Total No. of Questions : 10]

SEAT No :

P2949

[Total No. of Pages :3

[5154]-501
B.E.(Civil)
ENVIRONMENTAL ENGINEERING-II
(2012 Course) (End Sem.) (401001) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume necessary data.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Differentiate between separate and combined sewerage system. **[5]**

b) Explain the procedure for determination of BOD. **[5]**

OR

Q2) a) What are the sources of sewage and how sewage flow quantity is estimated? **[5]**

b) Explain the procedure for determination of COD. **[5]**

Q3) a) Determine diameter and depth of primary sedimentation tank for sewage flow 10 million liters per day. **[5]**

Given data.

i) Detention time = 2.5 hours

ii) Surface loading rate = 40000 $1/m^2/d$

b) Write streeter-Phelps equation, explain the terminology and write its application. **[5]**

OR

P.T.O.

Q4) a) An average operating data for conventional activated sludge treatment plant is as follows **[2+2+2]**

i) Sewage flow = 30000 m^3/d
ii) Volume of aeration tank = 10500 m^3
iii) Influent BOD = 200 mg/l
iv) Effluent BOD = 20 mg/l
v) Mixed liquor suspended solids = 3000 mg/l
vi) Effluent suspended solids = 30 mg/l
vii) Waste sludge suspended solids = 9500 mg/l
viii) Quantity of waste sludge =200 m^3/d

Determine.

1) Food to microorganisms ratio
2) Sludge age
3) Percentage of efficiency of BOD removal

b) Differentiate between single stage and two stage filter. **[4]**

Q5) a) Design an oxidation pond for following data **[8]**

i) Location : 24° Latitude
ii) BOD loading at 24° Latitude : 225 kg/ha/d
iii) Elevation : 900 m above sea level
iv) Mean monthly temperature : 30° maximum and 15° minimum
v) Population to be served : 10000
vi) Sewage flow : 100 lpcd
vii) Desired effluent BOD5 : 20 mg/L
viii) Pond removal constant at 20°C : 0.1/d

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

OR

Q6) a) A wastewater flow is 10000 m^3/d, BOD_5 is 200 mg/L, design an aerobic flow through type lagoon to serve a town of 50000 persons, using a ideal complete mixing model. Since the lagoon is proposed to be followed by another treatment unit, its size can be restricted to give a detention time of only 3 days. **[8]**

Given data

k=0.015 per day at 20°C, Y = 0.5, k_d = 0.07 per day

b) Write wastewater treatment principle of root zone cleaning system and explain its working with schematic sketch. **[4+4]**

Q7) a) Draw a neat sketch of upflow sludge blanket (UASB) reactor. Explain the principle of working and its advantages and disadvantages. **[2+2+4]**

b) The sludge is known to be 70% organic and 30% inorganic in nature. Approximately 60% of the organic fraction is converted to liquid and gaseous end products after a 30 day period. The digested sludge has a solids content of 5% and must be stored for periods of up to 85 days. Determine the volume of requirement for a standard rate single stage digester. The raw sludge loading rate is 80 m^3/d. **[8]**

OR

Q8) a) Write principle and stages of anaerobic digestion. Explain factors affecting digestion process. **[4+4]**

b) Explain any two methods of sludge disposal with advantages, disadvantages and application. **[4+4]**

Q9) a) Explain methods of waste water sampling. **[6]**

b) Write short note on equalization and neutralization. **[6]**

c) Draw and explain units of treating dairy wastewater. **[6]**

OR

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

i) Flow sheet of manufacturing process and wastewater generation

ii) Characteristics of wastewater

iii) Flow sheet of wastewater treatment

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

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Total No. of Questions : 10]

SEAT No. :

P2950

[Total No. of Pages : 3

[5154]-502
B.E.(Civil)
Transportation Engineering
(2012 Pattern) (End Sem.) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Discuss briefly the various road patterns. Draw a neat sketch to justify your answer. **[3+2=5]**

b) Enlist the various surveys carried out for highway location. Explain any two in brief. **[2+3=5]**

OR

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

i) Passenger Car Unit.

ii) Traffic Signs

b) Define Passing Sight Distance. Why it is necessary? State the factors governing the PSD. **[1+2+2=5]**

Q3) a) Determine the height of the crown with respect to the edges of the road in the following cases: **[5]**

i) WBM road 3.8 m wide in areas of low rainfall

ii) Concrete road 7.0 m wide in areas of heavy rainfall

b) Discuss in brief Extraction test on bituminous mix and its significance in quality control. **[4+1=5]**

OR

P.T.O.

Q4) a) The CBR value of subgrade soil is 5.0%. Calculate the total thickness of pavement using design formula developed by U.S. Corps of Engineers. Assume wheel load of 4082 kg. Tyre pressure of 7 kg/cm^2. **[5]**

b) Explain in brief the following: **[5×1=5]**

i) Seal coat

ii) Mastic Asphalt

iii) Emulsion Bitumen

iv) Dowel bar

v) DBM

Q5) a) Explain in brief the following: **[4×1.5=6]**

i) Flaps

ii) Fuselage

iii) Tricycle undercarriage

iv) Control tower

b) Distinguish clearly between Minimum Circling radius and Turning radius. **[3+3=6]**

c) Write a short note on Wind Rose Diagaram type II **[4]**

OR

Q6) a) What do you mean by Airport capacity? State the various factors affecting airport capacity. **[2+4=6]**

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

i) Holding apron.

ii) Cross Wind Component.

iii) Calm period.

c) Draw a neat sketch of an aeroplane and show various component parts. **[1+3=4]**

Q7) a) Derive the Rational formula for determination of discharge for small culverts. Use usual notations. **[4]**

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

i) Quasi alluvial stream

ii) Artificial waterway area

iii) Permissible velocity of flow

c) What is free board? Why it is provided? Draw a neat sketch to justify your answer. **[2+2+2=6]**

OR

Q8) a) A bridge is proposed across an alluvial stream ($f=1.2$) carrying a discharge of 500 m^3/s. Calculate the depth of maximum scour when the bridge consist of 5 spans of 15 m each. **[6]**

b) Define Economic Span. Derive an equation for economical span. **[1+5=6]**

c) Explain with a neat sketch Afflux and its significance in bridge design. **[2+2=4]**

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

b) Explain with a neat sketch following: **[3×2=6]**

i) Balanced cantilever bridge

ii) Arch culvert

iii) Swing bridge

c) Discuss in brief the following: **[3×2=6]**

i) Earth pressure.

ii) Wind Load.

iii) Forces due to water current.

OR

Q10)a) State the various purposes of providing bridge bearings.Distinguish between Fixed bearing and Expansion bearing. **[3+3=6]**

b) Define Pier. Draw a neat sketch of the Hammer head shape pier and Multiple bent pier. **[2+2+2=6]**

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

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Total No. of Questions : 10]

SEAT No. :

P2951

[Total No. of Pages : 3

[5154]-503
B.E.(Civil)
STRUCTURAL DESIGN AND DRAWING - III
(2012 Pattern) (Semester-I) (End Sem.) (401003)

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

Instructions to the candidates:

1) ***Answer Q1or Q2; Q3 or Q4; Q5 or Q6; Q7 or Q8; and Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***IS 456, Is 1343, IS 3370 and IS 13920 are allowed in the examination.***
4) ***The designs should comply with the latest codal provisions.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculater is allowed.***

Q1) a) Explain any two post tensioned prestressing systems. **[4]**

b) A simply supported post tensioned concrete beam of span 15 m has a rectangular cross section 300 mm× 800 mm. The prestress at ends is 1300 kN with zero eccentricity at the supports and an eccentricity of 250 mm at the center, the cable profile being parabolic. Assuming k=0.15/ 100 m and μ =0.35, determine the loss of stress due to friction at the center of the beam. **[6]**

OR

Q2) a) What role does high grade materials play in prestressed concrete. **[4]**

b) A simply supported prestressed T-beam of 16 m span has the following properties. Top flange-width and thickness are 500 mm and 200 mm, Depth and thickness of the web are 600 mm and 200 mm respectively. The beam is prestressed with HT steel of c/s area of 2000 mm^2. The cable profile is parabolic with an eccentricity of 600 mm at the center of the span and 300 mm at the support section.The effective prestress in the tendons is 1000 N/mm^2. Estimate the ultimate shear resistance at the support section, and the maximum permissible uniformly distributed load on the beam. **[6]**

P.T.O.

Q3) a) A prestressed concrete I section beam is simply supported over a span 8 meters supporting a live load of 4 kN/m. The beam has overall depth of 400 mm. The thicknesses of flange and web are 60 mm and 80 mm respectively. The width of the flange is 200 mm.Find the eccentricity required for the prestressing force of 235 kN such that the resultant stress is zero at the bottom fibre of the central section. **[4]**

b) Calculate the base shear for an unbraced building located in Pune. The building is having plan dimensions 25 m× 25 m having 5 similar bays in both direction. The soil conditions are medium stiff. The R.C. frames are in filled with brick-masonry. The lumped weight due to dead loads is 12 kN/m^2 on floors and 10 kN/m^2 on the roof. The floors are to cater for a live load of 4 kN/m^2 on floors and 1.5 kN/m^2 on the roof. The total height of the building is 14 m with floor height as 3.5 m. Also show shear distribution over the height of the building. **[6]**

OR

Q4) a) Explain the approximate method of analysis for gravity loads for a multistory frame. **[4]**

b) A continuous three span beam ABCD have equal span of 6 m. The design data for the beam is

$M_A(-)$ = 78.07 kNm; $M_B(-)$ = 127.92 kNm; M_{AB} (+) = 74.41 kNm and M_{BC} (+) = 61.45 kNm.

Earthquake moments is 210 kNm.

Design the beam ABCD for combined effect of lateral and gravity loads for flexure only. **[6]**

Q5) a) Draw the active earth pressure diagram on a retaining wall showing the expression for maximum earth pressure for the following conditions.**[4]**

i) Backfill is inclined at angle α, where angle α is less than angle of repose of soil and

ii) Backfill is horizontal with uniform surcharge Ws/unit run at a distance 'a' form the steam and 'a' < height of stem.

b) Provide a T- shaped retaining wall to retain a horizontal leveled backfill of height 5 m. It is subjected to a surcharge of 10 kN/m^2 from the face of the wall. The backfill has unit weight of 17 kN/m^3 Angle of repose = 30°, coefficient of friction between concrete and soil = 0.55, SBC of soil = 150 kN/m^2, depth of foundation = 1.0 m. Perform stability analysis. **[12]**

OR

Q6) A L-shaped retaining wall is to be provided to retain a backfill of 4.2 m.The backfill is horizontal.The unit weight of the soil is 17 kN/m^3, angle of repose=30^o, SBC of soil = 180 kN/m^2, good foundation is available at a depth of 1.0 m.Design and sketch the details of reinforcement in the wall and base slab. **[16]**

Q7) a) Two columns C_1 and C_2 are spaced at 3.0 m apart carrying 650 kN and 800 kN respectively. If the width of footing is restricted to 1.8 m and C_1 is boundary column. Safe bearing pressure of soil is 180 kN/m^2. Column size are 500 mm×500 mm. Comment on the feasibility of providing rectangular slab type combined footing. **[3]**

b) Design a slab type combined footing for two boudary columns spaced 4.0 m apart. The two columns of size 230 mm×450 mm carry service loads of 700 kN each. The safe bearing pressure on soil is 180 kN/m^2. Use M30 grade of concrete and steel of grade Fe 500. **[13]**

OR

Q8) Design a slab-beam type combined footing for two columns spaced 3 m apart carrying a service load of 800 kN and 1000 kN each. The columns are 400 mm×400 mm and 500 mm×500 mm respectively . The SBC of soil is 190 kN/m^2. Use M30 grade of concrete and steel of grade Fe 500. **[16]**

Q9) a) Determine the maximum bending moments at mid-span and support as per IS 3370 in the long wall and short wall of a rectangular water tank resting on ground. The tank dimensions are 5 m×2 m×3 m high is the tank wall is free at top and hinged at bottom. **[6]**

b) The wall of a circular water tank with flexible base has thickness of 300 mm. It is subjected to a maximum hoop tension of 240 kN. The reinforcement provided is 12 # @ 100 mm c/c. The material used are Fe 500 grade of steel and M 35 grade of concrete. Find the crack width and check for serviceability if the limiting design surface crack width is taken as 0.2 mm. **[12]**

OR

Q10)Design the water tank open at top resting on ground having a size of 5.0m× 5.0m× 3m high.Use M 30 and Fe 500 grade material. Sketch details of reinforcement for the wall. **[18]**

Total No. of Questions : 10]

SEAT No. :

P2952

[Total No. of Pages : 3

[5154]-504
B.E. (Civil)
STRUCTURAL DESIGN OF BRIDGES
(2012 Pattern) (Elective - I) (Semester - I)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Write a note on IRC loading with neat sketches. **[10]**

OR

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

Q3) Write a note on Pigeaud's method. **[10]**

OR

Q4) An interior panel of a T beam deck slab bridge is 4.0m×2.5m. Calculate the maximum bending moment developed due to placing of IRC class A loading. **[10]**

Q5) Design the member (U-3, U-4), (U-3,L-3) for the broad gauge railway steel truss bridge shown in Fig.1. The details are as follows. **[18]**

a) Weight of stock rail = 0.60 kN/m,

b) Weight of check rail = 0.45 kN/m.

c) Timber sleepers of size = (0.25×0.25×2.5)m@ 0.40 m c/c.

d) Unit weight of timber = 6.0 kN/m^3.

P.T.O.

e) Spacing of truss = 4.5 m c/c.

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

g) CDA = 0.255.

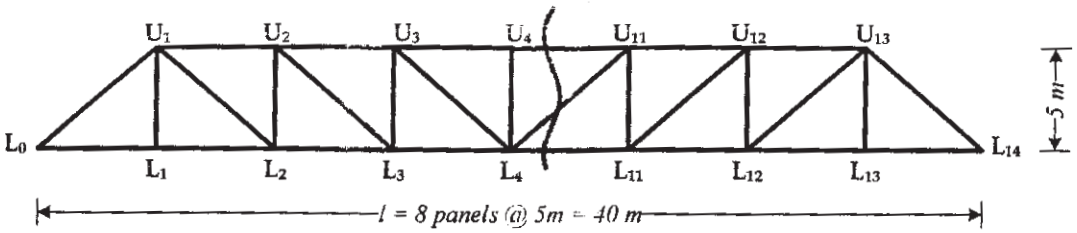

Fig. 1

OR

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

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

a) Maximum Normal Load = 1100 kN.

b) Minimum Normal Load -400 kN.

c) Lateral Load = 45 kN.

d) Longitudinal Load = 85 kN.

e) Total Longitudinal Translation = 10 mm.

f) Rotation at support = 0.001.

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

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

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

Also sketch the details of the bearing.

OR

Q8) a) The vertical reaction at the end of a bridge girder is 1500 kN. The vertical reaction at each end of the girder due to overturning effect is 60 kN. Design a roller bearing if the least allowable perpendicular distance between the faces of adjacent roller after the revolved position may be taken as 4 mm. The centers of the rollers travel 20 mm. **[10]**

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

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

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

OR

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

a) Span = 30 m.

b) Width of carriageway = 7.5 m.

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

d) Dead weight of span = 8800 kN.

e) Longitudinal force = 220 kN.

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

g) Unit weight of backfill soil = 16 kN/m^3.

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

i) μ = 0.32, Φ = 30°, Ground acceleration = 0.11 g,

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

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Total No. of Questions : 10]

SEAT No. :

P2953

[Total No. of Pages : 4

[5154]-505
B.E. (Civil)
SYSTEMS APPROACH IN CIVIL ENGINEERING
(2012 Course) (Semester - I) (End Semester) (Elective - I) (401004 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***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 application of system approach in Civil Engineering? **[4]**

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

i) Objective function

ii) Constraint

iii) Convex and Concave function

OR

Q2) a) State the algorithm of steepest gradient method. **[4]**

b) Find maximum of $f = x\ (1.5 - x)$ in the interval of (0, 1) within 10% accuracy using Dichotomous Search technique. Take $\varepsilon = 0.001$. Solve up to two iteration. **[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	10	14	9	11	16
B	15	8	13	10	12

b) Explain operating characteristics of queuing theory. **[4]**

OR

Q4) a) What is mean by simulation? Explain the application of Monte Carlo Simulation. **[5]**

b) Minimize $Z = 2\ x_1^2 + 2x_1x_2 + 2\ x_2^2 - 4\ x_1 - 6x_2$
Take, $x^0 = [0\ 0]$ by Newton Method. **[5]**

P.T.O.

Q5) a) Explain 'Principle of Optimality' in context with Dynamic Programming. **[4]**

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

Node	Distance in kms	Node	Distance in kms
A-B	12	B-C	14
B-D	15	C-E	21
C-F	18	C-G	29
D-E	32	D-F	26
D-G	34	E-H	19
E-I	22	F-H	15
F-I	28	G-I	35
G-H	12	H-J	41
I-J	31		

OR

Q6) a) What is the need and applications of Dynamic Programming? **[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
0	45	52	60
1	55	64	69
2	62	70	77
3	74	79	86
4	82	92	95
5	88	95	98
6	85	97	102
7	90	100	109

Q7) a) Minimize $Z = 6x_1 + 5x_2$ **[8]**

Subject to $20x_1 + 12x_2 \geq 200$

$8x_1 \geq 40$

$6x_2 \geq 30$

$x_1, x_2 > 0$

Use Simplex method to solve the problem.

b) Explain with the help of diagrams, following conditions in LPP **[8]**

i) Unbounded solution

ii) No feasible solution

iii) Infinite solution

iv) Unique solution

OR

Q8) a) Explain 'Two phase method'. Explain the application of this method in solving LP problems. **[6]**

b) Use Big M method to solve following **[10]**

Minimize $Z = 60\, x_1 + 80\, x_2$

Subject to

$x_1 \leq 400$

$x_2 \geq 200$

$x_1 + x_2 = 500$

$x_1, x_2 \geq 0$

Q9) a) Explain steps involved in V.A.M. **[6]**

b) Solve following assignment problem to minimize time (in minutes) required by 4 operators on 4 machines **[12]**

machines

Operators	I	II	III	IV
A	14	19	16	12
B	12	15	22	18
C	10	12	18	15
D	16	14	19	15
E	15	10	18	15

OR

Q10)a) Write a short note on assignment problem. **[4]**

b) Calculate transportation cost for following problem using V.A.M. **[6]**

destinations

origins		D1	D2	D3	D4	Supply
	O1	09	18	16	20	25
	O2	14	10	19	15	75
	O3	17	13	15	17	50
	O4	10	14	12	18	100
	Demand	60	50	100	40	

c) Optimize above problem using u-v method. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2954

[Total No. of Pages : 3

[5154]-506

B.E. (Civil Engineering)

ADVANCED CONCRETE TECHNOLOGY

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write a short note on previous concrete. **[4]**

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

OR

Q2) a) What is light weight concrete? How it can be achieved in practice? **[4]**

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

i) Jet cement concrete (Ultra rapid hardening concrete)

ii) Ultra light weight concrete

Q3) a) Write a short note on manufactured sand as a fine aggregate. **[4]**

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

OR

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

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

i) Stress wave propagation method

ii) Nuclear methods

P.T.O.

