Total No. of Questions : 10]

SEAT No. :

P2110

[Total No. of Pages : 3

[5254]-501
B. E. (Civil)
ENVIRONMENTAL ENGINEERING - II
(2012 Pattern) (Semester - End)

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 indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume Suitable data if necessary.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Explain effect of change of life style on sewage quality. **[4]**

b) Write Streeter - Phelps equation and explain the terminology used in equation. **[6]**

OR

Q2) a) Write the procedure to determine biochemical oxygen demand and its significance in wastewater treatment. **[3+2]**

b) Enlist different methods of collection and conveyance of sewage. **[5]**

Q3) a) Draw a process flow diagram of sewage treatment and write the impurities removed from each unit. **[5]**

b) Draw a schematic sketch of rotating biological contractor and write the design parameters considered. **[5]**

OR

Q4) a) Write the difference between primary treatment and secondary treatment.**[4]**

b) A single stage filter is designed for an organic loading of 10000 kg of BOD in raw sewage per hectare meter per day with a recirculation ratio of 1.2. This filter treats a flow of 4 MLD of raw sewage with a BOD of 200 mg/l. Use NRC formula to determine the strength of the effluent. BOD removal in primary sedimentation tank is 35%. **[6]**

P.T.O.

Q5) a) Explain aerated lagoon with respect to its working principle, design parameters and applications. **[4 + 2 + 2]**

b) Write wastewater treatment principle of phytoremediation technology and explain its working with schematic sketch. **[4 + 4]**

OR

Q6) a) Write working principle, draw a schematic sketch and application of root zone cleaning system for wastewater treatment. **[3 + 3 + 2]**

b) Design an oxidation pond for the following data **[8]**

i)	Sewage flow	=	20 m^3/d
ii)	BOD of raw sewage	=	200 mg/l
iii)	Mean monthly temperature	=	30°C Maximum and 10 °C minimum
iv)	Desired effluent BOD	=	20 mg/l
v)	Location	=	20° latitude
vi)	Yield of photosynthetic	=	250 kg/ha/d
vii)	Depth of pond	=	1.5 m

Q7) a) Write advantages, disadvantages and application of up flow sludge blanket reactor. **[3 + 3 + 2]**

b) Write principle of anaerobic digestion and enlist factors affecting anaerobic digestion and explain any one factor in detail. **[2 + 3 + 3]**

OR

Q8) a) Enlist different methods of sludge treatment and disposal and explain any one method of sludge treatment. **[2 + 2 + 4]**

b) Explain working principle of package sewage treatment plant, write its advantages and disadvantages. **[2 + 3 + 3]**

Q9) a) Explain equalization tank with respect to parameters considered in design, advantages and disadvantages. **[3 + 3 + 3]**

b) Explain the following points related to distillery industry. **[3 + 3 + 3]**

i) Flow sheet of manufacturing process and wastewater generation

ii) Characteristics of wastewater.

iii) Flow sheet of wastewater treatment

OR

Q10)a) Explain the following points related to dairy industry. **[4 + 3 + 3]**

i) Flow sheet of manufacturing process and wastewater generation

ii) Characteristics of waste water.

iii) Flow sheet of wastewater treatment

b) Explain in brief primary and secondary treatment process adopted for treating industrial wastewater. **[4 + 4]**

Total No. of Questions : 10]

SEAT No. :

P2111

[Total No. of Pages : 3

[5254]-502

B. E. (Civil)

TRANSPORTATION ENGINEERING

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6, Q.7 or Q8, Q.9 or Q.10.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollies charts, electronics pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***
6) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) State comparison between Nagpur road plan and Bombay Road plan. **[5]**

b) Explain in brief the factors controlling an highway alignment. **[5]**

OR

Q2) a) Explain in brief the following : **[5]**

i) PCU ii) O and D Survey

b) Define Unevenness Index. Explain in brief how it is measured **[5]**

Q3) a) Design the superelevation required for a road curve of 240 m radius with mixed traffic conditions. The design speed is 80 Kmph. The coefficient of friction is 0.15. The road is passing through rolling terrain. **[5]**

b) Write a short note on Marshall Stability Test **[5]**

OR

Q4) a) Draw a neat cross section of flexible pavement. Explain in brief functions of various layers of flexible pavement **[5]**

b) The CBR value of the subgrade is 6 percent. Calculate the total thickness of pavement using design formula developed by U.S. Corps of Engineers. Assume wheel load = 4082 Kg. Tyre pressure = 7 Kg/cm^2. **[5]**

P.T.O.

Q5) a) Draw a neat sketch showing the component parts of aeroplane. **[6]**

b) Write a note on Basic Runway length and Orientation of Runway. **[3+3=6]**

c) How is the minimum turning radius is decided **[4]**

OR

Q6) a) How can the plotting of wind rose diagram can be done **[6]**

b) Explain in brief the following : **[2×3=6]**

i) Holding Apron

ii) Tricycle undercarriage

iii) Instrument runway

c) What are the factors which influence the location of an airport. **[4]**

Q7) a) Explain in brief the following : **[6]**

i) Submersible Bridge ii) Class B Bridge

iii) Skew Bridges iv) Through Bridges

b) What is Afflux? How it is estimated. **[6]**

c) Explain in brief the significance of following terms in bridge design: **[2 + 2 + 2 = 6]**

i) Clearance above HFL

ii) Size of opening

iii) Fixing waterway

OR

Q8) a) Calculate the peak runoff for designing a bridge across a stream, given Catchment Length = 6 Km; H= 25 m; Area of catchment(A) = 10 sq km; Runoff coefficient = 0.285; The severest storm in 20 years dropped 15cm rain in 2.5 hours ;Type of catchment = Loamy soil largely cultivated. **[6]**

b) How would you estimate the maximum scour depth for any bridge pier. **[6]**

c) Write a short note on determination of velocity of stream by Surface Float method. **[6]**

Q9) a) How will you account for the following in the design of highway bridge: **[2 × 3 = 6]**

i) Dead Load

ii) Earth pressure

iii) Erection stresses

b) What do you understand by fixed span bridges? Explain any two types of fixed span bridges with the help of neat sketch **[2 + 2 + 2 = 6]**

c) Discuss in brief the following : **[2 + 2 = 4]**

i) Causeway ii) Pontoon Bridges

OR

Q10)a) Explain with a neat sketch the following: **[3 + 3 = 6]**

i) Pile Bent Pier ii) Splayed wing Wall

b) State merits and demerits of Continuous Bridges. **[6]**

c) Write a note on maintenance and preservation of Steel bridges. **[4]**

Total No. of Questions : 10]

SEAT No. :

P2112

[Total No. of Pages : 3

[5254]-503

B. E. (Civil)

STRUCTURAL DESIGN AND DRAWING - III

(2012 Pattern)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2; Q.3 or Q.4; Q.5 or Q.6; Q.7 or Q.8; and Q.9 or Q.10***
2) ***Figures in bold to the right, indicate full marks.***
3) ***IS 456, IS 1893, IS 1343, IS 3370 (Part II and Part IV) and IS 13920 are allowed in the examination.***
4) ***The designs should comply with the latest codal provisions.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Write shortnote on types of prestressing steel and explain the necessity of use high tensile strength steel in prestressing. **[4]**

b) A simply supported pre-stressed concrete beam having 9 m effective span is 250 mm wide and 500 mm deep. It carries a distributed load of intensity 6kN/m inclusive of self-weight. Pre-stressing force of 200 kN applied through a straight tendon located at 100 mm below the centroidal axis of the beam. Plot the pressure line. **[6]**

OR

Q2) a) Explain how the bearing stresses behind the anchorage are taken care of.**[4]**

b) A prestressed concrete beam having cross-section 250mm × 650mm deep is subjected to an effective prestressing force of 1380 kN along the longitudinal centroidal axis. The cables are symmetrically placed over bearing plate of 200mm × 400mm size. Find the bursting force and design the anchorage reinforcement. **[6]**

P.T.O.

Q3) a) Explain any four losses in pre-stressed member. **[4]**

b) A residential building of size 6m × 6m having two equal bays has a height of 10.5 m with each storey having height 3.5 m. The building is located in zone III. Soil conditions is medium stiff. OMRF is adopted. DL=10 kN /m^2 and IL=2 kN/m^2 Determine the design seismic forces for the building using seismic coefficient method as per IS 1893 and show the distribution of lateral forces with the building height. **[6]**

OR

Q4) a) Write a note on the serviceability limit state design criteria of pre- stressed member focusing on limits on compressive stress and crack control. **[4]**

b) The bending moments developed due to gravity and earthquake loads for a continuous beam ABC are as follows : **[6]**

Bending Moments due to	Support moments at (kN-m)			Mid-span moments for span (kN-m)	
	A	B	C	AB	BC
Lateral load	± 90	± 90	± 90	0	0
Dead load	– 50	– 40	– 50	+ 20	+ 20
Dead load + Imposed load	– 75	– 65	– 75	+ 37	+ 37

Calculate the design moments developed due to gravity and earthquake loads using load combinations as per IS : 1893.

Q5) a) Explain with proper sketches, active and passive earth pressure diagram for a cantilever retaining wall with a shear key provided underneath the stem. **[4]**

b) Suggest a cantilever retaining wall with levelled backfill without a heel projection for retaining soil with the data given below and perform the stability analysis for it. The overall height of the wall = 5m, Weight of soil = 16kN/m^3. Angle of repose = 30°, Foundation shall not project on the retained side, SBC of soil = 200kN/m^2, Coefficient of friction = 0.45. **[12]**

OR

Q6) Design a L-shaped retaining wall to retain a backfill of 3.2 m. The backfill is horizontal. The unit weight of the soil is 18 kN / m^3, angle of repose = 30°, SBC of soil = 180 kN/m2. Sketch the details of reinforcement in the wall and base slab. **[16]**

Q7) A rectangular slab beam type combine footing is to be provided for two columns A and B located 4.5 m apart. They carry a service load of 650 kN and 1000 kN each. The sizes of columns are 400 mm × 400 mm and 600 mm × 600 mm respectively. The SBC of soil is 275 kN/m^2. Proportion the base slab for each of following conditions separately with comments on feasibility of footing. **[16]**

a) Width of slab restricted to 1.75 m

b) The projection of the footing to the length of footing beyond axis of column A is restricted to 0.75 m

c) Column A is boundary column

d) Column B is boundary column.

OR

Q8) A rectangular slab type combine footing is to be provided for two columns A and B located 4.5 m apart. They carry a service load of 650 kN and 1000 kN each. The sizes of columns are 400 mm × 400 mm and 600 mm × 600 mm respectively. The SBC of soil is 275 kN/m^2. Design the footing using M25 grade of concrete and steel of grade Fe 500. Sketch the reinforcement details. **[16]**

Q9) a) Explain the approximate analysis for **[12]**

i) A circular water tank fixed at base.

ii) Short wall of rectangular tank

iii) Long wall of rectangular tank for condition L/B < 2

b) Explain the limit state of serviceability for design of section of water tank subjected to both bending and direct tension. **[6]**

OR

Q10) Design the long wall for a rectangular water tank open at top resting on ground having a size of 8.0 m × 3 m × 2.5 m high. Use M 30 and Fe 500 grade material. Sketch details of reinforcement for the wall. **[18]**

Total No. of Questions : 10]

SEAT No. :

P2113

[Total No. of Pages : 2

[5254]-504
B. E. (Civil)
STRUCTURAL DESIGN OF BRIDGES
(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Classify the road bridges with neat sketches. **[10]**

OR

Q2) Explain IRC loadings adopted for railway steel bridges. **[10]**

Q3) Explain Curbon's Method of Design of Bridges. **[10]**

OR

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

Q5) Design the members U_3-U_4, U_4-L_4 for the broad gauge railway steel truss bridge shown in Fig.1. The details are as follows **[18]**

a) Weight of stock rail = 065 kN/m

b) Weight of check rail = 0.75 kN/m

c) Sleepers of size = (0.25 x 0.25 x 2.5) m @ 0.40 m c/c

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

e) Spacing of truss = 5.0 m c/c

f) Equivalent uniformly distributed load for BM and SF are 2174 kN and 3060 kN respectively

g) CDA = 0.31

P.T.O.

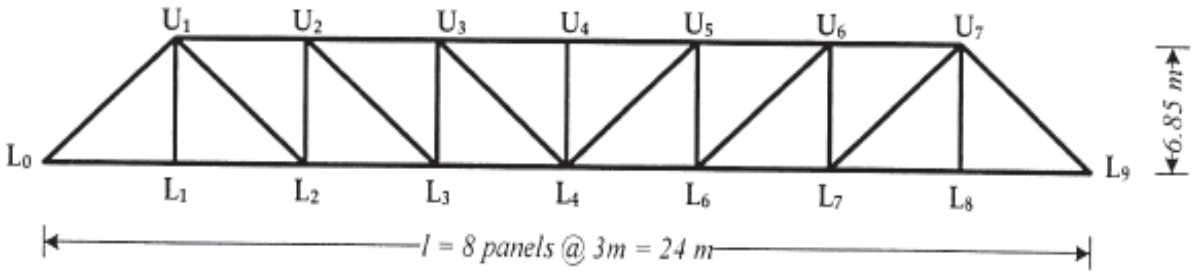


Fig. i

OR

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

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

i) Maximum normal load = 4500 kN

ii) Minimum normal load = 950 kN

iii) Lateral load = 50 kN

iv) Longitudinal load = 450 kN

OR

Q8) a) Explain the classification of bridge bearings with neat sketches. **[8]**

b) Explain the design procedure for Rocker and Roller bearing. **[8]**

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

OR

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

a) Span = 16 m

b) Width of carriageway = 10 m

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

d) Dead weight of span = 6800 kN

e) Longitudinal force = 450 kN

f) Height of abutment from the top of footing to bearing level = 12.5 m

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

h) Allowable bearing pressure = 250 kN/m^2

i) Materials = M 30 grade concrete and steel of grade Fe 415

Total No. of Questions : 10]

SEAT No. :

P2114

[Total No. of Pages : 4

[5254]-505

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

SYSTEMS APPROACH IN CIVIL ENGINEERING

(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7or Q.8, Q.9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) State application of optimization in Civil Engineering? **[4]**

b) State whether following functions are Convex or Concave **[6]**

i) $f(x) = x^4 + x^2 + 10\,x$

ii) $f(x) = x^3 + x^2 - 15x$

OR

Q2) a) What are the advantages of Newton's method over steepest gradient technique. **[4]**

b) Minimize $Z = 3x_1^2 + 4x_2 - 5x_1x_2 - 8\,x_2$,

Subject to $x_1 + x_2 = 4$ by Lagrange's multiplier method. **[6]**

Q3) a) Find the sequence that minimize the total elapsed time to complete the job in the order of AB **[6]**

Machine	Jobs Processing Time in Minutes				
	1	2	3	4	5
A	3	10	6	4	9
B	7	12	8	5	2

b) Explain Kendal's Notation. **[4]**

P.T.O.

OR

Q4) a) Explain the process of sequencing of n jobs on three machines. **[4]**

b) Ships arrive at a port at an average rate of 8 ships per week and their arrival pattern follows Poisson distribution. On an average 12 ships are loaded and unloaded with exponential distribution per week. Determine **[6]**

i) The average queue length and the number of ships in the system.

ii) The average time spent by the ships waiting in the queue and in the system.

Q5) a) Write short note on characteristics of Dynamic Programming. **[4]**

b) Find shortest path for a network with following data **[12]**

Node	Distance in kms	Node	Distance in kms
A-B	14	A-C	15
A-D	18	B-E	19
B-F	21	C-E	25
C-F	30	D-E	24
D-F	20	E-G	14
E-H	18	E-I	15
F-G	16	F-H	17
F-I	22	G-J	22
H-J	24	I-J	23

OR

Q6) a) Discuss Dynamic Programming applications to business. **[4]**

b) Maximize the sales by allocating salesman to different zones as per amount of sales contribution as given below **[12]**

No of salesman	Zone 1	Zone 2	Zone 3
	Profitability in thousands of Rs.		
0	12	13	14
1	14	15	18
2	15	18	23
3	17	20	27
4	19	23	31
5	20	27	35
6	25	30	40

Q7) a) Minimize $Z = x_1 - 3x_2 + 2x_3$ **[12]**

Subject to $3x_1 - x_2 + 2x_3 \geq 7$

$-2x_1 + 4x_2 \leq 12$

$-4x_1 + 3x_2 + 8x_3 \leq 10$

$x_1, x_2, x_3 \geq 0$

Use Simplex method to solvc the problem.

b) What do surplus variable and slack variables represent in Simplex method? Also, explain when these are used. **[4]**

OR

Q8) a) What is the difference between simplex solution procedure for a maximization and minimization problem? **[4]**

b) Maximize $Z = 3x_1 + 2x_2 + 5x_3$ **[12]**

Subject to $x_1 + x_2 + x_3 \leq 9$

$2x_1 + 3x_2 + 5x_3 \leq 30$

$2x_1 - x_2 - x_3 \leq 8$

$x_1, x_2, x_3 \geq 0$

Use Simplex method to solve the problem.

Q9) a) What do you understand by a balanced and unbalanced transportation problem? How are the unbalanced problems solved? **[8]**

b) Solve following assignment problem to minimize time (in minutes) required by 5 operators on 5 machines **[10]**

Machines

Operators	I	II	III	IV	V
A	10	17	27	18	28
B	11	24	16	19	33
C	25	26	12	20	29
D	32	23	15	13	34
E	31	22	14	21	30

OR

Q10)a) Give the mathematical formulation of an assignment problem with the help of an example. **[6]**

b) Calculate transportation cost for following problem using Column minima, row minima and least cost method. **[12]**

Destinations

Origins	D_1	D_2	D_3	D_4	Supply
O_1	20	18	16	20	75
O_2	14	12	18	15	75
O_3	17	13	11	17	50
O_4	16	14	12	18	100
Demand	100	50	100	50	

Total No. of Questions : 8]

SEAT No. :

P2116

[Total No. of Pages : 2

[5254]-507

B. E. (Civil)

ARCHITECTURE AND TOWN PLANNING

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

Q1) a) Explain in detail Principles used for Architectural Composition. **[7]**

b) Why Urban renewal is essential for improving quality of life. **[7]**

c) Write a short note on : Neighbourhood plan **[6]**

OR

Q2) a) Elaborate following Qualities of Architecture: future growth, ecofriendly. **[6]**

b) Write a short note on: importance of landscapes in urban areas. **[7]**

c) Write a short note on: levels of planning. **[7]**

Q3) a) Elaborate: Various types of civic surveys for DP. **[9]**

b) What is the purpose of Planning agencies? Explain any one in detail. **[8]**

OR

Q4) a) How Planning agencies work at various levels of planning? **[8]**

b) Write a short note on Intelligent Transport Systems. **[9]**

P.T.O.

Q5) a) How Legislative mechanism is used for preparation of DP? **[8]**

b) Write a short note on Smart City Guidelines. **[9]**

OR

Q6) a) Write a short note on: MRTP Act. 1966. **[8]**

b) Write a short note on : CRZ (with sketches) **[9]**

Q7) a) Why "Special townships" are developed nearby developed urban areas? **[8]**

b) Write a short note on: Application of remote sensing in planning. **[8]**

OR

Q8) a) Write the features of Land Acquisition Rehabilitation and Resettlement Act. 2013. **[8]**

b) What are the application of modern tools in planning **[8]**

Total No. of Questions : 6]

SEAT No. :

P2117

[Total No. of Pages : 3

[5254]-508

B. E. (Civil)

ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS

(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***

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

3) ***Neat diagrams should be drawn wherever necessary.***

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

OR

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

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

OR

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

Q3) a) Explain process of decomposition in soil formation. **[7]**

OR

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

P.T.O.

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

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

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

OR

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

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

Sr. No.	R	a	2 πaR
1	1.48	1	
2	1.55	2	
3	1.38	3	
4	1.50	4	
5	1.20	5	
6	1.67	10	

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

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

OR

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

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

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

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

OR

a) Define R.I.S. and explain how the dam building activity cause a major earthquake. **[10]**

b) Explain suitability of DTB as construction material. **[7]**

Total No. of Questions : 8]

SEAT No. :

P2118

[Total No. of Pages : 4

[5254]-509

B. A. (Civil Engineering)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(2012 Pattern) (Elective - II)

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

Instructions to the candidates:

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

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

i) Gauss-Jordan Method

ii) Gauss-Elimination Method

iii) Gauss-Seidal Method

b) Two bars one of aluminum and other of steel are jointed together and subjected to load as shown in Figure 1. Determine displacement at common joint using stiffness matrix method. Take c/s areas of aluminum and steel bars are 2000 mm^2 and 400 mm^2 respectively. Young's modulus of aluminum and steel bars are 70 GPa and 200 GPa respectively. **[6]**

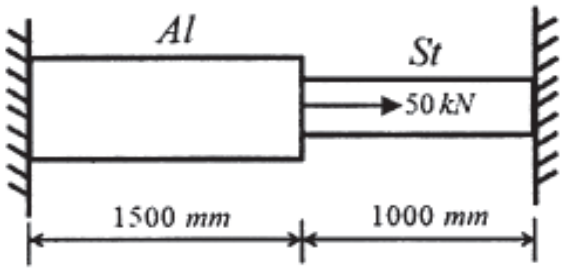


Figure 1.

c) Determine support reactions of continuous beam ABC if support B sink by 10mm. Take EI = 6000 kNm^2. Use flexibility matrix method. **[8]**

P.T.O.

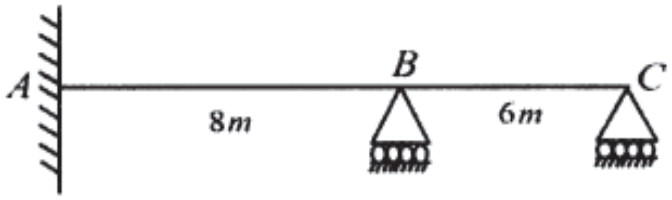


Figure 2.

OR

Q2) a) Write computer flowchart and algorithm for Gauss Jordan Method. **[6]**

b) Determined the prop reaction of the propped cantilever beam AB as shown in Figure 3 using flexibility matrix method. Take EI = constant**[6]**

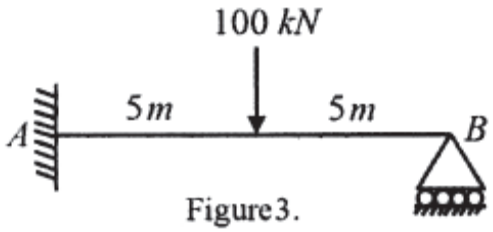


Figure 3.

c) Analyze the two member truss shown in Figure 4 using stiffness matrix method. Take c/s area of each member 1000 mm^2 and E = 200 GPa. The length of each member is 5m. **[8]**

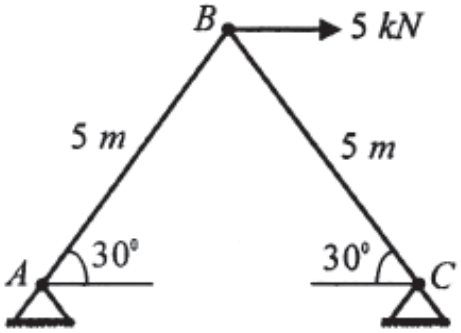


Figure 4.

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

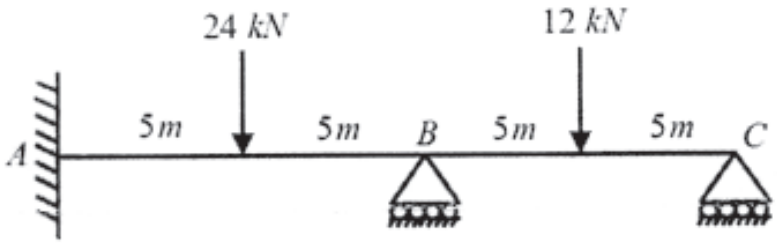


Figure 5

OR

Q4) Analyze the rigid jointed portal frame shown in Figure 6 using stiffness matrix method. Take EI constant. Draw BMD **[18]**

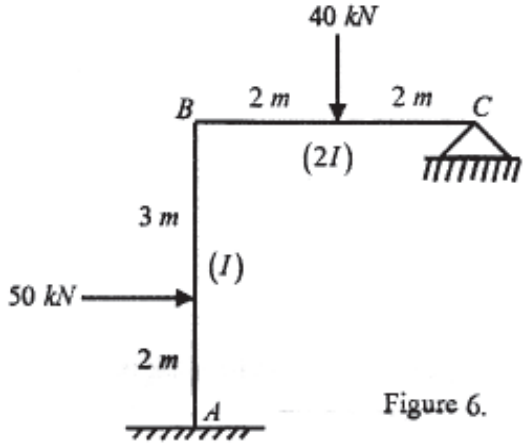


Figure 6.

Q5) a) Derive the stiffness matrix of two noded grid element with 06 D.O.F. as shown in figure 7 Take length L, fiexural rigidity EI and torsional rigidity G.J. **[8]**

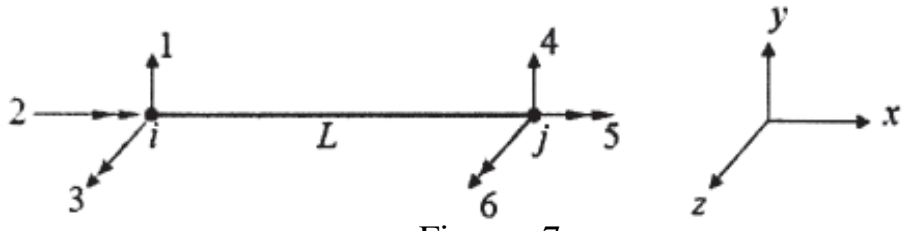


Figure - 7

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

OR

Q6) a) Determine the joint displacements of the grid structure ABC as shown in Figure 8 using stiffness matrix method. Take E = 2.54×10^7 kN/m^2, G = 8.8×10^6 kN/m^2, I = 3.188×10^{-3} m^4 and J = 2.230×10^{-3} m^4.**[16]**

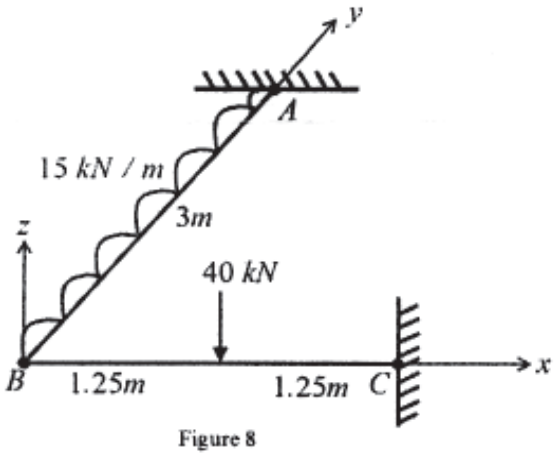


Figure 8

Q7) The tripod shown in Figure 9 is subjected to horizontal and vertical loads. Determine the deflections at the loaded joint using stiffness matrix method. Take E = 200 GPa and c/s area of all members 2000 mm^2. **[16]**

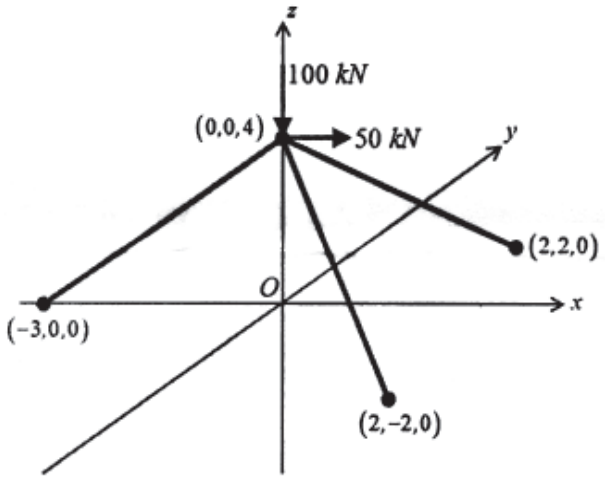


Figure 9

OR

Q8) a) A propped cantilever beam AB fixed at A and propped at B is of length 10m. The beam has constant flexural rigidity and it supports uniformly distributed load of 10 kN/m over the whole length. Considering four sub intervals estimate the maximum deflection. Take EI constant. Apply finite difference method. **[8]**

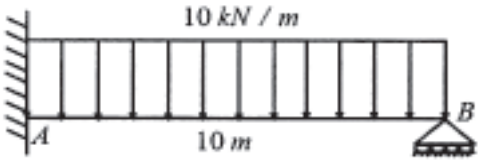


Figure 10.

b) Determine the critical buckling load of a pin ended column with variable moment of inertia using three sub intervals. Apply finite difference method.**[8]**

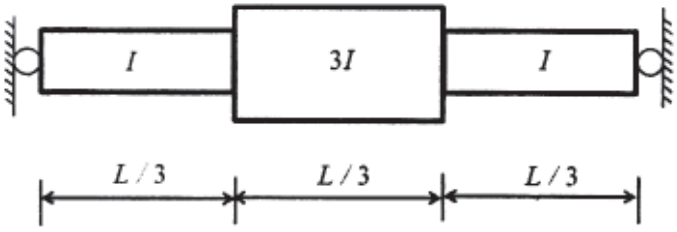


Figure11.

Total No. of Questions : 12]

SEAT No. :

P3338

[Total No. of Pages : 2

[5254]-510

B.E. (Civil)

INTEGRATED WATER RESOURCES PLANNING AND MANAGEMENT

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write a note on: History of water resources development. **[3]**

b) Write a note on: Scope for privatization. **[3]**

OR

Q2) a) Present framework for water management in your institute. **[3]**

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

Q3) a) Write a note on: Principles of water allocation. **[3]**

b) Write a note on: Concept of 'blue water' and 'green water'. **[3]**

OR

Q4) a) Write a note on: Financing of water resources project. **[3]**

b) Write a note on: Requirement of water for human and nature. **[3]**

Q5) a) What is meant by export of water? **[4]**

b) What is meant by severity index? **[4]**

OR

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

b) How to do the assessment of flood damage? **[4]**

P.T.O.

Q7) a) Explain in detail necessity of water management in irrigation sector. **[8]**

b) What is hydropower sector water demands? Explain how it is estimated.**[8]**

OR

Q8) a) What are consumptive and non-consumptive demands? Explain in detail,**[8]**

b) Write a note on estimation and forecasting of water demand for irrigation sector. **[8]**

Q9) a) Write a note on: Social impact of water resources development. **[8]**

b) Social impact of water resources development on industrial growth to enhance living standards. **[8]**

OR

Q10)a) How to protect the vital ecosystem by environmental management? **[8]**

b) Write Social impact of water resources development on management of rehabilitation & resettlement. **[8]**

Q11)a) How the management of IWRM is carried out by use of data driven techniques like Genetic programming is done. **[8]**

b) Write a note on: **[10]**

i) Contour Bunding

ii) Strip Cropping

iii) Bench Terracing

iv) Check Dams.

OR

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

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

Total No. of Questions : 10]

SEAT No. :

P3339

[Total No. of Pages : 2

[5254]-511

B.E. (Civil)

TQM & MIS IN CIVIL ENGINEERING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Give any two definitions of 'Quality'. **[4]**

b) List any two reasons of poor quality in RCC work and give measures to overcome them. **[6]**

OR

Q2) a) What is the definition of MIS? What are its uses in construction field? **[4]**

b) What are the decision support systems required by Project Manager in a construction firm? **[6]**

Q3) a) Write a short note on DSS. **[4]**

b) Differentiate between DMAIC and DMADV and share their applications. **[6]**

OR

Q4) a) Give two practical examples of design defects. **[4]**

b) Give all six sigma levels. Give your view on the sigma levels that can be achieved on construction site by giving reasons. **[6]**

Q5) a) Describe 'Nonconfirmity' for concreting of slabs and beams. **[6]**

b) Prepare checklist for formwork of column. **[6]**

c) Differentiate between preventive and corrective actions by giving suitable examples on site. **[6]**

OR

P.T.O.

Q6) a) Differentiate between Quality Assurance and Quality Control. **[5]**

b) Describe Quality policy and quality objectives. **[5]**

c) Write short notes on any two of the following **[8]**

i) Document control

ii) Record Management

iii) Internal audit

Q7) a) What is meant by Supply chain Management? Give the supply chain for cement received at the site. **[8]**

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

OR

Q8) a) What are the different modules that are used in ERP software developed for a construction site? Highlight the contents of each. **[8]**

b) What is 'Benchmarking in TQM'? Also, describe process benchmarking by giving suitable example. **[8]**

Q9) a) Elaborate the use of modern tools for documentation of construction projects. **[8]**

b) What is meant by Enterprise Resource Planning system? What are its application areas in construction field? **[8]**

OR

Q10)a) What is database management system? What are its advantages? **[8]**

b) Explain the use of GIS for monitoring of construction projects. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2119

[Total No. of Pages : 3

[5254]-512
B. E. (Civil) (End Semester)
EARTHQUAKE ENGINEERING
(2012 Pattern) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

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

i) Magnitude of earthquake

ii) Intra plate Earthquake

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

OR

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

b) Explain different causes of earthquake? **[6]**

Q3) A simply supported beam 3 m long supports mass of 100kg at the center. Find the natural period and natural frequency. E=2.1 × 10^6 kg/cm^2 & EI = 10,000 kN.m^2. **[6]**

OR

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

b) Convert the mass m=20,000kg supported as shown in figure 4. 1 into a mass and equivalent spring system (SDOF). Assume stiffness of each column 3kN/m for first and second storey and 2kN/m for top storey.**[3]**

P.T.O.

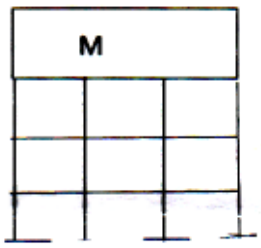


Figure 4.1

Q5) Explain the following terms (Any two) **[6]**

a) Seismic Zoning.

b) Vertical irregularity in buildings.

c) Weak storey and Soft Storey.

OR

Q6) Calculate the distribution of base shear at each floor level as per seismic coefficient method for the OMRF without brick infill building shown in Fig. 6.1 The building is located in Zone IV. The frames are spaced at 4m c/c. Assume soil of Type II. Assume Three storeyed building with D.L = 5kN/m^2, L.L.= 4kN/m^2 on each floor and 1.5 kN/m^2 on roof Storey height = 3m. **[6]**

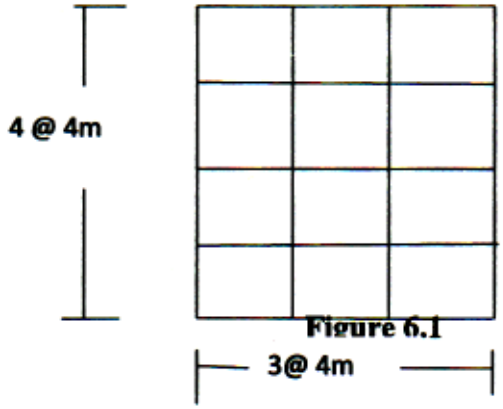


Figure 6.1

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

OR

Q8) a) What is Liquefaction? Write effects of liquefaction. **[4]**

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

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

Q9) a) What are the various methods available to control the lateral forces acting on a structure? Explain in details. **[8]**

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

OR

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

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

Q11)a) What is retrofitting and rehabilitation of structures? **[8]**

b) Explain the Shear Wall and its behavior? **[8]**

OR

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

b) Explain any three retrofitting techniques used for masonry buildings?**[8]**

Total No. of Questions : 10]

SEAT No. :

P2120

[Total No. of Pages : 2

[5254]-513

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

ADVANCED GEOTECHNICAL ENGINEERING

(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, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data, if necessary.***
4) ***Use of electronic pocket calculator is allowed in the examination.***
5) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain Textural Classification of soil system. **[4]**

b) State the earth pressure at rest, active and passive. **[6]**

OR

Q2) a) Differentiate between Rankine's and Coulomb's earth pressure theories. **[4]**

b) With the help of structure, explain any two Clay minerals. **[6]**

Q3) a) A 5 m high retaining wall has to retain a backfill of dry, cohesionless soil having the properties $\varnothing = 30^{\theta}$; e = 0.74, G = 2.68, $\mu = 0.36$. Determine the magnitude and point of application of the resultant thrust. Compute the percent change in the lateral thrust if the water table rises from a great depth to the top of the backfill. **[5]**

b) Explain mechanism of reinforced soil. **[5]**

OR

Q4) a) Write a note on : **[5]**

i) Function of Geosynthetics.

ii) Slope stabilization using soil nails.

b) A vertical excavation was made in a clay deposit having unit weight of 20 kN/m^3. It cracked after digging reached the depth of 4 meters. Calculate total active and passive earth pressure. **[5]**

P.T.O.

Q5) a) Describe elastic half space method in machine foundation. **[8]**

b) State the design procedure for a block foundation for cyclic loading. **[9]**

OR

Q6) a) Define the following term. **[8]**

i) Natural Frequency ii) Period

iii) Resonance iv) Degree of Freedom

b) State the design criteria for machine foundation. **[9]**

Q7) a) Explain the following : **[8]**

i) Grouting ii) Freezing soil

b) State the purpose of 'sand drain' and explain function of vertical sand drain. **[9]**

OR

Q8) a) Write a note on : **[8]**

i) Bored compaction piles

ii) Deep mixing

b) Describe the procedure of vibro-flotation technique for ground improvement. **[9]**

Q9) a) Explain Kelvin's rheological model with a neat sketch. **[8]**

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

i) Creep

ii) Secondary consolidation

OR

Q10)a) Explain in detail 'Maxwell model'. **[8]**

b) Explain 'Saint - Venants' model. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2121

[Total No. of Pages : 4

[5254]-514

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

DAMS AND HYDRAULIC STRUCTURES

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, 3Q. or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*

2) *Figures to right indicate full marks.*

3) *Neat labeled diagram should be drawn wherever necessary.*

4) *Assume suitable data, if necessary and state them clearly.*

5) *Use of non-programmable pocket size electronic calculator is allowed.*

Q1) a) Discuss four factors to be considered for selection of the site for a Dam with sketches. **[4]**

b) What is a Seismograph? Explain its use with reference to the safety of a Dam. **[4]**

OR

Q2) a) Why is it necessary to determine the possible tilt of a Dam wall? Briefly explain one instrument-accessory used to measure the tilt. **[4]**

b) Discuss the possible social issues associated with Dams. **[4]**

Q3) Explain constant angle and constant radius arch dams with the help of neat labeled plans and sections. **[6]**

OR

P.T.O.

Q4) Determine the maximum and minimum vertical stresses on the base of the foundation of a concrete gravity dam assuming that there is no tail water. Also calculate the major principal stress at the toe of the dam. Use following data. **[6]**

- Base width of dam = 60 m
- Slope of downstream face of the dam = 0.8 H: 1 V
- Total vertical force on the base = 60 MN
- Total overturning moment about the toe = 1.5×10^6 kN.m
- Total restoring moment about the toe = 3×10^6 kN.m

Q5) Sketch the graphs for the following cases and state the provision for energy dissipation in each case. **[6]**

a) Jump Height Curve (JHC) lies below Tail Water Curve (TWC) for all discharges.

b) JHC lies above the TWC for all discharges.

c) JHC lies above the TWC for small discharges and below for large discharges.

OR

Q6) Sketch a typical high head hydropower plant and label all essential components (parts) of it. Also state use of these parts. **[6]**

Q7) a) Fig.1 (Q. 7-a) shows the section of homogeneous earth dam (Not to scale). Obtain the phreatic line. Take interval for 'x' as 10 m for calculations. Show the line clearly on neatly drawn section of the dam. **[10]**

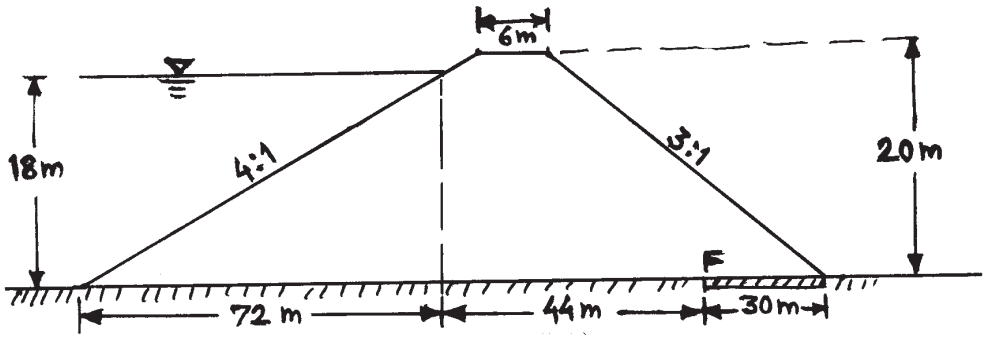


Fig.1 (Q.7-a)

b) Draw layout plan of a typical diversion headwork and label all its parts. Write the function (purpose) of each part. **[8]**

OR

Q8) a) Compare Bligh' s and Lane's Creep Theories with the help of neat sketches. **[10]**

Determine exit hydraulic gradient for the floor shown in Fig. 2 (Q. 8-a) using:

(i) Bligh's Theory. and

(ii) Lane's Theory. The values in the Fig. 2 indicate the R.L. values in meters. Neglect thicknesses of cutoffs.

Comment on the safety of floor against piping if Bligh's and Lane's coefficient of creep C and C_1 are 5 and 3 respectively.

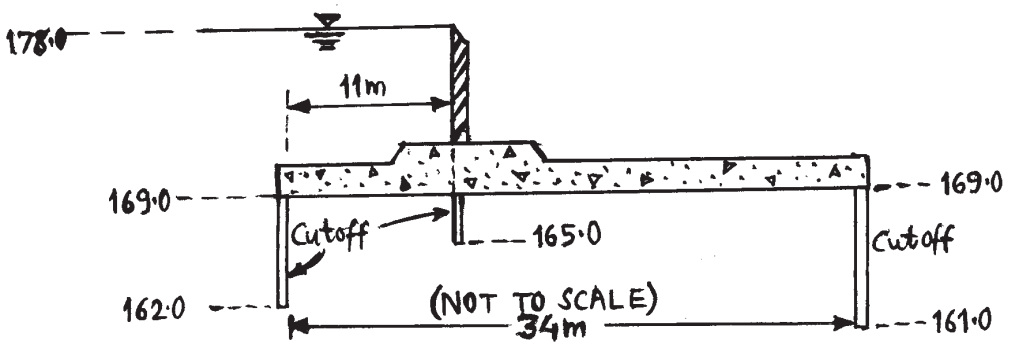


Fig.2 (Q.8-a)

b) Discuss in detail the 'Swedish Slip Circle Method' for stability of earthen dam. Draw neat explanatory sketch/sketches. **[8]**

Q9) a) Design an irrigation canal with side slopes 1 H: 2 V and bed slope 1:5000 to carry water at the rate 14 m^3/s. Take 1.3 m as first (initial) trial depth of water. Assume critical velocity Ratio (m) = 1.0 and value of Kutter's N = 0.0225 **[8]**

b) What is meant by 'Canal Fall'? When/why is it necessary? Enlist all known types of Canal Falls. **[4]**

c) Classify canals based on their alignment. Briefly explain these types with the help of neat sketch/sketches. **[4]**

OR

Q10)a) Design a regime channel of trapezoidal section for carrying water at the rate 10 cumecs having side slopes 1 H: 2 V, if Lacey's silt factor is 0.90. **[8]**

b) Write a note on 'Canal Modules (Outlets)' with sketches. **[4]**

c) State the functions of Head Regulator and Cross Regulator. **[4]**

Q11)a) What is meant by 'C.D. Works'? Classify C.D. Works. Explain any one type with relevant plan and section. **[8]**

b) Enlist the objectives of river training works. State and define three basic classes of river training work. **[4]**

c) Briefly explain with sketches: Artificial Cut-off, Pitched Island. **[4]**

OR

Q12)a) Draw neat sketches and explain different types of 'Groynes (Spurs)'. **[8]**

b) Discuss guide banks as river training works. Draw relevant sketch/ sketches. **[4]**

c) What is meant by 'Levees (Embankments)'? State their merits and demerits. **[4]**

Total No. of Questions : 12]

SEAT No. :

P2122

[Total No. of Pages : 5

[5254]-515

B.E. (Civil)

QUANTITY SURVEYING, CONTRACTS & TENDERS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define estimate & what are the methods of estimate? **[3]**

b) Differentiate between estimate and quantity surveying. **[3]**

OR

Q2) a) State the unit of measurement for the following : **[3]**

i) Brick masonry in super structure in cm 1:6

ii) RCC (1:2:4) for beam and lintel

iii) Plastering (internal & external)

b) Write detailed note on DSR. **[3]**

Q3) a) Briefly explain about preliminary Estimate, and how does it differ from detailed estimate. **[3]**

b) Enlist various method of preliminary Estimate and explain any one method. **[3]**

OR

P.T.O.

Q4) a) Explain the need for work charge establishment and contingency. **[3]**

b) What is an item of work? Explain the deductions for brickwork in super structure. **[3]**

Q5) Work out the quantity for the following item of work from fig. 1 & 2

a) PCC (1:4:8) for foundation **[4]**

b) Footing in stone masonry for substructure any III footing. **[4]**

OR

Q6) Work out the quantity for the following item of work, from fig.1 & 2

a) Brick masonry in super structure in CM 1:6 **[4]**

b) RCC work in beam and lintel and quantity of steel **[4]**

Q7) a) What are the basic cost and indirect cost involved in the analysis of various item rates of a building. **[6]**

b) Explain open, restricted and closed specification with necessary examples. **[6]**

c) What is specification and how does the specification of material and item of work differ. **[6]**

OR

Q8) a) Prepare a detailed specification for Brick masonry in super structure. **[6]**

b) What are the factors which affect the rate of an item of work. Explain the affect of lead on the rate an item of work. **[6]**

c) Prepare the rate analysis for the following item of work (any one) **[6]**

i) 12 mm thick internal plastering

ii) Earthwork excavation for foundation

The following rates for material & labour may be considered for rate analysis.

i) Cement = Rs. 300/bag,

ii) Sand = Rs. 1400/m^3

iii) Aggregate = Rs.1400/m^3

iv) Bricks = Rs. 4500/l000No

v) Steel = Rs. 38,500/MT

Labour rates/day

i) Head mason = Rs. 600/-

ii) Mason = Rs. 450/-

iii) Mazdoor = Rs. 300/-

iv) Helper = Rs. 350/-

Q9) a) What is a tender notice? What informations should a contract document contain? **[6]**

b) Explain the unbalanced tender and ring contract in detail. **[6]**

c) Explain the following with examples **[4]**

i) Distress value and

ii) Depreciation

OR

Ql0) a) Explain in detail the process of administrative approval and technical sanction in PWD for execution of any work. **[6]**

b) What are the different establishments in PWD. Explain briefly regular establishment in PWD. **[4]**

c) What is comparative statement, its use and how is it prepared. **[6]**

Q11) a) What are the different types of contracts? Explain them briefly. **[4]**

b) Explain the role of Arbitrator in Civil engineering works. Explain how an arbitrator can be appointed and his powers. **[6]**

c) Explain the important legal implications of a contract and explain the conditions under which a contract can be terminated. **[6]**

OR

Q12) a) Prepare a tender document for construction of office building. The cost of building may be taken as 1.5 crore. The building is to be completed in 24 months including monsoon period. **[8]**

b) Explain briefly any two of the following : **[8]**

i) Dispute Resolution board.

ii) Prequalification for tenders.

iii) Voidable contract.

Q NO 5 & 6

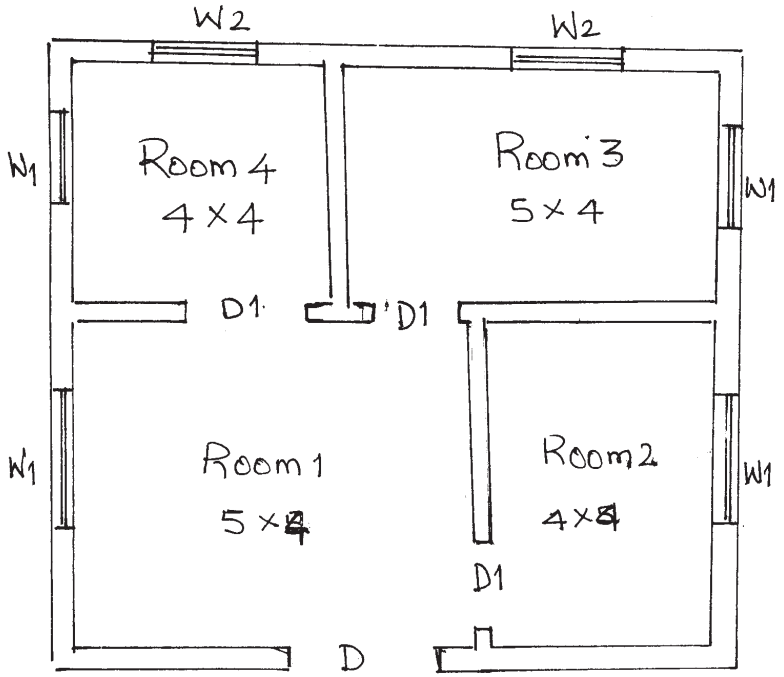
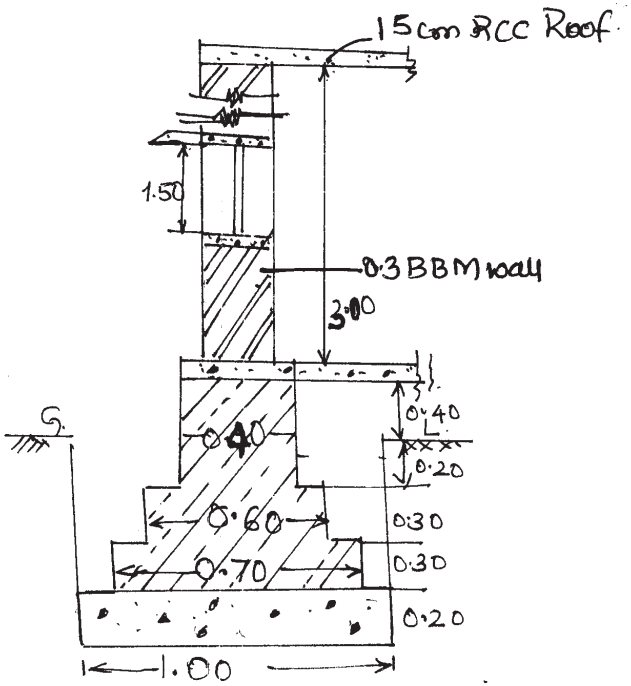


Fig 1(a) – Plan.



fig(2) – Section along AA.

Schedule of opening

D = 1.20 × 2.10
D1 = 0.90 × 2.10
W1 = 1.20 × 1.80
W2 = 1.20 × 1.50

(All dimensions in metre).

Total No. of Questions : 10]

SEAT No. :

P2123

[Total No. of Pages : 2

[5254] -516
B.E. (Civil)
ADVANCED STRUCTURAL DESIGN
(2012 Pattern) (Elective - III) (Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***All relevant IS codes and Steel Table are allowed in the examination.***
4) ***If necessary, assume suitable data and indicate clearly.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) Design a column of length 2.0 m with restrained ends to carry a load of 200 kN. **[10]**

OR

Q2) A simply supported beam of span 4.0 m carries a uniformly distributed load of 3 kN/m. Design the beam. **[10]**

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

OR

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

Q5) Determine the uniformly distributed collapse load of a circular slab having clamped support along the periphery and a column support at the centre of the slab. **[16]**

OR

Q6) Obtain the value of β for the simply supported slab shown in Fig. 2 The slab carries a uniformly distributed load of w. **[16]**

P.T.O.

Q7) An elevated square water tank is 6 m 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 functions of shear walls. What are proportionate and non proportionate shear walls? **[8]**

b) Sketch a typical reinforcement details of a RC shear wall with boundary elements. **[8]**

OR

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

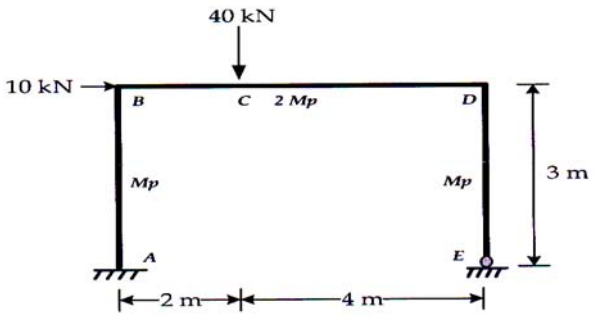


Fig. 1

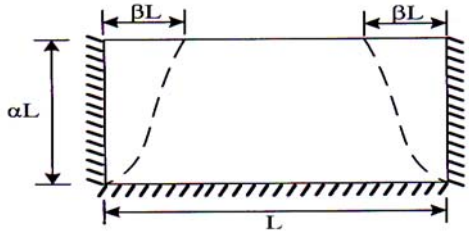


Fig. 2

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P2124

[Total No. of Pages : 2

[5254]-517
B. E. (Civil)
ADVANCE FOUNDATION ENGINEERING
(2012 Pattern) (Elective - III)

Time : 2½ 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) ***Assume suitable data, if necessary***

Q1) Draw a typical cross section of unlined canal and explain I.S. code provisions of its various components. **[6]**

OR

Q2) Explain the IS code provisions for subsoil exploration for the construction of an earth dams. **[6]**

Q3) Explain the static method for estimation of Load carrying capacity of **[6]**

a) friction piles and b) Bearing piles

OR

Q4) Explain in detail the classification of piles with respect to **[6]**

a) function and b) materials.

Q5) Explain the various stages in the construction of under reamed piles with suitable sketches. **[8]**

OR

Q6) Draw a neat sketch of stone columns and explain the functions of various components. Also, comment on design criterias of stone columns. **[8]**

Q7) a) Explain the soil line method (elastic approach) for the design of raft foundations. **[8]**

b) Enlist the design of combined footing based on the standard penetration test. **[8]**

P.T.O.

OR

Q8) a) Define the term safe bearing pressure. Write the terraghis equations for safe bearing capacity for **[8]**

a) strip footing b) square footing

c) circular footing.

b) Explain the terms **[8]**

a) Elastic settlement &

b) consolidation settlement. Also, Explain how they are estimated.

Q9) a) Draw a neat sketch of rockfill coffer dam and explain the functions of various components. **[8]**

b) Explain the terms Titls and shifts in well foundation, Also, explain the measures to counteract the tilts in well during sinking. **[9]**

OR

Q10)a) Explain the provisions for design as per IRC and as per IS for the design of well foundation. **[8]**

b) Enlist the various forces acting on the well foundation. How they are estimated? **[9]**

Q11)a) Explain the stress distribution around tunnels in case of **[8]**

a) Elastic case and b) plastic case.

b) Explain how load on positive projecting conduit in 'complete ditch condition' is estimated. **[9]**

OR

Q12)a) Explain the projecting conduits for the cases **[8]**

i) Projecting conduits in complete projection.

ii) Projecting conduits in Incomplete projection.

b) Write a short note on "Estimation of load on Negative projecting conduits**[9]**

Total No. of Questions : 12]

SEAT No. :

P2125

[Total No. of Pages : 3

[5254] -518
B.E. (Civil Engineering)
HYDROPOWER ENGINEERING
(Elective - III) (Semester - II) (2012 Pattern)

Time : 2½ 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.11 or Q.12.***
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) Considering the day by day increasing demand of water, discuss the future prospects of water power in India. **[3]**

b) Discuss the strength and weakness of water power in India. **[4]**

OR

Q2) a) What is the effect of climate change on Hydropower? Elaborate with suitable example. **[4]**

b) Which agencies are responsible for planning of water power generation in centre and in state level? What are their duties? **[3]**

Q3) a) Explain diversion canal plants in detail. **[3]**

b) When a runoff river plant operates as a peak load station with a weekly load factor of 25%, all is capacity is firm capacity. What must be the minimum flow in the river so that the station may serve as the base load station? It is given that rated installed capacity of the generator is 10000 kW. Operating head is 20 m. Plant efficiency is 80%. Estimate the daily load factor of the plant if the stream flow is 20 cumec. **[4]**

OR

Q4) a) A 100 MW reversible pump turbine has to work under a head of 400 m. Choose a suitable specific speed and running speed for the machine. Assume suitable data if necessary. **[4]**

P.T.O.

b) Enlist the components of high head diversion plant and give two examples of such plant. **[3]**

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

b) What are the load curve and load duration curves? **[3]**

OR

Q6) a) Write the significance of diversity factor on the cost of hydropower generation. **[3]**

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

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

i) Run of river intake

ii) Dam Intake

iii) Shaft intake

b) What are the measure electrical equipments used in power plants? **[5]**

c) What is the necessity of cooling the transformers? Elaborate different methods of it. **[5]**

OR

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

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

c) Explain different methods of air cooling of generators. **[6]**

Q9) a) What is the function of draft tube in a turbine installation? **[5]**

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

c) What do you understand by abrasion damage? How does it take place? How can you minimize it? **[6]**

OR

Q10) a) Explain the classification of turbines based on **[6]**

i) discharge

ii) flow direction and

iii) speed

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

Q11) a) A power plant of 210 MW is installed when the capital cost is 18000 / kW The interest and depreciations are 12%. Annual load factor is 60%. Annual capacity factor is 54%. Annual running charges Rs. 200 × 10^6. Energy consumed by power plant auxiliaries is 6%. Calculate cost of power generation for KWh. **[6]**

b) Write down the economic load sharing between base load and peak load plants. **[6]**

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

OR

Q12) a) The cost of a small power plant is Rs. 2 × 10^6 having the life expectancy of 20 years. The net annual installment to recover the cost is Rs. 20000. The interest is 12%. Using sinking fund method find the salvage value of the plant after 20 years of service. **[6]**

b) Write a note on selection of power plant for power generation. **[6]**

c) What are the performance and operating characteristics of a power plant.**[6]**

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P2126

[Total No. of Pages : 2

[5254] -519
B.E. (Civil)
AIR POLLUTION AND CONTROL
(2012 Pattern) (Elective - III) (End Sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Draw a sketch of Wind rose diagram and write about its use in air pollution studies. **[4 + 2]**

b) Enlist various methods of sampling particulate matter and explain one in detail. **[2 + 2]**

OR

Q2) a) Explain Radiation and Subsidence Inversion. **[3 + 3]**

b) Explain effects of the following on plume dispersion. **[4]**

- Wind
- Topography
- Time of the day
- Atmospheric stability

Q3) a) Write a short note on High volume sampler with sketch. **[3 + 3]**

b) Explain any four effects of indoor air pollutants with sources. **[4]**

OR

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

b) What is odour pollution? Explain. **[1 + 3]**

P.T.O.

Q5) a) Explain with a neat sketch principle of Electro Static Precipitator. **[4 + 4]**

b) What are the advantages and disadvantages of gravity settling chamber. **[4 + 4]**

OR

Q6) a) 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). **[4 + 2 + 2]**

b) Explain working principle of Venturi scrubber with a neat sketch.**[4 + 4]**

Q7) a) What is the purpose of environmental (protection) ACT 1986? Explain the powers and duties of central pollution control boards. **[4 + 4]**

b) Explain Objectives and Drawbacks of "THE AIR (Prevention and Control of Pollution) ACT 1981". **[4 + 4]**

OR

Q8) a) What is land use planning? Explain its importance in controlling air pollution. **[4 + 4]**

b) Write the environmental rules 1999(sitting of industries) as per the notification of Ministry of Environment and Forests. **[8]**

Q9) a) Explain Components of EIA. **[9]**

b) What is a need of Environmental Impact Assessment (EIA)? Also write about Indian policies requiring EIA. **[4.5 + 4.5]**

OR

Q10) a) Explain roles of public and impact Assessment agency in the (EIA) Process. **[4.5 + 4.5]**

b) Write a short note on the following EIA methodologies : **[4.5 + 4.5]**

i) Matrix and

ii) Network

♦♦♦♦

Total No. of Questions : 08]

SEAT No. :

P2127

[Total No. of Pages : 3

[5254] -520
B.E. (Civil Engineering)
FINITE ELEMENT METHOD IN CIVIL ENGINEERING
(2012 Pattern) (Elective - III) (Semester - II)

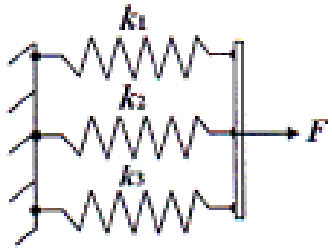
Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

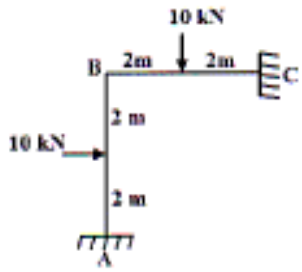
1) ***Answer Q.1 or 2, Q.3 or Q.4, Q.5 or 6, Q.7 or 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Derive differential equations of equilibrium for 3D elasticity problem. **[6]**

b) Figure shows three springs connected parallel. Take k_1 = 10 N/mm, k_2 = 20 N/mm, k_3 = 40 N/mm and F = 700 N. Using finite element method determines the deflections of individual springs. **[6]**



c) Determine the rotation of joint B for the frame supported and loaded as shown in figure. Take EI constant and neglect axial deformations. **[8]**

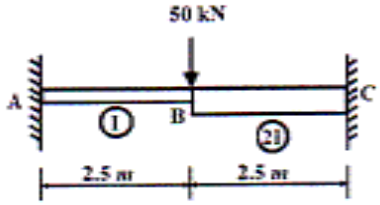


OR

P.T.O.

Q2) a) Derive strain displacement relations for 3D elasticity problem. **[6]**

b) Find the vertical deflection and rotation at joint B of the beam loaded and supported as shown in figure using finite element method. Take EI constant. **[6]**



c) Derive the stiffness matrix for the two noded grid element considering six DOF. **[8]**

Q3) a) What is node? Explain types of nodes with suitable example. **[6]**

b) What is aspect ratio of element? How it affect the FEM solution? Explain with suitable example. **[6]**

c) Explain step by step procedure of FEM. **[6]**

OR

Q4) a) Write difference between CST and LST elements. **[6]**

b) Write short note on applications of 3D elements in FEM. **[6]**

c) What is the convergence criteria of displacement function? **[6]**

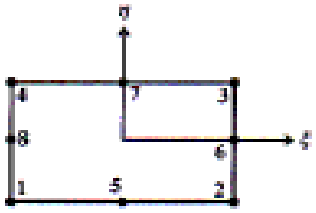
Q5) a) Derive the shape function for two noded beam element using polynomial in Cartesian coordinate system. **[10]**

b) Derive shape functions for the nine noded rectangular elements in natural coordinate (ξ,η) system using Lagrange's interpolation function. **[6]**

OR

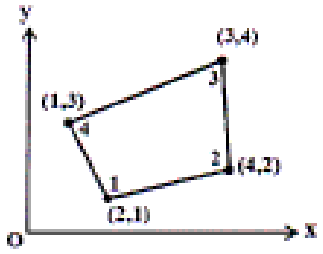
Q6) a) Derive shape functions for two noded bar element using polynomial in natural (ξ,η) coordinate system. **[8]**

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



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

b) Determine the Cartesian coordinate (x, y) of the any point $P(\xi = 0.4, \eta = 0.5)$ as shown in figure. **[8]**



OR

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

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P2128

[Total No. of Pages : 3

[5254] -521
B.E. (Civil) (Semester - II)
CONSTRUCTION MANAGEMENT
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12***

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right indicate full marks.***

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

Q1) Discuss in detail various components of infrastructure sector. **[6]**

OR

Q2) Write short note on work break down structure. **[6]**

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

a) Line of balancing technique

b) Repetitive project management.

OR

Q4) Write short note on : **[8]**

a) factors affecting project schedule

b) Importance of balance sheet.

Q5) Explain in detail need and importance of labour laws. **[6]**

OR

Q6) Discuss the various provisions of interstate migrant workers act **[6]**

P.T.O.

Q7) a) What is Risk Management? Explain in detail various risks in construction. **[6]**

b) Write short note on Sensitivity analysis. **[6]**

c) Define 'Value'. Explain importance of value analysis in construction sector. **[6]**

OR

Q8) a) What are methods of Risk Management? Explain any one in detail. **[6]**

b) Discuss the role of insurance in risk management. **[6]**

c) What is energy cost escalation? What is its impact on any infrastructure project? **[6]**

Q9) a) Explain in detail role of ERP in materials management. **[6]**

b) What is supply chain management. State its importance in construction sector. **[6]**

c) Write short note on : importance HRM in construction industry. **[4]**

OR

Q10) a) A construction company requires 1500 door frames per year. Cost of each door frame is Rs. 2000. Ordering cost is Rs. 2200 per order and holding cost is 18%. Calculate EOQ. **[6]**

b) Write short note on : Material Resource Information system. **[6]**

c) What is meant by performance Appraisal? State the importance of it. **[4]**

Q11) a) What is an expert system? Write down the applications of expert system in construction. **[8]**

b) What is ANN? Explain. Write down the applications of artificial intelligence in construction management? **[8]**

OR

Q12) a) Define Artificial Intelligence (AI) and write down applications of AI in Civil engineering. **[8]**

b) What do you mean by fuggy logic? State various application of fuggy logic in civil engineering. **[8]**

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P2129

[Total No. of Pages : 6

[5254] - 522
B.E. (Civil Engg.)
ADVANCED TRANSPORTATION ENGINEERING (Theory)
(Elective - IV) (End Sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right indicate full marks.***

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

Q1) a) Explain the principle behind the Gravity Model of trip distribution. Also state the advantages over growth factor models. **[5]**

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

i) No. of dwelling unit = 1000

ii) No of cars owned per dwelling unit = 2

iii) Average number of persons per house = 4

iv) Social Rank Index = 2

v) Urbanization Index = 4

OR

Q2) a) Highlight the importance of mass transit system in Mumbai. **[5]**

b) Enumerate the salient features of• Pune Metro'. **[5]**

Q3) Urban Mobility is the toughest challenges cities face today. What are the initiatives that you as transportation planner propose? **[10]**

P.T.O.

OR

Q4) a) Describe how the PPP model contributed to the growth of infrastructural sector in India. **[5]**

b) Write a note on Pavement Management System. **[5]**

Q5) a) Explain the necessity and types of grade separated intersections. **[6]**

b) Write a note on 'Level of Service' of a road. **[5]**

c) Describe the various types of on-street parking facilities **[5]**

OR

Q6) a) With reference to household survey, explain the objective. sampling size, procedure and sample questionnaire of such a survey. **[12]**

b) What are the advantages of mechanical methods of conducting traffic surveys over the manual methods. **[4]**

Q7) a) Design a flexible pavement as per IRC 37 - 2001 using the following data : Also draw a typical cross section showing all the basic layers. **[10]**

i) Type of road = Dual three lane carriageway

ii) CVPD in the year 2012 = 1500 (in one direction)

iii) Expected year of completion = 2016

iv) Traffic growth rate = 7.5%

v) Design life = 10 years

vi) Vehicle Damage factor = 4.5

vii) Design CBR = 5%

b) With neat sketches explain any three types of distresses on flexible pavements. **[6]**

OR

Q8) a) Explain the procedure of field data collection during Benkelman Beam Survey, computation of characteristic deflection and the correction for pavement temperature. **[12]**

b) Explain the concept of 'pavement deflection' as a measure of structural evaluation of flexible pavement. **[4]**

Q9) a) The design traffic for a major road with heavy traffic is found to be 77 msa. From the BBD survey, the mean value of deflection (Dm) = 1.28 mm and the standard deviation of deflection = 0.26 mm. The temperature of the pavement during study is 45°C. and the correction factor for seasonal variation in subgrade moisture content = 1.3. Determine the thickness of the overlay if DBM binder course and BC surface course is to be adopted. **[8]**

b) What do you mean by overlay? Enumerate the various type of overlays used in India. **[6]**

c) Write a note on warping stresses developed during the day in cement concrete pavement. **[4]**

OR

Q10) a) Design the tie bars considering plain bars for the following data : **[8]**

i) Slab thickness = 32 cm

ii) Lane width – 3.5 m

iii) Coefficient of friction = 1.5

iv) Density of concrete = 2500 kg/m^3

v) Allowable tensile stress in plain bars = 1200 kg/cm^2

vi) Allowable bond stress = 17 kg/cm^2

vii) Diameter of tie bar = 12 mm

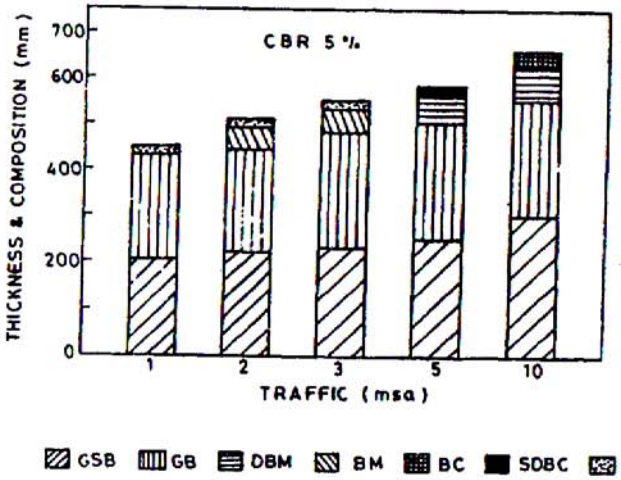
b) What is the scope of constructing cement concrete roads in India? **[6]**

c) State the difference between IRC 58 - 2002 and the revised IRC 58 - 2012 **[4]**

PAVEMENT DESIGN CATALOGUE

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

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



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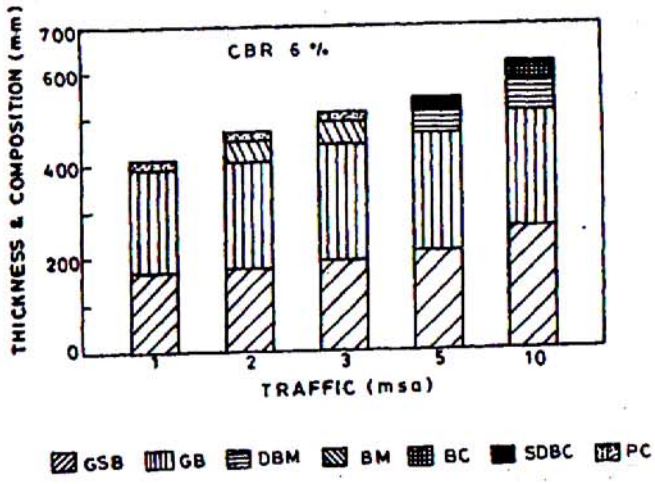
PAVEMENT DESIGN CATALOGUE

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

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



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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	

Contd.

