a) Define and explain in short following size reduction laws **[10]**

i) Bonds law

ii) Rittingers law

iii) Kick's law

b) What is a effect of size reduction on properties of food? Explain with suitable examples. **[8]**

OR

Q6) a) Enlist various size reduction equipment along with type of forces acting in them. Also mention at least three examples of each. **[8]**

b) Write short note on **[10]**

i) Hot oil frying

ii) Hot air dehydration

Q7) a) What do you mean by packaging of food? Explain its importance in food industries. Enlist various Packaging materials used in food industries **[6]**

b) Differentiate between flexible and non flexible packaging. Give suitable Examples. **[5]**

c) What are various advancements in food packaging? Enlist and explain any Two. **[5]**

OR

Q8) a) Explain the process of corrosion of containers in food industries and explain how it is controlled? **[8]**

b) i) What are various factors which influence on selection of right packaging material? Explain with suitable examples. **[5]**

ii) Enlist various purposes served by packaging materials. Explain with suitable examples. **[3]**

Q9) a) Explain how assessment of fruits, vegetables, cereals and other food products is done for its quality control. **[6]**

b) Write short note on **[10]**

i) Food adulteration and its safety

ii) Rheology of food products and its importance in food quality.

OR

Q10)a) Explain food regulation and its grades and standards along with various methodologies and acts for it **[8]**

b) Explain the following **[8]**

i) USFDA

ii) Trends and composition of India's foreign trade in food

✓ ✓ ✓

Total No. of Questions : 8]

SEAT No. :

P3089

[Total No. of Pages : 2

[5059]-737
B.E. (Chemical)
ADVANCED MATERIALS
(2012 Course) (Semester II) (409351) (Elective-III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) State properties and applications of anstempered ductile iron. **[6]**

b) Describe properties and applications of advanced polymeric material-Kevlar. **[6]**

c) Describe advanced powder synthesis techniques used for ceramic materials. **[6]**

OR

Q2) a) Describe advanced metallic systems used for special applications. **[6]**

b) Explain fiber technology in preparing composite polymeric materials. **[6]**

c) Explain the effect of microstructural design on properties of advanced ceramic materials. **[6]**

Q3) a) Explain the reinforcing mechanisms in formation of composite materials. **[8]**

b) Explain the factors influencing the properties of composite materials. **[8]**

OR

Q4) a) Explain fibre winding techniques used in preparing polymer composite materials. **[8]**

b) State applications of advanced composite materials. **[8]**

Q5) a) Explain mechanical behavior of metal composites. **[8]**

b) Explain crack propagation mechanism in metal composites. **[8]**

OR

P.T.O.

Q6) a) Explain fabrication processes for preparing metal composites. **[8]**

b) Explain crack propagation mechanism in ceramic composites. **[8]**

Q7) Write short notes on the following: **[20]**

a) Properties of carbon composites.

b) Ablative polymers.

c) Air craft materials.

d) Nanomaterials.

OR

Q8) Write short notes on the following: **[20]**

a) Preparation methods for carbon composites.

b) Synthesis & characterization of nano materials.

c) Manufacturing of ablative polymers.

d) Chemical engineering background of application of nanomaterials.

✓ ✓ ✓

Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 2

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[5059] - 738

B.E. (Chemical) (Elective - IV)

CATALYSIS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) Explain how homogenous and hetrogeneous catalyst is industrially useful? **[10]**

OR

Q2) Explain the application of catalyst in organic industrial process. **[10]**

Q3) What is adsorption isotherm? Write down important assumption of Langmuir Adsorption Isotherm and obtain its mathematical expression. **[10]**

OR

Q4) For the reaction, A $\longrightarrow$ 4R, (gaseous reaction) run at 3 atm and 120 °C. The rate at this temperature is measure as $a - r_A^1 = 98\ C_A$, Mol/kgCat.hr. Determine the amount of catalyst needed in a packed bed reactor with a very large recycle rate (assume mixed flow) for 40 % conversion of A to R for a feed rate of 2500 mol/hr of pure A. **[10]**

Q5) 10.68 gm of imported hydrogenation catalyst when studied with N_2 adsorption reveals **[16]**

Pressure, (mmHg)	6	70	110	240	380	452
Volume adsorbed (cm^3)	68	147	172	215	267	318

The volume is measured at 0 °C and 1 atm. Estimate the surface area of the catalyst.

Data : Density of liquid N_2 at –195.8 °C is 0.808 gm/cm^3.

P.T.O.

OR

Q6) a) Explain the major steps involved in the preparation of Catalysts. **[8]**

b) Explain the helium-mercury method for determining the void volume. **[8]**

Q7) Write a short note on : **[16]**

a) Modification of Zeolites

b) Industrial application of molecular sieves

OR

Q8) Write a short note on : **[16]**

a) Applications of Zeolite

b) ZSM-5

Q9) a) Explain the methods for evaluating the constants (k and Cm) of the m-m equation. **[9]**

b) Give the kinetics of competitive inhibition. **[9]**

OR

Q10) Substrate A and enzyme E flows through a mixed how reactor of volume(V) 6 lit. Find a rate equation to represent the action of enzyme on the substrate using the following data. **[18]**

C_{EO} (mol/lit)	0.02	0.01	0.001
C_{AO} (mol/lit)	0.2	0.3	0.69
C_A (mol/lit)	0.04	0.15	0.6
v,(l/h)	3	4	1.2

Total No. of Questions : 10]