Q5) a) Enlist different naturally occurring fibers. Explain any two in detail. **[4]**

b) Explain the merits and demerits of fibers in respect of fiber reinforced concrete. **[6]**

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

i) Glass fibers.

ii) Steel fibers

OR

Q6) a) Explain the historical development of fiber reinforced concrete composite. **[4]**

b) Define fiber reinforced concrete composite? Enlist different naturally occurring fibers. Explain any two in brief. **[6]**

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

Q7) a) Explain the behaviour of hardened steel fiber reinforced concrete under tension. **[4]**

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

c) Which are the constituent materials used in the SIFCON? Explain the physical properties of each material? **[6]**

OR

Q8) a) Write a short note on polymer fiber reinforced concrete composite. **[4]**

b) What are the factors affecting strength of hardened FRC? **[6]**

c) Explain the behaviour of hardened steel fiber reinforced concrete under compression? **[6]**

Q9) a) Define ferrocement? What are its applications? **[6]**

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

c) Explain skeletal armature method of ferrocement along with merits and demerits. **[6]**

OR

Q10)a) What are the advantages Ferrocement? **[6]**

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

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

x x x

Total No. of Questions : 8]

SEAT No. :

P2955

[Total No. of Pages : 2

[5154]-507
B.E. (Civil)
ARCHITECTURE AND TOWN PLANNING
(2012 Course) (End Semester) (Semester - I) (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 different elements of Architectural Composition. **[7]**

b) Why it is said that there exists, "Relation between quality of life and livability". **[7]**

c) What are the benefits of town planning? **[6]**

OR

Q2) a) Explain the following Qualities of Architecture: user friendly, contextual. **[6]**

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

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

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

b) Explain various Traffic transportation systems in town and its impact. **[9]**

OR

Q4) a) List various planning agencies and explain functioning of any one Planning agencies in detail. **[9]**

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

P.T.O.

Q5) a) Why MRTP Act 1966 is influential for DP? **[8]**

b) Elaborate the need of UDPFI guidelines for land use, infrastructure. **[9]**

OR

Q6) a) State & explain steps in the Legislative mechanism for preparation of DP. **[8]**

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

Q7) a) Write a note on Special townships. **[8]**

b) Explain various applications of GIS in town planning. **[8]**

OR

Q8) a) Write a note on Land Acquisition Rehabilitation and Resettlement Act 2013. **[8]**

b) Explain various applications of GPS in town planning. **[8]**

x x x

Total No. of Questions : 6]

SEAT No. :

P2956

[Total No. of Pages : 2

[5154]-508
B.E. (Civil)
ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS
(2012 Course) (Semester - I) (End semester) (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) Describe the physiographic divisions of India. **[6]**

OR

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

Q2) a) What are the reasons of Tail Channel erosion in Deccan Trap area. **[7]**

OR

b) How economy has been achieved by proper geological interpretation? Discuss any one case history. **[7]**

Q3) a) Write a note on residual & transported soils. **[7]**

OR

b) Discuss water bearing characteristics of rocks occurring in Maharashtra. **[7]**

Q4) a) Explain electrical resistivity method of geophysical exploration. **[8]**

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

Run in m	Piece No.	Length in cm.	Nature of fracture
0 - 3 m	1	11	J
	2	11	J
	3	06	J
	4	50	J
	5	50	J
	6	14	J

P.T.O.

	7	54	J
	8	10	J
	9	8	J
3 - 6m	10	70	M
	11	95	M
	12	115	M
	13	07	J

OR

a) Differentiate between mechanical and natural fractures during core logging. **[8]**

b) Determine apparent resistivity of strata at different depth zones. **[8]**

Sr. No	R	a	apparent resistivity ($2\pi aR$)
1	2.87	1	
2	1.50	2	
3	1.34	3	
4	1.32	4	
5	1.21	5	
6	1.07	10	
7	1.03	15	

Q5) a) Explain in detail Engineering Geological investigations for Tunnels. **[10]**

b) How the nature and structure of rocks affects on SBC? **[7]**

OR

a) Describe geological conditions responsible for roof collapsing of tunnel. **[10]**

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

Q6) a) Types of faults and significance of them in civil engineering projects. **[10]**

b) Describe various seismic zones of India. **[7]**

OR

a) Explain suitability of Deccan Trap basalts as construction material. **[10]**

b) Explain Influence of geological factors in urban planning. **[7]**

✕ ✕ ✕

Total No. of Questions : 8]

SEAT No. :

P2957

[Total No. of Pages : 4

[5154]-509
B.E. (Civil)
MATRIX METHODS OF STRUCTURAL ANALYSIS
(2012 Course) (Semester - I) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

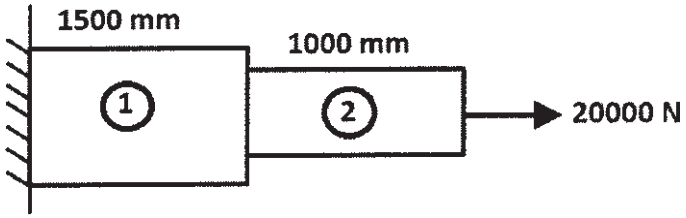
Instructions to the candidates:

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

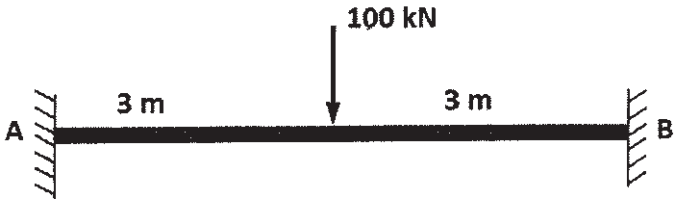
Q1) a) Solve the following system by Gauss-Elimination Method **[5]**

$$x - 2y - 6z = 12$$
$$2x + 4y + 12z = -17$$
$$x - 4y - 12z = 22$$

b) Determine maximum elongation of the bar structure as shown in figure using stiffness matrix method. The c/s area of member 1 is 1000 mm^2 whereas c/s area of member 2 is 500 mm^2. Take E = 2 × 10^5 MPa. **[5]**



c) Determine support reactions of beam AB as shown in figure using flexibility matrix method. Take EI constant. **[10]**



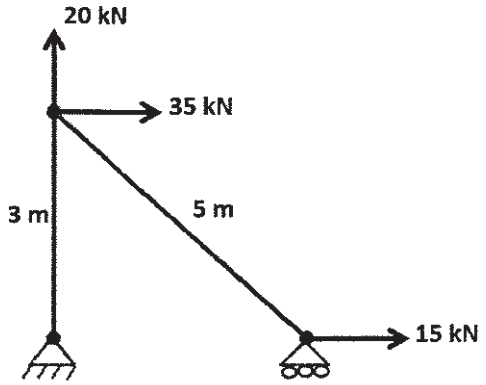
OR

P.T.O.

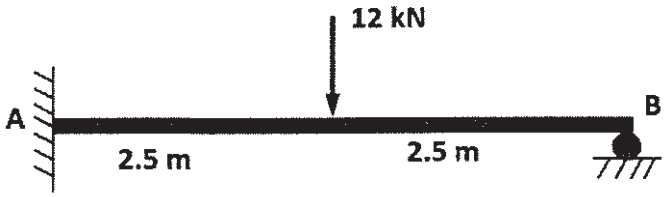
Q2) a) Solve the following system by Gauss-Jordan Method **[6]**

$$2x - 2y + z = 3$$
$$3x + y - z = 7$$
$$x - 3y + 2z = 0$$

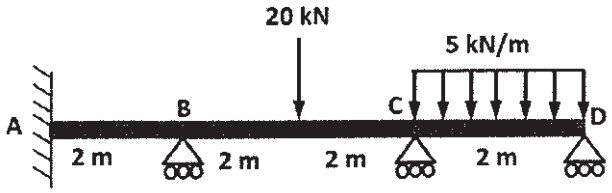
b) Determine deflections of loaded joints of the two member truss as shown in Figure using stiffness matrix method. Take c/s area of each member 1000 mm^2 and E = 200 GPa. **[8]**



c) Determine propped reaction of the beam AB as shown in figure using flexibility matrix method. Take EI constant. **[6]**

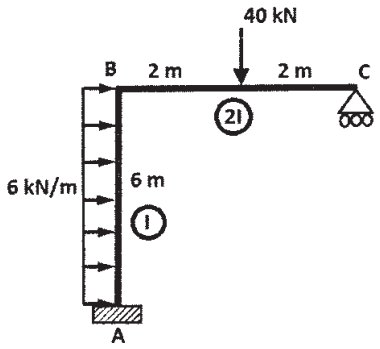


Q3) Analyze the continuous beam ABCD as shown in figure using stiffness matrix method. Take EI constant. Draw BMD. **[18]**



OR

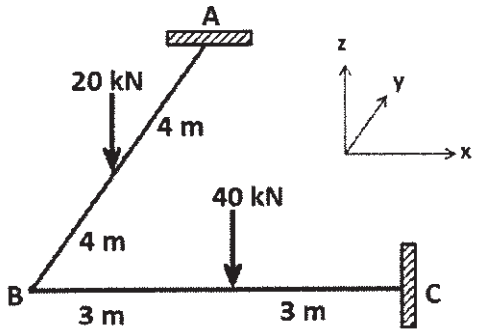
Q4) Analyze the rigid jointed portal frame as shown in figure using stiffness matrix method. Take EI = constant KN.m^2. Draw BMD. **[18]**



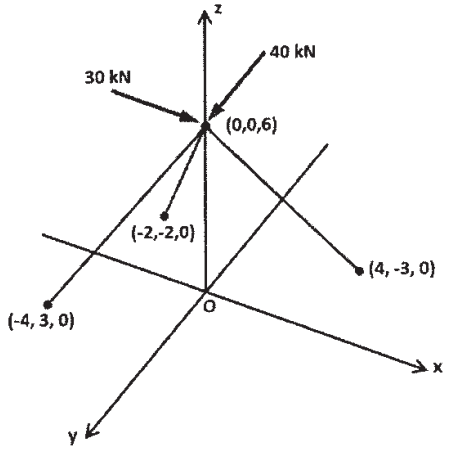
Q5) Derive the stiffness matrix and transformation matrix for grid element with 06 D.O.F. Take flexural rigidity EI and torsional rigidity GJ. **[16]**

OR

Q6) Determine unknown displacements at joint B of the orthogonal grid as shown in figure using stiffness matrix method. take EI = 1000 kN.m^2 and GJ = 500 kN.m^2. **[16]**

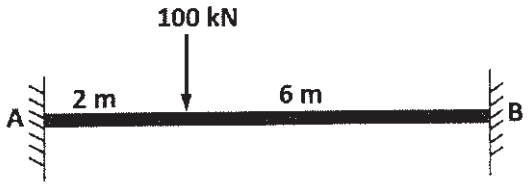


Q7) The tripod shown in figure is subjected to horizontal and vertical loads. Determine the deflections at the loaded joint using stiffness matrix method. Take E = 200 GPa and c/s area of all members 1000 mm^2. **[16]**



OR

Q8) a) A fixed beam loaded as shown in figure. Estimate the deflection under the point load using finite difference method. Use four sub intervals. Take EI constant. **[8]**



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

Total No. of Questions : 12]

SEAT No. :

P2958

[Total No. of Pages : 2

[5154]-510

B.E. (Civil Engineering)

INTEGRATED WATER RESOURCES AND PLANNING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any one from 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, 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) a) Comment on "water infrastructure-problems and perspectives". **[3]**

b) What do you mean by Institutional frame work for water management? **[3]**

OR

Q2) a) Explain in brief "water as finite resource". **[3]**

b) Write a note on "Riparian rights". **[3]**

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

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

OR

Q4) a) Explain Benefit cost analysis. **[3]**

b) Explain "Inter basin water transfer". **[3]**

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

b) Explain "Water management in irrigation sector". **[4]**

OR

Q6) a) Write note on **[4]**

i) flood damage assessment

ii) severity index

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

P.T.O.

Q7) a) What is navigation and recreational water demands? Explain how it is estimated. **[8]**

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

OR

Q8) a) What is thermal and nuclear water demands? Explain how it is estimated. **[8]**

b) What are consumptive and non consumptive demands? Explain in detail. **[8]**

Q9) a) What is "Decision support system for Integrated Water Resources Management (IWRM)". **[8]**

b) Write a note on "Protection of vital ecosystem". **[8]**

OR

Q10)a) What are the direct and indirect social impacts of water resources development? **[8]**

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

i) Minimum Flow

ii) Water quality management

Q11)a) Write note on role of RS and GIS in watershed management. **[8]**

b) Explain in short about the two terms: **[10]**

i) Genetic programming and

ii) Model Tree in water resources planning

OR

Q12)a) Explain data driven techniques in Artificial Neural Networks related to watershed management. **[8]**

b) How watersheds are classified? Explain integrated approach for watershed management. **[10]**

x x x

Total No. of Questions : 10]

SEAT No. :

P2959

[Total No. of Pages : 2

[5154]-511
B.E. (Civil)
TQM & MIS IN CIVIL ENGINEERING
(2012 Course) (401005 C) (Semester - I) (Elective - II) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are the factors affecting the poor quality of construction? **[4]**

b) What is PDCA cycle? Explain the application of PDCA cycle for quality achievement of structural designing of a building. **[6]**

OR

Q2) a) Define data and information. What are the major differences between them? Explain with the help of suitable example. **[6]**

b) Give measures to overcome the causes responsible for poor quality of construction. **[4]**

Q3) a) What are the benefits of applying TQM on construction site? **[4]**

b) State the definition of Six Sigma. Explain DMAIC and DMADV. What are the differences between the two? **[6]**

OR

Q4) a) What are the obstacles in implementing TQM on construction sites? **[4]**

b) What are the types of defects? Give two practical examples for each type of defect. **[6]**

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

b) Prepare checklist of reinforcement activity at design and concreting stage. **[6]**

c) What are the advantages and limitations of implementation of ISO on construction sites? **[6]**

OR

P.T.O.

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

b) What are the eight Quality Management Principles adopted by ISO 9001? **[8]**

c) Write short notes on any two of the following: **[5]**

i) Management Responsibility.

ii) Quality Management System.

iii) Product Realization.

Q7) a) Write a detailed note on 'Strategic Planning'. **[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 do you mean by Supply Chain Management? What are the objectives of SCM? **[8]**

b) Explain in detail 'Kaizen' system in TQM. **[8]**

Q9) a) What data and information is required for planning of new road corridor between two megacities? **[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 the advantages of DBMS? **[8]**

b) Write a detailed note on application of mobile technology in construction industry. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2960

[Total No. of Pages : 3

[5154]-512
B.E. (Civil)
EARTHQUAKE ENGINEERING
(2012 Course) (401005D) (Semester - I) (Elective - II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 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) What is the difference between Intensity and Magnitude of an earthquake? Explain MMS measurement of earthquake in brief. **[4]**

b) Explain the causes and types of earthquake. **[6]**

OR

Q2) a) Classify and describe with suitable sketches different types of waves generated by an earthquake and their effects on structure? **[4]**

b) Explain the elastic rebound theory. **[6]**

Q3) A simply supported beam 4 m long supports mass of 1000kg at the center. Find the natural period and natural frequency. $E = 2.1 \times 10^6$ kg/cm^2 & EI = 10,000 kN.m^2. **[6]**

OR

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

b) Draw the mathematical model for the structure shown in Fig. 4.1 and obtain governing equation of motion. Assume m = 1000kg. **[3]**

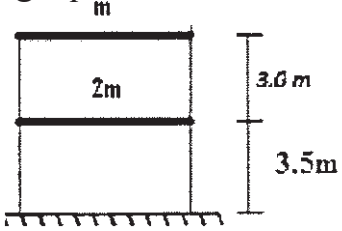


Figure 4.1

P.T.O.

Q5) Explain the following terms (Any two): **[4]**

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 with brick infill building shown in Fig. 6.1. The building is located in Zone V. The frames are spaced at 4m c/c. Assume m = 3000 kg and soil of Type II. **[4]**

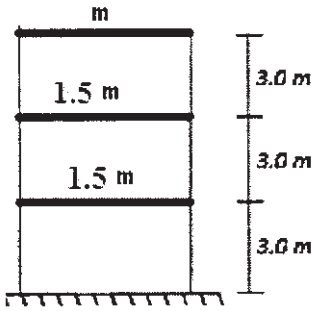


Figure 6.1

Q7) A (350 × 350)mm column is supported on isolated footing. The load coming on the footing is 550 kN and a moment of 30 kN-m due to lateral loads. The SBC of the soil is 155 kN/m^2. Using M25 grade of concrete and steel of grade Fe 415, design the 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 is disaster management? Explain various phases in it? **[8]**

OR

Q10)a) What are the basic precautions to be followed in rescue operations. **[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 techniques used for strengthening RCC beams and Columns. **[10]**

OR

Q12)a) Explain the Shear Wall and its behavior. **[8]**

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

Total No. of Questions : 10]

SEAT No. :

P2961

[Total No. of Pages : 2

[5154]-513
T.E. (Civil)
ADVANCED GEOTECHNICAL ENGINEERING
(2012 Pattern) (401005 E) (End Semester) (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, Q9 or Q10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and mention it clearly.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Discuss different soil classification system. **[6]**

b) Discuss, role of 'montmorillonite'. **[4]**

OR

Q2) a) Explain different 'clay minerals'. **[6]**

b) Discuss, 'Diffuse Double layer'. **[4]**

Q3) a) Explain: **[6]**

i) AEP

ii) PEP

iii) EP at rest

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

OR

Q4) a) Discuss the following: **[6]**

i) Different types of geosynthetics & their functions.

ii) Properties & functional requirements of geogrid.

b) Explain - 'geosynthetics in geoenvironment'. **[4]**

P.T.O.

Q5) Explain the following: **[16]**

a) Free & forced vibrations.

b) Barken's method.

c) Pauw's analysis.

d) Elartic half space method.

OR

Q6) a) Discuss the design criteria for impact type machines as per IS-2974 (Pt-II)-1966. **[8]**

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

Q7) Explain the following:

a) Bored compaction piles. **[4]**

b) Stone columns. **[4]**

c) Pecher grouting. **[5]**

d) Sand drains. **[5]**

OR

Q8) a) Explain the steps for design of sand drains, for following cases, **[9]**

i) Isotropic soil.

ii) Anisotropic soil.

b) Explain the stages of inserting reinforcement in vibro-expanded pile. **[9]**

Q9) a) Discuss different 'Rheological Models'. **[8]**

b) Explain the utility of 'Rheological Models'. **[8]**

OR

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

i) Secondary consolidation

ii) Creep

b) Discuss the 'basic & composite', 'Rheological Models'. **[8]**

Total No. of Questions :12]

SEAT No. :

P2962

[Total No. of Pages :3

[5154] - 514

B.E. (Civil)

DAMS AND HYDRAULIC STRUCTURES

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) State the objectives regarding the instrumentation in dam safety. **[3]**

b) Differentiate between large dam and small dam. **[3]**

OR

Q2) a) What are the types of arch dams? Write the merits and demerits of arch dams. **[3]**

b) What factors govern the selection of type of dam? **[3]**

Q3) a) State any three forces acting on gravity dam and write their equations. **[3]**

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

i) Constrution Joint.

ii) Drainage Gallery.

OR

Q4) a) Write a note on galleries in gravity dam with respect to location, size, shape and function. **[3]**

b) Write short note on buttress dams. **[3]**

P.T.O.