PAVEMENT DESIGN CATALOGUE

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

CBR 6%				
Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION		
		Bituminous Surfacing		Granular Base & Sub-base (mm)
		BC (mm)	DBM (mm)	
10	615	40	65	Base = 250 Sub-base = 260
20	640	40	90	
30	655	40	105	
50	675	40	125	
100	700	50	140	
150	720	50	160	

Contd.

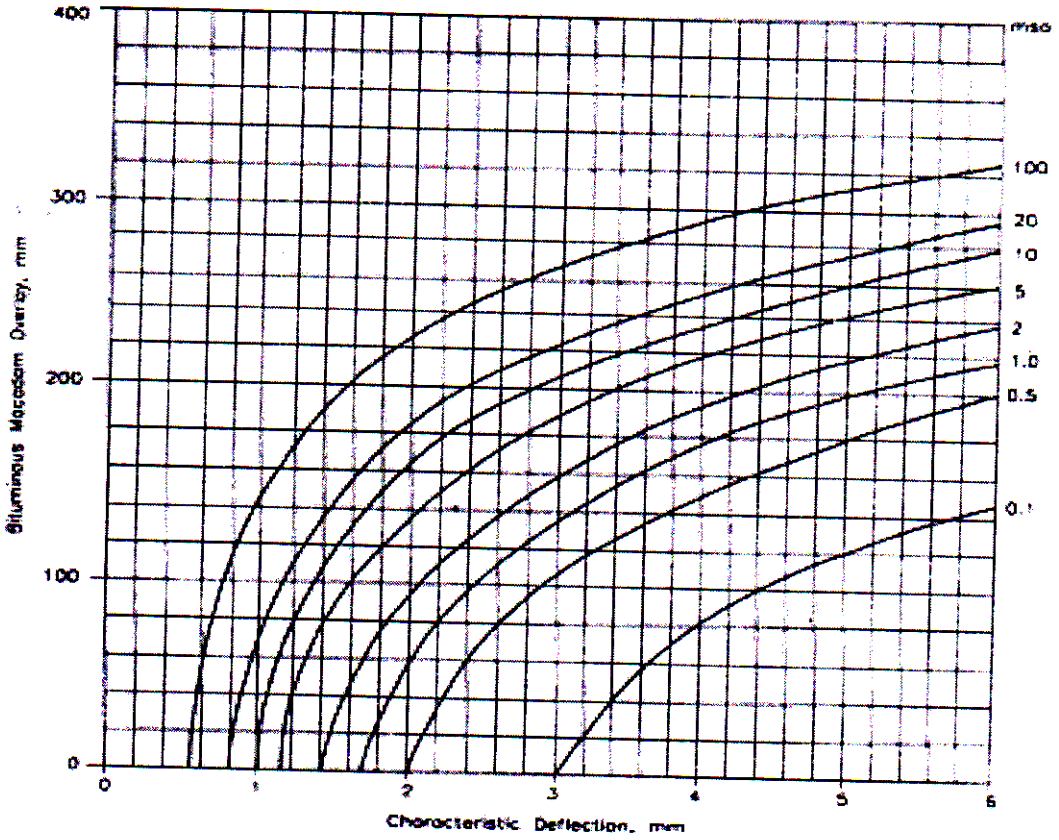


Fig. 9. Overlay Thickness Design Curves

♦♦♦♦

Total No. of Questions : 10]

SEAT No. : ____

P2130

[Total No. of Pages : 5

[5254] -523
B.E. (Civil)
STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS
(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.***

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 : $xe^x = 2$, 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 $\int_1^5 \frac{1}{x}$ using Gaussian 3 point formula. **[5]**

P.T.O.

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 = 80 sec. **[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	46.29	50.67

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) Write down importance of optimization techniques and also Enlist the different Techniques. **[4]**

b) Solve by Gauss Seidal Method. **[6]**

$$4x_1 + x_2 + x_3 = 5$$
$$x_1 + 6x_2 + 2x_3 = 19$$
$$-x_1 - 2x_2 - 5x_3 = 10$$

Q5) a) Write down limitations of statistics. **[4]**

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 :
240, 260, 290, 245, 255, 288, 272, 263, 277, 255. Calculate standard deviation with the help of assumed mean. **[6]**

OR

Q6) a) Write down limitations of sampling. **[4]**

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

Expenditure (Rs.)	No. of Students
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 2016 was as follows.

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

Fit Poisson distribution for the above **[7]**

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 tool 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

Can we accept the hypothesis that the average life machine tool 4 hrs.

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 Chi square 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	Corelation coefficient
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 : **[8]**

Year	1975	1980	1985	1990	1995	2000	2005
Production in tonnes	20	22	26	30	35	?	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. **[8]**

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) Determine the percentage of Engineers under 35 years of age. **[8]**

Age	<25 yrs	<30 yrs	<40 yrs	<50 yrs
Percentage of Engineers	52	67.3	84.1	94.1

Use Lagrange's method.

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P2131

[Total No. of Pages : 2

[5254] -524
B.E. (Civil)
PLUMBING ENGINEERING
(2012 Pattern) (Elective)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.No. 1 or Q.No. 2 , Q.No. 3 or Q.No. 4, Q.No. 5 or Q.No. 6, Q.No. 7 or Q.No. 8, Q.No. 9 or Q.No. 10.***

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right indicate full marks.***

4) ***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]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P2132

[Total No. of Pages : 2

[5254] -525
B.E. (Civil)
GREEN BUILDING TECHNOLOGY
(End Semester) (2012 Pattern) (Open Elective) (Elective - IV)

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.***

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

3) ***Figures to the right indicate full marks.***

Q1) a) Why and How ecofriendly materials benefit the users? **[6]**

b) What do you mean by climate responsive architecture? Mention the importance of it. **[7]**

c) Elaborate importance of "energy management" in todays' context. **[7]**

OR

Q2) a) Why today low VOC materials are preferred? **[7]**

b) Explain wind effect and stack effect. **[6]**

c) What is Embodied energy? Elaborate the importance of the same in relation with construction materials. **[7]**

Q3) a) Explain in depth : Biogas generation methods. **[8]**

b) Explain various methods of using solar energy. **[8]**

OR

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

b) Write a short note on use of wind energy. **[8]**

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

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

P.T.O.

OR

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

b) What is the importance of codal provisions for energy conservation? Explain with example. **[9]**

Q7) a) Write a short note on importance of different rating systems. **[9]**

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

OR

Q8) a) Elaborate in detail "Green Globes". **[9]**

b) Elaborate the benefits offered to any one rated building. **[8]**

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P2133

[Total No. of Pages : 2

[5254]-526

B. E. (Civil Engineering)

FERROCEMENT TECHNOLOGY

(2012 Pattern) (End Semester) (Open Elective)

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.***

Q1) a) Compare Ferrocement construction with **[6]**

i) Fiber Reinforced concrete

ii) Polymer concrete

b) Discuss properties of ferrocement under dynamic loading. **[6]**

c) Discuss following with respect to **[6]**

i) Raw materials

ii) Skilled Labour

OR

Q2) a) Discuss method of construction for ferrocement. **[6]**

b) Discuss 'three stage behavior of ferrocement in flexure'. **[6]**

c) Discuss various methods for design of ferrocement members. **[6]**

Q3) a) Discuss effects of seismic forces on ferrocement structures. **[6]**

b) Discuss in detail the factors affecting cost analysis of ferrocement structures. **[6]**

c) Write a note on ferrocement pipes. **[6]**

OR

P.T.O.

Q4) a) Explain how to write specifications for ferrocrete. Discuss specifications for ferrocement water tank, and ferrocement double wall. **[10]**

b) Discuss in detail various building components using ferrocement. **[8]**

Q5) a) Write a note on water retaining structures using ferrocement. **[6]**

b) Discuss 'Ferrocement water proofing'. **[5]**

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

OR

Q6) a) Discuss structural behavior of ferrocement retaining wall. **[6]**

b) Explain advantages of ferrocement technique for water retaining structures. **[5]**

c) Enlist various types of tanks, those can be cast using ferrocement technique, explain any two in detail. **[6]**

Q7) a) Discuss advantages of precast ferrocement construction technique. **[6]**

b) Discuss ferrocement space structures. **[5]**

c) Write note on ferrocement shells. **[6]**

OR

Q8) a) Compare ferrocement poles and precast prestressed concrete poles. **[6]**

b) Discuss various factors which influence the choice of casting between precast and cast-in-situ. **[6]**

c) Write a note on Ferrocement Domes. **[6]**

Total No. of Questions : 12]

SEAT No. :

P2134

[Total No. of Pages : 2

[5254] -527
B.E. (Civil)
Subsea Engineering
(2012 Pattern) (Semester - II) (Open Elective)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10***

2) ***Neat sketches must be drawn wherever necessary.***

3) ***Figures to the right indicate full marks.***

4) ***Use of non - programmable calculator.***

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

Q1) Explain engineering involved in oil and gas extraction industry and state its international scenario. **[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 subsea oil establishment and exploration process. **[6]**

b) Differentiate technical aspects of shallow and deep water oil exploration.**[6]**

OR

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

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

P.T.O.

Q5) a) Write the purpose/function of each subsea system in oil exploration process. **[7]**

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

OR

Q6) a) Explain forces acting on deep sea, subsea pipe line system. **[7]**

b) Explain how electrical, acoustic, hydraulic systems work for application in subsea engineering. **[7]**

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) Water pipe of 60 mm diameter contains oil pressure head 100 mm. Find the thickness of metal required if weight of oil is 8500 N/m^3, when $D/t \geq 31$ and $D/t \leq 30$. Density of sea water 10300 N/m^3 and permissible stress in metal is 270 Mpa. **[9]**

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

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P2135

[Total No. of Pages : 3

[5254] -528
B.E. (Civil)
WAVE MECHANICS
(2012 Pattern) (Open Elective)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***

2) ***Figure to the right indicate full marks.***

3) ***Use of electronic pocket calculator is allowed.***

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

Q1) a) Discuss 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]**

P.T.O.

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

b) A wave has 3 m 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 10 m before refraction. Calculate the wave height after crossing this contour line. **[4]**

OR

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 modes of sediment transport. **[6]**

c) Describe the mechanics of suspended sediment transport. **[6]**

OR

Q12) a) Explain the terms grain size distribution, fall velocity, permeability with respect to littoral drift. **[6]**

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

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

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P2136

[Total No. of Pages : 4

[5254]-531

B. E. (Mechanical)

REFRIGERATION AND AIR CONDITIONING

(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 logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***
5) ***All questions are compulsory.***

Q1) a) In a refrigeration plant working on Bell Coleman cycle, operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from cold chamber at 10°C, compressed and then cooled to 30°C before entering the expansion cylinder. The expansion and compression follows the law $pv^{1.3}$=C. Determine the theoretical COP of the system. **[6]**

b) What are the advantages and disadvantages of vapor compression cycle over Bell Coleman cycle. **[4]**

OR

Q2) a) A refrigerating system operates on reversed Carnot cycle. The higher temperature of the refrigerant in the system is 35°C and the lower temperature is – 15°C. The capacity of the system is to be 12 tonnes. Determine the following. **[6]**

i) COP

ii) Heat rejected from the system per hour.

iii) Power required

b) Explain with neat sketch 'Evaporative Coolers'. **[4]**

P.T.O.

Q3) a) The temperature limits of an ammonia refrigerating system are 25°C and –10°C. If the gas is dry at the end of compression. Calculate the coefficient of performance of the cycle assuming no under-cooling of the liquid ammonia. Use the following table for properties of ammonia: **[6]**

Temperature(°C)	Liquid heat (KJ/kg)	Latent heat (KJ/kg)	Liquid entropy (KJ/kg)
25	298.90	1166.94	1.1242
– 10°C	135.37	1297.68	0.5443

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

i) SEER ii) IPLV

OR

Q4) a) Write note on 'Cascade VCC system'. **[5]**

b) In an absorption system heating, cooling and refrigeration takes place at 150°C, 30°C and – 20°C respectively. Find the theoretical COP of the system. If the generator temperature is increased to 190°C and evaporator temperature is decreased to – 30°C, find the percentage change in theoretical COR. **[5]**

Q5) a) 10 cmm air at 37°C DBT, 24 % RH, flow through a desert cooler having an adiabatic efficiency of 75 %. What is the final dry bulb temperature and RH (Relative Humidity), and how much water is required in kg/hr? (USE PSYCHROMETRIC CHART-See page-4,Fig.Q. 5 (a)) **[6]**

b) Write note on 'Human Comfort Chart'. **[4]**

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

i) SHF

ii) RSHF

iii) DPT (Dew Point Temperature).

OR

Q6) a) On a particular day, the atmospheric air was found to have a dry bulb temperature of 30°C & wet bulb temperature of 18°C. The barometric pressure was observed to be 756 mm of Hg. Without using Psychrometric chart, determine the following properties of moist air. **[6]**

i) RH

ii) the specific humidity

iii) the dew point temperature

iv) the enthalpy of air per kg of dry air. **(USE STEAM TABLE)**

b) Discuss the factors affecting Human Comfort. **[4]**

c) Derive an expression of Bypass Factor of coil **[6]**

Q7) a) Explain with neat sketch **'Summer Air Conditioning System'**. **[6]**

b) Write note on **'Variable Refrigerant Flow System'**. **[6]**

c) Explain working of Capillary tube and list its advantages and disadvantages. **[6]**

OR

Q8) a) Explain with neat sketch **'All Year Air Conditioning System'.** **[6]**

b) Write note on **'Variable Air Volume System'.** **[6]**

c) Explain with neat sketch **'Evaporative Condensers'.** **[6]**

Q9) a) Explain Equal Friction Method of Duct Design. List its advantages and disadvantages. **[5]**

b) A rectangular duct of 0.15 m × 0.12 m is 20 m long and carries standard air at the rate of 0.3 m^3/s. Calculate the total pressure required at the inlet of the duct in order to maintain this flow and the air power required. Take friction factor, f = 0.005. **[6]**

c) Write note on **Fan Laws.** **[5]**

OR

Q10)a) Write a note on Classification of ducts. **[5]**

b) Explain with neat sketch **'Fan Coil Unit'**. **[5]**

c) A circular duct of 40 cm diameter is used to carry air in an air conditioning system at a velocity of 440 m/min. If this duct is to be replaced by a rectangular duct of aspect ratio of 1.5, find out the size of rectangular duct for equal friction method. **[6]**

When

i) Velocity of air in two ducts is same.

ii) The discharge rate of air in two ducts is same.

If f = 0.015, find out the pressure loss per 100m length of the duct. Take the density of air = 1.15 Kg/m^3.

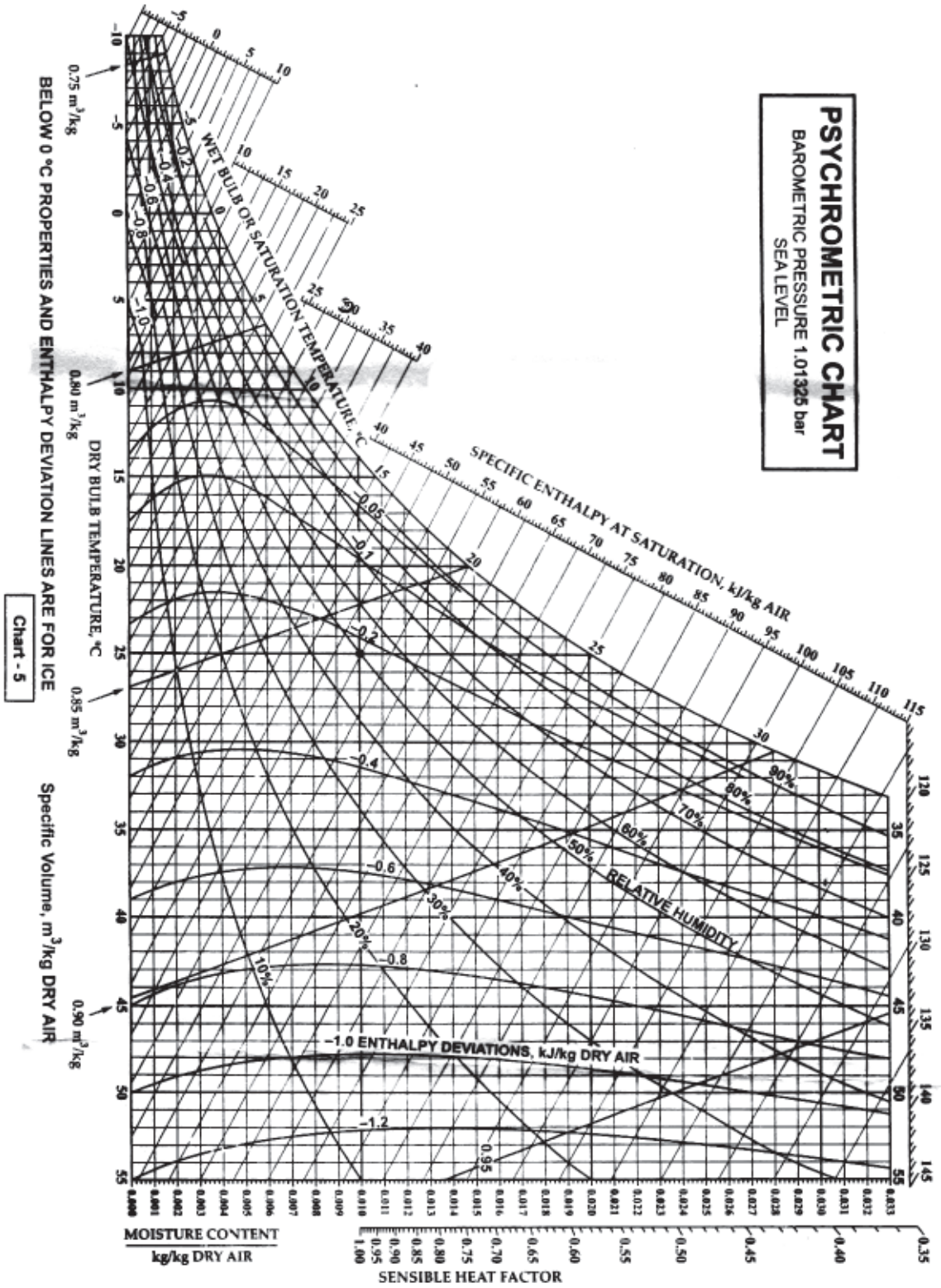


Fig. Q.5 (a) – Psychrometric Chart

Total No. of Questions : 10]

SEAT No. :

P2137

[Total No. of Pages : 3

[5254]-532

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

CAD/CAM AND AUTOMATION

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. No.1 OR Q. No. 2, Q. No.3 OR Q. No. 4, Q. No.5 OR Q. No. 6, Q. No.7 OR Q. No. 8, 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) An object is to be rotated about point A (-10,-10) by 90° in counterclockwise direction. Calculate concatenated (CT) transformation matrix. **[6]**

b) Explain with neat sketch a constructive solid geometry (CSG) technique of modeling. State its two main advantages. **[6]**

OR

Q2) a) Write a short note on Bezier Curves. State its two main limitations. **[4]**

b) Find stresses in step bar due to forces 10KN and 5 KN. Refer fig.1. Modulus of elasticity: E1 = 200Gpa & E2=70 Gpa, Area: A1 = 150mm^2 & A2=100 mm^2: **[8]**

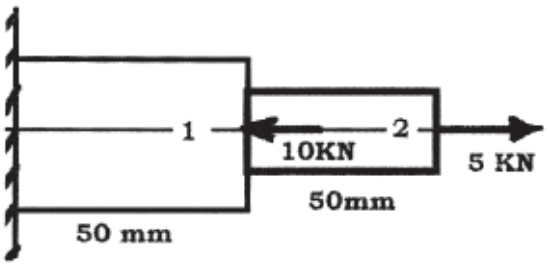


Fig.1

Q3) a) A point P having coordinates (3, 3) is mirrored about X and Y axis (i.e. about origin). Find new coordinates. **[4]**

b) Explain linear shape functions in FEM. **[4]**

OR

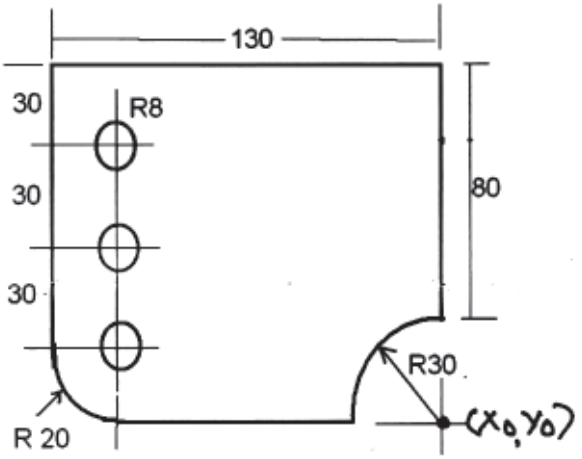
P.T.O.

Q4) a) State advantages of Solid model over Surface model. **[4]**

b) Derive Element Stiffness Matrix for 1-D by any method. **[4]**

Q5) a) Explain tool length and tool radius compensations with example. **[8]**

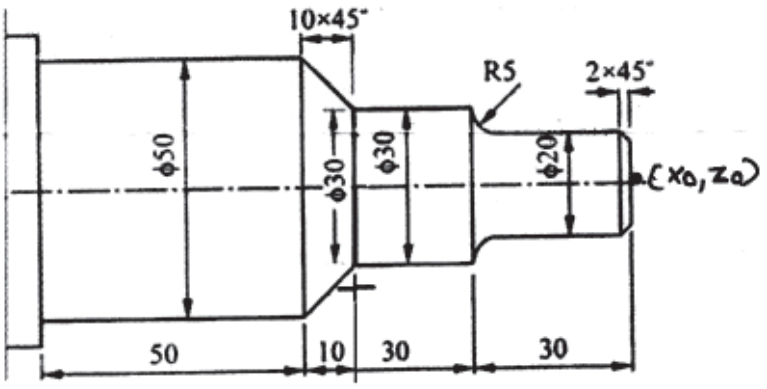
b) Write a CNC program using G and M codes for contouring a component of thickness 10 mm. Also make drill of 16 mm diameter hole, as shown in fig.2. **[10]**



Assume suitable data for speed, feed and depth of cut.
(All dimensions are in mm)
Fig.2

OR

Q6) a) Write a CNC program using G and M codes to turn a component shown in fig.3. Assume suitable data for speed and feed and.Use rough and finish cycles. **[10]**



(All dimensions are in mm)
Fig.3

b) Explain with neat sketch various origins used in CNC machine: *Machine Origin, Work piece or Part Origin and Program Origin.* **[8]**

Q7) a) Explain Selective Laser Sintering (SLS) in detail with neat sketch. State it's advantages. **[8]**

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

OR

Q8) a) Explain Rapid Tolling and STL format. **[8]**

b) Explain Fused Deposition Modeling. State its for applications. **[8]**

Q9) a) Explain vacuum and magnetic gripper with neat sketch. State their advantages. **[8]**

b) Define Automation. Compare fixed, programmable and flexible automation systems. **[8]**

OR

Q10)a) Explain Wrist Configurations: Roll, Pitch and Yaw with neat sketch. Also explain meaning of Link 0 and Link 2. **[8]**

b) Explain computer integrated manufacturing (CIM). What are various functional areas of CIM? State benefits of CIM. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2138

[Total No. of Pages : 4

[5254]-533

B.E. (Mechanical)

DYNAMICS OF MACHINERY

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figure to the right indicate full marks.***
3) ***Use of electronic 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 Ist, 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]**

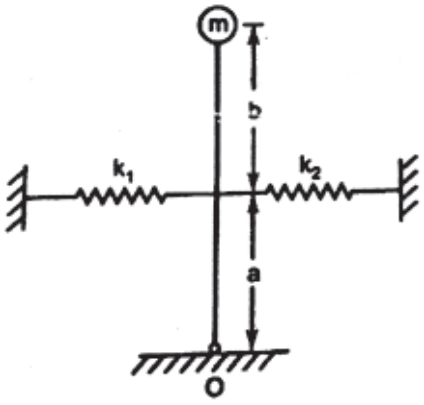


Fig. 1 (Q. 1b)

OR

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]**

P.T.O.

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 150mm with SHM. A dashpot attached to the system offers a resistance of 490 N at a velocity of 0.3 m/s. Determine : **[6]**

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.

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

$k_1 = 40 \times 10^3$ N/m $k_2 = 50 \times 10^3$ N/m $k_3 = 60 \times 10^3$ N/m.

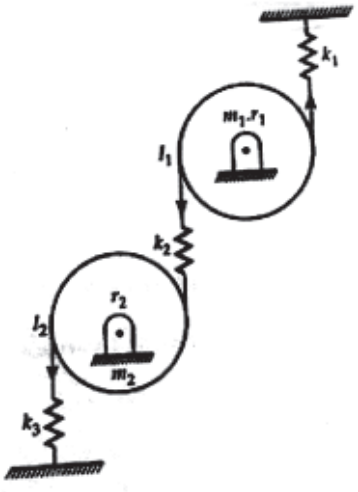


Fig. 2 (Q. 5 a)

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]**

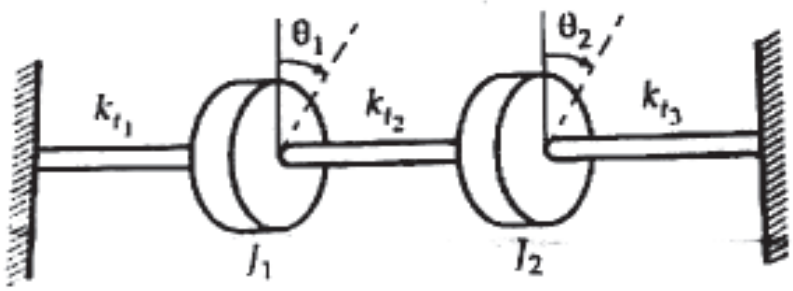


Fig. 3 (Q. 6a)

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) 0.5W ii) 1.5W

iii) 2.2 W iv) 3W 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 : 10]

SEAT No. :

P2139

[Total No. of Pages : 3

[5254]-534

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

ENERGY AUDIT AND MANAGEMENT

(2012 Pattern) (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 Electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

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

i) Primary & Secondary energy sources.

ii) Primary energy consumption & Final energy consumption.

b) Explain targeted energy audit & its importance. **[4]**

OR

Q2) a) Explain detailed energy audit. **[6]**

b) Explain following instruments used in Energy Audit with their application: **[4]**

i) Ultrasonic leak detector

ii) Lux meter

Q3) a) What is the NPV of an energy conservation project with cash flow given below : **[6]**

Initial investment	Rs. (20,00,000)
Saving in Year	Cash Flow
1	Rs. 400,000
2	Rs. 400,000
3	Rs. 600,000
4	Rs. 600,000
5	Rs. 700,000

The discount rate k = 10%. Is the proposal attractive?

b) Write a short note on simple payback period with the advantages of this method. **[4]**

P.T.O.

OR

Q4) a) An air pre-heater costs Rs.4,00,000 and will last for 5 years. It will generate a saving of Rs. 1,40,000 per year with a maintenance cost of Rs.20,000 per year. The discount rate is 10% and salvage value is Rs. 10,000 at the end of 5 year. Is the proposal attractive by NPV method? **[6]**

b) What is return on investment? **[4]**

Q5) a) What are the different losses in a boiler system, which are considered in Indirect method for calculating boiler efficiency? Explain with neat sketch. Write formula for calculating boiler efficiency by Indirect method. **[8]**

b) What are the different opportunities for saving energy in central chilled water plant? **[8]**

OR

Q6) a) Explain direct and indirect method of performance evaluation of a furnace with their advantages & disadvantages. **[8]**

b) What are different Energy Conservation Opportunities in Cooling Tower and Pumping System? **[8]**

Q7) a) Explain step by step approach for maximum demand control. **[8]**

b) Write a short note on - Energy saving opportunities with electrical system.**[8]**

OR

Q8) a) What is power factor? What are the benefits of improving power factor?**[8]**

b) Write a detail note on recommended luminance levels for various tasks/ activities/locations. **[8]**

Q9) a) Explain the concept of co-generation and its potential benefits with a neat sketch. **[8]**

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

i) Recuperator

ii) Regenerator

c) How does a shell & tube heat exchange work? **[4]**

OR

Q10)a) Explain various topping cycle cogeneration systems. **[8]**

b) What are the direct and indirect benefits of Waste Heat Recovery plant? **[6]**

c) Explain working heat wheel with neat sketch. **[4]**

Total No. of Questions : 10]

SEAT No. :

P2140

[Total No. of Pages : 4

[5254]-535
B. E. (Mechanical)
TRIBOLOGY
(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain different regimes of hydrodynamic lubrication with the help of Sribeck curve. **[6]**

b) Explain the factors affecting wear. **[4]**

OR

Q2) a) Define Tribology. Explain its importance in the design of machine elements. **[6]**

b) What is friction? Explain the laws of dry friction. **[4]**

Q3) a) What is fatigue wear? Where does it occur? **[2]**

b) Following data refers to the full journal bearing. **[8]**

i) Diameter of bearing = 75 mm

ii) Length of bearing = 75 mm

iii) Load on bearing = 12 KN

iv) Speed of journal =1800 rpm

v) $\frac{d}{c}$ Ratio = 2000

vi) Viscosity of oil = 10 cP at operating temperature.

Determine the coefficient of friction by using Raimondi and Boyd chart. 'd' is journal diameter and 'c' is the radial clearance in the bearing.

P.T.O.

Given is table for Dimensionless parameter for 360° Hydrodynamic journal bearing.

S	$\left(\frac{r}{c}\right)$ f
0.264	5.79
0.121	3.22
0.0446	1.70

OR

Q4) a) What is adhesive wear? Where does it occur? **[2]**

b) Derive from basic principle, two dimensional Reynolds equations taking usual notation. Also state assumptions made. **[8]**

Q5) a) Following data is given for the hydrostatic step bearing : **[8]**

- Thrust load = 450 KN
- Shaft speed = 750 rpm
- Shaft diameter = 400 mm
- Recess diameter = 250 mm
- Viscosity of the lubricant = 30 cP
- Specific gravity of the lubricant = 0.86
- Specific heat of the lubricant = 2 KJ/Kg °C

Calculate:

i) The optimum oil-film thickness for minimum power loss

ii) The frictional power loss

iii) The pumping power loss

iv) Total power loss

v) The temperature rise

Assuming the total power loss in the bearing is converted into the frictional heat.

b) Derive an expression for viscous flow through a rectangular slot [slit] for a constant viscosity. 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 a circular plate near a plane under hydrostatic squeeze film lubrication. **[8]**

b) Explain the 'Hydrostatic squeeze film lubrication phenomenon with at least four examples. A rectangular plate having 50 mm length and an infinite width is approaching a fixed plane surface. Initially oil-film thickness is 0.035 mm and viscosity of oil is 75 cP. Load supported per unit width of plate is 30 KN/m. **[8]**

Calculate :

i) The time required to squeeze the film to 0.008 mm.

ii) The maximum and average pressure.

Q7) a) Explain the phenomenon of Elastohydrodynamic lubrication [EHL] and how it differs from hydrodynamic lubrication. State the applications of EHL. **[8]**

b) Explain gas lubricated bearings and state advantages and disadvantages or limitations of gas bearings. **[8]**

OR

Q8) a) Explain the significance of the Hertz theory in Elastohydrodynamic Lubrication. Write Ertel-grubin equation with all specific terms and also write the limitations of this equation. **[8]**

b) Explain the working principle of active and passive magnetic bearing. Also mention its types. **[8]**

Q9) a) Explain the lubrication requirements in case of **[8]**

i) Rolling operation

ii) Forging operation

iii) Drawing operation

iv) Extrusion

b) How surface engineering processes are specified? Classify in detail the surface engineering processes and Explain any one process in short.**[10]**

OR

Q10) Write a note on following. (Any Three) : **[18]**

a) Foil bearing

b) Mechanics of tyre-road interactions.

c) Properties and parameters of coatings

d) Hybrid bearing

Total No. of Questions : 10]

SEAT No. :

P2141

[Total No. of Pages : 4

[5254]-536

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

RELIABILITY ENGINEERING

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) List and compare discrete and continuous probability distributions. **[4]**

b) Following table shows test results for 600 fuel pumps tested for 660 hours under severe conditions. The following data was obtained for number of fuel pumps failed out of 600 nos. Calculate the failure density and hazard rate and tabulate the results. **[6]**

Time interval (hrs.)	0-110	110-220	220-330	330-440	440-550	550-660
Number of fuel pumps failed	123	180	144	63	54	36

OR

Q2) a) State the importance and role of the reliability function in an organization.**[4]**

b) Obtain the reliability of the system for the block diagram shown in figure 1. The number in each block shows the reliability of each component. All the elements are independent. Find the reliability of the system if all the elements have a reliability value of 0.88. **[6]**

P.T.O.

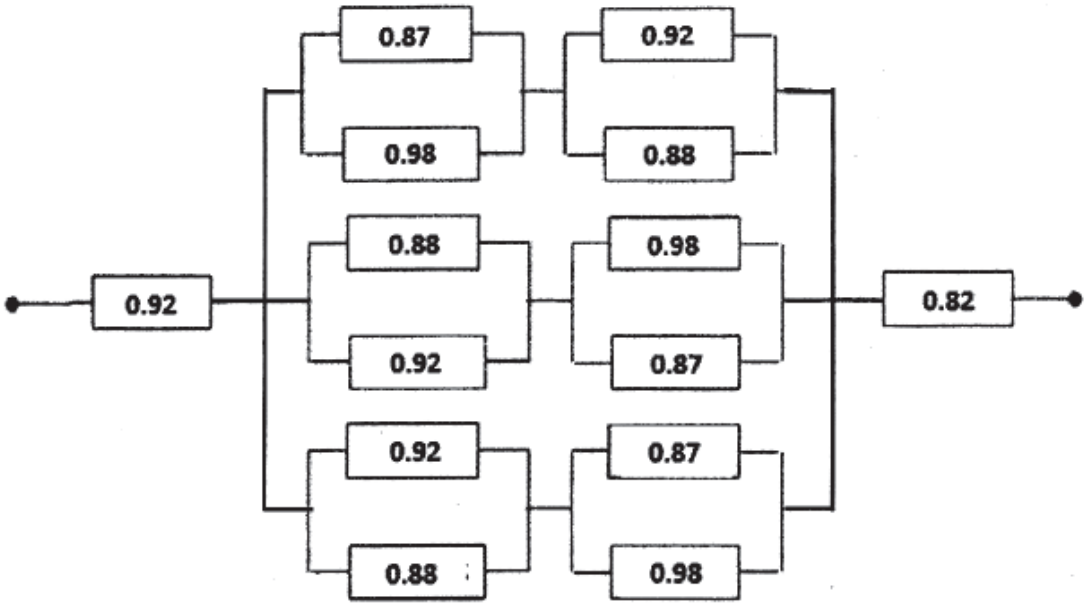


Fig. 1

Q3) a) Explain delta-star method for conditional probability analysis. **[4]**

b) A steering gear assembly consists of three components having reliabilities of 0.78, 0.93 and 0.84 connected in series. The reliability of a steering gear assembly is desired as 0.72. Find for which components the reliability values are to be improved and also find the values of individual reliabilities of the critical components by using minimum effort method. **[6]**

OR

Q4) a) compare the approach used for reliability analysis of a system when using tie-set and cut-set methods. **[4]**

b) A system with three elements 1, 2 and 3are having failure rates $\lambda 1=0.008$, $\lambda 2=0.003$ and $\lambda 3=0.002$ per hour respectively. Find failure rates as well as reliability of each sub system for the entire mission period using ARINC apportionment technique assuming mission time of 120 hours and desired system reliability of 0.86. **[6]**

Q5) a) Operational availability of a cold storage assembly over 1600 hours is 0.84. Failure of the cold storage assembly follows an exponential distribution with the probability of failure within 1600 hours is 0.24. Find mean down time (MDT), mean time to repair (MTTR) and inherent availability of the cold storage assembly ignoring the preventive maintenance downtime. Consider mean administrative and logistic time as 25% of MTTR. **[8]**

b) Define maintainability and state the factors which affect maintainability. Also, compare the inherent, achieved and operational availability. **[8]**

OR

Q6) a) A carburetor assembly has to be designed with a reliability value of 0.96 for 900 hours. Obtain the operational availability if maintainability of the carburetor assembly over the same period of time is 0.88 and administrative and logistic time is 30% of MTTR. Assume that the repair time follows an exponential distribution and a constant hazard rate for failure of carburetor assembly. Also, obtain the inherent availability of the system over the same period of time. **[8]**

b) Define preventive, predictive and corrective types of maintenance. State the benefits of each type of maintenance with suitable examples. **[8]**

Q7) a) Abrasive feeder system supplies abrasive particles to mixing chamber of abrasive jet machine using two supply lines. Flow of abrasive particles is controlled by flow control valves. Supply line 1 has fitted with flow control valve A and a supply line 2 has fitted with flow control valve B. Compressed air is supplied to mixing chamber using compressor (C) which is run by a prime mover (PM). To have a proper mixing of the abrasive particles with the compressed air, it is necessary to have a continuous supply of the abrasive particles from at least one of the supply lines and prime mover and compressor should function satisfactorily. Draw the block diagram for the complete feeder system and construct the fault tree for the condition no mixing of abrasive particles. Also, calculate the reliability of the feeder system. The probability of failure of the valves, compressor and prime mover is as given below. **[10]**

Name of the Component	Valve		Compressor	Prime mover
	A	B	C	PM
Failure Probability	0.004	0.005	0.003	0.006

b) What is fault tree analysis (FTA)? Give four basic symbols used in FTA. Explain four points of differences between FTA and failure mode and effects analysis (FMEA) approach. **[8]**

OR

Q8) a) A coolant supplying system consists of two supply lines fitted with valves, motors and pumps. A supply line 1 is fitted with coolant pump P1 run by a coolant motor Ml and flow control valve V1 to control the flow of coolant. A supply line 2 is fitted with coolant pump P2 run by a coolant motor M2 and a flow control valve V2. To have a continuous coolant supply, it is necessary to have a coolant supply at least from one of the supply line. Draw a block diagram for the system and construct the fault

tree for the condition 'no supply of coolant from the system'. Also, calculate the reliability of the system if the reliabilities of pumps, valves and coolant motors are as follows. **[10]**

Name of the Component	Coolant pumps		Valves		Coolant motors	
	P1	P2	V1	V2	M1	M2
Failure Probability	0.953	0.872	0.932	0.888	0.915	0.865

b) What is Design of Experiments (DOE)? Comment on the statement that a well-designed experiment assist in determining the key factors in a process and in selecting the process parameters at which the process would give better performance. **[8]**

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

Failure number	1	2	3	4	5	6	7	8
MTTF (hrs.)	277	144	444	377	311	244	188	366

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

i) Mean ranking method and

ii) Median ranking method

b) Write a note on **[8]**

i) Markov model

ii) Reliability in Manufacturing

OR

Q10)a) The stress developed in journal housing is known to be normally distributed with a mean a value of stress is 281 N/mm^2 and standard deviation of 24 N/mm^2. The mean material strength of journal housing is 384 N/mm^2 and standard deviation is 33 N/mm^2. Assuming that the material strength of journal housing and induced stresses are independent, determine the probability of survival of journal housing, average, minimum and maximum values of factor of safety.

Extract the data from following table which shows the normal variant (Z) and ∅(Z). **[8]**

Z	2.1	2.2	2.3	2.4	2.5	2.6
∅(Z)	0.9642	0.9722	0.9786	0.9836	0.9876	0.9906

b) Reliability test and durability test appear very similar from the testing mechanics' viewpoint; it is often difficult to discern any differences. Comment on the statement. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3191

[Total No. of Pages : 2

[5254]- 537

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

MACHINE TOOL DESIGN

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) The most commonly large values of geometric progression ratio (φ) are used on small-sized machine tools whereas small values of φ are used on large-sized machine tools. Please comment on the statement. **[10]**

OR

Q2) Draw the structural diagrams (minimum three) of a machine tool speed box for minimum speed of 16 rpm and maximum speed of 760 rpm considering a geometric progression ratio as 1.26. The machine tool speed box is to be driven by an induction motor rotating at 1440 rpm. Obtain an optimum ray diagram and draw the layout of the gearbox. **[10]**

Q3) Give the comparative evaluation of machine tool structures on the basis of : a) Profiles of machine tool structures and b) Materials for machine tool structures. **[10]**

OR

Q4) Classify and sketch the various types of guides used in machine tools, based on material, lubrication system, drives control.

P.T.O

Q5) a) Discuss in detail how optimization of spacing between spindle supports is achieved. **[8]**

b) Explain the methods of preloading of antifriction bearings. **[8]**

OR

Q6) a) Explain the method of compensating the errors resulting due to backlash (pitch error) with neat sketches. **[8]**

b) State the various technological performance indices for spindle units in small and medium-size machine tools. **[8]**

Q7) a) Explain various dynamic characteristics of the cutting process. **[8]**

b) Explain adaptive control of machine tools. **[8]**

OR

Q8) a) State the sources of perturbance acting on the cutting process? **[8]**

b) State the various mechanical and electrical automatic control systems. State the various factors that govern the selection of appropriate automatic control system. **[8]**

Q9) a) With the help of applications, explain recent trends in machine tools. **[10]**

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

OR

Q10)a) With the help of a block diagram explain a closed-loop N.C. system for taper turning. **[10]**

b) Discuss the advantages of retrofitting in building machine tools. **[8]**

ⓘⓘⓘ

Total No. of Questions : 10]

SEAT No. :

P2142

[Total No. of Pages : 3

[5254]-538

B. E. (Mechanical - Heat Power Engg)

GAS TURBINE PROPULSION

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data where ever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) State the principle of rocket propulsion. **[2]**

b) What are advantages of co-generation cycle? State minimum of criteria. **[4]**

c) State any four assumptions of Brayton cycle. **[4]**

OR

Q2) a) With the help of neat diagram explain reheat gas turbine cycle. **[4]**

b) A simple gas turbine is to develop 2000kW. Ambient conditions are 0.95bar, 20°C. Stagnation pressure at inlet to compressor is 1 bar and at compressor exit the conditions are 6 bar 220°C. Total head temperature at turbine exit is 450°C. Find out total head isentropic efficiency of compressor and air mass flow for duct diameter of 30cm.

Also find out temperature at inlet to turbine. Neglect fuel mass. Assume standard properties. **[6]**

Q3) a) Give advantages of gas turbine plants over steam power plants. **[5]**

b) What is pulse jet engine? Mention its advantages and drawbacks. **[5]**

OR

P.T.O.

Q4) a) A turbo jet unit mounted on aircraft has following data:

Isentropic efficiencies for compressor, turbine and nozzle are 80%, 85%, 90% respectively, inlet conditions are 0.8 bar, 280k, final pressure 4 bar, C_{pa}=1 kJ/kg k, γ=1.4, C_{pg} = 1 .2kJ/Kg K, γ_g=l.35, fuel calorific value 42000kJ/kg,nozzle back pressure. 0.6 bar, maximum cycle temperature 550°C, craft speed 720km/hour, air flow 20kg/second. Find out power required to drive compressor and air fuel ratio. **[6]**

b) Define inlet diffuser efficiency and propulsive efficiency. **[4]**

Q5) a) Referring to axial flow turbines, define Degree of reaction static head efficiency and total head efficiency. **[6]**

b) In a single stage impulse turbine nozzle angle is 65° to axial direction, gas leaves blades with absolute velocity 300m/s, at 30° to axial direction. Assume zero axial thrust and find blade velocity, blade angle, power and blade efficiency assuming inlet and outlet angles equal Assume m_g = 16kg/s.**[10]**

OR

Q6) a) Discuss in brief: cooling of gas turbine blades. **[4]**

b) Explain velocity compounding if impulse turbine. **[6]**

c) Discuss performance curves of gas turbine. **[6]**

Q7) a) A 8 stage axial flow compressor with 50 % reaction blading takes air at 20°C at rate of 3 kg/s. pressure ratio is 6 with isentropic efficiency 89%. All stages are similar. Mean blade velocity is 180m/s and axial flow velocity is 110m/s. **[12]**

Find :

i) Power required

ii) Blade angles

b) Draw velocity triangles for axial flow compressor and obtain expression for work input/kg air. **[6]**

OR

Q8) a) Define degree of reaction for a stage of axial flow compressor and prove that $R = \frac{1}{2}\frac{vf}{U}$ (tanB1 + tanB2) Where Bl and B2 are blade angles with respect to axial direction. **[10]**

b) Explain surging and stalling and explain how to avoid them. **[4]**

c) Explain flow coefficient and diffuser enthalpy drop coefficient. **[4]**

Q9) a) What is flame stabilization? List out different methods and explain any one. **[8]**

b) Discuss any four requirements of gas turbine combustion chamber. **[8]**

OR

Q10)a) With help of neat diagram explain tubular combustion chamber. Compare it with annular and Tubo -Annular chambers. **[8]**

b) Discuss methods of cooling flame tubes. Draw neat sketches. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2143

[Total No. of Pages : 2

[5254]-539

B. E. (Mechanical)

PRODUCT DESIGN & DEVELOPMENT (Theory)

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

nstructions to the candidates:

1) ***All questions are compulsory.***

2) ***Figure to the right indicate full marks.***

Q1) Discuss various factors that affect concept selection. Explain puzh's chart with suitable example. **[10]**

OR

Q2) a) Explain difference between product design & development. **[4]**

b) Explain different types of customer needs. **[6]**

Q3) Discuss product verification & product validation with suitable example.**[10]**

OR

Q4) Discuss How mission statement & technical questioning helps to design better products. Elaborate in detail. **[10]**

Q5) a) Explain various concerns in measurement phase during? tear down. **[8]**

b) What is cost control? Explain systematic procedure for calculation of cost. **[8]**

OR

Q6) a) Explain detailed procedure of Benchmarking. **[8]**

b) Explain any two types of product portfolio architectures in detail with suitable example. **[8]**

P.T.O.

Q7) a) Explain Guidelines of Design for manufacture. **[8]**

b) Discuss Guidelines of Design for welding. **[8]**

OR

Q8) a) Elaborate guidelines for Design for environment. **[8]**

b) What is life cycle assessment? Explain any one method in detail. **[8]**

Q9) a) Explain different phases of product life cycle with suitable example. **[9]**

b) Discuss elements of product life cycle management. **[9]**

OR

Q10)a) Explain different phases with corresponding technologies utilized in detail.**[9]**

b) Explain the importance of product data & product workflow in product life cycle management. **[9]**

Total No. of Questions : 12]

SEAT No. :

P2144

[Total No. of Pages : 6

[5254]-540

B. E. (Mechanical SandWich) (Semester - VIII)

OPERATIONS RESEARCH

(2012 Pattern) (Elective - II)

Time : 2.½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) ABC company uses lathe, milling and grinding machines to manufactures parts. The given table represents the machining time required for parts. The manufacturing time available on different machines and processing on each machine part. Formulate LPP for Part I and Part II to be manufactured per week in order to maximize profit. **[8]**

Type of Machine	Machining time required for Machined parts (minutes)		Machining time required per week (minutes)
	I	II	
Lathe Machine	12	06	3000
Milling Machine	04	10	2000
Grinding Machine	02	03	900
Profit per unit	Rs 40	Rs 100	

OR

Q2) a) Explain the various environments in which decision are made. **[4]**

b) Explain basic steps involved in construction of decision tree. **[4]**

P.T.O.

Q3) Determine an initial basic feasible solution to the following transportation problem shown in table below using lowest cost entry method. **[8]**

		Warehouses						Supply
		W_1	W_2	W_3	W_4	W_5	W_6	↓
	A	2	1	3	3	2	5	50
Origin	B	3	2	2	4	3	4	40
	C	3	5	4	2	4	1	60
	D	4	2	2	1	2	2	30
Demand →		30	50	20	40	30	10	

OR

Q4) A company has one surplus car in each of the district's 1, 2, 3, 4 and 5 and one deficit car in each of districts I, II, III, IV, V and VI. The distance between districts in kilometers is given in table below. Determine the assignment of cars from districts in surplus to districts in deficit so that total distance covered by car is minimum. **[8]**

	I	II	III	IV	V	VI
1	12	10	15	22	18	8
2	10	18	25	15	16	12
3	11	10	3	8	5	9
4	6	14	10	13	13	12
5	8	12	11	7	13	10

Q5) Using method of sub game, solve the following game **[6]**

Player 2

		1	2	3
Player 1	1	1	3	11
	2	8	5	2

OR

Q6) XYZ production company have following data,

Sell price per unit = Rs 14

Total units sold = 50,000

Fixed cost = Rs12,000

Find: i) P/V ratio

ii) B.E.P. in units

iii) B.E.P. in sales

iv) Margin of safety

v) Total profit

[6]

Q7) a) A chemical company requires 3600 kg of raw material for manufacturing a particular item/year. It has been estimated that cost of placing an order is Rs 36 and cost of carrying an inventory is 25% of investment in inventories. The price is Rs 10/kg.. **[8]**

Find i) optimal lot size ii) optimal order cycle time

iii) minimum yearly total cost

b) An Automotive company 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 : **[8]**

Year	1	2	3	4	5	6	7
Maintenance cost in Rs	220	500	800	1200	1800	2500	3200

Determine when the company should get the machine replaced?

OR

Q8) a) A manufacturing company purchases 9000 parts of a machine for its annual requirements, ordering one month's requirement at a time Each part costs Rs 20 The ordering cost per order is Rs15 and carrying charges are 15% of average inventory/year Suggest a economical purchasing policy for company. What advice would you offer and how much would it save the company per year? **[8]**

b) Machine X costs Rs 45,000/- and the operating costs are estimated at Rs 1000/-for the first year, increasing by Rs 10,000/- per year in the second and subsequent years. Machine Y costs Rs 50000/and operating costs are Rs 2000/- for the first year, increasing by Rs 4000/- in the second and subsequent years. If we now have a machine of type X, should we replace it by Y. If so when? Assume both machines have no resale value and future costs are not discounted. **[8]**

Q9) a) A machinist finds that the time spent on his jobs have an exponential distribution with mean of 30 minutes. If he repairs sets in the order in which they come in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8 hour day, what is machinist's expected idle time each day? How many jobs are ahead of the average set just brought in? **[8]**

b) Five jobs A, B, C, D and E are to be made on the three groups of machines m_1, m_2 and m_3 in that order, the time required for each job is given in table below Sequence the job on machines for minimum elapsed time starting from first job on m_1 to the finishing of last job on m_3, also find idle time for machine during elapsed time. **[8]**

Job	A	B	C	D	E
Time for m_1 (min.)	20	27	31	15	19
Time for m_2 (min.)	7	9	6	12	14
Time for m_3 (min.)	27	31	16	14	16

OR

Q10)a) In a bank one cashier is there to serve the customers. And the customers pick-up their needs by themselves. The arrival rate is 9 customers for every 5 minutes and the cashier can serve 10 customers in 5 minutes. Assuming Poisson arrival rate and exponential distribution for service rate. 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 served

b) There are five jobs each of which must go through two machines X and Y in the order of XY. Processing times are given in table below. Determine a sequence for five jobs that will minimize the elapsed time and also calculate the total idle time. **[8]**

Job	1	2	3	4	5
Time for X (min.)	5	1	9	3	10
Time for Y (min.)	2	6	7	8	4

Q11)a) A project consists of six activities. Draw the network diagram and calculate EST, LST, EFT, LFT and floats. Determine the critical path and find total project duration. **[8]**

Activity	Immediate Predecessor	Activity Duration
A	-	4
B	A	6
C	B	5
D	A	4
E	D	3
F	E, C	3

b) An electronic company sells some good items, the post data of demand per week in 100 kg with frequency is given below. **[8]**

Demand	0	5	10	15	20	25
Frequency	2	11	8	21	5	3

Using the following sequence of random nos. 35, 52, 19, 13, 23,93, 34, 57, 35, 83. Generate demand for next 10 weeks and also find average demand per week.

OR

Q12)a) A small maintenance project consist of following 12 jobs. Draw the network of the project. Summarize CPM calculations in tabular form. Calculating the three types of floats for jobs and hence determine critical path. **[12]**

Job	1-2	2-3	2-4	3-4	3-5	4-6	3-8	6-7	7-9	6-10	8-9	9-10
Duration	2	7	3	3	5	3	5	8	4	4	1	7

b) A T.V. company produces two components, A and B which must be processed through assembly and finishing department. Assembly has 90 hours available, finishing can handle upto 72 hours of work. Manufacturing one A component needs 6 hours in assembly and 3 hours in finishing. Each B components needs 3 hours in assembly and 6 hrs in finishing, If profit is Rs120 per A and Rs 90 per B, calculate the best combinations of A and B to realize profit of 'Rs 2100 **[4]**

Total No. of Questions : 10]

SEAT No. :

P2145

[Total No. of Pages : 4

[5254]-541

B. E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

(2012 Pattern) (End Semester) (Theory)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory i.e. Solve Q.1 or Q. 2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.l0.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) In following table,advanced manufacturing processes are given on left hand side and two characteristics/applications of each process are given on right hand side. Match the process with their correct application/characteristic.**[10]**

Advanced processes	Process characteristics and/or applications
A. Chemical etching	i) Burr-free sharpening of hypodermic needles
	Profiling of worn locomotive traction motor gears
B. Hydroforming	ii) Electrohydraulic forming
	Radar dishes
C. Electrochemical grinding	iii) Bending of thin tubes into complex shapes
	Ball Joint Assembly
D. Friction stir welding	iv) Non consumable rotating tool
	A solid phase process
E. HERF	v) Dedicated expensive toolings
	Automotive wheels and suspension parts
F. Squeeze casting	vi) Undercutting effect
	Machining of Silicon substrate

P.T.O.

G.	High velocity forming	vii)	Turbulated cooling holes
			Sulfuric, Nitric, and hydrochloric acids
H.	Shear spinning	viii)	Products free from shrink, voids and gas pocket etc.
			Automobile steering wheel
I.	Shaped tube electrolytic	ix)	Production of conical and axisymmetric parts
	machining		Flow turning
J.	Vacuum die casting	x)	Medical and commercial cookware applications
			Aluminium tubes for bicycle frames

OR

Q2) State whether the following statements are true or false : **[10]**

a) Non-traditional or unconventional machining processes are the processes where in there is direct contact between tool and work piece.

b) In Roll forming, side rolls and cluster rolls are used to provide greater precision and flexibility and to limit stresses on the material.

c) Electrolytic in-process dressing, Electro-jet machining and Laser assisted electrochemical machining are hybrid machining processes.

d) Electrochemically ground specimens havehigh fatigue strength and good dimensional tolerances.

e) In forward flow forming spun material flows under the roller in opposite direction of the feed motion of roller and towards the unsupported end of the mandrel.

f) Large and thick parts can be economically and efficiently shaped by explosive forming in comparison to Electromagnetic Forming (EMF) process.

g) The spinnability of the material is dependent on the material to be shear form.

h) Shaped-Tube Electrolytic Machining (STEM) is usually used to obtain small aspect ratio circular holes.

i) Using Electrochemical grinding on hard materials higher MRR and good tolerances are achieved as compared to conventional grinding.

j) Electromagnetic forming (EMF) process is applicable only for small size electrically conducting work pieces.

Q3) a) Friction stir welding is considered as 'Green technology', comment on the statement. **[6]**

b) State with sketch the working principle of the Electrolytic in-processdressing. **[4]**

OR

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

b) Roll forming is ideal for producing constant-profile parts with long lengths and in large quantities. Justify the statement. **[4]**

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

b) In what way the micro-electric discharge machining (micro-EDM) process differs from Electric discharge machining process. Also, state the process parameters which affect the oversize and aspect ratio obtained using micro-EDM process. **[8]**

OR

Q6) a) With a schematic explain the principle of Ultrasonic micromachining process (USMM). Also, state the various process parameters which influence the USMM performance. **[8]**

b) List four properties of diamond tools which considered them as the most suitable tool for diamond micromachining? Also, state the applications of diamond micromachining. **[8]**

Q7) a) State the advantages and applications of additive manufacturing processes. Also, categorize the additive manufacturing processes as specified by ASTM standard. **[8]**

b) What is Direct Write technology (DW)? Classify Direct Write technology and explain any one of them with neat schematic. **[8]**

OR

Q8) a) State with sketches the principle of Laminated Object Manufacturing (LOM) and Fused Deposition Modeling (FDM). **[8]**

b) Describe the process steps for manufacturing a component from design/drawing stage to finished component using an additive manufacturing process. **[8]**

Q9) a) State advantages of electron microscopes over optical microscopes.Also, name the various types of electron microscopes. **[6]**

b) Explain with sketch the principle of online dimensional measurement using laser-based diffraction technique. **[6]**

c) With a schematic state the working principle of interference microscope. Also, state the applications of interference microscopy. **[6]**

OR

Q10)Write Short notes on : **[18]**

a) Atomic force microscope (AFM)

b) Scanning tunneling microscope (STM)

c) Interference comparators

Total No. of Questions : 10]

SEAT No. :

P2146

[Total No. of Pages : 3

[5254]-542

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

POWER PLANT ENGINEERING

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, 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) The peak load in a power plant is 60 MW. The load having maximum demand of 30 MW, 20 MW, 10 MW and 14 MW are connected t the power plant. The capacity f the power plant is 80 MW and annual load factor is 0.50. estimate, **[6]**

i) average load on the power plant

ii) energy supplied per year

iii) demand factor

b) Explain essential properties of coal required for thermal power plant. **[4]**

OR

Q2) a) Define the following terms : **[6]**

i) Connected load,

ii) Diversity Factor

iii) Maximum demand

b) Explain coal beneficiation **[4]**

P.T.O.

Q3) a) Describe fluidized bed combustion system. **[4]**

b) State the advantages and disadvantages of nuclear power plant. **[6]**

OR

Q4) a) Explain silent features of high pressure boiler? **[4]**

b) Explain with neat sketch types of spillways. **[6]**

Q5) a) Explain with neat sketch combined cycle power plant. **[8]**

b) Draw performance characteristics of diesel power plant. **[8]**

OR

Q6) a) Discuss the working of semi closed cycle with neat sketch. **[8]**

b) Discuss various losses related to diesel power plant. **[8]**

Q7) a) What is function of PV system? What are advantages and disadvantages? **[10]**

b) Explain single basin and double basin tidal power plant with neat sketch. **[8]**

OR

Q8) a) Write short notes on : **[12]**

i) Geothermal power plant

ii) MHD

iii) Classification of wind mills.

b) What are the concentrating type collector systems? Discuss their advantages. **[6]**

Q9) a) Write a short note on : **[8]**

i) Global warming

ii) Acid precipitation

b) What are major electrical equipment's used in electrical power plant. **[8]**

OR

Q10) a) Explain with neat sketch construction and working of power transformer. **[8]**

b) Explain the different method adopted to control Nuclear pollution. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2147

[Total No. of Pages : 6

[5254]-543

B.E. (Mechanical)

MECHANICAL SYSTEM DESIGN

(2012 Pattern)

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

Instructions to the candidates:

1) ***Answers Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of programmable calculator is not permitted.***
5) ***Assume suitable data if necessary.***

Q1) a) Draw the structure diagram and identify the optimum structural formula out of them. **[4]**

i) 2(1) 3(2)

ii) 2(3) 3(1)

iii) 3(2) 2(1)

b) The mean tensile strength of 250 nuts is 310 N/mm^2 and the standard deviation is 35 N/mm^2. Find **[6]**

i) how many nuts are expected to have strength less than 270 N/mm^2?

ii) how many nuts are expected to have strength between 270 and 410 N/mm^2?

OR

Q2) a) What is the need of multi speed gearbox in a machine tools or automobiles. **[4]**

b) Tension test is carried out on 120 specimens, of grade FG300. It is observed that the ultimate tensile strength is normally distributed with a mean of 300 MPa and a standard deviation of 25 MN/m^2. **[6]**

P.T.O.

i) How many specimens have ultimate tensile strength less than 275 MN/m^2?

ii) How many specimens have ultimate tensile strength between 275 and 350 MN/m^2.

Q3) a) With the help of sketches explain unloading methods in belt conveyor system. **[4]**

b) Design a horizontal belt conveyor used for conveying a coal in steel plant: **[6]**

i) Capacity of conveyor = 300×10^3 kg/hr

ii) Belt speed = 3 m/s

iii) Density of coal = 900 kg/m^3

iv) Surcharge factor for belt = 0.0725

v) No. of piles for belt = 4

vi) Material factor for plies = 2

vii) Belt tension & arc of contact factor for belt = 80

viii) Electric motor speed = 1440 rpm

ix) Centre dist. between snub pulley = 255 m

x) C.D. between drive & tail pulley = 260 m

xi) Pitch of carrying run idlers = 1m, pitch of return run idlers = 2.5m

Determine :

1) the standard belt width

2) dia of drive pulley

3) the reduction ratio of gear reducer

Standard belt width (mm) : 500, 600, 750, 800, 900, 1000, 1200, 1400, 1600.

OR

Q4) a) Explain the procedure to estimate the power requirement for belt conveyors. **[4]**

b) A horizontal belt conveyor is used for transporting the material having density 11772 N/m^3. The surcharge factor for belt is 0.2, while the belt width is 0.7 meter. If the belt speed is 1750 mm/sec determine the capacity of conveyor. **[6]**

Q5) a) What is autofrettage? Explain any one method of prestressing the cylinder. **[8]**

b) A pressure vessel consists of a cylindrical shell with an inner diameter of 1500 mm and thickness of 20mm. It is provided with a nozzle of inner diameter 250mm and thickness 15mm. The yield strength of the material for the shell and nozzle is 200 N/mm^2 and the design pressure is 2.5 MPa. The extension of the nozzle inside the vessel is 15mm. The corrosion allowance is 2mm while the weld joint efficiency is 0.85. Neglecting the area of welds, determine whether or not a reinforcing pad is required for the opening. If so, determine the dimensions of pad made from a plate of 15mm thickness. **[10]**

OR

Q6) a) Derive Birnie's equation. Explain under what conditions it is used. **[8]**

b) A pressure vessel subjected to a design pressure of 0.75 MPa consists of a cylindrical shell with 2m inside diameter and 10mm thickness. An opening of inner diameter 300mm and wall thickness 10mm is provided in the shell. The corrosion allowance is 2mm and the weld joint efficiency is 85%. The extension of the opening inside the shell is 15mm. The yield strength of the material used for the shell and opening is 210 N/mm^2. A reinforcing pad made of a 10mm thick plate is provided for the opening. Determine the inner and outer diameters of pad. **[10]**

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

Table No: 01, Areas below Normal Distribution Curve for 0 to Z .

Q7) a) Explain the step by step procedure for designing of piston head of IC engine. **[6]**

b) Cylinder of Two stroke petrol engine is to be designed for following data: **[10]**

Brake power = 7 kW

IMEP = 0.5 MPa

Speed = 800 RPM

Efficiency = 80%

Design : Bore and stroke of cylinder liner, its thickness and thickness of cylinder head.

OR

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

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

Cylinder bore = 250mm

Piston pin length in bush = 0.45D

Maximum gas pressure = $4N/mm^2$

Bearing Pressure = $15N/mm^2$

ID OD ratio for piston pin = 0.6

Mean Dia of piston boss = 1.5 × OD of pin

Calculate OD, ID and mean diameters of piston pin

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 400mm is subjected to constant tensile force of 4000N. If the factor of safety is 2, design the bar diameter, using Johnson's method, with the objective of minimizing material cost by using optimum material from the list given in **Table 1**. **[10]**

Material	Density (ρ) kg/m^3	Cost (c) Rs./kg	Syt N/mm^2
Steel	7800	14	400
Aluminum alloy	2800	66	150
Titanium Alloy	4500	1100	800

Table 1

OR

Q10)a) Write a short note on design for machining **[6]**

b) In lightweight equipment, a shaft is required to transmit 40kW power at 425 RPM. Required stiffness of shaft is 90N-m/Degree. Factor of safety based on S_{ys} is 1.5

Using max shear stress theory of failure design the shaft with the objective of minimum weight by using optimum material from the list given in Table 2 below. **[10]**

Material	Desnity (ρ) kg/m^3	Modulus of Rigidity (G) N/mm^2	Syt N/mm^2
Chromium Steel	7800	82000	450
Al Alloy	2800	27000	150
Titanium Alloy	4500	41000	800

Table 2

Total No. of Questions : 10]

SEAT No. :

P2148

[Total No. of Pages : 5

[5254] -544

B.E. (Mechanical)

REFRIGERATION AND AIR - CONDITIONING EQUIPMENT DESIGN

(2012 Pattern) (Elective - III)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) Explain the performance characteristic curves of reciprocating and centrifugal compressors. **[10]**

OR

Q2) A typical two - evaporator R - 134a system working with individual compressor and individual expansion valve has - 30°C(20TR) and - 5°c (30TR) evaporating temperature and 40°C condensing temperature. Calculate **[10]**

a) Overall COP

b) Mass flow rate of refrigerant through each compressor

c) Cooling capacity on the condenser

d) Displacement volume required for each compressor if their vol. eff. = 0.9

Q3) a) List out the limitations of VCS for the production of low temperatures.**[5]**

b) Explain the construction working of externally compensated regulating valve. **[5]**

OR

P.T.O.