SEAT No. : ____

P3752

[Total No. of Pages : 2

[5059]-740

B.E. (Semester - VI)

FUEL CELL TECHNOLOGY

(2012 Pattern) (Elective - IV)

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

Instructions to the candidates:

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

Q1) Compare polymer electrolyte membrane fuel cell and solid oxide fuel cell. Describe the construction and working of any one of them. **[10]**

OR

Q2) a) Calculate the current in amperes required to liberate silver completely from a solution containing 7.5×10^{-3} kg of $AgNO_3$ in one hour. (E.C.E. of Ag = 1.118×10^{-3} kg/C, Atomic Mass of Ag = 108, N = 14, O = 16). **[5]**

b) What is Emf of a cell? How it is calculated from emf of a half cell? **[5]**

Q3) Describe various steps involved in an electrode reaction. **[10]**

OR

Q4) Describe various ways by which hydrogen can be stored in a hydrogen based fuel cell unit. Also discuss difficulties cum challenges for the same. **[10]**

Q5) a) Describe various overpotential losses and their importance in the design considerations of a Proton Exchange Membrane Fuel Cell. **[8]**

b) Describe various cathodic catalyst materials used in the construction of a Proton Exchange Membrane Fuel Cell and their possible functions in its working. **[8]**

P.T.O.

OR

Q6) Write short notes on any three : **[16]**

a) Anodic Materials of PEMFCs

b) Schematic diagram of PEMFCs

c) Gas Diffusion Layer Materials

d) Electrode Support Materials

Q7) a) Describe the construction and working of tubular and flat Solid Oxide Fuel Cell. **[8]**

b) Describe with the help of a diagram reduction reaction on the TPB of an anode made of NI-YSZ. **[8]**

OR

Q8) Describe the mechanism of charge transfer at extensive three phase boundaries, and illustrate the importance of materials involved in its construction. **[16]**

Q9) Write down generic fuel conversion reactions before a fuel is fed to the fuel cell. **[18]**

OR

Q10)a) Describe any one arrangement of a hybrid fuel system. **[9]**

b) Write a detailed note on autothermal reforming needed in fuel processing. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2176

[Total No. of Pages : 2

[5059]-740-A

B.E. (Chemical)

PETROCHEMICAL ENGINEERING

(2012 Course) (Elective - IV) (Semester- II) (409352)

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

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) Define Petrochemicals and the status of Petrochemical industries in India. **[10]**

OR

Q2) Describe main basic building blocks of petrochemical industry explain with suitable. Examples . Enlist the petrochemical products that are produced from benzen. **[10]**

Q3) Describe the BTX aromatic separation by suitable diagram. **[10]**

OR

Q4) List out the various separation and purification techniques used in petrochemical industry. Explain any two techniques. **[10]**

Q5) a) With neat sketches explain in detail about production ethylene glycol as a second generation intermediates. **[12]**

b) Discuss the various types and uses of second generation intermediates in petrochemicals. **[6]**

OR

Q6) With neat schematic diagram describe about the production of maleic anhydride from benzene and also discuss the major Engineering problems. **[18]**

Q7) a) Define addition polymerization. Describe the steps and mechanisms of addition Polymerization. **[10]**

b) Explain classification of different polymerization process along with its advantages and disadvantages. **[6]**

OR

P.T.O.

Q8) a) With neat sketches explain in detail about production of PVC along with its engineering problems. **[10]**

b) What are various polymeric products? Differentiate between different polymerization processes. **[6]**

Q9) a) Discuss about recent advances in petrochemical plants & refineries in India. **[10]**

b) Discuss major petrochemical plants in India as well as in world. **[6]**

OR

Q10) Write a note on following. **[16]**

a) Pollution control aspects in Petrochemical industries.

b) Safety consideration in petrochemical plants.

Total No. of Questions : 10]

SEAT No. :

P2077

[Total No. of Pages : 2

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

Internet of Things

(2012 Pattern) (Elective - IV)

Time : 2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Discuss area of development and standardization in Internet of Things. **[6]**

b) Explain in detail HLSA IoT framework. **[4]**

OR

Q2) a) Explain in detail IoT Architecture with neat diagram. **[6]**

b) Write in detail applications of Internet of Things. **[4]**

Q3) a) What are the challenges and issues in RFID system? **[6]**

b) What are basic components of sensor network? **[4]**

OR

Q4) a) Discuss various components of RFID system. **[6]**

b) Explain challenges for WSN. **[4]**

P.T.O.

Q5) a) Explain in detail design guidelines for Internet of Things. **[9]**

b) Explain in detail data synchronization techniques in Internet of Things. **[9]**

OR

Q6) a) Explain in detail clustering principal in Internet of Things. **[8]**

b) What is Identity management in Internet of Things? Explain any 2 Identity management techniques of Internet of Things. **[10]**

Q7) a) What is Internet of Things security tomography? Explain in detail layered attacker model. **[10]**

b) Explain in detail vulnerabilities of Internet of Things. **[8]**

OR

Q8) a) Why security required in IoT? Explain in detail various security model in Internet of Things. **[10]**

b) Explain in detail access control and message integrity of Internet of Things. **[8]**

Q9) a) Write in detail business model scenario for Internet of Things. **[6]**

b) Explain in detail business model and business innovation in Internet of Things. **[8]**

OR

Q10) a) Write applications of Internet of Things for e-health body area network. **[6]**

b) Explain in detail application of Internet of Things in city automation and home automation. **[8]**