Q5) a) Draw neat sketch of any one type of spillway gate and explain. **[4]**

b) Write short note on safety and maintenance of spillway gate. **[4]**

OR

Q6) a) Explain pumped storage type of hydro-electric power plant. **[4]**

b) Write advantages and limitations of hydro power plant. **[4]**

Q7) a) Explain Swedish slip circle method of stability analysis with neat sketch. **[8]**

b) Write note on Khosla's theory application for design of structure on permeable foundations. Also explain the importance of exit gradient. **[8]**

OR

Q8) a) Explain Bilgh's theory of seepage with neat sketch. State its limitations. **[8]**

b) Determine the factor of safety of downstream slope of (homogenous section) an earthen dam drawn to a scale of 1:750 for the following data. **[8]**

i) Area of N- rectangle = 20 cm^2

ii) Area of T- rectangle = 10 cm^2

iii) Length of slip circle arc = 20 cm^2

iv) Angle of internal friction = 26^o

v) Cohesion C' = 4000 Kg/m^2

vi) Specific weight of soil = 1760 Kg/m^3

Q9) a) How irrigation canals are classified? Also describe the various considerations made in the alignment of an irrigation canal. **[8]**

b) Design an irrigation canal in alluvial soil according to lacey's factor theory. **[8]**

i) Full supply discharge = 12 m^3/s,

ii) Lacey's silt factor = 1,

iii) Channel side slope = 1/2:1

OR

Q10)a) State various types of canal falls and explain any one with the help of neat sketch. **[8]**

b) Explain the procedure of designing cross regulator. **[8]**

Q11)a) Write short note on: **[10]**

i) Launching Aprons,

ii) Stepped fall,

iii) Weir type escape,

iv) Hokey head groynes,

v) River training work.

b) What is Groynes? State the classification of Groynes. **[8]**

OR

Q12)a) Write short note on: **[10]**

i) Pipe aqueduct,

ii) Super passages,

iii) Syphon aqueduct,

iv) Level crossing,

v) Inlet and outlet.

b) What do you mean by C.D. works? Write the factors for selection of C.D. Works. Also explain design considerations of it. **[8]**

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Total No. of Questions :12]

SEAT No. :

P2963

[Total No. of Pages :6

[5154] - 515

B.E. (Civil)

QUANTITY SURVEYING, CONTRACTS AND TENDERS

(2012 Course) (401008) (End Semester) (Semester-II)

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 diagrams should be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) A brick wall is constructed to a length of 5m long, 3m height and 30 cm thick . Estimate the quantities of brick work and plastering required. Calculate the cost if the rate of brickwork is Rs.4900 per cu.m and of plastering is Rs.345 per sq.m. **[4]**

b) A client requires the estimation of his proposed building having a plot area of 120 m^2, and a built up area of 100 m^2 for taking loan from a bank. Explain the complete process of preparing the estimation for his building. **[2]**

OR

Q2) a) What are the different methods of taking out quantities for preparing estimates? **[3]**

b) Explain Bay method and Service unit method for preparing approximate estimate. **[3]**

Q3) a) What are Provisional sum & prime cost items. **[3]**

b) What is the objective of preparing preliminary estimate and what are the documents to be provided with a preliminary estimate and explain detailed estimate. **[3]**

OR

P.T.O.

Q4) a) Explain in detail the approximate estimate for Road work. **[3]**

b) A building was constructed to have a plinth area of $75m^2$. The total cost of construction was Rs. 11,62,500/-. The building has an height of 3.5m from ground level to roof top and parapet wall has an height of 75cm. Calculate the cost of similar building in the same locality to have an plinth area of 120 m^2 by **[3]**

i) Plinth area method &

ii) Cubic content (volume rate) method.

Q5) The plan and elevation for the column footing for an RCC framed structure is shown in fig. 2.a & 2.b. Work out the quantities for the following item of works **[8]**

a) Earthwork excavation for foundation.

b) C:C 1:2:4 for column footing.

OR

Q6) a) Work out the quantities for the following item of works by centre line method from the plan provided in fig 1.a &1. b.

i) Internal plastering. **[2]**

ii) RCC lintel provided throughout the walls of the building. **[2]**

b) Define valuation & what are the important factors influencing the value of building? **[2]**

Differentiate between **[2]**

i) Scrap Value and Salvage value.

ii) Capitalized value and Book value.

Q7) a) What are the objects of specification & characteristics of good specification? **[4]**

b) Briefly explain **[6]**

i) General or brief specification.

ii) Detailed specification.

iii) Standard specification.

c) Write a detailed specification for **[8]**

i) Damp proof course and,

ii) BBM in CM 1:6 for super structure

OR

Q8) a) Work out the quantity of material required for **[6]**

i) BBM in super structure - 1cu-m.

ii) Plastering to walls and ceiling 12 mm thick - 10 sq-m.

b) Explain how lead and lift, cost of material affect the rate of an item of work. Will the Centering, shuttering, scaffolding affect the rate of item of work, if so explain how. **[4]**

c) Using the standard format, conduct the rate analysis for the following item of work **[8]**

i) Cement concrete 1:2:4 for RCC Roof slab with 1.5% steel

ii) 2.5 cm thick Cement concrete 1:3:6 flooring

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. 4500/1000No,

v) Steel = Rs. 38,500/ MT.

Labour rate/day

i) Head mason = Rs. 600/-,

ii) Mason = 450/-,

iii) Mazdoor = Rs. 350/-,

iv) Bhisti/Helper = Rs. 300/-

Q9) a) What is a tender notice? Why and when the earnest money deposit are collected? An organization wish to construct a hospital building. The construction is estimated to be of Rs. 2.50 crore. The work is to be completed in 15 months. Prepare a tender notification to be published in national news paper, giving all details, inclusive of pre qualification. **[8]**

b) Explain the following: **[8]**

i) Global Tender.

ii) Open Tender.

iii) Limited Tender.

iv) Informal Tender.

OR

Q10)a) Write brief note about the P.W.D. & its branches for carrying out different types of work related to public interest. Explain the working responsibilities of **[4]**

i) Superintending Engineer,

ii) Executive Engineer &

iii) Junior Engineer.

b) Explain the process & significance of Administrative and Technical with an example. **[6]**

c) Explain the classification of works based on likely expenditure. What are the different methods of executing P.W.D works & explain Rate list method of execution of work. **[6]**

Q11)a) Explain the necessity for making contract. What are the type of contract & what are the informations that a contract document should a contain?**[6]**

b) Explain void, voidable valid contract. What are the essential requirements of valid contract as per the ICA (1872). **[6]**

c) What are the types of termination of contract? What are the types of penalties that are imposed on a contract and why are they imposed? **[4]**

OR

Q12)a) What is meant by Arbitration and what is its necessity in Civil Engineering & construction works. What are the types of Arbitration and explain any one. **[6]**

b) What are the essentials for: **[6]**

i) Qualification,

ii) Appointment of arbitrator,

iii) Powers and duties of arbitrator as per IA & CA(1996)

c) Explain the advantages & disadvantages of arbitration. **[4]**

Q.NO 6(a) fig 1(a) - Plan.
A →
3×5
1.7×5
5×3
4×3
4×5
W
W1
D
D1
V
Q.NO 5 fig 2(a) Plan
1.50
0.30
1.50
fig 2(b) Section
R.C.C. Beam
R.C.C. Column
0.15
0.45
0.30
0.10
1.50
fig 1(b) - Section along A-A
0.15 R.C.C. Lintel
0.30 B.B.M. Wall
3.0
0.90
0.30
0.20
0.30
0.20
R.C.C. Roof Slab
Schedule of Openings
Door
D - 0.90 × 2.10
D1 - 0.75 × 2.10
Opening - O
0.90 × 2.10
Window
W - 1.20 × 1.50
W1 - 0.90 × 1.20
Ventilator
V - 0.60 × 0.30
Note : All Dimensions are in metre.

ꝏꝏꝏ

Total No. of Questions : 10]

SEAT No. :

P2964

[Total No. of Pages : 3

[5154]-516
B.E. (Civil)
ADVANCED STRUCTURAL DESIGN (Elective - III)
(2012 Pattern) (Semester - II) (End Semester) (401009A)

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 examinations.***
4) ***If necessary, assume suitable data and indicate clearly.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) Calculate the moment of inertia for deflection calculation for the floor deck shown in Fig. 1. All the dimensions mentioned are in mm. **[10]**

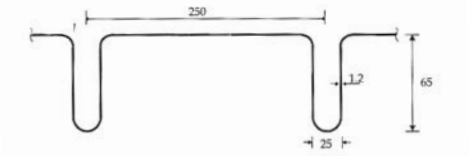


Fig. 1

OR

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

Q3) Determine the plastic moment and draw the bending moment diagram for the frame shown in Fig. 2. **[10]**

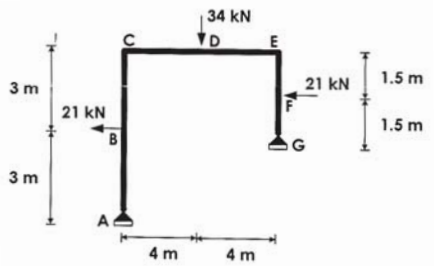


Fig. 2

OR

Q4) Explain how the basic proportioning of the dimensions of a self-supporting steel chimney is done. **[10]**

Q5) A (7 × 4) m two-way slab is simply supported on all four sides. It carries a uniformly distributed load w kN/m^2. If the slab is to be isotropically reinforced, calculate the ultimate moment m in terms of w. **[16]**

OR

P.T.O.

Q6) The yield line patterns for a rectangular slab simply supported at two opposite edges and free at the other two edges are shown in Fig. 3. The slab is isotropically reinforced in the top and the bottom with ultimate positive and negative moments per unit width m_u and m_u' respectively. Determine the ultimate concentrated load P that the slab can carry. **[16]**

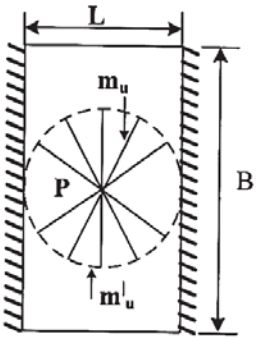


Fig. 3

Q7) For the elevated water tank shown in Fig.4, analyze the staging and calculate the resultant moment at the base of the staging for tank-full condition. The tank is located on soft soil in seismic zone III. The staging confirms to the ductile detailing of IS 13920. The weights of various components are given below.

Roof slab = 100 kN; wall = 200 kN; floor slab = 130 kN; floor beam = 65 kN; gallery = 80 kN; columns = 150 kN; braces = 220 kN.

The total stiffness of the columns may be taken as 5,500 kN/m. **[18]**

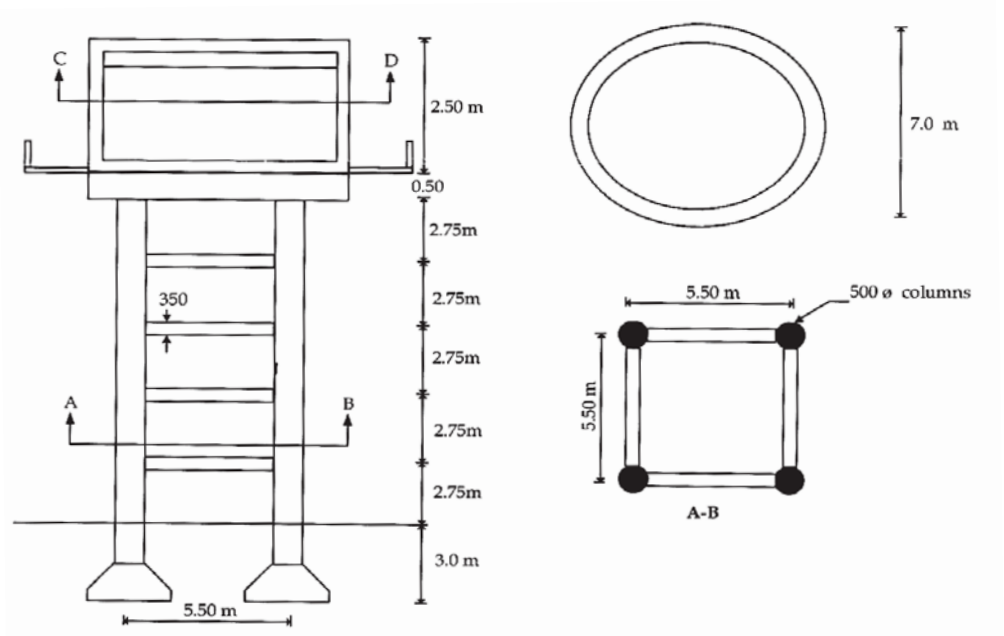


Fig. 2

OR

Q8) a) For the elevated water tank in Q.7, analyze the staging for tank empty condition. **[12]**

b) Explain the spring-mass model of an elevated water tank. **[6]**

Q9) The un-factored load combinations on a 5 m wide RC shear wall are as follows:

Load combination	BM (kNm)	Axial force (kN)	Shear force (kN)
(DL+IL)	450	1,700	25
EL	3,500	150	450

Design the RC shear wall for the given loads and sketch the details of reinforcement. Use M30 grade concrete and Fe 500 grade of steel. **[16]**

OR

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

a) Boundary elements in a shear wall

b) Modes of failure of shear walls.

c) Typical reinforcement detailing for a RC shear wall with boundary elements

d) Coupled shear walls.

Total No. of Questions : 10]

SEAT No. :

P2965

[Total No. of Pages : 2

[5154]- 517
B.E. (Civil)
ADVANCED FOUNDATION ENGINEERING
(2012 Pattern) (w.e.f. June 2015) (End Sem.) (Elective -III (2)) (Semester -II) (401009 B)

Time :2½ Hours] *[Max. Marks :70*

Instructions to candidates:

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

Q1) a) What are the I.S. code provisions for subsoil exploration of airports for runways for preliminary and detail investigations. **[5]**

b) Draw a typical layout of canal with all technical details as per I.S. code provisions and explain functions of each component. **[5]**

OR

Q2) a) Explain how would you plan subsoil explorations for preliminary and detail investigations for the construction of bridge on national highway. **[5]**

b) Explain any one case study of failure of a Earthdam with all technical details. **[5]**

Q3) a) Explain classification of piles based on materials & functions. **[5]**

b) Write a short note on " Testing of piles subjected to tensile loads". **[5]**

OR

Q4) a) Draw a neat sketch of sand drains and explain functions of each components. **[5]**

b) Explain the static method to estimate load carrying capacity of underreamed piles. Write meaning of each term. **[5]**

Q5) a) Explain how effect of incline loadings are considered in the design of shallow foundations. **[8]**

b) Explain the term " Raft foundation is called a floating foundation". Also, explain the design of Raft foundation on sandy soil from the data obtained by SPT test. **[8]**

OR

P.T.O.

Q6) a) Explain the equations proposed by i) Terzaghi and ii) Skempton for estimation of net ultimate bearing capacity of shallow foundation. **[8]**

b) Explain static method for estimation of load carrying capacity of friction pile. **[8]**

Q7) a) Explain the various forces acting on well foundation.Also, explain any four forces, How are evaluated using the provisions of IS & IRC codes.**[8]**

b) What is tilt and shifts in case of well foundation? What are tolerable limits of tilt & shift. What are the corrective measures adopted to counter-act tilt & shift. **[8]**

OR

Q8) a) What is cofferdam? What are the situations, where cofferdam is used. Explain any two cofferdams with suitable sketches. **[8]**

b) Explain the design guidelines as per IRC and IS codes for proportioning of component parts of well foundation (any three) **[8]**

Q9) a) What is positive projecting conduit? Explain the different types of positive projecting conduits. **[9]**

b) Explain how load on a rigid ditch conduit is evaluated. **[9]**

OR

Q10) Write short notes on: **[18]**

a) Imperfect ditch conduit

b) Negative projecting conduit

c) A rigid ditch conduit.

Total No. of Questions : 12]

SEAT No. :

P2966

[Total No. of Pages : 3

[5154]- 518

B.E. (Civil Engineering)

HYDROPOWER ENGINEERING

(2012 Pattern) (Semester - II) (Elective - III) (401009 C)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer any six questions from Q.No.1 OR 2, Q.No.3 OR 4, Q.No.5 OR 6, Q.No.7 OR 8, Q.No.9 OR 10, Q11 OR 12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What is the effect of Global warming? **[3]**

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

OR

Q2) a) What are the different trends in energy use patterns in India? Explain the present scenario of any one trend. **[4]**

b) Write note on hydropower development in India. **[3]**

Q3) a) Give classification of hydro electric power plants. **[3]**

b) Write a note on valley dam plants. **[4]**

OR

Q4) a) Define: Reservoir capacity,pondage capacity,pondage factor and plant capacity. **[4]**

b) What are the advantages of pumped storage plants? **[3]**

Q5) a) Define: Connected load, maximum demand and average demand. **[3]**

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

OR

P.T.O.

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

b) Explain the effect of variable load on operation of power plant. **[3]**

Q7) a) Differentiate between exposed and buried penstocks. **[4]**

b) Explain canal intakes, dam intakes and tower intakes in short. **[6]**

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

OR

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

b) Write a note on generators. **[4]**

c) What is the necessity of cooling the transformers? Elaborate different methods of it. **[6]**

Q9) a) Write note on 'open type surge tanks' and 'restricted orifice type surge tanks'. **[6]**

b) What is cavitation and how can you minimize it? **[4]**

c) A power house is equipped with four units of vertical shafts pelton turbines to be coupled with 70000k VA, 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 to gether is to be 94%. The four units together will provide power of 250000 Kw with the efficiency of 90%. The nozzle efficiency is 0.98. Find the design discharge for the turbine, jet diameter and number of jets , the nozzle tip diameter and specific speed. **[6]**

OR

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

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

c) In a hydroelectric plant, Kaplan turbine is fixed with following specifications: Calculate speed ratio, flow ratio and overall efficiency.

Operation Head = 22.5 m, Output power = 126 MW, Discharge = 615 m^3/s, speed = 68.2 rpm, Runner tip to tip diameter = (D) = 9.3m,

Hub Diameter = (D_h)=4.3m,Number of blades =6 **[6]**

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

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

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

OR

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

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

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

Total No. of Questions :10]

SEAT No. :

P2967

[Total No. of Pages : 2

[5154]-519
B.E.(Civil)
AIR POLLUTION AND CONTROL
(2012 Pattern) (Semester-II) (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 side indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables are allowed.***
5) ***Assume suitable data, if necessary.***

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

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

OR

Q2) a) Enlist primary and secondary meteorological factors influencing air pollution & explain any two. **[6]**

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

Q3) a) What is iso kinetic sampling? Explain with a neat sketch. Why it is required? **[6]**

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

OR

Q4) a) Explain Radiation and Subsidence Inversion. **[6]**

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

Q5) a) What are the advantages and disadvantages of Electro Static Precipitator? **[8]**

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

OR

P.T.O.

Q6) a) Explain working principle of a gravity setting chamber with a neat sketch and how the smallest size of particles removed can be found out? **[8]**

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

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

b) What are the advantages and disadvantages of bag filter? **[8]**

OR

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

b) What is a need of Environmental Impact Assessment (EIA)? Also write about Indian policies requiring EIA. **[8]**

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

b) Explain Cost-benefit analysis (CBA) or Cost-Benefit Ratio in view of: Purposes of CBA, Process, Evaluation, and Cost-benefit ratio analysis with example. **[9]**

OR

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

b) Write a short note on the following EIA methodologies: **[9]**

i) Matrix Method and

ii) Ad Hoc method.