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

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

i) Liquefaction of nitrogen

ii) Liquefaction of hydrogen

Q5) a) Write a short note on "Baudelot Cooler'. **[4]**

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

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

State the selection basis of condenser

OR

Q6) a) Write a short note on 'Pump Circulation System". **[8]**

b) Explain the procedure of thermal design of shell and tube condensers. **[8]**

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

Water flow rate :	12.67 kg/s
Air flow rate :-	11.9 kg/s
Water entering temperature :	36.3°C
Water leaving temperature :	32.1°C

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

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

i) Value of the performance coefficient.

ii) The wetted area of tower if air HTC is 83 W/m^2K.

iii) Value of mass transfer coefficient

iv) Tower efficiency

OR

Q8) a) Explain working of coil/fill type evaporative cooling tower with neat sketch. **[8]**

b) Explain the thermal analysis of cooling tower. **[8]**

Q9) a) Write a short note on : **[12]**

i) Vortex Tube

ii) Thermoelectric Refrigeration

b) Discuss various types of wick structures used in heat pipe. **[6]**

OR

Q10) a) In steam jet refrigeration the dry saturated motive steam is supplied at 6 bar. The amount of motive steam per unit mass of flash vapour is 2 kg/kg. The quality of vapour at the beginning of compression is 0.9. The condensing and flash vapour temperature is 40°C and 5°C respectively. The compression efficiency is 0.78. Obtain the TR of the system for 0.8 kg/s of motive steam and volume of vapour handled by the ejector. (Use steam table for properties). **[12]**

b) Discuss various applications of heat pipe. **[6]**

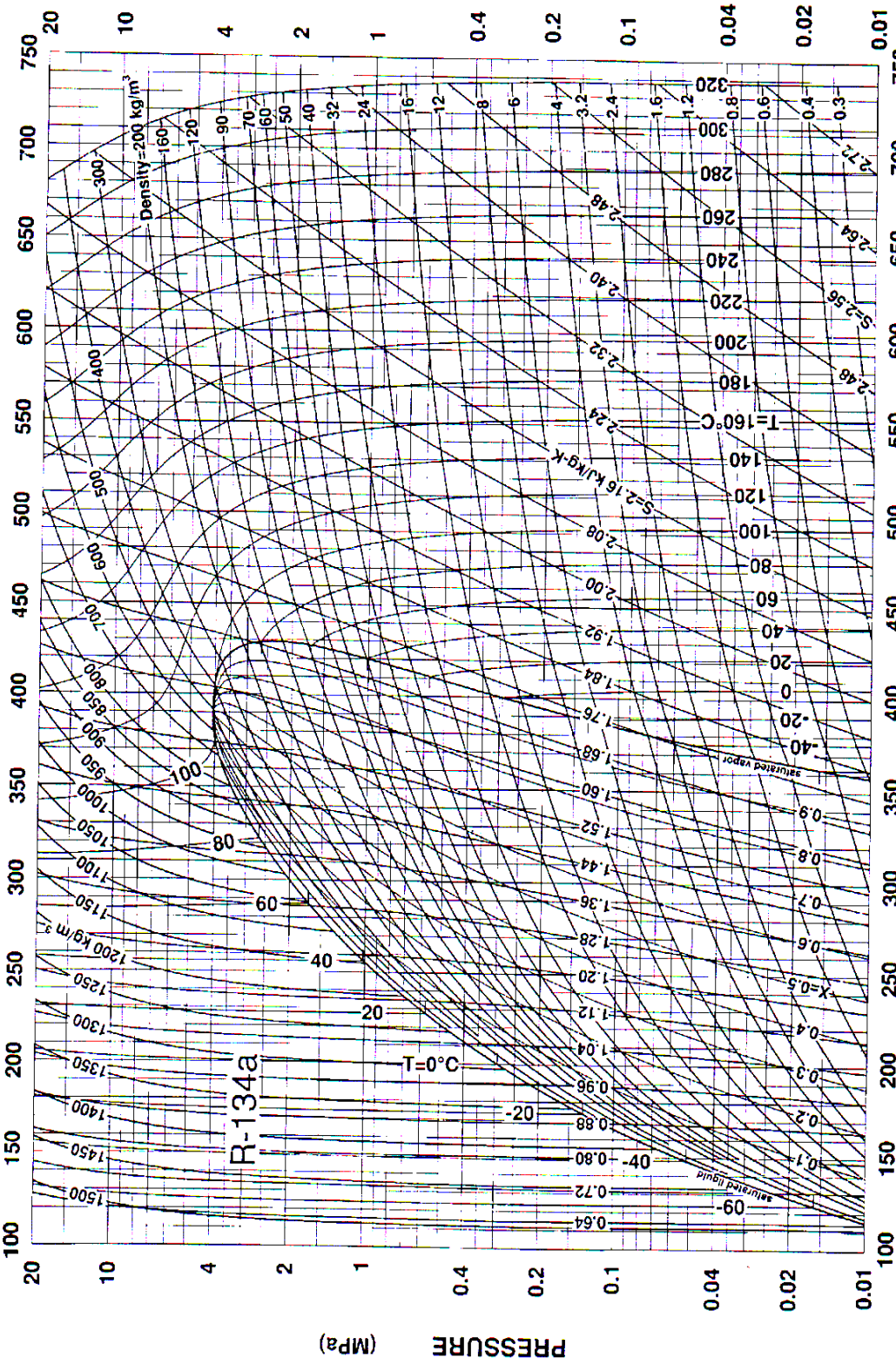
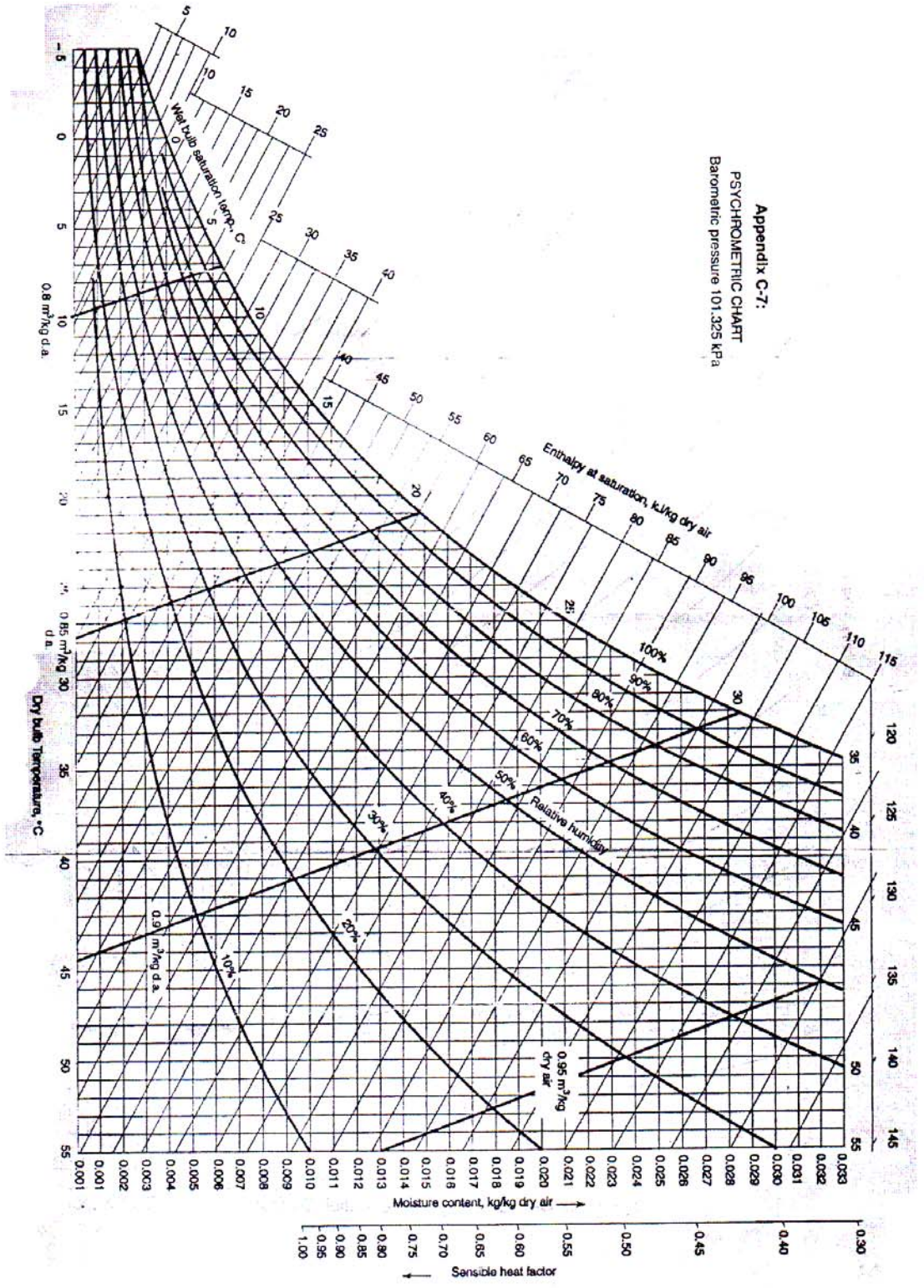


Fig. 12 Pressure–Enthalpy Diagram for Refrigerant 134a


Appendix C-7:
PSYCHROMETRIC CHART
Barometric pressure 101.325 kPa
Wet bulb saturation temp., °C
Enthalpy at saturation, kJ/kg dry air
Relative humidity
Dry bulb Temperature, °C
Moisture content, kg/kg dry air
Sensible heat factor
0.8 m³/kg d.a.
0.85 m³/kg d.a.
0.9 m³/kg d.a.
0.95 m³/kg dry air

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P2149

[Total No. of Pages : 3

[5254] -545
B.E. (Mechanical) (End Sem)
ROBOTICS
(Semester - II) (Elective - III) (2012 Pattern)

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. **[4]**

b) Explain sensor selection criteria for robotic applications. **[6]**

OR

Q2) a) Explain the construction of Brushless DC motor with neat sketch. Transformation matrix of an object with respect to the robot base is given by **[4]**

$$\text{Base}_{\text{Tobject}} = \begin{bmatrix} 1 & 0 & 0 & 15 \\ 0 & 0 & 1 & -35 \\ 0 & -1 & 0 & 20 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

b) The gripper of the robot has its application vector parallel to X - axis of the robot base frame and the sliding vector parallel to the Y - axis of the robot base frame. Determine the 3×3 rotation matrix between the robot base and gripper; also between the object and the gripper. **[6]**

Q3) a) Explain with suitable examples velocity ellipse and ellipsoids. **[6]**

b) Explain different joints used in robots. **[4]**

OR

P.T.O.

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) 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]**

OR

Q6) a) Derive Lagrangian - Euler formulation for single link with rotary joint. Derive an expression for torque at joint. **[10]**

b) What are different tools used in simulation of Robotics? **[6]**

Q7) a) What are general considerations in Trajectory planning. An actuated joint of a six axis Robot is to be rotated from 30° to 80° in 5 seconds. **[8]**

b) Determine Linear, Quadratic, and Cubic trajectories for the joint. **[8]**

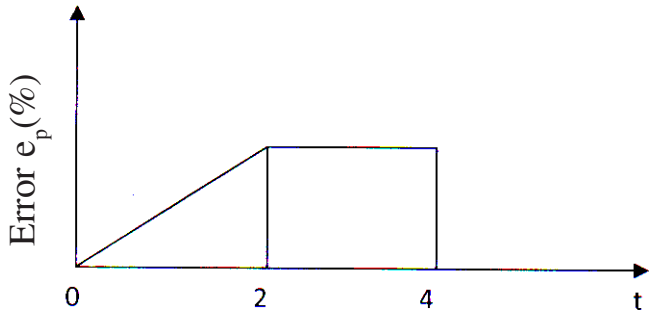
OR

Q8) a) Explain different types of controllers used in industrial robots. **[8]**

b) What will be the PID output having $K_p = 4$, $K_I = 0.6$, $K_D = 0.5$ and $P_0 = 55\%$ and subject to error change as shown in figure. **[8]**

i) Initially

ii) After 4 seconds



Q9) a) Explain steps in Image processing and analysis. **[8]**

b) Explain necessity and application of Artificial Intelligence for Robotic system. **[10]**

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. :

P2150

[Total No. of Pages : 4

[5254] -546
B.E. (Mechanical Engineering)
INDUSTRIAL ENGINEERING
(Elective - III) (Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answers should be written in one answer book.***

2) ***Answer Q. 1 or Q.2, Q.3 or Q.4, Q.5 or Q.6***

3) ***Neat diagrams must be drawn wherever necessary.***

4) ***Figures to the right side indicate full marks.***

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

SECTION - I

Q1) Define and explain what do you understand by industrial Engineering? Explain the Frederick Taylor's contribution towards scientific management. **[6]**

OR

Q2) Explain types of organization. **[6]**

Q3) Explain Method Study. What are different recording techniques in method study. **[7]**

OR

Q4) Describe with suitable examples following (Any Two) **[7]**

a) Operation process chart

b) Flow process chart

c) Two handed process chart

P.T.O.

Q5) Write short notes on : (Any Four) **[7]**

a) Allowance

b) Basic time

c) Standard time

d) MOST

e) PMTS

OR

Q6) Following are the element times of a machining operation. Calculate normal time, standard time for this job. **[7]**

Element	Observed Time (Min)	Performance Rating	Frequency	Relaxation Allowance. (%)
1	1.8	80	1	10
2	2.20	90	1	12
3	6.30	100	1	10
4	3.20	100	1	10
5	1.40	90	1	12
6	20.00	80	1/25	12

Q7) a) For a particular product demand is given below. With a smoothing constant of 0.20 and using first order exponential smoothing what is forecast for month of September? **[8]**

Month	Actual Demand
April	200
May	150
June	180
July	220
August	200

b) Explain the objectives of material handling and meterial handling Equipments. **[8]**

OR

Q8) a) Annual demand for an item is 5400 units. Ordering cost is Ps. 600 per order, Inventory carrying cost is 12% of the average inventory. **[8]**

Lot Size	Unit Price (Rs.)
0 - 2300	12
2400 - 2999	10
3000 and above	8

b) What is demand forecasting? Explain functions of production planning and control. **[8]**

Q9) a) Describe the factors to be considered while finalizing the plant location with suitable illustration. **[9]**

b) What is assembly line balancing? Explain Largest Candidate Rule method. **[8]**

OR

Q10) a) Explain need of store management. **[8]**

b) Explain following terms **[9]**

i) LCR method

ii) Push and Pull Production system

Q11) a) What do you understand by BEA? **[8]**

b) A company has given following information. **[9]**

Data	Rs.
Sales	2,00,000/-
Variable Overheads	1,20,000/-
Fixed Overheads	50,000/-
Net profit	30,000/-

Determine

i) P/V ratio

ii) BEP

iii) Margin of Safety

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.

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P2151

[Total No. of Pages : 2

[5254] -547
B.E. (Mechanical)
Product Life Cycle Management
(Open Elective) (2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***

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

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

Q1) Elaborate the role of various External Drivers in PLM implementation. **[10]**

OR

Q2) Discuss in detail PLM Life Cycle Model with all its phases. Explain significance. **[10]**

Q3) a) Discuss emergence of PLM from Product Data Management. **[6]**

b) What is Engineering Vault? Discuss in brief. **[4]**

OR

Q4) a) Explain the impact of any three Board Room Drivers on PLM. **[6]**

b) What is Product Reuse in Digital Life Cycle? Explain. **[4]**

Q5) Elaborate need and requirements of Product Life cycle Management System? Discuss its working in detail. **[16]**

OR

Q6) Explain in detail with structure and working product model and product information data model. Compare the characteristics. **[16]**

P.T.O.

Q7) a) Discuss key management issues in product data and product workflow. **[9]**

b) What is PLM strategy? Explain different principles of PLM strategy formulation. **[9]**

OR

Q8) Discuss in detail various data issues as Access, Applications, Archiving, Availability, Change, Confidentiality in PLM. **[18]**

Q9) Elaborate in detail various phases of product life cycle and corresponding technologies to be applied. **[16]**

OR

Q10) a) What is Change Management in Engineering. Discuss its implementation in PLM. **[8]**

b) Discuss the concept of Collaborative Engineering. How it is different from Concurrent Engineering? Explain. **[8]**

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P2152

[Total No. of Pages : 3

[5254] -548

B.E. (Mechanical)

AUTOMOBILE ENGINEERING

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain with neat sketch an 'Articulated Vehicle Layout'. **[5]**

b) Write note on Vacuum operated clutch. **[5]**

OR

Q2) a) Write short note with sketch on Continuous Variable Transmission. (CVT)**[5]**

b) Explain with neat sketch various loads acting on Vehicle Frame. **[5]**

Q3) a) Define with neat sketches the following terms related to steering geometry.**[6]**

i) Camber

ii) Scrub radius

iii) KPI (King Pin Inclination)

b) How tyres are rated and specified. **[4]**

OR

Q4) a) Explain with neat sketch 'Hotchkiss Drive'. **[5]**

b) What are different types of stub axles. Explain any one with neat sketch.**[5]**

Q5) a) What are different types of shock absorbers. Explain with neat sketch 'Telescopic type hydraulic shock absorber'. **[8]**

b) Explain with neat sketch Antilock Braking System (ABS). Write its advantages and limitations over other types. **[8]**

P.T.O.

OR

Q6) a) Explain with the help of suitable diagram Hydro gas suspension. State its merits and demerits. **[8]**

b) Explain with neat sketch the working principle of Hydraulic brakes and write its advantages and limitations. **[8]**

Q7) a) A Ashok Leyland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m^3, power is 77.3 KW at governed speed of 2400 rpm and maximum torque 345.8 N-m at 1400 rpm. Rear axle ratio is 6.166 : 1. Fourth speed reduction ratio in transmission is 1.605 : 1, drive line losses amount to 10.7 KW at 1400 rpm. Tyre size is 0.4572 m × 1.016 m (effective wheel diameter is 0.950 m), frontal area of truck is 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air conditions.

i) At Governed engine speed. **[6]**

ii) At speed of maximum torque in the equation $R = Kr. W + Ka. A.V^2$ **[4]**

Where, Kr = 0.014, Ka = 0.0462 and V in Km/h.

Overall gear ratio G = 6.166 × 1.605 : 1 = 9.9 : 1

b) Write short notes on the following (any two) **[8]**

i) NVH in automobiles

ii) Electrical car layout

iii) Air bag systems

OR

Q8) a) Write short notes on the following (any two) **[8]**

i) Road performance curves.

ii) Automatic seat belts.

iii) Roll over safety Regulations.

b) Explain with schematic diagram 'Solar Operated vehicle'. **[5]**

c) Write working principle of any type of tachometer. **[5]**

Q9) a) Explain the following (any two) **[8]**

i) Trafficator

ii) Electrical Horn

iii) Electric Wind Screen Wiper

b) Explain any two complaints of propeller shaft assembly along with four causes and remedies of each complaint. **[8]**

OR

Q10) a) Write short notes on following (Any Two) **[8]**

i) Traction Control Devices.

ii) Dashboard Instruments.

iii) Electrical Fuel Pump

b) Explain with neat sketch 'Lead Acid Battery'. Write its advantages and limitations over other types of batteries. **[8]**

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P2153

[Total No. of Pages : 4

[5254] - 549
B.E. (Mechanical Engg.)
COMPUTATIONAL FLUID DYNAMICS
(Semester - II) (Elective - IV) (2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right indicate full marks.***

4) ***Use of electronic pocket calculator is allowed.***

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

Q1) a) Write momentum equation in differential form. Identify the pressure gradient and diffusion terms in the momentum equation. Interpret its physical significance. **[6]**

b) In the context of CFD analysis of following engineering domains, explain the post processing **[4]**

i) Electronic cooling

ii) Brake pad heat dissipation

OR

Q2) a) Justify implicit methods are computationally costly. Comment on advantages of implicit methods over explicit methods. **[5]**

b) Discretize the second order partial differential term with suitable discretization method and show that **[5]**

$$\frac{\partial^2 u}{\partial x^2} = \frac{2u_i - 5u_{i+1} + 4u_{i+2} + u_{i+3}}{(\Delta x)^2}$$

P.T.O.

Q3) a) Consider one dimensional steady-state heat conduction in varying cross section horizontal fin as shown in Fig.1 The fin is subjected to the boundary conditions shown in Fig.1.

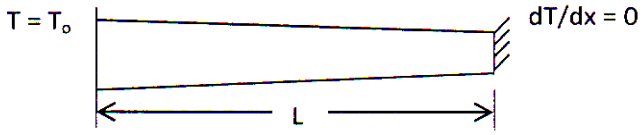


Fig.1 Fin

Above system results into following set of equations.

$$\begin{bmatrix} 1 & 2 & 0 & 0 \\ -1 & 1 & 2 & 0 \\ 0 & 1 & 3 & 1 \\ 0 & 0 & 2 & 2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \end{bmatrix} = \begin{bmatrix} 4 \\ 1 \\ 7 \\ 8 \end{bmatrix}$$

i) Write an algorithm to find out numerical solution of above system of equations. **[3]**

ii) Find temperature distribution (temperatures, T_1 to T_4) in the fin using same algorithm. **[4]**

b) Explain divergence of velocity. Explain the physical significance of it with suitable example. **[3]**

OR

Q4) a) Explain any two physical boundary conditions used in CFD analysis.**[2]**

b) Two parallel plates are separated by a fluid film of 0.04 m. The fluid between the plates has a kinematic viscosity 2.17×10^{-4} m^2/s and density of 800 Kg/m^3. The lower plate is stationary and upper plate is suddenly set in motion with a constant velocity of 40 m/s. Find the velocity distribution within the fluid in y direction for one time step of 0.5 sec. Use 5 nodes for finite differencing and apply crank Nicolson's implicit method. The governing equation reduced from Navier-Stokes equation is as given below **[8]**

$$\rho \frac{\partial u}{\partial t} = \mu \frac{\partial u^2}{\partial y^2}$$

Q5) a) Derive an expression of Lax-Wendroff method used for solving an initial value problem. What is stability condition for Lax-Wendroff method? Comment on the CFL number and order of accuracy of the method. **[10]**

b) Discretize the Convective – Diffusion equation using upwind difference approach. Comment on the accuracy of the method. **[8]**

OR

Q6) a) Compute solution for the first time step of the wave equation as given below **[10]**

$$\frac{\partial u}{\partial t} + C\frac{\partial u}{\partial x} = 0, \quad \text{c = constant} > 0$$

Using Lax - Wendroff scheme. The initial condition and boundary conditions are given below.

Initial condition : $u(x,0) = \begin{cases} x - x^2, & 0 \le x \le 1 \\ 0, & x > 1 \end{cases}$

Boundary condition : $u(0,t) = 0,$ for all t.

Take $\Delta x = 0.25,\ c\dfrac{\Delta t}{\Delta x} = 0.25$

b) Write an algorithm to find the numerical solution of second order wave equation. Give any suitable example and discuss its implementation. **[8]**

Q7) a) Differentiate between Finite difference method and finite volume method. **[6]**

b) Explain SIMPLE numerical technique. Write stepwise algorithm to find out the numerical simulation of flow through convergent divergent nozzle. **[10]**

OR

Q8) a) Write a note on finite volume method. Give the nomenclature of a discretized cell in finite volume method with neat schematics. Explain advantages of finite volume method. **[10]**

b) 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. **[6]**

Q9) a) Write any four characteristics of the turbulence. Explain its significance in brief. **[6]**

b) Write a grid generation method in any suitable commercial software. What are the important criteria considered for grid generation? Explain how grid quality affects the CFD solution. **[10]**

OR

Q10) a) Why do the results obtained through numerical methods differ from the exact solutions solved analytically? What are some of the causes for this difference? **[4]**

b) List any two advanced topics in CFD and discuss them briefly. **[6]**

c) What is turbulence modeling? Explain. k — ω model in detail. **[6]**

♦♦♦♦

Total No. of Questions : 10]

SEAT No. :

P2154

[Total No. of Pages : 4

[5254] - 550
B.E. (Mechanical)
FINITE ELEMENT ANALYSIS
(Elective - IV) (2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Draw suitable neat diagrams, wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if required.***

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

i) Effect of element aspect ratio on accuracy.

ii) Mesh refinement vs higher order elements.

b) Discuss the advantages and disadvantages of FEM over **[4]**

i) Classical method

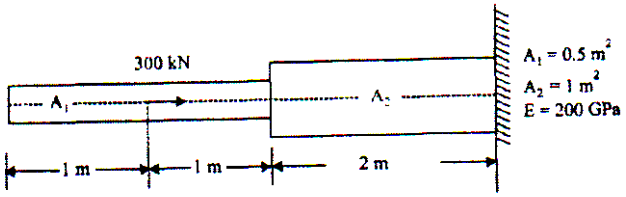
ii) Finite difference method

OR

Q2) a) Explain the principle of Rayleigh - Ritz method. **[6]**

b) Explain plane stress formulation and its importance. **[4]**

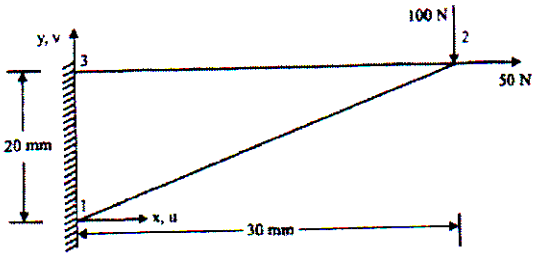
Q3) Determine the nodal displacements and element stresses by finite element formulation for the following figure. Use P = 300 kN; A_1, = 0.5 m^2; A_2 = 1 m^2; E = 200 GPa **[10]**



OR

P.T.O.

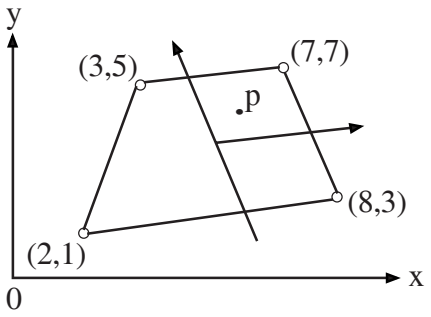
Q4) a) Calculate displacements and stress in a triangular plate, fixed along one edge and subjected to concentrated load at its free end. Assume E = 70,000 MPa, t = 10 mm and v = 0.3 **[6]**



b) What is meant by displacement function? Write down convergence criteria for Finite element Analysis. **[4]**

Q5) a) Explain the isoparametric concept in finite element analysis. **[6]**

b) Determine the Cartesian coordinate of the point P($\zeta = 0.25$, $\eta = 0.5$) shown in fig. **[6]**

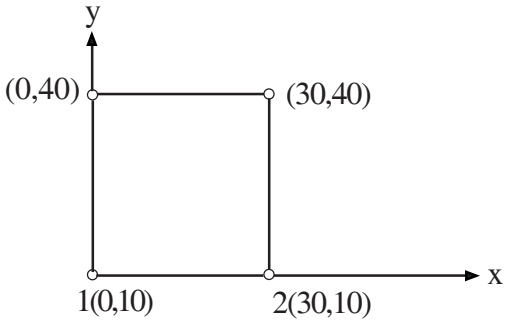


c) State and explain the three basic laws on which isoparametric concept is developed. **[6]**

OR

Q6) a) Explain the terms isoparametric, subparametric and superparametric elements. **[8]**

b) For the element shown in fig. assemble Jacobian matrix and strain displacement matrix for the Gaussian point (0.2578, 0.6550). **[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 0.6 m, k = 0.8 W/m°K. The inner surface is at 28°C and the outer surface is exposed to cold air at - 10°C. The heat transfer coefficient associated with the outside surface is 40 $W/m^{2^\circ}k$. 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 = 0.4 W/m °C) at the rate of 5000 W/m^3 The plate is 20 cm thick. Outside surface of the plate is exposed to ambient air at 30°C with a convective heat transfer coefficient of 20 $W/m^{2^\circ}c$. Determine the temperature distribution in the wall. **[10]**

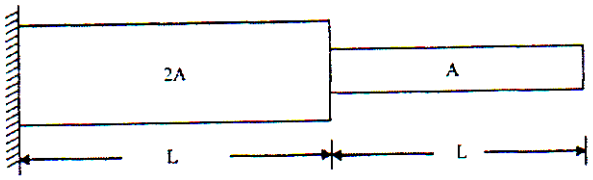
b) Derive FEA stiffness matrix for Pin Fin Heat Transfer problem. **[6]**

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 = 1000 mm^2 and 2A = 2000 mm^2 and of equal lengths (L = 1m), when it is constrained at one end, as shown below. **[10]**

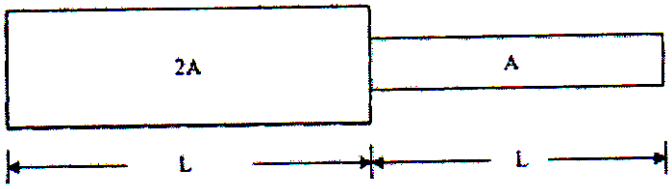


OR

Q10) a) Explain Each term of Dynamic Equation given below and explain importance of eigen values and eigen vectors. **[6]**

$$m\ddot{x} + c\dot{x} + kx = f$$

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]**



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Total No. of Questions : 10]

SEAT No. :

P2155

[Total No. of Pages : 3

[5254] -550-A
B.E. (Mechanical Engineering)
DESIGN OF PUMPS, BLOWERS AND COMPRESSORS
(Elective - IV) (Semester - II) (2012 Pattern)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, 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) Write note on : **[5]**

i) Compressible flow machines

ii) Incompressible flow machines

b) Explain performance characteristics curves for pumps. **[5]**

OR

Q2) a) Differentiate between compressible & incompressible flow machines. **[5]**

b) Explain the basic equation of energy transfer between fluid & rotor. **[5]**

Q3) a) Explain effect of acceleration in suction & delivery pipe on indicator diagram. **[5]**

b) A double acting reciprocating pump running at 40 rpm is discharging 1 m^3 of water per min. the pump has a stroke of 400 mm. The diameter of the piston is 200 mm. the delivery & suction head are 20 m & 5 m respectively. Find the slip of the pump & power required to drive the pump. **[5]**

OR

P.T.O.

Q4) a) What is slip in pump? Explain the meaning of negative slip. **[5]**

b) A single acting reciprocating pump has a plunger diameter 250 mm & stroke of 450 mm runs at 60 rpm. The length & diameter of delivery pipe are 60 m & 100 mm respectively. Determine the power saved in overcoming friction in the delivery pipe by fitting an air vessel on the delivery side of the sump. Assume friction factor = 0.01. **[5]**

Q5) a) Explain performance of axial fan with graph. **[8]**

b) How the dust erosion of centrifugal impeller does occur? What is its effect on the performance? **[8]**

OR

Q6) a) Enlist the methods to reduce the fan noise. **[8]**

b) Discuss various applications of fans & blowers. **[8]**

Q7) a) Explain UGV & DGV with velocity triangle. **[8]**

b) A centrifugal blower takes in 180 m^3/min of air at suction pressure of 1.013 bar & temperature of 430° C and delivers it at 750 mm of W.G. taking the efficiencies of the blower and drive as 80% & 82% respectively. Determine the power required to drive the blower and the state of air at exit. **[8]**

OR

Q8) a) Write short note on selection of blowers for a desired application. **[8]**

b) A centrifugal fan has the following data :

Inner diameter of the impeller	=	18 cm
Outer diameter of the impeller	=	20 cm
Speed	=	1450 rpm
relative velocity at entry	=	20 m/s
absolute velocity at entry	=	21 m/s
relative velocity at exit	=	17 m/s
absolute velocity at exit	=	25 m/s

flow rate = 0.5 kg/s

motor efficiency = 78%

Density of air = 1.25 kg/m^3

Determine

i) Stage pressure rise

ii) degree of reaction

iii) Power to drive the fan **[8]**

Q9) a) Explain enthalpy - entropy diagram for centrifugal compressor. **[8]**

b) Draw velocity triangles at the entry & exit for the following axial compressor stage. **[10]**

i) R = ½

ii) R < ½

OR

Q10) a) What are the basic design features in axial flow compressor? **[8]**

b) Draw & explain performance curves of centrifugal compressors. **[10]**

♦♦♦♦

Total No. of Questions : 12]

SEAT No. :

P2218

[Total No. of Pages : 3

[5254]-551
B.E. (Mechanical Sandwich)
AUTOMOBILE ENGINEERING (Self Study -III)
(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain the following terms: **[4]**

i) Air resistance

ii) Rolling resistance

b) Explain the construction of a truck chassis frame with a neat sketch. **[12]**

OR

Q2) a) Write advantages and disadvantages of frameless body construction. **[8]**

b) Explain the characteristics of Front engine front drive, Rear engine rear drive. **[8]**

Q3) a) Write the desirable characteristics of a good clutch lining material. **[8]**

b) Explain the working of a differential in rear axle with a neat sketch. **[8]**

P.T.O

OR

Q4) a) Explain merits and demerits of diaphragm type spring over coil type spring sued in clutch. **[8]**

b) Explain the working of a constant mesh gear box with a neat sketch. **[8]**

Q5) a) Explain centre point steering and cornering force. **[6]**

b) Explain the working of a shock absorber with a neat sketch. **[6]**

c) Explain the working of a power steering with a neat sketch. **[6]**

OR

Q6) a) Explain the working of a disc brake with a neat sketch. **[6]**

b) Explain merits and demerits of independent suspension. **[6]**

c) Write short on "ABS". **[6]**

SECTION - II

Q7) a) Describe various safety provisions adopted in modern automobile. **[8]**

b) Explain with example basic sensors used in automobile. Describe the purpose and advanatages of it. **[8]**

OR

Q8) a) What do you understand by active safety and passive safety of automobile? Explain. **[8]**

b) Describe procedure to regester to RTO, new vehicle passanger car, as per CMVR rules. **[8]**

Q9) a) Explain various performance parameters to check, when vehicle is manufactured. **[8]**

b) Draw a neat sketch of chassis Dynamometer and describe the function of each component on it. **[8]**

OR

Q10)a) Explain the various types of a crash tests performed in Laboratory. Justify answer with neat sketch. **[8]**

b) Describe what do you mean by stability of vehicle? What are factors responsible for it? Explain. **[8]**

Q11)a) Describe with neat sketch Multi-axle vehicle. **[10]**

b) With neat sketch explain the following: **[8]**

i) Hydraulic dozers

ii) Tankers

OR

Q12)Write short note on the following: **[18]**

i) Dumpers

ii) Windscreen wiper

iii) Automobile bumpers

▲ ▲ ▲

Total No. of Questions : 12]

SEAT No. :

P2219

[Total No. of Pages : 3

[5254]-552
B.E. (Mechanical Sandwich Engg.) (Semester -I)
POWER PLANT ENGINEERING
(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from section I and any three questions from section II.***

2) ***Answers to the two sections should be written in separate answer-books.***

3) ***Figures to the right indicate full marks.***

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

5) ***Use of scientific calculator, steam table, Mollier charts is allowed.***

SECTION - I

Q1) a) Write the classification of fuels? Explain in brief about Higher calorific value and Lower calorific Value. **[8]**

b) Explain Rankine cycle with P-v and T-s diagram. **[8]**

OR

Q2) a) Write the complete combustion equation for Octane (C_8H_{18}). Define the following terms: **[8]**

i) Stoichiometric air fuel ratio

ii) Equivalence ratio

iii) Actual air fuel ratio

b) Compare Pulverized bed combustion and Fluidized bed combustion systems along with their neat sketches. **[8]**

P.T.O

Q3) a) Explain with neat sketch of Cochran Boiler. **[8]**

b) Write a short note on "Coal Handling Systems". **[8]**

OR

Q4) a) Discuss about the Boiler Mountings and accessories. **[8]**

b) Explain with neat sketch Natural Draught. **[8]**

Q5) a) Explain site selection for hydro electric power plant. **[8]**

b) Explain with neat sketch of pelton wheel turbine. **[7]**

c) Write any three hydro power plants in India. **[3]**

OR

Q6) a) Write short note on

i) Dams and Penstocks **[8]**

ii) Hydrograph **[7]**

iii) Advantages of Hydro power plant **[3]**

SECTION - II

Q7) a) Explain with neat sketch working of Nuclear power plant? **[8]**

b) List out any three Nuclear power plant in India. **[4]**

c) What are the different types Nuclear wastes? **[4]**

OR

Q8) a) Draw the General layout of the Diesel Power plant showing all systems. **[8]**

b) Explain the components of the Nuclear reactor. **[8]**

Q9) a) Differentiate between open loop and closed loop gas turbine. **[8]**

b) Explain with neat sketch closed cycle MHD with liquid metal. **[8]**

OR

Q10)a) Write a short note on (any two)

i) Biomass power plant **[8]**

ii) Wind power station **[8]**

iii) Solar power plant **[8]**

Q11)a) Explain the terms: load factor, Reserve factor, plant use factor and capcity factor. **[6]**

b) Explain brief about selection type of generation. **[6]**

c) Explain the requirements of peak load plants. **[6]**

OR

Q12)a) Write short note on

i) Incremental fuel rate curves **[6]**

ii) Incremental fuel cost curve **[6]**

iii) Load allocation among various generators **[6]**

▲ ▲ ▲

Total No. of Questions : 10]

SEAT No. :

P2220

[Total No. of Pages : 6

[5254]-553
B.E. (Mechanical Sandwich)
MECHANICAL VIBRATIONS
(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.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data, wherever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) The following data refers to 90º two Cylinder V Engine. **[10]**

Mass of Reciprocating parts = 2 kg

Length of crank = 100 mm

Length of connecting Rod = 400 mm

Engine speed = 3000 R.P.M.

The crank is vertical and bisect the lines of reciprocation of pistons of the cylinders.

i) Examine the Engine for primary and secondary balancing, using concept of Direct and reverse crank for the analysis.

ii) Find also the maximum primary and secondary unbalance Forces.

OR

Q2) a) A uniform rigid rod is restrained to move vertically by both linear and torsional springs as shown in the Figure No. 1. Calculate the frequency of vertical oscillation of the rod. **[6]**

Assume the mass of the rod is 'm'.

P.T.O

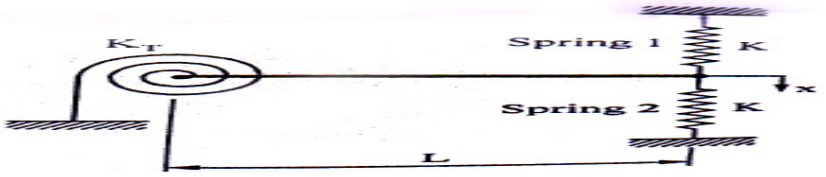

Figure No.1

b) Derive the equation of motion for single DOF undamped free vibratory system using Rayleigh's method. **[4]**

Q3) a) A mass (m) of 2 kg is suspended by a spring passing over a pulley. The system is supported horizontally by a spring of stiffness 1 kN/m. Determine the natural frequency of the system in Hertz using energy method. Refer Figure No. 2 **[6]**

i) Mass of pulley (M) 10 kg

ii) Radius of pulley 50 mm

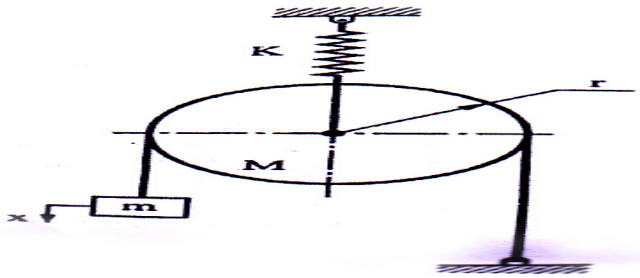

Figure No. 2

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

i) Logarithmic Decrement

ii) Damping Factor

iii) Critical damping coefficient

iv) Continuous system

OR

Q4) a) A machine weighing 20 kg is supported on two slabs of isolators natural rubber and Felt as shown in the figure No.3. The natural rubber slab has a stiffness of 4,000 N/m and Viscous damping coefficient of 150 Nsec/m. The Felt slab has a stiffness of 10,000 N/m and Viscous damping coefficient of 260 Nsec/m.Find: **[6]**

i) Undamped Natural Frequency of the system.

ii) Damped Natural Frequency of the system. (Neglect mass of isolators.)

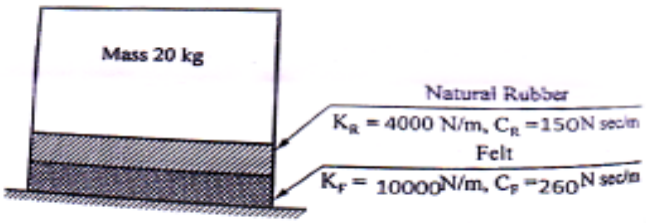

Figure No. 3

b) Classify different types of damping. Explain Eddy current damping in detail with sketch. **[4]**

Q5) a) A spring-mass-damper system is subjected to harmonic force of F=500sin 13.2 t. The value of spring stiffness is 50,000 N/m, damping factor is 0.2 and the mass of the system is 100 kg. For steady state vibrations of the system, determine **[8]**

i) Amplitude of motion of the system

ii) Phase angle

iii) Transmissibility

iv) Max. Dynamic force transmitted and Max.velocity of motion.

b) Explain in detail with plot **[8]**

i) Frequency Response curves

ii) Phase angle verses frequency ratio.

OR

Q6) a) A rotor of 12 kg mass is mounted midway on 2.5 cm diameter horizontal shaft simply supported in bearings at both the ends. The bearing span is 90cm. The center of gravity of the rotor is 0.02 mm away from its geometric center. The system rotates at 3000 rpm. Take E = 200 GPa. Determine **[8]**

i) Static deflection of shaft

ii) Critical speed of shaft in rad/sec.

iii) Amplitude of steady state vibrations

iv) Dynamic load on each bearing.

b) In a spring-mass-damper system, a mass 'm' is supported by spring of stiffness 'K' and a damper having damping constant 'C'. If the support is vibrating with motion $y = Y\sin\omega t$, Derive the expression for **[8]**

i) Absolute amplitude of vibration of mass

ii) Relative amplitude of vibration of mass.

Q7) a) Find the natural frequencies and amplitude ratios for the system shown in fig. No.4: **[10]**
Take K = 300 N/m, m_1 = 20 kg and m_2 = 35 kg

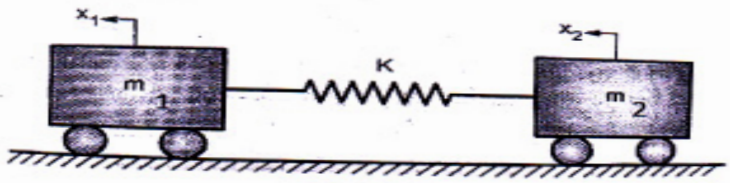

FIG. NO. 4

b) i) Explain with neat diagram mathematical model of a Car. **[8]**

ii) Define following terms related to two DOF system.

Mode shapes, Node point, Zero frequency and coupled differential equations.

OR

Q8) a) Determine the natural frequency for the system shown in Figure No.5 consider K_1 = 1,00, 000 N/m, K_2 = 20, 000 N/m, m_1 = 200 kg and m_2 = 50 kg. **[10]**

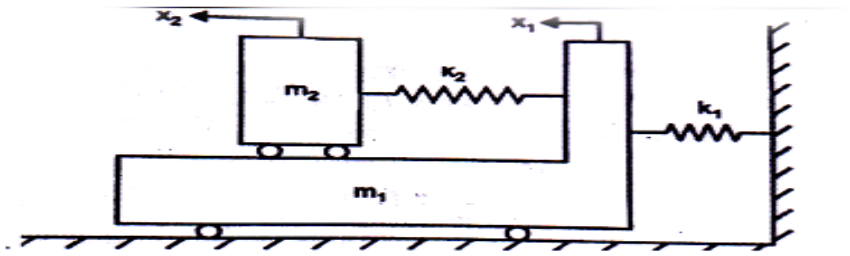

Figure No.5

b) Two rotors A and B are attached to the ends of the shaft of length 0.5.m The rotor 'A' weigh 300 N and its radius of gyration is 0.3 m and the corresponding values of rotor 'B' are 500 N and 0.5m respectively. The diameter and lengths of shafts are in meters as shown in Figure No.6 Take for shaft material i G = 85 GPa. Determine **[8]**

i) Equivalent length of the shaft (assume 0.1m diameter is the diameter of equivalent shaft)

ii) Position of node

iii) Frequency of torsional vibrations

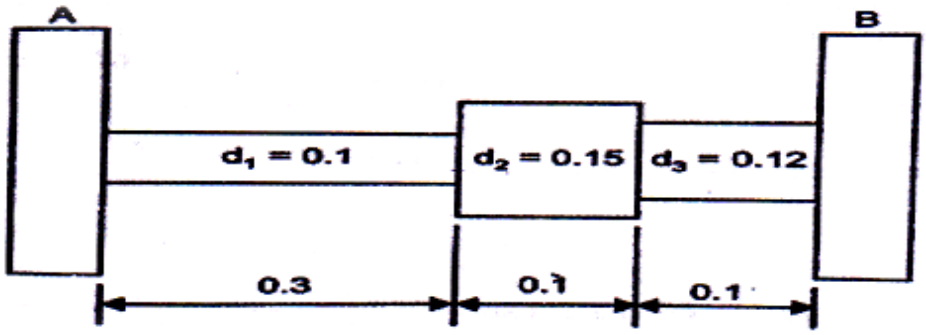

Fig. No. 6 (All dimensions are in meters)

Q9) a) What is FFT? Explain the working of FFT analyzer with the help of block diagram. State various applications of FFT analyzer. **[8]**

b) A seismic instrument is used to find the amplitude of vibration (acceleration) of a machine tool structure. It gives a reading of a relative displacement of 0.4μm. The natural frequency of the seismic instrument is 5 Hz. The machine structure is subjected to excitation frequency of 2 Hz. Find the magnitude of acceleration of the vibrating machine tool structure. Assume damping of seismic instrument is negligible. **[8]**

OR

Q10)a) What are different types of vibration exciters? Explain with diagram principle and working of Electro dynamic Exciters. **[6]**

b) Explain in detail time and frequency domain vibration analysis techniques in detail. **[6]**

c) What is vibration absorber? Explain any one in detail. **[4]**

▲ ▲ ▲

Total No. of Questions : 8]

SEAT No. :

P2221

[Total No. of Pages : 3

[5254]-554

B.E. (Mechanical -Sandwich) (Mechanica) (Semester -II)

INDUSTRIAL HYDRAULICS & PNEUMATICS

(2012 Pattern)

Time :2.½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer to all questions should be written in one answer sheet only.***
2) ***Neat diagrams to be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are the properties of Hydraulic fluids. **[6]**

b) Explain in detail the energy losses in hydraulic systems. **[6]**

c) Explain construction and working of Balanced vane pump. **[8]**

OR

Q2) a) Explain construction & working of "Counter Balance Valve". **[8]**

b) Describe in detail the "Reservoir Assembly" **[6]**

c) Explain with neat sketch the working of Weight Loaded Accumulator". **[6]**

Q3) a) Write short note on "Synchronization Ckt". **[8]**

b) Write short note on "Regenerative Ckt". **[8]**

OR

Q4) a) Write short note on "sequencing circuit". **[8]**

b) Explain in detail the sources of contamination and types of contamination. **[8]**

P.T.O

Q5) a) Write short note on "Mufflers lubricators & Air Dryers" used for pneumatic system. **[8]**

b) Explain selection criteria for compressors in detail. **[8]**

OR

Q6) a) Explain in detail the types of vaccum pumps. **[8]**

b) Explain in detail the advantages and applications of pneumatics in industrial Automoation. **[8]**

Q7) a) Explain Design parameter considerations for designing a Hydraulic system. **[9]**

b) Explain design parameter considerations for designing a pneumatic system. **[9]**

OR

Q8) A machine tool slide is to be moved by means of hydraulic cylinder as follows.

a) It initially moves through a distance of 200mm against a load of 08 kN in 05 seconds.

b) It follows a working stroke of 110mm against a load of 30 kN. The feed rate is between 0.5 to 01 m/min.

c) The return stroke is as fast as possible. Draw and design suitable Hydraulic ckt. for above requirements. Select different components from data given. **[18]**

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S_1	38
S_2	76
S_3	152

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.3
F_4	70	0-24.6

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

9. Cylinder-(Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

2. Pressure Gauge :

Model	Range (bar)
PG_1	0 - 25
PG_2	0 - 40
PG_3	0 -100
PG_4	0 - 160

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R_1	11.4	70
R_2	19	210
R_3	30.4	70
R_4	57	105

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D_1	350	19
D_2	210	38
D_3	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

10. Oil Reservoirs :

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

▲ ▲ ▲

Total No. of Questions : 10]

SEAT No. :

P2222

[Total No. of Pages : 6

[5254]-555
B.E. (Mechanical Sandwich)
REFRIGERATION & AIR CONDITIONING
(2012 Pattern)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the effect of following on COP of vapour compression refrigeration system with schematic Ph diagram- **[4]**

i) Condensing temperature

ii) Suction gas superheat in the suction pipe line

b) A refrigerator working on Carnot cycle has refrigerating COP of 5. **[6]**

i) Determine the ratio of T1/T2

ii) If the work done is 5 kW, determine the maximum refrigeration effect in TR.

iii) If this cycle is used as heat pump, determine the COP and heat delivered.

OR

Q2) a) Why COP of Bell Coleman cycle is lower than Carnot cycle? Explain with the help of T-s diagram. **[4]**

b) A Bell-Coleman refrigerator of 5 TR capacity operates between 1 bar & 6 bar. Air temperature at the inlet of compressor and expander are 15° C and 35°C respectively. Both compression and expansion indices are 1.2.Find- **[6]**

P.T.O

i) Mass of air circulation per minute.

ii) Power required.

iii) COP

Q3) a) What are Zeotropes and Azeotropes? How they are designated? **[4]**

b) A vapour compression refrigeration system working on R 134a operates between -10° C and 38° C. The liquid refrigerant is sub cooled to 32° C. The vapour leaving evaporator is dry saturated. Assuming isentropic compression calculate: **[6]**

i) Refrigeration effect in kJ/kg.

ii) Work of Compression in kJ/kg

iii) COP

Properties of ammonia R 134a

Temperature	Specific Enthalpy kJ/kg		Specific Entropy kJ/kgk		Specific Heat kJ/KgK	
°C	Liquid	Vapour	Liquid	Vapour	Liquid	Vapour
–10	186.70	392.66	0.9506	1.7334	1.316	0.854
32	244.62	415.78	1.1529	1.7138	1.4561	1.080
38	253.43	418.55	1.1811	1.7118	1.4871	1.127

OR

Q4) a) List down the desirable properties of Refrigerant-Absorbent combination used in vapour absorption refrigeration system. **[6]**

b) Explain cascade system with simple schematic arrangement diagram. **[4]**

Q5) a) In a cooling application, moist air enters a refrigeration coil at a rate of 100 kg da/min at 35° C DBT and 25° C WBT. The ADP of the coil is 15° C and bypass factor is 0.2 Determine: **[8]**

i) Outlet state of the moist air (DBT & W)

ii) Rate of water removal from the air kg/min

iii) SHF of the process

iv) Refrigeration capacity in TR

b) For determining cooling capacity of air conditioning system for an office, what different factors are to be considered? How dehumidified air quantity is calculated? **[6]**

c) Define- **[4]**

i) Degree of saturation

ii) Relative humidity

OR

Q6) a) Obtain the following properties of moist air at 30º C DBT and 25º C WBT without using psychrometric chart. **[8]**

i) Partial pressure of water vapour

ii) RH

iii) Specific humidity

iv) Air density

v) Vapour density

vi) Enthalpy of moist air

Assume barometric pressure 1.01325 bar.

Steam properties - Psat at 30ºC: 0.00425 MPa and Psat at 25ºC: 0.00317 MPa

b) What are the six primary factors affecting thermal comfort? Explain ASHRAE comfort zone. **[6]**

c) Explain following terms: **[4]**

i) Humidity ratio

ii) Wet bulb temperature

Q7) a) Explain Variable Refrigerant Volume systems with neat sketch. What are the advantages of VRVs over a central air conditioning plant. **[8]**

b) What are the different ways of classifying refrigeration compressors? Explain any one type with neat sketch. **[8]**

OR

Q8) a) What different type of expansion devices are used in refrigeration system? Explain working of Thermostatic Expansion Valve with neat sketch. What are the advantages of Thermostatic expansion valve. **[8]**

b) Explain working of screw compressor with neat sketch. **[4]**

c) Compare VAV with fixed air volume system. **[4]**

Q9) a) What are the different ways of classifying ducts? **[4]**

b) What materials are commonly used for duct fabrication? What are the IS standards for guage of GI sheets? **[4]**

c) What are the different types of pressure losses in duct systems? **[4]**

d) List different types of fans used in AHU. Why forward curved blowers are preferred for domestic and commercial air conditioning applications. **[4]**

OR

Q10) a) Derive equation for circular equivalence of rectangular duct for the two alternatives- **[8]**

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 is the empirical relation used for determining frictional pressure loss in GI ducts? Write a short note on duct friction chart. **[8]**

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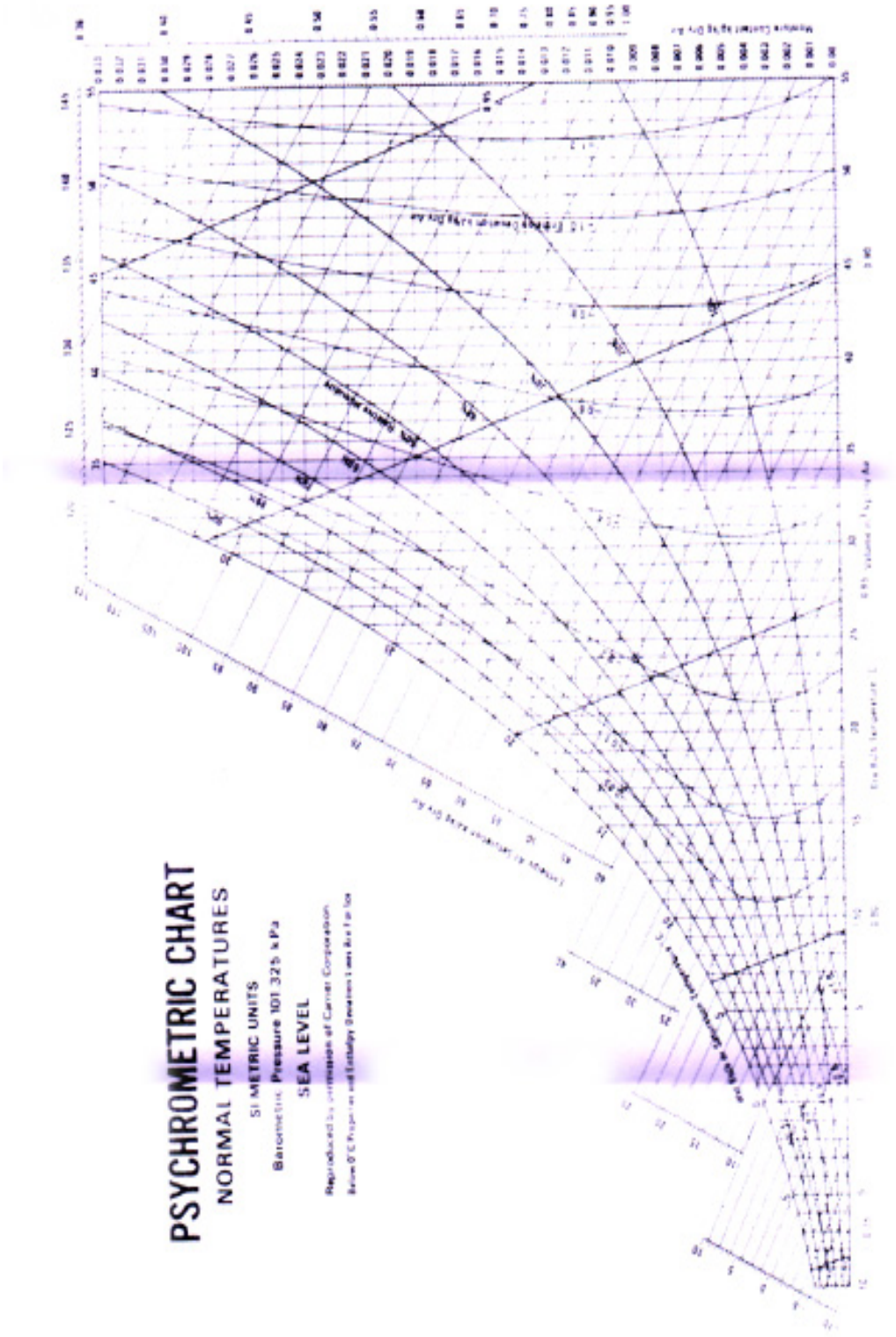
PSYCHROMETRIC CHART
NORMAL TEMPERATURES
SI METRIC UNITS
SEA LEVEL

Total No. of Questions : 10]

SEAT No. :

P2223

[Total No. of Pages : 3

[5254]-556
B.E. (Mechanical Sandwich)
COMPUTATIONAL FLUID DYNAMICS (Elective -I)
(2012 Pattern)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Describe the physical meaning of substantial derivative with a practical example. **[7]**

b) Consider a laminar boundary layer that can be approximated as having a velocity profile u(x) = $U_\infty y / \delta$ where δ = $Cx^{½}$, C is a constant is free stream velocity, is the boundary layer thickness. Considering 2 dimensional flows, determine vertical component of velocity v inside the boundary layer. (Make use of differential form of continuity equation).**[7]**

δ

OR

Q2) a) Describe the various flow models used to investigate a fluid flow. State what are conservation and non conservation form of the governing equations? **[7]**

b) Discuss about the Governing equations in CFD. **[7]**

Q3) a) What is discretization? Comment further on it in relation with consistency and stability of governing equations. **[7]**

b) Derive the following finite difference approximation for applications in

P.T.O

two dimensional fluid flow at point (i,j) **[7]**

OR

Q4) a) Explain what you mean by an implicit solution method and an explicit solution method. Also discuss merits and demerits of these two methods. **[7]**

b) Why relaxation techniques are needed in numerical calculations, explain how under relaxation and over relaxation works in numerical calculations. **[7]**

Q5) a) Solve following Tridigonal Matrix system using Thomas algorithm **[7]**

$$\begin{bmatrix} 2.25 & -1 & 0 & 0 \\ -1 & 2.25 & -1 & 0 \\ 0 & -1 & 2.25 & -1 \\ 0 & 0 & -2 & 2.25 \end{bmatrix} = \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \end{bmatrix} \equiv \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\frac{\partial^4 y}{\partial x^2} \equiv \frac{y_{i-2,j} - 4y_{i-1,j} + 6y_{i,j} - 4y_{i+1,j} + y_{i+2j}}{(\Delta x)^4} + O(\Delta x)^2$$

b) What do you mean by Dirichlet, Neumann and Mixed boundary conditions give an example of each. **[7]**

OR

Q6) a) For one dimensional Transient heat conduction, formulate the finite difference expression **[7]**

i) Explicit form

ii) Crank Nicholson (semi implicit) form

b) Explain the solution algorithm for Tridiagonal Matrix encountered in CFD calculations. **[7]**

Q7) a) Explain what is Stability and stability criteria? **[7]**

b) Explain Mac Cormac Scheme with a suitable equation. **[7]**

OR

Q8) 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. **[14]**

Q9) What is Turbulence modeling? Explain k ε-model in detail. **[14]**

OR

Q10) Write short note on any two of the following: **[14]**

a) Use of CFD simulation in automobile industry

b) Types of Grids used in CFD simulations

c) Examples of X-Y plots and contour plots and vector plots in post processing.

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Total No. of Questions : 10]

SEAT No. :

P2224

[Total No. of Pages : 5

[5254]-557

B.E. (Mechanical Sandwich Engineering) (Semester -II)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2012 Pattern) (Elective -I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2,Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat 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: Po_1 = 1.008 bar, T_{01} = 300 K, C_p = 1.009 kJ/kg K

Calculate the power required to drive the compressor?

P.T.O

Q3) a) What is slip? Explain the negative slip with neat sketch. **[5]**

b) The cylinder bore diameter of a single acting reciprocating pump is 150 mm and its stroke length is 300 mm. The pumps runs at 50 r.p.m. and lifts water through a height of 25m. The delivery pipe is 22m long and 100 mm in diameter. Find the theoretical discharge and the theoretical power required to run the pump. If the actual discharge is 4.2 liters/s. Find the percentage slip. Also determine the acceleration head at the beginning and middle of the delivery stroke. **[5]**

OR

Q4) a) Explain the Air vessel in Reciprocating Pumps? **[5]**

b) A single acting reciprocating pump has piston diameter 12.5 cm and stroke length 30cm. The center of the pump is 4m above the water level in the sump. The diameter and length of suction pipe are 7.5 cm and 7m resp. The separation occurs if the absolute pressure head in the cylinder during suction stroke falls below 2.5 m of water. Calculate the maximum speed at which the pump can run without separation. Take atmospheric pressure head = 10.3 m of water. **[5]**

Q5) a) Explain the different Mechanical losses in fans and blowers? **[8]**

b) A centrifugal fan has the following data: **[8]**

Inner diameter of the impeller	18cm
Outer diameter of the impeller	20cm
Speed	1450 rpm

The relative and absolute velocities respectively are

At entry	20 m/s, 21 m/s
At exit	17 m/s, 25 m/s
Flow rate	0.5 kg/s
Motor efficiency	78%

Determine-

i) Stage Pressure rise

ii) Degree of reaction

iii) The power to drive the fan

Take density of air as 1.25 kg/m^3

OR

Q6) a) Discuss the various applications of fans & blowers **[8]**

b) A centrifugal blower with a radial impeller produces a pressure equivalent to 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 $0.2u_2$. 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	10º
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 = 37ºC 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	36cm
iv)	Rotational Speed	18000 rpm

v)	Blade Height at entry	6 cm
vi)	Air angles at rotor and stator exit	25º
vii)	Axial velocity	180 m/s
viii)	Work done factor	0.88
ix)	Stage Efficiency	85%
x)	Mechanical Efficiency	96.7%

Determine:-

i) Air angles at the stator and rotor entry

ii) The mass flow rate of air

iii) The power required to drive the compressor

iv) The loading coefficient

v) The pressure ratio developed by the stage

vi) 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, To1=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. :

P2225

[Total No. of Pages : 3

[5254]-558
B.E. (Mechanical Sandwich Engineering)
CAD/CAM AND AUTOMATION (Elective -I)
(2012 Pattern)

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 indicate full marks.***

4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

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

Q1) a) Explain reflection of geometrical entity about line $y = mx + c$, with schematic representation and write concatenated transformation matrix. **[6]**

b) Compare analytical and parametric curve with example of circle. **[4]**

OR

Q2) a) Compare geometrical Transformation and mapping. **[4]**

b) Circle is drawn with centre at(5,5) and radius 4 units write parametric equation of circle in recursive form and find number of points on cirlce if increment in angle $\Delta\mu = 30^{o}$. **[6]**

Q3) a) Compare Brep and CSG Technique of solid modeling with neat sketch. **[6]**

b) Derive expression of stiffness matrix for truss elements. **[4]**

P.T.O

OR

Q4) An axial step bar is shown in figure 1. Determine deflection,stresses and reaction force. **[10]**

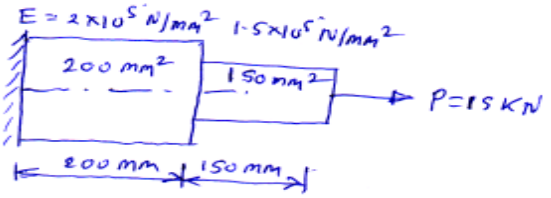

Figure 1

Q5) a) Explain linear, circular CW and circular CCW interpolation with G word format. **[6]**

b) Write CNC part program for roughing and finishing cycle using canned cycle for turned components as shown in figure 2. Assume suitable cutting data: **[12]**

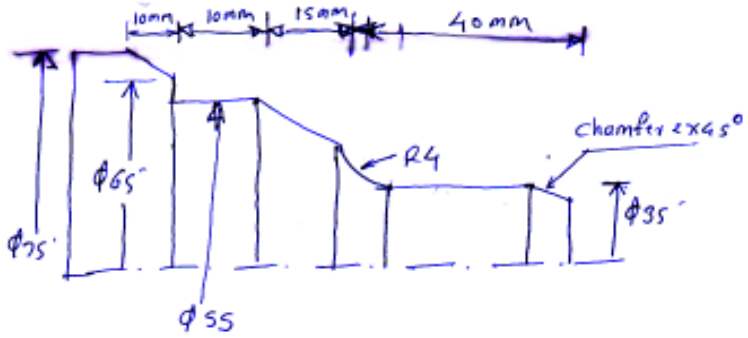

Figure 2

OR

Q6) a) Explain G28 G04 M03 G41 code in part programming. **[6]**

b) Explain canned cycle for drilling and boring for milling components. **[6]**

c) Compare the incremental and absolute method of programming with G code. **[6]**

Q7) a) Classify various R.P. process. **[6]**

b) Explain 3-D printing process. **[10]**

OR

Q8) a) Explain Laminated object manufacturing (LOM) modeling method of rapid prototyping with advantages and limitation. **[12]**

b) List R.P. applications. **[4]**

Q9) a) Draw work envelopes for various robot configurations. Explain the articulated configuration Robot with neat sketch. **[10]**

b) Explain mechanical gripper with figure. **[6]**

OR

Q10)a) Compare various Automations. **[8]**

b) Explain various elements of FEM. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2226

[Total No. of Pages : 4

[5254]-559
B.E. (Mechanical S/W)
ENERGY AUDIT AND MANAGEMENT
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagram must be drawn wherever necessary.***

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

3) ***Use of electronic pocket calculator is allowed.***

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

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

i) Primary & Secondary energy sources.

ii) Primary energy consumption & final energy consumption.

b) Explain targeted energy audit & its importance. **[4]**

OR

Q2) a) Explain detailed energy audit. **[6]**

b) Explain following instruments used in Energy Audit with their application: **[4]**

i) Ultrasonic leak detector

ii) Lux meter

P.T.O

Q3) a) What is the NPV of an energy conservation project with cash flow given below: **[6]**

Initial investment	Rs.(2,000,000)
Saving in Year	Cash Flow
1	Rs.400,000
2	Rs.400,000
3	Rs.600,000
4	Rs.600,000
5	Rs.700,000

The discount rate k = 10%. Is the proposal attractive?

b) Write a short note on simple payback period with the advantages of this method. **[4]**

OR

Q4) a) An air pre-heater costs Rs.400,000 and will last for 5 years. It will generate a saving of Rs.140,000 per year with a maintenance cost of Rs.20,000 per year. The discount rate is 10% and salvage value is Rs.10,000 at the end of 5^{th} year. Is the proposal attractive by NPV method? **[6]**

b) What is return on investment? **[4]**

Q5) a) What are the different losses in a boiler system. which are considered in Indirect method for calculating boiler efficiency? Explain with neat sketch. Write formula for calculating boiler efficiency by Indirect method. **[8]**

b) What are the different opportunities for saving energy in central chilled water plant. **[8]**

OR

Q6) a) Explain direct and indirect method of performance evaluation of a furnace with their advantages & disadvantages. **[8]**

b) Find out the efficiency of the boiler by direct method with the data given below: **[8]**

Type of boiler: Coal fired

Quantity of dry saturated steam generated: 12TPH

Steam pressure(gauge) and Temperature: 10kg/m^2(G) and 200ºC

Quantity of coal consumed: 2.1 TPH

Feed water temperature: 75ºC

Gross calorific value of coal: 12000 kJ/kg

Enthalpy of saturated steam at 10 kg/m^2 (G) pressure: 1785 kJ/kg

Enthalpy of feed water: 320 kJ/kg

Q7) a) Explain step by step approach for maximum demand control. **[8]**

b) Write a short note on-energy saving opportunities with electrical system. **[8]**

OR

Q8) a) What is power factor? What are the benefits of improving power factor? **[8]**

b) A 50 kW induction motor with 86% present full load efficiency is being considered for replacement by a 89% efficiency motor. What will be the savings in energy if the motor works for 6000 hours per year and cost of energy is Rs.4.50 per k Wh? **[8]**

Q9) a) Explain the concept of co-generation and its potential benefits with a neat sketch. **[8]**

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

i) Recuperator

ii) Regenerator

c) How does a shell & tube heat exchange work? **[4]**

OR

Q10)a) Explain various topping cycle cogeneration systems. **[8]**

b) What are the direct and indirect benefits of Waste Heat Recovery plant? **[6]**

c) Explain working heat wheel with neat sketch. **[4]**

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Total No. of Questions : 10]

SEAT No. :

P2227

[Total No. of Pages : 6

[5254]-560
B.E. (Mechanical/Sandwich Engineering)
OPERATIONS RESEARCH (Semester -II)
(2012 Pattern) (Elective -II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***

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

3) ***Use of calculator is permitted.***

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

Q1) a) Define terms of Linear programming: Basic Solution, Feasible Solution. **[4]**

b) Obtain the optimal strategies for both persons and the value of game for two person zero sum game whose pay off matrix is as follows (Use graphical Method) **[6]**

		Player B	
		B1	B2
Player A	A1	1	–3
	A2	3	5
	A3	–1	6
	A4	4	1
	A5	2	2
	A6	–5	0

OR

Q2) a) Explain Hungarian Method to solve assignment problems. **[4]**

P.T.O

b) Find out the initial feasible solution by **Vogel's Approximation Method (VAM)** **[6]**

Destinations

Plants or Origins	1	2	3	4	Supply
1	2	3	11	7	6
2	1	0	6	1	1
3	5	8	15	9	10
Requirement	7	5	3	2	Total = 17

Q3) a) What is balanced and unbalanced transportation problem? **[4]**

b) Five jobs are to be assigned to 5 machines to minimize the total time required to process the jobs on machines. The time is in hours for processing each job on each machine is given in the following matrix. Make assignment of jobs to machines so that total assignment cost should be reduced. **[6]**

Machines

		A	B	C	D	E
Jobs	1	2	4	3	5	4
	2	7	4	6	8	4
	3	2	9	8	10	4
	4	8	6	12	7	4
	5	2	8	5	8	8

OR

Q4) a) Explain the break even chart. **[4]**

b) The annual demand of parts is 3200. The unit cost is Rs. 6 and inventory carrying charges are estimated as 25% per annum. If the cost per procurement is Rs. 150 find: **[6]**

i) Economic order quantity

ii) Time between two consecutive orders

iii) Number of orders per year

iv) The optimum cost

Q5) a) What are the situations which make replacement of items necessary?**[6]**

b) An engineering is offered two types of material handling equipments A and B. A is priced at Rs. 5,00,000 including the cost of installation and the cost for the operation and maintenance are estimated as Rs 60,000 for each of the first 5 years and increasing every year by Rs.20,000 in the sixth and the subsequent year. Equipment B the same rated capacity is priced at Rs.2,50,000 including the cost of installation and the cost for the operation and maintenance are estimated as Rs 1,20,000 for each of the first 5 years ane increasing every year by Rs.20,000 in the fifth year onwards. The company expected the return of 10% on all its investment. Neglect the scrap value of the equipment at the end of its economic life, determine which equipment the company should buy? **[10]**

OR

Q6) a) Explain detailed procedures to solve problems of dynamic programming. **[6]**

b) A manufacturer has to supply his customers with 600 units of his product per year. Shortage are not allowed and storage amount of 60 paise per unit per year. The set up cost per run is Rs.80.00. Find out the **[10]**

i) Economic ordering quantity

ii) Minimum yearly average cost

iii) Minimum yearly total inventory cost. When the cost per unit item is 2/- per unit.

iv) Optimum number of orders per year

v) The optimum period of supply per optimum order.

The increase in the order cost associated with ordering (i) 20% more than the EOQ.

Q7) a) What is the need of simulation? How can you use simulation to solve industrial problems? **[6]**

b) Six jobs are to be process on three machines. the processing time is as follows, Find the optimal schedule so that the total elapsed time is minimized. **[10]**

Job	J1	J2	J3	J4	J5	J6
Machine M1[Turning]	10	3	5	4	2	1
Machine M2[Threading]	2	4	6	3	1	2
Machine M3[Knurling]	8	6	7	9	7	7

OR

Q8) a) Explain with the help of neat sketch a generalized queuing model. **[6]**

b) A road transport company has one reservation clerk on duty at a time. He handles the information of bus schedules and makes reservations. Customers arrive at the rate of 8 per hour and the clerk can arranges, service 12 customers per hour. After stating your assumptions answer the following. **[10]**

i) What is the average number of customers waiting for the service?

ii) What is the average time a customer has to wait before being served?

The manager is contemplating to install a computer system for handling information and reservations. This is expected to reduce the service time from 5 minutes to 3 minutes. The additional cost of having new system is Rs.50 /day. If the cost of goodwill of having to wait is estimated to be 12 paisa per minute spent waiting, before being served, should company install the computer system. Assume an 8 hour working day.

Q9) a) Explain the rules devised by Fulkerson **[6]**

b) Estimated time for the jobs of a project are given below: **[12]**

Job	A	B	C	D	E	F	G	H	I	J	K	L
Time (Weeks)	13	5	8	10	9	7	7	12	8	9	4	17

The constraints governing the job are

A & B are start jobs; A controls C, D & E; B controls F & J; G depends on C; H depends on D; E & F controls I & K; K follows J; L is also controlled by K; G,H,I & L are the last jobs. Draw the network, determine float for each activity, project duration and the critical path.

OR

Q10) Consider the project having following activities and their time estimates: **[18]**

Job	A	B	C	D	E	F	G	H	I	J	K	L	M
Optimistic Time	3	4	5	9	4	3	5	1	2	7	4	8	6
Most likely Time	4	8	6	15	6	4	6	3	4	8	5	9	7
Pessimistic Time	5	10	8	10	8	5	8	4	5	10	6	13	8
Immediate Predecessors	--	--	B	A, C	B	D, E	D, E	D, E	G	F,I	G	H	J,K, L

i) Draw the network for the project

ii) Compute the expected project completion time

iii) What should be the due date to have 0.9 probability of completion

iv) Find the E & L values for all events

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Total No. of Questions : 10]

SEAT No. :

P2228

[Total No. of Pages : 3

[5254]-560 -A
B.E. (Mechanical Sandwich)
ROBOTICS (Elective -II)
(2012 Pattern)

Time : 2 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 the D-H Convention with neat sketch. **[5]**

OR

Q2) a) Explain the gometric approach. **[5]**

b) Write a short note on algebraic approach. **[5]**

Q3) a) Explain the following notations used to describe robot system. **[5]**

i) RLR

ii) LL-TRL

b) What is the physical significance of angular velocity vector. **[5]**

OR

P.T.O

Q4) a) What are homogeneous transformation, explain its importance. **[5]**

b) Explain velocity and force transformation. **[5]**

Q5) a) Explain the significance of Singularities. **[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) A two jointed robot as shown in Fig. 1 has length of its arm as 15cm. and 20cm. The first arm makes and angle of 20º and second arm makes an angle of 35º to the first arm. Compare the co-ordinate position for the end of the arm. **[10]**

b) (UVW) is obtained from (XYZ) by rotation of 90º about Z-axis followed by rotation of 90º 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 general block diagram of robot control system. **[8]**

b) Explain PID types of controllers used in industrial robots. **[8]**

OR

Q8) a) Explain Cartesian space trajectory planning. **[8]**

b) Describe the different steps in trajectory planning. **[8]**

Q9) a) Explain the different steps involved in segmentation. **[8]**

b) Describe the elements of the Artificial intelligence. **[8]**

OR

Q10)a) Explain the forward and backward search technique in problem solving for AI. **[8]**

b) Explain with neat block diagram of machine vision system. **[8]**

▲ ▲ ▲

Total No. of Questions : 10]

SEAT No. :

P2229

[Total No. of Pages : 4

[5254]-560 -B
B.E. (Mechanical Sandwich) (Semester -II)
TRIBOLOGY (Elective -II)
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any three questions.***

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right indicate full marks.***

4) ***Use of logarithmic tables and electronic pocket calculator is allowed.***

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

Q1) a) Discuss the effect of following on coefficient of friction between two surfaces- **[4]**

i) Surface finish

ii) Sliding velocity

b) Explain different regimes of hydrodynamic lubrication with the help of Sribeck curve. **[6]**

OR

Q2) a) What is friction? Explain the laws of dry friction. **[4]**

b) 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

P.T.O

Q3) a) Using diagram show the pressure distribution along the axis and the circumference in infinitely narrow/short hydrodynamic journal bearing. **[4]**

b) Explain the importance of recycling of used oils. Explain different ways of disposal of used oil. **[6]**

OR

Q4) a) Following data is given for full hydrodynamic journal bearing. **[10]**

Radial load of	= 3.2 kN
Journal speed	= 1440 r.p.m.
Journal diameter	= 50 mm
Bearing length	= 50 mm
Viscosity of lubricating oil	= 20 cP
Radial Clearance	= 0.05 mm

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing. Use Raimondi and Boyd chart given in table no.-I and calculate:

i) Minimum oil film thickness

ii) Total oil flow in litter/minutes,

iii) Side leakage,

iv) Maximum oil film pressure,

v) Eccentricity,

vi) Angle of eccentricity or attitude angle

Table no.-I Dimensionless performance parameters for full hydrodynamic journal bearing.

I/d	ε	h_o/c	S	Φ	(r/c)f	Q/rcn_sI	Qs/Q	p/p_{max}
1	0.1	0.9	1.33	79.5	26.4	3.37	0.150	0.540
	0.2	0.8	0.631	74.02	12.8	3.59	0.280	0.529
	0.4	0.6	0.264	63.10	5.79	3.99	0.497	0.484
	0.6	0.4	0.121	50.58	3.22	4.33	0.680	0.415
	0.8	0.2	0.0446	36.24	1.70	4.62	0.842	0.313
	0.9	0.1	0.0188	26.45	1.05	4.74	0.919	0.247
	0.97	0.03	0.00474	15.47	0.514	4.82	0.973	0.152

Q5) a) Derive an expression for viscous flow through a rectangular slot [slit] for a constant viscosity. What are the assumptions made while deriving the equation? **[8]**

b) A circular plate is approaching an oily fixed plane surface with velocity 'V' at the instant, the film thickness is h_1, if both the surfaces are separated by a lubricant of viscosity 'μ'. Derive the expression for the time 't' taken to reduce the film thickness from h_1 to h_2. **[10]**

OR

Q6) a) Derive relation for load carrying capacity in terms of supply pressure for thrust bearing. **[12]**

b) State and explain different types of energy losses in hydrostatic bearing. **[6]**

Q7) a) Explain the phenomenon of Elastohydrodynamic lubrication [EHL] and how it differs from hydrodynamic lubrication. State the applications of EHL. **[8]**

b) Explain gas lubricated bearings and state advantages and disadvantages/ limitations of gas bearings. **[8]**

OR

Q8) a) Explain the significance of the Hertz theory in Elastohydrodynamic Lubrication. Write Ertel -grubin equation with all specific terms and also write the limitations of this equation. **[8]**

b) Explain the working principle of active and passive magnetic bearing. Also mention its types. **[8]**

Q9) a) What are the different Properties and parameters of coatings, explain in brief. **[10]**

b) Explain the mechanics of tyre-road interactions. **[6]**

OR

Q10) Write a note on following:

a) Foil bearing **[5]**

b) Lubrication requirements in case of Rolling operation **[5]**

c) Cladded Coating **[6]**

▲ ▲ ▲

Total No. of Questions : 9]

SEAT No. :

P2230

[Total No. of Pages : 3

[5254]-561
B.E. (Automobile) (Semester -I)
AUTOMOTIVE REFRIGERATION & AIR CONDITIONING
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Figures to the right side indicate full marks.***

2) ***Use of steam tables, slide rule, electronic calculator, and psychrometric chart is allowed.***

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

4) ***Solve 5 question 1 or 2, 3 or 4, 5 or 6, 7 or 8,9 is compulsory.***

SECTION - I

Q1) a) The capacity of refrigerator of 450 TR when working between -15ºC and 30ºC find mass of ice produced at 0º C with 24 hrs when water is supplied at 20ºC also find out the minimum power required and heat in condenser in kw assume the machine to be working on reversed carnot cycle take Cp_w = 4.18 kJ/kgºC and latent heat of ice as 335 kJ/kg. **[6]**

b) Explain vapour compression system. **[4]**

OR

Q2) a) Domestic refrigerator of 1/8 ton refrigeration (TR) capacity has cop half that of carnot cop, outside air temperature difference is required on both sides determine power consumption also outside air temp is 40ºC while freezer is maintained at -10ºC also assume 5ºC temp difference. **[6]**

b) Define one tonn of refrigeration & compare cop of heat pump & refrigerator. **[4]**

P.T.O

Q3) Write note on- **[10]**

a) Future refrigerant

b) Air conditioning components

OR

Q4) Explain various modes in details. **[10]**

Q5) Explain following properties. **[8]**

a) i) Saturated air
   ii) Relative humidity
   iii) Adiabatic saturation temp
   iv) DBT & WBT

b) Calculate without using psychromatic chart. **[8]**
   i) Partial pressure
   ii) Sp-humidity
   iii) Abs-humidity
   iv) Relative humidity
   v) Sp-enthalpy

   For moist air DBT of 24ºC & DPT of 15ºC under total pressure of 740 mm of Hg.

OR

Q6) a) Explain in detail sensiable heating & sensiable cooling. **[8]**

b) Calculate properties of moist air at 36ºC DBT & 20 WBT without psychrometric chart. **[8]**

Q7) Air with 60% RH at 25ºC is supplied AC unit, it is condition to this state first by cooling & dehumidification and then by reheating it cooling coil surface temp is 13ºC and ambient conditions are 32ºC DBT & RH 65% if the air supply rate is 15000 m^3/hr

Calculate- **[16]**

i) Cooling coil capacity in TR.

ii) Bypass factor of cooling coil

iii) Heating capacity in Kw

iv) Mass of water vapour removed per hr.

v) Heating coil s/f temp if bypass factor 0.3

OR

Q8) In an Ambulance air conditioning system all outside air is supplied as per medical requirement following data is noted **[16]**

Inside design for 24ºC DBT & 50% RH

Outside condition 38ºC DBT & 27%RH

Room sensiable load = 25kw, Room LH load = 31U

by pass factor of coil = 0.01, ventilation requirement = 30cmm find

i) App dew point

ii) Dehumidified air quantity

iii) Condition of air entering and leaving coil

iv) Capacity of cooling coil

Q9) Write any three: **[18]**

a) Leak detection test and detectors

b) Types of compressor, it used as per AC applications

c) Refrigerant recovery & recycling

d) Initial vehicle inspection points

e) Measure refrigerant in automotives

Total No. of Questions : 10]

SEAT No. :

P2231

[Total No. of Pages : 3

[5254]-562
B.E. (Automobile) (Semester - II)
AUTOMOTIVE CHASSIS & SYSTEMS
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 and Q9 or Q10 is compulsory.***

2) ***Neat diagrams must be drawn whenever necessary.***

3) ***Figures to the right side indicate full marks.***

4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and tables is allowed.***

Q1) a) Explain the functions of front axle and types of front axle. **[6]**

b) What are the types of suspension systems? Discuss any one. **[4]**

OR

Q2) a) Define following with neat sketch. **[6]**

i) Roll Centre

ii) Castor

iii) King pin inclination

b) Explain basic requirements of wheels and tyres. **[4]**

P.T.O

Q3) a) Discuss cross ply and radial ply tyre with constructional details. **[6]**

b) Explain the types and characteristics of leaf spring. **[4]**

OR

Q4) a) What is need of shock absorber? Explain operating principle. **[6]**

b) Explain tyre retreading (hot and cold)and factors affecting tyre performance. **[4]**

Q5) a) What are the requirements of braking system and explain drum brake arrangement with neat sketch. **[8]**

b) Explain disk brake with the help of neat sketch. Also give advantages.**[10]**

OR

Q6) a) Explain vacuum servo assisted brake in details. **[8]**

b) Draw layout of hydraulic brake system and explain all components of hydraulic system. **[10]**

Q7) a) Write down latest trends in traffic system for improved road safety. **[8]**

b) Compare active safety and passive system with examples. **[8]**

OR

Q8) a) Explain elecronics stability program and draw simple layout. **[8]**

b) Explain types of different mirrors and their location. **[8]**

Q9) a) Explain different types of chassis frames. **[8]**

b) Explain Causes of chassis failure. **[8]**

OR

Q10)a) Draw lay out of heavy vehicle with nomenclature. **[8]**

b) Write the manufacturing process for chassis. **[8]**

▲ ▲ ▲

Total No. of Questions : 9]

SEAT No. :

P2232

[Total No. of Pages : 3

[5254]-563
B.E. (Automobile Engineering) (Semester -I)
MACHINE AND VEHICLE DYNAMICS
(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) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***

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

Q1) a) Four masses 30, m1, 30, m2 Kg are attached to shaft which is completely balanced having first and third mass at an angle 20 and 180º. The planes of masses rotating are 300mm apart. Masses can be assumed to be concentrated at radii of 500,600,800 and 300mm respectively. **[10]**

Determine:

i) Masses M1 and M2

ii) Its angular position

OR

Q2) a) Explain direct-reverse crank method in brief? **[5]**

b) Explain the term Logarithmic Decrement. **[5]**

Q3) a) Machine having mass of 4 Kg, with spring stiffness 10,000N/m, and damping coefficient 400 N-sec/m. If initial displacement is 2cm and velocity of 20m/s.then, **[10]**

P.T.O

i) Find out equation of motion for the system in terms of time.

ii) Find displacement and velocity at 0.01 sec.

OR

Q4) Derive generalize equation for single degree force vibration due to harmonic excitation and find out phase difference with the help of graphical method.**[10]**

Q5) a) Write a short note on acceleration, gradibility and drawbar pull. **[9]**

b) Derive expression for axial loading. **[9]**

OR

Q6) a) Write a short note on nature of forces acting on vehicle and factors affecting the forces in brief. **[9]**

b) Explain the terms Draw bar pull, Tractive effort and equivalent mass in brief. **[9]**

Q7) a) What are the basic components of power limited acceleration system?**[6]**

b) The information of the drive line of passenger car is as follows, **[10]**

Engine Inertia: 1.2 Nmax Engine Torque:220 Nm at 4000 rpm

Transmission Data,	Gear1	Gear2	Gear3	Gear4	Gear5	GearR
Inertia	1.3	0.9	0.7	0.5	0.3	1.5
Ratio	4.28	2.79	1.83	1.36	1.00	6.0

Efficiency:0.97 for all gears

Final Drive, Inertia: 1.4 N Ratio:3.12 Efficiency: 0.99

Wheel inertia:15N 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 2nd and 4th gear.

OR

Q8) a) Explain the terms constant Deceleration and Braking efficiency in brief. **[6]**

b) Consider a light truck weighing 5000Kg applied brake to stop the vehicle from 80 Km/hr, which develop brake force 2400N. 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) **[16]**

i) Yaw velocity

ii) Under steer and over steer

iii) Constant steer angle test for vehicle handling

iv) Mathematical model of handling

v) Active and semi active suspension

vi) Vibration Sources in vehicle

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Total No. of Questions : 10]

SEAT No. :

P2233

[Total No. of Pages : 2

[5254]-564
B.E. (Automobile) (End Sem)
FUNDAMENTALS OF COMPUTATIONAL FLUID DYNAMICS
(2012 Pattern) (Elective -I)

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

Instructions to the candidates:

1) ***Answer one question from Q.1 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 whenever necessary.***

Q1) a) Explain strengths and weakness of CFD. **[6]**

b) Explain preprocessor in CFD. **[4]**

OR

Q2) a) Explain Need of discretization. **[6]**

b) Explain in short flow modeling using control volumes. **[4]**

Q3) a) Derive **[10]**

$$\frac{D}{Dt} = \frac{\partial}{\partial t} + (V * \nabla)$$

OR

Q4) $x_1 + 2x_2 = 4$ **[10]**

$-x_1 + x_2 + 2x_3 = 1$

$x_2 + 3x_3 + x_4 = 7$

$2x_3 + 2x_4 = 8$

Solve by Thomas Algorithm

P.T.O

Q5) a) Explain phase relative error for upstream differencing scheme. **[8]**

b) Explain first order wave equation solution with Lax Wendroff scheme. **[8]**

OR

Q6) a) Explain first order wave equation solution with Maccormack method. **[8]**

b) Explain the amplification factor modulus for upstream differencing scheme. **[8]**

Q7) a) Explain boundary conditions for the pressure correction method. **[8]**

b) Explain the numerical procedure using SIMPLE algorithm. **[8]**

OR

Q8) a) Explain the numerical procedure using SIMPLER algorithm. **[8]**

b) Explain finite volume method. **[8]**

Q9) a) Explain post processing in CFD. **[10]**

b) How convergence is monitored in CFD. **[4]**

c) Draw the flow chart for various flow physics. **[4]**

OR

Q10)a) Explain the solver settings in CFD. **[10]**

b) Explain K-6 model equation with it's advantages and disadvantages. **[8]**

▲ ▲ ▲

Total No. of Questions : 8]

SEAT No. :

P2234

[Total No. of Pages : 4

[5254]-565
B.E. (Automobile Engineering)
FUNDAMENTALS OF FINITE ELEMENT ANALYSIS
(2012 Pattern) (Elective -I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

2) ***Neat diagrams must be drawn wherever necessary.***

3) ***Figures to the right side indicate full marks.***

4) ***Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.***

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

Q1) a) Explain the difference between FEM & FDM and Analytical & FEM. **[6]**

b) For the two-bar truss shown in figure 1.1. Determine the nodal displacement. A force of P = 1000 kN is applied at node 1, take E = 210 GPa and A = 600 mm^2 for each element. **[8]**

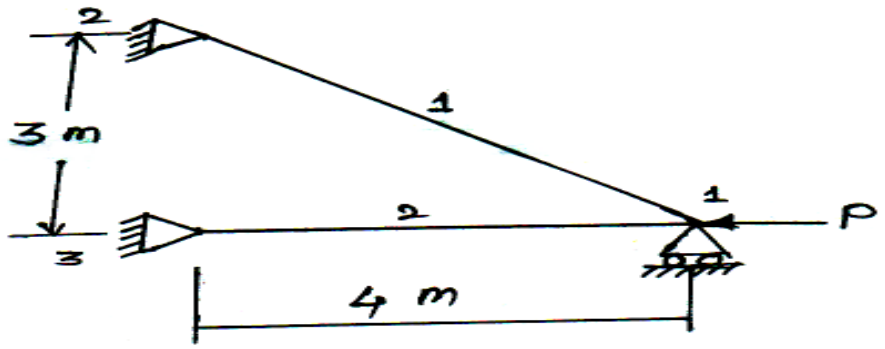


Figure 1.1

c) Explain the importance of shape function and write a shape function for CST & LST elements. **[6]**

P.T.O

OR

Q2) a) Explain the Reyleigh-Ritz & Galerkin Methods. **[6]**

b) Determine the displacement, stuess in each element shown in figure. Applied force P = 100 kN, E_{steel} = 200 GPa & E_{copper} = 100GPa. **[8]**

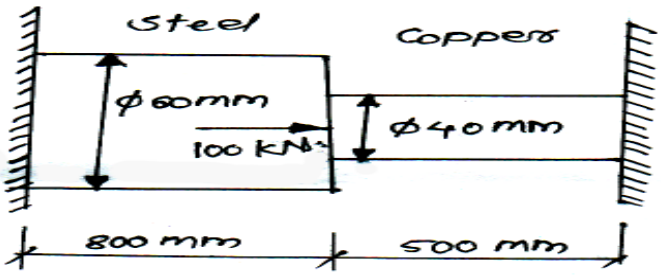


Figure 2.1

c) For the triangular plate shown in figure 2.2 compute the strain-displacement matrix using a one element CST model. **[6]**

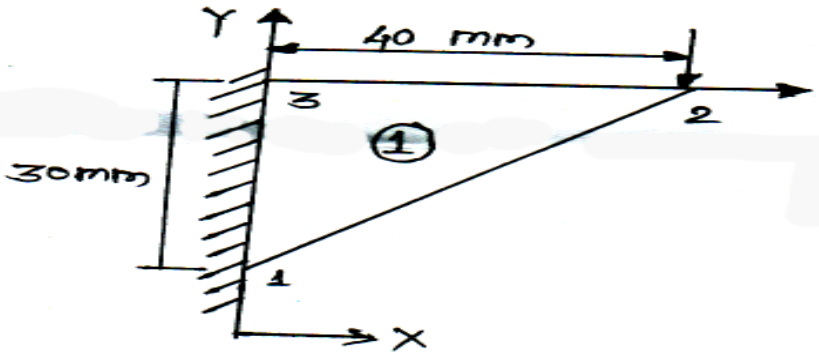


Figure 2.2

Q3) a) Explain the terms Lagrangean and serendipity elements. **[8]**

b) Evaluate the integrals using one point and two point Gaussian quadrature and compare with exact solution. **[10]**

$$I = \int_{-1}^{1} \left[3e^{x} + x^{2} + \frac{1}{(x+2)} \right] dx$$

OR

Q4) a) Explain Isoparametric formulation of bar element. **[8]**

b) Explain Newton Cotes quadrature and Gauss Quadrature methods of numerical integration. **[10]**

Q5) a) An induction furnace wall is made of three layers with thermal conductivity k_1, k_2, and k_3 respectively as shown in figure. Determine the nodal temperature. **[8]**

$k_1 = 8.5$ W/mK
$k_2 = 0.25$ W/mK
$k_3 = 0.08$ W/mK
$h = 45$ W/m^{2}K
$T_\infty = 30^\circ$ C

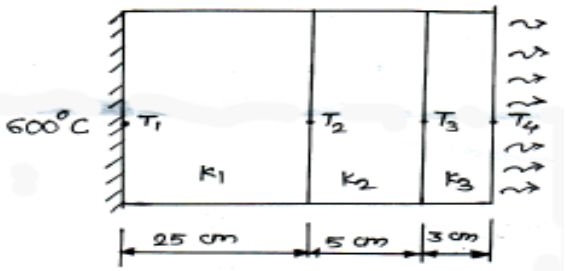


Figure 5.1

b) Formulate the one - dimensional heat transfer equations using a variational method. **[8]**

OR

Q6) Find the distribution in the 1 D fin shown in figure 6.1. Considere two element. **[16]**

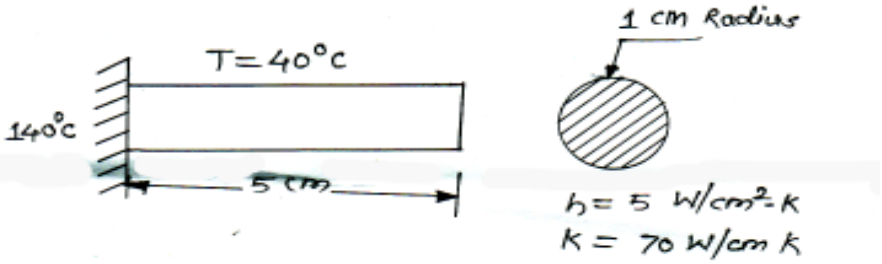


Figure 6.1

Q7) a) Derive the lumped mass matrix for bar element. **[6]**

b) Using two equal-length finite elements, determine the natural frequencies of the solid circular shaft using consistent mass matrix fixed at one end shown in Figure 7.1. **[10]**

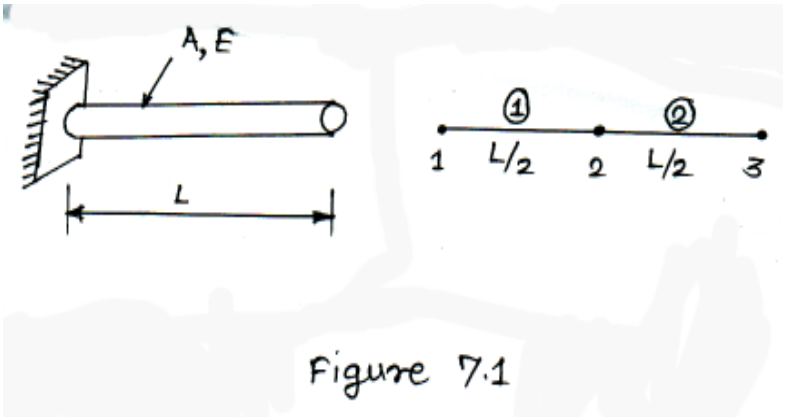


Figure 7.1

OR

Q8) a) Explain in brief the Priori error estimates & Posteriori error estimates. **[8]**

b) Obtain the expression for the first non-zero natural frequency of vibration for a uniform free-free (both ends free) rod by FEM with two elements & consistent mass matrix. **[8]**

$$\left[m^e\right] = \frac{\rho AL}{6}\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

Total No. of Questions : 10]

SEAT No. :

P2235

[Total No. of Pages : 4

[5254]-566
B.E. (Automobile)
CAE & AUTOMATION
(2012 Pattern) (Elective -I)

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

Instructions to the candidates:

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

Q1) a) Compare CSG & B-rep. Explain the various boolean operations used in CSG with neat sketch. **[6]**

b) A line joins two points (3,4,6) and (5,7,1) Find, **[4]**

i) Parametric equation of line

ii) Tangent vector of the line

iii) Unit vector in the direction of line

OR

Q2) a) Explain the significance of Inverse Transformation & write down the inverse transformation matrices for. **[4]**

i) Translation

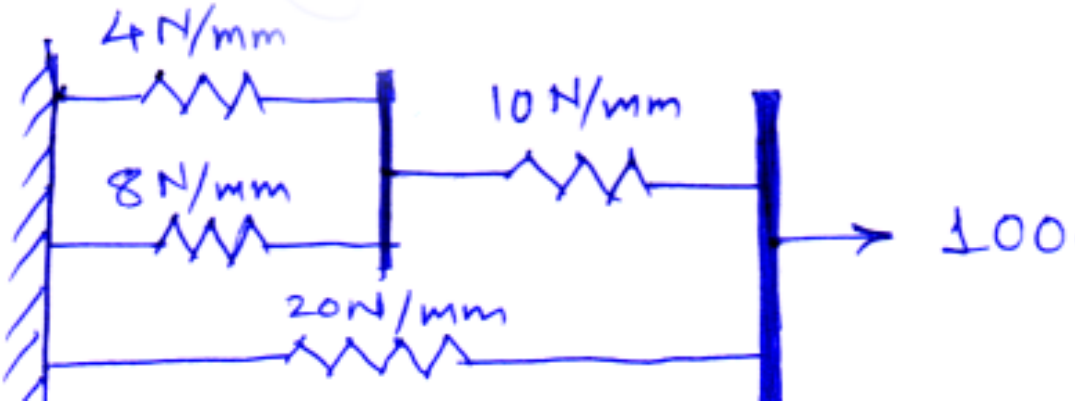
ii) Rotation

b) A triangle has co-ordinates A(1,2,3) B(4,3,4) and C(5,8,2). The three orthographic views of this traingle are to be projected write the transformation matrix and determine the co-ordinates of the views. **[6]**

Q3) a) A cricle is passing through two end points A(6,4) and B(10,10) where AB is the diameter of the circle. Find the co-ordinates of the centre point. radius and parametric eq^{n} of circle. Also find the co-ordinates of points on the circle at $\theta = 30^{o}$ and $\theta = 120^{o}$. **[6]**

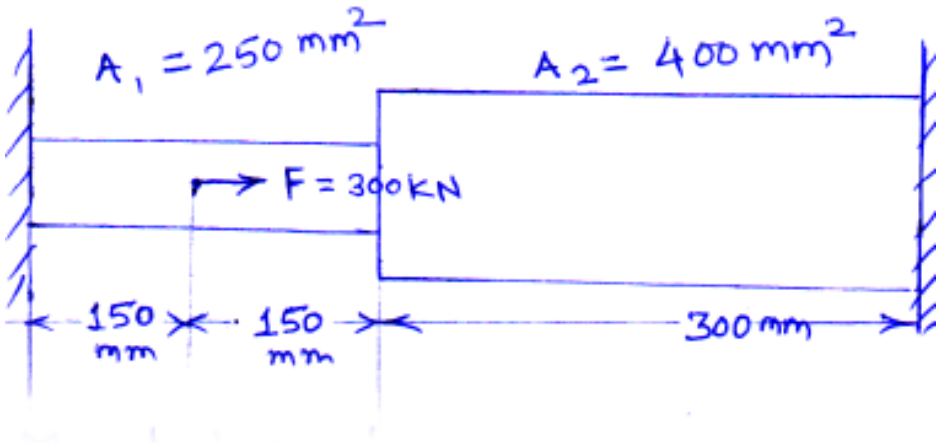
P.T.O

b) Figure shows a cluster of four springs one end of the assembly is fixed and a force of 1000N is applied at the other end using FEM determine the deflection of each spring. **[4]**



OR

Q4) A stepped steel bar ($E = 200 \times 10^3$ N/mm^2) is subjected to an axial load of 300 kN as shown in figure. **[10]**



Using FEM, determine,

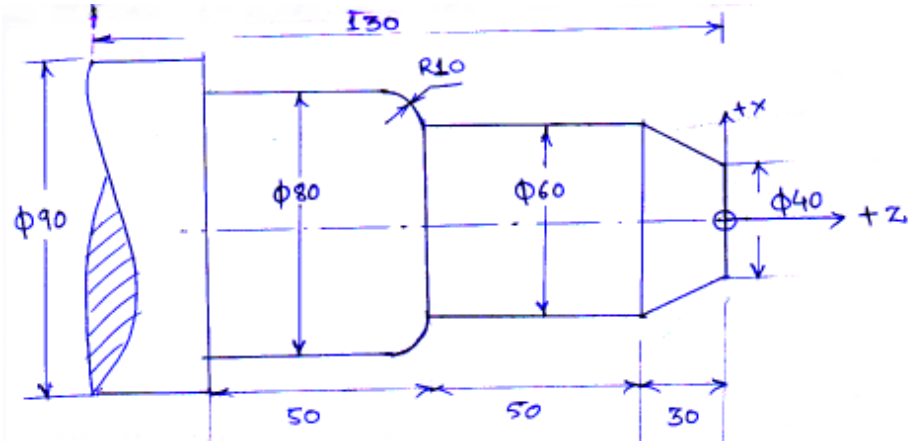
i) Nodal displacement

ii) Stress in each element

iii) Reaction forces at support

Q5) a) List the different techniques of Rapid prototyping. Explain any one R.P. Technique indetail with neat sketch. **[8]**

b) Develop a part program using G and M code to turn MS Job of size ϕ 80 × 120 mm long as shown in figure. Assume suitable cutting parameters and various canned cycles to turn the final shape from the raw material of size ϕ 90 × 130 mm. **[10]**



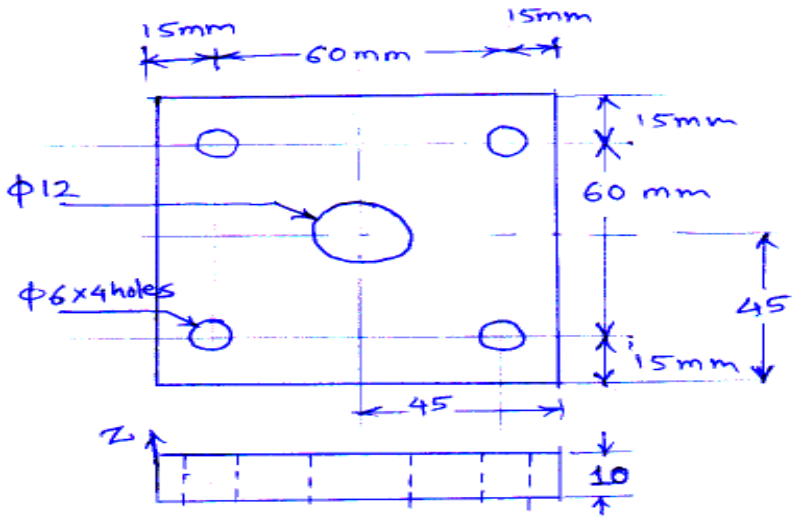
All dimensions are in mm.

OR

Q6) a) What is DNC? Explain the elements of DNC. Describe limitations of DNC. **[8]**

b) Write a part program to drill the holes in a component as shown in figure using CNC milling machine. Take cutting speed (v) = 60 m/min & feed (f) = 0.5 mm/tooth. Assume twisted drill with one complete helix teeth (z = 1). **[10]**

All dimensions are in mm.



Q7) a) What is automation? Compare the types of Automation on the basis of , **[8]**

i) Initial Investment

ii) Production rate

iii) Flexibility

iv) Production system

v) Tool setup

b) What is Group Technology? Describe OPTIZ coding system in detail. **[8]**

OR

Q8) a) What is FMS? Explain different elements of FMS. **[8]**

b) Write short note on AGV. Write down advantages and dissadvantages of AGV. **[8]**

Q9) a) What is Gripper? State different types of grippers. Explain any one gripper in detail with neat sketch. **[8]**

b) State and explain parameters used in robot specifications. **[8]**

Q10) Write short note on, **[16]**

i) Robot programming Languages

ii) Sensors used in robots

iii) Application of robot in Industry

iv) Methods of robot programming

▲ ▲ ▲

Total No. of Questions : 10]

SEAT No. :

P2236

[Total No. of Pages : 3

[5254]-567
B.E. (Automobile Engineering)
HYBRID & FUEL CELL VEHICLES
(2012 Pattern) (Semester -I) (Elective -II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 ,Q9 or Q10.***

2) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain the working of Synchronous Motor with neat sketch. **[6]**

b) Enlist the various applications of the Electric Vehicle. **[4]**

OR

Q2) a) Explain the working of Switched Reluctance Motor with neat sketch. **[5]**

b) What is Engine downsizing? Why engine downsizing is done in hybrid vehicle. **[5]**

Q3) a) Explain vehicle dynamics attribute in HVs. How it affects performance characteristics. **[5]**

b) Write a note on Grid Connected Hybrid Vehicle. **[5]**

OR

Q4) a) Explain parallel configuration and its various operating modes. **[6]**

b) Explain the Power split Hybrid Electric Vehicle. **[4]**

P.T.O

Q5) a) Which are the devices used to matching of electric drives and ICE. How epicyclic gear train used in matching. **[10]**

b) Classify the Traction batteries. Explain any one with neat sketch. **[7]**

OR

Q6) a) Explain different battery parameters. **[10]**

b) How the sizing the propulsion motors is done explain in with sketch. **[7]**

Q7) a) Explain following any two with neat sketch: **[12]**

i) Proton exchange membrane fuel cell (PEM)

ii) Direct methanol fuel cell (DMFC)

iii) Solid oxide fuel cell (SOFC)

b) Explain fuel cell characteristics. **[5]**

OR

Q8) a) Explain hydrogen storage system. **[6]**

b) With neat sketch explain fuel cell electrical vehicles. **[6]**

c) Explain Ultra capacitor. **[5]**

Q9) a) Explain continuously variable transmission. **[8]**

b) Explain hydraulic pumps and motors. **[8]**

OR

Q10)a) Explain Pneumatic Hybrid Engine systems operating mode. **[10]**

b) Explain hydraulic accumulators. **[6]**

▲ ▲ ▲

Total No. of Questions : 12]

SEAT No. :

P2237

[Total No. of Pages : 2

[5254]-568
B.E. (Automobile) (Semester - I)
AUTOMOTIVE MATERIALS (Elective - II)
(2012 Pattern)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Your are advised to attempt not more than 6 questions.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain strength - density chart with neat sketch? **[3]**

b) Explain specific stiffness and specific strength chart with neat sketch? **[3]**

OR

Q2) a) Explain the material limit and shape factor? **[3]**

b) What is the criteria of selecting material for automotive components? **[3]**

Q3) a) Write a short note on Nano-materials? **[3]**

b) Explain the MEMS material? **[3]**

OR

Q4) a) What are the application of super-conductor material for automotive components? **[3]**

b) Explain the P & N type semiconductor material? **[3]**

Q5) a) Give four areas of application of ceramics in industries. Give specific name of ceramic being used and appropriate property which makes it suitable? **[4]**

b) Classify the processing of plastics & explain any one with neat sketch? **[4]**

OR

P.T.O

Q6) a) What are the application of composite material and polymer in industry? **[4]**

b) Write a short note on "Metal Matrix composite"? **[4]**

Q7) a) Write down the different types of mechanical surface treatment and explain any one in details? **[8]**

b) Difference between case hardening and hard facing? **[8]**

OR

Q8) a) Explain the ceramic and organic coating? **[8]**

b) Explain diffusion coating and diamond coating? **[8]**

Q9) a) Write a short note on nano-crystalline material? **[8]**

b) Write a short note on trip steel and merging steel? **[8]**

OR

Q10)a) Explain the high strength low alloy steel? **[8]**

b) Explain shape memory alloy and smart material? **[8]**

Q11)a) Write the application of non-metallic material polymer for automotive purpose? **[9]**

b) Which steel would you select for following automotive component and justify them. **[9]**

i) Cam shaft

ii) Connecting rod

iii) Piston

OR

Q12)a) What is the criteria of selecting materials for automotive component?**[9]**

b) Write the application of non-metallic material composite for automotive purpose? **[9]**

▲ ▲ ▲

Total No. of Questions : 10]

SEAT No. :

P2238

[Total No. of Pages : 2

[5254]-569
B.E. (Automobile) (End Sem)
AUTOMOTIVE HYDRAULICS & PNEUMATICS
(2012 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***

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

Q1) a) Explain basic hydraulic circuit. **[6]**

b) Explain Pascal's Law & it's importance. **[4]**

OR

Q2) a) Sketch & explain gear pump. **[6]**

b) Explain HWCF. **[4]**

Q3) a) Sketch the symbols for **[6]**

i) Cylinder with cushion

ii) Spring return single acting cylinder

iii) 3 Position DCV

b) Explain DCV. **[4]**

OR

Q4) a) Discuss the function of different accessories used in hydraulic circuit. **[6]**

b) Explain seals used in hydraulic system. **[4]**

P.T.O

Q5) a) Explain meter out circuit with neat sketch. **[8]**

b) Explain sequencing circuit. **[8]**

OR

Q6) a) Explain actuator locking circuit. **[8]**

b) Explain bleed off circuit. **[8]**

Q7) a) Explain the dryers used in Pneumatics. **[8]**

b) Compare the Pneumatics with hydraulic power system. **[8]**

OR

Q8) a) What are the advantages & disadvantages of Pneumatic system. **[4]**

b) Sketch & explain vane type compressor. **[8]**

c) Explain the working of Lubricator in Pneumatic system. **[4]**

Q9) a) Explain function of accumulators with application. **[4]**

b) Explain the application of hydraulics in earth movers. Why Pneumatics is not used in earth movers? **[8]**

c) Explain dead weight type accumulator. **[6]**

OR

Q10)a) Explain with neat sketch, application of hydraulics in automotive clutch. **[10]**

b) Sketch & explain Gas charged accumulator. **[6]**

c) Enlist the real life applications of hydraulics & Pneumatics in automobiles. **[2]**

▲ ▲ ▲

Total No. of Questions : 9] **SEAT No. :**

P2239 **[Total No. of Pages : 3**

[5254]-570
B.E. (Automobile) (Semester -II)
VEHICLE PERFORMANCE & TESTING
(2012 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***

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

Q1) a) What are the different types of ture wear patterns? Explain in Brief. **[5]**

b) Draw simple layout of steering system. Explain the effect of steering system of vehicle performance. **[5]**

OR

Q2) a) Explain EGR system with the help of neat sketch. **[5]**

b) What is function of suspenssion system? Enlist types of suspenssion system. **[5]**

Q3) Write a short note on- **[10]**

i) High speed track

ii) Steering pad

iii) Mud track

iv) Deep weding through

v) Pot hole track

P.T.O

OR

Q4) a) Explain Evaporetive emission testing with the help of neat sketch. **[6]**

b) Explain testing procedure for gear box. **[4]**

Q5) a) What are the different types of energy absorbtion systems use in vehicle? Explain any one. **[8]**

b) Explain Adptive cruise system with the help of neat sketch. **[8]**

OR

Q6) a) Explain importance of Ergonomics in vehicle performance. **[8]**

b) What are the types of occupant safety systems are use in vehicle? Explain any one. **[8]**

Q7) a) Why crash testing carried out in vehicle testing? Explain testing procedure. **[10]**

b) Explain- **[8]**

i) Front impact

ii) Side impact

iii) Vehicle to vehicle impact

OR

Q8) a) Explain Data Acquisition system and Application of Data Acquisition system in vehicle testing. **[10]**

b) Compare active safety and passive safety with four applications. **[8]**

Q9) Write a short note on- (any four) **[16]**

i) Engine Noise

ii) Sensors use in vehicle testing

iii) Tyre Noise

iv) Noise, vibration and harshness

v) Transmission Noise

▲ ▲ ▲

Total No. of Questions : 10]

SEAT No. :

P2240

[Total No. of Pages : 4

[5254]-571
B.E. (Automobile Engineering) (Semester -II)
AUTOMOTIVE SYSTEM DESIGN
(2012 Pattern) (End -Sem)

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

Instructions to the candidates:

1) ***Solve question No. 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10.***
2) ***Neat diagrams must be drwn whenever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Use electronic pocket calculator.***
5) ***Assume suitable data if necessary.***

Q1) a) Answer the following: **[6]**

i) What are the drawbacks with metallic lining?

ii) What causes the clutch to slip?

iii) List the desirable properties of lining material.

b) What are the advantages of increasing number of gear ratio steps in automobile gearbox? **[4]**

OR

Q2) a) A four speed gear box is to have the following gear ratio 1.0, 1.5, 2.48 and 3.93. The centre distance between the lay shaft and main shaft is 73.12 mm and the smallest pinion is to have at least 15 teeth with a diameteral pitch of 3.25mm. Find the number of teeth of the various wheels. Find the exact gear ratios. **[6]**

b) What are the design requirements of clutch? **[4]**

Q3) a) Enlist the bearing types. **[2]**

P.T.O

b) An automobile engine develops a maximum torque of 162 Nm and the low gear ratio of transmission is 2.75, while the back axle ratio is 4.25. The effective wheel radius is 0.325 m, the coefficient of friction between the tyre and road surface is 0.6. If the permissible shear stress is 32370 $\times 10^4$ Pa, determine the maximum shaft diameter. Assuming the load is nearly torsional. What is the maximum load on each wheel? **[8]**

OR

Q4) a) Enlist the types of gear train. **[2]**

b) Name the basic types of universal joints and explain any one in detail with sketch. **[8]**

Q5) Explain the following: **[18]**

a) Brake fade

b) Brake torque

c) Brake balance

d) Braking efficiency

e) Properties of friction lining

f) Components used in hydraulic brake system

OR

Q6) In a hydraulic single line braking system the force on foot pedal is 100N, pedal leverage ratio is 4.4, cross sectional area of master cylinder is 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 following.**[18]**

a) Front to rear brake ratio

b) Total force ratio

c) Distance moved by output

d) Cylinder movement ratio

e) Total movement ratio

Q7) a) i) Explain the design features of leaf spring. **[12]**

ii) Discuss the vehicle dynamics

iii) Discuss the forces on vehicle suspension system

b) Write a note on air springs. **[4]**

OR

Q8) a) A truck spring has 12 umber of leaves, 2 of which are full length leaves. The spring supports are 1.05 m apart and the central band is 85 mm wide. The central load is to be 5.4 KN with a permissible stress of 280 N/m^2. Determine the thickness and the width of steel spring leaves. The ratio of total depth to the width of the spring is 3. Also determine the deflection of the spring. **[12]**

b) Explain in brief under steer and over steer. **[4]**

Q9) a) What do you understand by optimum and adequate design? **[6]**

b) A hollow shaft is required to transmit 60 KW at 110 rpm. The maximum torque being 20% greater than the mean. The shear stress is not to exceed 63Mpa and twist in a length of 3 meters not to exceed 1.4 degrees. Find the external diameter of the shaft, if the internal diameter to external diameter is 3/8. Take modulus of rigidity as 84 Gpa. **[10]**

OR

Q10) a) What are the aesthetic and ergonomic considerations in design? **[6]**

b) Explain the optimization techniques in design. **[5]**

c) Write a short note on Design for natural tolerance. **[5]**

▲ ▲ ▲

Total No. of Questions : 8]

SEAT No. :

P2241

[Total No. of Pages : 2

[5254]-572
B.E. (Automobile Engineering) (Semester -II)
AUTOMOTIVE NVH (Elective -III)
(2012 Pattern)

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

Instructions to the candidates:

1) ***Figures to the right side indicate full marks.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of Logarithmic tables, Sliderule, Electronic pocket calculator is allowed.***
4) ***Assume Suitable data if necessary.***
5) ***Q No . 3 & 8 is compulsory.***

Q1) a) Explain mathematical model. Draw the mathematical model for car. **[6]**

b) What are the types of vibration? Explain any two in details. **[6]**

OR

Q2) a) What are the different types of damping? Explain any one. **[6]**

b) Derive the equation for single degree of freedom system to find out natural frequency with energy method. **[6]**

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

a) Vibration Isolation

b) Vibration absorber

Q4) a) Draw the Anatomy of human Ear and explain mechanism of hearing.**[10]**

b) Explain weighting networks in details. **[8]**

P.T.O

OR

Q5) a) What are the types of sound propagation? Effects of reflecting surfaces on sound propagation. **[8]**

b) Explain relation between sound power, sound intensity and sound pressure level. **[10]**

Q6) a) Explain pass by noise test with the help of neat sketch. **[8]**

b) What is mean by FFT? Explain FFT with neat sketch. **[8]**

OR

Q7) a) Explain Drive by noise test with the help of neat sketch. **[8]**

b) What are the different techniques use for vibration measurement? Explain any one. **[8]**

Q8) Write a short note: (any four) **[16]**

a) Transmission noise

b) Aerodynamics noise

c) Tyre noise

d) Noise control methods

e) Vibration control Techniques

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Total No. of Questions : 10]

SEAT No. :

P2242

[Total No. of Pages : 2

[5254]-573
B.E. (Automobile Engineering) (Semester -II)
OFF-ROAD VEHICLE (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 wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain the chassis and transmission considerations in an off road vehicle. **[8]**

b) What is an off road vehicle? State the applications and construction layout of an off road vehicle. **[8]**

OR

Q2) a) Differentiate between crawler mounted tractor and wheel mounted tractor. **[8]**

b) Explain the construction and working of dipper shovel. **[8]**

Q3) Explain the construction layout of a scraper with a neat sketch. **[4]**

OR

Q4) Explain the construction and working of dragline with a neat sketch. **[4]**

Q5) a) Describe the constructional details of a tanker. **[10]**

b) Compare transmission drive P.T.O. and Independent drive P.T.O. **[8]**

P.T.O

OR

Q6) Write a short note on- **[18]**

a) Gun Carriers

b) Transport Vehicles

c) Pulverizes & Rollers

Q7) a) Explain power steering system of the vehicle. **[8]**

b) Explain OCDB and dry disc caliper brake system of the vehicle. **[8]**

OR

Q8) a) Explain the design aspects of the dumper body. **[8]**

b) Describe the safe warning system for a dumper. **[8]**

Q9) a) What are the factors affecting traction performance. **[8]**

b) Write down the characteristics of soil. **[8]**

OR

Q10) Write a short note on- **[16]**

a) Soil-Vehicle Mechanics

b) Mobility Index (MI)

c) Vehicle Cone Index (VCI)

d) Rated Cone Index (RCI)

Total No. of Questions : 10]

SEAT No. :

P2243

[Total No. of Pages : 2

[5254]-574
B.E. (Automobile)
ALTERNATIVE FUELS & EMISSION CONTROL
(2012 Pattern) (Semester -II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.***

Q1) a) Explain storage and handling of Hydrogen fuel? **[4]**

b) What are the fuel additives used for SI & CI engines. **[6]**

OR

Q2) a) Compare LPG and CNG fuels for IC engines. **[4]**

b) What do you mean by alternative fuels? Explain its need, advantages and application in an automobile. **[6]**

Q3) a) List out the modifications required in conventional engine for use of Alternative fuels in it? **[2]**

b) What are the different synthetic fuels used in vehicle? Explain its effect on engine performance. **[8]**

OR

Q4) a) Write down the properties of Hydrogen fuel? **[2]**

b) Explain any two synthetic fuels with its properties, advantages, disadvantages & handling. **[8]**

P.T.O

Q5) Explain effect of design and operating parameters on SI engine emission. **[16]**

OR

Q6) a) Explain Charcoal Canister Control for Evaporative Emission Control. **[8]**

b) What is positive crankcase ventilation? Explain. **[8]**

Q7) Write short note (any 3) **[18]**

a) Chemical delay

b) Intermediate compound formation

c) Pollutant formation on incomplete combustion

d) Exhaust gas recirculation

OR

Q8) a) Explain Turbocharger in detail. **[9]**

b) Describe the sources and causes of soot and particulate formation? **[9]**

Q9) a) Explain Indian emission norms. **[8]**

b) Explain Ambient air quality monitoring. **[8]**

OR

Q10)a) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? **[8]**

b) Effect of NOx emission on human as well as on environment. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2244

[Total No. of Pages : 2

[5254]-575
B.E. (Automobile) (Elective -IV)
TRANSPORT MANAGEMENT & MOTOR INDUSTRY
(2012 Pattern) (End Sem.)

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) Write the responsibility of driver for contract carriage vehicle? **[5]**

b) Write in Short Motor Vehicle Act. **[5]**

OR

Q2) a) Write a short note on Taxations. **[5]**

b) Explain One Time tax for Maharashtra State. **[5]**

Q3) a) Explain procedure of driving licenses. **[5]**

b) What is certificate of fitness and its validity? **[5]**

OR

Q4) a) What is third party insurance. **[5]**

b) Difference between assurance and insurance. **[5]**

Q5) a) Explain the meaning of vehicle scheduling. **[8]**

b) Explain Calculation of cost of transport. **[8]**

P.T.O

OR

Q6) a) What are the modes of road Transport. **[8]**

b) Write classification of transport. **[8]**

Q7) a) Differentiate between MSRTC and Privet Bus. **[9]**

b) Explain transportation of Petroleum Product. **[9]**

OR

Q8) a) Explain the good transport management. **[10]**

b) Explain GPS System. **[8]**

Q9) a) Explain the role of ARAI in Automobile Industry. **[8]**

b) Explain traffic management techniques. **[8]**

OR

Q10)a) Write short note on BEST, PMT, MSRTC BUS services. **[8]**

b) Explain VRDE **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2245

[Total No. of Pages : 5

[5254]-576
B.E. (Automobile Engg.) (Semester - II)
OPERATION RESEARCH
(2012 Pattern) (Elective -IV)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drwan wherever necessary.***
3) ***Figures to the right 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 $Z = 5X_1 + 8X_2$ Subjected to the following constraints

$2X_1 + X_2 \leq 400$

$4X_1 + X_2 \leq 600$ $\quad X_1\ X_2 \geq 0$

OR

Q2) a) Solve the following linear programming problem by graphical method.**[6]**

Maximize $Z = 3X_1 + 2X_2$ Subjected to the following constraints

$X_1 + X_2 \leq 4$

$X_1 - X_2 \leq 2$ $\quad X_1, X_2 \geq 0$

b) Enlist the different applications of linear programming problem. **[4]**

Q3) Determine an initial basic feasible solution to the following transportation problem using. **[10]**

a) Vogel's Approximation Method

b) North-West Corner Method

P.T.O

	X	Y	Z	Availability
A	1	4	6	60
B	9	7	10	70
C	4	5	11	80
Demand	50	80	80	

OR

Q4) a) The assignment cost of assigning any one operator to any one machine is given in the following table. **[7]**

Machines	Operators			
	I	II	III	IV
A	10	5	13	15
B	3	9	18	3
C	10	7	3	2
D	5	11	9	7

b) Why Assignment Model is used in industries? **[3]**

Q5) a) A project Schedule has the following characteristics. **[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

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Total No. of Questions : 10]

SEAT No. :

P2246

[Total No. of Pages : 3

[5254]-581
B.E. (Electronics) (Semester -I)
VLSI DESIGN
(2012 Pattern)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***

2) ***Draw neat diagrams.***

3) ***Assume Suitable data if necessary.***

Q1) a) What is power delay product? Derive the expression for it. What is its significance? **[6]**

b) Explain Body effect and Channel length modulation in detail. **[4]**

OR

Q2) a) What is VHDL code to infer following RTL shown in fig 1. What do you mean by FDC? **[6]**

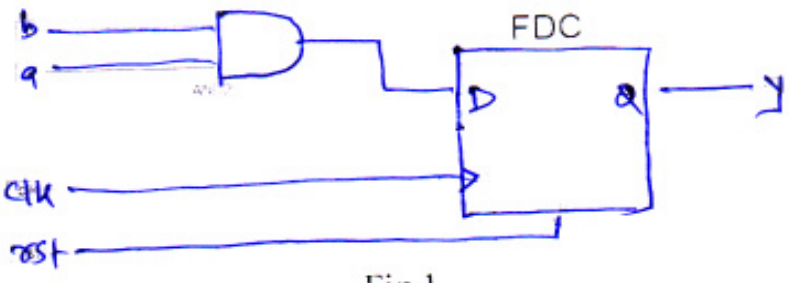

Fig 1

b) What are packages with an example. **[4]**

P.T.O

Q3) a) Explain CPLD architecture in detail. What do you understand by xc9572-7pc84 number? **[6]**

b) Draw CMOS inverter circuit and explain voltage transfer characteristics. **[4]**

OR

Q4) a) How logic is implemented in FPGA? Explain with half adder circuit configuration. **[6]**

b) Compare PROM, PLA, PAL and CPLD. **[4]**

Q5) a) Compare SRAM and DRAM. **[8]**

b) What is the role of memories in PLDs? Explain in detail. **[8]**

OR

Q6) a) Which different refresh circuits are available for memories? Explain detail. **[8]**

b) Explain working of DRAM in detail. Why it is preferred though it is slower? **[8]**

Q7) a) Explain switch box routing with its advantages. **[8]**

b) What assumptions are made in estimating path delays? Which router is used to remove same assumptions? **[8]**

OR

Q8) a) What are goals and objectives of detail routing. **[8]**

b) What is important difference between path and net when Global router minimizes delay? **[8]**

Q9) a) Explain TAP Controller in detail. **[9]**

b) Explain controllability measure with an example. **[9]**

OR

Q10)a) What is need of Design for testability? **[9]**

b) What is partial scan and full scan checks? **[9]**

▲ ▲ ▲

Total No. of Questions : 8]

SEAT No. :

P2247

[Total No. of Pages : 3

[5254]-582
B.E. (Electronics)
ELECTRONICS SYSTEM DESIGN
(2012 Course)

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

Instructions to the candidates:

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

2) ***Figures to the right indicates full marks.***

3) ***Neat diagram must be drawn wherever necessary.***

4 ***Use of electronic, calculator is allowed.***

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

Q1) a) Explain the bath tub curve for reliability indicating all its regions. Also explain how failure rate can be reduced in different regions of bath tub curve. **[8]**

b) List different DAC specifications and explain its importance in design. **[6]**

c) Explain R & D prototype in details. **[6]**

OR

Q2) a) Explain instrumentation amplifier with it's different specifications. **[8]**

b) Design and explain interfacing of relay circuit with microcontroller. **[6]**

c) What are the different LED configurations? Give suitable example for the same. **[6]**

Q3) a) Explain different phases of software design. List the common bugs and how to overcome these bugs. **[8]**

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b) What are the different factors affecting on the choice between assembly & high level language. **[8]**

OR

Q4) Explain following approaches in development of application software for electronic product. **[16]**

a) Top-Down approach

b) Bottom-up approach

c) Modular programming

d) Water fall model

Q5) a) What are the different PCB design issues for high speed integrated circuits. Explain in detail. **[10]**

b) Define crosstalk? What should be the remedy to minimize the crosstalk. **[8]**

OR

Q6) a) What are the different PCB design issues of analog and mixed signal circuits. Explain in detail. **[10]**

b) What are the testing standards for EMI/EMC? **[8]**

Q7) a) What are the features and limitations of analog CRO, DSO, Logic analyzer and mixed signal Oscilloscope for fault findings? **[8]**

b) Explain with suitable example of vibration testing. **[8]**

OR

Q8) a) What is monte Carlo method? Explain the use of environmental testing. **[8]**

b) Explain the significance of following specification of DSO. **[8]**

i) Memory depth

ii) Sampling rate

iii) Band width

iv) Frequency

▲ ▲ ▲

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

P2248

[Total No. of Pages : 2

[5254]-583

B.E. (Electronics) (End Semester)

ADVANCED POWER ELECTRONICS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain in detail the operation of three phase dual converter with circulating current. Draw all the necessary waveforms. Also explain different modes of operations. **[8]**

b) Explain the operation of 3Φ double sided PWM converter system with the help of circuit diagram. **[6]**

c) Explain the operation of 3 phase to 3 phase cycloconvertyer with the help of neat circuit diagram and waveforms. **[6]**

OR

Q2) a) With the help of neat circuit diagram and waveforms explain the operation of single phase bridge Flying Capacitors Multilevel inverter. State its features, advantages and disadvantages. **[8]**

b) Explain Symmetrical Angle Control (SAC) method for Power factor improvement of Controlled rectifiers. **[6]**

c) What are the causes and effects of EMI and Power Quality problems in controlled rectifiers? **[6]**

Q3) a) Explain the motor performance parameters. **[6]**

b) The speed of separately excited motors is controlled by 1Φ Semiconverter. The field current is also controlled by a semiconverter and is set to maximum possible value. The ac supply voltage to the

P.T.O.

armature & field converter is 1Φ, 230V, 50 Hz. Ra=0.25Ω, kv= 0.7032 V/A-rad/s, T_L= 50 N-m at 1000 rpm. The armature & field currents are continuous & ripple free. Determine **[10]**

i) The field current I_f,

ii) Delay angle α_a and

iii) Input supply PF of armature circuit converter.

OR

Q4) a) With the help of neat circuit diagram and waveforms explain the operation of three phase full converter fed dc drives for continuous current mode. **[8]**

b) Explain dynamic braking in detail for DC machines. Compare dynamic and regenerative braking for DC machines. **[8]**

Q5) a) Which are the speed control methods of induction motor? Explain in detail. **[8]**

b) Explain Dynamic and Regenerative Braking for three phase Induction motor. **[8]**

OR

Q6) a) What is difference between VSI and CSI drive? Explain the various protection circuits for induction motor. **[8]**

b) With the help of suitable circuit diagram and waveforms explain the working of VSI drive for three phase induction motor. **[8]**

Q7) a) Explain the Cylindrical rotor motor with vector diagram. **[6]**

b) With the help of a neat circuit diagram and waveforms explain the operation of three phase brushless dc motor drive. **[6]**

c) List the drive requirements for stepper motor drive. Draw the circuit diagram and explain the working of Chopper drive (unipolar) for stepper motor. **[6]**

OR

Q8) a) Compare Variable reluctance motor and Salient pole Synchronous motor. **[6]**

b) Explain working of Switched Reluctance motor drive. **[6]**

c) Explain the universal motor drive. **[6]**

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

P4393 **[Total No. of Pages : 2**

[5254]-584
B.E. (Electronics)
IMAGE PROCESSING & MACHINE VISION
(2012 Pattern)

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

Instructions to the candidates:

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

Q1) a) With the help of block diagram, explain various components of Image Processing system. **[6]**

b) Explain logical operations between images with example. Give its application. **[4]**

OR

Q2) a) What is KL transform? Discuss its properties and application. **[6]**

b) With respect to the elements of visual perception, explain the concept of Mach Bands and simultaneous contrast. **[4]**

Q3) a) Explain in detail the steps of smoothening of an image in frequency domain. **[6]**

b) Explain with reference to 2D transform **[4]**

i) Symmetry

ii) Separability of a transform

OR

Q4) a) What are the elements of visual perception and hence explain MTF of visual system. **[6]**

b) Explain the image enhancement using Gray level slicing. **[4]**

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Q5) a) Explain image segmentation based on Thresholding. Explain the various types of thresholding techniques used in image segmentation. **[10]**

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

OR

Q6) a) Discuss in detail the Gradient operators & Laplacian operators for edge detection. Hence compare them & which is used when? **[10]**

b) Explain how internal and external edge linking is done in detail. **[8]**

Q7) a) What is the redundancy? Explain any three type of redundancies useful for compression. **[8]**

b) Explain loss less predictive encoder and decoder in detail. **[8]**

OR

Q8) a) Consider an 8 bit image shown below. Calculate Huffman code, entropy, average length of code and compression ratio for the same. **[8]**

$$\begin{bmatrix} 21 & 21 & 21 & 95 & 169 & 243 & 243 & 243 \\ 21 & 21 & 2 & 95 & 169 & 243 & 243 & 243 \\ 21 & 21 & 21 & 95 & 169 & 243 & 243 & 243 \\ 21 & 21 & 21 & 95 & 169 & 243 & 243 & 243 \end{bmatrix}$$

b) With the help of block diagram explain MPEG encoder in detail. **[8]**

Q9) a) Explain any two methods of image restoration. **[8]**

b) Explain application of image processing in remote sensing. **[8]**

OR

Q10)a) Explain different noise models in detail. **[8]**

b) How character recognition is done using image processing. **[8]**

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

P2249 [Total No. of Pages : 2

[5254]-585

B.E. (Electronics) (End Semester)

EMBEDDED SYSTEMS AND RTOS

(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Figures to the right side 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 are the typical characteristics of Embedded System? What are the applications of Embedded System. **[5]**

b) Explain the design steps involved for developing vending machine. **[5]**

OR

Q2) a) Explain steps involved in designing Embedded system from memory selection point of view. **[5]**

b) Define & Explain interrupt, interrupt latency time. interrupt response time, and interrupt recovery time. **[5]**

Q3) a) Explain the concept of context switching? **[5]**

b) Define inter-process communication and synchronization. **[5]**

OR

Q4) a) Explain priority inversion problem and solution for the same. **[5]**

b) What is difference between Task, ISR and Function. **[5]**

Q5) a) What are µC/OS-II event flag services? **[8]**

b) Explain models used in Software development. **[8]**

P.T.O.

OR

Q6) a) Explain the various kernel objects for interprocess communication in μcos - II. **[8]**

b) Draw & Explain the data structure of Memory control Block. **[8]**

Q7) a) Explain digital camera with suitable block diagram and state its hardware and software requirements. **[8]**

b) Explain steps involved in Porting μcos - II. **[8]**

OR

Q8) a) Compare the traditional OS with RTOS and explain the task states and enlist the function for transition of state in the μcos - II. **[8]**

b) Define : **[8]**

i) Kernel

ii) Task

iii) Critical session

iv) ready list

Q9) a) Explain the steps to build a Linux system. **[8]**

b) Write difference between BIOS and Bootloader **[10]**

OR

Q10) a) Explain boot-loader challenges. **[8]**

b) Explain the concept of loadable device driver for Linux kernel. **[10]**

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

P2250 **[Total No. of Pages : 2**

[5254]-586

B.E. (Electronics)

BIOMEDICAL INSTRUMENTATION

(2012 Pattern) (Elective - I)

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

Instructions to the candidates:

1) ***Answer Q 1 or Q 2, Q 3 or Q 4, Q 5 or Q 6, Q 7 or Q 8.***
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 different specification of biomedical instrument system. **[8]**

b) Draw and explain block diagram of EEG. **[6]**

c) Draw and explain the diagram of ECG amplifier. **[6]**

OR

Q2) a) What are the different components of central nervous system? Explain in detail. **[8]**

b) Draw ECG Wave forms labels critical parts of waveforms. Show amplitude and time duration for normal ECG. **[6]**

c) Explain chemical sensors to measure PH,Po2. **[6]**

Q3) a) With block schematic explain complete blood gas analyzer. **[8]**

b) Write short note on stress test. **[8]**

OR

Q4) a) Explain in detail indirect and direct blood pressure measurement. **[8]**

b) Draw block diagram of Pulse Oximeter and explain. **[8]**

P.T.O.

Q5) a) Explain electromagnetic blood flow meter. **[8]**

b) Write short note on blood cell counter. **[8]**

OR

Q6) a) What is echo cardiogram? Explain important of echocardiography. **[8]**

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

Q7) a) State three processes to form LASER beam. Explain in detail with help of diagram. **[10]**

b) With block schematic explain operation of X ray machine. **[8]**

OR

Q8) a) Compare MRI and CT scan. **[10]**

b) Explain biotelemetry. Gives application of biotelemetry related to physiological parameters. **[8]**

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

P2251

[Total No. of Pages : 2

[5254]-587

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

ADVANCED MEASUREMENT SYSTEMS

(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain different Signal Integrity issues in High frequency digital circuit design. **[8]**

b) Explain DSO trigger modes with examples. **[6]**

c) Explain the interfacing of graphic LCD display with typical embedded processor. **[6]**

OR

Q2) a) Explain different features of MSO and its applications in electronics measurements. **[6]**

b) Explain hardware design and testing methods of Spectrum analyzer. **[8]**

c) Describe testing equipments required for testing of serial bus signals. **[6]**

Q3) a) Draw and explain the fundamental set up for advanced radar system. **[8]**

b) Explain measurement of microwave power bridge circuit using thermistors and barraters. **[8]**

OR

Q4) a) Explain different attenuation measurement techniques in microwave network. **[8]**

b) Explain single line cavity coupling system for wavelength measurement. **[8]**

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Q5) a) Explain hardware and software role in virtual instrumentation. **[8]**

b) Explain LabView based data acquisition system design. **[8]**

OR

Q6) a) Explain the concept of virtual instrumentation and its applications. **[8]**

b) Explain the application of TDM and PSK in instrumentation. **[8]**

Q7) a) Explain the concept of DAC. List various types and explain any two types of DAC in detail. **[10]**

b) Explain the following terms : **[8]**

i) Measurement errors in counter

ii) Data logger

OR

Q8) Draw the block diagram of universal counter and explain following with respect to it. **[18]**

a) Totalizing mode

b) Period measurement mode

c) Frequency measurement mode

d) Time interval measurement

e) Ratio measurement

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

P2252 **[Total No. of Pages : 2**

[5254]-588
B.E. (Electronics Engineering)
DSP PROCESSORS
(2012 Pattern)

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

Instructions to the candidates:

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

Q1) a) Draw the block schematic of representation of a digital filter. **[5]**

b) Discuss different errors in A to D conversion. Comment on mean & variance of A to D conversion errors. **[5]**

OR

Q2) a) The signal sequence $x(n) = \{0, 2, 4, 6, 8\}$ is interpolated using the interpolation filter sequence, $b_k = \{0, 5, 1, 0.5\}$ and the interpolation factor is 2. Determine the interpolated sequence, $y(m)$. **[5]**

b) Consider the equation, **[5]**

$y(n) = \{x(n) + x(n-1)\}/2$.

Calculate the impulse response, frequency response. Plot the magnitude & phase response. Comment on group delay.

Q3) a) Draw the conceptual diagram of a program sequencer. **[6]**

b) What is meant by overflow in an arithmetic computation? How is an overflow condition detected in an ALU? **[4]**

OR

Q4) a) Describe the operation of the following MPY instructions : **[6]**

i) MPY 13, B

ii) MPY # 01234, A

iii) MPY ★AR2 -, ★ AR4+O, B

b) Draw the logical block diagram of timer circuit and discuss in short. **[4]**

P.T.O.

Q5) a) Describe the importance of Q-notation in DSP algorithm implementation with examples. **[5]**

b) What are the values represented by 16 - bit fixed point number N=4000h in Q15, Q10, Q7 notations? **[3]**

c) What is the drawback of using linear interpolation for implementing an FIR filter in TMS320 C54XX processor?
Show the memory organization for the filter implemenation with block schematic. **[8]**

OR

Q6) a) Discuss PID controllers with neat labelled block diagram.
Write the mathematical equations for PID controller in CT and DT form. **[8]**

b) Define adaptive filter.
Write the mathematical equation for output of a filter and the error. Draw the block schematic of an adaptive filter and state its advantages and applications. **[8]**

Q7) a) What do you understand by bit-reversed index generation?
Comment on bit reversal in DIF-FFT & DIT-FFT. How it is implemented in TMS320 C54XX? **[8]**

b) Draw and discuss an 8-point DIT FFT implementation structure based on the butterfly using scale factor for all butterflies as 1/4. **[8]**

OR

Q8) a) Discuss 2-point DFT computation and 4-point DFT computation with **[8]**
i) signal flow graph & ii) mathematical equations

b) Discuss **[8]**
i) Overflow ii) Scaling

Q9) a) What are interrupts?
Explain "Interrupt handling" by C54XX processors with flowchart. **[10]**

b) Explain an interface between an A/D converter & the TMS 320 C54XX processor in programmed I/O mode. Draw the interfacing block schematic. **[8]**

OR

Q10)a) Design an interface to connect a 64K×16 flash memory to a TMS320 C54XX device. The processor address bus is A0-A15. Draw the block schematic. **[10]**

b) Discuss the I/O interface timing diagram for read - write - read sequence of operations. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2253

[Total No. of Pages : 3

[5254]-589

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

ROBOTICS AND AUTOMATION

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All answers to be written on single answer sheet.***
2) ***Assume suitable data wherever necessary.***
3) ***Figures to the right indicate marks assigned.***

Q1) a) Explain by giving appropriate example effect of globalization on. **[4]**

b) Explain how robots can be classified based on the types of joints with the help of neat sketches. **[6]**

OR

Q2) a) Define the terms : **[5]**

i) Tool Orientation

ii) Payload

iii) Repeatability

iv) Precision

v) Accuracy

b) Explain the role of actuator in a robot. Explain any one with neat sketch. **[5]**

Q3) a) What are CNC machines? What are different types of CNCs? Explain any one type in detail using appropriate diagram. **[5]**

b) List different types of sensors used in robotics? Explain working of any 2 with neat diagram. **[5]**

P.T.O.

OR

Q4) Write Short note on : **[10]**

a) Need of automation in industry and relation of automation with productivity

b) Motion sensors and their types

c) Six degree of freedom associated with the robot

Q5) a) Explain the forward & backward solution. What is its significance? Give typical set of forward & backward equations. **[8]**

b) What is D-H representation? Discuss D-H algorithm. **[8]**

OR

Q6) a) Discuss the steps for obtaining forward solution of a robotic manipulator and explain. **[8]**

b) For the point 4i + 5j + 6k, perform following operations **[8]**

i) Rotate 20 deg about Y-axis.

ii) Translate 3 units along Z-axis.

iii) Rotate 40 deg about X-axis & translate 2 units along Z-axis.

iv) Translate 4 units along Y-axis then rotate 45deg about Y-axis.

Q7) a) Explain the term - Robot arm dynamics. Discuss the E-L formulation used for a robotic manipulator. **[8]**

b) Explain the concepts of robot arm dynamics with the help of block diagrams. **[8]**

OR

Q8) a) What is Jacobian control? Discuss Jacobian in terms of D-H matrices. **[8]**

b) What is trajectory planning? Compare different types of motion used for trajectory planning. **[8]**

Q9) a) What do you mean by fuzzy logic? Explain fuzzy logic controller with the help of proper diagram. **[9]**

b) How vision sensing used for object tracking? **[9]**

OR

Q10) Write short note on any three : **[18]**

a) Control strategies for Aerial vehicle

b) Control strategies for bidirectional X4 flyer

c) Architecture for human robot interface

d) Oscillatory based time varying control

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

P2254

[Total No. of Pages : 2

[5254]-590

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

ELECTRONICS IN AGRICULTURE

(2012 Pattern)

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

Instructions to the candidates:

1) ***Attempt Q 1 or Q 2, Q 3 or Q 4, Q 5 or Q 6 and Q 7 or Q 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Describe various data logging applications in the field of agriculture. **[8]**

b) Explain necessity & use of SCADA in agricultural irrigation. **[8]**

c) With suitable diagram write functional description of soil moisture sensor. **[4]**

OR

Q2) a) Compare various temperature sensing techniques based on principle of operation, range, advantages & disadvantages. **[8]**

b) Explain basic elements of Data acquisition system with suitable diagrams. **[8]**

c) State advantages & limitations of sensor based network. **[4]**

Q3) a) Explain various capabilities of GIS in the field of agriculture. **[6]**

b) State the principles of soil sampling & explain method of sampling farm fields. **[6]**

c) Comment on status of precision farming in India. **[4]**

OR

Q4) a) State & explain challenges in agricultural mechanization. **[6]**

b) What approach is adopted by policy makers to promote precision farming? **[6]**

c) What do you mean by Geometric correction & Rasterization in GIS? **[4]**

P.T.O.