Total No. of Questions : 8]

SEAT No :

P2968

[Total No. of Pages :3

[5154]-520

B.E.(Civil Engineering)

FINITE ELEMENT METHOD IN CIVIL ENGINEERING

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

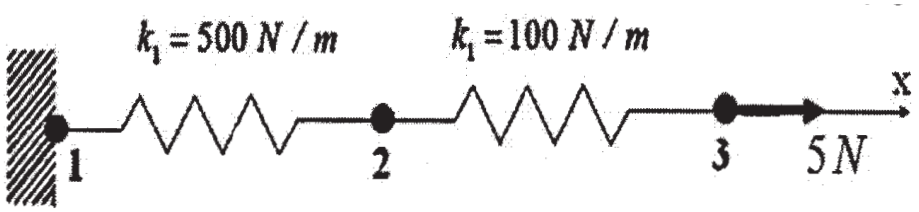
Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

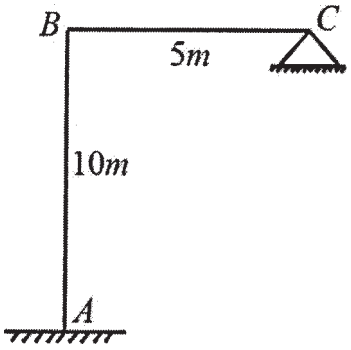
1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

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

b) Detrmine the axial displacements at nodes 2 and 3 for the spring assembly given below. **[6]**



c) Derive the stiffness matrix of portal frame ABC as shown in figure using finite element method. **[8]**

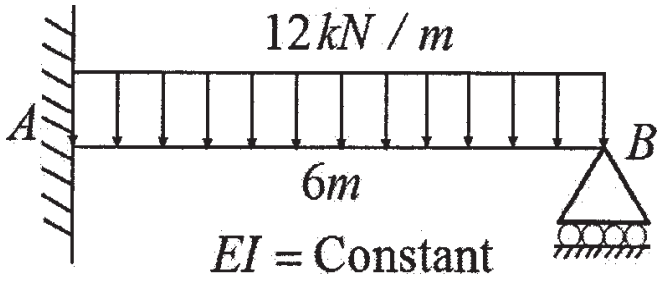


OR

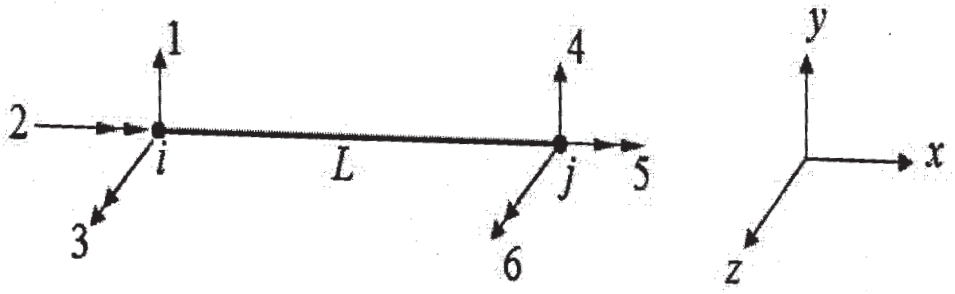
P.T.O.

Q2) a) Explain step by step procedure for finite element method. **[6]**

b) Obtain fixed end moment at support A using finite element method. Take $E = 2\times10^{8}$ kN/m^2 and $I = 4\times10^{-6}$m^4. **[6]**



c) Derive the stiffness matrix for the grid element considering six degrees of freedom. **[8]**



Q3) a) Write short note on principle of minimum potential energy and principle of virtual work. **[6]**

b) Derive 4×4 stiffness matrix for the truss member using finite element formulation. **[12]**

OR

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

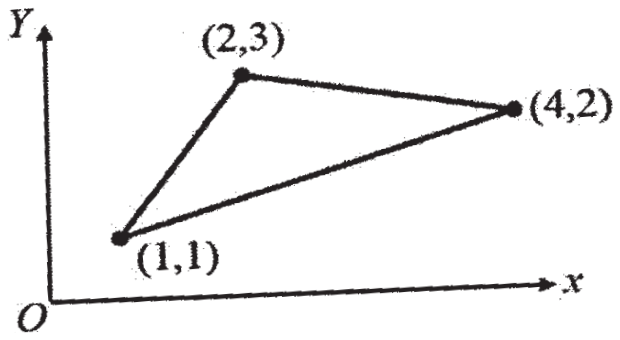
b) Derive strain displacement matrix [B] for the four noded rectangular element using finite element formulation. **[12]**

Q5) a) Derive the shape function for two noded 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 the area coordinates for the three noded CST elements as shown in figure. **[8]**



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

Q7) Derive the stiffness matrix for 1D isoparametric element using principle of virtual work. **[16]**

OR

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

✈ ✈ ✈

Total No. of Questions : 12]

SEAT No. :

P2969

[Total No. of Pages : 2

[5154]-521
B.E. (Civil)
CONSTRUCTION MANAGEMENT (Elective - IV)
(2012 Course) (Semester - II) (End Sem.) (401010A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) Write a note on Project monitoring & Reporting System. **[6]**

OR

Q2) Explain in detail purpose of construction scheduling. **[6]**

Q3) Define. Prepare WBS for the construction of bridge across river. **[8]**

OR

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

a) Application of LOB.

b) Work study.

Q5) Explain in detail Building & other Construction Worker's act 1996. **[6]**

OR

Q6) Discuss the importance of child labour act in construction sector. **[6]**

Q7) a) What are the different types of risks involved in any road project. **[6]**

b) Write short note on: Break Even Analysis. **[6]**

c) Discuss in detail the concept of risk mitigation. **[6]**

OR

P.T.O.

Q8) a) Write short note on: Risk control. **[6]**

b) Discuss in detail decision tree analysis. **[6]**

c) Write short note on: Value Management. **[6]**

Q9) a) Discuss the role of materials management. **[6]**

b) What are the aim & objective of career planning. **[6]**

c) Discuss the importance of vendor networking in construction projects. **[4]**

OR

Q10)a) A supplier has to supply 500 units of a commodity to his client every week. The cost rate is Rs. 200 per unit and ordering cost is Rs. 200 per order. The carrying cost of inventory is 20% per year of the cost of inventory. Find Economical order quantity. **[6]**

b) Explain the importance of buyer seller relationship in civil engineering projects. **[6]**

c) Write short note on: Human Resource Information System. **[4]**

Q11)a) Explain the term artificial intelligence. Discuss its benefits to construction sector. **[8]**

b) What do you mean by genetic algorithm? Explain with suitable example. **[8]**

OR

Q12)a) Explain with example importance of ANN in construction management. **[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 :

P 2970

[Total No. of Pages :3

[5154]-522
B.E.(Civil)
ADVANCED TRANSPORTATION ENGINEERING
(2012 Pattern) (Semester-II) (401010 B) (Elective-IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the comprehensive transport planning with a flow diagram. **[6]**

b) Explain the road side interview method of carrying O-D survey. **[4]**

OR

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

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

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

Q3) a) What are the advantages of providing BRTS (Bus rapid Transit Systems) in a city. **[5]**

b) Write a short note on NHDP projects. **[5]**

OR

Q4) Compare and contrast between. **[10]**

a) BOT and BOOT
b) NPV and B/C ratio

Q5) a) Describe with an example the process of conducting classified traffic volume count using the manual method. Also, explain how you would use the data collected for improving the existing traffic scenario. **[10]**

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

OR

P.T.O.

Q6) a) Enumerate the various traffic studies. Describe any two modern technologies involved in conduction of the traffic surveys. **[10]**

b) Write a note on various 'Level of Service '(LOS) of a road. **[6]**

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

i) Two lane single carriageway.

ii) Initial traffic in the year of completion of construction = 400 CVPD in both directions.

iii) Traffic growth rate per annum = 7.5%.

iv) Design life = 15 years.

v) CBR = 4%

vi) Terrain - Rolling

Assume any necessary data but state it clearly.

b) With neat sketches explain any 3 types of distresses on flexible pavements. **[6]**

OR

Q8) a) With reference to IRC 37, explain the following terms: **[10]**

i) Vehicle Damage Factor

ii) Lane Distribution Factor

b) Write a note on pavement unevenness and its measurement. **[6]**

Q9) a) List out the various types of overlays. Explain with an example the design procedure for estimating the thickness of the overlay as per IRC 81.**[12]**

b) Explain the concept behind the design of rigid pavement in comparison to that of a flexible pavement. **[6]**

OR

Q10)a) Discuss the various parameters necessary for the design of thickness of rigid pavement as per IRC 58. **[6]**

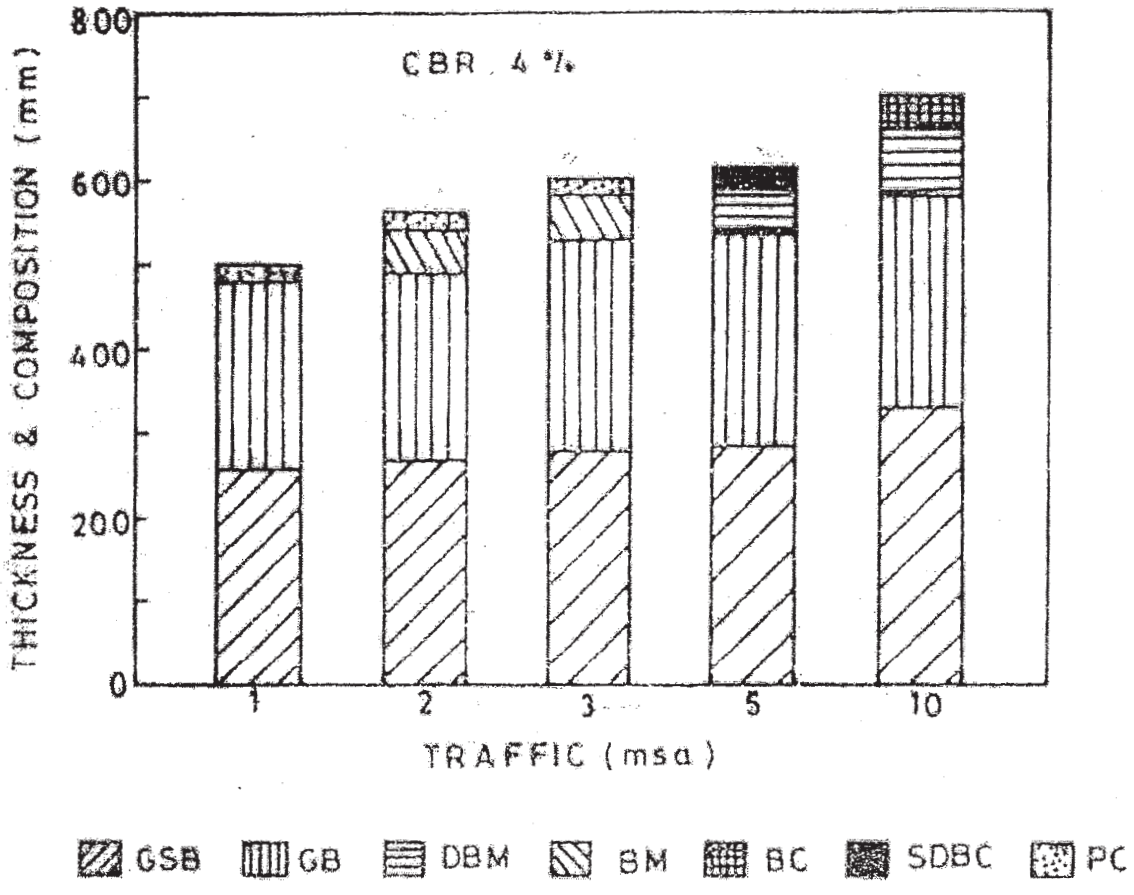
b) Explain function of dowel bars in concrete pavement with a sketch. **[6]**

c) Write a note on failures in rigid pavement. **[6]**

PAVEMENT DESIGN CATALOGUE

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

CBR 4%					
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	480	20 PC		225	255
2	540	20 PC	50 BM	225	265
3	580	20 PC	50 BM	250	280
5	620	25 SDBC	60 DBM	250	285
10	700	40 BC	80 DBM	250	330



Total No. of Questions : 10]

SEAT No. :

P2971

[Total No. of Pages : 4

[5154]- 523
B.E. (Civil)
STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS
(2012 Pattern) (Semester - II) (Elective - IV) (401010 C)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Use of electronic pocket calculator is allowed in the examination.***
5) ***Use of cell phone is prohibited in the examination hall.***

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

b) Find a root of $x = e^{-x}$ Carry out computations upto 3 iterations by secant method. **[6]**

OR

Q2) a) Explain need and scope of Numerical integration. **[5]**

b) Evaluate $\int_1^5 \frac{1}{x} dx$ by three point Gaussian Quadrature formula. **[5]**

Q3) a) Write short notes on : Simpson's Rule and it's applications. **[3]**

b) Solve the following equation by Gauss seidal Method. Obtain the solution at the end of fourth iteration. **[7]**

$7a + 2b - 5c = -18$

$a + 5b - 3c = -40$

$2a - b - 9c = -26$

OR

Q4) a) Use the trapezoidal rule to numerically integrate **[3]**

$f(x) = 0.2 + 25x$ from $a = 0$ to $b = 2$

P.T.O.

b) Solve by Gauss Elimination Method. **[7]**

$2x + y + z = 10$

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

$x + 4y + 9z = 16$

Q5) a) Explain advantages and disadvantages of statistical method. **[3]**

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

X	0-10	10-20	20-30	30-40	40-50
f	14	20	22	27	25

c) The following table gives marks obtained by a group of 80 students in an examination. calculate the variance. **[7]**

Marks obtained	10-14	14-18	18-22	22-26	26-30	30-34	34-38	38-42	42-46	46-50	50-54	54-58
No of students	2	4	4	8	12	16	10	8	4	6	2	4

OR

Q6) a) Explain sampling and methods of sampling. **[3]**

b) The number of employees average wages per employee and variance of the wage per employee for the two different organisations are given below. **[6]**

	Organisation A	Organisation B
No of Employees	100	200
Avg wage/Employee (Rs)	5000	8000
Variance of marks per Employee	6000	10000

Which organisation has more uniform wages?

c) Find mean and standard deviation. **[7]**

Class interval	59.5-62.5	62.5-65.5	65.5-68.5	68.5-71.5	71.5-74.5
No of observation	5	18	42	27	8

Q7) a) There items are drawn at random from a box containing 2 defective and 4 non-defective item. Find the expected number of Non defective items. **[4]**

b) The scores obtained by students of a class follow a uniform distribution with woo as maximum and minimum as 60. find the mean score and standard deviation of scores. if the passing score is set at 70, what percentage of students will pass the examination. **[6]**

c) Frequencies of normal distribution having same mean standard deviation and total frequencies as in.

Observed frequencies	1	5	20	28	42	22	15	5	2
Expected frequencies	1	6	18	25	40	25	18	6	1

Apply the x^2 test of goodness of fit. **[7]**

OR

Q8) a) The marks obtained in statistical method paper in Engineering, followed normal distribution with mean 75 and standard deviation 10. if 250 students appeared at the examination Estimate the number of students scoring. **[7]**

i) Less than 70 marks

ii) More than 90 marks.

b) In 524 times of six face dice, odd points appeared 180 times. would you say that dice is fair 5% level of significance. **[6]**

c) Explain chi square distribution and its applications. **[4]**

Q9) a) An estimate No. of students who get more than 48 but less than 50 Marks from following data **[8]**

Marks upto	45	50	55	60	65
No. of student	447	484	505	511	574

Use Newton's interpolation.

b) The following data (in Rs crores) gives expenditure on advertisement and sales of a particular form. **[9]**

	Advertisement Expenditure (x)	sales(Y)
Mean	10	90
Standard deviation	03	12
Co-relation coefficient	0.8	0.8

i) Calculate the regression equation of y on x.

ii) Estimate the advertisement expenditure required to attain a sales target of Rs. 120 Crores.

OR

Q10)a) Extrapolate business done in 2016 from following data. **[8]**

Year	2011	2012	2013	2014	2015
Business done (Rs Lakh)	160	245	375	535	790

b) The following table gives indices of industrial production of registered unemployed (100 thousand). Calculate value of Co efficient of co-relation. **[9]**

Year	2005	2006	2007	2008	2009	2010	2011	2012
Index of production	100	102	104	107	105	112	103	99
No.of unemployed	15	12	13	11	12	12	19	26

Total No. of Questions : 10]

SEAT No. :

P2972

[Total No. of Pages : 2

[5154]- 524
B.E. (Civil)
PLUMBING ENGINEERING
(2012 Pattern) (Semester - II) (Open 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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

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

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

OR

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

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

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

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

OR

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

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

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 Indian pattern water closets & European type Closets with neat sketch. **[8]**

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

OR

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

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

Q9) a) Explain RCC, PVC, Nu-Drain, and Stoneware for building sewers. Also explain ancient stone ware drainage of Mohenjo-Daro. **[10]**

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

OR

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

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

Total No. of Questions : 8]

SEAT No. :

P2973

[Total No. of Pages : 2

[5154]- 525
B.E. (Civil)
GREEN BUILDING TECHNOLOGY
(2012 Pattern) (Semester - II) (Elective - IV - Open Elective)
(End Sem.)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***

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

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

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

OR

Q2) a) Why today Construction Waste is considered as a resource? **[7]**

b) Why today low VOC materials are preferred for sustainance? **[6]**

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

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

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

OR

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

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

P.T.O.

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

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

OR

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

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

Q7) a) Elaborate importance of rating the buildings. **[9]**

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

OR

Q8) a) Elaborate in detail the following rating system: "BREEAM". **[9]**

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

Total No. of Questions : 8]

SEAT No. :

P2974

[Total No. of Pages : 2

[5154]- 526
B.E. (Civil Engineering)
FERROCEMENT TECHNOLOGY
(2012 Pattern) (Semester - II) (Elective - IV) (Open Elective)
(End Sem.)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) What is Ferrocement? Discuss applications of ferrocement in construction industry. **[6]**

b) Discuss properties of ferrocement under static loads. **[6]**

c) Discuss strength through shapes for structural elements. **[6]**

OR

Q2) a) Explain - **[6]**

i) Protective Surface Treatments

ii) Damages to Ferrocement structures.

b) Discuss the parameters affecting material properties of Ferrocement. **[6]**

c) Discuss methods of mortar application during construction of Ferrocement. **[6]**

Q3) a) Discuss building components using Ferrocement, explain Ferrocement cavity wall in detail. **[6]**

b) Explain Earthquake resistance properties of Ferrocement. **[6]**

c) Discuss factors govering cost analysis of Ferrocement. **[6]**

OR

P.T.O.

Q4) a) Write a note on 'Ferrocement in Foundation'. **[6]**

b) Determine quantities of materials required for a ferrocement partion wall 30 mm thick and of size 4m × 3m Details are as follows: **[12]**

i) Skeletal steel $\rightarrow$ 8 mm dia, 500 mmc/c in both directions

ii) Weld mesh $\rightarrow$ 150 mm × 150 mm × 12 ×12g

iii) Chicken mesh $\rightarrow$ 2 layers (one layer on each face) 13 × 13 mm × 24 × 24g

Mortar - cement mortar 1 : 3 by volume.

Q5) a) Compare RCC and Ferrocement counter for Γ Retaining wall. **[6]**

b) Discuss various types of storage tanks with Ferrocement. **[6]**

c) Write a note on 'Ferrocement water proofing'. **[5]**

OR

Q6) a) Discuss design procedure of soil retaining structures in Ferrocement , with example. **[6]**

b) Discuss Ferrocement septic Tank. **[5]**

c) Discuss layered system of ferrocement applications. **[6]**

Q7) a) Discuss 'Ferrocement shells'. **[5]**

b) Discuss Ferrocement precast walling and flooring panels. **[6]**

c) Discuss various types of large size structures. **[6]**

OR

Q8) a) Discuss design of joints in precast elements. **[5]**

b) Discuss various precast members cast using ferrocement. **[6]**

c) Discuss 'Ferrocement pyramids'. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2975

[Total No. of Pages : 2

[5154]- 527
B.E. (Civil)
SUB SEA ENGINEERING
(2012 Pattern) (Semester - II) (Elective - IV) (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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non-programmable calculator.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain Metaocean condition. **[4]**

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

OR

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

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

Q3) a) Explain challenges faced by Civil Engineer in sub sea oil exploration project. **[6]**

b) What is shallow and deep water oil exploration? **[5]**

OR

Q4) a) Explain elements of Risk assessment for subsea production system. **[6]**

b) State how field economics dominates the oil exploration at any subsea site. **[5]**

P.T.O.