Q5) a) Draw & Explain Hardware system schematic for drip irrigation instrumentation. **[6]**

b) What are the advantages & limitations of weed activated & site-specific spraying? **[6]**

c) Explain necessity of site-specific spraying. **[4]**

OR

Q6) a) Compare different methods of measurement of soil moisture. **[6]**

b) Why grain moisture measurement is required? Explain indirect method of grain moisture measurement. **[6]**

c) What is weather forecasting? How is it useful to our farmers? **[4]**

Q7) a) Enlist parameters to be measured for monitoring environmental conditions within greenhouse. Explain effect of excess CO_2 levels on plant health. **[6]**

b) State the types of Greenhouses. Explain any one in detail. **[6]**

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

i) crop preservation

ii) Drying process for preservation

OR

Q8) a) Draw & explain electronic control system for grape drying process. **[6]**

b) Explain in brief : E-governance. **[6]**

c) Explain areas of concern in agriculture growth in india. **[6]**

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

P2255 **[Total No. of Pages : 2**

[5254]-591
B.E. (Electronics) (End Semester)
MOBILE COMMUNICATION
(2012 Pattern)

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

Instructions to the candidates:

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

Q1) a) A hexagonal cell within a 4-cell system, has a radius of 1.387 km. A total of 60 channels are used within the entire system. If the load per user is 0.029 Erlangs, and $\mu = 1$ call/hour, compute the following for Erlang C system for Gos of 5%. **[6]**

i) How many users per square km will this system support.

ii) What is the probability that a delayed call will have to wait for more than 10s.

[Given : traffic intensity = 8.8 Erlangs (C = 15), for C = 20, traffic intensity = 11 Erlangs, C = 40, traffic intensity = 30.1 Erlangs]

b) Derive the impulse response model for multipath channel. **[7]**

c) Explain concept of equalization in communication and explain the block diagram of adaptive equalizer at receiver. **[7]**

OR

Q2) a) Explain hand off mechanism in detail and also explain the call dropping conditions. While hand off. **[6]**

b) A receiver is located 10km from a 50W transmitter. The carrier frequency is 900 MHz, free space propagation is assumed with $G_t = 1$ and $G_r = 2$, find. **[7]**

i) the magnitude of E-field at the receiver antenna.

ii) the power at the receiver.

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iii) the rms voltage applied to the receiver input, assuming that the receiver antenna has a purely real impedance of 50Ω and is matched to the receiver.

c) Define diversity and write a note on RAKE receiver. **[7]**

Q3) a) State and explain the criterias for selection of speech codecs for mobile communication. **[8]**

b) Explain the various types of multiple access techniques used in mobile communication and explain SDMA in detail. **[8]**

OR

Q4) a) With neat block diagram explain USDC speech encoder and decoder. **[8]**

b) What are disadvantages of FDMA and TDMA? How these are over come in CDMA? Explain with help of neat diagram **[8]**

Q5) a) Write a note on **[10]**

i) Packet Reservation multiple access Protocol.

ii) Distributed database for mobility management.

b) Explain fixed network transmission Hierarchy. **[6]**

OR

Q6) a) Write a note on **[10]**

i) Common channel signaling.

ii) SS 7 signaling protocol.

b) Draw the cellular packet switched architecture for PCS/PCN. **[6]**

Q7) a) Draw and explain the block diagram GSM system architecture. Also draw the GSM frame structure. **[9]**

b) Draw the logical and physical channels for CDMA 2000 system. **[9]**

OR

Q8) a) Describe the evolution of CDMA 2000 from IS95 and explain the CDMA handoff parameters. **[9]**

b) Compare IS-95 CDMA and CDMA 2000 standard on basis of carrier spacing, chiprate, Modulation types, Frame duration and generation. **[9]**

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

P2256 [Total No. of Pages : 2

[5254]-592

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

COMPUTER NETWORK

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Briefly explain various types of addresses with examples. **[4]**

b) Explain the working physical layer of 802.11 LAN. **[3]**

c) Explain any one noisy channel protocol at Datalink layer. **[3]**

OR

Q2) a) Discuss the relationship between primitives and protocols. **[3]**

b) Explain with diagram and application a coaxial cable. **[4]**

c) Briefly explain the basic functions of Datalink layer. **[3]**

Q3) a) List the uses of computer networks. **[4]**

b) Explain how microwaves are used as transmission media? **[3]**

c) What are virtual LANs? **[3]**

OR

Q4) a) Draw the TCP/IP model with protocols at each layer. **[4]**

b) How does datagram switching work? **[3]**

c) Explain CSMA/CD protocol. **[3]**

Q5) a) Describe various classes in IP addressing and give applications of each. **[8]**

b) Discuss design issues at Network layer. **[6]**

c) With example explain connection oriented and connectionless service. **[4]**

P.T.O.

OR

Q6) a) Discuss ICMP and IGMP. **[6]**

b) Explain Distance Vector Routing. **[6]**

c) Explain any one technique of congestion control in detail. **[6]**

Q7) a) Explain in detail with diagram the working of Email. **[6]**

b) What is the function of Trace Route, TFTP and BOOTP? **[6]**

c) What is a socket and its significance? **[4]**

OR

Q8) a) Explain in detail DNS with diagram. **[6]**

b) Create a webage using HTML specifying various commands and its outcomes. **[6]**

c) How does FTP work? What is its application? **[4]**

Q9) a) With diagram explain cryptography model. **[4]**

b) Discuss the types of security attacks with solutions. **[6]**

c) How is internet accessed through dialup, leased line and mobile handset? **[6]**

OR

Q10)a) Compare Symmetric and Asymmetric cryptography. **[4]**

b) Generate public and private key for the prime numbers 7, 13 using RSA algorithm. Consider the smallest prime number during computation. **[6]**

c) Write a note on UTP cabling for PC to PC communication. **[6]**

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

P2257 [Total No. of Pages : 3

[5254]-593

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

PROCESS AUTOMATION

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the following discontinuous controller modes. **[5]**

i) ON-OFF Control

ii) Floating Control

b) Write a note on piping and instrumentation (P & I) diagrams. **[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) What is the necessity of actuators? How actuators are classified? Explain any one actuator? **[5]**

Q3) a) Explain with suitable example process control block diagram. **[4]**

b) What do you mean by process loop tuning? Enlist different tuning methods and explain any one method in detail. **[6]**

OR

Q4) a) State the following control system evaluation criteria. **[4]**

i) Minimum Area Criteria

ii) Quarter Amplitude Criteria

b) How would you realize PID controller using operational amplifier. Explain with the help of neat circuit diagram. **[6]**

P.T.O.

Q5) a) Explain with neat diagram architecture of a PLC? Give important specifications of a PLC. **[9]**

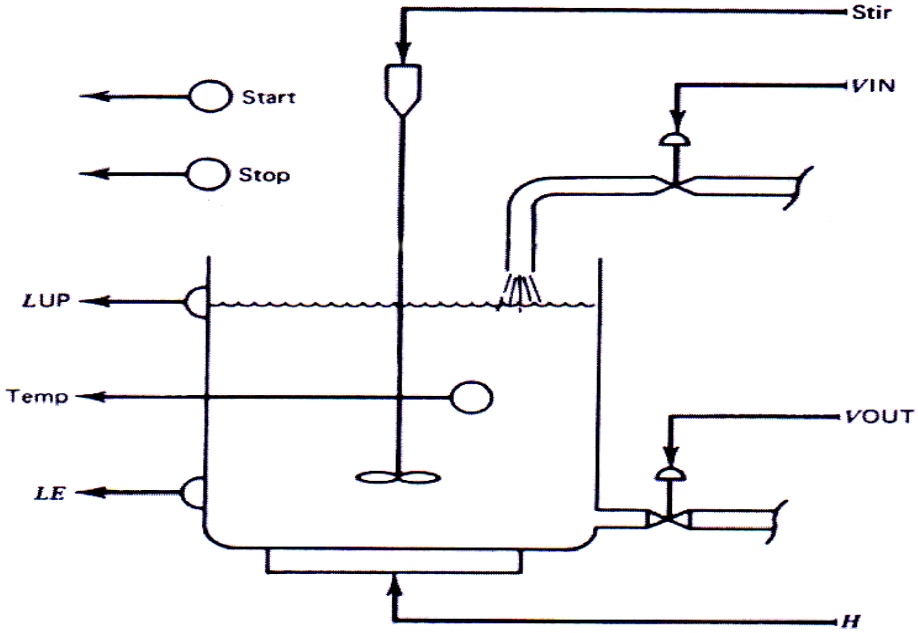
b) Prepare the physical ladder diagram for the control problem shown in figure. The event sequence is : **[8]**

i) Fill the tank

ii) Heat and stir the liquid for 30 min

iii) Empty the tank

iv) Repeat from step (i).



OR

Q6) a) Explain the PLC operation with respect to **[9]**

i) I/O scan mode

ii) Execution mode

iii) Scan time

b) Develop physical ladder diagram for a bottle filling plant. **[8]**

Q7) a) Explain feed forward control scheme for a heat exchanger. **[9]**

b) Explain with block diagram the concept of Model Predictive Control. **[8]**

OR

Q8) a) Explain with neat P& I diagram instrumentation scheme for a multiple effect evaporator. **[9]**

b) Explain with block diagram the concept fuzzy logic control. **[8]**

Q9) Write Short notes on :

a) Strip Chart recorder **[8]**

b) Virtual Instrumentation **[8]**

OR

Q10)a) Explain with suitable block diagram architecture of a typical Distributed Control System (DCS). **[8]**

b) Explain the functions of RTU and MTU in a SCADA. **[8]**

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

P2258 [Total No. of Pages : 2

[5254]-594

B.E. (E & TC Engineering)

SPEECH AND AUDIO SIGNAL PROCESSING

(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 side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) What is pitch or fundamental frequency? On what factors does the pitch frequency depend? **[5]**

b) What is autocorrelation? How autocorrelation is used for pitch frequency calculation? **[5]**

OR

Q2) a) Describe LTI model for speech production. Write assumptions clearly. **[5]**

b) Explain in brief the functions of outer ear, middle ear and inner ear. **[5]**

Q3) a) Explain need for short time signal processing. **[5]**

b) What is auditory filter bank? How will you convert the frequency in Hz to frequency in bark scale? **[5]**

OR

Q4) a) What is spectrogram? What are their types? Explain its significance and applications in speech processing. **[5]**

b) Explain the following terms : **[5]**

i) Spectral centroid

ii) Spectral spread

iii) Spectral flux

P.T.O.

Q5) a) Explain applications of LPC parameters as pitch detection and formant analysis. **[8]**

b) Explain Burg algorithm for calculation of predictor coefficients. **[8]**

OR

Q6) a) Explain Durbin recursive algorithm for calculation of LPC. **[8]**

b) Explain the method of finding LPC coefficients using covariance method. **[8]**

Q7) a) What is cepstrurn? How to evaluate the cepstrum of a speech segment? **[8]**

b) Explain relation between formants & LPC. **[8]**

OR

Q8) a) Define MFCC. Explain the procedure for calculation of MFCC with a block schematic.

b) What is homomorphic system? Explain homomorphic canonic system for speech production. **[8]**

Q9) a) Draw a block schematic for spectral subtraction method for wideband noise removal and explain it. What is the modification used in the basic method for modified spectral subtraction. **[10]**

b) Draw the block schematic for a text-to-speech synthesis system and explain the function of each block. **[8]**

OR

Q10)a) What are temporal features of a musical wave? Explain the ADSR envelope. How will you extract the positive envelope of the music wave? **[8]**

b) Explain isolated digit recognition system with block diagram. Also explain different features used for this system. **[10]**

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

P2259

[Total No. of Pages : 2

[5254]-595

B.E. (Electronics Engineering) (Semester - II)

AUDIO AND VIDEO ENGINEERING

(2012 Pattern) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define following terms - **[5]**

i) Hue

ii) Saturation

iii) Kell factor

iv) Brightness

v) Aspect ratio

b) Why (G-Y) signal is not suitable for color transmission? **[5]**

OR

Q2) a) What is chromaticity diagram? Explain its significance in color TV. **[5]**

b) Sketch a well label diagram of composite video signal and explain it in detail. **[5]**

Q3) a) Compare PAL, NTSC and SECAM TV System. **[5]**

b) Draw the block diagram of colour TV receiver and explain its operation. **[5]**

OR

Q4) a) Draw a block diagram of PAL Encoder. Explain its working. **[5]**

b) Write short notes on Interlaced and progressive scanning. **[5]**

P.T.O.

Q5) a) Discuss in brief IPTV and Wi-Fi TV. **[8]**

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

i) Camcorders

ii) Webcam

OR

Q6) a) Discuss in detail Web TV system. **[8]**

b) Explain the following: **[8]**

i) 3D TV

ii) Perspective of TV white spaces

Q7) a) State the necessity of reverberation, typical reverberation periods & factors on which reverberation time depends. **[10]**

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

i) PA system for Auditorium

ii) Special types of Microphone

OR

Q8) a) Discuss acoustic chamber in detail. **[10]**

b) Discuss with block diagram, working of cordless microphone PA system. **[8]**

Q9) a) Compare CD, DVD and Blue- ray DVD. Draw the block diagram of CD recording. **[8]**

b) Explain in detail Dolby sound system and also state its advantages. **[8]**

OR

Q10)a) Describe ITU-T (G) compression standards. **[8]**

b) Draw and explain the block diagram of MP3 player. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3192

[Total No. of Pages : 3

[5254]- 596

B.E. (Electronics Engg.)

OPTICAL AND MICROWAVE COMMUNICATION

(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.***
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 Wavelength Division Multiplexing along with neat diagram. State the key features of the same. **[7]**

b) An optical Fiber has a core refractive index of 1.49 and a cladding refractive index of 1.45. Determine: **[6]**

i) The critical angle

ii) NA of the fiber

iii) Acceptance angle

c) Explain the construction and working of Silicon reach-through Avalanche Photodiode. **[7]**

OR

Q2) a) Explain 2 × 2 fiber coupler with performance parameters. **[6]**

b) Explain the working of LASER diode. Compare LASER with LED. **[6]**

c) Compare the following terms: **[8]**

i) Step index fiber and Graded index Fiber.

ii) Pin photodiode and Avalanche photodiode.

P.T.O

Q3) a) Explain the following waveguide parameters. **[10]**

i) Cutoff wavelength

ii) Guide wavelength

iii) Phase velocity

iv) Wave impedance

v) Dominant mode

b) Explain the construction and working of isolator based on Faraday's rotation principal. **[8]**

OR

Q4) a) Explain Directional Coupler. Define : **[6]**

i) Coupling coefficient

ii) Directivity

iii) Insertion Loss

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) What are the limitations of conventional tubes at microwave frequencies? **[8]**

b) Enlist the different types of magnetron. Explain how mode jumping is avoided in magnetron. **[8]**

OR

Q6) a) Explain the construction and working of TWT(Travelling Wave Tube) in detail. **[8]**

b) A two cavity klystron amplifier has Vo=1200V, Io=28mA, F=86Hz, gap spacing in each cavity (d)= 1 mm, spacing between two cavities (L) = 4cm, effective shunt resistance of each cavity=40KΩ. **[8]**

i) Find input microwave voltage V1 in order to generate maximum output voltage.

ii) Determine the voltage gain.

iii) Calculate the efficiency of the amplifier.

Q7) a) What is varacter diode? Give its construction, working principle and explain any one application. **[8]**

b) Write short note on : **[8]**

i) Gunn Diode

ii) Tunnel Diode

OR

Q8) a) What is PIN diode? Describe the construction, characteristics and applications of PIN diode. **[8]**

b) Write short note on : **[8]**

i) Schottky Diode

ii) TRAPATT Diode.

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

P2260 [Total No. of Pages : 3

[5254]-597

B.E. (Electronics Engineering) (Semester - II)

SOFT COMPUTING

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8. and Q.9 or Q. 10.***
2) ***Figures to the right indicate full marks.***
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) a) Define ANN. State characteristics of ANN. **[6]**

b) State Cover's Theorem. Discuss how it is used in RBFN. **[4]**

OR

Q2) a) Consider fuzzy relations : **[6]**

$$R = \begin{array}{c} \\ x_1 \\ x_2 \end{array} \begin{array}{c} \begin{array}{cc} y_1 & y_2 \end{array} \\ \begin{bmatrix} 0.7 & 0.6 \\ 0.8 & 0.3 \end{bmatrix} \end{array}$$

$$S = \begin{array}{c} \\ y_1 \\ y_2 \end{array} \begin{array}{c} \begin{array}{ccc} Z_1 & Z_2 & Z_3 \end{array} \\ \begin{bmatrix} 0.8 & 0.5 & 0.4 \\ 0.1 & 0.6 & 0.7 \end{bmatrix} \end{array}$$

Find the relation $\underset{\sim}{T} = \underset{\sim}{R} O \underset{\sim}{S}$ using max - product composition.

b) Explain the following terms in Backpropagation Algorithm : **[4]**

i) Multilayer NN

ii) Gradient Descent

iii) Chain Rule

iv) Error Energy

P.T.O.

Q3) a) Discuss **[6]**

i) Gaussian

ii) Multiquadrics

iii) Inverse Multiquadrics mapping functions used in RBFN.

b) Draw : **[4]**

i) Convex fuzzy set

ii) Non - convex fuzzy set

iii) Normal fuzzy set

iv) Subnormal fuzzy set

OR

Q4) a) Write the category, supervised/ unsupervised for the following algorithms and justify your answer. **[6]**

i) Backpropagation Algorithm

ii) Radial Basis function Network

iii) Linear Vector Quantization

b) Consider two fuzzy sets : **[4]**

$$\underset{\sim}{A} = \left\{\frac{0.2}{1} + \frac{0.3}{2} + \frac{0.4}{3} + \frac{0.5}{4}\right\}$$

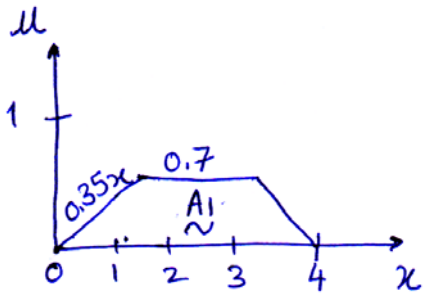
$$\underset{\sim}{B} = \left\{\frac{0.1}{1} + \frac{0.2}{2} + \frac{0.2}{3} + \frac{1}{4}\right\}$$

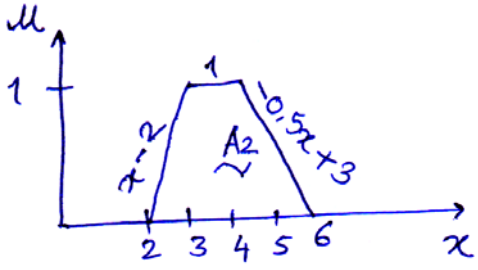
Find the algebraic sum & algebraic product.

Q5) a) For the given membership functions as shown in figure below, determine the defuzzified output value by

i) Centroid method **[8]**

ii) Weighted average method **[2]**





b) Discuss Sugeno Fuzzy Model with neat diagram. **[8]**

OR

Q6) a) Write mathematical expressions for following fuzzy set operations : **[6]**

i) Empty fuzzy set

ii) Normal fuzzy set

iii) Equal fuzzy set

iv) Fuzzy Set Support

v) Product of fuzzy sets

vi) Fuzzy set multiplication by a crisp number

Define fuzzy set.

Give one example. **[4]**

b) What is Fuzzy Inference? Discuss the three Fuzzy Implication Rules alongwith Mathematical expressions. **[8]**

i) Mamdani

ii) Dienes Rascher

iii) Zadeh

Q7) a) Draw the block schematic of Conventional PID controllers & Fuzzy Logic Controllers. State any 2 advantages of FLCs. **[8]**

b) Illustrate the Fuzzy Logic Mamdani Controller. **[8]**

OR

Q8) a) Discuss the input & output parameters and their membership function assignment in Aircraft Landing Control Problem. **[8]**

b) Enlist 8/10 applications of FLC systems. **[8]**

Q9) a) Discuss the constraints on Adaptive Neuro-Fuzzy Inference System (ANFIS) in MATLAB. **[8]**

b) Discuss the general neuro-fuzzy hybrid system with suitable block schematic. **[8]**

OR

Q10)a) State the limitations of neural networks & fuzzy systems when operated individually. **[8]**

b) Discuss : How ANFIS can be applied for regression? **[8]**

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

P2261 **[Total No. of Pages : 2**

[5254]-598

B.E. (Electronics Engineering) (End - Semester)

BIOMEDICAL SIGNAL PROCESSING

(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. No. 5 or Q. 6 , Q.7 or Q. 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Draw & explain block of Biomedical instrumentation system. **[8]**

b) What is baseline wandering? Explain method to remove it from ECG signal? **[6]**

c) Explain the structure and function of neuron. **[6]**

OR

Q2) a) Explain different type of electrodes for measurement of Bio signal. **[8]**

b) Write short notes on plethysmography. **[6]**

c) Write short notes on nervous system. **[6]**

Q3) a) Draw block diagram of EEG machine. Explain in detail. **[8]**

b) Explain α, β & θ in relation with EEG. **[8]**

OR

Q4) a) Draw and explain 10-20 electrodes system for EEG Recording. **[8]**

b) List out the applications of EEG and explain in brief brain machine Interface. **[8]**

P.T.O.

Q5) a) Explain different grounding technique used in medical instruments. **[8]**

b) Write requirement of basic amplifier and Explain the use of Instrumentation amplifier. **[8]**

OR

Q6) a) Explain the concept for design of LPF and HPF and its application in Biomedical Field. **[8]**

b) What is adaptive filter? Explain the principle noise cancellation model. **[8]**

Q7) a) Design a frequency domain filter to remove high frequency noise with minimal loss of signal component in specified pass-band. **[10]**

b) Explain in detail, stationary and non-stationary Bio signals. **[8]**

OR

Q8) a) What is Digital signal processing? Explain Characteristics of Digital signal processing in Biomedical Application. **[10]**

b) Explain the selection criteria of filter for biomedical application. **[8]**

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

P2262 [Total No. of Pages : 2

[5254]-599

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

NANO ELECTRONICS AND MEMS

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. No. 5 or Q. 6 and Q.7 or Q. 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicates full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain how silicon nanocrystal improves the performance of non volatile memories? **[7]**

b) Explain properties of semiconductor and metal nano particles. **[7]**

c) Discuss applications of nanotechnology in following fileds : **[6]**

i) Sensors

ii) Optics

OR

Q2) a) Enlist the tools for measurement of nanostructures. **[7]**

b) Explain optical properties at nanoscale. **[7]**

c) Explain with suitable example application nanostructure electronics. **[6]**

Q3) a) What are the driving forces for miniaturization? Explain in detail. **[9]**

b) What are the applications of MEMS in consumer products. Explain one of them. **[9]**

OR

Q4) a) Explain photolithography process in detail. **[9]**

b) Explain in detail dry etching process in MEMS fabrication. **[9]**

P.T.O.

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

b) Explain working of piezoresistive pressure sensors with neat diagram. **[8]**

OR

Q6) a) What is polymer? Explain their characteristics and give principal applications of polymers. **[8]**

b) What are the key properties of Silicon Carbide? Give its typical uses. **[8]**

Q7) a) Enlist the pressure sensors. Explain strain guage with respect to pressure measurements. **[8]**

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

OR

Q8) Write a short note on (any three) : **[16]**

a) Molecule based biosensor

b) Biological Transducers

c) Gyroscope

d) Accelerometer

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

P2263

[Total No. of Pages : 2

[5254]-600(A)

B.E. (Electronics)

MECHATRONICS

(2012 Pattern) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. No. 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 side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) List the Phases in mechatronics design process. Explain with neat diagram. **[6]**

b) Explain functions of mechatronic systems. **[4]**

OR

Q2) Write a short note on any two **[10]**

a) Bearing

b) Mechatronic function module

c) Autonomous mechatronic systems

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) Explain design of a mobile robot with neat diagram. **[6]**

b) Explain key elements of controlled mechatronic systems. **[4]**

Q5) a) Explain in detail TIA/EIA serial interface standards. **[10]**

b) Write a short note on UART with neat diagram. **[8]**

P.T.O.

OR

Q6) Write short notes on following (any three): **[18]**

a) Unbalanced v/s balanced transmission

b) Point to point v/s multipoint communication system

c) Asynchronous serial data format

d) Simplex, half - duplex and full duplex communication

Q7) a) Explain in detail functional requirement of date logger. **[10]**

b) What are the hardware options available in data logging systems? Explain. **[6]**

OR

Q8) a) Explain case study of any one application of data logging system in mechatronics. **[10]**

b) Write short note on on-line analysis and off-line analysis. **[6]**

Q9) a) Explain in detail LIGA of MEMS. **[10]**

b) What are mechanical properties of MEMS. **[6]**

OR

Q10) Write short note on (any two) : **[16]**

a) Inertial sensors (MEMS)

b) Micromachine pressure sensor

c) Surface micromachine devices

Total No. of Questions : 10]

SEAT No. :

P2325

[Total No. of Pages : 2

[5254]-660-D

B.E.

(INSTRUMENTATION AND CONTROL ENGINEERING)

Automobile Instrumentation

(2012 Pattern) (End Semester)

Time : 2:30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Questions. 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 circuit diagrams should be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Write short notes on: **[10]**

i) Automotive electronic electromagnetic interference suppression.

ii) Working of starter drive unit.

OR

Q2) Elaborate on Ignition timing calculation. **[10]**

Q3) What is voltage and current regulators? How is it achieved in automobile instrumentation? **[10]**

OR

Q4) a) Explain vehicle speed sensor used automobile instrumentation. **[6]**

b) What are Throttle position sensors? **[4]**

Q5) Explain the following with respect to automobile: **[17]**

a) Garage door opening system.

b) Tyre pressure control system.

c) Rain sensor system.

d) Environment information system.

P.T.O.

OR

Q6) Write short note on emission test procedures. **[16]**

Q7) Write short notes on : **[16]**

i) Automatic seat belt tightener system.

ii) Central locking system.

OR

Q8) Explain in detail the principle of operation of emission measuring instruments. **[16]**

Q9) Explain alternators principle and constructional aspects used in automobiles. **[17]**

OR

Q10) Write short notes: **[16]**

a) Automatic coolant temperature control in automobiles.

b) Vehicle speed sensor.

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

P2264

[Total No. of Pages : 2

[5254]-601

B.E. (Electronics & Telecommunication)

VLSI DESIGN & TECHNOLOGY

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. No. 5 or Q. 6 and Q.7 or Q. 8.***
2) ***Neat diagrams should be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain Metastability with timing diagram. **[6]**

b) Draw and explain the detail architecture of CPLD. **[8]**

c) Explain positive and negative clock skew. Briefly explain the sources of clock skew. **[6]**

OR

Q2) a) Write VHDL code and test bench for 1011 Mealy sequence detector. **[8]**

b) What factors are considered to make a choice in between FPGA and CPLD? **[6]**

c) Outline power distribution and optimization. **[6]**

Q3) a) Which lambda rules are used for CMOS layout? Give its significance. **[8]**

b) Design CMOS logic for $YA = \overline{A(D+E)+BC}$. Calculate W/L ratio for N_{MOS} and P_{MOS} area needed on chip. **[10]**

OR

Q4) a) Explain the static and dynamic power dissipation. **[6]**

b) What is technology scaling? What are its effects? **[6]**

c) Draw and Explain the RC Delay Model for nMOS and pMOS transistor. Give example. **[6]**

P.T.O.

Q5) a) Explain various types CMOS inverting amplifier with diagram. **[8]**

b) Explain small signal low frequency and small signal high frequency model of MOS transistor with diagram. **[8]**

OR

Q6) a) Draw and explain CMOS operational amplifier. **[8]**

b) Draw and explain current mirror circuits. **[8]**

Q7) a) Describe types of faults? Explain with schematic. **[8]**

b) Explain JTAG boundary scan. Which are the various pins involved. **[8]**

OR

Q8) a) Draw and explain the architecture of TAP Controller. **[8]**

b) What is scan path? Give advantages and disadvantages of scan path. **[8]**

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

P2265 **[Total No. of Pages : 2**

[5254]-602
B.E. (E & TC)
COMPUTER NETWORKS
(2012 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. No. 5 or Q. 6 or Q.7 or Q. 8. Q.9 or Q. 10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Explain UTP? Why it is twisted? **[5]**

b) Explain sliding Window Protocol? **[5]**

OR

Q2) a) Explain Selective Repeat ARQ Protocol used for Noisy channel? **[5]**

b) Explain Bluetooth Profile? **[5]**

Q3) a) Explain Microwave Transmission in unguided transmission media? **[4]**

b) Explain Non Persistent, 1-Persistent, P-Persistent CSMA? **[6]**

OR

Q4) a) Write a short note on Zigbee? **[4]**

b) Explain LCP & NCP used in PPP stack? **[6]**

Q5) a) Explain NAT, ARP at Network Layer? **[8]**

b) Explain $ICMP_v4$? **[4]**

c) List and Explain different types of addresses used in IP_v6? **[5]**

OR

Q6) a) Explain Transition strategies from IP_v4 to IP_v6? **[8]**

b) Explain Forwarding and Delivery in IP_v4? **[9]**

P.T.O.

Q7) a) Explain different services provided by Transport Layer? **[6]**

b) Explain three way handshakes during connection establishment at Transport Layer? **[5]**

c) Explain Transport Service Primitives? **[6]**

OR

Q8) a) Explain a Real Time Transport Protocol? **[6]**

b) Draw and Explain TCP segment Header? **[6]**

c) Explain User datagram Protocol? **[5]**

Q9) a) Explain different services provided by user agent in e-mail system? **[6]**

b) Explain URL and Cookies? **[6]**

c) Compare Persistent and Non persistent HTTP connections? **[4]**

OR

Q10) a) Explain file Transfer Protocol? **[6]**

b) Write short note on DNS? **[6]**

c) Explain Authorization Vs Authentication? **[4]**

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

P2266 **[Total No. of Pages : 3**

[5254]-603
B.E. (E & TC)
MICROWAVE ENGINEERING
(2012 Pattern) (End Semester)

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

Instructions to the candidates:

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

Q1) a) Explain advantages and applications of microwave. **[8]**

b) Draw and explain the two hole directional coupler. Also represent it in terms of S-matrix. **[6]**

c) Explain the faraday's rotation principle? Draw and explain isolator. **[6]**

OR

Q2) a) For an air filled rectangular waveguide of dimensions a =2cm and b=lcms calculate the cut off wavelength for TE_{10} and TM_{11} modes. Also calculate the guide wavelength at 10GHz. **[6]**

b) Write a short note: The concept of Impedance and different types of impedance. **[4]**

c) What is a cavity resonator? Explain in detail the re-entrant type 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]**

P.T.O.

OR

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 = $I_O = 30mA$

Characteristics impedance of the helix = $Z_O = 10\Omega$

Circuit length N = 50

Frequency f = 10 GHz

Determine:

i) gain parameter 'c',

ii) the output power gain 'A_p' in decibels and

iii) all the propagation constant.

Q5) a) Explain the working of Schottky barrier diode. **[6]**

b) Write a note on: Varactor Diode. **[4]**

c) Explain the working of Microwave transistor. **[6]**

OR

Q6) a) Explain the working principle of Gunn diode. **[8]**

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

i) PIN diode

ii) Tunnel 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 o a slotted line. Calculate the standing wave ratio of transmission system. **[6]**

b) Explain Roberts and Von-Hipple method of dielectric constant measurement. **[6]**

c) Write a note on: Measurement of noise 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. :

P2267

[Total No. of Pages : 3

[5254]-604

B.E. (E & TC)

DIGITAL IMAGE PROCESSING

(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is meant by histogram? Can two different images have same histogram? Justify your answer. **[4]**

b) List any two colorspaces with their applications. **[2]**

OR

Q2) a) What is quantization? How does it affect gray level resolution in images? **[4]**

b) List any two point processing operations. Perform image addition of following 8 - bit images. **[2]**

$$A = \begin{bmatrix} 10 & 69 \\ 70 & 125 \end{bmatrix} \qquad B = \begin{bmatrix} 25 & 26 \\ 20 & 155 \end{bmatrix}$$

Q3) a) Write short note on log transformation. **[4]**

b) What is gamma correction? Write its application. **[3]**

P.T.O.

OR

Q4) a) Write the equation for 2D DFT. Describe steps used in frequency domain filtering. **[4]**

b) Explain inverse filtering with one example. **[3]**

Q5) a) List types of redundancies in images. Explain any two. **[4]**

b) Write any three properties of wavelet transform that are useful in compression. **[3]**

OR

Q6) a) Explain Run length coding with one example. **[4]**

b) List standards used for image compression and video compression. Draw block diagram of image compression standard. **[3]**

Q7) a) Draw and explain mask used for point detection and prewitt edge detection. **[9]**

b) Explain image segmentation using **[9]**

i) Region growing

ii) Region splitting and merging

OR

Q8) a) Explain algorithm of Hit or Miss transform. Write its application. **[9]**

b) What is meant by morphological operations? Explain any two operations in detail. **[9]**

Q9) a) What are the chain codes? Draw shape for following chain codes. **[8]**

i) 2, 2, 4, 4, 6, 6, 0, 0.

ii) 1, 1, 7, 7, 4, 4.

b) Explain the concept of image representation. Describe signature used in representation with one example. **[8]**

OR

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

i) Fourier descriptor

ii) Texture descriptor

b) Write short note on : **[8]**

i) Shape number

ii) Statistical moments

Q11) a) What are the different features used in object recognition? Explain how feature extraction is useful in classification. **[8]**

b) Explain character recognition system. Explain how classifiers are useful in this application. **[8]**

OR

Q12) a) Describe patterns and pattern classes. **[8]**

b) Explain minimum distance classifiers and correlation based classifiers. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2268

[Total No. of Pages : 2

[5254]-605

B.E. (E & TC)

EMBEDDED SYSTEM & RTOS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right 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 architecture of embedded system .Give classification of embedded system. **[5]**

b) Explain various processor technologies in design of embedded processors. **[5]**

OR

Q2) a) Explain difference between V model and spiral model of software design. **[5]**

b) Define the context Switching. What are the steps involved in μC/OS-II context. **[5]**

Q3) a) Explain kernel architecture & configuration. **[5]**

b) What do you mean by clock tick in RTOS. Explain the time management functions in μC/OS-II. **[5]**

OR

Q4) a) What do you mean by task communication &explain various IPC techniques. **[5]**

b) Explain OS MutexCreate() and OS MutexPost( )function. **[5]**

P.T.O.

Q5) a) Explain BIOS and the role of boot loader in embedded Linux concept. **[8]**

b) Explain tracing &profiling tools. **[8]**

OR

Q6) a) List and explain various file systems used in Embedded Linux. **[8]**

b) What is binary utilities? Discuss miscellaneous binary utilities. **[8]**

Q7) a) Define software testing .Explain various level of testing. **[8]**

b) Explain concept of loadable device driver for Linux kernel. **[8]**

OR

Q8) a) Draw and explain linux kernel architecture. **[8]**

b) Discuss different Linux file systems in short. **[8]**

Q9) a) Discuss challenges to kernel debugging. **[8]**

b) Explain mobile phone with its hardware & software requirements. **[10]**

OR

Q10)a) Explain embedded system application in automatic chocolate vending machine. **[8]**

b) Explain GNU debugger. What is hardware assisted debugging? **[10]**

Total No. of Questions : 8]

SEAT No. :

P2269

[Total No. of Pages : 2

[5254]-606

B.E. (E & TC)

SOFTWARE DEFINED RADIO (SDR)

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

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

Instructions to the candidates:

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

Q1) a) Draw and explain hardware architecture of SDR. **[8]**

b) Explain decimation process with spectral diagram. **[6]**

c) Explain the role of antenna and LNA used in SDR. **[6]**

OR

Q2) a) List the types of RF Front-End Topologies. Explain any one with suitable diagram. **[8]**

b) Explain design principles using FPGA in SDR. **[6]**

c) What is the benefit of using multistage structure of decimator or interpolator when large changes of sampling rater are required. **[6]**

Q3) a) Explain the following terms w.r.to Vector Channel Modeling : **[9]**

i) Angle of Arrival (AOA)

ii) Array Calibration

iii) Array Ambiguity

b) What is smart antenna? List the benefits and drawbacks of smart antenna systems. **[9]**

OR

Q4) a) List the relative benefits and trade-offs of Switched beam and Adaptive array. **[9]**

b) What is fully adaptive array? Explain the LMS algorithm for smart antenna system. **[9]**

P.T.O.

Q5) a) Explain Dynamic Spectrum Access (DSA). **[8]**

b) Objectives, Benefits, and Applications of CR. **[8]**

OR

Q6) a) Block diagram of OFDM Receiver and its explanation. **[8]**

b) Benefits of OFDM. **[8]**

Q7) Write short notes on :

a) Beagle board based SDR **[8]**

b) SPECtRA **[8]**

OR

Q8) Write short notes on any one

a) Embedded PCSR using GNU radio. **[8]**

b) Explain Military applications of SDR. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P2270

[Total No. of Pages : 2

[5254]-607

B.E. (E & TC)

INDUSTRIAL DRIVES & CONTROL

(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Your answers will be valued as a whole.***
6) ***Use of logarithmic tables slide rule mollier charts, electronic pocket. Calculator and steam tables is allowed.***
7) ***Assume suitable data if necessary.***

Q1) a) What is the need of 3ϕ drives in Industries? Explain working of 1ϕ seperately excited DC Motor drive speed control technique. Comment on Tq Vs N characteristics. **[7]**

b) What is the need of Induction Motor drives in Industries? Explain with block diagram speed control technique of 3ϕ Induction Motor drive by using $\frac{V}{f}$ method. **[7]**

c) What are PWM Inverters? Explain in brief working of 3Q PWM based drive. **[6]**

OR

Q2) a) What are synchronous motors? Explain the working of synchronous reductance motor drive. **[7]**

b) What are Reversible drives? Explain with circuit diagram working of 4-quadrant chopper drive. **[7]**

c) Explain in brief working of switched reluctance motor drives? Why it is prefered for variable speed drive. **[6]**

Q3) a) What are Brushlers DC Motors? Explain with diagram working of BLDC Motor drive. State its advantages & disadvantages. **[10]**

b) What are stepper Motors? Explain any one of stepper Motor with relevant details. State its advantages. **[6]**

P.T.O.

OR

Q4) a) What is the need of servo Motors in Industries? Explain. State its advantages over DC Motors. **[8]**

b) What are AC Synchronous Motor drives? Explain. **[8]**

Q5) a) What are different types of batteries used for solar Applications? Explain float cum Boost charging method for lead Acid batteries. **[10]**

b) Explain fixed speed & variable speed operation in wind power system. **[8]**

OR

Q6) a) What are the limitations of Back to Back converter in wind power plants? Explain state its advantages. **[10]**

b) What is the role of power electronics in the wind energy conversion system? Explain in detail. **[8]**

Q7) a) Explain the operation of Neural Networks based PWM controller. **[8]**

b) What is fuzzy logic? Explain fuzzy logic based Induction Motor Drive. **[8]**

OR

Q8) a) Explain Artificial Intelligence based applications in any drives. **[8]**

b) What are fuzzy sets? Explain various properties with relevant examples. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2271

[Total No. of Pages : 2

[5254]-608

B.E. (E & TC)

MULTIRATE AND ADAPTIVE SIGNAL PROCESSING

(2012 Pattern) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) For the signal $x(t)$ shown in Fig. 1 Find.

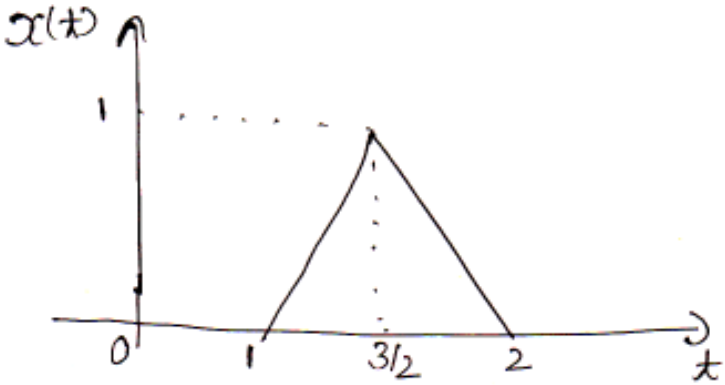

Fig 1

a) Time Bandwidth product of $x(t)$. **[12]**

b) Magnitude spectrum of $\frac{d}{dt}x(t)$. **[8]**

OR

Q2) a) What is the use of time frequency distributions. Explain any two time frequency distributions giving their comparison. **[12]**

b) Explain interpolation by integer factor with suitable diagram, mathematical equation and spectral interpretation. **[8]**

P.T.O.

Q3) a) Explain role of nested subspaces in MRA. **[8]**

b) Show that for Harr 2 Band filter bank structure, the alias components are cancelled by the proper choice of analysis and synthesis filter. **[10]**

OR

Q4) For the signal.

$$x(t) = 3\phi(2t) + 6\phi(2t-1) + 2\phi(2t-2) + 10\phi(2t-3) + 8\phi(2t-4) + 9\phi(2t-5)$$

a) State which V subspace $x(t)$ belongs to and why? **[2]**

b) Decompose the signal into V and W subspaces down the ladder and also reconstruct it. **[10]**

c) Establish relationship between V_j, V_{j-1} and W_{j-1} for given nested subspaces of $L_2(R)$. **[6]**

Q5) a) Draw various configurations of the adaptive filter. **[8]**

b) Starting with the equation of the mean square error, derive the Wiener Hopf equation. **[8]**

OR

Q6) a) Explain the steps involved in LMS algorithm. **[8]**

b) Explain with block diagram, any one application of adaptive filter. **[8]**

Q7) For a signal

$$x[n] = \{30, 5, 38, 10, 49, 2, 18, 0\} \in V_3$$

a) Decompose the signal using Harr filters fill Vo and Wo subspace. **[8]**

b) Show smoothening effect. Reconstruct after suppresing coefficients in W_j subspaces. **[8]**

OR

Q8) a) Discuss any one application of multirate signal processing. **[8]**

b) Explain how sub band coding is use in signal processing domain. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2272

[Total No. of Pages : 3

[5254]-609

B.E. (E & TC)

ELECTRONIC PRODUCT DESIGN

(2012 Pattern) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is techno-commercial feasibility? Establish techno-commercial feasibility of any one electronic product. **[7]**

b) Explain the concept of egoless design. **[6]**

c) State the salient features of - (i) Algorithm, (ii) Flowchart (iii) Pseudo code. **[7]**

OR

Q2) a) Define ergonomics & state the objectives of ergonomics. Explain the various design considerations wrt to ergonomics. **[7]**

b) What is prototyping? Explain different types of prototyping. **[6]**

c) Explain the concept of risk abatement & failure prevention. **[7]**

Q3) a) Discuss the PCB layout design rules for analog circuits; digital circuits & high speed circuits. **[7]**

b) Explain the various termination schemes for avoiding reflections & cross-talk in high speed PCB designs. **[7]**

c) Calculate the characteristics impedance for a stripline geometry when the PCB laminate thickness is 1.6mm, width of embedded track is 1mm with thickness of 35 microns. The relative permitivity is 3.2. **[4]**

P.T.O.

OR

Q4) a) Explain the PCB design considerations with respect to - **[7]**

i) Ground & supply planes.

ii) Analog & digital grounds.

iii) Ground bounce.

b) Estimate the parasitic values for the following geometries of PCB tracks. **[7]**

i) Resistance of 12cm long copper track with 0.6mm width on standard 35 micron copper-clad laminate. (The resistivity of copper at 20°C is 1.72×10^{-6} Ω.cm).

ii) Capacitance of two 1.5mm wide tracks on opposite side of double sided PCB, each with a track length of 10cm. The PCB laminate thickness is 1.5mm & $\in_r = 4.2$.

c) Explain the selection criterion for bypass & decoupling capacitor with suitable example. **[4]**

Q5) a) Explain the different methods of product debugging. **[8]**

b) Compare - **[8]**

i) Simulation with prototyping

ii) Conducted EMI with radiated EMI.

OR

Q6) a) Enlist the important parameters to be considered while selecting passive, active & switching components. **[8]**

b) Explain the process of EMI test to be carried out on product with suitable example. **[8]**

Q7) a) Define documentation. What are the different types of documents to be prepared by the product manufacturer. **[8]**

b) With the help of suitable example explain how the bill-of-material is prepared. **[8]**

OR

Q8) a) Explain the following terms with respect to documentation. **[8]**

i) Records

ii) Accountibility

iii) Liability.

b) Discuss the visual techniques of documentation with suitable example.**[8]**

Total No. of Questions : 12]

SEAT No. :

P2273

[Total No. of Pages : 2

[5254]-610

B.E. (E & TC)

PLC'S & AUTOMATION

(2012 Pattern) (Semester - I) (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, Q.11 or Q.12.***
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) Compare Analog and Digital control system with suitable example. **[8]**

OR

Q2) Explain . **[8]**

a) Servomechanism.

b) Human aided control system.

Q3) Explain working principle of DPT with suitable application. **[6]**

OR

Q4) A sensor outputs a range of 20 to 250 mv as a variable varies over its range. Develop signal conditioning so that this becomes 0 to SV. The circuit must have very high input impedance. **[6]**

Q5) Write a short note on relay contactors. **[6]**

OR

Q6) Explain working of solenoid with suitable application. **[6]**

P.T.O.

Q7) a) Design. **[10]**

i) 4 : 1 MUX

ii) 1 : 4 DEMUX

using Ladder Logic

b) Write a short notes on Human Machine Interface. **[8]**

OR

Q8) a) How you will select PLC for specific application. Explain various functions of PLC. **[10]**

b) Explain following **[8]**

i) ERP

ii) MES

Q9) a) What is SCADA? Explain the functions of RTU in detail. **[8]**

b) Compare between PLC and DCS. **[8]**

OR

Q10)a) What are different communication methods used in SCADA system. **[8]**

b) Draw and explain architecture of DCS. **[8]**

Q11)a) Explain. **[8]**

i) HART protocol

ii) PROFIBUS - DP

b) What are the differences between NC and CNC machines. **[8]**

OR

Q12)a) Write a role of panel engineering in automation. **[8]**

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

i) Interbus.

ii) Devicenet.

● ● ●

Total No. of Questions : 8]

SEAT No. :

P2274

[Total No. of Pages : 2

[5254]-611

B.E. (E & TC)

ARTIFICIAL INTELLIGENCE

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

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 diagram 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) Draw and explain the different architectures of agents and give at least two examples where these agents are used. **[8]**

b) Compare Depth First and Best Firth search methods. **[6]**

c) Explain A* algorithm and write its C pseudo code. **[6]**

OR

Q2) a) Explain the different types of environments and give example for each. **[8]**

b) Explain hill climbing algorithm with the help of plateau, ridge, local maxima and global maxima. **[6]**

c) Write a note on backward chaining algorithm. **[6]**

Q3) a) What are the different learning method? Explain them in short. **[8]**

b) Explain the decision tree algorithm with suitable example. **[8]**

OR

Q4) a) Explain in detail the architecture of artificial neural network. **[8]**

b) Which are the different ways to assess the performance of learning algorithm? **[8]**

Q5) a) What is the difference between expert system and traditional system? Comment on the advantages and disadvantages of expert system. **[9]**

b) Explain Waltz algorithm with example and comment on its limitations. **[9]**

P.T.O.

OR

Q6) a) What is perception? Explain detailed structures of it. **[9]**

b) Design phases of an expert system to diagnose childhood disease. **[9]**

Q7) a) What is NLP? Explain all the five phases of NLP. **[8]**

b) Explain the Syntactic analysis with suitable Example. **[8]**

OR

Q8) a) Show the parse tree for : **[8]**

i) John wanted to go to the movie with Sally.

ii) The brown dog ate the bone.

b) Explain the Semantic analysis with suitable Example. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2275

[Total No. of Pages : 2

[5254]-612

B.E. (E & TC)

MOBILE COMMUNICATION

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. 1 or 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 side rule, mollier, charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) State and explain switching functions of a switching system. **[5]**

b) Explain with a neat diagram the concept of cell splitting and cell sectoring. **[5]**

OR

Q2) a) Define and explain the terms "Availability" and "Unavailability" of a dual processor system with necessary equations. Calculate unavailability of a dual processor system for a period of 25 years if its MTBF = 3300 Hrs. and MTTR = 6 Hrs. **[5]**

b) Discuss basic propagation mechanisms, Reflection and Diffraction in wireless communication. **[5]**

Q3) a) Derive second Erlang distribution formula of a Queuing system. **[5]**

b) With a neat diagram explain the principle of Grading and state different types of Gradings. **[5]**

OR

Q4) a) Differentiate between single-stage and Multi-stage switching networks. **[5]**

b) With neat diagrams explain In-band and out-band signaling. **[5]**

Q5) a) With a neat diagram, explain the AMPS Radio interface. **[8]**

b) Explain with a neat block diagram the architecture of GSM. **[8]**

P.T.O.

OR

Q6) a) With reference to AMPS, explain the call processing steps for : **[8]**

i) Mobile originated call

ii) Mobile terminated call.

b) Explain the classification of logical channels in GSM and describe each GSM logical channel in brief. **[8]**

Q7) a) With a neat block diagram, explain the GSM full-rate RPE-LTP speech decoder. **[8]**

b) Write a note on the various data services offered by GSM system. **[8]**

OR

Q8) a) Explain with a neat diagram the architecture of HSCSD. **[8]**

b) Explain in brief GMSK modulation. Highlight its advantages over the other modulation schemes. **[8]**

Q9) a) Explain various power control mechanisms used in IS-95 systems. **[9]**

b) With a neat diagram explain the operation of a Rake Receiver. **[9]**

OR

Q10)a) With a neat diagram, explain the downlink transmission in IS-95. **[9]**

b) Explain in brief 3G mobile systems W-CDMA and cdma - 2000. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2276

[Total No. of Pages : 2

[5254]-613

B.E. (E & TC)

BROADBAND COMMUNICATION SYSTEM

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt five questions as 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 side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain the terms: mode field diameter, spot size, cut off wavelength for single Mode fibers and Explain numerical aperture. **[6]**

b) Write short notes on : **[4]**

i) Rise Time Budgeting.

ii) Optical power budget

OR

Q2) a) Explain in detail the architecture of EDFA. **[4]**

b) A graded index fiber has a core with a parabolic refractive index profile which has a Diameter of 45μm. The fiber has numerical aperture of 0.25 Estimate the total number of guided modes propagating in the fiber when it is operating at a wavelength of 1.5μm. **[6]**

Q3) a) A 1550 nm single mode digital fiber optic link needs to operate at 622 Mb/s over 80 km without amplifiers. A single mode laser launches an average optical power of 13dB m into the fiber. **[6]**

The fiber has a loss of 0.35 dB/km. and there is a splice with a loss of 0.1 dB every kilometer. The coupling loss at the receiver is 0.5 dB and the receiver uses an lnGaAs APD with a sensitivity of-39 dBm. Excess noise penalties are predicted to be 1.5 dB. Set up an optical power budget for this link and find the system margin. What is the system margin at 2.5 Gb/s with an APD sensitivity of -31 dBm?

b) Write a short note on optical coupler. **[4]**

P.T.O.

OR

Q4) a) Radioactive and non-radioactive recombination lifetimes of the minority carriers in the Active region of a DH InGaAsP-LED are 50 ns and 110 ns respectively. Determine the total carrier recombination lifetime and the power internally generated within the device when the Peak emission wavelength is 0.87 μm at a drive current of 40 mA . **[6]**

b) Write short notes on Optical amplifier. **[4]**

Q5) a) State and explain Kepler's three laws of planetary motion. Explain the forces associated with it. **[8]**

b) Find apogee and perigee heights for satellite orbit having semi-major axis 7192.3km and eccentricity 0.0013. **[8]**

OR

Q6) a) Derive the equation for computing Elevation angle and Azimuth angle for an earth station - GEO satellite arrangement. **[8]**

b) Explain with block diagram basic satellite communication system. **[8]**

Q7) a) With the help of block diagram. explain typical tracking, telemetry, command and monitoring system. **[9]**

b) Explain the transponder arrangement and frequency plan (uplink and downlink) for any satellite. Also draw block diagram ot single conversion transponder for 6/4 GHz band. **[9]**

OR

Q8) a) What are different types of antennas used in satellite systems, explain importance of each. **[9]**

b) Write a short note on equipment reliability and space qualification. **[9]**

Q9) a) Derive the link equation for satellite communication. **[8]**

b) Explain in detail design of specified C/N. **[8]**

OR

Q10)a) Explain system noise temperature and G/T ratio. **[8]**

b) Obtain the expression of EIRP in terms of flux density. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2277

[Total No. of Pages : 2

[5254]-614

B.E. (E & TC)

SPEECH AND AUDIO SIGNAL PROCESSING

(2012 Pattern) (Elective - III)

Time : 2 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.***

Q1) a) Explain Acoustic theory of speech production? LTV model of speech Production mechanism signal? **[5]**

b) Explain Mel Scale and Bark Scale? **[5]**

OR

Q2) a) What is Uniform and Non Uniform filter bank in human auditory mechanism? **[4]**

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

i) Sound pressure level and

ii) Loudness

iii) Sound intensity and

iv) Decibel sound levels

Q3) Explain following features of time domain processing of speech signal. **[10]**

a) Short- time average magnitude

b) Short time Energy

c) Average Zero Crossing rate

d) Short-time autocorrelation function

e) Short-time average magnitude difference function.

OR

P.T.O.

Q4) Explain following terms in audio feature extraction. **[10]**

a) Spectral Centroid

b) Spectral Spread

c) Spectral Entropy

d) Spectral Flux

e) Spectral Roll-off.

Q5) a) Why levison durbin algorithm is used? How it is applied in LPC? **[8]**

b) Explain Autocorrelation for Pitch and formant estimation in LPC analysis. **[8]**

OR

Q6) a) Explain with neat block diagram concept of LPC? **[8]**

b) How LPC is used for pitch and formant estimation? **[8]**

Q7) a) What is homomorphic processing? With reference to speech processing. How it is useful for speech analysis? **[8]**

b) What is real cepstrum and the complex cepstrum? Explain. **[8]**

OR

Q8) a) Explain in detail estimation of formant and pitch parameters using cepstrum. **[8]**

b) Explain in detail computation of Mel Frequency Cepstral Coefficients (MFCC). **[8]**

Q9) a) Explain in detail automatic speech recognition system with suitable example (e.g. automatic telephone dialling system). **[9]**

b) Write a short note on vector quantization? What is its role in speech processing applications. **[9]**

OR

Q10)a) What is speech enhancement? Explain spectral subtraction method. **[9]**

b) Explain various steps involved in speaker recognition systems? What is difference between speaker recognition, speaker identification, speaker verification? **[9]**

Total No. of Questions : 10]

SEAT No. :

P2278

[Total No. of Pages : 2

[5254]-615

B.E. (Electronics & Telecommunication)

RF CIRCUIT DESIGN

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Describe Electric equivalent circuit of a capacitor at high frequency. Draw the characteristic graph of real capacitor and Ideal capacitor impedance as function of frequency. **[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) Discuss the method of open circuit time constants to estimate the bandwidth. **[5]**

Q3) a) Discuss zeros as bandwidth enhancer with simplified oscilloscope/ probe model. **[5]**

b) List out Key components of a mobile phone with respect to RF Processing. **[5]**

OR

Q4) a) Discuss RF Behavior of surface mounted inductors. **[5]**

b) Explain Bandwidth enhancement techniques. **[5]**

Q5) a) Explain LNA Topologies with suitable diagrams. **[8]**

b) Design LNA to operate at 400 MHz Design suitable bias. Compute device width degenerating inductance, noise figure & Lg. Assume suitable data. **[8]**

P.T.O.

OR

Q6) a) With the help of schematic in detail, explore the design steps of single ended LNA. **[8]**

b) Differentiate between Single ended and differential ended LNA. **[8]**

Q7) a) Discuss basic oscillator model with appropriate diagram. **[6]**

b) Explain Start up model of Colpitts oscillator. **[6]**

c) How we can use describing functions to analyze oscillators? **[6]**

OR

Q8) a) What is describing function? Explain with suitable examples. **[6]**

b) Discuss Negative resistance oscillator. **[6]**

c) Explain with appropriate diagram basic LC Feedback Oscillator. **[6]**

Q9) a) Discuss the characteristics of mixer in detail. **[8]**

b) With schematic & mathematical expressions explain multiplier & square law MOSFET mixers in detail. **[8]**

OR

Q10)a) Explain Active Single balanced mixer with suitable diagram. **[8]**

b) Derive an expression for conversion gain of single ended MOSFET mixer. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2279

[Total No. of Pages : 2

[5254]-616

B.E. (Electronics & Telecommunication)

AUDIO VIDEO ENGINEERING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw and explain the colour composite video signal used in colour TV transmission. **[5]**

b) What is meant by additive mixing? Explain with proper diagram. **[5]**

OR

Q2) a) Draw a simplified block diagram of PAL decoder and explain. **[5]**

b) Draw the block diagram of TV Pattern Generator. List the various Pattern used. **[5]**

Q3) a) Draw and explain the block diagram of advanced DTV receiver with component encoding. **[5]**

b) Compare the DTV standards for ATSC, DVB and ISDB. **[5]**

OR

Q4) a) Compare CAS and DTH. **[5]**

b) Describe with the help of block diagram the working of component Encoded HDTV Transmitter. **[5]**

Q5) a) What is IPTV? Explain characteristics and advantages for IPTV. **[8]**

b) What is a video projector? What are the different projection technologies? **[8]**

P.T.O.

OR

Q6) a) Write a short note on digital satellite TV. **[8]**

b) What is mobile TV? What are its challenges and the hardware requirements? **[8]**

Q7) a) Explain the playback process of compact disc with suitable diagram. Discuss the different steps involved in the preparation process of CDs. **[10]**

b) Compare Blu-ray disc and DVD. Explain their working. **[8]**

OR

Q8) a) Give the detailed classification of recording techniques. Explain optical recording. **[10]**

b) What is Dolby's noise reduction system? Explain its applications. **[8]**

Q9) a) What is reverberation? Define reverberation time. Explain the importance of reverberation. **[8]**

b) Draw the block diagram of P.A. system and explain. **[8]**

OR

Q10)a) With the help of block diagram, explain digital radio receiver. **[8]**

b) What do you understand by Woofer, Squawker and Tweeter speakers? Explain the necessity of crossover network. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2280

[Total No. of Pages : 2

[5254]-617

B.E. (E & TC)

SOFT COMPUTING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Hebbian and Delta learning rule in short. **[6]**

b) Explain the Back propagation algorithm in detail. **[8]**

c) Describe the Properties of fuzzy sets. **[6]**

OR

Q2) a) Draw and explain the linear model of neuron. **[6]**

b) Explain the RBF network and state its learning mechanism. **[8]**

c) Explain the concept of primary and composite linguistic terms and use of concentration and dilation operation. **[6]**

Q3) a) What is fuzzification? In short explain the various membership Value Assignment techniques. **[8]**

b) Explain the Sugeno fuzzy model of FIS with example. **[8]**

OR

Q4) a) Explain in detail the following defuzzification methods. **[8]**

i) Weighted Average method

ii) Centroid method

b) Explain block diagram of fuzzy inference system (FIS) in detail. **[8]**

Q5) a) What is a fuzzy control system? Explain the various assumption in Fuzzy control system. **[8]**

b) Draw and explain the architecture of a typical Mamdani FLC. **[8]**

P.T.O.

OR

Q6) a) Compare and contrast a traditional PID controller and FLC controller. **[8]**

b) What are the steps involved in designing FLC? State the applications of FLC. **[8]**

Q7) a) Explain in detail, ANFIS with architecture. **[8]**

b) Write a short note of Hybrid Learning Algorithm employed in ANFIS. **[10]**

OR

Q8) a) What are the advantages and limitations of ANFIS. **[8]**

b) Discuss in detail, two pass learning in ANFIS. **[10]**

Total No. of Questions : 8]

SEAT No. :

P2281

[Total No. of Pages : 2

[5254]-618

B.E. (E & TC)

BIOMEDICAL SIGNAL PROCESSING

(2012 Pattern) (End Semester)

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

Instructions to the candidates:

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

Q1) a) Draw & explain block of Biomedical instrumentation system. **[8]**

b) Draw and explain in brief the block diagram of ECG acquisition system. **[6]**

c) Explain with suitable diagram the Electrical activity of Heart. **[6]**

OR

Q2) a) State the classification of Biosignals. **[8]**

b) State advantages and disadvantages of STFT. **[6]**

c) Explain PAN TOMPKINS algorithm to detect QRS segment from acquired ECG signal. **[6]**

Q3) a) Explain α, β & θ in relation with EEG. **[8]**

b) Explain grounding and shielding techniques. **[8]**

OR

Q4) a) List out the applications of EEG and explain in brief brain machine Interface. **[8]**

b) Explain the structure of neuron. Describe the neuronal communication with respect to electrical and chemical action. **[8]**

Q5) a) Write a short note on "Use of EEG to diagnose various Brain disorders". **[8]**

b) Write requirement of basic amplifier and Explain the use of Instrumentation amplifier in Biomedical Field. **[8]**

P.T.O.

OR

Q6) a) Distinguish between stationary and nonstationary biosignals. Also state the edge effects due to sampling a finite length data sequence. **[8]**

b) State the Weiner Hopf equation. Compare it with LMS algorithm. **[8]**

Q7) a) State the PCA algorithm and its significance. **[8]**

b) For an input represented by X(z) and output given by Y(z),State the generalized transfer function H(z) in terms of b(k) and a(k) as coefficients of numerator and denominator respectively.And state a method to find the frequency spectrum of the same. **[10]**

OR

Q8) a) State the advantages and disadvantages of STFT with suitable equation. **[10]**

b) Explain the selection criteria of filter for biomedical application. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2282

[Total No. of Pages : 2

[5254]-619

B.E. (E & TC)

NANO ELECTRONICS AND MEMS

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any one questions 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 is band and bond diagram? Show energy diagram for intrinsic semiconductor. **[7]**

b) What do you mean by clean factories and how it can be maintained? **[7]**

c) Using SET Logic draw and explain circuit model of a inverter. **[6]**

OR

Q2) a) Why basic crystal lattice representation is important? What do you mean by FCC explain it with suitable diagram. **[7]**

b) How contanimation reduction can be done in wafer? **[7]**

c) Explain the concept of **[6]**

i) Quantum dot

ii) Quantum Wire

iii) Nano Wires

Q3) a) Write short note on : **[9]**

i) Electronic Noise

ii) Mechanical Noise.

b) What do you mean by packaging and Integration of MEMS? Why it is so important. **[9]**

P.T.O.

OR

Q4) a) What is Intrinsic stress? Discuss the methods which can be used to reduce intrinsic stress in MEMS Design? **[9]**

b) Write Mechanical properties of silicon with respect to stress and strain. **[9]**

Q5) a) Explain thermal bimorph principle with necessary sketches. **[8]**

b) Explain basic principle of thermocouple which can be used in MEMS. **[8]**

OR

Q6) a) What is the working principle of gyro? Write various applications of it. **[8]**

b) Write different piego electric material used for MEMS devices. **[8]**

Q7) a) What is Holl effect? How this effect is used for measurement of different parameters of silicon wafer? **[8]**

b) What is reflectometer? Explain principle of working of it. **[8]**

OR

Q8) a) Explain electron microscopy tool used for analysis of wafer. **[8]**

b) Explain FTIR method along with experimental setup for physical parameter measurement. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2283

[Total No. of Pages : 2

[5254]-620

B.E. (E & TC Engg.)

DETECTION AND ESTIMATION THEORY

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write characteristics of Maximum Likelihood Estimator. **[5]**

b) What is Bayes criteria. Derive the expression for Bayes Dession rule. Under what condition Bayes criteria reduces to LRT and MAP. **[5]**

OR

Q2) a) Explain best linear unbiased Estimator (BLUE)? **[5]**

b) Write short note on Composite Hypothesis testing. **[5]**

Q3) a) Write a short note on Minimum Variance Unbiased Estimator. **[5]**

b) Write a note on Generalized Likelihood Ratio Test. **[5]**

OR

Q4) a) Let Y1 and Y2 be two statistically independent Gaussian random variables, such that E[Y1] = m, E[Y2] = 3m, and var [Y2] = 1;m is unknown. Obtain the ML estimate of m. **[5]**

b) Discuss the Bayes estimation method briefly for Least Square Estimation and kalman filter. **[5]**

Q5) a) Explain minimum Mean -Square Error Estimate. **[8]**

b) Write a note on Discrete Wiener Filters. **[8]**

P.T.O.

OR

Q6) a) What is Cramer Rao Bound inequality and what are its limitations discuss in detail. **[8]**

b) Write a note on Recursive Least-Square Estimator. **[8]**

Q7) a) In a binary communication system received signal is s (t)+n(t) is Gaussian noise with zero mean. The PDF of two hypotheses are **[8]**

$f(Y/H_0) = \frac{1}{\sqrt{2\pi}} e^{-\frac{y^2}{2^2}}$ and $f(Y/H_1) = \frac{1}{\sqrt{2\pi}} e^{-\frac{(y-1)^2}{2^2}}$ calculate likelihood Ratio.

b) In on-off keying system, the source transmits signal of amplitude 1 volt or 0 volt. Noise n(t) is added which has zero mean and variance = 1 and it is Gaussian. Set up the LRT (Likelihood Ratio Test) for this problem.**[8]**

OR

Q8) a) A rectangular pulse of known amplitude A is transmitted starting at time instant t_o with probability 1/2. The duration T of the pulse is a random variable uniformly distributed over the interval [T1, T2]. The additive noise to the pulse is white Gaussian with mean zero and variance N0/2. Determine the likelihood ratio. **[8]**

b) Explain three criteria of likelihood ratio testing. **[8]**

Q9) a) Explain the Radar Elementary concepts- Range, Range Resolution, and Doppler Shift. **[9]**

b) Give a Review of Some CFAR Detectors. **[9]**

OR

Q10)a) What is CFAR Detection and state the Principles of Adaptive CFAR Detection. **[9]**

b) Write short note on Neyman-Pearson detector. **[9]**

Total No. of Questions : 8]

SEAT No. :

P2284

[Total No. of Pages : 2

[5254]-620-A

B.E. (E & TC)

WIRELESS NETWORKS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Give the difference between 3GPP and 3GPP2. Discuss the evolution of 3GPP2 wireless technologies. **[7]**

b) What is OFDM? How it is spectrally efficient? **[6]**

c) What is WEP? What are the various types of authentication in 802.11? **[7]**

OR

Q2) a) Explain basic network of mobile system. **[6]**

b) What is importance of VPN? What are the various types of mobile VPN? Explain any one of them. **[7]**

c) Describe 3GPP Release 4 distributed network architecture with suitable diagram. **[7]**

Q3) a) What are the important features of LTE systems? With help of block diagram describe various components required in LTE architecture. **[9]**

b) Write notes on : **[9]**

i) LTE scheduler

ii) Enhanced Node (eNode)

OR

Q4) a) What are the LTE channel types? Explain radio channels components. **[9]**

b) How MIMO used to enhance the performance of LTE? Draw and explain eNode B 4 × 4 MIMO. **[9]**

P.T.O.

Q5) a) What is WiMAX? Give the functionalites of WiMAX. **[8]**

b) Explain the modulation techniques used in WiMAX. Describe 802.16e frame layout. **[8]**

OR

Q6) a) Explain frequency planning & spectrum used in WiMAX technology. **[8]**

b) Write short notes on : **[8]**

i) Power Management in WiMAX.

ii) Handover mechanism in WiMAX

Q7) a) What are the advantages of VoIP over other traditional networks? Explain the challenges for implementation of VOIP. **[8]**

b) What is MEGACO in VOIP? List and explain MEGACO commands. **[8]**

OR

Q8) a) What are advantages of using SIP in VOIP? Explain the complete. Functionalities of SIP for VOIP calls. **[8]**

b) Write short notes on : **[8]**

i) Resource Reservation Protocol.

ii) VOIP QOS.

Total No. of Questions : 8]

SEAT No. :

P2285

[Total No. of Pages : 2

[5254]-620-B

B.E. (E & TC)

ADVANCED AUTOMOTIVE ELECTRONICS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain with diagram, four stroke diesel engine operation based upon following action : **[8]**

i) Inlet ii) Compression

iii) Power iv) Exhaust

b) With suitable block diagram explain automatic cruise control system. List sensors used in such system. **[8]**

c) What are the advantages of diesel engine over petrol engine? **[4]**

OR

Q2) a) Draw and explain conventional automobile ignition system in brief. **[8]**

b) What is engine management system? Explain with neat block diagram how it works in various operation modes. **[8]**

c) Write a short note on automotive grade processors. **[4]**

Q3) a) Brief about internet protocols such as TCP/IP and state its use in automotive applications. **[6]**

b) Comment on recent trends in automotive buses and explain buses such as ODBII, MOST, IE, D2B and DSI. **[6]**

c) What is Global Positioning Systems (GPS) and its use in automotive. **[4]**

OR

Q4) a) Explain different communication interface with ECUs. **[6]**

b) In automotive vehicle what is the concept of multiplexed wiring? Explain with diagram how it is implemented. **[6]**

c) What way FlexRay is more superior to CAN? State key features of it. **[4]**

P.T.O.

Q5) a) Write a short note automotive control systems through various analog and digital control methods involved. **[6]**

b) Explain the tool chain for Renesas family of processors. **[6]**

c) How does the transient operation of engines cause emission formation? **[4]**

OR

Q6) a) Draw & Explain engine control system using speed-density method. **[6]**

b) Write a short note on Arduino and explain how it assists in real-time simulation of automotive systems. **[6]**

c) Enlist the various features and specifications of Raspberry Pi. **[4]**

Q7) a) With the help of neat diagram explain necessity of traction control. How it improves stability. **[6]**

b) Explain the role of computer vision in collision warning and pedestrian protection. **[6]**

c) What is the sequential diagnostic procedure in automotive context? **[6]**

OR

Q8) a) Write a short note on diagnostic protocols: KWP2000 and UDS. **[6]**

b) Compare On-board diagnostic & Off-board diagnostic system. **[6]**

c) What are the preliminary checks in automotive systems and adjustments? **[6]**

Total No. of Questions : 10]

SEAT No. :

P2286

[Total No. of Pages : 2

[5254]-620-C

B.E. (IT, E & TC & Comp. Engg.)

UNIFIED COMMUNICATIONS & CONTACT CENTER APPLICATIONS

(2012 Pattern) (Open Elective)

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

Instructions to the candidates:

1) ***Answer 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) Explain how the speed of 2.048 Mbps derived for E1. **[5]**

b) What is silence suppression and how is it achieved? **[5]**

OR

Q2) a) Why can't DTMF digits be transmitted on highly compressed codecs such as G.729? **[5]**

b) How is telephone mobility achieved in enterprise networks? Describe with a call flow. **[5]**

Q3) a) Show a typical SDP for audio call and explain its mandatory headers. **[5]**

b) What is Session Border Controllers. **[5]**

OR

Q4) a) Explain in detail the following features. **[5]**

i) Video Conference

ii) Presence

b) Differentiate between hosted and on-premise telephony solutions. What does the capabilities message of H.245 contain? **[5]**

Q5) a) Explain the lifecycle of an inbound voice contact. Describe the components involved and their functionalities. **[6]**

b) What are the functions of an Email Management application for a Contact Center? Describe the server, agent and supervisor features. Describe security aspects as well. **[6]**

c) What is CTI? What are types of CTI? What are the server and agent side CTI functionalities? **[6]**

P.T.O.

OR

Q6) a) Explain the lifecycle of an inbound chat contact. Describe the components involved and their functionalities. **[6]**

b) Explain the functionalities of PABX, ACD, Self Service and CTI in an Inbound Call Center. **[6]**

c) What is an Email MIME? Explain how MIME headers play a role in Email management in a Contact Center. **[6]**

Q7) a) Explain the 3 modes of outbound dialing? Provide key differentiators between the three with sample use cases for each. **[8]**

b) What is blending? How does it work? **[8]**

OR

Q8) a) What is outbound CPA and call classification? Explain how call classification is done at a high level and how it helps outbound contact centers. **[8]**

b) Explain the core components of Workforce Optimization with a brief description and advantage of each. **[8]**

Q9) a) List down and explain various types of deployment models are used in cloud? **[8]**

b) How Speech Analytics can give a company a significant competitive advantage? What are key challenges ahead of Speech Analytics? **[8]**

OR

Q10)a) What is DevOps and explain it helps Continuous Integration? What is UCaaS and CCaaS and list five key advantages of this? **[8]**

b) What is virtualization and explain the role of hypervisor in the same context? **[8]**

Total No. of Questions : 10]

SEAT No. :

P2287

[Total No. of Pages : 2

[5254]-621

B.E. (Electrical Engg.)

POWER SYSTEM OPERATION & CONTROL

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Explain any three of following concepts, **[10]**

a) Equal area criterion

b) Swing Equation

c) Effect of clearing time on stability

d) Critical clearing angle

OR

Q2) a) With neat connection diagram, explain any one shunt compensation scheme. **[5]**

b) Explain the generation of reactive power by a synchronous machine. **[5]**

Q3) With characteristics, explain any TWO of following : **[10]**

a) SVC

b) TCSC

c) STATCOM

OR

Q4) a) State the problems of AC transmission system. **[5]**

b) State the problems with Series Compensation. **[5]**

P.T.O.

Q5) a) Explain the advantage of adding integral control along with proportional control in case of load frequency control of single area case. Draw block diagram and frequency response. **[8]**

b) Explain the droop Characteristic of speed governor of generator. **[8]**

OR

Q6) a) With mathematical equation, explain Area Control Error of load frequency control of single area case and two area case. **[6]**

b) Write only mathematical equation and block diagram representation of following : **[10]**

i) Speed governor system

ii) Turbine model

iii) Generator-load model

Q7) Explain following concepts : **[16]**

a) Unit commitment and its necessity

b) Economic Load dispatch and its necessity

c) Objective function of Unit commitment and constrains

d) Objective function of economic load dispatch and constrains

OR

Q8) Explain with suitable numerical, following methods of Unit Commitment **[16]**

a) Priority list method

b) Dynamic programming

Q9) a) Explain the working of power pool. **[9]**

b) With Mathematical formula, explain the following Reliability indices **[9]**

i) SAIFI

ii) SAIDI

OR

Q10)a) Explain the condition, when Capacity interchange of power is applied?**[9]**

b) With Mathematical formula, explain the reliability indices evaluation for Parallel System. **[9]**

● ● ●

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

P2288 **[Total No. of Pages : 2**

[5254]-622

B.E. (Electrical) (Semester – I)

PLC AND SCADA APPLICATIONS

(2012 – Pattern)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Black figures to the right indicate full marks.***

Q1) a) State advantages and disadvantages of PLC. **[8]**

b) Draw and explain ladder diagram of Down counter along with all its bits. Draw its timing diagram also. **[8]**

c) Which are the different ON/OFF output devices? Explain any two in detail. **[6]**

OR

Q2) a) Define programmable logic controller and state the selection criteria for the same. **[7]**

b) Draw the ladder diagram for the following function table **[8]**

Inputs – I1, I2 Outputs - Q1, Q2, Q3, Q4

I1	I2	Q1	Q2	Q3	Q4
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

c) What is the effect of change in Ki and Kd parameters on the performance of PID controlled system? **[7]**

P.T.O.

Q3) a) Explain any two flow and level sensors. **[8]**

b) How speed of the DC motor is controlled using PLC? Explain with the help of block diagram only. **[8]**

OR

Q4) a) Design traffic light controller using PLC ladder diagram. **[8]**

b) Draw and explain AC motor overload protection. **[8]**

Q5) a) State and Explain different features of SCADA system. **[8]**

b) Explain with block diagram use of SCADA in chemical plant. **[8]**

OR

Q6) a) Draw SCADA architecture and explain its important components. **[10]**

b) What is Automatic Generation Control (AGC) and how it is achieved? Explain clearly the objectives of the system. **[6]**

Q7) a) Explain MODBUS model along with communication layers. **[8]**

b) Explain IEC61850 layered architecture. **[8]**

OR

Q8) a) Write a short note on Profibus standard. **[8]**

b) Write a short note on DNP3 protocol. **[8]**

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

P2290 **[Total No. of Pages : 2**

[5254]-624

B.E. (Electrial)

SPECIAL PURPOSE MACHINES

(2012 Pattern) (Elective – I)

Time : 2:30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

Q1) Explain energy content in singly excited magnetic field systems. **[7]**

OR

Q2) How to determine magnetic force and torque from coenergy. **[7]**

Q3) Convert three phase system natural frame in Stationary reference frame. **[7]**

OR

Q4) Derive expression for electromagnetic torque developed in PMSM machine. **[7]**

Q5) Compare BLDC machine with PMSM machine. **[6]**

OR

Q6) Explain closed loop control scheme used in PMSM control. **[6]**

P.T.O.

Q7) Solve any two. **[18]**

a) Give principle of operation of reluctance machine. Also give associated analysis.

b) Explain different configurations of reluctance machines.

c) Derive relation for torque developed in reluctance machine. Also discuss nature of current waveforms.

Q8) a) Explain VRM type stepper motor its construction and principle of operation. **[8]**

b) Explain process of torque production in case of stepper motors. **[8]**

OR

Q9) a) Explain different types stepping motors. Also state advantages of each type. **[8]**

b) With block diagram explain control of stepper motor by microstepping method. **[8]**

Q10) Solve any two. **[16]**

a) Explain different constructions of Linear Induction Machines.

b) Explain important characteristics of Linear Induction Motor.

c) Explain requirements of Linear Induction Motors for applications like high speed traction, missile launcher etc.

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

P2291 **[Total No. of Pages : 2**

[5254]-625

B.E. (Electrical)

POWER QUALITY

(Elective – I) (Semester – I) (2012 Pattern)

Time : 2:30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

Q1) a) Why power quality has become important in today's context? **[5]**

b) Write note on how power quality is affected due to grounding problems. **[5]**

OR

Q2) a) Define power quality terms transients, voltage fluctuation and waveform distortion. **[5]**

b) State voltage sag mitigation techniques and explain any one in details. **[5]**

Q3) a) Write various sources of transient over voltages and explain any one in detail **[5]**

b) What is Flicker? Explain sources of flicker. **[5]**

OR

Q4) a) Explain various grounding practices as per IEEE standards. **[5]**

b) Explain Area of vulnerability. **[5]**

P.T.O.

Q5) a) Discuss in details various sources of harmonics. **[8]**

b) Explain following terms **[8]**

i) Interharmonics ii) subharmonics

iii) Triplen harmonics iv) Harmonic phase sequence

OR

Q6) a) Explain Effects of Harmonics on various power system equipments. **[8]**

b) Explain Harmonic indices in detail. **[8]**

Q7) a) What is point of common coupling and its use in harmonic study? **[8]**

b) Explain Harmonic distortion study procedure in details. **[8]**

OR

Q8) a) Explain various principles of controlling harmonic distortion. **[8]**

b) Explain passive filter design procedure for harmonics reduction. **[8]**

Q9) a) State equipment used for power quality monitoring and explain any three equipment in detail. **[10]**

b) Write note on choosing PQ monitoring duration. **[8]**

OR

Q10) Write short notes on the following **[18]**

a) True RMS meters

b) Transient disturbance analyser

c) Harmonic analyser

Total No. of Questions : 7] **SEAT No. :**

P2292 **[Total No. of Pages : 3**

[5254]-626

B.E. (Electrical) (Elective – I)

RENEWABLE ENERGY SYSTEMS

(2012 Pattern)

Time : 2:30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Q7 is compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Define and explain concentration ratio with neat diagram. **[4]**

b) Calculate the zenith angle for air mass 1.5. **[4]**

c) What are the different factors affecting the selection of site for installation of wind generator? **[8]**

d) What is maximum power point tracking? List the methods of MPPT. **[4]**

OR

Q2) a) Explain solar water heating system. **[8]**

b) Wind at 1 Standard atm pressure and 15°c has a velocity of 15 m/s. Calculate **[8]**

i) Total power contained in a wind

ii) Power output of a generator

iii) Torque at maximum efficiency

iv) Maximum axial thrust.

Given : Turbine diameter = 120m, Turbine Operating speed = 40 rpm at maximum efficiency, Air density = 1.226 kg/m^3, $\eta_{\text{wind sys}}$ = 35%.

c) What are the factors required for electrical design of solar array? **[4]**

P.T.O.

Q3) a) Write the construction and working of Floating dome type biogas plant with the help of proper diagram. **[8]**

b) What is meant by anaerobic digestion? What are the factors affecting biodigestion? Draw the suitable diagram. **[10]**

OR

Q4) a) What is wet fermentation and dry fermentation. **[4]**

b) A community biogas plant is to be designed for a village consisting of 98 families. Each family has 5 persons (adults). A village survey report had given the information about the cattles ___ COWS (102), Oxes (124), Buffalo (52) Pig (3)
Given : Gas reqd for cooking / person / day = 0.227 m^3
Gas reqd for lighting 100 cp 1 amp/hr = 0.126m^3 Each family has 1 lamp which would burn 2 hours daily. **[14]**

Assume :

i) Gas produced from 1 kg of Gober in winter = 42 litre & in summer = 55 litres

ii) Calorific value of gas/m^3 = 4713 kcal

iii) Burning η = 60%

iv) density of slurry = 1090 kg/m^3

v) Retention period = 30 days

vi) No of digesters = 4

vii) 10% extra space for proper expansion of gas.

viii) $\frac{\text{Height of digester}}{\text{Diameter of digester}} = 1$

ix) Amount of dung required by each animal to produce 1 m^3 gas / day$\rightarrow$ Cow – 10 kg, Oxe – 12kg Buffalo – 15kg, Pig – 2kg.

Q5) a) List the methods for hydrogen production. Elaborate any one method.**[8]**

b) What is a fuel cell? What are the advantages and disadvantages of a fuel cell? Give the different types of fuel cell. **[8]**

OR

Q6) a) Explain the principle of working of a battery Describe a lead acid battery. **[8]**

b) Write a note on compressed air storage. **[8]**

Q7) a) Draw the grid connected wind generator? What are the necessary parameters required to be checked before integration with grid. **[6]**

b) Define and explain **[10]**

i) Simple payback period

ii) Life cycle cost

iii) Inflation rate

iv) Initial Rate of Return

v) Net Present Value

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

P2293 **[Total No. of Pages : 2**

[5254]-627

B.E. (Electrical) (Elective – I)

DIGITAL SIGNAL PROCESSING

(2012 – Pattern)

Time : 2:30 Hours] ***[Max. Marks : 70***

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

b) State and prove any two properties of 'z' transform **[5]**

OR

Q2) a) Find 'z' transform of **[5]**

i) $x(n) = \{1, 2, \underset{\downarrow}{-2}, 2\}$

ii) $x(n) = \delta(n) + 2\,\delta(n-1) + 2\,(\delta + 1)$

b) Explain significance of DTFT in analysis of DTS **[5]**

Q3) a) State and explain any two properties of DTFT **[5]**

b) Give the detail classification of DTS **[5]**

OR

Q4) a) Explain Frequency response of second order discrete system. **[5]**

b) Explain i) static & dynamic system ii) Linear & non-linear system in DTS. **[5]**

Q5) a) Explain DIFFFT algorithm for N = 4 **[8]**

b) State and prove linearily & time shifting properly of DFT **[8]**

OR

Q6) a) Explain circular convolution property of DFT. **[8]**

b) Define DFT and explain how it can be used to measure phasor of sinusoidal signal **[8]**

P.T.O.

Q7) a) Explain Bilinear transformation method in designing IIR Filter. **[9]**

b) Explain cascade structure of IIR Filter. **[9]**

OR

Q8) a) Explain ideal selective Filter with diagram & graphs **[9]**

b) Explain direct form structure of IIR Filter. **[9]**

Q9) a) Compare FIR and IIR Filter **[6]**

b) Explain cascade and direct Form structure of FIR Filter. **[10]**

OR

Q10)Write short note on **[16]**

a) Application of DSP in power Factor correction.

b) Application of DSP in induction motor control.

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

P2294 [Total No. of Pages : 2

[5254]-628

B.E. (Electrical) (Elective – II)

RESTRUCTURING AND DE REGULATION

(2012 Pattern)

Time : 2:30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Describe the concept of power exchange **[5]**

b) What are different characteristics of electricity tariff? **[5]**

OR

Q2) a) Explain the functions of CEA. **[5]**

b) Explain why Public participation is necessary in regulatory process. **[5]**

Q3) a) Give the structure of regulatory process in India. **[5]**

b) Explain different performance indices for generation and transmission. **[5]**

OR

Q4) a) Describe the various stages in determination of tariff for integrated utility. **[5]**

b) Write a short note on Performance Based Regulation. **[5]**

Q5) Explain following structural models. **[16]**

a) Monopoly.

b) Single Buyer.

c) Wholesale competition.

d) Retail competition.

OR

P.T.O.

Q6) a) Write a short note on Californian Energy Crisis **[8]**

b) Explain Electricity reforms of **[8]**

i) Nordic Pool

ii) UK

Q7) Write a short note on following electricity trading models. **[16]**

a) Integrated

b) Wheeling

c) Decentralized

OR

Q8) a) Explain in detail Retail competition. Also explain Retail Access Framework **[8]**

b) Explain various methods of transmission pricing **[8]**

Q9) a) Explain the three parts of Availability based tariff and how its implementation has helped in the improvement of the grid operation in Indian power sector. **[9]**

b) What are transmission congestion issues, explain in details. Also mention the different congestion management methods. **[9]**

OR

Q10)a) Explain the concept of open access and transmission right. Also explain transmission pricing. **[9]**

b) Explain the necessity of transmission planning with reference to market structure. Also explain the concept of transmission rights. **[9]**

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

P2295 [Total No. of Pages : 2

[5254]-629

B.E. (Electrical)

ELECTROMAGNETIC FIELDS

(Elective – II) (Semester – I)

(2012 Pattern)

Time : 2:00 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Derive the boundary conditions for electric flux density for the boundary between two dielectric materials. **[7]**

b) Determine $\bar{D}$ at (4, 0, 3) if there is a point charge -5 mC at (4, 0, 0) and a line charge 3 π mC/m along the Y axis. **[6]**

c) State and explain scalar & vector magnetic potential. **[7]**

OR

Q2) a) A boundary exists at Z = 0 between two dielectrics $\epsilon r_1 = 2.5$ region Z < 0. and $\epsilon r_2 = 4$ region Z > 0. The field in region of ϵr_1 is $\bar{E}_1 = -30\,\bar{a}\,x + 50\,\bar{a}\,y + 70\,\bar{a}\,z$ V/m.

Find i) Normal component of E_1 ii) Tangential component of E_1 iii) The angle $\propto_1 \leq 90^o$ between E_1 and normal to the surface iv) Normal component of D_2 (v) angle between E_2 and Normal to the surface. **[7]**

b) Explain what is mean by an electric dipole. Derive the expression for electric field at distant point due to electric dipole. **[6]**

c) State and explain Biot – Savart law. **[7]**

P.T.O.

Q3) a) Explain magnetic force on moving charged particle and on a differential current element. **[8]**

b) The region I and II interface each other region I has $\mu_{r1} = 1.5$ and region II has $\mu_{r2} = 1.$ ϵ of both regions are equal. The flux density vector $\bar{B}_1 = -1.2\ \bar{a}\ x + 0.8\ \bar{a}\ y + 0.4\ \bar{a}\ z$ Tesla is incident at boundary of I and II from medium I. Compute BII, angle of incidence, angle of refraction and angle of reflection by applying boundary conditions. **[8]**

OR

Q4) a) Derive the boundary conditions at an interface between two magnetic media having permeability μ_1 and μ_2 respectively. **[8]**

b) Explain Magnetic torque, Magnetic dipole moment. **[8]**

Q5) a) State Maxwell's equations in point and integral form for time varying fields. **[8]**

b) Derive the expression for emf induced in conductor in motion through the time varying field. **[8]**

OR

Q6) a) Using displacement current density, modify Ampere's law. **[8]**

b) State and explain Faraday's law. **[8]**

Q7) a) What is the uniform plane wave and why is the study of uniform plane waves important. **[9]**

b) Discuss the wave motion for a lossy dielectric medium. **[9]**

OR

Q8) a) Derive the Poynting theorem and give its significance. **[9]**

b) Derive the wave equation and write its vector - phasor form. **[9]**

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

P2297 **[Total No. of Pages : 2**

[5254]-631

B.E. (Electrical) (End sem)

INTRODUCTION TO ELECTRICAL TRANSPORTATION SYSTEMS (Elective – II)

(2012 Pattern)

Time : 2:30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicates full marks.***

Q1) a) What is the role and importance of the transportation system? Explain the factors affecting transportation system. **[8]**

b) Explain different types of batteries with their characteristics. **[12]**

OR

Q2) a) What are the advantages and disadvantages of Electric traction? **[4]**

b) Explain various power quality issues of charging electric vehicles. **[6]**

c) Explain the working of Ni-cd battery with neat diagram and its characteristics. **[10]**

Q3) a) Explain various components of electric wheel chair. **[8]**

b) Draw & Explain block diagram of BLDC motor. **[8]**

OR

Q4) a) Explain smart traffic control with their benefits. **[8]**

b) Draw & explain electric power steering. **[8]**

P.T.O.

Q5) a) Explain DC and AC traction systems with their applications. **[8]**

b) Explain the various components and working of hybrid vehicle with a neat diagram. **[10]**

OR

Q6) a) Explain the types of mechanical drives used in transportation systems. **[8]**

b) Explain the power train architecture of high speed rail. **[10]**

Q7) a) Draw & Explain load characteristics of Elevator systems. **[8]**

b) Describe the concept of special purpose vehicles. **[8]**

OR

Q8) a) Explain the control scheme used in different types of elevators. **[8]**

b) Draw and explain an acceleration and speed characteristics of hybrid car. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2298

[Total No. of Pages : 3

[5254]-632

B.E. (Electrical)

SWITCHGEAR & PROTECTION

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. No.1 or 2, Q.No.3 or 4, Q. No.5 or 6, Q. No.7or 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 electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are essential qualities of protective relaying. **[6]**

b) Write a short note on current chopping. **[4]**

OR

Q2) a) Explain the following terms w.r.t. circuit breaker. **[6]**

i) Restriking voltage.

ii) R.R.R.V.

iii) Recovery voltage

b) An instantaneous value of magnetizing current of 5.5 A in a 132 kV transmission line having line to ground capacitance of 0.015 μF and inductance of 5 H is required to be interrupted. Determine **[4]**

(i) the voltage across the contacts of circuit breaker at the time of current interruption.

(ii) the resistance to be inserted in the contacts in order to avoid restriking voltage.

P.T.O.

Q3) a) Explain construction and working of vacuum circuit breaker. **[6]**

b) Explain the term resistance switching. **[4]**

OR

Q4) a) Explain current graded overcurrent protection scheme. **[4]**

b) Explain puffer type SF6 circuit breaker. **[6]**

Q5) a) Compare static relays with electromechanical relays with respect to construction, working principle, advantages and limitations. **[8]**

b) Compare gap type and gapless type lightning arresters. **[8]**

OR

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

i) Anti-Aliasing filter.

ii) Sampling theorem.

b) With suitable diagram explain construction and working of Rod-gap arrester. ` **[8]**

Q7) a) Explain the phenomenon of overfluxing in the transformer and protection used against it. **[9]**

b) A 3 phase 12 kV alternator winding is required to be protected against earth faults. The 80% of winding is protected against earth faults by a relay having pick up current of 1 Amp. The CT has a ratio of 1000/5. Calculate resistance to be connected between neutral and ground. If resistance of 10 ohms is connected between neutral to ground, how much percentage of winding is protected against earth fault. **[9]**

OR

Q8) a) Explain protection against single phasing in 3 phase induction motor. **[9]**

b) Explain the abnormal conditions like unbalance loading, overspeeding and loss of prime mover in case of alternator. **[9]**

Q9) a) Explain the step distance protection scheme for transmission line. Also draw the neat sketch for the same. **[8]**

b) Explain the need of high impedance relay for differential protection of busbar. **[8]**

OR

Q10)a) Write a short note on Wide Area Measurement System (WAM). **[8]**

b) Explain how reactance relay is used for distance protection. Derive its torque equation. Draw its characteristics on R-X diagram. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2299

[Total No. of Pages : 3

[5254]-633

B.E. (Electrical)

POWER ELECTRONICS CONTROLLED DRIVES

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Derive the fundamental torque equation of a motor load system. Write down the conditions of steady state, acceleration and deceleration. **[5]**

b) A drive has following equations for motor and load torques: **[5]**

$T = (20 + 0.5\omega_m)$ and $T_l = 5 + 0.6\omega_m$ Obtain the equilibrium speed and comment on its steady state stability.

OR

Q2) a) A 220 V, 1500 rpm, 10 A separately excited dc motor is fed from a single phase fully controlled rectifier with an AC source voltage of 230 V, 50 Hz. Ra = 2Ω . Assuming continuous conduction calculate firing angle for rated motor torque and (1000) rpm. **[5]**

b) Explain Regenerative braking method along with the torque speed characteristics of DC separately excited motor. **[5]**

Q3) a) A 220 V, 970 rpm, 100 A dc separately excited motor has an armature resistance of 0.05Ω. It is braked by dynamic braking from an initial speed of 900 rpm. Calculate the resistance to be placed in armature circuit to limit braking current to the full load value. **[6]**

b) With a neat diagram explain the regenerative braking mode of DC separately excited motor using class B chopper. **[4]**

P.T.O.

OR

Q4) a) Why variable frequency control of induction motor is more efficient than stator voltage control? **[5]**

b) Explain the thyristorised stator voltage control of 3 ph induction motor. What are its demerits? **[5]**

Q5) a) Draw Torque speed characteristics and explain multi quadrant operation of Induction motor drives. **[10]**

b) Compare 6 step and PWM inverter used to operate Induction Motor. **[6]**

OR

Q6) a) How speed control is achieved using Vector control of induction motor? Draw vector diagram and explain. **[10]**

b) Write in brief about control and applications of AC Servo Drives. **[6]**

Q7) a) Draw neat diagram to explain Permanent Magnet Brushless DC Motor. **[8]**

b) How constant torque angle control is used for Permanent Magnet Brushless DC Motor? **[8]**

OR

Q8) a) Explain unity power factor control of Permanent Magnet Brushless DC Motor. **[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 textile mill operations? **[6]**

c) What are the characteristics for drives used in Traction applications? Explain. **[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. :

P2300

[Total No. of Pages : 3

[5254]-634

B.E. (Electrical)

HIGH VOLTAGE ENGINEERING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer all questions.***

2) ***Answer Ql 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) State and explain Paschens' law and its limitations. **[8]**

b) Explain following breakdown theories for solid dielectrics:

i) Thermal breakdown

ii) Partial Discharge **[8]**

c) In an experiment in a certain gas, it was found that the steady state current is 4.5×10^{-8}A at 8kV at a distance of 0.4 cm between the plane electrodes keeping the field constant and reducing the distance to 0.1cm results in a current of 4.5×10^{-9} A. Calculate Townsend's primary ionization coefficient. If the breakdown occurred when gap distance was increased to 0.9 cm what is the value of secondary ionization coefficient. **[4]**

P.T.O.

OR

Q2) a) Explain various reasons for switching surges. Also state the remedial actions for the same. **[8]**

b) Explain properties of composite dielectrics. Explain long term breakdown theory of composite dielectric. **[6]**

c) Explain any two breakdown theories of commercial liquids. **[6]**

Q3) a) Explain generation of high AC voltage with the help of series and parallel resonance circuit. **[8]**

b) Draw a neat sketch of Marx Circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances? **[8]**

OR

Q4) a) Explain the working of three cascade connected transformers used for generation of AC voltages. State its advantages and disadvantages also. **[8]**

b) Explain the generation of High Impulse Current with a suitable diagram. Also describe its main parts. **[8]**

Q5) a) Draw a vertical arrangement of sphere gap used for peak value measurement of the voltage. Clearly show insulator support, sphere shank, operating gear and motor for changing gap distance, HV connection and sparking point. Discuss various factors that affect the spark over voltage of a sphere gap. **[8]**

b) What is dielectric loss and dielectric constant? Explain the method of measurement of dielectric constant and loss factor. **[8]**

OR

Q6) a) State the different methods of partial discharge measurement and explain any one in detail. **[8]**

b) With suitable figure explain the working of capacitance voltage transformer. Also state its advantages. **[8]**

Q7) a) Explain the different test carried on insulators in high voltage testing laboratory. **[9]**

b) Classify the different High voltage laboratories and give salient features of each of them. **[9]**

OR

Q8) a) State and explain the different high voltage tests carried on surge arresters. **[9]**

b) Explain the earthing and shielding of High Voltage Laboratories. **[9]**

Total No. of Questions : 9]

SEAT No. :

P2301

[Total No. of Pages : 2

[5254]-635

B.E. (Electrical)

HVDC AND FACTS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Explain suitable controls used for HVDC System. **[10]**

OR

Q2) What are the advantages of multi-terminal HVDC system over classical HVDC system? Also explain control characteristics of multi-terminal system. **[10]**

Q3) Explain generation of harmonics in HVDC systems. Discuss mechanisms used for control harmonics. **[10]**

OR

Q4) Is HVDC light is superior to classical HVDC? In what ways? Justify. **[10]**

Q5) Attempt any two : **[16]**

a) Explain Power Converter structures.

b) Explain Ac controller structures.

c) Explain considerations in selection of power converters.

P.T.O.

Q6) a) With internal control structure explain operation of STATCOM. Draw necessary phasor diagrams. **[10]**

b) Explain operation of SSSC. **[8]**

OR

Q7) a) Explain with schematic controller used for TCSC. Also explain modes of operation of TCSC. **[12]**

b) Explain operation of TCR+FC to minimize generation of harmonics. **[6]**

Q8) a) With internal control structure explain operation of UPFC. **[8]**

b) Discuss applications of UPFC. **[8]**

OR

Q9) a) Explain controller used for UPFC. **[8]**

b) Explain coordinated operation of UPFC in combined modes of operation. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2302

[Total No. of Pages : 3

[5254]-636

B.E. (Electrical)

DIGITAL CONTROL SYSTEMS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt questions Q.1 & Q.2, Q.3 & Q.4, Q.5 & Q.6, Q.7 & Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarithmic tables, slide rules, electronic unprogrammable pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain sampling and reconstruction process. State Sampling theorem and give its importance. **[8]**

b) Explain mapping between S-plane & Z-plane with proper diagrams. **[6]**

c) For the system $x(t) = Ax(t) + Bu(t)$, where $A = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$, compute e^{At} using Caley Hamilton Theorem. **[6]**

OR

Q2) a) Explain the various standard discrete input test signals with neat diagrams. **[6]**

b) Define State Transition Matrix & explain its properties. **[8]**

c) The characteristic equation of a discrete system is given by

$$P(Z) = Z^4 - 1.2Z^3 + 0.07Z^2 + 0.3Z + 0.08 = 0$$

Find the stability of this system using Routh stability criterion. **[6]**

P.T.O.

Q3) a) Define and explain the concepts 'Controllability and observability of discrete-data Control System. With their methods. **[8]**

b) Design a full state observer for the system having

$$G=\begin{bmatrix}0 & 20.6\\ 1 & 0\end{bmatrix};\ H=\begin{bmatrix}1\\ 0\end{bmatrix};\ C=\begin{bmatrix}0 & 1\end{bmatrix}$$

Desired Eigen values of observer matrix are $Z = -1.8+j2.4$, $Z = -1.8-j2.4$. **[8]**

OR

Q4) a) Write a short note on pole placement design technique. **[8]**

b) Derive Ackermann' s formula for determination of state feedback gain matrix K. **[8]**

Q5) a) Explain pole zero matching with example. **[4]**

b) The pulse transfer function of discrete time system given as

$$\frac{Y(z)}{U(z)}=\frac{z+1}{z^2+1.3z+0.4}$$

Derive its Jordan canonical form. **[6]**

c) Explain bilinear transformation with frequency warping. **[6]**

OR

Q6) a) Explain Euler's forward, backward method and trapezoidal method with example. **[8]**

b) Determine State space representation in Controllable canonical form & Observable canonical form of the system

$$\frac{Y(z)}{U(z)}=\frac{4z^2-3z+0.5}{z^3+z^2-z-0.75}$$ **[8]**

Q7) a) Draw a neat block diagram of digital temperature control scheme and explain the function of each block. **[10]**

b) Explain computer program Structure for simulation for simulation of discrete time control of continuous time plant. **[8]**

OR

Q8) a) Draw a neat block diagram of digital position control scheme and explain its working. **[10]**

b) Explain stepper motor control with block diagram and algorithm. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2303

[Total No. of Pages : 2

[5254]-637

B.E. (Electrical)

INTELLIGENT SYSTEMS AND ITS APPLICATION IN ELECTRICAL ENGINEERING (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, Q.7 Or Q.8.***
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) Explain biological neuron model with neat sketch. **[6]**

b) Explain learning rules. **[6]**

c) Explain ART-1 network with neat sketch. **[8]**

OR

Q2) a) Explain Single neuron model with activation function. **[6]**

b) What are different supervised methods? Draw perceptron model. **[6]**

c) Explain Self organizing maps. **[8]**

Q3) a) Explain various membership functions used in fuzzy logic **[8]**

b) Discuss various fuzzy operators. **[8]**

OR

P.T.O.

Q4) a) Explain properties of fuzzy set. **[8]**

b) Explain crisp logic Vs fuzzy logic. **[8]**

Q5) a) Explain predicate logic used in fuzzy systems. **[8]**

b) Explain sugeno inference system. **[9]**

OR

Q6) a) Explain various de-fuzzification methods. **[8]**

b) Explain Mamdani inference system. **[9]**

Q7) a) Give introduction of genetic algorithm. **[8]**

b) Explain software architecture used in expert system. **[9]**

OR

Q8) a) Explain various operators used in genetic algorithm. **[8]**

b) Explain rule based system in expert system. **[9]**

Total No. of Questions : 8]

SEAT No. :

P2304

[Total No. of Pages : 2

[5254]-638

B.E. (Electrical Engineering)

SMART GRID

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 Or Q.2, Q.3 Or Q.4, Q.5 Or Q.6, Q.7 Or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) State and explain the challenges for Smart Grid. **[6]**

b) Explain the function of Intelligent Electronic Devices & their application for monitoring & protection. **[6]**

c) List different smart appliances and describe an integration of smart appliances into grid for Home and Building Automation. **[8]**

OR

Q2) a) Compare Conventional Grid and Smart Grid. **[8]**

b) How smart grid can be benefited by implementing PHEV technology? **[6]**

c) What is the role of Advanced Metering Infrastructure (AMI) in Smart Grid? **[6]**

Q3) a) Write a note on 'protection & control of Microgrid'. **[8]**

b) Explain concept of micro grid, and its need and applications. **[8]**

P.T.O.

OR

Q4) a) Compare Microgrid and Smart Grid. **[8]**

b) Describe Power Quality Issues of grid connected Renewable Energy Sources. **[8]**

Q5) a) Write a note on 'Web based Power Quality Monitoring'. **[8]**

b) Explain the concept of Power Quality and EMC in Smart Grid. **[8]**

OR

Q6) a) Describe Power Quality Issues of grid connected Renewable Energy Sources. **[8]**

b) Explain the power quality audit and its importance in smart grid. **[8]**

Q7) a) Explain the role HAN in smart grid. **[9]**

b) Why cyber security is of prime importance in Smart grid & how it can be achieved? **[9]**

OR

Q8) a) Explain cloud computing and its need. **[9]**

b) Write a note on, Broadband over power line. **[9]**

Total No. of Questions : 5]

SEAT No. :

P2305

[Total No. of Pages : 2

[5254]-639

B.E. (Electrical)

ROBOTICS AND AUTOMATION

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2.***

2) ***Solve any two sub-questions from Q3 to Q5.***

3) ***Neat diagram must be drawn wherever necessary.***

4) ***Figures to the right indicate full marks.***

5) ***Your answers will be valued as a whole.***

6) ***Use of logarithmic tables, slide rule, Mollier charter, electronic pocket calculator and steam tables is allowed.***

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

Q1) a) Write a short note on Robot intelligence based on robot programming. **[7]**

b) Explain with neat sketch about Robot anatomy. **[7]**

c) Explain degree of freedom with neat sketch. **[6]**

OR

Q2) a) Explain Yaw, pitch and roll. **[7]**

b) Explain Arm prosthesis Automation. **[7]**

c) Write in detail about Historical information of Robot science. **[6]**

P.T.O.

Q3) Solve any two **[16]**

a) Explain with neat sketch about Homogeneous coordinate.

b) Explain co-ordinate reference frame.

c) How many parameters are required for specifying position and orientation of rigid body? Explain.

Q4) Solve any two **[18]**

a) Explain Euler-Lagrange method to control robot motions and hence comment on Euler angle.

b) Write short note on inverse kinematic problem using fixed frame rotation.

c) How end effecter rotary motion about an arbitrary axis can be achieved using dynamic control.

Q5) Solve any two **[16]**

a) Explain various linear control schemes.

b) Explain resolved motion position control.

c) Explain joint position control.

Total No. of Questions : 10]

SEAT No. :

P2306

[Total No. of Pages : 3

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B.E. (Electrical)

ILLUMINATION ENGINEERING (Elective - IV)

(2012 Pattern) (Semester - II) (Theory)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Compare artificial light with natural light (Minimum six points of comparison expected). **[6]**

b) State good and bad effects of light. **[4]**

OR

Q2) a) With suitable diagram explain measurement of candle power by photometer. **[6]**

b) Describe the construction and operation of induction lamp. **[4]**

Q3) a) With suitable diagram explain one type of super imposed ignitor and impulse ignitor. **[6]**

b) With suitable diagram explain - Indirect lighting system and general diffused lighting system . **[4]**

OR

P.T.O.

Q4) a) With suitable diagram explain construction and working of compact flourocent lamp (CFL). Give typical power ratings of this lamp. **[6]**

b) Explain any two types of lighting fixtures. **[4]**

Q5) a) Define following terms - lux, utilization factor, maintenance factor, candle power. **[8]**

b) A room of size 20m × 5m is illuminated by 20 number of 200 watt lamps. The MSCP of each lamp is 250. Assume utilization factor of 0.6 and depreciation factor of 1.2. Calculate average illumination on working plane. **[8]**

OR

Q6) a) Describe the lighting scheme for swimming pool. **[8]**

b) Explain following methods for lighting calculation – **[8]**

i) Lumen or light flux method.

ii) Point to point or inverse square law method.

Q7) a) It is required to provide flood lighting scheme for a building of 30m × 20m wall. The brightness required is 20 lumens/m^2, the coefficient of reflection of building surface is 0.2. The lamps of 500 watts having lumen output of 8450 each are used. Beam factor is 0.6 and waste light factor is 1.2 and maintenance factor is 0.8. Calculate number of lamps of flood lighting. **[8]**

b) With suitable diagrams explain arrangement of luminaries for roads. **[8]**

OR

Q8) a) With suitable diagram explain neon lamps/neon tube signs used for advertising. **[8]**

b) With suitable diagram explain ISO lux-graphical method used for road lighting. **[8]**

Q9) a) Compare LED with LASER. **[6]**

b) With suitable diagram explain working of OLED. **[6]**

c) State the differences between conventional lighting and OLED lighting. **[6]**

OR

Q10)a) With suitable diagram explain any one type of Fibre optic guide. **[6]**

b) State and explain precautions to be taken for fibre optic installation. **[6]**

c) State the disadvantages of OLEDS. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2307

[Total No. of Pages : 2

[5254]-640-A

B.E. (Electrical)

VLSI DESIGN

(2012 Pattern) (Elective - IV) (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.1O***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rules, Mollier Charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Define with example architecture, Components, Configuration. **[6]**

b) Differentiate between synchronous and asynchronous machines in sequential circuit design. **[4]**

OR

Q2) a) Explain the three modeling styles in VHDL with help of example. **[6]**

b) Differentiate between Moore and Mealy Machines. **[4]**

Q3) a) Write VHDL code for 4-bit synchronous UP counter **[6]**

b) List the concurrent statements used in VHDL. **[4]**

OR

Q4) a) Define with example configurations statement used in VHDL. **[6]**

b) Draw a Moore FSM (state diagram) to detect sequence 1101. **[4]**

P.T.O.

Q5) a) Compare ASIC, general purpose processor, DSP processor and microcontroller. **[8]**

b) With neat schematic explain the architectural building blocks of FPGA. **[8]**

OR

Q6) a) List the features, specifications and applications of FPGA. **[8]**

b) Explain the need of PLDs. Compare CPLD and FPGA. **[8]**

Q7) a) Explain CMOS inverter and its transfer characteristics in detail. **[8]**

b) Draw and explain CMOS NAND and CMOS NOR gate. **[8]**

OR

Q8) a) Compare TL,ECL,CMOS logic. **[8]**

b) Explain the following : **[8]**

i) Body effect,

ii) Hot Electron Effect and

iii) Velocity Saturation w.r.t. CMOS.

Q9) a) Explain in detail the parameters that should be considered in design of memory. **[10]**

b) Differentiate between carry ripple adder and carry look ahead adder with diagram. **[8]**

OR

Q10) a) Explain the example of Fixed point division in VHDL. **[10]**

b) Explain barrel shifter with diagram. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2308

[Total No. of Pages : 3

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B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION - I

(2012 Pattern)(Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain different types of process variables and their selection criteria in process control. **[4]**

b) Explain in brief purpose of Correlations for Tuning Constants. **[6]**

OR

Q2) Explain in brief : **[10]**

a) Degree of Freedom

b) Deadtime

c) Transmitter gain

d) Variable time constant

e) Loop gain

Q3) a) Draw a schematic of feedback control system and describe the necessary components of feedback control system. **[6]**

b) Discuss in brief factors affecting controller tuning. **[4]**

OR

P.T.O.

Q4) a) How will you analyze a typical level control system? **[7]**

b) Draw the faceplate of SLPC. **[3]**

Q5) a) Discuss with suitable example advantage of adding Feedback control to Feedforward controller. **[8]**

b) Two liquid ingredients A & B are to be blended in the proportion of 1 :2. Draw control loop schematics to indicate the two ways in which this task can be achieved. **[8]**

OR

Q6) a) Explain with suitable application Selective Control. **[8]**

b) Explain with suitable example use of cascade control to enhance the performance. **[8]**

Q7) a) Explain in brief procedure for calculating Relative Gain Array for 2×2 systems. Decide the pairing of variables for a given relative gain matrix.

$$\begin{bmatrix} 1 & 1 & -1 \\ 3 & -4 & 2 \\ -3 & 4 & 0 \end{bmatrix}$$ **[10]**

b) Explain in brief Decoupling of control loops. **[8]**

OR

Q8) a) The transfer function model of two input two output system is given by,

$$\begin{vmatrix} \frac{12.8e^{-s}}{16.7s+1} & \frac{-18.9e^{-3s}}{21s+1} \\ \frac{6.6e^{-7s}}{10.9s+1} & \frac{-19.4e^{-3s}}{14.4s+1} \end{vmatrix}$$ **[12]**

Determine the RGA matrix, decide paring of variables and find out static decoupler.

b) Discuss in brief Interaction and its effect on process performance. **[6]**

Q9) a) In context to control for safety, match the pairs : **[5]**

i)	Never turn off	a)	be avoided
ii)	Manual bypass valves around control and shutdown valves should	b)	too many alarms
iii)	Same sensor for control, alarm and SIS should	c)	critical functions
iv)	Do not have	d)	safety interlock system
v)	Use redundancy in instruments for	e)	Never be opened

b) Explain in brief factors that influence operability from the perspective of control performance. **[11]**

OR

Ql0) a) Explain in brief important features of final control elements. **[8]**

b) Discuss in brief function of each level of alarms. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2309

[Total No. of Pages : 2

[5254]-642

B.E. (Instrumentation & Control)

PROJECT ENGINEERING AND MANAGEMENT

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10***
2) ***Neat diagrams 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 R & D firm. **[10]**

OR

Q2) a) Explain interaction between Electrical, Mechanical & Instrumentation departments. **[6]**

b) Explain Hot Commissioning in brief. **[4]**

Q3) a) Explain process of Instrument Tagging. **[5]**

b) Explain how computers are useful 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) Draw the physical loop wiring diagram for Temperature Control loop. **[6]**

P.T.O.

Q5) a) Explain Kick-off meeting Project Engineering department. **[6]**

b) Explain P & ID. Also give its impotence. **[10]**

OR

Q6) a) Write note on Cable Schedule. **[6]**

b) What is FAT, CAT, SAT? Write the importance of the same. Also prepare FAT report for any typical instrumentation item. **[10]**

Q7) a) Give Hazardous area classifications. **[6]**

b) Explain different types of Instrument index sheet. **[10]**

OR

Q8) a) Define Project statement & P&T Diagram. Also give its impotence. **[9]**

b) Explain Project Estimation, Project Planning, Project Commissioning, Project Hardware w.r.t. Instrumentation & Control. **[7]**

Q9) Explain different types of Control Panels. Explain Straight panel with dimensional details. **[18]**

OR

Q10)a) Explain Vendor registration, Vendor Liaison, in relation with industrial purchases. **[10]**

b) Write notes of Intelligent operator Interface, calibration report of I/P converter. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2310

[Total No. of Pages : 3

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B.E. (Instrumentation & Control)

DIGITAL CONTROL

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, 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 various types of sampling and one application of each type of sampling. **[6]**

b) List the disadvantages of discrete control system. **[4]**

OR

Q2) a) Derive the Mathematical model of Zero Order Hold. **[6]**

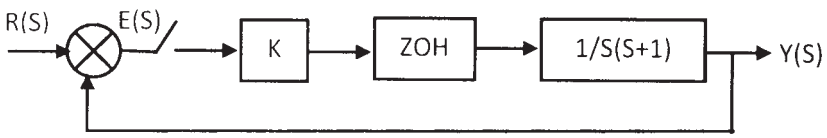
b) Define Impulse Sampling and Explain it with the help of diagram. **[4]**

Q3) a) Derive the equation for Positional form of Digital PID Controller. **[6]**

b) Write a short note on Bilinear Transformation. **[4]**

OR

Q4) Determine the range of 'K' for which the system shown below is stable by using Jury's Stability Test. **[10]**



P.T.O.

Q5) a) Find the Pulse Transfer Function from the following State Space Model. **[8]**

$$\begin{bmatrix} X1(K+1) \\ X2(K+1) \end{bmatrix} = \begin{bmatrix} 1 & 0.4323 \\ 0 & 0.1353 \end{bmatrix} \begin{bmatrix} X1(K) \\ X2(K) \end{bmatrix} + \begin{bmatrix} 0.2838 \\ 0.4323 \end{bmatrix} U(K)$$

$$Y(K) = \begin{bmatrix} 1 & 0 \end{bmatrix} X(K)$$

b) A system is described by a State Model as shown below. Obtain the State Model in Jordon Canonical Form. **[8]**

$$\begin{bmatrix} X1(K+1) \\ X2(K+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} X1(K) \\ X2(K) \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} U(K)$$

$$Y(K) = \begin{bmatrix} 1 & 2 \end{bmatrix} X(K)$$

OR

Q6) a) Obtain the state transition matrix $\psi(K)$ for the following discrete time control system. **[10]**

$$\begin{bmatrix} X1(K+1) \\ X2(K+1) \\ X3(K+1) \end{bmatrix} = \begin{bmatrix} 0.1 & 0.1 & 0 \\ 0.3 & -0.1 & -0.2 \\ 0 & 0 & -0.3 \end{bmatrix} X(K)$$

b) Explain any two of the following terms : **[6]**

i) State Feedback Gain Matrix

ii) State Transition Matrix

iii) State Observer Matrix

Q7) a) Determine the State Feedback Gain Matrix 'K' for the following system which exhibits the Deadbeat Response. **[10]**

$$X(K+1) = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -0.5 & -0.2 & 1.1 \end{bmatrix} X(K) + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} U(K)$$

b) lnvestigate State Controllability and State Observability of the system below. **[8]**

$$X(K+1)=\begin{bmatrix}-1 & 0 & 0\\ 0 & -2 & 0\\ 0 & 0 & -3\end{bmatrix}X(K)+\begin{bmatrix}1 & 0\\ 1 & 2\\ 2 & 1\end{bmatrix}U(K)$$

$$Y(K)=\begin{bmatrix}1 & 1 & 2\\ 3 & 1 & 5\end{bmatrix}X(K)$$

OR

Q8) a) Obtain the State Space representation of the following P.T.F. in Jordon Canonical Form. **[6]**

$$\frac{Y(Z)}{U(Z)}=\frac{(Z+1)(Z+3)}{(Z-1)(Z-2)(Z-3)}$$

b) Define the following terms with the help of diagram : **[12]**

i) Minimum Order State Observer

ii) Full Order State Observer

iii) Reduced Order State Observer

Q9) Consider the discrete time system defined by the following equations. **[16]**

$$X(K+1)=G\,X(K)+H\,U(K)$$

$$G=\begin{bmatrix}0 & 1\\ -1 & 1\end{bmatrix};\ H=\begin{bmatrix}0\\ 1\end{bmatrix};\ X(0)=\begin{bmatrix}1\\ 1\end{bmatrix}$$

Determine Optimal Control Law to minimize the following performance index and also find J_{MIN}.

$$J=\frac{1}{2}\left[X^2(3)\right]+\frac{1}{2}\sum_{K=0}^{2}\left[X^2(K)+U^2(K)\right]$$

OR

Q10)a) Write a short note on Optimal Control and List the various applications of Optimal Control and explain any one application in short. **[12]**

b) What is performance index? **[4]**

✷ ✷ ✷

Total No. of Questions : 10]

SEAT No. :

P2311

[Total No. of Pages : 2

[5254]-644

B.E. (Instrumentation & Control) (Semester - I)

ADVANCED BIOMEDICAL INSTRUMENTATION

(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, 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 radionuclide imaging? Expiain how it is advantageous than other mode of imaging. **[6]**

b) What is an auto - analyzer? Brief out various sub systems of auto analyzer. **[4]**

OR

Q2) a) With a neat diagram explain time division multiplexing type telemetry. **[6]**

b) Explain the acoustic impedance with respect to Ultrasound imaging. **[4]**

Q3) a) Describe the various components in CT machine. **[6]**

b) What is X- ray Fluoroscopy and its applications? **[4]**

OR

Q4) a) Describe any four applications of Telemetry in Biomedical field. How parameters of telemetry system should be selected based on application? **[5]**

b) Compare Radiography and Fluoroscopy. **[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) Distinguish between : **[8]**

i) AC & DC Defibrillator

ii) Synchronous & Asynchronous pacemakers

OR

Q6) a) What are the different methods of Diathermy? Explain any one method in detail. **[8]**

b) What is a pacemaker? Explain, briefly the various waveforms used for pacing. **[8]**

Q7) a) What is an endoscope? Explain the construction with the help of a neat diagram. **[8]**

b) Explain properties of lasers. **[8]**

OR

Q8) a) Describe different types of lasers used in Biomedical applications. **[8]**

b) Describe applications of lasers in opthalmology. **[8]**

Q9) a) Explain types of Wheelchair and materials used in wheelchair. **[10]**

b) Compare haemodialysis and Peritoneal Dialysis. **[8]**

OR

Q10)a) Explain with diagram the working of haemodialysis machine. **[10]**

b) Define orthosis and prosthesis in rehabilitation engineering. Enlist atleast two applications of orthosis and prosthesis devices. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2312

[Total No. of Pages : 2

[5254]-645

B.E. (Instrumentation & Control)

BUILDING AUTOMATION - I

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is BAS? Explain importance of FAS in BAS System with neat sketch. **[6]**

b) Define the following Term : **[4]**

i) Velocity pressure

ii) Sealed Pressure

iii) Absolute Pressure

iv) Static Pressure

OR

Q2) a) What is Human Comfort? Explain various factor affecting to human comfort. **[6]**

b) Write a short notes on Intelligent building. **[4]**

Q3) a) List and explain working of different components in AHU with neat sketch. **[6]**

b) Write a short notes on relative humidity **[4]**

OR

P.T.O.

Q4) a) List and explain any one application of AHU. **[6]**

b) Write a short notes on Damper Sizing in AHU. **[4]**

Q5) a) Explain Dual duct constant volume air conditioning system with neat sketch. **[10]**

b) Explain CAV system with neat sketch. **[8]**

OR

Q6) a) What is Vapour Compression Cycle? Explain any one type of Compressor used in Vapour Compression cycle with neat sketch. **[10]**

b) Explain working of Heat Pump with neat sketch. **[8]**

Q7) a) Explain VRV System with neat sketch **[8]**

b) Difference between series fan powered and parallel fan powered. **[8]**

OR

Q8) a) List different types of Boiler, Explain fire tube boiler with neat sketch. **[8]**

b) Explain various fan section used in air conditioning system with neat sketch. **[8]**

Q9) a) What is BAS System? Explain field level components of BAS System with neat sketch. **[8]**

b) Explain Architecture of DDC with neat sketch. **[8]**

OR

Q10)a) Explain MODBUS ASCII with neat sketch. **[8]**

b) Explain in Detail BACnet Protocol with neat sketch. **[8]**

Total No. of Questions : 10]

SEAT No. :

P4366

[Total No. of Pages : 2

[5254]-646

B.E. (Instrumentation)

ADVANCED CONTROL SYSTEM

(2012 Pattern) (Elective - I)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt all questions.***
2) ***Figures to the right indicate full marks.***

Q1) a) Discuss determination of stability using phase portrait. **[8]**

b) Explain limit cycling. **[2]**

OR

Q2) a) Consider a nonlinear system described by the equations. **[6]**

$$\dot{x} = x_2$$

$$\dot{x}_2 = -(1-|x_1|)x_2 - x_1$$

Find the region in state plane for which the equilibrium state of the system is asymptotically stable use Liapunov function $V = x_1^2 + x_2^2$.

b) Explain Liapunov stability criteria. **[4]**

Q3) Draw a block diagram if system given by transfer function $G(s) = \dfrac{10}{s(s+2)(s+5)}$ has backlash nonlinearity. Obtain stability of system. **[10]**

OR

Q4) A first order system is given by $\dfrac{dy}{dx} = -4y + 3u$ and desired system response is given by $\dfrac{dy}{dx} = -3y + 2r.$ Design a adaption law using MIT rule and draw block diagram of MRAC system. **[10]**

P.T.O.

Q5) a) Explain with neat block diagram self tuning controller. **[8]**

b) Explain pole placement approach to design STR. **[8]**

OR

Q6) a) Explain any one parameter estimation technique use in STR. **[8]**

b) Explain Model following STR with neat block diagram. **[8]**

Q7) a) Explain application of adaptive control in ultra-filtration plant. **[9]**

b) Explain EXACT controller. **[9]**

OR

Q8) a) Explain ABB adaptive controller. **[9]**

b) Explain adaptive control for temperature control in distrillation column. **[9]**

Q9) Consider a system is given by $\dot{x} = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$ the control law is given by $u = -Kx = -k_1 x_1 - k_2 x_2$. Determine constant k_1 and k_2 such that function $j = \int_0^\infty (x^T x + u^2)\, dt$ is minimized. **[16]**

OR

Q10)a) Explain designing of optimal control using Riccati equation. **[8]**

b) Explain model matching based linear quadratic optimal regulator. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2313

[Total No. of Pages : 2

[5254]-647

B.E. (Instrumentation & Control Engg.)

ADVANCED SENSORS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain static characteristics of sensor with examples. **[5]**

b) Give detail classification of temperature sensor with their operating principles. **[5]**

OR

Q2) a) Explain dynamic characteristics of sensor with examples. **[5]**

b) Give detail classification of flow sensor with their ranges and operating principles. **[5]**

Q3) a) Explain selection criteria for sensor fabrications in detail. **[5]**

b) With neat block diagram explain manufacturing process of sensor. **[5]**

OR

Q4) a) Discuss different techniques used for sensor fabrication. **[5]**

b) Explain recent techniques sensor fabrication. **[5]**

P.T.O.

Q5) a) List different chemical sensing mechanisms. **[8]**

b) Give classification of biosensors. **[8]**

OR

Q6) a) Give different types of gas sensors. Explain any one in detail. **[8]**

b) Explain working of fibre optic sensor with block diagram. **[8]**

Q7) a) Explain term smart sensor. Give importance of smart sensors in industry. **[8]**

b) Explain selection criteria for smart sensor. **[8]**

OR

Q8) a) Explain advantages of smart sensors. **[8]**

b) Enist smart temperature IC sensors. Explain any one in detail. **[8]**

Q9) a) Give various applications of Chemical sensors. **[9]**

b) Explain how and where biosensors are used in industry. **[9]**

OR

Q10)a) Explain application of fiber optic sensor with neat sketch. **[9]**

b) Discuss application gas sensors in industry. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2314

[Total No. of Pages : 2

[5254]-648

B.E. (Instrumentation & Control)

ADVANCED DIGITAL SIGNAL PROCESSING

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Assume suitable data if necessary.***
2) ***Use of Calculators, log tables, charts is allowed.***
3) ***Figures to the right indicate full marks.***

Q1) a) Explain any application of TFD. **[5]**

b) Discuss the need of multirate systems. **[5]**

OR

Q2) Discuss the selection of window and its length in STFT. **[10]**

Q3) Explain decimation with polyphase filters. **[10]**

OR

Q4) a) Explain WSS and SSS with suitable examples. **[5]**

b) Increase the sampling frequency of 100 Hz signal from 1000 Hz to 4000 Hz. **[5]**

Q5) a) Explain Mean, Variance and Bias for PSD estimator. **[10]**

b) Explain periodogram PSD estimation method. **[6]**

P.T.O.

OR

Q6) a) Enlist parametric PSD estimation methods. Explain any one with suitable diagram. **[10]**

b) Explain applications of PSD estimation. **[6]**

Q7) a) Explain RLS algorithm. **[10]**

b) Enlist the applications of adaptive filtering. Explain any one. **[8]**

OR

Q8) a) Define cepstral coefficients. State properties of complex spectrum. **[10]**

b) Explain homomorphic signal processing with suitable example. **[8]**

Q9) Explain architecture of DSP processor ADSP 2lxx with suitable diagram. **[16]**

OR

Q10)a) Explain status registres in DSP processors. **[8]**

b) Explain barrel shifter block of DSP processor. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2315

[Total No. of Pages : 2

[5254]-649

B.E. (Instrumentation & Control)

OPTO-ELECTRONICS INSTRUMENTATION

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer the questions: Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of non programmable electronic pocket calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain the mode-locking technique in laser system. **[6]**

b) Explain the measurement of splice loss and bending losses in optical fibers. **[8]**

c) What are the design considerations and characteristics of optical fiber system. **[6]**

OR

Q2) a) Describe the single mode operation and frequency stabilization in Laser. **[6]**

b) Explain the principle of total internal reflection and numerical aperture in optical fiber with the help of neat diagram. **[6]**

c) Explain various types of optical detectors in optical fiber system. **[8]**

Q3) a) Explain various configurations of optical modulators. **[10]**

b) Explain the directional couplers in detail. **[6]**

OR

P.T.O.

Q4) Write short notes on :

a) Opto-electronic integration. **[8]**

b) Polarization transformation. **[8]**

Q5) a) Explain the two optical fiber based displacement measurement in detail. **[10]**

b) What are the advantages of optical fiber sensors over conventional sensors. **[6]**

OR

Q6) a) Describe the evanscent field based transduction technique in optical fiber sensors. **[8]**

b) Explain the application of optical fiber sensor for displacement measurement. **[8]**

Q7) Describe following in detail:

a) Applications of fiber grating. **[9]**

b) Distributed Optical Fiber Sensing. **[9]**

OR

Q8) a) Explain two-beam laser configuration of velocimetry in detail. **[8]**

b) List out the types of optical gyroscopes. Explain any one configuration. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2316

[Total No. of Pages : 2

[5254]-650

B.E. (Instrumentation & Control)

ENVIRONMENTAL INSTRUMENTATION

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the role of Instrumentation & control for environment. **[5]**

b) Explain the role of sensor in environmental analysis. **[5]**

OR

Q2) a) Explain the portable analytical instruments. **[5]**

b) Explain the stationary analytical instruments. **[5]**

Q3) a) Explain opacity Monitors. **[5]**

b) Discuss water quality standards for raw and treated water. **[5]**

OR

Q4) a) Explain thermal conductivity detectors used in water treatments. Discuss their advantages. **[6]**

b) Explain the design criteria of settling tank. **[4]**

P.T.O.

Q5) a) Write short notes on Coagulation. **[8]**

b) What is floating? Explain its types. **[8]**

OR

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) Discuss the Air sampling methods & equipments. **[8]**

Q9) a) Explain the necessity of Rain water harvesting. List the methods of same. **[8]**

b) Define Sound pollution. Explain its effect to environment. **[8]**

OR

Q10) Write short notes on : **[2 × 8 = 16]**

a) Virtual Instruments Environmental Engineering Laboratory.

b) Barometer.

Total No. of Questions : 10]

SEAT No. :

P3340

[Total No. of Pages : 2

[5254]-651

B.E. (Instrumentation and Control Engineering)

ROBOTICS & AUTOMATION

(2012 Pattern) (End-Semester)

Time : 2:30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, 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) a) What is end-effector? State different type of end-effectors. **[6]**

b) State laws of robotics. **[4]**

OR

Q2) a) What are latest trends/types of robots manufactured? Give a couple of examples. **[6]**

(You may include parameters : DOF and human like robots).

b) Give two specifications of two sensors used for robots. **[4]**

Q3) Explain architecture of robot system with help of neat diagram **[10]**

OR

Q4) a) Why electric drives are preferred for robots? Describe. **[4]**

b) For which applications image processing sensors are used with robots? Elaborate two such applications. **[6]**

Q5) a) What do you mean by robot dynamic stabilization? **[8]**

b) Explain the following with respect to robots: **[10]**

i) Jacobian work envelope

ii) Position control

iii) Force control

OR

P.T.O.

Q6) a) Why path planning is important? **[6]**

b) What is meant by manipulator dynamics? **[6]**

c) What is role of robot kinematics? **[6]**

Q7) a) Explain the different robot programming levels. **[10]**

b) Which are the problems encountered in robot programming? **[6]**

OR

Q8) Compare robot versus PLC controls. Include points such as safety features, flexibility for engineer to configure/tune drives, software architecture or hardware architecture, communication protocols (what are the contents in communication data for example 32 bytes). **[16]**

Q9) a) What is robot cell design? Elaborate **[6]**

b) What is role of robot is manufacturing applications? Give an example. **[10]**

OR

Q10) Which are robot selection criteria? Enlist important 8 points. **[16]**

Total No. of Questions : 10]

SEAT No. :

P2317

[Total No. of Pages : 2

[5254]-652

B.E. (Instrumentation & Control)

SENSOR NETWORKS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Compare traditional networks and wireless sensor networks. **[5]**

b) Explain a communication in a wireless sensor networks. **[5]**

OR

Q2) a) Explain basics of sensor classifications in WSN with examples. **[5]**

b) Explain a sensing and sensors in detail. **[5]**

Q3) a) Explain the processing components of the artificial retina in detail with suitable diagram. **[5]**

b) Explain XYZ node architecture in detail. **[5]**

OR

Q4) a) Describe architecture of a wireless sensor node. **[5]**

b) Explain IMote Node Architecture in detail. **[5]**

P.T.O.

Q5) a) Explain different types of channels in detail of channel encoding. **[7]**

b) Explain digital communication system in detail with basic components. **[8]**

OR

Q6) a) Explain pulse code modulation and delta modulation with suitable diagrams. **[7]**

b) Explain source encoding with calculations of efficiency of a source encoder in detail. **[8]**

Q7) a) Explain the five characteristics of MAC protocols in sensor networks. **[7]**

b) Explain Zebra MAC in detail of hybrid MAC protocols. **[8]**

OR

Q8) a) Explain the contension free and contension based medium access protocol in detail. **[7]**

b) Write a short note on mobility adaptive hybrid MAC. **[8]**

Q9) a) Explain destination sequenced distanced vector. **[10]**

b) Write a short note on SPIN-PP of data centric Routing. **[10]**

OR

Q10)a) Explain flooding and Gossiping in detail in network layer. **[10]**

b) Explain optimized link state routing of proactive routing. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3942

[Total No. of Pages : 2

[5254]-654

B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION - II

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidate :

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 right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of calculator is allowed.***

Q1) Explain dynamics of second order system with suitable example. Also derive equation for the same. **[10]**

.OR

Q2) Compare feedback+ feedforward and cascade control schemes for control of heat exchanger. **[10]**

Q3) What is the limitation of single element boiler drum level control? How they are eliminated? Explain with suitable sketches. **[10]**

OR

Q4) Describe Burner Management system in boiler. **[10]**

Q5) a) Explain different basic control systems used to control CSTRs, **[8]**

b) Explain typical cascade control system used in continuous reactors. **[8]**

OR

Q6) a) Explain sequence logic control used in batch stirred tank reactors. **[8]**

b) Explain batch production management. **[8]**

Q7) a) Explain in brief control strategy for distillation column temperature control. **[8]**

b) Discuss on importance of predictive control used in distillation column. **[8]**

OR

P.T.O.

Q8) a) Explain with net sketch the composition, level and pressure control in distillation column. **[8]**

b) What are the goals of distillation column controls'? Enlist dynamic difficulties in column control. **[8]**

Q9) a) What is pump? What are the different types of pump? Explain centrifugal pump characteristics. **[10]**

b) Explain use of anti-surge control system used in compressor. **[8]**

OR

Q10)a) Draw two control strategy for controlling flow from gear pump. **[10]**

b) Explain override control in compressor. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2318

[Total No. of Pages : 2

[5254]-655

B.E. (Instrumentation & Control)

INDUSTRIAL AUTOMATION

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) List & Explain any two classical approaches for plant automation. **[6]**

OR

Q2) With an example explain the term control system audit. **[6]**

Q3) List and explain at least three Universal commands used in HART. **[7]**

OR

Q4) Write short note on Profibus. **[7]**

Q5) Explain the PWM function used in PLC systems. **[7]**

OR

Q6) Explain the architecture of PLC. **[7]**

Q7) a) Explain the use of action qualifiers in the SFC programming. **[8]**

b) With an example explain Instruction list of PLC programming. **[8]**

P.T.O.

OR

Q8) a) Explain the PLC programming methods as per IEC 61131-3. **[8]**

b) Explain the procedure for interfacing a PLC with SCADA system using different communication protocols. **[8]**

Q9) a) Explain why and how database management is done in any DCS system. **[8]**

b) Explain different logical function blocks available in any DCS system. **[8]**

OR

Q10)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]**

Q11)a) Write short note on safety integrity level (SIL). **[8]**

b) Explain the importance of Process Hazard Analysis (PHA) & Hazard and operability study (HaZOP)? **[10]**

OR

Q12)a) What are the different applications of safety systems. **[8]**

b) What are IEC 61511 standards for functional safety. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2319

[Total No. of Pages : 2

[5254]-656

B.E. (Instrumentation & Control)

DIGITAL IMAGE PROCESSING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10***
2) ***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 fundamental steps in DIP. **[6]**

b) Explain Radon transform. **[4]**

OR

Q2) a) Explain image sharpening filters. **[6]**

b) Explain statistical parameters with respect to DIP. **[4]**

Q3) a) Explain color image models. **[6]**

b) Explain multi resolution property of wavelet transform. **[4]**

OR

Q4) a) Write short note on point operations for image enhancement. **[6]**

b) Explain Hough transform. **[4]**

Q5) a) Explain detection of discontinuities in image segmentation. **[10]**

b) Explain image representation schemes. **[8]**

P.T.O.

OR

Q6) a) Explain image regional descriptors. **[10]**

b) Explain pattern and pattern classes. **[8]**

Q7) a) What is the need of compression'? Explain lossy and lossless compression. **[8]**

b) Explain Huffman and run length encoding. **[8]**

OR

Q8) a) Explain LZW and arithmetic 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. :

P2320

[Total No. of Pages : 2

[5254]-657

B.E. (Instrumentation & Control)

BUILDING AUTOMATION - II

(2012 Pattern) (Elective - III (B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain different components used in FAS Panel. **[6]**

b) How zone is defined in conventional system and in addressable system? **[4]**

OR

Q2) a) Give classification of fire alarm system. **[5]**

b) What are the factors affecting sensitivity of conventional detectors. **[5]**

Q3) a) What are Power supply requirements of fire alarm system? What are its designing parameters. **[6]**

b) Explain concept of water leak detection system. **[4]**

OR

Q4) a) Explain construction and working of ionization type smoke detector. **[6]**

b) Explain how self compensation is done in addressable devices. **[4]**

Q5) a) Explain wet pipe sprinkler system and give its classification. **[10]**

b) Explain dry pipe sprinkler system. **[8]**

P.T.O.

OR

Q6) a) Explain FM-200 and Novec based gas suppression system. **[10]**

b) What is role of flow switch and tamper switch in sprinkler system? Explain OS&Y type supervisory switch. **[8]**

Q7) a) What is access control system? What are components of access control system. **[8]**

b) Explain Smartcard and Proximity Card technology used in access control system. **[8]**

OR

Q8) a) Which types of cables used in access control system? Explain any one in detail. **[8]**

b) What is role of field controllers used in access control system? What are components of field controller? **[8]**

Q9) a) List various types of cameras used in CCTV. Explain any one in detail. **[8]**

b) Explain terms: CIF, MPEG, MP4 & POE. **[8]**

OR

Q10) a) Explain different types of intrusion detectors. **[8]**

b) Write short note on video management system. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2321

[Total No. of Pages : 3

[5254]-658

B.E. (Instrumentation & Control)

PROCESS MODELING AND OPTIMIZATION

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) A simply supported beam carries a concentrated load P at its mid-point. Corresponding to various values of P, the maximum deflection Y is measured. The data are given below. Find the law of the form $Y = a + bP$. **[10]**

P	100	120	140	160	180	200
Y	0.45	0.55	0.60	0.7	0.8	0.85

OR

Q2) Derive mathematical model of tanks in series system. **[10]**

Q3) With and example explain difference between mathematical modeling by first principle and system identification. **[10]**

OR

Q4) a) With an example explain identification by step testing. **[5]**

b) With an example explain identification by ATV method. **[5]**

P.T.O.