Q5) a) Explain flow line, umbilical, riser, mooring. **[8]**

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

OR

Q6) a) Explain the step by step design of subsea pipe line system. **[7]**

b) Explain intervention methods AUV's, ROV's, and Divers. **[8]**

Q7) a) Explain the effect of acid gases on corrosion of subsea pipe lines. **[8]**

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

OR

Q8) a) Explain types of corrosion in subsea oil field. **[9]**

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

Q9) a) Sketch typical Christmas tree, Enlist typical design loads under consideration. **[9]**

b) Explain phenomenon of buckling and collapse of Pipe under deep sea. **[8]**

OR

Q10) a) Explain stress analysis criteria for Pipe line design under design loads. **[9]**

b) How the geotechnical parameters affect the design of Pipe line at sub sea level. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2976

[Total No. of Pages : 2

[5154]- 528
B.E. (Civil)
WAVE MECHANICS
(2012 Pattern) (Semester - II) (Open Elective - (4e)) (401010 DE)

Time :2½ 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) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Discuss classification of waves. **[3]**

b) Discuss the process of wave generation and draw a definition sketch of wave propagation. **[4]**

OR

Q2) a) Discuss any one numerical model for wave forecasting in detail. **[4]**

b) Enumerate methods for wave measurement. **[3]**

Q3) a) Obtain expressions for wave velocity and acceleration. **[4]**

b) Short note on non-linear wave theories. **[3]**

OR

Q4) a) Define celerity, group velocity, dynamic free surface boundary condition, kinematic free surface boundary condition. **[4]**

b) Write a note on choice of wave theory. **[3]**

Q5) a) Write short notes on wave set up, wave run up. **[2]**

b) A wave of significant height 3.5 m and period 10 sec in deep water travels towards shore parallel to bed contours. If its crest makes an angle of 30 with bed contour of 12 m before refraction calculate wave height after crossing the contour. **[4]**

OR

P.T.O.

Q6) a) Write a short note on shoaling. **[3]**

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

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

b) What is wave spectrum analysis? What is its significance? **[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) Elaborate in detail the dynamic beach response to the storms with neat figures. **[6]**

b) Define the terms sea, currents, surges, tides and Tsunamis. **[4]**

c) What are the man induced causes of coastal erosion? **[6]**

OR

Q10)a) Draw a typical beach profile and explain surf zone. **[5]**

b) What are the natural causes of shore line erosion. **[5]**

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

Q11)a) Explain the effect of extreme events on littoral processes. **[6]**

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

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

OR

Q12)a) Enlist different factors affecting the littoral process and explain any one in detail. **[6]**

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

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

Total No. of Questions : 10]

SEAT No :

P 2977

[Total No. of Pages :4

[5154]-531
B.E.(Mechanical)
REFRIGERATION AND AIR CONDITIONING
(Semester-I) (402041) (2012 Course) (Endsemester)

Time : 2½ Hours] *[Max. Marks : 70*

Instruction 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 and mention it clearly.***
4) ***Use of steam table is allowed.***

Q1) a) Explain in detail the commercial refrigeration system used for ice plant. **[5]**

b) A vapour compression refrigeration system works between the pressures of 4.98 bar and 1.86 bar. The vapour is superheated at the end of compression, its temperature being 25°C. The liquid is sub cooled to 9°C before throttling. The vapor is 95% dry before compression. Using the data given below find COP of the refrigerator. The specific heat at constant pressure of superheated vapor is 0.65 kJ/kgK and that of liquid is 0.97 kJ/kgK. **[5]**

Pressure (bar)	Temp(°C)	h_f(kJ/kg)	h_{fg}(kJ/kg)
4.98	14.45	49.22	148.3
1.86	–15	21.74	162

OR

Q2) a) Explain how practical VCC deviates from simple saturated VCC. **[6]**

b) What is the necessity of multi-pressure systems? Name the commonly used multipressure systems. **[4]**

Q3) a) Explain the use of following components in vapour compression system:

i) Accumulator; ii) Receiver;

iii) Filter / dryer; iv) liquid suction heat exchanger **[4]**

b) A dense air refrigerating system operating between pressures of 17.5 bar and 3.5 bars is to produce 10 tonnes of refrigeration. Air leaves the refrigerating coils at –7°C and it leaves the air cooler at 15.5°C. Neglecting losses and clearance, calculate the net work done per minute and the COP. For air C_p=1.005 kJ/kgK and γ=1.4. **[6]**

OR

P.T.O.

Q4) a) Discuss ODP, GWP and LCCP of refrigerant. **[6]**

b) Find out the generator temperature for an absorption system having evaporator and absorber temperatures as 250 K and 310 K respectively. Maximum C.O.P. is to be 1.30. If the saturated steam is supplied at a temperature 15 K above the generator temperature, what is the steam pressure? **[4]**

Q5) a) Moist air at saturated atmospheric pressure is passed over a cooling coil. The inlet state-DBT 30°C, RH 50% and exit state-DBT 15°C, RH 90%. Show the process on psychrometric chart. Determine the amount of heat and moisture removed per kg of dry air. **[6]**

b) Calculate; 1. Relative humidity 2. Humidity ratio 3. Dew point temperature 4. Density 5. Enthalpy of atmospheric air when the DBT is 35°C, WBT is 23°C and barometer reads 100kPa. **[10]**

OR

Q6) a) Derive an expression for specific humidity and show that it is a function of vapour pressure and barometric pressure of air. **[6]**

b) A building has the following calculated cooling loads: **[10]**

RSH gain = 310 kW, RLH gain = 100 kW

The space is maintained at the following conditions:

Room DBT = 25°C Room RH = 50%.

Outdoor air is at 28°C and 50% RH. And 10% of mass of air supplied to the building is outdoor air. If the air supplied to the space is not to be at a temperature lower than 18°C, Find.

i) Minimum amount of air supplied to space in m^3/s

ii) Volume flow rates of return air, exhaust air and outdoor air

iii) State and volume flow rate of air entering the cooling coil

iv) Capacity ADP,BPF and SHF of cooling coil.

Q7) a) State the factors which should be taken into consideration while selecting a system of air-conditioning. **[6]**

b) Explain the following control devices. **[8]**

i) Thermostats ii) Automatic humidity control

c) Enumerate the functional elements of a control unit. **[4]**

OR

Q8) a) Explain briefly the following types of reciprocating compressors: **[6]**

i) Semi sealed type ii) Hermetically sealed type

b) Give the main types of condensers with specific application of each type. **[6]**

c) Explain Flooded type evaporator with neat sketch. **[6]**

Q9) a) Define the following as applied to 'Air distribution': **[12]**
Intake, Outlet, Grille, Register, Diffuser, Throw, Drop and Primary air

b) The main supply air duct of an air-conditioning system is 100cm×90cm in cross section and carries 10 m^3/s of air. It branches off in to two ducts, one 80cm×80cm and the other 80cm×60cm. If the mean velocity in the larger branch is 9 m/s, find the mean velocities in the main duct and smaller branch. **[6]**

OR

Q10)a) Explain any two of the following air distribution system: **[8]**

i) Ejector system

ii) Downward system

iii) Upward system

b) A centrifugal fan with90cm X 70cm outlet is moving standard air at a rate of 11.5 m^3/s through a system which consists of straight inlet and outlet ducts. The inlet duct is 90cm in diameter and 15m long. The outlet duct is 100cm in diameter and 60m long. There is a fan diffuser between the fan discharge and the 100cm diameter duct for which thepressure loss is onethird the difference in velocity pressures. The pressure drop at the filter, damper and cooling coil (AC apparatus) in the inlet duct is 150 Pa. The loss at the entry to the inlet is 0.5 × velocity pressure. The friction factor for the outlet duct is 0.0035 and that for the inlet duct is 0.004. Determine the fan total pressure. The air is sucked in by the inlet duct and delivered by the oulet at atmospheric pressure. **[10]**

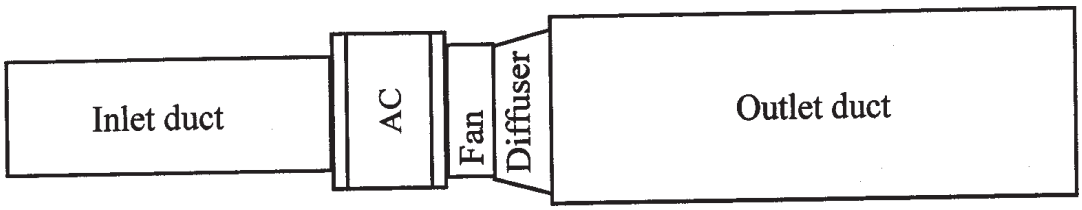
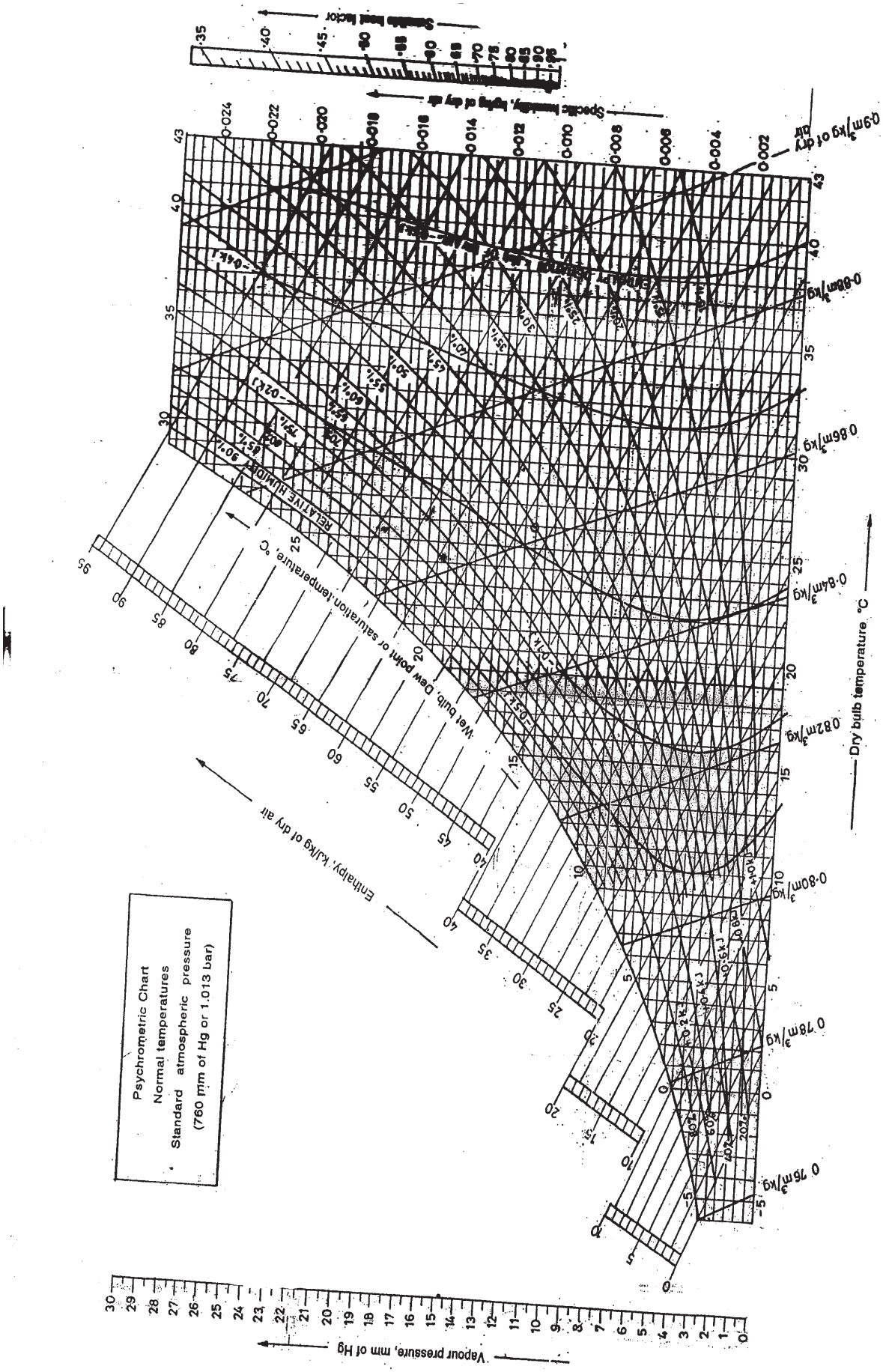


Fig. for Q. 10 b)


Psychrometric Chart
Normal temperatures
Standard atmospheric pressure
(760 mm of Hg or 1.013 bar)
Enthalpy, kJ/kg of dry air
Dry bulb temperature, °C
Wet bulb, Dew point or saturation temperature, °C
Vapour pressure, mm of Hg
Specific humidity, kg/kg of dry air
Sensible heat factor
RELATIVE HUMIDITY

Total No. of Questions : 10]

SEAT No. :

P2978

[Total No. of Pages : 3

[5154]-532
B.E. (Mechanical Engineering)
CAD/CAM and Automation
(2012 Course) (End Semester) (402042)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer five questions.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic calculator allowed.***
4) ***Assume suitable data.***

Q1) A line is drawn with vertices A(4,4) B(15,10) has undergone following transformation in sequence. **[10]**

a) Rotation through 45° anticlockwise

b) Scaling by 1.5 units.

c) Reflection about x axis.

Find concatenated matrix and new co-ordinates of triangle.

OR

Q2) a) Write equation of line having P_1 [3,5,8] and P_2 [6,4,3] and find tangent vectors and points on line at μ = 0.25, 0.5, 0.75. **[5]**

b) Write short notes on Hermite cubic spline curve with neat sketch. **[5]**

P.T.O.

Q3) a) Explain feature based modelling. **[4]**

b) Find displacement and reaction force for cluster of springs as shown in fig.1 **[6]**

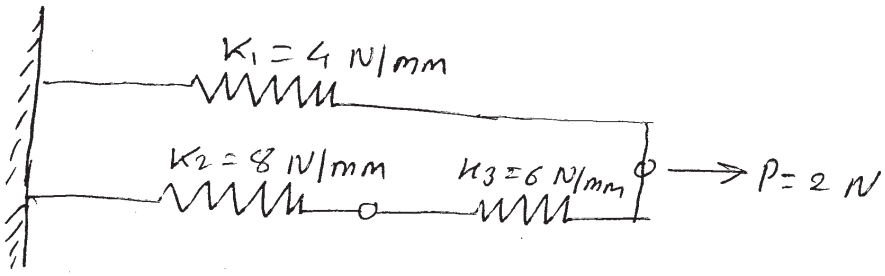


Figure 1

OR

Q4) Truss element is as shown in figure 2. Determine, deflection, stresses and reaction force in element. **[10]**

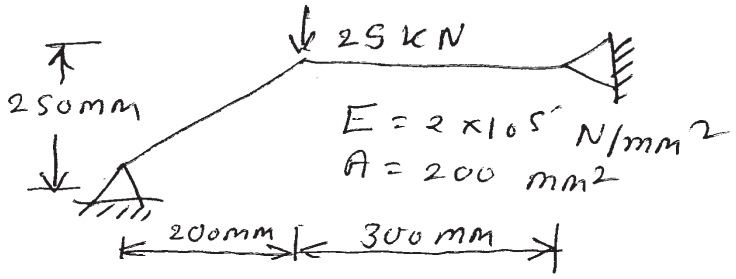


Figure 2

Q5) a) Explain canned cycle for parting and threading for turned components. **[6]**

b) Write CNC port program for roughing and finishing using canned cycle for turned components as shown in figure 3. Assume suitable data **[12]**

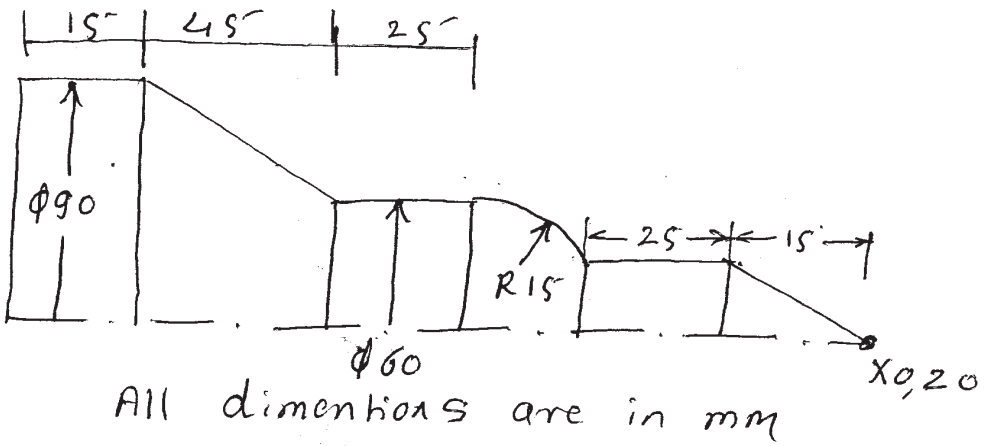


Figure 3

OR

Q6) a) Explain concept of sub programming. **[6]**

b) Write CNC program for the component shown in figure 4. **[12]**

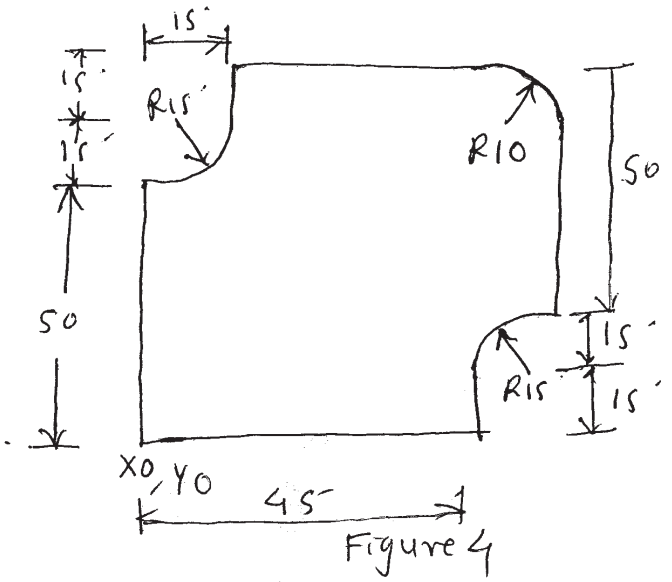


Figure 4

Q7) a) Explain basic steps in R.P. process. **[6]**

b) Explain fused deposite manufacturing R.P. process. **[10]**

OR

Q8) a) Explain laminated object manufacturing (LOM) modelling method of R.P. **[12]**

b) Explain of R.P. Aerospace Industry. **[4]**

Q9) a) Explain various joints used in robots with neat sketch. **[8]**

b) Explain the vacuum gripper with neat sketch and its applications. **[8]**

OR

Q10)a) Explain Automation strategies. **[8]**

b) Explain Group Technology layout and advantages over process layout. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2979

[Total No. of Pages : 4

[5154]-533
B.E. (Mechanical)
DYNAMICS OF MACHINERY
(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Determine the primary and secondary unbalanced forces in a V-90 engine. **[6]**

b) A wheel is mounted on a steel shaft ($G = 83 \times 10^9$ N/m^2) of length 1.5m and radius 0.80 cm. The wheel is rotated 5° and released. The period of oscillation is observed as 2.3 seconds. Determine the mass moment of inertia of the wheel. **[4]**

OR

Q2) a) Explain how maximum primary unbalance can be found in radial engines having four cylinders by direct and reverse crank method. **[4]**

b) A 20 kg mass is resting on a spring of stiffness 4700 N/m and dashpot with damping coefficient 147 N-sec/m in paralle. If a velocity of 0.10 m/sec is applied to the mass at rest position, determine its displacement from the equilibrium position at the end of first second.**[6]**

Q3) a) Explain the significance of negative damping. **[4]**

P.T.O.

b) The restroom door shown in Fig. 3a is equipped with a torsional spring with 25 Nm/rad as stiffness and a torsional viscous damper. The door has a mass of 60 kg and a centroidal moment of inertia about an axis parallel to the axis of the door's rotation is 7.2 kg-m^2. Assuming that the system is critically damped, determine the damping coefficient. **[6]**

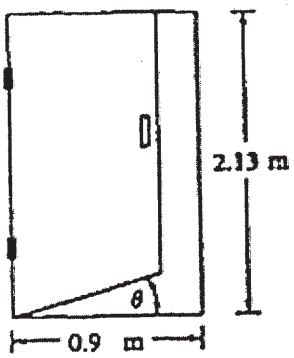


Fig. 3a

OR

Q4) a) Explain the significance of frequency response curves. **[4]**

b) A machine of mass 25 kg is placed on an elastic foundation. A sinusoidal force of magnitude 25 N is applied to the machine. A frequency sweep reveals that the maximum steady state amplitude of 1.3 mm occurs when the period of response is 0.22 seconds. Determine the equivalent stiffness and damping ratio of the foundation. **[6]**

Q5) a) Determine the natural frequencies of the system shown in Fig. 5a. **[12]**

k = 90 N/m, l =.25m, m_1 = 2kg, m_2 = 0.5 kg

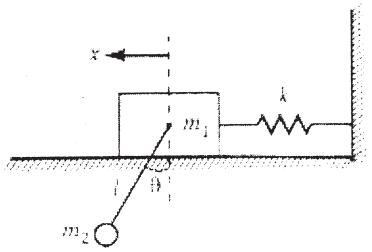


Fig. 5a

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

OR

Q6) a) An automobile of mass 2000 kg has a wheel base of 2.5m. Its C.G. is

located 1.5m behind the front wheel axle and has a radius of gyration about C.G. 1.2m. The front springs have a combined stiffness of 4000 N/m and rear springs 4500 N/m. Refer Fig. 6a. **[12]**

Determine:

i) The natural frequency

ii) Amplitude ratio for two modes of vibration.