Q5) a) Calculate the Niederlinski index for the system. **[10]**

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} \frac{2.9e^{-2.8s}}{9.5s+1} & \frac{-0.49e^{-2.3s}}{18s+1} & \frac{-0.46e^{-3s}}{17.8s+1} \\ \frac{9.17e^{-4.5s}}{39.5s+1} & \frac{-3.5e^{-5.5s}}{17s+1} & \frac{-0.218e^{-7.2s}}{19.9s+1} \\ \frac{44.18e^{-12.6s}}{8.5s+1} & \frac{39.6e^{-13.5s}}{15.6s+1} & \frac{1.37e^{-1.9s}}{14.8s+1} \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$$

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

OR

Q6) a) Calculate the RGA for the system represented by transfer function matrix. **[10]**

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} \frac{2.9e^{-2.8s}}{9.5s+1} & \frac{-0.49e^{-2.3s}}{18s+1} & \frac{-0.46e^{-3s}}{17.8s+1} \\ \frac{9.17e^{-4.5s}}{39.5s+1} & \frac{-3.5e^{-5.5s}}{17s+1} & \frac{-0.218e^{-7.2s}}{19.9s+1} \\ \frac{44.18e^{-12.6s}}{8.5s+1} & \frac{39.6e^{-13.5s}}{15.6s+1} & \frac{1.37e^{-1.9s}}{14.8s+1} \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$$

b) With an example explain the concept of robustness. **[8]**

Q7) a) For the following functions determine convexity and concavity. **[8]**

i) $9x^2$

ii) $14x$

iii) $-9x^2$

iv) $3x^2 - x^3$

b) With an example explain classification of optimization problem based on nature of design variables. **[8]**

OR

Q8) a) For the following functions determine convexity and concavity. **[8]**

i) $4x_1^2 + 8x_1x_2 + 3x_2^2 + 7x_1 + 9x_2 + 24$

ii) $x_1^2 + x_1x_2 + 2x_2 + 4$

b) With an example explain classification of optimization problem based on Number of objective functions. **[8]**

Q9) a) Find the maximum value of $Z = 2x + 3y$ **[10]**
subject to the constraints :

$x + y \leq 30,$
$x - y \geq 0,$
$y \geq 3,$
$0 \leq y \leq 12,$
$0 \leq x \leq 20.$

b) Explain the Newton's method for unidimensional search. **[6]**

OR

Q10) a) Maximize $Z = 100x_1 + 40x_2$ subject to constraints **[10]**

$10x_1 + 4x_2 \leq 2{,}000$
$3x_1 + 2x_2 \leq 900$
$6x_1 + 12x_2 \leq 3{,}000$
$x_1, x_2 \geq 0$

b) Explain direct methods for unconstrained multi-variable optimization. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2322

[Total No. of Pages : 2

[5254]-660

B.E. (Instrumentation & Control)

COMPUTER TECHNIQUES & APPLICATIONS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right 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) Explain the following with respect to Process Management. **[10]**

a) Job Queue.

b) Device Queue.

c) Ready Queue.

d) Mid Term Scheduler.

e) Context switch.

OR

Q2) What is Process Control Block? Discuss information stored in it. **[10]**

Q3) What is external and internal fragmentation? How does paging help in minimizing fragmentation? **[10]**

OR

Q4) Explain Parallelism and following methods of it. **[10]**

a) Temporal Parallelism.

b) Data Parallelism.

c) Temporal & Data Parallelism.

d) Data Parallelism with dynamic assignment.

P.T.O.

Q5) Write short notes on : **[16]**

a) Features and capabilities of TCP/IP.

b) IEEE 488.

OR

Q6) a) Compare Circuit Switching and Packet Switching Networks. **[8]**

b) Explain TCP/IP reference model with diagram. **[8]**

Q7) a) Discuss architectural overview of ARM 9. **[9]**

b) Explain operating modes of ARM7TDMI processors. **[9]**

OR

Q8) a) Discuss architectural overview of ARM 10. **[9]**

b) Explain interrupt structure of ARM 7 processors. **[9]**

Q9) a) What is software debugging? Explain any three debugging techniques. **[8]**

b) Explain control structure testing with respect to software testing. **[8]**

OR

Q10)a) Explain Integration testing and explain following three Integration testing approaches : **[8]**

i) Big-Bang Integration testing.

ii) Bottom-up Integration testing.

iii) Top Down Integration testing.

b) Explain corrective and adaptive software maintenance. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2323

[Total No. of Pages : 2

[5254]-660-A

B.E. (Instru. and Control) (Semester - II)

SMART MATERIALS AND SYSTEM

(2012 Pattern)

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

Instructions to the candidates:

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

Q1) a) Compare advantages of smart sensor over Conventional sensor. **[5]**

b) What is role of sensor and actuator in smart system. **[5]**

OR

Q2) a) List out different types of smart materials & its application. **[5]**

b) Explain in detail shape memory polymer material. **[5]**

Q3) a) Explain in detail ferroectricity property. **[5]**

b) Explain in detail wide scope of Nano tube. **[5]**

OR

Q4) a) Explain in detail wide scope of magneto rheological fluid. **[5]**

b) Explain in detail about superconductor and list out its applications. **[5]**

Q5) a) Explain with neat sketch working of accelerometer sensor. **[8]**

b) Explain with neat sketch working of capacitive sensor. **[8]**

OR

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

b) Explain with neat sketch Electro thermal actuator. **[8]**

P.T.O.

Q7) a) Explain with neat sketch different steps of photolithography process. **[8]**

b) Explain with neat sketch epitaxial growth of silicon. **[8]**

OR

Q8) a) Explain with neat lift off technique. **[8]**

b) Explain with neat sketch etching (Isotropic). **[8]**

Q9) a) Explain with neat sketch any sensor used in Lab on chip. **[9]**

b) Explain with neat sketch the sensor used in Air bag control. **[9]**

OR

Q10)a) Explain the role of actuators in dosing system in health care. **[9]**

b) List out the applications of Lab on chip. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2324

[Total No. of Pages : 2

[5254]-660-B
B.E. (Instrumentation & Control)
INSTRUMENTATION IN AGRICULTURE & FOOD PROCESSING
(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, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the Role of 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 Mohrs circle of stress. **[5]**

Q3) Explain the Sugar Industry instrumentation set up. **[10]**

OR

Q4) a) Explain concept of irrigation scheduling. **[5]**

b) Explain Sensor system 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]**

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]**

P.T.O.

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) Explain food safety and standard bill 2005. **[8]**

b) Explain in detail Indian food standards. **[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 : 8]

SEAT No. :

P2326

[Total No. of Pages : 2

[5254]-661
B.E. (Computer Engineering)
DESIGN & ANALYSIS OF ALGORITHMS
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Find an optimal solution for the following instance using job sequencing with scheduling: Number of jobs n = 4, profits = (100, 27, 15, 10), deadlines = (2, 1, 2, 1) **[6]**

b) Define asymptotic notations. Explain their significance in analyzing algorithms. **[6]**

c) Explain backtracking algorithm with graph coloring problem. **[8]**

OR

Q2) a) With respect to dynamic programming, explain in brief the following: **[6]**

i) Optimal Substructure.

ii) Overlapping Subproblem.

b) State Recursive Relation for Binary Search and solve them using Master Theorem. **[6]**

c) Write the algorithm for m-coloring graph using backtracking strategy And also analyze the time complexity for the same. **[8]**

Q3) a) State Vertex Cover Problem and prove that Vertex Cover Problem is NP Complete. **[8]**

b) What is deterministic and non deterministic algorithm? Explain with example. **[8]**

P.T.O.

OR

Q4) a) Explain the concept of Randomized algorithm and Approximation algorithm in brief with example. **[8]**

b) Explain in brief NP complete problem. Prove that the 3-SAT problem is NP-complete. **[8]**

Q5) a) Explain in brief how parallel algorithm can be used for finding shortest paths of a given graph. **[8]**

b) Explain Concurrent Algorithms for Dining philosopher's problem. **[8]**

OR

Q6) a) When the parallel algorithms are "work optimal". Explain performance parameters for parallel algorithms. **[8]**

b) Explain in detail parallel algorithm with example. **[8]**

Q7) a) What is election algorithm in distributed system? Explain Bully algorithm with example. **[9]**

b) Explain Buddy memory algorithm to allocate memory. **[9]**

OR

Q8) a) Explain in detail KMP algorithm. **[9]**

b) Write Short note on: **[9]**

i) Data management algorithms and clustering.

ii) Cryptography algorithms.

Total No. of Questions : 10]

SEAT No. :

P2327

[Total No. of Pages : 3

[5254]-662

B.E. (Computer Engineering)

PRINCIPLES OF MODERN COMPILER DESIGN

(2012 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Why compilation phases are divided into front-end and back-end? What are the advantages? **[4]**

b) Give syntax directed definition for any example arithmetic expression. **[6]**

OR

Q2) a) What is YACC? Give format of Yacc specification file. **[4]**

b) Write the syntax directed translation scheme for generating Intermediate code for array assignment statement. **[6]**

Q3) a) Explain the terms phase and pass related to compiler. **[2]**

b) Construct LL (1) parsing table for the following grammar. **[8]**

Terminals = {id, num, while, print, >, {,}, ; (,)}

Nonterminal = {S,E,B,L}

Rule =
- i) $S \rightarrow$ print (E)
- ii) $S \rightarrow$ while (B)S
- iii) $S \rightarrow \{L\}$
- iv) $E \rightarrow$ id
- v) $E \rightarrow$ num
- vi) $B \rightarrow E > E$
- vii) $L \rightarrow SL$
- viii) $L \rightarrow \varepsilon$

Start Symbol = S

P.T.O.

OR

Q4) a) Enlist the operations performed on symbol table. **[2]**

b) Construct SLR (1) parsing table for the following grammar. **[8]**

$S \rightarrow aAb|bB$

$A \rightarrow Aa|\ \varepsilon$

$B \rightarrow Bb|\ \varepsilon$

Q5) a) What do you mean by common sub-expression? Discuss the algorithm for elimination of common sub-expression. **[6]**

b) Discuss peephole optimization techniques. **[6]**

c) What is DAG? with suitable illustrations explain the role of DAG in code generation phase. **[6]**

OR

Q6) a) Discuss following optimizations with example. **[6]**

i) Strength reduction

ii) Dead code elimination.

b) What do you meant by 'Next Use' information? How it is computed? **[6]**

c) Explain the algorithm for generating code from labeled tree. **[6]**

Q7) a) Explain the different translation schemes to remove syntactic sugar from Haskell program. **[6]**

b) Explain following features of object oriented languages related to compiler design. **[6]**

i) Overloading

ii) Inheritance.

c) Discuss features of Java CC compiler. **[4]**

OR

Q8) a) Discuss following with respect to object oriented languages. **[6]**

i) Type checking.

ii) Type coercion.

b) Explain following with respect to functional languages. **[6]**

i) Referential transparency.

ii) Lazy evaluation.

c) What is activation record? Explain possible structure of an activation record? **[4]**

Q9) a) Discuss parallel programming models. **[6]**

b) Write short notes: **[6]**

i) g++

ii) NVCC

iii) LLVM

c) Compare processes and threads. **[4]**

OR

Q10)a) Discuss issues in message passing techniques. **[6]**

b) Explain following concepts related to automatic parallelization. **[6]**

i) Data dependencies.

ii) Loop transformations.

c) What is Interpreter? Explain Dalvik. **[4]**

Total No. of Questions : 10]

SEAT No. :

P2328

[Total No. of Pages : 2

[5254]-663

B.E. (Computer Engineering)

SMART SYSTEM DESIGN AND APPLICATIONS

(2012 Pattern) (End Semester)

Time : 2.30 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) ***Assume suitable data, if necessary.***

Q1) a) What is artificial intelligence? Explain how AI system is different from a conventional computing system. **[6]**

b) Explain the concept of hierarchical planning along with example. **[6]**

c) Define Search problem. Solve 8 Queen problem as a space search problem. **[8]**

OR

Q2) a) Explain different environment types. **[6]**

b) Explain CSP.Using CSP, explore the search space to solve the following crypt arithmetic problem. TAKE+ A + CAKE= KATE **[8]**

c) How well defined problem is formed? Give example. **[6]**

Q3) a) Explain the concept of Decision Network with suitable example. **[6]**

b) Write a short note on Kalman filters. **[6]**

OR

Q4) a) Explain Basis of Utility Theory. **[6]**

b) Explain Baye's rule and its use with suitable example. **[6]**

P.T.O.

Q5) a) Explain in brief the concept of Support Vector Machine. **[6]**

b) Write a short note on Nonparametric Models. **[6]**

OR

Q6) a) What is Active Learning? **[6]**

b) Write a note on Artificial Neural Network. **[6]**

Q7) a) What are the Information Retrieval characteristics? How to evaluate and refine Information Retrieval System **[6]**

b) Write a note on Robot Hardware. **[6]**

OR

Q8) a) Explain the process of Image Formation. **[6]**

b) Explain Text Classification with suitable example. **[6]**

Q9) a) What is reinforcement Learning? **[6]**

b) Describe Decision Tree with suitable example. **[8]**

OR

Q10)a) Explain Syntactic analysis (Parsing) **[6]**

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

i) Machine Translation

ii) Speech Recognition

Total No. of Questions : 8]

SEAT No. :

P2329

[Total No. of Pages : 2

[5254]-664
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 diagrams should be drawn wherever necessary.***
3) ***Use of electronic pocket calculator is allowed***
4) ***Assume suitable data, jf necessary.***

Q1) a) Explain Nyquist rate, aliasing effect and fold over frequencies in case of two dimensional sampling. **[6]**

b) Explain Spatial domain techniques used in image enhancement. **[8]**

c) Define histogram? If all the pixels in an image are shuffled, will there be any change in the histogram? Justify your answer. **[6]**

OR

Q2) a) What do you mean by Image file format? Mention the name and use of frequently used file format. **[6]**

b) Define histogram? Discuss how histogram equalization helps in image enhancement with example. **[8]**

c) Explain watershed segmentation method in image processing. **[6]**

Q3) a) Explain any two methods used for lossless image compression. **[8]**

b) Define feature and pattern. Discuss relationship between image processing and pattern recognition. **[8]**

OR

P.T.O.

Q4) a) Explain different approaches for object recognition. **[8]**

b) Explain Vector Quantization and its applications. **[8]**

Q5) a) Write a short note on any two: **[10]**

i) Images from X-rays and its application

ii) Images from r-rays

iii) Does and risk

b) Explain picture archives and communication systems (PACS). **[8]**

OR

Q6) a) i) List three ways in which the contrast is maximized in mammography with a short explanation of the principles behind each. **[18]**

ii) List two factors that help to achieve high spatial resolution in mammography

iii) Why should noise be minimized in mammography? How it can be minimized?

Q7) a) Discuss workflow of digital photogrammetric process. **[8]**

b) Explain coordinate system for photogrammetry. **[8]**

OR

Q8) a) Explain remote sensing process and state advantages and limitation of remote sensing? **[8]**

b) Explain different stereo imaging concepts from satellites. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2330

[Total No. of Pages : 2

[5254]-665

B.E. (Computer Engineering)

COMPUTER NETWORK DESIGN AND MODELING

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

Time :2:30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the right indicates full marks.***
4) ***Assume suitable data, jf necessary.***

Q1) Theoretically prove network analysis, architecture, and design are similar to other engineering processes with respect to following areas - problems to be addressed, Analyzing data and optimization. **[6]**

OR

Q2) What is the need of developing service metric? With the help of suitable diagram explain the requirement analysis process. **[6]**

Q3) What are the different Application Types and Application Groups needs to consider while designing a network. **[8]**

OR

Q4) Write a short note on:

a) Service metrics for RMA. **[4]**

b) Variables used as service metrics. **[4]**

Q5) Write Flowspec Algorithm and explain with example. **[8]**

OR

Q6) Explain in detail with example and diagram - Topological Models, Flow-Based Models, Functional Models and Distributed computing model. **[8]**

P.T.O.

Q7) a) What are the different Addressing Strategies during the life cycle of the network explain with diagram. **[8]**

b) What is importance of Network Layout for analyzing network performance?. **[4]**

OR

Q8) a) Explain FCAPS model in details **[4]**

b) Explain with diagram: **[8]**

i) In-band and out-of-band management

ii) Centralized, Distributed, and Hierarchical Management

Q9) a) What are the different addressing mechanisms strategies explain in details? **[8]**

b) Explain Prioritization, Traffic Management, Scheduling, Queuing and Quality of Service with respect to performance mechanism. **[10]**

OR

Q10)a) List four types of problems that the performance architecture addresses. Give examples of each type of problem? **[8]**

b) What are the roles of design traceability and design metrics for analyzing network performance? **[10]**

Q11)a) Enlist the tools used for network simulation and elaborate any one of them. **[4]**

b) Explain the concept of the NED Language and IDE Support for NED.**[6]**

c) Explain in details the The OMNeT++ Approach for Modeling. **[8]**

OR

Q12)a) Explain Simulating a Computer Network in ns-3. **[6]**

b) Write a short note on: **[12]**

i) Smart Pointers in ns-3

ii) Events in ns-3

iii) Scalability with distributed simulation.

Total No. of Questions : 10]

SEAT No. :

P2331

[Total No. of Pages : 2

[5254]-666
B.E. (Computer Engineering)
ADVANCED COMPUTER PROGRAMMING
(2012 Pattern) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain with example a message - passing services in distributed programming. **[5]**

b) Explain simple lock and distributed lock using time stamps. **[5]**

OR

Q2) a) Write short note on: **[5]**

i) A single - copy distributed shared memory.

ii) A multi-copy distributed shared memory.

b) What is bounded buffer? How semaphores are useful in bounded buffer. **[5]**

Q3) a) Explain with examples autoboxing and unboxing. Where and how Java reflection API is used. **[5]**

b) What are the difference between Hashmap and Hashtable? Also brief on Java utility classes. **[5]**

OR

Q4) a) Why list - Iterator has added () method but Iterator doesn't What is the difference between list and set in Java. **[5]**

b) What is Navigable map in Java? Waht is the benefit over map? **[5]**

Q5) a) Explain the use of services in cloud based environment. **[9]**

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

i) RMI

ii) Soap

iii) Servlet

iv) EJB

P.T.O.

OR

Q6) a) Explain in detail Java message service and what are the advantages of JMS? **[9]**

b) Write a short note on HTML and Java script programming. **[8]**

Q7) a) Explain with example the implementation of JDBC processes with mongo DB. **[8]**

b) Write a short note on tag based approach in web programming. **[8]**

OR

Q8) a) Write a short note on SNA. Also Write the difference between parallel & distributed systems. **[8]**

b) i) What are the advantages of Hadoop over RDBMS.

ii) Write short notes on:

A) HDFS Daemons.

B) Hadoop YARN. **[8]**

Q9) a) Explain the execution modes of pig Also explain word count example using pig. **[8]**

b) Explain searching and sorting examples in hadoop using Map Reduce. **[9]**

OR

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

i) Map Reduce Daemons.

ii) Concept of mapper.

iii) Reducer

iv) Combiner

b) Explain with examples data types and complex data types in pig. **[9]**

Total No. of Questions : 8]

SEAT No. :

P2332

[Total No. of Pages : 2

[5254]-667

B.E. (Computer Engineering)

DATA MINING TECHNIQUES AND APPLICATIONS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are missing values? Explain methods to handle missing values. **[6]**

b) Write Apriori Algorithm and explain it with suitable example. **[6]**

c) What are the different metrics for performance evaluation? Explain any four. **[8]**

OR

Q2) a) Explain Bayes theorem and Naive Bayes classification algorithm. **[8]**

b) Use the two methods below to normalize the following group of data: **[8]**
200, 300, 400, 600, 1000

a) min-max normalization by setting min = 0 and max = 1

b) z-score normalization.

c) Explain applications of Market basket analysis. **[4]**

Q3) a) Explain CLARA(Clustering Larage Applications), as. extension of PAM(Partitioning Around Medoids) algorithms for handling large data sets. **[6]**

b) Explain AGNES and DIANA Hierarchical Clustering with example and diagram. **[8]**

c) What is meant by cluster analysis? **[3]**

P.T.O.

OR

Q4) a) Using K-Means Clustering, Cluster the following data into 2 cluster. **[8]**
{4,6,12,14,5,22,32,13,27}, Explain each step with diagram

b) Explain K- Medoids clustering algorithm with example. **[6]**

c) Write equations for min, max, mean and average distance, to find out inter cluster distance. **[3]**

Q5) a) Explain following terms: **[9]**

i) Term Frequency

ii) Inverse Document Frequency

iii) Bag of Words

b) What is web crawler? Explain working of web crawlers. **[6]**

c) What is document ranking? **[2]**

OR

Q6) a) Differentiate between Web content mining and Web usage mining. **[6]**

b) Which are dimensionality reduction techniques in text mining? List them and explain any one of them. **[8]**

c) What is feature vector? **[3]**

Q7) a) Explain Intelligent agent and environment, learning agents, rewards, adaptive learning in reinforcement learning. **[8]**

b) Write a note on multi-perspective learning and Holistic Learning. **[8]**

OR

Q8) a) Draw and explain diagram for systematic machine learning frmework. **[8]**

b) Write a note on Advanced techniques for big data mining. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2333

[Total No. of Pages : 2

[5254]-668
B.E. (Computer Engineering)
PROBLEM SOLVING WITH GAMIFICATION
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt questions Q1 or Q2, Q3or Q4, Q5or Q6, Q7or Q8, Q9 and Q10.***
2) ***Assume Suitable data if necessary***

Q1) a) Define Engagement. List and explain relevance of series of potentially interrelated metrics that combine to form "E" (Engagement) score. **[5]**

b) What are the critiques of gamification? **[5]**

OR

Q2) a) What are intrinsic and extrinsic motivations? **[5]**

b) How gamification can be incorporated with respect to Music Dance? **[5]**

Q3) a) List and explain Game elements of Farmville. **[5]**

b) How Game mechanics are important for making gamification with respect to non game context? **[5]**

OR

Q4) a) What do you mean by choice architecture? How it support gamification with respect to non game context? **[5]**

b) For game designer, How badges are an excellent way to encourage social promotion of their product and services? **[5]**

Q5) a) What is significance of Feedback and Reinforcement? How it act as an important game mechanics? **[8]**

b) Describe how Pattern recognition and Collecting game mechanics can be useful for gamified system? **[8]**

P.T.O.

OR

Q6) a) With suitable diagram, describe how social engagement loop motivating emotions leads to player re-engagement. **[8]**

b) How leadership oriented challenges and opportunities acts as a mechanics for game engagement? **[8]**

Q7) a) What is role of level model? How levels will be awarded to player? Write simple pseudo code for creation of level table which reflect level number, name of the level and points required to award the level. **[8]**

b) Describe how foursquare uses location intelligence to build meaningful consumer experiences and business solutions. **[8]**

OR

Q8) a) How following game mechanics will help players to track their progress on the site? **[8]**

i) Adding Player's score and level to the side bar

ii) Adding a basic leader board

b) Describe Health Month point system to nudge players towards their GOALS. **[8]**

Q9) a) 'What are critical elements of online rewards program? How gamification platform will be helpful to player and publisher point of view? **[9]**

b) One of the important aspect of developing rewards program is reward editor. Draw and explain GUI for reward editor of rewards program. Mention Virtual and Tangible business rules for awards. **[9]**

Q10)a) A company wants to use gamification for a Social rewards project. Identify and discuss task related to design of project for achieving success using gamification. **[9]**

b) Justify importance of Analytics for loyalty and rewards program using Gamification. What is analytical support provided by Badgeville publisher module? **[9]**

Total No. of Questions : 10]

SEAT No. :

P2334

[Total No. of Pages : 2

[5254]-669
B.E. (Computer Engineering)
PERVASIVE COMPUTING
(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, or Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume Suitable data if necessary.***

Q1) a) What is transparency? What is openness? Are they complementry to each other? **[5]**

b) Define context? Comment on context awareness? **[5]**

OR

Q2) a) Explain dynamic adaptation in IBM'S transcoding application. **[5]**

b) Comment on improvement in device technology how devices can be more suitable for pervasive computing? **[5]**

Q3) a) What is posthuman model of UbiCom? How sense of presence and telepresence is generated in UbiCom? **[6]**

b) How the brain computer interface is facilitated? **[4]**

OR

Q4) a) Discuss any application of hidden UI in wearable computing. **[4]**

b) Differentiate between. **[6]**

i) Virtual vs. Augmented reality.

ii) Mediated vs. Embodied Reality.

P.T.O.

Q5) a) What is middleware? What can be adapted in middleware. **[6]**
b) Explain core capabilities of context aware applications. **[6]**
c) How service discovery helps in middleware adaption. Explain in brief with example. **[4]**

OR

Q6) a) How data adaption is done in Ubicom? Explain. **[6]**
b) What is mobile agent? Give architecture? Mobile agent? **[6]**
c) Write short note on mobile middleware. **[4]**

Q7) a) Differentiate between security and Privacy in Ubicom? **[6]**
b) Explain kerberos as authentication algorithm. **[7]**
c) Discuss different defense strategies for network security. **[4]**

OR

Q8) a) Explain V-SAT Security models in Ubicom? **[6]**
b) Discuss blowfish algorithm in detail for authentication. **[7]**
c) Compare different collaborative defense strategies. **[4]**

Q9) a) Discuss challenges in Ubicom? How they can be overcome? **[9]**
b) Differentiate between machine intelligence and human intelligence. **[8]**

OR

Q10)a) Discuss device interaction in smart devices. **[8]**
b) Write Short note on: **[9]**
i) Smart watch
ii) Smart boards, Pads and Tabs.
iii) Smart meeting Rooms.

Total No. of Questions : 10]

SEAT No. :

P2335

[Total No. of Pages : 2

[5254]-670
B.E. (Computer) (Semester - I)
EMBEDDED SECURITY
(2012 Pattern) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagram wherever necessary.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Explain EPID (Enhanced Privacy Identification) **[4]**

b) Differentiate between Intel AMT vs. Intel vPro Technology. **[6]**

OR

Q2) a) Explain in brief eBay data breach? **[4]**

b) Explain PAVP with neat diagram? **[6]**

Q3) a) Explain in detail Digital signature algorithm. **[4]**

b) Explain the embedded security and management engine. **[6]**

OR

Q4) a) Explain the boot integrity. **[4]**

b) Write short notes on:

i) Random number generation.

ii) Message Authentication. **[6]**

P.T.O.

Q5) a) Differentiate between BIOS and UEFI. **[8]**
b) Explain features of Trusted Platform Module (TPM) **[8]**

OR

Q6) a) Differentiate between Field programmable Fuses vs. Flash Storage. **[8]**
b) What is Intel Boot Guard, Measured Boot, Verified Boot? **[8]**

Q7) a) Explain types and levels of rights protection to protect for content. **[8]**
b) What are Dynamic application Loader security considerations? **[8]**

OR

Q8) a) Explain popular Digital Right Managements (DRMs) used for protecting online media. **[8]**
b) Explain block diagram of Intel's Hardware - Based Content Protection in detail. **[8]**

Q9) a) Write short notes on: **[9]**
i) Anonymous Authentication.
ii) Secure Session Establishment.
iii) Basic utilities of embedded security.
b) Explain the building Blocks for Embedded security? **[9]**

OR

Q10)a) Explain Firmware components of security and management engine using neat block diagram? **[9]**
b) Write a short note on: **[9]**
i) Protected Input and output.
ii) Software guard extension.
iii) DAL.

Total No. of Questions : 10]

SEAT No. :

P2336

[Total No. of Pages : 2

[5254]-671

B.E. (Computer Engineering)

MULTDISCIPLINARY NATURAL LANGUAGE PROCESSING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers Q1 or Q2, Q3 or Q4, Q5 or Q6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data if necessary***

Q1) a) Define the following terms: **[6]**
   i) Hybrid Parsing
   ii) Robust Parsing

b) Give the significance of Named Entities in Natural Language Processing. **[4]**

OR

Q2) a) What is meant by Scope Ambiguity and ambiguity resolution? **[6]**

b) With suitable example, explain the Maximum Entropy framework. **[4]**

Q3) a) With suitable example , explain how robust processing is used on noisy web collected data? **[6]**

b) Enlist the steps of Graphical models for sequence labeling in NLP. **[4]**

OR

Q4) a) What do you mean by Unsupervised NLP? Compare Unsupervised NLP with Supervised NLP. **[6]**

b) Write a Note on: Discourse Processing. **[4]**

P.T.O.

Q5) a) What is Speech Synthesis? Explain Multimodal / audio-visual speech synthesis. **[8]**

b) Differentiate between Sentence-level and adaptation level Phenomena. **[8]**

OR

Q6) a) What is Acoustic Speech Analysis ? Explain it. **[8]**

b) Write a note on Auditory physiology. **[8]**

Q7) a) Define Metaphor. Give suitable example. **[8]**

b) Explain in short the following approaches of Word Sense Disambiguation. **[8]**

i) Knowledge-Based

ii) Supervised

iii) Unsupervised

OR

Q8) a) Explain the importance of Multilingual Dictionary. **[8]**

b) Write a note on: Semantic role. **[8]**

Q9) a) With suitable example, Explain Textual Entailment. **[10]**

b) Explain various uses/applications of machine translation. **[8]**

OR

Q10) Write a Note on : **[18]**

i) Database interface in machine translation.

ii) NLP applications.

iii) Sentiment Analysis

Total No. of Questions : 10]

SEAT No. :

P2337

[Total No. of Pages : 2

[5254]-672

B.E. (Computer Engineering)

SOFTWARE DESIGN METHODOLOGIES AND TESTING

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Assume Suitable data if necessary.***

Q1) a) Explain Aggregation, Composition and Generalisation with reference to Class Diagram? **[5]**

b) Explain the fundamental design concepts applied in modern software design. **[5]**

OR

Q2) a) What is Unified Modeling Language (UML)? List few standard notation and diagrams of UML **[5]**

b) What extension points in use cases? Explain with proper use case description and diagram. **[5]**

Q3) a) Explain the concept of generalization and specialization of class hierarchies using suitable example and class diagram. **[5]**

b) What is Iterator pattern ? Explain one example scenario where you will Iterator pattern to get applied. **[5]**

OR

Q4) a) What is software architectural pattern ? And why they are important in modern software development? Explain in brief. **[5]**

b) What are important design principles for service oriented architecture? **[5]**

P.T.O.

Q5) a) Explain V test model with suitable block diagram? **[8]**
b) What are different advantage and disadvantage of validation? **[8]**

OR

Q6) a) Explain the cases and effects of defects? **[8]**
b) Explain the defect management process with suitable block diagram? **[8]**

Q7) a) Briefly explain different types of functional system testing. **[6]**
b) Explain graph based testing with example? **[6]**
c) What is security testing. Explain different types security testing. **[6]**

OR

Q8) a) Differentiate between white box and black box testing. **[6]**
b) Explain regression testing. **[6]**
c) What is testing? List the benefits of unit testing. **[6]**

Q9) a) What is functional testing ? Explain its types? **[8]**
b) What are different required features in automated testing tools and explain them. **[8]**

OR

Q10)a) What are the selection criteria of automated testing tool? **[8]**
b) Write Short note on: **[8]**
i) Monkey talk
ii) Selenium

Total No. of Questions : 8]

SEAT No. :

P2338

[Total No. of Pages : 2

[5254]-673
B.E. (Computer Engineering)
HIGH PERFORMANCE COMPUTING
(2012 Pattern) (End - Semester)

Time : 2.½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***First two questions are compulsory. Answer three quetions.(Q3 or Q4), (Q5 or Q6), (Q7 or Q8).***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary***

Q1) a) What are applications of Parallel Computing? **[4]**

b) Explain basic working principal of VLIW processor. **[6]**

Q2) a) Explain Randomized block distribution and hierarchical mappings. **[6]**

b) Write note on : Topologies and Embedding. **[4]**

Q3) a) Implement Producer Consumer Problem using Mutex synchronization primitives in Pthreads. **[7]**

b) Describe Barrier Synchronization for shared address space Model. **[8]**

OR

Q4) a) Describe Logical Memory Model of a Thread? **[7]**

b) Why synchronization in important?Enlisht Thread APIs to for Mutex Synch. **[8]**

Q5) a) Explain sorting network with suitable diagram. **[7]**

b) Explain single source shortest path algorithm with suitable example. **[8]**

P.T.O.

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) Petascale Computing.

ii) Nano Technology.

iii) Power Aware Processing.

b) Elucidate Thread Organization in detail. **[5]**

OR

Q8) a) Write a short note on (Any two) **[15]**

i) Discrete optimization problems.

ii) Parallel Best - First - Search.

iii) Quantum Computers.

b) Intricate sorting issues in parallel computers. **[5]**

Total No. of Questions : 10]

SEAT No. :

P2339

[Total No. of Pages : 2

[5254]-674
B.E. (Computer Engineering)
MOBILE COMPUTING
(2012 Pattern) (End Semester) (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) ***Assume Suitable data if necessary***

Q1) a) Explain IG,2G,3G and 4G **[5]**

b) What is the need of spread spectrum technology? Explain Slow FHSS. **[5]**

OR

Q2) a) Explain GSM Network Architecture. **[5]**

b) What are the limitations of Mobile Devices? **[5]**

Q3) a) Explain DSSS with one example. **[5]**

b) Draw and explain Mobile Computing architecture for a mobile device. **[5]**

OR

Q4) a) Explain various traffic and control data channels used in GSM network. **[5]**

b) Explain how the confidentiality is maintained during a call using ciphering and encryption processes? **[5]**

P.T.O.

Q5) a) Describe the registration of a visiting mobile node in handover. How is the binding between the home agent and the foreign agent created? **[6]**

b) Describe Indirect TCP. Explain the modifications of Indirect TCP as the selective repeat protocol. **[6]**

c) Explain Cluster-head Gateway Switch Routing (CGSR) in MANET. **[6]**

OR

Q6) a) Explain what is MANET. What are the security threats to a MANET? **[6]**

b) Explain the role of Agent Discovery, Agent advertisement and Agent Solicitation during location Management in GSM Network. **[6]**

c) List the entities of mobile IP and describe data transfer from a mobile node to a fixed node and vice-versa. **[6]**

Q7) a) Describe pull-based data-delivery mechanism. What are the advantages and disadvantages of pull-based data-delivery? **[8]**

b) Explain Data Synchronization Protocols for synchronizing mobile applications at mobile devices. **[8]**

OR

Q8) a) Show architecture for data dissemination and broadcast. Explain the reason for communication asymmetry in mobile network. **[8]**

b) What are the different types of data synchronizations in mobile computing systems?Describe synchronization usage models in mobile applications. **[8]**

Q9) a) Explain the role of a gateway in connecting networks using different protocols. Describe a transcoding gateway and its applications in mobile computing systems. **[8]**

b) Write Short note on:

i) Android OS

ii) Service discovery and device management. **[8]**

OR

Q10)a) Describe the functions of a mobile agent. Why does an agent move from tier to tier during an application? **[8]**

b) Write Short note on: **[8]**

i) Mobile-agent-based architecture

ii) IOS

Total No. of Questions : 10]

SEAT No. :

P2340

[Total No. of Pages : 2

[5254]-675
B.E. (Computer Engineering) (End-Sem)
WEB TECHNOLOGY
(2012 Pattern) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain properties of Autonomic IoT Systems. **[6]**

b) Explain Governance, Security and Privacy in the Butler Project. **[4]**

OR

Q2) a) Write Research Directions for Self - manageable IoT systems. **[6]**

b) Write objectives and uses of Smart campus. **[4]**

Q3) Describe the challenges and opportunities of data management in details. **[10]**

OR

Q4) a) Write use of IoT for any two industry. **[6]**

b) Explain the components of a typical smart city information system. **[4]**

Q5) a) Draw and explain IoT reference model. **[8]**

b) Explain iCoreFunctional Architecture. **[8]**

P.T.O.

OR

Q6) a) What are Current IoT Requirements? **[8]**

b) Cross Vertical M2M Service Layer Standardisation. **[8]**

Q7) a) Explain identity management in Internet of Things. **[9]**

b) Explain identity portrayal different phases. **[9]**

OR

Q8) a) List and explain different identity management model. **[12]**

b) Elaborate identity Hybrid Identity Management. **[6]**

Q9) a) Explain Paradigms for Identity Trust. **[8]**

b) Explain Different access control schemes of IoT. **[8]**

OR

Q10)a) Explain Authentication and Access control policies modeling. **[8]**

b) Write contents of a typical attribute certificate. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2341

[Total No. of Pages : 2

[5254]-676
B.E. (Computer Engg.) (Semester - II)
CLOUD COMPUTING
(2012 Pattern) (Elective - III (C))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define and explain any five characteristics of cloud computing. **[5]**

b) Write a short note on open stack. **[5]**

OR

Q2) a) Elaborate IaaS, PaaS and SaaS. **[6]**

b) Explain the cloud deployment models. **[4]**

Q3) a) Write a short note on : Xen. **[5]**

b) Elaborate taxonomy of virtualization techniques. **[5]**

OR

Q4) a) Write a short note on : Dynamo. **[5]**

b) Write a short note on SAN and NAS. **[5]**

Q5) a) Elaborate scheduling techniques in the context of cloud computing. **[8]**

b) Explain and elaborate virtual machine provisioning process. **[8]**

OR

P.T.O.

Q6) a) Explain Distributed management of virtual machines. **[8]**

b) Explain Anatomy of cloud Infrastructure. **[8]**

Q7) a) Elaborate the model for federated cloud computing with suitable diagram. **[6]**

b) Elaborate performance related issues of HPC in cloud computing. **[6]**

c) Explain cloud interface standards along with SOAP and REST. **[6]**

OR

Q8) a) Explain types of SLAs in detail. **[6]**

b) Elaborate cloud service life cycle phases in detail. **[6]**

c) Differentiate between "classical HPC" and "HPC in cloud Environment". **[6]**

Q9) a) What are the security risks involved in context of cloud computing? **[8]**

b) Explain digital identity and Access management. **[8]**

OR

Q10)a) Elaborate various techniques for data security in cloud computing. **[8]**

b) Write a short note on "Security As-A-Cloud Service. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2342

[Total No. of Pages : 2

[5254]-677
B.E. (Computer) (Semester - II)
CYBER SECURITY (Elective - III)
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are various security technique used in cyber security? **[5]**

b) Explain various active attacks in detail. **[5]**

OR

Q2) a) Use poly alphabetic ciphers to encrypt plain text "SHE IS VERY HAPPY AND BEAUTIFUL GIRL" use key 'ANOTHER'. **[5]**

b) What is Stegnography? Explain its application. **[5]**

Q3) a) Explain operation of 3DES algorithm. **[5]**

b) Describe linear & differential cryptanalysis. **[5]**

OR

Q4) a) Explain RSA algorithm with suitable example. **[5]**

b) What is kerberas? Explain its operation. **[5]**

Q5) a) Describe IPsec protocol with its components & security services. **[9]**

b) What is S/MIME? State operation of S/MIME in detail. **[8]**

P.T.O.

OR

Q6) a) What is the role of OAK LEY protocal in communication? **[6]**

b) Explain the operation of secure electronic transaction protocal. **[6]**

c) State security measure applied by VPN for security. **[5]**

Q7) a) List & explain types of intrusion detection system (IDS) **[9]**

b) Describe screened subnet fire wall architecture. **[8]**

OR

Q8) a) Explain the firewall types with its operation. **[9]**

b) Explain operation of anomaly based intrusion detection system in detail. **[8]**

Q9) a) How war dialing software are used in remote connectivity?. **[8]**

b) How VolP hacking is done by attackers? What are the counter measures for it? **[8]**

OR

Q10)a) What is VLAN jumping? What are counter measures used for it? **[8]**

b) Explain various hacking devices used for hacking. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2343

[Total No. of Pages : 3

[5254]-678

B.E. (Computer Engineering)

BUSINESS ANALYTIC AND INTELLIGENCE (Elective - IV-A)

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary***

Q1) a) Describe the 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]**

P.T.O.

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]**

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 the following terms used in management of BI infrastructure.**[6]**

i) Capacity Planning

ii) BI Tools

b) Explain the need of Scalability in Business Intelligence infrastructure.**[6]**

c) What is business continuity (BC)? Explain Resilience in terms of BC.**[5]**

OR

Q8) a) Explain the following terms used in management of BI infrastructure.**[6]**

i) Performance Tuning

ii) Security Management

b) Explain the concept and importance of maintaining Business Intelligence systems. **[5]**

c) Explain Recovery and Contingency in terms of business continuity. **[6]**

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 discounts 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. :

P2344

[Total No. of Pages : 3

[5254]-679

B.E. (Computer Engineering)
OPERATIONS RESEARCH FOR ALGORITHMS IN SCIENTIFIC APPLICATIONS
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 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) Discuss the scope of operation research in real world decision making problem? **[6]**

b) Explain Operation Research as tool for Decision Support System Give its one example? **[6]**

c) Solve the following LP Problem graphically. Maximize $Z = 2x_1+4x_2$ Subject to restrictions. **[8]**

$x_1 + 3x_2 \leq 3000,$

$x_1 + x_2 \leq 2500,$

$x_2 \leq 400$ and $x_1, x_2 \geq 0$

OR

Q2) a) How do you detect degeneracy, infeasibility and unboundedness in simplex iterations? **[6]**

b) Explain the transportation and Transshipment problems. **[6]**

c) Solve the following problem using the simplex method. **[8]**

Maximize

$$Z = 3X_1 + 5X_2$$

Subject to

$$X_1 \leq 4$$

$$2X_2 \leq 12$$

$$3X_1 + 2X_2 \leq 18$$

$$X_1, X_2 \geq 0$$

P.T.O.

Q3) a) All products manufactured are shipped out of the storage area at the end of the day. Therefore, the two products must share the total raw material, storage space and production time. The company wants to determine how many units of each product to produce per day to maximize its total income. **[8]**

b) Draw sketches to show unbounded solution and multiple optimal cases? **[6]**

c) Draw graph to show infeasibility and multiple optimal solution? **[3]**

OR

Q4) a) Explain the different decision rules usually adopted in context of decision-making. **[4]**

b) Differentiate slack, surplus and artificial variables? **[5]**

c) What is a queuing theory problem? Describe the advantages of queuing theory to a business executive with a view to persuading him to make use of the same in management. **[8]**

Q5) a) Explain the method of solving a zero-sum two person game as a linear programming problem. **[5]**

b) A project consist of a series or tasks labeled A,B,.....,H, I with the following relationship (W < X,Y, means X and Y cannot start until W is completed; X,Y < W means we cannot start until both X and Y are completed). With this notation, construct the network diagram having the following constraints: **[12]**

A < D, E; B, D < F; C < G; B < H; F, G < I.

Find also the optimum time of completion of the project, when the time (in days) of completion of each task is as follows:

Task	A	B	C	D	E	F	G	H	I
Time	20	6	22	14	20	16	17	2	12

OR

Q6) a) What is balanced transportation problem? What is its application? **[6]**

b) What is stepping stone transportation problem? **[5]**

c) Show that assignment model is a special case of transportation model. **[6]**

Q7) a) Explain single additive constraints, additively separable return model of dynamic programming. **[6]**

b) Discuss some important applications of queuing theory. **[5]**

c) Compare PERT and CPM. **[5]**

OR

Q8) Write short notes of the following: **[16]**

a) Guidelines for Network Construction.

b) Bellman's Principles of optimality.

c) Recent development on OR with perspective of Bio-Technology.

Total No. of Questions : 10]

SEAT No. :

P2345

[Total No. of Pages : 3

[5254]-680

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

Q1) a) What do you mean by dedicated mobile Website? Explain in detail. **[5]**

b) Which tool would you recommend for debugging web services? **[5]**

OR

Q2) a) What are the myths associated with mobile development? **[4]**

b) Define WAP1 and support your answer with WAP1 architecture. **[4]**

c) Differentiate between WAP1 and WAP2. Any two points. **[2]**

Q3) a) Write short note on Native, Hybrid and HTML Apps. **[5]**

b) What is the need of CSS in Mobile Applications? Write a simple code sample illustrating the concepts? **[5]**

OR

Q4) a) Explain WML and XHTML Mobile profile. **[5]**

b) Explain basics of HTML 5. Design a HTML 5 Form with HTML Tags for select list for single selection in the form. **[5]**

P.T.O.

Q5) a) Explain in detail user agent spoofing and HTTP sniffing? Support your answer with example? **[6]**

b) Write short note on HTTP Live streaming with suitable example? **[6]**

c) Write a short note on device interaction. **[5]**

OR

Q6) a) Explain in detail the Architecture of Web App development with suitable diagram. **[6]**

b) Explain in detail problems and solutions associated with Mobile Device Detection. **[6]**

c) How will you optimize the performance factors in web technology? **[5]**

Q7) a) Explain the tools for J2ME programming. **[6]**

b) What are the different type of JavaScript Debugging. Explain any one type? **[6]**

c) What is DOM , explain in details? **[5]**

OR

Q8) a) Write a short note on JQuery? **[6]**

b) What is JavaScript Libraries and how they can be used to develop mobile website? **[6]**

c) Explain Enyo and Montage framework. **[5]**

Q9) a) Explain Web SQL database API in detail. **[6]**

b) Explain Web Sockets in detail. **[6]**

c) Describe how google map API is used to show maps on mobile devices? **[4]**

OR

Q10)a) Illustrate how a user will locate you using SMS and Email? **[6]**

b) Define and explain Mobile SEO. **[6]**

c) Explain mobile tiny URL and QR Codes? **[4]**

Total No. of Questions : 10]

SEAT No. :

P2346

[Total No. of Pages : 3

[5254]- 680 - B

B.E. (Computer Engineering)

PROGRAMMING PARADIGMS FOR COMPLEX PROBLEMS-CASE STUDIES IN PYTHON

(2012 Pattern)(Open Elective) (Semester - 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. Neat diagrams must be drawn wherever necessary.***

Q1) a) Describe the general structure of Python Program. What are generalized rules of compound expression evaluation? **[6]**

b) Create a collection called as dictionary named participant_table that contains mobile number as keys, and their current password as values. Write a function that generates a temporary new password for a given user and updates it in the table. **[4]**

OR

Q2) a) Describe sequences as a type of data structures along with corresponding operations. **[6]**

b) Describe following type of GOFER statements and comment on feature of functional programming covered in the statement. [**4]**

i) Expression Statement.

ii) Assignment Statement.

Q3) a) What are scripts? How these are helpful while writing programs? **[6]**

b) Write a python function to calculate square of a number, using same design a function quad which raises its argument to the fourth power.**[4]**

P.T.O.

OR

Q4) a) What are features of imperative programming paradigms? **[4]**

b) How type systems are good for detecting errors? **[6]**

Q5) a) Give a recursive definition of exponentiation calculations. Prove the same with mathematical induction. **[9]**

b) Using the recursive definitions of addition and multiplication of natural numbers, prove the following properties of arithmetic. **[9]**

i) m + n = n = n + m

ii) K* (m + n) = (K*m) + (K*n)

iii) K * (m * n) = (K * m) * n

OR

Q6) a) Describe following evaluation policies for program defined functions. **[9]**

i) Substitute

ii) Lazy Evaluation

b) What is Tail recursion? Describe factorial calculation using tail recursion. **[9]**

Q7) a) What are pure functions? List and explain advantages of pure functions. **[8]**

b) What is meaning of callable methods of class? Describe Assessors and operators with respect to class. **[8]**

OR

Q8) a) Describe following measures of a tree. **[8]**

i) Size

ii) Depth

b) With suitable examples, describe following object oriented concepts using python. **[8]**

i) Binding

ii) Encapsulation

iii) Destructor

iv) Polymorphism

Q9) a) What happens during a python module import? **[8]**

b) How processing of modules takes place with respect to python? **[8]**

OR

Q10)a) What is role of fabric for application development? **[8]**

b) What are the roles of module? **[8]**

Total No. of Questions : 10]

SEAT No. :

P2347

[Total No. of Pages : 3

[5254]-680-C

B.E. (Computer Engineering) (Semester - II)

CONCURRENCY ON OPEN SOURCE SYSTEMS (Elective - IV)

(2012 Pattern) (Open Elective)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are four necessary conditions that must hold simultaneously for a deadlock? Explain in detail. **[5]**

b) What are Common Features in Shared-Memory Programming and Distributed- Memory Programming? Explain each in detail. **[5]**

OR

Q2) a) How should you partitioning the global data structure into chunks? Explain in detail. **[5]**

b) Explain the necessity of taking global snapshot periodically in distributed system. **[5]**

Q3) a) With the help of suitable example explain how multiple entry points, allowing users to navigate within an android application? **[5]**

b) What is data shipping? What are advantages of distributed object over RPC? **[5]**

OR

Q4) a) Explain in detail the libraries used in android architecture? **[5]**

b) How semaphore is useful for solving the deadlock ? Write the pseudo code for solution to dining philosophers problem using semaphore. **[5]**

P.T.O.

Q5) a) Explain in detail centralized symmetric shared memory architecture.**[10]**

b) What are the drawback of maintaining directory at central server for locating remote data. How it can be overcome in distributed directory?**[8]**

OR

Q6) a) Write a note on communication of processes in concurrent system. **[6]**

b) Explain how client server systems are implemented using distributed Object. **[6]**

c) Explain request reply mechanism in client server systems. **[6]**

Q7) a) What are the different model of computation for concurrent processing? Explain any one in detail? **[8]**

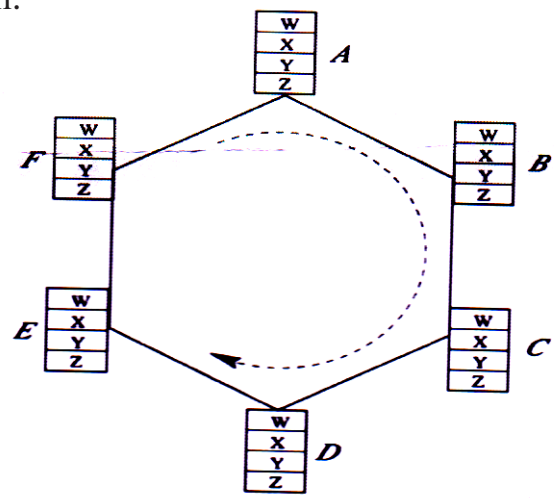
b) Explain in details the steps involved in graph theoretical algorithm. **[8]**

OR

Q8) a) Explain in detail the difference between True Concurrency vs. Pseudo-Concurrency. **[8]**

b) Draw and explain the terms (a) Holding a resource (b) Requesting a resource (c) Deadlock for Resource allocation graphs. **[8]**

Q9) a) Consider ring database (shown in below figure) in distributed system. How will you avoid deadlock while simultaneously updating register. Explain in detail. **[10]**



b) Write the deadlock Rule 2 and prove it for node ordering. **[6]**

OR

Q10)a) Describe the following semantics with respect to CSP 1) Operational Semantics 2) Denotational Semantics 3) Algebraic Semantics. **[6]**

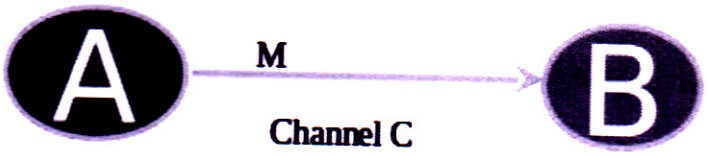
b) 

Figure (model for secrecy with scoping)shows that A sends M to B over secure channel c. Write the Pi Calculus syntax for above mentioned model. Which pi notation will be used to show channel c is invisible to process other then processes A or B. **[5]**

c) Capture the intended specification in terms of failures in modeling bully algorithm for election. Explain in detail using CSP. **[5]**

Total No. of Questions : 10]

SEAT No. :

P2348

[Total No. of Pages : 2

[5254]-681

B.E. (Information Technology) (Semester - I)

INFORMATION AND CYBER SECURITY

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Passive attacks and Active attacks in detail. **[6]**

b) State the Euclids algorithm with example. **[4]**

OR

Q2) a) Draw AES block diagram and state the general steps in detail. **[6]**

b) Distinguish between linear cryptanalysis and differential cryptanalysis. **[4]**

Q3) a) Enlist the requirement of hashfunction and explain working of MD5 algorithm In detail. **[6]**

b) What is Needham Schroeder protocol? Explain with sequence diagram. **[4]**

OR

Q4) a) Define Fermat's theorem with example. **[3]**

b) What is Kerberos? **[2]**

c) Explain Diffie- Hellman Key exchange algorithm with example. **[5]**

P.T.O.

Q5) a) Explain SSL hand shake and SSL Record protocol in detail with neat sketch. **[8]**

b) Explain different IDS methods with one example each. **[8]**

OR

Q6) a) Define IKE protocol and explain its aggressive mode and quick mode in brief. **[8]**

b) Describe briefly how IPSec works and enlist its applications? Distinguish between tunnel and transport mode of IPSec. **[8]**

Q7) a) Describe the Indian and global legal perspective oncyber-crime. **[6]**

b) Explain the types of cyber-crime in detail. **[10]**

OR

Q8) a) What is cyber stalking? Explain the types of stalkers. **[10]**

b) Address security issues in cloud computing. **[6]**

Q9) a) Write short note on. **[12]**

i) Indian IT Act 2000 and its challenges.

ii) SQL injection

b) Define and differentiate phishing and pharming? Describe key loggers and Spywares in brief. **[6]**

OR

Q10) Write short note on following

a) Host based Malicious programs: Trap Door, Logic Bombs and Trojan Horse. **[6]**

b) Virus and Worm. **[6]**

c) Proxy server and an anonymizer. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2349

[Total No. of Pages : 3

[5254]-682

B.E. (Information Technology.)

SOFTWARE MODELING & DESIGN

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***

2) ***Use UML 2.0 notations for draw UML diagrams***

Q1) a) Draw a sequence diagram for booking a ticket of one passenger from source to destination by a railway. Assume that the seats in the railway are available. **[6]**

b) Draw a class diagram for generalization relationship using the keywords Shape, ClosedShape, OpenShape, line, circle, ellipse. **[4]**

OR

Q2) a) Use the following details to draw the activity diagram When a customer visits a bank to withdraw money, she needs to fill a pay slip and hand it over to the bank employee. The bank employee issues a token to her. The customer waits till the token number is displayed at the cash counter. The bank employee checks the balance in the account and passes the slip for checking the signature. When the signature is verified and balance is adequate, the token number is displayed at the cash counter. The customer approaches the cash counter. The cashier gives the amount to her. She goes away from the counter. **[6]**

b) Show asynchronous, synchronous, create object and return message notations in the context of sequence diagram. **[4]**

P.T.O.

Q3) a) For the following description identify which nouns can go as class and which cannot.

Every employee fills up a self-appraisal form. The self-appraisal form has a list of expectations. Each expectation has a description, self-rating, appraiser's rating and justification. The appraisal form has overall rating. Based on the self-assessment, every employee gives self-rating in the range of 0 to 5 for each expectation [0 means 'Expectation not met' and 5 means 'Expectation completely met']. Once completed, employee submits the appraisal form. Appraiser can view the appraisal forms of subordinates **[6]**

b) Elaborate the concept of concurrent sub states in the context of state diagram. **[4]**

OR

Q4) a) A vending machine has a coin insertion slit, a display panel and a dispensing tray. At start, a vending machine is in IDLE state. Being into IDLE state, when the coins are inserted in the coin insertion slits, it goes to accepting coins state. When the amount becomes equal to the price of drink, it goes to select drink state. In this state, it asks for selection of the drink. When it is selected, it goes into dispensing state. In this state, it delivers the drink can in the dispensing tray and goes back to idle state. Identify the transitions and write those as trigger[guard condition]/effect in the state diagram. **[6]**

b) Elaborate the steps to identify use cases of a system. **[4]**

Q5) a) Write a note on Making a Reuse Plan using libraries and patterns. **[8]**

b) What is a procedure driven software control and event driven software control elaborate. **[8]**

OR

Q6) a) Describe the ways of splitting a system into subsystems. **[8]**

b) Describe process of selecting hardware resources for a software system. **[8]**

Q7) a) Elaborate the need of design patterns. **[4]**

b) Explain the use of state design pattern with example. **[6]**

c) Apply strategy design pattern to the following and draw the class diagram. A company has many employees. Each employee has a name and a performance index in the range of 1 to 5. When the index is 2 the increment is 10 percent of the previous year salary, 3 the increment is 15 percent of the previous year salary, 4 the increment is 20 percent of the previous year salary and when it is 5 the increment is 25 percent of the previous year salary. Indicate the roll of each class in the class diagram. **[8]**

OR

Q8) a) Write the types of design pattern. Give one example of each type. **[4]**

b) Explain the use of adaptor design pattern with example, **[6]**

c) Weather station supplies information about the temperature, pressure & humidity to three display devices named Statistics display, Graph display & Forecast display. Draw the class diagram of the system with appropriate design pattern. Write clearly the role of each class in the class diagram.**[8]**

Q9) a) Define verification and validation. **[4]**

b) What is test driven development? Explain in brief **[4]**

c) Given three inputs as integer numbers to check whether it represents a triangle, equilateral triangle, a right angled triangle and an isosceles triangle write one test case for each. **[8]**

OR

Q10)a) Explain white box testing in brief. **[4]**

b) Explain black box testing in brief. **[4]**

c) A mail sign up UI is to be tested; it should have name, email id, password and a secret question, write four test cases to test this UI. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2350

[Total No. of Pages : 3

[5254]-683
B.E. (Information Technology)
MACHINE LEARNING
(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of calculator is allowed.***
4) ***Assume Suitable data if necessary***

Q1) a) For following multi-class classification predictions: **[6]**

	Predicted		
	15	2	3
Actual	7	15	8
	2	3	45

Calculate Accuracy, Per Class Precision, Per Class Recall.

b) Define and explain regression with its model. **[4]**

OR

Q2) a) Derive and explain output code matrix for One Vs One and One Vs Rest Scheme for construction of Multi class classifier (for 3 classes) **[6]**

b) How the performance of a regression function is measured? **[4]**

Q3) a) What are the different types of regularizers? **[6]**

b) What is a Probabilistic Model? Give an example of it. **[4]**

P.T.O.

OR

Q4) a) What are grouping models and grading models? Give one example of each. **[4]**

b) Consider the following data points: **[6]**

X	Y
1	1.5
2	2.75
3	4
4	4.5
5	5.5

Calculate the Cost Function for $\theta_0 = 0.5$ and $\theta_1 = 1$ using linear regression.

Q5) a) In a given dataset of 14 samples, 9 are positive and 5 are negative. Calculate the entropy of the dataset. **[6]**

b) Find all association rules in the following database with minimum Support =2, minimum confidence=70%. **[12]**

TID	Items
1	{a,b,c}
2	{b,c,d,e}
3	{c,d}
4	{a,b,d}
5	{a,b,c}

OR

Q6) a) Consider following dataset: **[10]**

X_1	X_2	Y
2	1	4
6	3	2
2	5	2
6	7	3
10	7	3
4	4	2
7	6	3

Model this function using the K-nearest neighbor regression. What will be the value of Y for the instance $(X_1,X_2)=(4,5)$ and K = 3

b) How empirical probabilities can be used in ranking and probability estimation. trees? Explain the purpose of pruning the subtree of a decision tree. **[8]**

Q7) a) Explain one dimensional and N- Dimensional Gaussian Mixture Model. **[8]**

b) What is logistic regression? How it outperforms basic linear classifier? **[8]**

OR

Q8) a) Write a note on Multi-nominal Distribution. **[8]**

b) Define and describe Logistic Regression. **[8]**

Q9) a) Explain Random Forest Method. **[8]**

b) What is the motivation behind Reinforcement Learning. Explain it with help of digram stating its important entities. **[8]**

OR

Q10)a) Write a note on Deep Learning and its applications. **[7]**

b) Define and explain: **[9]**

i) Sequence Prediction

ii) Sequence Generation

iii) Sequence Classification

Total No. of Questions : 8]

SEAT No. :

P2351

[Total No. of Pages : 2

[5254]-684
B.E. (I.T.)
SOFT COMPUTING
(2012 Pattern) (Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Figure to the right indicate full marks.***
2) ***Assume Suitable data if necessary.***

Q1) a) List and characterize the constituents of soft computing. **[6]**

b) Explain the types of pattern recognition tasks. **[6]**

c) What is Boltzman machine? With neat sketch explain its architecture. **[8]**

OR

Q2) a) Give an example of intelligent system and elaborate it. **[6]**

b) Explain the limitations of perceptron as a classifier. **[6]**

c) What is SOM? Explain training algorithm for SOM. **[8]**

Q3) a) Explain the merits and demerits of fuzzy logic. **[8]**

b) Explain the alpha-cut method for discrete fuzzy sets to perform arithmetic operations. **[8]**

i) Subtraction.

ii) Multiplication.

OR

Q4) a) "Behavior of fuzzy logic is deterministic"? Justify. **[8]**

b) What are fuzzy relations? Explain following operation on fuzzy relations.

i) Intersection. **[8]**

ii) Containment.

P.T.O.

Q5) a) Is it advisable to apply genetic algorithm for all kinds of optimization problems? Justify. **[10]**

b) What is evolutionary programming? **[6]**

OR

Q6) a) What are types of crossover and mutation techniques. **[10]**

b) What are limitations of genetic algorithms. **[6]**

Q7) a) Describe an application how soft computing can be used in mobile ad-hoc networks. **[9]**

b) Mention the application area of fuzzy logic. **[9]**

OR

Q8) a) Describe an application how soft computing can be used in software engineering. **[9]**

b) Mention application area of genetic algorithms. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2352

[Total No. of Pages : 2

[5254]-685
B.E. (I.T.)
USABILITY ENGINEERING
(2012 Pattern) (Elective - I) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the importance of human factors in design. **[4]**

b) What is importance of "Feedback" in usability testing? **[6]**

OR

Q2) a) List and explain significance of usability Heuristic. **[4]**

b) List and explain with example various stages of information design. **[6]**

Q3) a) Discuss the goals of user interface design. **[4]**

b) Explain the importance of "know the user" in usability process. **[6]**

OR

Q4) a) Explain "Tree Model" of system acceptability. **[4]**

b) Why is it important to perform an analysis of the financial impact of the usability on the system. **[6]**

Q5) a) Explain various usability inspection methods with example. **[8]**

b) What are various stages of usability testing? List and explain in detail. **[10]**

P.T.O.

OR

Q6) a) What are the attributes of usability performance measurement? **[8]**

b) Usability Laboratories is important part of usability testing. Explain with diagram. **[10]**

Q7) a) Explain need of 'Test goals and test plans in usability testing. **[8]**

b) What are the benefits from 'consistency and standards' to users and vendors? **[8]**

OR

Q8) a) How Interactive tutorials are useful to understand user interface? **[8]**

b) What is difference between national and international user interface? **[8]**

Q9) a) Explain in detail intelligent user interfaces. **[8]**

b) Write a short note on (Any 2) **[8]**

i) CAUSE Tools

ii) User Interface Management Systems.

iii) Ethics of Usability.

OR

Q10)a) Explain the role of user interface designer & developer. **[8]**

b) Write a short note on (Any 2) **[8]**

i) GOMS model.

ii) Organizational role and structure in usability.

iii) International graphical Interface.

Total No. of Questions : 8]

SEAT No. :

P2353

[Total No. of Pages : 2

[5254] - 686
B.E. (Information Technology) (Semester - I)
MODERN COMPILERS
(2012 Pattern) (Elective - I)

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 side indicate full makrs.*
3) *Assume suitabe data, if necessary.*

Q1) a) Draw a stack frame. Explain the concepts of static linking, display array, lambda lifting with respect to stack frame. **[6]**

b) Define Basic Block. What are the steps for converting a long sequence of statements into basic blocks? **[6]**

c) What is incremental garbage collection? Describe tricolor marking. **[8]**

OR

Q2) a) Describe tree operators for intermediate representation. **[6]**

b) What is a trace? Write the algorithm for traces generation. **[6]**

c) Explain reference counting for garbage collection. Discuss the problems with this techniques using suitable example. **[8]**

Q3) a) Explain Higher - order functions and functional programming language in brief. What are three flavors of functional programming language? **[6]**

b) Explain different techniques for optimization of lazy functional programming. **[6]**

c) Explain tail position with suitable example. Write the steps to implement tail call. **[6]**

OR

Q4) a) Define inline expansion. Explain the rules for inline expansion. **[6]**

b) Explain call-by-name and call-by-need with respect to lazy evaluation. **[6]**

c) Discuss function - types for a simple functional language with a sample program. **[6]**

P.T.O.

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) How to avoid the repeated global calculations of dataflow information? Write value-numbering algorithm to justify the same. **[8]**

b) What is reaching definitions? Write in and out definitions for reaching definitions. **[8]**

OR

Q8) a) Explain transformations using dataflow analysis with suitable examples. **[8]**

b) Explain explicit and implicit parametric polymorphism with suitable examples. **[4]**

c) Draw IR tree representation for quadruple: X = C1 * Z [i] + C2. **[4]**

Total No. of Questions : 10]

SEAT No. :

P2354

[Total No. of Pages : 3

[5254] - 687
B.E. (Information Technology) (Semester - I)
PARALLEL ALGORITHMS AND DESIGN
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) What is the difference between data-parallel computation and task-parallel computation? What is parallel efficiency? **[4]**

b) Consider the example of parallelizing bubble sort. Explain the performance analysis in serial and parallel versions. **[6]**

OR

Q2) a) Describe pyramid network processor organization for parallel computers. **[5]**

b) Write an algorithm to find minimum in parallel model using either CRCW or CREW model. **[5]**

Q3) a) Explain the term biotonic sorter, Biotonic sequence and half cleaner. **[6]**

b) What do you mean by cost optimality? What is cost of parallel algorithm? Explain time optimality. **[4]**

OR

Q4) a) Explain the Depth first search with suitable example. **[4]**

b) What do you mean by overhead function or total overhead of a parallel system, how does this effect on the performance of the parallel algorithms? **[6]**

Q5) a) Explain MESH Transpose. Write algorithm for same. **[8]**

b) Explain Conjugate Gradient Method-Sequential Algorithm. **[8]**

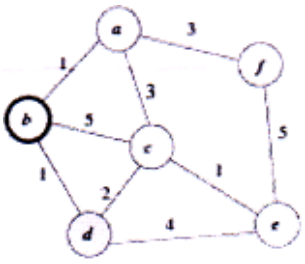
P.T.O.

OR

Q6) a) Explain eigen values. State suitable example and derive algorithm for finding eigen values. **[8]**

b) Analyse Cube connected Transpose. Check algorithm for optimality. **[8]**

Q7) a) What is MST? Solve Given problem Using Prims algorithm of parallel computing. **[10]**



b) Define BFS. Write an algorithm for BFS in parallel computing. **[8]**

OR

Q8) a) Define DFS. Write an algorithm of DFS in parallel computing. **[8]**

b) Give the visited node order for each type of graph search, starting with s, given the following adjacency **[10]**

adj(s) = [a, c, d]

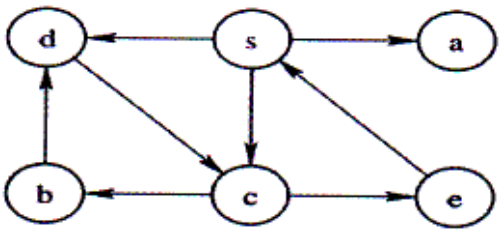
adj(a)=[],

adj(c) = [e, b],

adj(b) = [d],

adj(d) = [c],

adj(e) = [s].



Q9) a) Explain linear and non-linear pipelines stages in parallel computing? **[8]**

b) Explain the algebric method in synthesis of parallel algorithm. **[8]**

OR

Q10)a) Explain the knapsack problem with branch and bound algorithm? **[8]**

b) Describe map reduce computation in homomorphism? **[8]**

Total No. of Questions : 10]

SEAT No. :

P2355

[Total No. of Pages : 2

[5254] - 688
B.E. (I.T.) (Semester I)
CLOUD COMPUTING (Elective - I)
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***All questions are compulsory.***

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

Q1) a) Explain the benefits of paaS. **[5]**

b) Explain applications of virtualization. **[5]**

OR

Q2) a) Explain in brief how cloud helps in reducing capital expenditure. **[4]**

b) Compare KVM, Xen and HyperV. **[6]**

Q3) a) Draw and explain model for federated cloud computing. **[6]**

b) Explain Grid vs Cloud. **[4]**

OR

Q4) a) Explain the life cycle of SLA. **[6]**

b) Explain in brief following terms. **[4]**

i) Public cloud economics

ii) Vmware

Q5) a) What are the several useful implications of the fact that 'OS state is saved in file and copied & shared? **[8]**

b) Enlist & describe security risks posed by shared images **[8]**

P.T.O.

OR

Q6) a) Enlist and explain cloud security risks identified by Cloud security Alliance. **[8]**

b) Discuss four widely accepted information practices complied by Consumer Oriented commercial web sites. **[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) Write short note RFID tag. **[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 : 5]

SEAT No. :

P2356

[Total No. of Pages : 2

[5254] - 689
B.E. (Information Technology) (Semester I)
BUSINESS INTELLIGENCE (Elective - II)
(2012 Pattern)

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

Instructions to the candidates:

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

Q1) a) Describe the major components of data Warehouse. **[6]**

b) What is ETL? Explain in detail. **[4]**

OR

a) Explain various types of data modeling schemas in detail. **[6]**

b) Explain fact and Dimension table in Detail. **[4]**

Q2) a) What are the snapshots used in data warehouse design? Explain in detail. **[6]**

b) Write a short note on multi-valued dimension and dimesion attributes. **[4]**

OR

a) Write down the advantages of ROLAP and MOLAP and compare them. **[6]**

b) Explain the concept of dimension grain in brief. **[4]**

Q3) a) Explain Reporting architecture in detail with diagram. **[8]**

b) What is the difference between in-memory analytics and in-db analytics. **[7]**

OR

a) What are the various design and implementation issues of OLTP? **[8]**

b) Explain in brief about Data warehouse security. **[7]**

P.T.O.