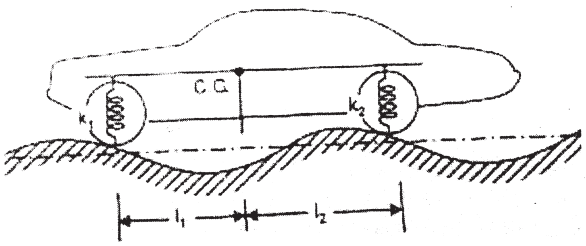


Fig. 6a

b) Explain with respect to 2DOF free vibration, torsionally equivalent shaft. **[4]**

Q7) a) Write a short note on: **[8]**

i) Using free vibrations to measure properties of a system.

ii) Using forced vibration response to measure properties of a system.

b) An electric motor running at 1500 rpm is mounted on five springs and the force transmitted is one eleventh of the impressed force. The weight of the motor is 125 N while the armature weighs 35 N with its center of gravity 0.05 cm from the rotational axis. Determine: **[8]**

i) Stiffness of each spring

ii) Natural frequency of the system

iii) Dynamic force transmitted to the base at operating speed.

OR

Q8) a) Explain with neat sketch working of vibration shaker. **[8]**

b) Vibrations of a machine tool structure subjected to an excitation at 2 Hz is measured using a seismic instrument whose natural frequency is 5 Hz. The relative displacement shown is 0.4 μm. Determine the acceleration of the machine tool structure. **[8]**

Q9) a) Explain the working of sound meter neat diagram. **[6]**

b) Explain reverberation chamber and anechoic chamber. **[6]**

c) Determine the sound pressure level for a sound with rms sound pressure of 2 N/m^2 and 0.4 N/m^2. **[6]**

OR

Q10)a) Define the following terms: **[8]**

i) sound power level

ii) sound pressure level

iii) sound intensity

iv) decibel scale

b) Given four machines producing 100dB, 91dB, 90 dB and 89 dB. What is the total sound pressure level? **[4]**

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

Total No. of Questions : 10]

SEAT No. :

P3623

[Total No. of Pages : 3

[5154]-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 indicates 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) Commercial & non-commercial energy.

ii) Renewable & non-renewable energy

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

OR

Q2) a) Explain detailed energy audit with its 10 steps. **[6]**

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

i) Combustion analyzer

ii) Infrared pyrometer

P.T.O.

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

Initial investment	Rs. (1,000,000)
Saving in Year	Cash Flow
1	Rs. 200,000
2	Rs. 200,000
3	Rs. 300,000
4	Rs.300,000
5	Rs. 350,000

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

b) Write a short note on Return on Investment. **[4]**

OR

Q4) a) An economizer costs Rs. 200000 and will last for 10 years. It will generate a saving of Rs. 35,000 per year with a maintenance cost of Rs.5000 per year. The discount rate is 10% and salvage value is Rs.5000 at the end of 10 years. Is the proposal attractive by NPV method? **[8]**

b) What is the simple payback period? **[2]**

Q5) a) Explain merits and demerits of Direct and Indirect methods used for calculating boiler efficiency. **[8]**

b) Write down varies energy conservation opportunities in HVAC System and DG set. **[8]**

OR

Q6) a) Explain various losses in industrial furnace system with a neat schematic sketch. Explain the indirect method of performance evaluation of a furnace. **[8]**

b) What is the importance of Analysis and Recommendation for Energy Audit? **[8]**

Q7) a) Explain electrical billing tariff structure for an industrial consumer. **[8]**

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

OR

Q8) a) What is maximum demand in electrical systems? Explain how maximum demand is calculated with the help of a load curve. **[8]**

b) What are the types of lamps used in lighting system? Write down their features with typical applications. **[8]**

Q9) a) Describe various factors influencing selection of co-generation plant. **[8]**

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

i) CDM projects

ii) Carbon credits

c) How the Waste heat recovery systems are classified? **[4]**

OR

Q10)a) What is cogeneration? What are the advantages of cogeneration? **[8]**

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

c) Explain working of convective Recuperator with neat sketch. **[4]**

Total No. of Questions : 10]

SEAT No. :

P2980

[Total No. of Pages : 3

[5154]- 535
B.E. (Mechanical)
TRIBOLOGY (Elective - I)
(End Sem.) (2012 Pattern) (Semester - I) (402044 B) (Theory)

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 write indicates full marks.*
3) *Assume Suitable data wherever necessary.*

Q1) a) Why recycling of used oil is important? How recycling of motor oil is done? **[5]**

b) What is friction? Classify it. Write four friction measuring methods. **[5]**

OR

Q2) a) Define Tribology. Explain its importance in industry. **[5]**

b) Define wear. Explain Adhesive and Abrasive wear. **[5]**

Q3) The following data is given for a 360° hydrodynamic bearing: **[10]**

i) Radial load = 10 KN

ii) Journal speed = 1450 rpm

iii) $\frac{l}{d}$ Ratio = 1

iv) Bearing length = 50 mm

v) Radial clearance = 20 microns

vi) Eccentricity = 15 microns

Calculate:

i) The minimum oil film thickness

ii) The coefficient of friction

P.T.O.

iii) The power lost in friction

iv) The viscosity of lubricant in cP

v) The total flow rate of lubricant in *lit/min.*

$\frac{l}{d}$	$\frac{ho}{C}$	$\in$	S	$\left(\frac{r}{c}\right)f$	$\frac{Q}{r.C.n.l}$	$\frac{Qs}{Q}$	$\frac{Pmax}{p}$
1	0.2	0.8	0.0446	1.7	4.62	0.842	3.195
	0.4	0.6	0.121	3.22	4.33	0.680	2.409
	0.6	0.4	0.264	5.79	3.99	0.497	2.066

OR

Q4) a) Explain the mechanism of pressure development in hydrodynamic thrust bearing. **[6]**

b) Explain any TWO. **[4]**

i) Surface fatigue wear

ii) Rolling friction

iii) EP Additive

Q5) a) Explain with neat sketch, working principal of hydrostatic step bearing. A hydrostatic step bearing has shaft diameter 120 mm and recess diameter 80 mm. It is working under supply pressure of lubricant of 8 bar which induces film thickness in the bearing of 0.08 mm. **[8]**

Viscosity of oil lubricant is 30×10^{-9} N-S/mm^2.

b) Derive an expression for flow rate through rectangular slot. State the assumptions made. **[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 phenomenon of squeeze film lubrication **[8]**
Two parellel plates 30 mm long and infinitely wide are separated by an oil film 25 μm thick having viscosity of 0.65 Ns/m^2. If the load per unit width of 15000 N/m is applied to the plates, find the time required to reduce the film thickness to 2.5 μm and the velocity of approach, maximum pressure.

Q7) a) Explain the phenomenon of Elastohydrodynamic lubrication [EHL] and state the applications where EHD lubrication is observed. **[8]**

b) Explain merits, demerits and applications of gas bearings. **[8]**

OR

Q8) a) What is 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 of active magnetic bearing with its advantages and applications. Also mention its types. **[8]**

Q9) Write a note (Any THREE): **[18]**

a) Lubrication in metal working

b) Foil bearing

c) Tribological aspects of wheel on rail road.

d) Lobe bearing.

OR

Q10)a) State desirable properties of bearing materials. List few suitable bearing materials **[6]**

b) Explain the mechanics of tyre road interactions. **[6]**

c) What is surface engineering? State its significance and applications. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2981

[Total No. of Pages : 5

[5154]-536

B.E. (Mechanical Engineering)

RELIABILITY ENGINEERING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Compare the Weibull and Poisson distribution. (3 points) **[4]**

b) Fuel injectors of 900 numbers were tested for 240 hours and the failure data obtained for fuel injectors is tabulated as given below. Find the hazard rate and reliability and tabulate the results. **[6]**

Time interval (hrs.)	0-40	40-80	80-120	120-160	160-200	200-240
Number of failed fuel injectors	230	263	145	136	90	36

OR

Q2) a) Explain the term Probability Density Function and Cumulative Distribution Function. **[4]**

b) For the system shown in Fig.1, find the reliability of the system using cut set method. **[6]**

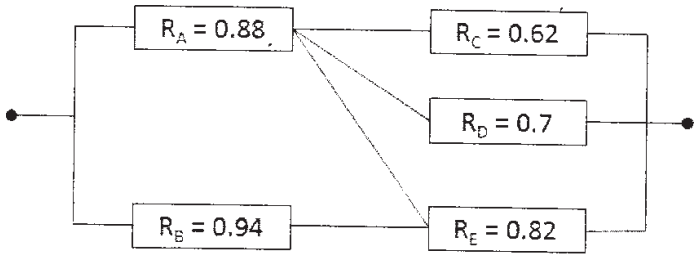


Fig. 1

Q3) a) It is desired to have reliability of the system as 0.945. How many numbers of identical and independent subsystems with reliability of 0.68 are required when connected in parallel? Also, find how many numbers of identical and independent subsystems with reliability of 0.98 are required when connected in series to have a system reliability of 0.945? **[4]**

P.T.O.

b) A system consists of three subsystems with elements as connected is shown in Fig. 2. Determine the reliability goal of each subsystem using minimum effort method if the system reliability is to be improved to a value of 0.88. **[6]**

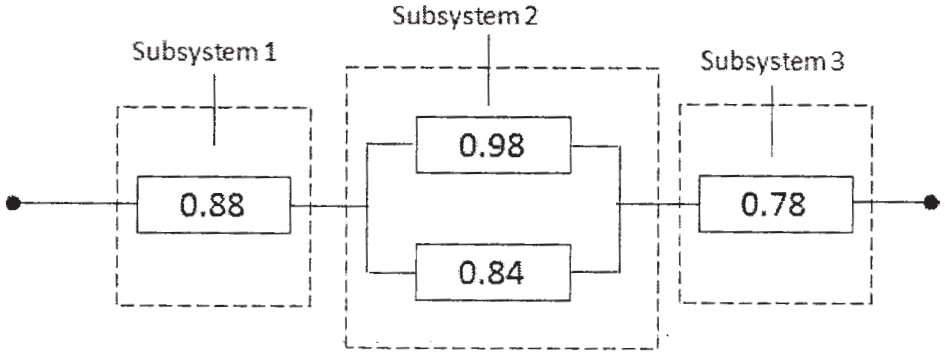


Fig. 2

OR

Q4) a) Explain conditional probability with an example. **[4]**

b) A system consists of 4 subsystems in series. Each subsystem consists of some number of modules. Determine the mean lives and reliabilities of various subsystems so as to have system reliability of 0.93 for 90 hours mission time using "AGREE" method of allocation. The necessary information for subsystem is given below: **[6]**

Subsystem	Number of modules (in each subsystem)	Importance factor	Operating time (hours)
1	35	0.88	69
2	63	0.97	81
3	33	1.00	90
4	57	0.83	57

Q5) a) Comment on the technology aspects in reliability management. Also, specify the functions to be performed by the reliability engineer to obtain the desired reliability. **[8]**

b) A refrigeration system has to be designed with a reliability value of 0.93 for 1050 hours. Operational availability is required to be 95% of the probability of survival over the same period of time. Consider the mean administrative and logistic time as 20% of mean time to repair. Assuming a constant hazard rate for failure and ignoring the preventive maintenance downtime find the mean time to repair (MTTR), mean down time (MDT) and inherent availability. **[8]**

OR

Q6) a) What is Maintainability function? Distinguish between Breakdown Maintenance and Preventive Maintenance. **[8]**

b) It has been observed that a failure pattern of an air conditioning system follows an exponential distribution with the probability of survival for 900 hours as 0.96. Obtain the inherent availability of system over the same period of time if maintainability of the whole system over the same period of time is 90% of the probability of survival an air conditioning system for 900 hours. Also, obtain the operational availability if administrative and logistic time is 15% of mean time to repair. Assume that the repair time follows an exponential distribution. **[8]**

Q7) a) Prepare FMEA in tabular form giving probable failure modes, causes and effects for "no water to the tap in house from overhead water tank."**[8]**

b) A system is represented by logic gate diagram for FTA as shown in fig. 3. The probability of failure for each component is also given in the figure. Represent the system by block diagram and find the reliability of the system. If component 'H' having reliability 0.9 is added in the system such that it is represented in series with component 'D' in the block diagram, find the reliability of new system. Is addition of component 'H' beneficial in reliability improvement? **[10]**

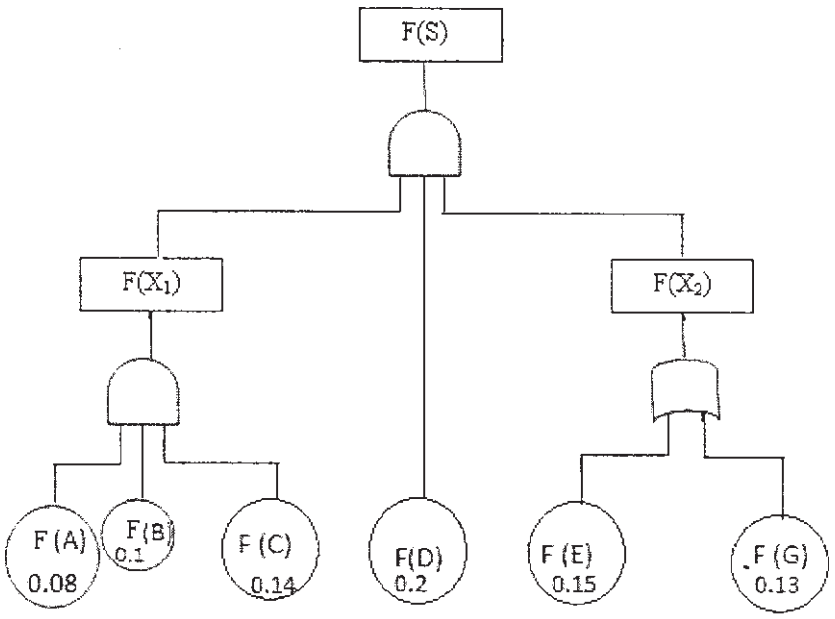


Fig.3

OR

Q8) a) Write a note on Monte Carlo simulation. Give details about its uses (three minimum), applications, the methodology adopted and how to find reliability of the system after conducting simulation. **[8]**

b) The block diagram of a system is as shown in figure. Draw FTA diagram and find the reliability of the system from the values of reliabilities of individual components as given in the fig.4. **[10]**

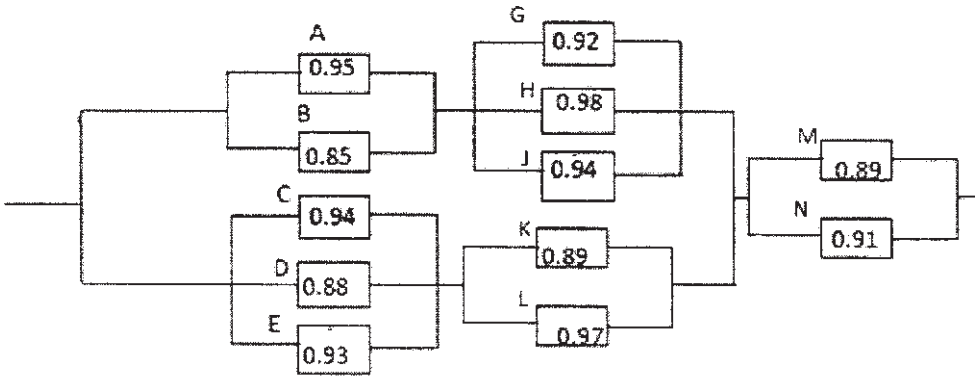


Fig. 4

Q9) a) Define HASS. What is the prerequisite for HASS? Write objective, methodology and benefits of HASS. **[8]**

b) The torsional mean stress of 350 MPa and standard deviation of 40 MPa is induced in a propeller shaft of 60 mm diameter. The medium carbon steel with a mean yield strength of 480 MPa and standard deviation of 58 MPa is used for the shaft. Find the **[8]**

i) Reliability of the shaft

ii) Minimum factor of safety

iii) Maximum factor fo safety

iv) Average factor of safety

With the help of data given below. Assume normal distribution. If the average factor of safety in design is required as 3, what is the strength and type of material required?

Z	1.80	1.81	1.82	1.83	1.84
(ØZ)	0.9641	0.9649	0.9656	0.9664	0.9671

Z	1.85	1.86	1.87	1.88	1.89
(ØZ)	0.9678	0.9686	0.9693	0.9699	0.9706

OR

Q10)a) What are the different types of stresses the components can be subjected to during the reliability testing? Name any six types and write in detail about any three types. **[8]**

b) Following table gives the failure data of 12 springs used in an engine. Find reliability of springs using

i) Mean method

ii) Median method

Plot the graph between failure time and reliability for both methods. Which method is more accurate? **[8]**

Spring No.	1	2	3	4	5	6	7	8	9	10	11	12
Failure time Hrs	235	340	176	67	489	524	695	257	392	798	456	617

x x x

Total No. of Questions : 12]

SEAT No. :

P2982

[Total No. of Pages : 2

[5154]-537
B.E. (Mechanical)
MACHINE TOOL DESIGN
(2012 Course) (Semester - I) (402044D) (Elective - I)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

SECTION - I

Q1) What are the general requirements of Machine Tool Design? Explain each in brief. **[10]**

OR

Q2) Explain the design procedure of Feed box by considering all safety factors. **[10]**

Q3) Explain the factors affecting the Machine tool structures. Suggest methods to improve it. **[10]**

OR

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

Q5) a) Discuss the methods of adjusting clearances in slide-ways. **[5]**

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

OR

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

P.T.O.

SECTION - II

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

b) Describe with neat sketch aerostatic bearings. **[6]**

OR

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

b) Explain the design procedure of Spindles with sketches. **[6]**

Q9) Explain the dynamic characteristics of the equivalent elastic system with the sketches. **[12]**

OR

Q10) What is Forced Vibration? Explain its effect on the cutting process on machine tools. **[12]**

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

b) Discuss the principle of self locking. **[8]**

OR

Q12) a) Discuss recent trends in machine tools in industries. **[8]**

b) What are the aesthetic and ergonomics considerations applied to the design of control members. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2983

[Total No. of Pages : 2

[5154]-538
B.E.(Mech.)
GAS TURBINES & PROPULSION
(2012 Pattern) (End Semester-I) (402045A) (Elective-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Compare atmospheric jet engines and rocket engines with suitable examples. **[6]**

b) Explain cogeneration cycle. **[4]**

OR

Q2) Write notes on: **[10]**

a) Single-shaft and twin-shaft gas turbine arrangements.

b) Industrial applications of gasturbines.

Q3) a) Explain thermodynamic analysis of a turbojet engine. **[7]**

b) What are stagnation & static properties. **[3]**

OR

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

a) Pressure losses and heat exchanger effectiveness in gas turbines.

b) Polytropic and isentropic efficiency.