Q4) a) What is hierarchical clustering? Name some other types of clustering techniques. **[9]**

b) Explain the concept of query rewrite with example. **[8]**

OR

a) What is business analytics? **[9]**

b) Explain the similarities and dissimilarities between Business intelligence and Business Analytics. **[8]**

Q5) a) What is Agile BI? Explain in detail. **[9]**

b) What are the different types of BI? Explain Real time BI in detail. **[9]**

OR

Write a short note on any 3 of the following (6 marks each) **[18]**

a) Netezza

b) Security in DW system.

c) PIG

d) Cloud BI

e) HIVE

Total No. of Questions : 10]

SEAT No. :

P2357

[Total No. of Pages : 2

[5254] - 690
B.E. (Information Technology)
SERVICE ORIENTED ARCHITECTURE (Elective - II)
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain the common misperceptions about SOA. **[6]**

b) Write brief notes on messaging with SOAP. **[4]**

OR

Q2) a) Enlist the pitfalls of adopting SOA. **[4]**

b) Explain in detail about service descriptions (WSDL) and it's types. **[4]**

Q3) a) Explain in detail about three different layers of abstration for SOA. **[6]**

b) Write brief notes on business activity coordinator with neat diagrams. **[4]**

OR

Q4) a) Explain in detail about coordinator service composition with activation, registration and completion process with a neat sketch. **[5]**

b) With neat diagrams, explain in detail about anatomy of the service oriented architecture. **[5]**

Q5) a) With a neat block diagram, explain in detail about step by step process of service modeling. **[8]**

b) What are the objectives of service oriented analysis? **[4]**

c) Discuss benefits of a business centric SOA. **[4]**

P.T.O.

OR

Q6) a) Explain in detail SOA delivery life cycle phases. **[8]**

b) What are the types of derived business services? **[4]**

c) Explain service modeling guidelines. **[4]**

Q7) a) Write brief notes on service oriented design process. **[8]**

b) Give the syntotical implementation of all the elements in WSDL. **[8]**

c) List out the elements that are present in the structure of a SOAP message document. **[2]**

OR

Q8) a) Explain in detail about WSDL language basics and SOAP language basics. **[8]**

b) Explain in detail about steps for composing SOA and possiple considerations for choosing service layer and for positioning core SOA standard. **[10]**

Q9) a) What is the purpose of application service design? **[8]**

Give step-by-step the process of application service design.

b) Explain briefly about WS-Coordination with coordination context, Identifier and expives elements. **[8]**

OR

Q10)a) What are the design concerns for a task-centric business service design? **[8]**

b) How are the switch, case and other wise elements used in WS-BPEL?**[8]**

Total No. of Questions : 10]

SEAT No. :

P2358

[Total No. of Pages : 3

[5254] - 691
B.E. (I.T.) (Semester I)
E&M GOVERNANCE (Elective - II)
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) What is meant by the terms front - office and back - office systems? How do front - office and back - office systems work in the context of the e-Business architecture? **[6]**

b) What are the reasons for using the internet as a basic infrastructure for e-Business? **[2]**

OR

Q2) a) What are the main business and technical e-Business challenges? Distinguish between: e- Commerce & e-Business. **[4]**

b) What is meant by strategic impact of IT? Using the three levels of strategy, explain how IT can have a strategic impact on the business. **[4]**

Q3) a) What determines program management complexity? Describe the key components of program management. **[6]**

b) What is a business process? List the seven characteristics of a business process. **[4]**

OR

Q4) a) Companies will develop inter-organizational relationships. **[6]**

i) Discuss three levels of inter-organizational relationships. Explain why these levels are important.

ii) Discuss differences of exchange of information for the three levels. Explain the similarities and differences.

iii) In addition, the time dimension (planning horizon) differs per level. Explain.

P.T.O.

b) Explain similarities and differences between the following concepts: Business unit value chain, industry value chain, supply chain, logistics. **[4]**

Q5) a) Explain how the element of trust has changed in an e-market perspective compared to a traditional market? Use the following terms in your answer. **[8]**

i) Quality of information

ii) Information security

iii) Geographic location

iv) Partnerships

b) List and explain the key advantages of an e - procurement solution. **[8]**

OR

Q6) a) Which three factors contribute to the success of e- markets? Give one example for each factor. **[8]**

b) Why are e-markets more efficient than traditional markets? What are the main functions of traditional and e - markets and explain them briefly. **[8]**

Q7) a) Explain framework for m-commerce, What are the implementation challenges in m - commerce? **[8]**

b) Write a short note on m - commerce life cycle. Discuss advantages and disadvantages of m - commerce. **[8]**

OR

Q8) a) Explain different types of mobile services in detail. **[8]**

b) What are the opportunities provided by www to business? State limitations of website marketing. **[8]**

Q9) a) Discuss the five major m - commerce applications, and provide a specific example of how each application can benefit a business. **[6]**

b) Discuss how m - commerce can expand the reach of e - business. **[6]**

c) What are various mobile commerce services for consumer? Explain. **[8]**

OR

Q10)a) Discuss advantages and disadvantages of m - commerce. **[6]**

b) Explain critical factors responsible for success of m - commerce. **[6]**

c) The mobile devices of the future will be more powerful, less heavy, and comprise new interfaces to the user and to new networks. Describe the special technologies used in m - commerce. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2359

[Total No. of Pages : 2

[5254] - 692
B.E. (Information Technology) (Semester - I)
GEO INFORMATICS SYSTEM (Elective - II)
(2012 Pattern)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) What are the applications of remote sensing. **[5]**

b) Explain GIS categories. **[5]**

OR

Q2) a) Explain Basic elements of Image interpretation. **[5]**

b) List and explain any 2 basic character of digital images. **[5]**

Q3) a) Write short note on SAR. **[5]**

b) Explain the Radar principle. **[5]**

OR

Q4) a) Explain basic elements of Image Interpretation. **[5]**

b) Explain spatial filtering. **[5]**

Q5) a) Explain Geo matric transformation in detail. **[8]**

b) Explain types of errors. **[8]**

OR

Q6) a) Describe attribute data in GIS. **[8]**

b) List sources of errors in GIS and explain the same. **[8]**

P.T.O.

Q7) a) Explain basic elements of GIS modeling. **[10]**

b) Differentiate between Vector and Raster data. **[8]**

OR

Q8) a) Explain types of data queries. **[6]**

b) Explain binary and Index model. **[6]**

c) Explain buffering and overlay. **[6]**

Q9) a) Explain components of ITS and its architecture. **[8]**

b) List urban and municipal applications. **[8]**

OR

Q10)a) Explain Geospatial database design methodology. **[8]**

b) Explain GIS can be used for vehical routing & scheduling by municipal corporation. Assume suitable data. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2360

[Total No. of Pages : 2

[5254] - 693
B.E. (I.T.)
NATURAL LANGUAGE PROCESSING (Elective - II)
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve any 1 out of Q1 or Q2 and any 1 out of Q3 or Q4 and***
2) ***Solve and 1 out of Q5 or Q6 and any 1 out of Q7 or Q8 and any 1 out of Q9 or Q10.***
3) ***Draw neat diagrams and assume suitable data wherever necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) State and explain applications of Natural Language processing. **[5]**

b) Describe syntactic and semantic level of language understanding in natural language processing. **[5]**

OR

Q2) a) Draw and explain flow of information in natural language understanding system. **[5]**

b) What is augmented grammar? **[5]**

Q3) Explain basic feature systems for English with an example. **[10]**

OR

Q4) Describe top - down chart parsing algorithm with example. **[10]**

Q5) a) Explain verbs and states in logical form. **[8]**

b) Describe estimating probabilities for part of speech tagging. **[8]**

OR

Q6) a) Draw and explain shift - reduce parsing in natural language processing. **[8]**

b) Describe a simple context dependent best first parser. **[8]**

P.T.O.

Q7) a) Explain probabilistic context - free grammar. **[8]**

b) Explain the human preferences in encoding uncertainty during parsing. **[8]**

OR

Q8) a) Explain the role of ontology in natural language processing. **[8]**

b) Explain word senses and ambiguity in natural language processing. **[8]**

Q9) a) Describe application of natural language processing in information extraction. **[9]**

b) Describe the challenges in the automatic machine translation problem. **[9]**

OR

Q10)a) Explain natural language processing techniques used in speech processing. **[9]**

b) How is natural language processing useful in semantic web search? **[9]**

Total No. of Questions : 10]

SEAT No. :

P2361

[Total No. of Pages : 3

[5254] - 694
B.E. (I.T.) (Semester - II)
DISTRIBUTED SYSTEM
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***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) The INFO service manages a potentially very large set of resources, each of which can be accessed by users throughout the Internet by means of a key (a string name). Discuss an approach to the design of the names of the resources that achieves the minimum loss of performance as the number of resources in the service increases. Suggest how the INFO service can be implemented so as to avoid performance bottlenecks when the number of users becomes very large. **[4]**

OR

Q2) a) List the three main software components that may fail when a client process invokes a method in a server object, giving an example of a failure in each case. To what extent are these failures independent of one another? Suggest how the components can be made of tolerate one another's failures. **[6]**

b) Give examples of applications where the use of mobile code is beneficial. **[4]**

Q3) a) Assume a client calls an asynchronous RPC to a server, and subsequently waits until the server returns a result using another asynchronous RPC. Is this approach the same as letting the client execute a normal RPC? What if we replace the asynchronous RPCs with asynchronous RPCs? **[4]**

P.T.O.

b) What is Interprocess communication? What are the characteristics of inter - process communication. Discuss about Java API for Internet addresses. **[6]**

OR

Q4) a) What is Socket? Explain the general pattern followed by a client and server for connection - oriented communication using sockets with neat diagram. **[4]**

b) Explain RMI software with respect to: **[6]**

i) Proxy

ii) Dispatcher

iii) Skeleton

Q5) a) What are three alternative approaches to external data representation and marshalling. Explain CORBA's Common Data Representation (CDR).**[8]**

b) What are two most important styles of middleware in use today? Discuss the issues with Object-oriented middleware. **[8]**

OR

Q6) a) What are Web Services? What are the Features of Web Services? Explain in brief, the various components of Web Service. **[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) Explain the concept of Scaling and Filtering in Stream Adaptation. **[8]**

OR

Q8) a) Explain the QoS Manager's subtasks and Responsibilities in the form of flowchart. **[8]**

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) Explain the following three important design issues that need to be taken into account when implementing general - purpose security services. **[9]**

i) Focus of control

ii) Layering of security mechanisms

iii) Simplicity

OR

Q10)a) What do you meant by public - key Cryptography? Explain Digital signatures with public keys. **[8]**

b) What are the Distributed File System requirements and potential pitfalls in the design of distributed services of distributed file systems. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2362

[Total No. of Pages : 2

[5254] - 695
B.E. (I.T.) (Semester - II)
ADVANCED DATABASES
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
2) *Figures to the right indicate full marks.*

Q1) a) Explain data replication in distributed DBMS? What is the difference between synchronous and asynchronous replication? **[4]**

b) What is DTD? Explain example of DTD for any XML document? **[6]**

OR

Q2) a) Explain main architectures for building parallel database system? **[6]**

b) What is data transparency? Explain different types of transparencies distributed databases should achieve? **[4]**

Q3) a) What are the similarities and differences between OODBMS and ORDBMS? **[6]**

b) Explain the replication strategy in Cassandra? **[4]**

OR

Q4) a) List and explain the four elements of Big data? **[4]**

b) Explain different methods of storing data in distributed database system in detail? **[4]**

c) Explain structured and unstructured data in object based databases? **[2]**

Q5) a) Explain in details apriori graph based approach for frequent subgraph mining? **[8]**

b) What is Data stream mining? Explain how data stream management system works? **[8]**

P.T.O.

OR

Q6) a) How stream classification performed? Explain any one method of stream classification? **[10]**

b) Explain relevance of big data and data analysis in E - commerce industry? **[6]**

Q7) a) What is text categorization? Which are various text categorization methods? Explain any one text categorization method in details. **[10]**

b) What is natural language processing (NLP)? Which are the tasks involved in NLP? **[8]**

OR

Q8) a) Explain recommender system? Which are the problems associated with recommender system? **[10]**

b) Explain in detail web usage mining and web content mining. **[8]**

Q9) a) Define temporal databases? Explain different types of temporal databases? Enlist the any two aplication of temporal databases? **[8]**

b) Explain the following **[8]**

i) Multimedia databases

ii) Cloud databases.

OR

Q10)a) Explain in details spatial data and spatial databases? Explain various application of spatial database? **[8]**

b) Define deductive databases? Explain various semantics of deductive databases? **[8]**

Total No. of Questions : 10]

SEAT No. :

P2363

[Total No. of Pages : 2

[5254] - 696
B.E. (I.T.) (Semester - II)
MOBILE COMPUTING (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) *Figures to the right indicate full marks.*

Q1) a) Describe various generation of network. **[4]**

b) Explain PCS Architecture with diagram. **[5]**

OR

Q2) a) If the user enters from Network A to Network B, how location is updated in GSM Architecture? Explain with diagram. **[4]**

b) Draw and explain mobile computing architecture. **[5]**

Q3) a) Explain in detail Network switching subsystem available in GSM architecture. Explain their functionality. **[5]**

b) Explain the VLR overflow control and alorithm OI - Registration. **[5]**

OR

Q4) a) Explain any 4 address identifiers in GSM architecture. **[5]**

b) Explain SMS architecture with diagram. **[5]**

Q5) a) Draw GPRS Architecture with interfaces and Explain. **[9]**

b) Draw diagram of WAP protocol stack in detail and Explain wireless Transport layer security. **[8]**

OR

Q6) a) Explain WAP Architecture with diagram. **[9]**

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

P.T.O.

Q7) a) Which are the key criteria used for determining mobile application architecture? **[9]**

b) Draw phases of mobile application development and explain any 3. **[8]**

OR

Q8) a) List down the various phases required for Client Development Process and explain in detail. **[9]**

b) Explain wireless Internet architecture and give advantages of same. **[8]**

Q9) a) Describe android OS architecture specific to role of Application framework and dalvik VM. **[9]**

b) Elaborate the challenges in Usability testing of mobile Applications. **[8]**

OR

Q10)a) What is the meaning of performance, Scalability, modifiability and availability. Explain w.r.t. mobile applications. **[9]**

b) Explain user interface design principles for mobile applications. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2364

[Total No. of Pages : 2

[5254] - 697
B.E. (I.T.) End Sem.
ADVANCED GRAPHICS AND ANIMATION
(2012 Pattern) (Elective - III)

Time :2:30 hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain different 3D display methods. **[5]**

b) Define B - Spline surface. Which are the properties of B - Spline surface? **[5]**

OR

Q2) a) Explain the following quadratic surfaces **[5]**

Paraboloids

Cones

b) Discuss about the spatial partitioning Representations and Octree Representations. **[5]**

Q3) a) Write a short note on: **[5]**

Sweeping Representation.

b) Explain texture mapping with example. **[5]**

OR

Q4) a) Which are the different methods of shading? Explain any one in detail. **[5]**

b) Illustrate "Basic Ray tracing Algorithm". **[5]**

Q5) a) Explain Open GL drawing primitives **[8]**

b) List and explain the libraries used in the OpenGL. **[8]**

P.T.O.

OR

Q6) a) Explain phong lightning with suitable example with respect to OpenGL. **[8]**

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

i) GLUT

ii) Open GL primitives.

Q7) a) List and explain various animation functions. **[8]**

b) Compare conventional and Computer assisted animation. **[8]**

OR

Q8) a) Which are the basic rules of animation? Explain with suitable example. **[8]**

b) Why control hierarchy is required in animation? Explain various methods of controlling animation. **[8]**

Q9) a) Explain the concept of collision detection and concept of surface deformation in case of physical modeling in virtual reality. **[8]**

b) What is meant by virtual reality? Describe any two VR architecture with neat diagram. **[10]**

OR

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

Omegalib

b) Explain the various applications of virtual reality in the field of medicine. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2365

[Total No. of Pages : 2

[5254] - 698
B.E. (Information Technology)
INFORMATION STORAGE AND RETRIEVAL (Elective - III)
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write difference between Data retrieval and information Retrieval. Define Index term. **[5]**

b) Explain single Pass algorithm. **[5]**

OR

Q2) a) Explain storage technique of Inverted file structure with example. **[6]**

b) Explain the term Harmonic mean, E - measure, R - precision, and precision histogram. **[4]**

Q3) a) What is ontology? How information is shared on ontology? **[5]**

b) Explain the trade - off between precision and recall. **[5]**

OR

Q4) a) Explain vector model in detail. **[5]**

b) Explain the two ways of serial search retrieval using matching function. **[5]**

Q5) a) Explain physical and logical document partitioning. **[8]**

b) What is meant by multimedia IR? What is the difference between traditional IR and multimedia IR? What are the goals and challenges in multimedia IR? **[8]**

P.T.O.

OR

Q6) a) Explain data models used for Multimedia IR. **[8]**

b) Explain GEMINI for two dimensional color image. **[8]**

Q7) a) What are crawlers? Explain centralized architecture and Harvest architecture. **[8]**

b) What are the processing steps in crawler? **[6]**

c) What is robo exclusion? Explain robot.txt. **[4]**

OR

Q8) a) Discuss challenges involved in web searching. **[10]**

b) Write a note on: characterizing the web. **[8]**

Q9) a) What is content based recommendation? **[8]**

b) Explain the method for extracting data from text. **[8]**

OR

Q10)a) Define Recommender System? Explain in brief collaborative filtering. **[8]**

b) Explain the concept of semantic web. How it is useful in web searching? **[8]**

Total No. of Questions : 10]

SEAT No. :

P2366

[Total No. of Pages : 2

[5254] - 699
B.E. (Information Technology)(Semester - II)
IT ENABLED SERVICES (Elective - III)
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Describe IT Application strategy in brief. **[6]**

b) Enlist Stages of IT Strategy development and implementation. **[2]**

OR

Q2) a) Discuss three important factors of framework of business and IT alignment. **[6]**

b) Draw figure of Three levels of Business & IT alignment. **[2]**

Q3) a) What is Critical Success factor? Explain. **[6]**

b) What is EITA? What are the components and sub components of EITA? **[6]**

OR

Q4) a) Which are the best practices of achieving good SITP? Explain in brief. **[6]**

b) Explain following terms with reference to EITA. **[6]**

i) Business use case model.

ii) Logical data model.

iii) State time model.

P.T.O.

Q5) a) Describe service level management (SLM) in brief. **[8]**

b) Explain capacity management process. **[8]**

OR

Q6) a) What is IT service continuity management (ITSCM)? Which are the measures for quick restoration from risk through ITSCM? **[8]**

b) Describe in brief IT Management Layers and Considerations for Outsourcing. **[8]**

Q7) a) Write a HTML program 'new.html' to design form to input Name and email ID. Display the same information through PHP program 'welcome.php'. Use method 'POST'. **[8]**

b) Write short note on 'PHP session'. **[8]**

OR

Q8) a) Write a program in PHP to sort an array of names in descending order. **[8]**

b) Explain 'how the exception is handled in PHP' stating proper example. **[8]**

Q9) a) Explain 'Google' considering different aspects of ITES. **[9]**

b) What are the roles of International bodies in facilitating Trend in ITES? **[9]**

OR

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

b) Write short note on 'Outlook of IT and IT Industry'. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2367

[Total No. of Pages : 2

[5254] - 700
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 diagram must be drawn whenever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain networking principle along with its architecture. **[6]**

b) Compare Internet protocol over ATM. **[4]**

OR

Q2) a) Explain various services provided by ISDN. **[6]**

b) How routing is done when host are mobile? **[4]**

Q3) a) How packets are transmitted in virtual circuit network? **[6]**

b) Draw the architecture of Bluetooth. **[4]**

OR

Q4) a) Explain WDM system for optical networks. **[6]**

b) List various delays in ATM networks. **[4]**

Q5) a) Explain in detail source based congestion avoidance. **[10]**

b) Explain in detail IP switching. **[8]**

OR

Q6) a) What is presentation formatting? Explain External Data Representation (XDR) with suitable example. **[10]**

b) What do you mean by congestion control? What are components of TCP congestion control? **[8]**

P.T.O.

Q7) a) Explain operations of Mobile IP. **[8]**

b) How neighbors are discovered in routing? **[8]**

OR

Q8) a) Explain the operation of MPLS in detail. **[8]**

b) What are the challenges of traffic engineering in IP/MPLS network? **[8]**

Q9) a) Draw and explain basic architectural stack of IEEE 802.16. **[8]**

b) Explain DSDV protocol for Adhoc wireless networks. **[8]**

OR

Q10)a) Explain in detail MAC implementation of IEEE 802.16 **[8]**

b) Describe different issues related to Adhoc wireless networks. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2368

[Total No. of Pages : 2

[5254] - 700-A
B.E. (Information Technology) (Semester - II)
BIOINFORMATICS (Elective - IV)
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Full marks for right and well labeled diagram.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is the scope of bioinformatics? Discuss challenges of bioinformatics. **[5]**

b) Enlist biological database? Give an example of database. **[5]**

OR

Q2) a) What is Baye's rule? Explain any two limitations of Baye's Theorem. **[5]**

b) Write a structure visualization tools available on web. **[5]**

Q3) a) What is Data mining? Explain data mining applications in genomic sequences. **[5]**

b) What is the role of microarray in bioinformatics? **[5]**

OR

Q4) Explain methods of computational sequence alignment.

a) Dynamic programming **[5]**

b) Dot matrix methods **[5]**

Q5) a) Write about the impact of drug discovery process in business management. **[8]**

b) What are the component of modeling and simulation system. **[8]**

P.T.O.

OR

Q6) a) Discuss the issues of collaboration in bioinformatics. **[8]**

b) What is pattern matching? Discuss different methods of pattern matching. **[8]**

Q7) a) Enlist different bioinformatics tools. Explain any one in brief. **[8]**

b) Explain FASTA algorithm in detail with neat diagrams. **[8]**

OR

Q8) a) Explain i) GAP penalty ii) E- Value iii) Dot plots with respect to BLAST. **[8]**

b) Explain the ralative merits of BLAST And FASTA in Database similarity Searches. **[8]**

Q9) a) What is modern biotechnology? What is biotechnology in agriculture? **[6]**

b) What is GE? What is GMO (Genetically modified organism) **[6]**

c) Write about dangers of genetic Engineering. **[6]**

OR

Q10)a) Define Biotechnology. What is the significance of environmental Biotechnology. **[8]**

b) Explain various applications of genetic engineering. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2369

[Total No. of Pages : 2

[5254] - 700-C
B.E. (Information Technology) (Semester - II)
GREEN IT - PRINCIPLES AND PRACTICES (Elective - IV)
(2012 Pattern)

Time :2:30 hours] *[Max. Marks :70*

Instructions to the candidates:

1) *Asnswer 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 do you infer the term green IT. Describe The Organization for Economic Co- operation and Development framework for Green IT. **[7]**

b) Explain the life cycle of hardware. How would you identify measures to readuce.Environmental impact at every stage of life cycle. **[7]**

OR

Q2) a) Briefly describe climate change, global warming, greenhouse gases and the greenhouse effect. **[7]**

b) What are some programming methods used to achieve computational efficiency? **[7]**

Q3) a) What are the energy challenges associated with data centers. **[6]**

b) Why it is necessary to include software development and maintenance as part of an organization's green IT strategy? **[8]**

OR

Q4) a) Describe the key facilities and IT components within data centers. **[6]**

b) How would you evaluate sustainability performance of a software system. **[8]**

Q5) a) Classify the evolving nature of green IT strategies of an organizations with respect to time **[7]**

b) Explain the steps for developing a green IT strategy. **[7]**

P.T.O.

OR

Q6) a) List the business driver for green IT strategies? What inference can you make from these? **[7]**

b) How product life cycle assessment is useful in analyzing environmental impacts of all the stages in product development? **[7]**

Q7) a) What are the requirements of sustainable IT development? **[7]**

b) Which key technologies are to be considered for developing sustainable IT strategic plan. **[7]**

OR

Q8) a) How according to you Sustainable Information Technology Services (SITS) dimensions are related to green IT? **[7]**

b) What are the sustainable IT strategic - planning road map elements? **[7]**

Q9) a) What do you think would happen if more IT manufacturers were included in the Greenpeace Greener Electronics study? **[7]**

b) How would perform risk assessment of an information system. **[7]**

OR

Q10)a) What is the difference between strategic thinking and strategic planning?**[7]**

b) What is enterprise architecture planning and how it is different from strategic planning. **[7]**

Total No. of Questions : 10]

SEAT No. :

P2370

[Total No. of Pages : 2

[5254] - 700-D
B.E. (I.T.)
INTERNET OF THINGS (Elective - IV)
(2012 Pattern)

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

Instructions to the candidates:

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

Q1) a) Explain Overview and Motivation for Internet of Things. **[6]**

b) Discuss area of development and standardization in Internet of Things. **[4]**

OR

Q2) a) Discuss any two example of Internet of Things. **[6]**

b) What types of things get connected in IoT? **[4]**

Q3) a) Explain security and QoS for WSN **[6]**

b) Explain the working principle of RFID **[4]**

OR

Q4) a) What is RFID? Discuss various types of RFID **[6]**

b) Write short note on WSN. **[4]**

Q5) a) Explain in detail design guidelines for Internet of Things. **[8]**

b) Explain in detail Software Agents for Object Representation and Data Synchronization for IoT. **[10]**

OR

Q6) a) What is clustering? Explain in detail clustering in Internet of Things. **[8]**

b) Explain in detail user - centric identity management, device centric identity management. **[10]**

P.T.O.

Q7) a) What is threat analysis in Internet of Things? Explain in detail with examples. **[10]**

b) What is vulnerabilities of Internet of things? Explain in detail. **[8]**

OR

Q8) a) Why security required in IoT? Explain in detail various security model in Internet of Things. **[10]**

b) Explain in detail security tomography and layered attacker model in Internet of Things. **[8]**

Q9) a) What are advanatages of business model scenario for Internet of Things. Explain in detail business model scenario for Internet of Things. **[8]**

b) Explain in detail value creation in Internet of Things. **[6]**

OR

Q10)a) What is smart metering? Explain in detail Advanced Metering Infrastructure of Internet of things. **[6]**

b) Explain in detail how Internet of things is used in automotive applications and smart cards. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2371

[Total No. of Pages : 3

[5254] - 701
B.E. (Chemical) (End Sem.)
PROCESS DYNAMICS AND CONTROL
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) Derive the transfer function of two interacting liquid tanks system from first principles. **[10]**

OR

Q2) A thermometer having first - order dynamics with a time constant of 1 min is placed in a temperature bath at 100°F. After the thermometer reaches steady state, it is suddenly placed in a bath at 110°F at t = 0 and left there for 1 min, after which it is immediately returned to the bath at 100°F. **[10]**

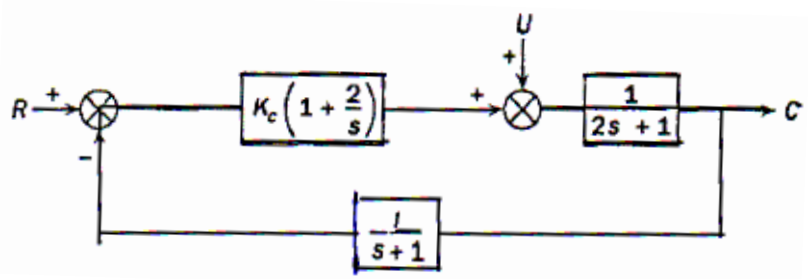
a) Draw a sketch showing the variation of the thermometer reading with time.

b) Calculate the thermometer reading at t = 0.5 min and at t= 2.0 min.

Q3) a) Write the characteristic equation for the control system shown in the following figure. **[10]**

b) Use the Routh Test to determine if the system is stable for $K_c = 4$.

c) Determine the ultimate value of K_c above which the system is unstable.



P.T.O.

OR

Q4) a) Sketch the root loci for following equation $1+\frac{K}{(2s+1)}=0$ **[5]**

b) Write a short note on any one **[5]**

i) Time integral performance criteria by IAE

ii) Time integral performance criteria by ITAE

Q5) a) Draw bode plots for $G(s)=\frac{s-1}{(10s+1)(0.1s+1)}$.Comment on its stability. **[8]**

b) Describe in details Bode stability criterion. What are gain margins and phase margins? **[8]**

OR

Q6) a) Draw Bode plots for $G(s)=\frac{s+1}{(s+1)(0.1s+1)^3}$. Comment on its stability. **[8]**

b) Describe and draw Bode plots for a second order system. **[8]**

Q7) a) Describe model adaptive control scheme in details. Also describe its use in any chemical process control. **[8]**

b) What is an inferential control? Draw a general structure and describe an inferential control scheme. **[8]**

OR

Q8) a) Describe scheduled/ Predictive adaptive control scheme in details. Also describe its use in any chemical process control. **[8]**

b) Describe a self tuning regulator in details. Also describe its use in any chemical process control. **[8]**

Q9) a) Which type of hardware is used to convert continuous to discrete signals? Describe its functioning. **[9]**

b) What are the types of programmable Logic controllers? Describe its use in the control loop. **[9]**

OR

Q10)a) Describe only typical hardware components used in a control loop. **[9]**

b) What are hold elements? How they influence the control action in a running plant? **[9]**

Total No. of Questions : 10]

SEAT No. :

P2372

[Total No. of Pages : 2

[5254] - 702
B.E. (Chemical) (Semester - I)
CHEMICAL REACTION ENGINEERING - II
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) For fluid particle reactions, derive an expression for time - conversion relationship in case of small size particles in Stokes regime. **[10]**

OR

Q2) Explain the various kinetic regimes for mass transfer and reaction in fluid - fluid reactions. Also explain the general kinetic equation and significance of Enhancement factor. **[10]**

Q3) Explain the catalyst poisoning and the types of catalyst poisoning in detail.**[10]**

OR

Q4) We plan to run the isomerization of $A \rightarrow R$ in a Packed bed reactor (Pure feed A, FA0 = 5 Kmol / hr, W = 1 ton catalyst, T = 730 K and π = 3 atm). The catalyst deactivates so we plan to run for 120 days and then regenerate the catalyst. Find the mean conversion on a 120 day run. The rate of reaction is given by - $r_A = k_l C_A^2 a = 0.2\ C_A^2 a$ mol / Kg Cat.hr and the deactivation rate is given by - $da/dt = 10^{-3}\ (C_A + C_R)\ a\ day^{-1}$. Calculate Conversion at start of reaction, at the end of the run and mean conversion for 120 days. **[10]**

Q5) Derive an expression for Effectiveness factor for a cylindrical catalyst particle. Also explain the testing method of pore resistance in porous catalyst. **[18]**

P.T.O.

OR

Q6) Explain the product distribution in case of reactions in series and also for the decomposition of a reactant in two paths. **[18]**

Q7) Ethanol can be produced by catalytic vapour phase hydration of ethylene at 135 atm and 573 k. C_2H_4 (A) + H_2O (B) $\leftrightarrow$ C_2H_5OH (R). The rate expression is given by - $r^1 = 0.018k_Ak_B (P_AP_B - P_R/K) / (1 + k_AP_A + k_BP_B)^2$ mol / g cat. hr where $k_A = k_B = 0.003$. The equilibrium constant is given by RT 1n K = 30T - 9730 where R = 1.987 Ca1 / (mol. K). The total flow rate to the plug flow reactor is 10 Kg / hr with equal amounts of ethylene and steam. Calculate the amount of catalyst required for 27% conversion of ethylene. **[16]**

OR

Q8) 1 m^3/hr of gas containing A (C_{AO} = 2 mol / m^3) is fed to a PFR with recycle loop (0.02 m^3 loop volume, 3 Kg catalyst) and the composition of the exit stream from the reactor system is 0.5 mol A /m^3. Find the rate equation for the decomposition of A for **[16]**

i) Very large recycle, A $\rightarrow$ 3R, n = 2 and feed contains 50% A and 50% inerts

ii) Very large recycle, A $\rightarrow$ 3R, n =1 and feed contains 50% A and 50% inerts

iii) Very large recycle, A $\rightarrow$ R, n = 1/2

Q9) Derive the M-M kinetics and how to evaluate the constants k_3 and C_M for a mixed flow fermenter. Explain the Eadie plot and lineweaver plot. **[16]**

OR

Q10)a) Differentiate between fixed bed reactors and fluidized bed reactors. **[6]**

b) Explain in detail design of staged adiabatic reactor **[10]**

Total No. of Questions : 10]

SEAT No. :

P2373

[Total No. of Pages : 3

[5254] - 703
B.E. (Chemical) (End Sem.)
CHEMICAL ENGINEERING DESIGN - II
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, 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) Find the overall efficiency of a column for the system given below. Using O'Connel's correlation. Give the relevant equation. **[5]**

Component	Mole Fraction	Viscosity mNs/m^2
propane	0.30	0.03
i-butane	0.20	0.12
i-pentane	0.10	0.14
n-butane	0.15	0.12
n-pentane	0.25	0.14

b) Describe the various plate areas. **[5]**

OR

Q2) a) What are the different types of supports used for packings in a packed column? What are their desirable characteristics? **[5]**

b) What is the function of hold down plates in a packed column? How is wetting rate calculated? What is the effect of wetting rate on the design of a packed column? **[5]**

Q3) a) Derive the equation for pipeline design based on fluid dynamic parameter for any one case. **[5]**

b) What are the considerations in restriction orifice sizing? **[5]**

P.T.O.

OR

Q4) a) What are the design considerations for piping used at very high temperature? **[4]**

b) Compare the design considerations for a pipeline for compressible and non-compressible fluids. **[6]**

Q5) a) Give the relevant equations and detailed considerations for pipelines used for crude oil. **[8]**

b) What are the considerations for selection of appropriate piping material? **[6]**

c) Calculate the optimum pipe diameter of a pipeline to be used for transportation of water at the rate of 2 kg/s. Take density of water as 995 kg/m^3 and MOC of pipeline as carbon steel. **[4]**

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 is the effect of soil condition if a pipeline is to be lain underground? **[4]**

Q7) a) What are the non - steam heating systems commonly used in chemical industries? Explain in detail. **[6]**

b) How can scaling be prevented in boilers? **[6]**

c) What is the function of a gasket? What are the desirable properties of a gasket material? **[4]**

OR

Q8) a) Natural gas with a specific gravity of 1.2 at 143000 kPa and 45°C is blown down to 100000 kPa. The flow rate could be from 95m^3/day to 35 m^3/day. The drop through the pressure reducing regulator is 3100kPa leaving 1000 kPa for the pipe. The pipe length is 140m upstream of the regulator and 8.7 m downstream. Determine the upstream and downstream pipe sizes. Molecular weight of gas = 29, $\Psi = 0.6$. **[8]**

b) List out all the parameters to be considered during design of natural gas pipeline. **[8]**

Q9) a) What are flame arresters? Explain their functioning in detail. **[8]**

b) What is meant by predictive maintenance? Explain in detail with example. **[8]**

OR

Q10)a) Write in detail about maintenance of industrial piping. **[8]**

b) What preventive/safety measures are mandatory when handling explosive chemicals? **[8]**

Total No. of Questions : 10]

SEAT No. :

P2374

[Total No. of Pages : 2

[5254] - 704
B.E. (Chemical)
ENVIRONMENTAL ENGINEERING
(2012 Pattern) (Elective - I)

Time :2 ½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answers 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 impact of population growth on environment. **[10]**

OR

Q2) Discuss the environmental impact of Nuclear energy with example. **[10]**

Q3) Discuss the Effects of Air Pollutants on vegetation. **[10]**

OR

Q4) Draw neat figure of Cyclone Separator. Explain its working and advantages. **[10]**

Q5) Discuss the types of water pollutants, their sources and effects. **[16]**

OR

Q6) What is BOD? Discuss the significance of BOD. **[16]**

Q7) Discuss the Primary wastewater treatment in detail and explain grit removal with neat figure and its working. **[18]**

OR

Q8) Explain the Trickling Filter Process in detail with neat figure and its working. **[18]**

P.T.O.

Q9) Explain a Photo catalytic reactor for the treatment of wastewater. **[16]**

OR

Q10) Write Short notes on **[16]**

a) Sanitary Land filling

b) Incineration.

Total No. of Questions : 10]

SEAT No. :

P2375

[Total No. of Pages : 2

[5254] - 705
B.E. (Chemical)
MEMBRANE TECHNOLOGY
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Define following terms. **[4]**

i) Membrane, ii) volume flux, iii) retention, iv) separation factor.

b) What are the various types of membranes? Explain any one in detail. **[6]**

OR

Q2) a) Explain solution diffusion theory in case of reverse osmosis. **[5]**

b) What are the various types of membrane materials? Explain with various responsible factors. **[5]**

Q3) Explain in detail the phase inversion method of membrane preparation. **[10]**

OR

Q4) Discuss in detail the spiral wound membrane module with schematic diagram. **[10]**

Q5) a) Differentiate membrane fouling and concentration polarization with suitable examples. **[6]**

b) Explain gel layer model in detail with all governing equations. **[10]**

OR

Q6) a) Explain various method to reduce membrane fouling with suitable examples. **[8]**

b) Explain osmotic pressure model in detail. **[8]**

P.T.O.

Q7) a) Consider a situation like, you have availability of abundant sea water around you and that water need to convert into drinkable water. You are suppose to use any membrane based process to do this. What will be your choice from available membrane based processes? What parameters you will consider for selection of a particular process? **[8]**

b) Explain the nanofiltration membrane with its pore size range and applications. **[8]**

OR

Q8) a) In dairy industry, it is expected to recover proteins from whey. What membrane process you will suggest for this operation and why? Explain with all factors responsible for selection of suitable membrane process. **[8]**

b) Explain in detail sterile filtration of pharmaceuticals. **[8]**

Q9) a) What do you mean by membrane selectivity in case of gas separation applications? Explain with suitable example. **[9]**

b) Explain in detail Thermally - driven membrane processes. **[9]**

OR

Q10)a) Discuss in detail the process of pervaporation. **[9]**

b) Explain in detail electrically driven membrane processes. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2376

[Total No. of Pages : 2

[5254] - 706
B.E. (Chemical)
CORROSION ENGINEERING (Elective - I)
(2012 Pattern)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.No.1 or 2, Q.No.3 or 4, Q.No.5 or 6, Q.No.7 or 8, Q.No.9 or 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide ruler, Mollier Charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define the term corrosion and differentiate it from erosion. **[5]**

b) How much rust (Fe_2O_3,H_2O) will be formed when 1 kg iron completely rusted. **[5]**

OR

Q2) a) Discuss the different types of corrosion that we commonly come across. **[5]**

b) Explain differential aeration corrosion. **[5]**

Q3) a) Explain the two important factors that influence the corrosion of metals? **[5]**

b) Mention the theories of corrosion and explain any one of them. **[5]**

OR

Q4) a) Distinguish between wet and dry corrosion. **[5]**

b) What are the differences between EMF and Galvanic series. **[5]**

Q5) a) How does the corrosion product influence further corrosion. **[8]**

b) What are the factors that influence corrosion. **[8]**

OR

Q6) a) Explain electrochemical theory of corrosion with suitable example. **[8]**

b) Explain the control of corrosion by the use of sacrificial anode. **[8]**

P.T.O.

Q7) Write note on **[16]**

a) Pilling - Bedworth rule

b) Galvanic corrosion

c) Concentration cell corrosion

OR

Q8) Write note on **[16]**

a) Passivity

b) Inter - granular corrosion

Q9) a) Discuss about the use of inhibitors in corrosion control. **[9]**

b) Explain the process of electroplating with a suitable example. Mention the uses of electroplating. **[9]**

OR

Q10)a) Discuss various methods of corrosion control. **[9]**

b) Give difference between galvanizing and tinning. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2377

[Total No. of Pages : 2

[5254] - 707
B.E. (Chemical Engineering)
PETROLEUM REFINING (Elective - I)
(2012 Pattern)

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

Instructions to the candidates:

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

Q1) a) Explain the process of formation of oil and gas. **[6]**

b) Describe properties of diesel fuels. **[4]**

OR

Q2) a) Explain the extraction of LPG from natural gas. **[6]**

b) Give the composition of LPG. **[4]**

Q3) a) Explain atmospheric distillation of crude oil with flow diagram. **[6]**

b) Describe pre-refining operations. **[4]**

OR

Q4) a) Explain thermal cracking with suitable reactions. **[5]**

b) Describe various process variables for de-asphalting process. **[5]**

Q5) a) Explain Fluidized catalytic cracking with the help of flow diagram. **[10]**

b) Explain in detail, any one method for de-waxing of lube oil. **[7]**

OR

Q6) a) With the help of flow diagram, explain removal of sulphur from sour gas. **[10]**

b) Explain with the help of flow diagram, continuous air blowing process to manufacture bitumen. **[7]**

P.T.O.

Q7) a) Discuss in detail blending of gasoline outlining different blending methods. **[10]**

b) Explain impact of refinery processes and operations on health, safety and environment. **[7]**

OR

Q8) a) What are different air pollutants emitted by petroleum refinery. How are they treated to decrease impact on environment? **[10]**

b) What safety aspects are practiced in crude oil refineries? Explain in brief. **[7]**

Q9) a) Explain various methods used for storage of petroleum products. **[8]**

b) Discuss various strategies for marketing petroleum products. **[8]**

OR

Q10)a) Describe in detail transportation of petroleum products in India. **[8]**

b) Explain the effect of additives on quality of refinery products. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3962

[Total No. of Pages : 2

[5254]-708

B.E. (Chemical)

CHEMICAL PROCESS SYNTHESIS

(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain different approaches to overall process design with advantages and disadvantages. **[5]**

b) Explain hierarchy of chemical process design. **[5]**

OR

Q2) Mention different types of reaction systems and discuss any two with examples. **[10]**

Q3) Explain the role of temperature and pressure during the choice of reactor. **[10]**

OR

Q4) a) Explain the concept of simulation and optimization of flow sheet structure with the help of heat exchanger network. **[5]**

b) Discuss the foremost cases where distillation is not well suited for the separation. **[5]**

Q5) a) Discuss thermal coupling of the prefractionator arrangement. **[8]**

b) Explain distillation sequencing for 5 component system with appropriate diagram. **[8]**

OR

Q6) a) Discuss heuristic used for the sequence- selection for simple distillation columns. **[8]**

b) Discuss optimization of a reducible structure. **[8]**

P.T.O.

Q7) a) Explain heat recovery problem with one hot and one cold stream with suitable example. **[8]**

b) What is integration of heat pumps. **[8]**

OR

Q8) a) Explain Threshold Problems in exchanger network. **[8]**

b) Write note on Utility selection. **[8]**

Q9) a) Explain various types of explosion hazard. **[9]**

b) Explain schematically servo reaction system. **[9]**

OR

Q10) Write short note on :

a) Hazard triangle. **[9]**

b) Toxic release from process. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3963

[Total No. of Pages : 2

[5254]-709

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

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

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

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Attempt Q1 or Q2,Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q1O.***

Q1) Write distinguishing points between. **[10]**

a) Entrepreneur and Intrapreneur.

b) Entrepreneur and Manager.

OR

Q2) Write short notes on : **[10]**

a) Intrapreneur

b) Manager

Q3) Role of Entrepreneur in Indian economy. **[10]**

OR

Q4) Explain the role of National Institute of Entrepreneurship and Small Business Development (NIESBUD) and Small Industries Service Institute (SISI) in entrepreneurship development. **[10]**

Q5) Write an explanatory note 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) Elaborate on computer based project management. **[16]**

Q9) Explain the following : **[18]**

a) Channel of Distribution

b) Promotion and pricing

c) Product and brand management

OR

Q10)a) Explain in detail about marketing and marketing management. **[10]**

b) Explain in detail the role of information in marketing decisions, support your answer with specific example. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2379

[Total No. of Pages : 2

[5254] - 710
B.E. (Chemical Engineering) (Semester - I)
PIPING DESIGN AND ENGINEERING (Elective - II)
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Discuss the major phases in the life cycle of chemical process and role of piping engineer in the different phases? **[5]**

b) Derive the following, $\Delta Q = \dfrac{-\sum r.Q_o^n}{\sum r.n.Q_o^{n-1}}$ **[5]**

OR

Q2) Explain the pipe sizing procedures based on the different criteria? **[10]**

Q3) a) Discuss the different sections of ASME B31 Code for Pressure Piping? **[6]**

b) Write down the different grades of stainless steel used for piping material components? **[4]**

OR

Q4) a) Write down in brief the classification of safety relief valve along with working principle? **[4]**

b) Discuss the different guidelines in selecting a suitable valve for any application? **[6]**

Q5) a) Explain the Homogenous and Heterogeneous Flow in slurry pipe lines? **[8]**

b) A pipe is to be designed to carry 150 CFM free air at 100 psig and 80°F. If the pressure loss must be limited to 5 psi per 100 ft of pipe, what is the minimum pipe diameter required? **[8]**

P.T.O.

OR

Q6) a) How to calculate NPSHa and NPSHr? How to increase NPSHa? **[8]**

b) Discuss the concept of Deposition Velocity? Calculate the deposition velocity of a heterogeneous slurry with a solid specific gravity of 3.0 in water, for a pipeline with an 8-in internal diameter. The particle size = 1 mm and volume concentration = 15 percent.

Data: Froude number $F_L = 1.45$? **[8]**

Q7) a) Write down the different insulation material classifications mostly used in the industrial and commercial piping industry. **[8]**

b) Write short notes on. **[8]**

i) Hot & cold insulation in piping

ii) Critical thickness of insulation

OR

Q8) a) Write down the insulation material selection criteria for piping of different utilities? **[8]**

b) Explain critical thickness of insulation and insulation materials for cold piping? **[8]**

Q9) a) Explain the types of plot plan and their advantages? **[9]**

b) Discuss piping isometrics and bill of material? **[9]**

OR

Q10)a) Discuss in detail the typical piping layout considerations for the equipments. **[9]**

i) Reactors

ii) Storage tanks.

b) Explain the concept of PFD, P&ID and utility diagram? **[9]**

Total No. of Questions : 10]

SEAT No. :

P2380

[Total No. of Pages : 2

[5254] - 711
B.E. (Chemical) (End Sem.)
ADVANCE SEPARATION PROCESSES
(2012 Pattern)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
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 Thiele - Geddes method in detail. **[10]**

OR

Q2) a) Explain low key and high key components in the multicomponent distillation. **[5]**

b) Explain the working principles of azeotropic distillation. **[5]**

Q3) Give the working principles and design aspects of reactive distillation process. **[10]**

OR

Q4) Explain the reversible chemical complexation give the characteristics of solute and complexing agent. **[10]**

Q5) a) Explain the reverse osmosis in detail with design and operating parameters. **[8]**

b) Explain electro-dialysis process with neat diagram. **[8]**

OR

Q6) a) Explain pervaporation process in detail with industrial applications. **[10]**

b) Explain classification of membrane technology. **[6]**

P.T.O.

Q7) a) Explain temperature swing adsorption process with neat diagram. **[8]**

b) Explain the different types of chromatography process. **[8]**

OR

Q8) a) Explain the liquid chromatography in detail with industrial applications. **[8]**

b) Explain the application of chromatography in separation of enzymes and proteins. **[8]**

Q9) Write short notes. **[18]**

a) Molecular sieves.

b) Froth flotation.

OR

Q10) Write short notes. **[18]**

a) Zone refining

b) Ultra centrifugation

Total No. of Questions : 10]

SEAT No. :

P2381

[Total No. of Pages : 2

[5254] - 712
B.E. (Chemical) End Sem.
PROCESS MODELING & SIMULATION
(2012 Pattern)

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) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) What is the motivation behind mathematical modeling? Explain the types of mathematical models? **[10]**

OR

Q2) An ice cube is dropped into a hot, perfectly mixed, insulated cup of coffee. List all assumption and define all terms. Develop the equations describing the dynamics of the system. **[10]**

Q3) Consider a perfectly mixed batch reactor in which a consecutive reaction takes place

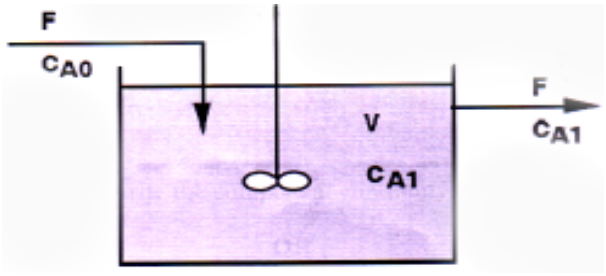
$$A \xrightarrow{K1} B$$

$$A \xrightarrow{K2} C$$

Assume 1st order reaction. Write the component continuity equation for A,B and C. **[10]**

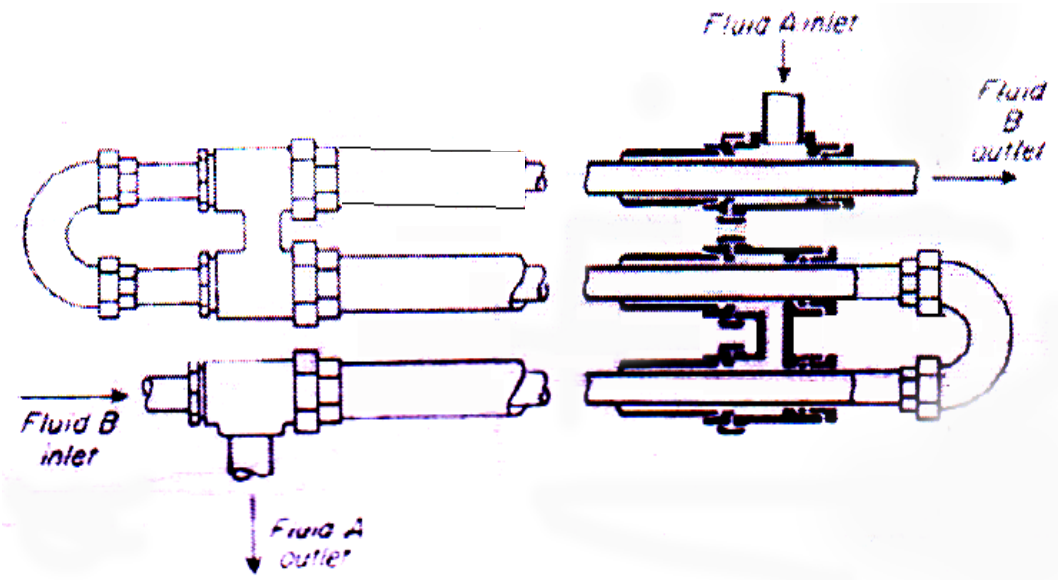
OR

Q4) A plant discharges an aqueous effluent at a volumetric flow rate F. Periodically, the effluent is contaminated by an unstable noxious waste, which is known to decompose at a rate proportional to its concentration. The effluent must be diverted to a holding tank, of volume V, prior to final discharge, as in Fig. Develop a mathematical model for the situation. **[10]**



P.T.O.

Q5) A double pipe heat exchanger is shown in the following figure Hot fluid B flows through the inner tube. Whilst cold fluid A passes in the opposite direction in the outer tube. The dynamic behaviour of the system is to be modelled.



Develop a fully labeled boundary volume diagram for the system. Write assumptions and justify them. **[16]**

OR

Q6) Develop a mathematical model for Agitated vessel. Draw a neat figure and write assumptions. **[16]**

Q7) Develop a model for Flash distillation. **[18]**

OR

Q8) Develop a dynamic model for absorption column **[18]**

Q9) What is process simulation? Write approaches for simulation. Explain each with suitable example. **[16]**

OR

Q10)Explain the simulation scheme for effluent treatment plant. **[16]**

Total No. of Questions : 10]

SEAT No. :

P2382

[Total No. of Pages : 4

[5254] - 713
B.E. (Chemical) (Semester - II)
PROCESS ENGINEERING COSTING AND PLANT DESIGN
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) Enlist the factors required and explain in detail for the comparison of different processes to make the same product. **[10]**

OR

Q2) The original investment for an asset was Rs. 10,000 and the asset was assumed to have a service life of 12 years with Rs.2,000 salvage value at the end of the service life.After the asset has been in use for five years,the remaining service life and final salvage value are reestimated at 10 years and Rs.1,000 respectively.Under these condition ,what is the depreciation cost during the sixth year of the total life if straight line depreciation is used? **[10]**

Q3) Draw and explain the tree diagram showing the cash flow for industrial operations. **[10]**

OR

Q4) A company has three alternative investments, which being considered. If in-charge expects 15 % rate of return on original investment which one is better?

Item	Investment (I)	Investment (II)	Investment (III)
Initial Fixed Capital (Rs.)	1,00,000	1,70,000	2,10,000
Working Capital Investment (Rs.)	10,000	10,000	15,000
Annual Cash Flow (Rs.)	30,000	52,000	59,000
Annual Expenditure (Rs.)	15,000	28,000	21,000

[10]

P.T.O.

Q5) A plant produces refrigerators at the rate of P units per day. The variable costs per refrigerator have been found to be Rs.(47.73 + o.1 $p^{1.2}$).The total daily fixed charges are Rs.1750 & all other expenses are constant at Rs.7325 per day. The profit is selling price per refrigerator minus total cost per refrigerator. Total cost of refrigerators is given as

$$C_T = 47.73 + 0.1P^{1.2} + \frac{1750 + 7325}{P}$$

Determine;

i) The daily profit at a production schedule giving the minimum cost per refrigerator.

ii) The daily profit at a production schedule giving the maximum daily profit.

iii) The production schedule at breakeven point **[15]**

OR

Q6) Explain with a neat sketch the breakeven chart for production schedule and its signification for optimum analysis. **[15]**

Q7) Explain composite curves for following heat recovery system . **[10]**

Stream	Type	Supply temperature $T_{S'}$ °C	Target temperature $T_{T'}$ °C	ΔH MW	Heat capacity Cp $MW.K^{-1}$
R_1	Cold	20	180	32	0.2
R_2	Hot	250	40	-31.5	0.15
R_3	Cold	140	230	27	0.3
R_4	Hot	200	80	-30	0.25

OR

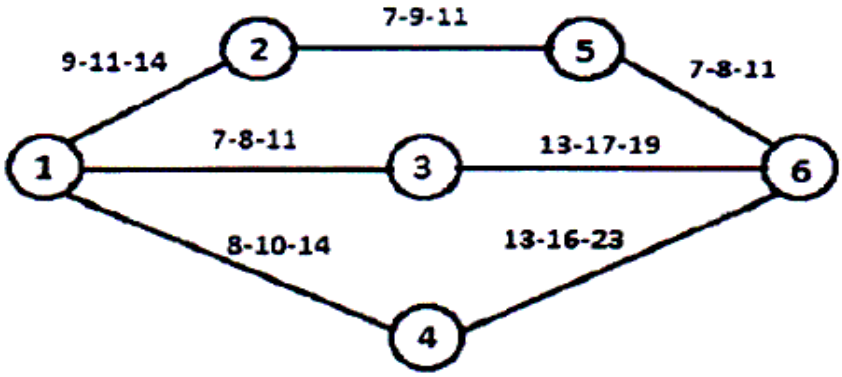
Q8) Enlist the components to calculate the cost of any distillation column of your choice giving details about technical specification and costing of the equipment. **[10]**

Q9) a) The following network diagram shows the three times-estimates for various activates. Find the path considering:

1) Optimistic time (a)

2) Pessimistic time (b)

3) Critical path using PERT **[10]**



b) A pilot plant consists six activates as tabulated below. Construct a network diagram and estimate EST,LST,EFT,LFT and floats .Make the critical path and determine project duration. **[15]**

Activity	Pre-event	Sub-event	Duration (Days)
A	1	2	5
B	2	3	7
C	3	5	6
D	2	4	5
E	4	5	4
F	5	6	4

OR

Q10)a) A chemical plant has sequence of following (A to N) activities . Show the expected time 'Te' and latest allowable time 'T_L' for each activity in the diagram. Estimate the schedule completion time, variance and standard deviation. Also indicate the critical path. **[15]**

Activity	Pre-event	Sub-event	Optimistic Time 'a'	Most Likely Time 'm'	Pessimistic Time 'b'
A	1	2	6	11	16
B	1	3	3	4	5
C	3	4	3	5	7
D	2,4	5	9	11	19
E	4	6	3	5	6
F	5	7	8	9	13
G	7	8	19	23	30
H	6	9	7	9	11
I	5	10	9	10	17
J	8	11	21	26	31
K	10,11	12	13	17	21
L	9,12	13	9	15	21
M	13	14	4	5	9
N	14	15	5	8	12

b) What points should be considered while deciding the plant location? Draw a plant layout and name the parts. **[10]**

Total No. of Questions : 10]

SEAT No. :

P2383

[Total No. of Pages : 2

[5254] - 714
B.E. (Chemical) (End Sem.)
ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES (Elective - III)
(2012 Pattern)

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

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Explain the power generation by wind and Geothermal energy. **[10]**

OR

Q2) 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 methodology. **[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 details 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

P.T.O.

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]**

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]**

Total No. of Questions : 10]

SEAT No. :

P2384

[Total No. of Pages : 2

[5254] - 715
B.E. (Chemical Engineering) (Semester - II)
CHEMICAL PROCESS SAFETY (Elective - III)
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
2) *Neat diagrams must be drawn wherever necessary.*

Q1) Define and explain Hazad, toxicity, threshold Limit Value (TLV) and accident. **[10]**

OR

Q2) a) Explain in short Dose versus Response curves. **[5]**

b) Explain safety program with a neat diagram. **[5]**

Q3) a) Define in short Ignition, Autoignition temperature, fire point and flammability limits. **[7]**

b) Define in short Boiling liquid expanding vapor explosion (BLEVE). **[3]**

OR

Q4) a) Estimate in detail worker exposures to noise. **[5]**

b) Discuss the importance of safety in chemical process industry. **[5]**

Q5) a) Discuss in detail confined explosion and unconfined explosion. **[8]**

b) Describe in brief Relief systems those are using in Chemical industry. **[8]**

OR

Q6) a) Write a short note on Event trees and fault trees. **[8]**

b) Discuss in detail hazard and Operability studies (HAZOP) **[8]**

P.T.O.

Q7) a) Explain in detail Relief system Risk and Hazards Management. **[8]**

b) Discuss in detail miscellaneous design for preventing fires and explosion. **[8]**

OR

Q8) a) Explain in detail hazard models and risk data. **[8]**

b) Discuss various plans for emergency and risk management routines. **[8]**

Q9) a) Discuss in detail prevention of hazard human element. **[8]**

b) Explain emergency shutdown systems and role of computers in safety. **[10]**

OR

Q10) Discuss in detail risk assessment with review of probability theory revealed and. **[12]**

a) Unrevealed failure.

b) Explain in detail process hazards checklists. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2385

[Total No. of Pages : 2

[5254] - 716
B.E. (Chemical Engineering)
FOOD TECHNOLOGY
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Attempt Q.1 or 2,Q.3 or4,Q.5 or Q.6,Q.7or Q.8and Q.9or Q.10.***
2) ***Assume suitable data wherever necessary.***
3) ***Draw neat figures wherever necessary.***
4) ***Use of Scientific Calculators is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) Enlist various food processing industries in India and write short note on any one of them. **[5]**

b) Enlist various food processing industries based out of India and write short note on any one of them. **[5]**

OR

Q2) a) Explain the process of microwave heating used for food preservation along with its effect on the quality of food **[5]**

b) What are various sensory and nutritional properties of food. Explain them in short. **[5]**

Q3) a) Enlist various milk products. Explain the process of cream making in detail. **[5]**

b) Write short note on Ultra high temperature (UHT)/asceptic process. **[5]**

OR

Q4) a) Explain the construction and working of multiple effect evaporator along with neat diagram. Mention any two applications of it in the milk processing. **[5]**

b) Explain the construction and working of spray dryer with neat diagram Mention any two applications of it in the milk processing. **[5]**

P.T.O.

Q5) a) Explain various methods of raw material preparation of food such as cleaning,sorting and grading /peeling used before its processing. **[8]**

b) Explain how in food industry waste management is done and controlled **[8]**

OR

Q6) a) Explain the construction and working of ball mill with neat diagram. **[5]**

b) Write short note on shredding,dicing and pulping equipment used in size reduction of food. **[6]**

c) Explain the construction and working of colloid mills with neat diagram. **[5]**

Q7) a) Enlist various packing materials used in the food industry and explain them in short. **[8]**

b) Write short note on bar code and other markings printed on food packets **[4]**

c) What is combined packaging system? Explain. **[4]**

OR

Q8) a) Write short note on various chemical food preservatives used. **[5]**

b) Explain the process of jelly and pickle making in detail. **[6]**

c) Write short note on modified and controlled atmosphere packaging. **[5]**

Q9) a) What are various factors considered while deciding packaging materials. Explain with suitable examples **[8]**

b) Differentiate between shrink packing and stretch packing. **[5]**

c) Write short note on labeling of containers. **[5]**

OR

Q10)a) Explain the term safety, good manufacturing practice and quality assurance in the food industry. **[6]**

b) Write short note on **[12]**

i) Hurdle Technology

ii) HACCP

iii) USFDA

Total No. of Questions : 8]

SEAT No. :

P2386

[Total No. of Pages : 2

[5254] - 717
B.E. (Chemical) (Semester - II)
ADVANCED MATERIALS
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Attempt Q.1 or 2,Q.3 or4,Q.5 or Q.6,Q.7or Q.8.***
2) ***Assume suitable data if necessary.***
3) ***Draw neat figures wherever necessary.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Figures to the right indicate full marks.***

Q1) a) State applications of austempered ductile iron. **[6]**

b) State advantages of advanced polymeric materials. **[6]**

c) Explain advanced ceramic processing methods. **[6]**

OR

Q2) a) Give examples of steels used for special applications. **[6]**

b) State applications of advanced polymeric material - kevlar. **[6]**

c) Explain microstructural design in advanced ceramic materials. **[6]**

Q3) a) Explain the effect of fiber parameters on properties of composite materials. **[8]**

b) Explain fiber winding techniques in composite materials. **[8]**

OR

Q4) a) Explain types of reinforcements in metal composites. **[8]**

b) Explain crack propagation mechanism in composite materials. **[8]**

Q5) a) Explain properties and applications of carbon composites. **[8]**

b) What are ablative polymers? State their applications. **[8]**

P.T.O.

OR

Q6) a) Explain fabrication methods for carbon composites. **[8]**

b) Describe techniques for synthesis and characterization of nanomaterials. **[8]**

Q7) Write short notes on the following- **[20]**

a) Laminated composite materials.

b) Matrix materials in ceramic composites.

c) Materials used for air - crafts.

d) Applications of nanomaterials.

OR

Q8) Write short notes on the following- **[20]**

a) Phase selection criteria in composite materials.

b) Mechanical behaviour of metal composites.

c) Grain boundary properties in ceramic materials.

d) Prepegs.

Total No. of Questions : 10]

SEAT No. :

P2387

[Total No. of Pages : 2

[5254] - 718
B.E. (Chemical)
CATALYSIS
(2012 Pattern)

Time :2½ hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, Q.3 or Q4, Q.5 or Q.6, Q.7or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Explain industrial application of catalysis in petroleum refining and petrochemical industries. **[10]**

OR

Q2) Explain industrial application of catalysis in organic and inorganic industries. **[10]**

Q3) For the dual functional catalyst following gas phase reaction. **[10]**

$$A + B \longrightarrow C + D$$

Derive the rate expression considering both the reactant adsorbing on different sites in terms of partial pressure of the respective components. (assuming surface reaction as rate controlling)

OR

Q4) Explain tri-phase catalysis and phase transfer catalysis. **[10]**

Q5) 8.01 gm of glucosil is studied with N_2 adsorption at - 195. 8°C is 1 atm. The following data are obtained **[16]**

Pressure, (mmHg)	4	21	132	219	269	311	409	491
Volume adsorbed (cm^3)	57	117	161	180	201	218	265	323

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) The following data were obtained at 87°C for the equilibrium adsorption of n-hexane on silica gel particles Establish the values of C_m and K_c. **[16]**

Partial Pressure of hexane in gas, atm	0.0020	0.0040	0.0080	0.0113	0.0156	0.0206
Hexane adsorbed g mol/(g gel)	10.5×10^{-5}	16×10^{-5}	27.2×10^{-5}	34.6×10^{-5}	43×10^{-5}	47.3×10^{-5}

Q7) a) Explain the industrial application of zeolites. **[12]**

b) What are zeolites? Explain. **[4]**

OR

Q8) Write a short note on: **[16]**

a) Applications of zeolites

b) Modification of zeolites

Q9) a) Derive M - M Kinetics. **[9]**

b) Explain enzyme 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)	0.03	0.02	0.0015
C_{Ao} (mol/lit)	0.25	0.35	0.75
C_A (mol/lit)	0.035	0.18	0.8
v,(1/h)	4	5	1.1

Total No. of Questions : 10]

SEAT No. :

P2388

[Total No. of Pages : 2

[5254] - 719
B.E. (Chemical) (Semester - II)
NANO TECHNOLOGY
(2012 Pattern) (Elective - IV)

Time :2 ½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or 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 necessary.***

Q1) a) Explain the synthesis methods available for the preparation of carbon nanotubes? **[6]**

b) Discuss about the various synthesis methods for fullerenes? **[4]**

OR

Q2) a) Explain the filling of nanotubes and also the mechanism of growth of carbon nanotubes. **[6]**

b) How nanomaterials are synthesized by Laser ablation of solid targets? **[4]**

Q3) a) What is reactive sputtering? Explain about RF magnetron sputtering? **[6]**

b) Describe various stages in Pulsed Laser Deposition process. **[4]**

OR

Q4) a) What is the basic principle in Scanning Electron Microscope? How are they different from Optical Microscopy- Explain. **[6]**

b) Write a note on X-ray diffraction technique used for nanoparticle characterization? **[4]**

Q5) a) What are the properties and advantages of quantum dot, quantum well and wire? **[8]**

b) What is doping? Explain types of dopants used in extrinsic semiconductor? **[8]**

P.T.O.

OR

Q6) a) How does the de Broglie relation enter the Schrodinger theory? Why is it important for the Schrodinger equation to be linear in the wavefunction? **[8]**

b) What are effective masses of charge carriers in semiconductor? Derive expression for it. **[8]**

Q7) a) Elaborate the concept of surface tension and interfacial tension? **[8]**

b) Explain the concept of colloid stability and zeta potential? **[8]**

OR

Q8) a) Discuss the concept of self assembly and catalysis in nano colloids? **[8]**

b) Explain experimental procedure for finding contact angles. Explain with neat sketch. **[8]**

Q9) a) Explain the biological applications of core-shell nanoparticles schematically. **[9]**

b) Explain in brief the applications of different types of nanomaterials in nanomachines & nanodevices? **[9]**

OR

Q10) Write short notes on (Any three) **[18]**

a) Nanohydrogel

b) Types of nanocoating and its advantages

c) Self cleaning materials

d) Nanoclays

e) Polymer Nanocomposites

Total No. of Questions : 10]

SEAT No. :

P3341

[Total No. of Pages : 2

[5254]-720

B.E. (Chemical)

FUEL CELL TECHNOLOGY (Elective - IV)

(2012 Pattern) (Semester - VI)

Time : 2:30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q8, Q9 or Q1O.***
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) When the same quantity of electricity is passed through two voltmeters arranged in series 1.12 dm^3 of dry H_2 gas is liberated at NTP and 9×10^{-4} kg of metal is deposited at cathode in other voltmeter. Calculate the equivalent mass of metal if that of hydrogen is 1 **[5]**

b) What is emf series? What is its importance in the design of a fuel cell?**[5]**

Q3) What are Tafel plots? Derive Tafel equation from the first principles. Describe its use in the fuel cell design. **[10]**

OR

Q4) What is reforming? How is ATR i.e Auto Thermal Reforming used to manufacture hydrogen needed for a fuel cell? Describe its advantages and disadvantages. **[10]**

Q5) a) What are the criteria for selecting anodic materials of a proton exchange membrane fuel cell system? **[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]**

OR

P.T.O.

Q6) Write short notes on ANY THREE **[16]**

a) Anodic Materials of PEMFCs

b) Membrane Electrolyte Materials

c) Gas Diffusion Layer Materials

d) Schematic diagram of PEMFCs

Q7) a) What are the criteria for selecting cathodic materials of a Solid Oxide fuel cell system? **[8]**

b) Describe with the help of a diagram oxidation reaction on the TPB of an anode made of Ni-YSZ. **[8]**

OR

Q8) At equilibrium how electric potentials are related to chemical potentials of fuel and oxidizer stream in a fuel cell? Describe their importance in the design of a fuel cell. **[16]**

Q9) Write down generic fuel conversion reactions before a fuel (Natural Gas/ Naphtha) is fed to the fuel cell. **[18]**

OR

Q10)Write short notes on any three - **[18]**

a) Carbon Deposition Avoidance

b) Impurities Reduction in reforming

c) Steam Reforming

d) Recent development in harnessing hydrogen

Total No. of Questions : 10]

SEAT No. :

P2389

[Total No. of Pages : 2

[5254] - 721
B.E. (Chemical) (Semester - II)
PETROCHEMICAL ENGINEERING (Elective - IV)
(2012 Pattern)

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

Instructions to the candidates:

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

Q1) Describe the methods of preparation of feedstock' s for petrochemical production and discuss the various petrochemical Feedstock challenges with suitable examples. **[10]**

OR

Q2) What are the main basic building blocks of petrochemical industry explain with suitable Examples? Give the details of petrochemical products that are produced from benzene. **[10]**

Q3) What are basic principle sources of aromatics? Describe the BTX aromatic separation by Suitable diagram. **[10]**

OR

Q4) Write in details about the various separation and purification techniques used in Petrochemical industry? **[10]**

Q5) a) Enumerate the synthetic chemical intermediates and products from olefins and describe the production of ethylene by naphtha cracking process. **[8]**

b) Write a note on furnaces used in petrochemical plants? **[8]**

P.T.O.

OR

Q6) Write a note on following. **[16]**

a) Fluid Catalytic Cracking units

b) Delayed coking

Q7) a) What is addition polymerization. Describe the steps and mechanisms of addition Polymerization. **[8]**

b) Explain classification of different polymerization process along with its advantages and disadvantages. **[8]**

OR

Q8) a) With neat sketches explain in detail about production of PVC along with its engineering Problems. **[8]**

b) What are various polymeric products? Differentiate between different polymerization Processes. **[8]**

Q9) Discuss about recent advances in petrochemical plants & refineries in India. **[18]**

OR

Q10) Write a note on following: **[18]**

a) Safety consideration in petrochemical plants

b) Major petrochemical plants in India as well as in world