Q5) a) Discuss various losses associated with axial flow turbines. **[6]**

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

i) Performance curves of gas turbines.

ii) Velocity triangle of axial flow turbines.

OR

P.T.O.

Q6) a) A single stage axial flow turbine (Impulse) is supplied with a gas at stagnation conditions of 4 bar & 650°C. The expansion of gas in nozzle is upto a pressure of 1 bar. The nozzle discharge angle is 15° to the plane of wheels. The blade speed is 360 m/s and the gas leaves the rotor blade in axial direction with a speed of 300 m/s. Assuming a nozzle efficiency of 96% find: **[10]**

i) Rotor blade angles at inlet & outlet.

ii) Power developed for 25 kg/sec of gas flow.

iii) Utilisation factor and stage efficiency.

b) Write a note on blade materials of axial flow turbines. **[6]**

Q7) a) Explain for axial flow compressor: **[6]**

i) Work alone factor.

ii) Choking and stalling.

b) A multistage axial flow compressor delivers 20 kg/sec of air. The inlet conditions are 1 bar and 22° C. Determine the delivery pressure. Also find the no.of stages and internal efficiency of compressor when the stage efficiency is 0.9 and the power input is 4500 kW. Assume the stage pressure ratio is constant and the temperature rise in the first stage is 18° C. **[10]**

OR

Q8) Write notes on: **[16]**

a) Cas cade of blade.

b) Velocity triangles for the rotor of an axial flow compressor.

c) Blade loading and flow coefficient.

Q9) Explain: **[18]**

a) Types and requirements of a combustion chambers.

b) Mixing and dilution.

c) Stability limits and combustion intensity.

OR

Q10)a) Discuss flame tube cooling. **[8]**

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

i) Combustion chamber with swirl vanes.

ii) Theories of combustion.

Total No. of Questions : 10]

SEAT No. :

P2984

[Total No. of Pages : 2

[5154]-539
B.E. (Mechanical)
PRODUCT DESIGN & DEVELOPMENT
(2012 Pattern) (Semester - I) (Elective - II) (402045B)

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 concept of Product Design Team. Explain any six Roles in Team in Detail. **[10]**

OR

Q2) a) Discuss in detail how Technical Questioning and Mission Statement contribute to Product Design Phase. **[6]**

b) Discuss the concept of Simplification and standardization. **[4]**

Q3) a) Explain Subtract and Operate ProcedureTechnique with suitable example. **[6]**

b) Discuss the concept of Functional Modeling. **[4]**

OR

Q4) a) What is Market Segment? Explain criterions affecting on Segmentation. **[6]**

b) What is necessity of Technology Forecasting? Explain. **[4]**

Q5) What is Product Tear Down? Explain the Tear Down Process in detail. Explain any two Techniques applied in Tear Down. **[18]**

OR

Q6) Define Benchmarking. What are objectives of Benchmarking? Explain the Procedure for Benchmarking. Explain any two tools applied in Benchmarking. **[18]**

Q7) a) Explain the guidelines of Design for Manufacture in detail. **[5]**

b) What are guidelines for Design for Safety? Discuss and Elaborate **[5]**

c) Explain the guidelines for Design for Casting. **[6]**

OR

P.T.O.

Q8) a) Discuss in detail Manufacturing Cost Analysis. **[6]**

b) Discuss various Regional and Global issues of Environmental Pollution. **[6]**

c) What are guidelines for Design for Robustness? Discuss. **[4]**

Q9) a) What is product Life Cycle? Elaborate the phases of life cycle with suitable example. **[8]**

b) Elaborate the concept of Product Life Cycle Management. **[8]**

OR

Q10)a) Explain the Elements of PLM in detail. **[8]**

b) Discuss the concept of Product Data and Product Work flow in PLM. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P2985

[Total No. of Pages : 7

[5154]-540
B.E. (Mechanical)
OPERATIONS RESEARCH
(2012 Course) (402045 C) (Semester - I) (Elective - II) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Draw neat diagrams wherever necessary.***
2) ***Use of electronic pocket calculator is allowed.***
3) ***Assume suitable data, if necessary.***

Q1) A firm manufactures pain relieving pills in two sizes A and B. Size A contains 4 grains of element X, 7 grains of element Y and 2 grains of element Z. Size B contains 2 grains of element X, 10 grains of element Y and 8 grains of element Z. It is found by users that it requires at least 12 grains of element X, 74 grains of element Y and 24 grains of element Z to provide immediate relief. It is required to determine the least number of pills a patient should take to get immediate relief. formulate the problem as standard L.P.P. **[7]**

OR

Q2) a) What is Decision Making? Explain and differentiate this under the condition of certainty and uncertainty. **[4]**

b) State advantages and limitations of decision tree approach. **[3]**

Q3) Solve the following transportation problem using Stepping Stone Method. **[7]**

Plants	Destination				Supply
	D1	D2	D3	D4	
P1	20	30	50	17	7
P2	70	35	40	60	10
P3	40	12	60	25	18
Requirement	5	8	7	15	

OR

P.T.O.

Q4) A team of 5 horses and 5 riders has entered a jumping show contest. The number of penalty points to be expected when each rider rides any horse is shown below. **[7]**

		Rider				
		R_1	R_2	R_3	R_4	R_5
Horse	H_1	5	3	4	7	1
	H_2	2	3	7	6	5
	H_3	4	1	5	2	4
	H_4	6	8	1	2	3
	H_5	4	2	5	7	1

How should the horses be allotted to the riders so as to minimize the expected loss of the team?

Q5) Two firms are competing for business under the conditions such that one firm's gain is another firm's loss. Firm A's payoff matrix is given below: **[6]**

		Firm B		
		No Advertising	Medium Advertising	Heavy Advertising
Firm A	No Advertising	10	5	-2
	Medium Advertising	13	12	15
	Heavy Advertising	16	14	10

Suggest optimal strategies for the two firms and the net outcome thereof.

OR

Q6) A ball bearing manufacturing company is planning to install an additional plant which will require leasing new equipment for monthly payment of Rs. 60,000. Variable cost would be Rs. 20 per item and each item would retail for Rs. 70. **[6]**

a) How many ball bearing units must be sold in order to break even?

b) What would be profit or loss if 1,000 items are made & sold in a month?

c) How many items must be sold to realize a profit of Rs. 40,000?

Q7) a) The cost of parameters and other factors for a production inventory system of automobile pistons are given below. **[8]**

Demand per year = 6,000 units

Unit Cost = Rs. 40

Set-up Cost = Rs. 500

Production Rate per year = 36,000 units

Holding cost per unit per year = Rs. 8

Shortage cost per unit per year = Rs. 20

Find

i) optimal lot size

ii) number of shortage and

iii) manufacturing time and time between set-ups

b) The cost of machine is Rs. 6,100 and its scrap value is Rs. 100. The maintenance costs found from experience are as follows: **[8]**

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.)	100	250	400	600	900	1,200	1,600	2,000

When should the machine be replaced?

OR

Q8) a) A stockist has to supply 400 units of a product every Monday to his customers, He gets the product at Rs. 50 per unit from the manufacturer. The cost of ordering and transportation from the manufacturer is Rs. 75 per order. The cost of carrying inventory is 7.5% per year of the cost of product. Calculate: **[8]**

i) Economic order quantity

ii) total optimal cost

iii) total weekly profit if the item is sold for Rs. 55 per unit.

b) The following failure rates have been observed for a certain type of light bulbs: **[8]**

End of week	1	2	3	4	5	6	7	8
Probability of failure to date	0.05	0.13	0.25	0.43	0.68	0.88	0.96	1.00

The cost of replacing an individual failed bulb is Rs. 1.25. The decision is made to replace all bulbs simultaneously at fixed intervals, and also to replace individual bulbs as they fail in service. If the cost of group replacement is 30 paise per bulb, what is the best interval betwen group replacements? At what group replacement price per bulb would a policy of strictly individual replacement become preferable to the adopted policy?

Q9) a) In a factory, the machines breakdown on an average rate of 10 machines per hour. The idle time cost of a machine is estimated to be Rs. 20 per hour. The factory works 8 hours a day. The factory manager is considering 2 mechanics for repairing the machines. The first mechanic A takes about 5 minutes, on an average, to repair a machine and demands wages at the rate of Rs. 10 per hour. The second mechanic B takes about 4 minutes in repairing a machine and demands wages at the rate of Rs. 15 per hour. Assuming that the rate of machine breakdown is Poisson distributed and the repair rate is exponentially distributed, which of the two mechanics should be engaged? **[8]**

b) A machine operator has to perform three operations: turning, threading and knurling on a number of different jobs. The time required to perform these operations (in minutes) for each job is known. Determine the order in which the jobs should be processed in order to minimize the total time required to turn out all the jobs. Also find the idle times for the three operations. **[8]**

Job	Time for turning (minutes)	Time for threading (minutes)	Time for knurling (minutes)
1	3	8	13
2	12	6	14
3	5	4	9
4	2	6	12
5	9	3	8
6	11	1	13

OR

Q10)a) A super market has two sales girls at the sales counters. If the service time for each customer is exponential with a mean of 4 minutes, and if the people arrive in a Poisson fashion at the rate of an 10 hour, then calculate: **[8]**

i) Probability that a customer has to wait for being served?

ii) Expected percentage of idle time for each sales girl?

iii) If a customer has to wait, what is expected length of his waiting time?

b) A manufacturing company processes 6 different jobs on two machines A and B. Number of units of each job and its processing times on A & B are given in table. Find the optimal sequence, the total minimum elapsed time and idle time for either machine. **[8]**

Job No.	No. of Units of each job	Processing time	
		Machine A (minutes)	Machine B (minutes)
1	3	5	8
2	4	16	7
3	2	6	11
4	5	3	5
5	2	9	7.5
6	3	6	14

Q11)a) The utility data for a network are given below. Determine the total, free, independent and interfering floats and identify critical path. **[10]**

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration	2	8	10	6	3	3	7	5	2	8

b) A dentist schedules all her patients for 30 minutes appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work, their probabilities and the time needed to complete work. **[8]**

Category	Time required (minutes)	Probability of category
Filling	45	0.40
Crown	60	0.15
Cleaning	15	0.15
Extraction	45	0.10
Checkup	15	0.20

Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well the idleness of the doctor. Assume that all the patients show up at the clinic at exactly their scheduled arrived times, starting at 8 a.m. Use the following random numbers for handling the above problem: 40, 82, 11, 34, 25, 66, 17 and 79.

OR

Q12)a) The time estimates (in weeks) for the activities of a PERT network are given below. **[12]**

Activity	t_0	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw the project network and identify all the paths through it.

ii) Determine the expected project length.

iii) Calculate the standard deviation and variance of the project length.

iv) What is the probability that the project will be completed?

1) At least 4 weeks earlier than expected time?

2) No more than 4 weeks later than expected time?

v) If the project due date is 19 weeks, what is the probability of not meeting the due date?

vi) The probability that the project will be completed on schedule if the scheduled completion time is 20 weeks.

vii) What should be the scheduled completion time for the probability of completion to be 90%?

b) What do you mean by Goal programming? Where is it applicable? **[6]**

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Total No. of Questions : 10]

SEAT No. :

P2986

[Total No. of Pages : 2

[5154]-541

B.E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain with schematic stand-off technique of Explosive forming. **[4]**

b) State the advantages and limitations of vacuum die casting process. **[6]**

OR

Q2) a) Compare with schematic forward and backward flow forming processes. **[4]**

b) State applications of FSW in ship building, aerospace and railways, automotive and electrical industries. **[6]**

Q3) a) Classify micro-manufacturing processes in terms of type of energy used in these processes for machining. **[4]**

b) Explain with schematic the principle and steps that are to be followed during squeeze casting process. **[6]**

OR

Q4) a) Differentiate the Electro chemical grinding with conventional grinding. **[4]**

b) With a schematic explain the working principle and material removal mechanism of Electrolytic in-process dressing process. **[6]**

Q5) a) State the advantages and limitations of a diamond being used as a cutting tool material for ultra-precision micromachining. **[8]**

b) With a schematic explain the working principle of micro-electric discharge machining (μ-EDM). Also give the important peripherals or components of μ-EDM set-up. **[8]**

OR

P.T.O.

Q6) a) Using cause-effect diagram state the process parameters which influence the process performance of ultrasonic micromachining (USMM) process. **[8]**

b) State the process parameters of micro-electric discharge machining (μ-EDM) process which affect the oversize and aspect ratio. Also, differentiate micro-EDM process with electric discharge machining process. **[8]**

Q7) a) What is additive manufacturing? With a schematic describe the different steps by which a part or component is built in extrusion based additive manufacturing process. **[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) Describe the process steps for manufacturing a component from design/ drawing stage to finished component using an additive manufacturing process. **[8]**

b) State with sketches the principle of Laminated Object Manufacturing (LOM) and Fused deposition Modeling (FDM). **[8]**

Q9) a) Online measurement of fine surface grooves having size in the range of few nanometers up to 200 μm is possible by using a focused laser beam using diffraction technique. Comment on the statement. **[6]**

b) With a schematic state the working principle of interference microscope. Also, state the applications of interference microscopy. **[6]**

c) State and explain the different imaging modes and contact scanning modes of Atomic Force Microscope (AFM). **[6]**

OR

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

a) Scanning tunneling microscope (STM)

b) Interference comparators

c) Surface profilers.

x x x

Total No. of Questions :10]

SEAT No. :

P2987

[Total No. of Pages :3

[5154] - 542
B.E. (Mechanical)
POWER PLANT ENGINEERING
(2012 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain the Principle of economic scheduling. **[6]**

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

i) Dust Collector.

ii) Coal-Oil Mixture.

OR

Q2) a) What is FBC. Explain with neat sketch. **[6]**

b) Define: Condenser Efficiency, Vacuum Efficiency. **[6]**

Q3) a) Write a short note on selection of Hydraulic turbine. **[4]**

b) A steam power plant operating on Rankine cycle receives steam from a boiler at 3.5 MPa and 350°C. It is exhausted to condenser at 10kPa. Calculate: **[6]**

i) Energy supplied per kg of steam generated in a boiler.

ii) Quality of steam entering the condenser.

iii) Rankine cycle efficiency considering feed pump work.

OR

P.T.O.

Q4) a) Explain with neat sketch pumped storage peak load plant. **[4]**

b) The capital cost of hydro power station of 100MW capacity is Rs. 10,000/kW. The annual depreciation charges are 15% of the capital coat. A royalty of Rs. 2/kW per year and Rs. 0.3/kWh generated is to be paid for using the river water for power generation. The maximum demand on power station is 70MW and annual load factor is 0.6. The annual salaries, maintenance charges are Rs. 10^7. If 20% of this expense is also chargeable as fixed charges, calculate the generation charge in two - part tariff. **[6]**

Q5) a) Draw a typical layout of Diesel Power Station and Explain. **[8]**

b) In an open cycle gas turbine power plant compressor is driven by the high pressure turbine power is produced by low pressure turbine. The exhaust gases are passed through the regenerator. Using the following data determine the air flow rate for 2MW power produced & thermal efficiency of the plant. **[10]**

i) Isentropic efficiency of compressor and turbines: 88%.

ii) Compressor inlet conditions:27^{o}C and 1 bar.

iii) Pressure ratio: 7.

iv) Regenerator effectiveness: 0.8.

v) Maximum temperature in the cycle: 900^{o}C.

Assume air flow rate to be equal to the gas flow rate, specific heat for air and gases as 1.005 and 1.128kJ/kgK, γ for air and gases as 1.4 and 1.34 respectively.

OR

Q6) a) Why the starting of Diesel Plant is more difficult? What different methods are used for starting Diesel Engine? Which method is common and why? **[8]**

b) An open cycle gas turbine plant uses heavy oil as fuel. The maximum pressure and temperature in the cycle are 5 bar and 650^{o}C. The pressure and temperature of the air entering into the compressor are 1 bar and 27^{o}C. The exit pressure of the turbine is 1 bar. Assuming isentropic efficiencies of the compressor and turbine to be 80% and 85% respectively. find the thermal efficiency of the cycle. Overall air fuel ratio used is 60:1. Take Cp (for air & gas)=1kJ/kg K γ for air and gas =1.4.**[10]**

Q7) a) What is the function of bus bar? Draw different types of Bus bar arrangements and discuss the relative merits and Demerits. **[8]**

b) Explain single basin and double basin tidal power plant with neat diagrams. **[8]**

OR

Q8) a) Explain the working of a fuel cell and list out its advantages over other nonconventional systems. **[8]**

b) What are high temperature solar thermal power plants? Discuss the working of central receiver tower power plant. **[8]**

Q9) a) State the function of relay system. How are relays classified Explain any one relay with neat sketch. **[8]**

b) What are the different methods presently adopted in the world to reduce the harmful Greenhouse Effect? **[8]**

OR

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

i) Acid Rain

ii) Thermal Discharge Index.

b) What are different methods used to control SO_2 in the flue gases? Explain any two. **[8]**

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Total No. of Questions :10]

SEAT No. :

P2988

[Total No. of Pages :5

[5154] - 543

B.E. (Mechanical)

MECHANICAL SYSTEM DESIGN

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

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

Instructions to the candidates:

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

Q1) a) What are the various laws for stepped regulation of speeds in multi-speed gear boxes? State the advantages and limitations any one of them. **[4]**

b) Define Design Tolerance and Natural Tolerance and explain the difference between them? **[6]**

OR

Q2) a) Explain the following terms with reference to machine tool gear box. How these parameters are decided while designing machine tool drives. **[4]**

i) Range ratio

ii) Number of transmission group or stages.

b) A particular type of rolling contact bearing has a normally distributed time to failure with a mean of 10000 hours and a standard deviation of 750h. If there are 100 such bearings fitted at a time, how many May be expected to fail within the first 11000h? **[6]**

z	0	1	2	3	4	5	6	7	8	9
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

P.T.O.

Q3) a) Explain on the basis of applications selection between **[4]**

i) chain conveyor

ii) screw conveyor

iii) belt conveyor

b) A three idler troughed belt horizontal conveyor is to be used for transporting 400 ton/hours of iron core having weight density of $1.67*10^{-8}$ KN/mm^3. If the belt speed is 7.2 kmph and surcharge factor is 0.1 calculate the width of belt in mm. **[6]**

OR

Q4) a) Explain the advantages and limitations of troughed conveyors over flat belt conveyor. **[4]**

b) Mr. X is required to transmit the coal from coal storage to boiler house by conveyor. So suggest him suitable type of conveyor and explain the different resistive forces consider to estimate the power requirement for the conveyors. **[6]**

Q5) a) i) What are the objectives of providing openings in pressure vessel. **[4]**

ii) What is pre stressing of thick cylinder? Explain Auto frettage. **[4]**

b) i) Derive Birnie's equation. Explain under what conditions it is used. **[5]**

ii) A hydraulic cylinder with closed ends is subjected to an internal pressure of 15MPa. The inner and outer diameter of the cylinder is 200mm and 240mm respectively. The cylinder material is cast iron FG300. Determine the factor of safety used in design. If the cylinder pressure is further increased by 50%. What will be the factor of safety. **[5]**

OR

Q6) a) i) What are types of end closure for cylindrical vessel? State the design procedure of hemispherical head. **[4]**

ii) Explain the various categories of the welded joints used in unfired pressure vessel. **[4]**

b) A hydraulic control for a straight line motion as shown in fig. utilizes a spherical pressure tank A connected to a working cylinder B. The pump maintains a pressure of 3 MPa in the tank. **[10]**

i) If the diameter of pressure tank is 800 mm, determine its thickness for 100% efficiency of the joint. Assume the allowable tensile stress as 50 MPa.

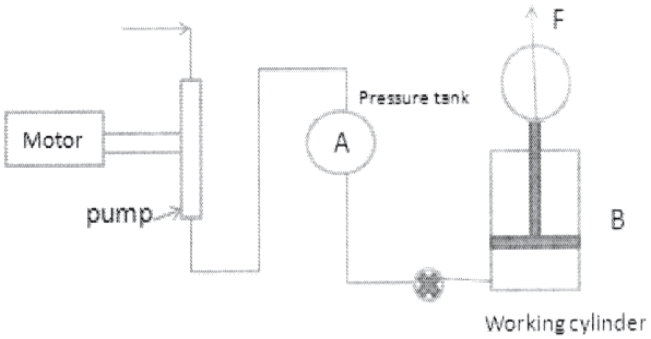
ii) Determine the diameter of a cast iron cylinder and its thickness to produce an operating force F = 25 KN. Assume

1) an allowance of 10% of operating force F for friction in the cylinder and packing and

2) a pressure drop of 0.2 MPa between the tank and cylinder. Take safe stress for cast iron as 30 MPa.

iii) Determine the power output of the cylinder if the stroke of the piston is 450mm and time required for the working stroke is 5 seconds.

iv) Find the power of the motor if the working cycle repeats after every 30 seconds and the efficiency of the hydraulic control is 80% and that of 60%.



Q7) a) i) What is the funciton of the cup on the piston head? **[3]**

ii) Why are more number of thin piston rings preferred over small number of thick rings? **[3]**

b) The following data is given for the piston of a four stroke diesel engine: Cylinder bore 0.25 m, maximum pressure = 4MN/m^2, Bearing pressure at small end of connecting rod = 15 MN/m^2, Length of piston pin in bush of small end = 0.45D, inner diameter of piston pin is 0.6 times outer diameter of piston pin and mean diameter of piston boss is 1.4 times outer diameter of piston pin, Allowable bending stress for piston pin = 84 MPa. Calculate: **[10]**

i) outer and inner diameter of the piston pin

ii) mean diameter of the piston boss

iii) check the design for bending stress

OR

Q8) a) i) Why are connecting rod made of I sections? **[3]**

ii) Why do inlet and exhaust valves have conical heads and seats? **[3]**

b) The following data is given for the cap and bolts of the big end of the connecting rod: **[10]**

Engine speed = 1500 rpm

Length of connecting rod = 0.320 m

Length of stroke = 0.140 m

Mass of reciprocating parts = 1.75Kg

Length of crank pin = 54 mm

Diameter of crank pin = 38 mm

Permissible tensile stress for bolts = 120MN/m^2

Calculate the nominal diameter of bolts and thickness of cap for the big end.

Q9) a) What is design for manufacture? Explain the general principles to be followed while designing the parts of manufacture. **[6]**

b) A shaft is required to transmit 100KW at 1000 rpm and torsional stiffness of the shaft is 90N.m/ degree. Design the shaft using maximum shear stress theory of minimum weight. Material properties are given below. Also find out diameter and length of shaft for the same. Assume factor of safety is 1.5 and combined shock and fatigue load factor = 1.5. **[10]**

Material	Density Kg/m^3	Tensile strength MN/m^2	Modulus of Rigidity MN/m^2
M1	7800	450	82000
M2	2800	150	27000
M3	1800	100	17000

OR

Q10)a) What is design for safety? Explain the general principles to be followed while designing the product for safety? **[6]**

b) A tensile rod of diameter 'd' having length 0.6 m is subjected to a tensile force 5 KN. Calculate the rod diameter with the objective of minimizing the weight of material. Assume factor of safety 2. Use following table.**[10]**

Material	Density Kg/m^3	Syt in N/m^2	Modulus of Rigidity MN/m^2	Material cost Rs./Kg
Steel	7800	$400*10^6$	82000	14
Aluminium Alloy	2800	$150*10^6$	27000	70
Titanium Alloy	4500	$800*10^6$	41000	1100

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Total No. of Questions : 10]

SEAT No. :

P2989

[Total No. of Pages : 3

[5154]- 544

B.E. (Mechanical)

REFRIGERATION AND AIR CONDITIONING EQUIPMENT DESIGN

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

Time :2½ Hours] *[Max. Marks :70*

Instructions to candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator, steam tables and p-h chart is allowed.***
4) ***Assume suitable data, if necessary.***

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

OR

Q2) a) Explain the construction working of pilot-operated solenoid valve. **[6]**

b) Write a short note on: re-evaporator coils. **[4]**

Q3) a) List out the limitations of VCS for the production of low temperatures. **[5]**

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

OR

Q4) a) Discuss various applications of cryogenies. **[5]**

b) Explain the performance characteristic curves of reciprocating compressor. **[5]**

Q5) a) Explain the procedure of thermal design of shell and tube condensers. **[8]**

b) Write a short note on "Pump Circulation System. **[8]**

OR

P.T.O.

Q6) a) Design R-22 condenser to meet the following conditions; **[10]**

Refrigeration load	30TR
Condensing temperature	55ºC
Evaporating temperature	–15ºC
Water inlet temperature	27ºC
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.

b) Write a short note on "Baudelot Cooler. **[6]**

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

Water flow rate:12.67 kg/s

Air flow rate :-11.9kg/s

Water entering temperature:-36.3ºC

Water leaving temperature:-32.1ºC

Ambient air conditions: 43.3ºC DBT, 25,6ºC 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:

a) Value of the performance coefficient.

b) The wetted area of tower if air HTC is 83 W/m^2K.

c) Value of mass transfer coefficient,

d) Exit condition of air.

OR

Q8) a) Explain the performance curves of cooling tower. **[8]**

b) Discuss various types of contact type of cooling tower. **[8]**

Q9) a) What is heat pipe? Explain advantages of heat pipe over other heat transport material. **[8]**

b) Explain limitations to heat transport in a heat pipe. **[10]**

OR

Q10) Write a short note on; **[18]**

a) Vortex Tube.

b) Thermoelectric Refrigeration.

c) Steam jet Refrigeration.

Total No. of Questions : 10]

SEAT No. :

P2990

[Total No. of Pages : 2

[5154]- 555
B.E. (Mechanical)
ROBOTICS
(2012 Pattern) (Semester - II) (Elective - III) (402049 B) (End Sem.)

Time :2½ Hours] *[Max. Marks :70*

Instructions to candidates:

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

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

Suggest which configuration robot is suitable for following application and justify.

b) i) Spray Painting

ii) Pick & Place

iii) Fastening a screw to car body. **[6]**

OR

Q2) a) Explain the construction of Brushless DC Motor with neat sketch. **[4]**

b) Explain the steps involved in DH notation process. **[6]**

Q3) a) Describe any three basic parameters used in DH notation algorithm. **[6]**

b) Explain different joints used in robots. **[4]**

OR

Q4) a) Explain sensor selection criteria for robotic applications. **[4]**

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

P.T.O.

Q5) a) What is Cartesian space trajectory planning? What are general considerations in trajectory planning? **[8]**

b) Derive transformation matrix for mapping velocity of a 3DoF manipulator having first and third joints as Rotating joints and second joint as prismatic joint. **[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) Describe the different steps in trajectory planning. **[8]**

b) An actuated joint of a six axis Robot is to be rotated from 20º to 80º in 6 seconds. Determine linear, Quadratic, and Cubic trajectories for the joint. **[8]**

OR

Q8) a) Write and explain general block diagram of robot control system. **[8]**

b) A spring mass system has m=2.2kg, b=7.5, k=3.5. If the gain in the velocity control is 2.5. Determine the control law to make the system critically damped. Compare the behavior of the system without gains by plotting the graph assuming x(0) and velocity (0)=1.2. **[8]**

Q9) a) Explain steps in Image processing and analysis. **[8]**

b) Write a short notes on: **[10]**

i) Artificial neural network

ii) ANT algorithm

OR

Q10)a) Explain with block diagramme Machine vision system for Robots. **[10]**

b) Explain Image acquisition and Sampling. **[8]**

Total No. of Questions : 12]

SEAT No. :

P2991

[Total No. of Pages : 4

[5154]- 556

B.E. (Mechanical Engineering)

INDUSTRIAL ENGINEERING

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

Time :2½ Hours] *[Max. Marks :70*

Instructions to candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 from section - I and answer Q7 or Q8, Q9 or Q10, Q11 or Q12 from section - II.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain principles of management. **[6]**

b) Differentiate between: Work measurement and method study. **[4]**

OR

Q2) a) Write short note on

i) Span of control

ii) Delegation of Authority

iii) Responsibility. **[6]**

b) Differentiate between work sampling and time study. **[4]**

Q3) a) Explain in detail "Work sampling process". **[5]**

b) Explain with proper example "Multiple Activity Chart". **[5]**

OR

Q4) a) Write short note on **[6]**

i) Travel chart

ii) String diagram.

b) State various work measurement techniques. Explain any one of them. **[4]**

P.T.O.

Q5) a) Explain with examples Method Study Symbols for recording facts. **[5]**

b) Explain functions of PPC. **[5]**

OR

Q6) a) Why allowances are considered in time study? what are various allowances considered? **[5]**

b) A work study was conducted in a machine shop. Following data has been recorded. **[5]**

i) No. of observations-2000

ii) No.of activity = 500

iii) Ratio between manual and machine = 3:1

iv) Rating = 85%

v) No. of pieces = 120

vi) Duration of study = 60 hours

Calculate standard time per piece assuming 15% relaxation allowance.

SECTION - II

Q7) a) Write short note on forecasting methods. **[5]**

b) What is selective inventory control? Explain briefly ABC analysis and FSN analysis. **[5]**

c) Write short note on- **[5]**

i) MRP - I

ii) MRP II

OR

Q8) a) A manufacturer has to supply his customers 3600 units of his product per year uniform throughout the period of the year. Stock-outs are not permitted. Inventory carrying cost amounts to Rs. 1.20 per unit per annum. The order processing cost is Rs. 80 per order. **[6]**

Calculate:-

i) Economic order quantity

ii) The optimum number of orders per year

iii) Average inventory cost

iv) Total inventory cost including material cost

v) Indicates purchase cycle graphically and order the important parameters in the graph.

b) Explain Moving Average Method for demand forecasting. **[4]**

c) Write note on **[5]**

i) Aggregate planning

ii) Capacity planning

Q9) a) Explain product layout with advantages and disadvantages. Explain single facility location. **[5]**

b) What is line balancing? What are different methods of line balancing? Explain Largest Candidate Rule. **[5]**

c) Write short note on

i) Stores management

ii) Push and pull systems. **[5]**

OR

Q10)a) Define material handling. List material handling equipments and describe any three of them. **[5]**

b) What is importance of standard costing? Explain method to calculate standard cost. **[6]**

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

i) Unit load

ii) Work cells.

Q11)a) What do you understand by BEA? What are uses of BEA? **[4]**

b) A company has given following information **[6]**

Data	Rs
Selling price	10/- unit
Variable Cost	2/-unit
Fixed Cost	40,000/-

Determine-

i) Profit when sales are Rs. 1,00,000/-

ii) BEP

iii) Sales when it is desirable to earn profit of Rs. 30,000/-

OR

Q12)a) A non variable manufacturing costs and operating expenses of a company are Rs. 40,000 a year, the marginal contribution is 40% of sales.

i) What is company's BEP?

ii) What profit can be expected on the sales of Rs. 120000?

iii) What sales volume is required to produce a profit of Rs. 20,000?**[6]**

b) Write short note on. **[4]**

i) Profit and loss account

ii) Payback method

Total No. of Questions : 10]

SEAT No. :

P2992

[Total No. of Pages : 2

[5154]-556-B

B.E. (Mechanical)

AUTOMOBILE ENGINEERING

(2012 Course) (Semester - II) (402049DB) (Open Elective - Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side 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) Explain the various sections used for side members and cross members of chassis frame. **[4]**

b) What is purpose of clutch plate? Explain with any kind of clutch plate used in automobile. Explain functions of various components of it. **[6]**

OR

Q2) a) What are different types of loads acting on vehicle frame and explain them. **[4]**

b) Explain the working of Synchromesh gear box with the help of neat sketch. **[6]**

Q3) a) Explain with the neat sketch layout of steering linkage for vehicle with rigid axle front suspension. **[6]**

b) What are the different factors which affecting tyre life? **[4]**

OR

Q4) a) Define with neat sketches the following terms related to steering geometry. **[6]**

i) Camber

ii) Castor

iii) Steering axis inclination

iv) Combined angle

b) Define the steering ratio? And discuss the reversibility of steering. **[4]**

P.T.O.

Q5) a) Explain with neat sketch the layout of Air brake system in details. Also state its advantages over the hydraulic brake system. **[10]**

b) What are interconnected suspension? Sketch and describe in briefly. **[8]**

OR

Q6) a) Explain with neat sketch of Hydro gas suspension system in details. Also state its advantages and disadvantages. **[10]**

b) Sketch and describe the disc brakes. Also state its advantages over the drum brake. **[8]**

Q7) Write a short notes on any four: **[16]**

a) Vehicle interior and ergonomics.

b) Air bags & seat belt.

c) Hybrid vehicles.

d) Measuring instruments for wear.

e) Vehicle performance curve.

OR

Q8) a) Necessity of NVH analysis in automobile, explain in details. **[8]**

b) A passenger car travelling at 80.45 KM/Hr. is accelerated up a gradient of 1 in 20. The gross vehicle weight is 11026.4N. It has a frontal area of 1.858 m^2 and the air resistance coefficient may be assumed as 0.0167. The rolling resistance is 221.7N. At the above speed, the engine develops 58.88 KW at engine speed of 4000 RPM. Rear axle ratio is 5:1 and transmission efficiency = 95%.

Calculate:

i) The total tractive resistance. **[3]**

ii) The tractive effort available at the wheel. **[3]**

iii) The acceleration while ascending the above gradient. **[2]**

Q9) a) Explain the working with neat sketch of Horn and windscreen wiper. **[8]**

b) Explain with neat sketch of lead acid battery. State its rating capacity. **[8]**

OR

Q10)a) Explain oxygen sensors, cranking sensor, speed sensor and fuel metering sensor in vehicle. **[8]**

b) Explain the vehicle maintenance chart for clutch, gear box, propeller shaft & tyres. **[8]**

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

P4836

[Total No. of Pages : 4

[5154]-557
B.E. (Mechanical Engg.) (Semester - II)
COMPUTATIONAL FLUID DYNAMICS
(2012 Pattern) (Elective - IV)

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

Instructions to the candidates:-

1) *Answer Q1 or Q2, Q3or Q4, Q5 or Q6, Q7or Q8, Q9 or Q10.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate side full marks.*
4) *Use of electronic pocket calculator is allowed.*
5) *Assume suitable data, if necessary.*

Q1) a) What is control volume analogy in CFD? What are the different flow models used in CFD analysis? Comment on the resultant equations. **[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) Explain divergence of velocity. Explain the physical significance of it with suitable example. **[3]**

b) Consider One Dimensional steady-state heat conduction in varying cross section horizontal fin as shown in Fig.l The fin is subjected to the boundary conditions shown in Fig.l.

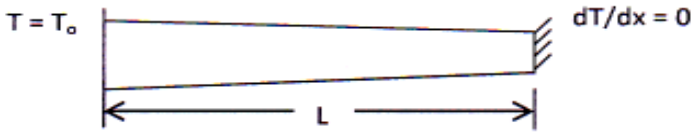


Fig.1 Fin

Above system results into following set of equations.

$$\begin{bmatrix} 1 & 2 & 0 & 0 \\ -1 & 1 & 2 & 0 \\ 0 & 1 & 3 & 1 \\ 0 & 0 & 2 & 2 \end{bmatrix} \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \end{bmatrix} = \begin{bmatrix} 4 \\ 1 \\ 7 \\ 8 \end{bmatrix}$$

P.T.O.

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]**

Q3) a) Discretize the second order partial differential term with suitable discretization method and show that **[5]**

$$\frac{\partial^2 u}{\partial x^2} = \frac{2u_i - 5u_{i+1} + 4u_{i+2} + u_{i+3}}{(\Delta x)^2}$$

b) Justify implicit methods are computationally costly. Comment on advantages of implicit methods over explicit methods. **[5]**

OR

Q4) a) In any commercial software, consider numerical analysis of any cooling application. Assign the Dirichlet and Neumann boundary conditions. Draw neat schematic and explain the boundary conditions for the same. **[6]**

b) Consider steady two-dimensional heat transfer in a long solid body whose cross section is given in the figure. The measured temperatures at selected points of the outer surfaces are as shown. The thermal conductivity of the body is k 45 W/m °C, and there is no heat generation. Discuss the solution methodology to determine the temperatures at the indicated points in the medium. Consider the finite difference method and formulate the problem. Take mesh size of & $\Delta x = \Delta y = 2.0$ cm. **[4]**

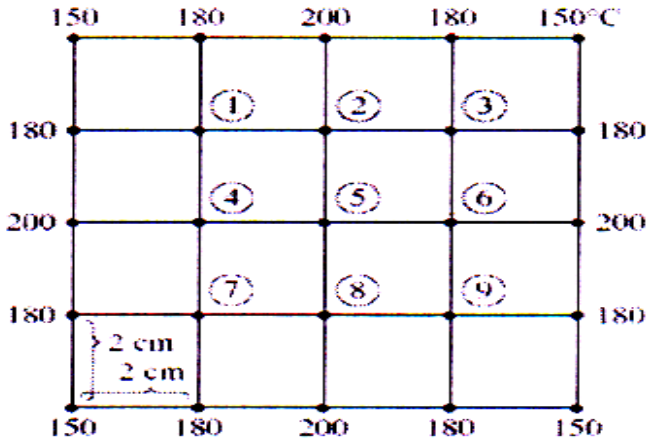


Fig.2 Computational domain

Q5) a) Discretize the Convective - Diffusion equation using upwind difference approach. Comment on the accuracy of the method. **[8]**

b) 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]**

OR

Q6) a) Compute solution for the first time step of the wave equation as given below

$$\frac{\partial u}{\partial t} + C\frac{\partial u}{\partial x} = 0, \text{ c = constant} > 0$$

using Lax-Wendroff scheme. The initial condition and boundary conditions are given below. **[10]**

Initial condition : $u(x,0) = \begin{cases} x - x^2, 0 \le x \le 1 \\ 0, \qquad x > 1 \end{cases}$

Boundary condition : $u(0, t) = 0$, for all t.

Take $\Delta x = 0.25, c\frac{\Delta t}{\Delta x} = 0.25$

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) Explain SIMPLE numerical technique. Write stepwise algorithm to find out the numerical simulation of flow through convergent divergent nozzle. **[10]**

b) Differentiate between Finite difference method and finite volume method. **[6]**

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 over come in SIMPLER algorithm. **[6]**

Q9) a) What is turbulence modeling? Explain **k - ω** model in detail. **[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) A schematic of a computational domain with boundary conditions is shown in Figure 3. Write a CFD simulation process in detail using any suitable commercial software. Draw neat sketches wherever necessary. Discuss **[10]**

i) The flow physics for given flow over circular cylinder.

ii) The flow parameters for analyzing the flow.

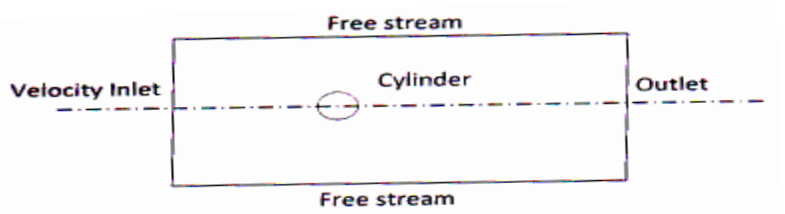


Fig.3 Computational Domain

b) Write any four characteristics of the turbulence. Explain its significance in brief. **[6]**

▲ ▲ ▲

Total No. of Questions : 10]

SEAT No. :

P2993

[Total No. of Pages : 3

[5154]-558
B.E. (Mechanical)
FINITE ELEMENT ANALYSIS
(2012 Course) (402050B) (Elective - IV) (Semester - II)

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) Explain importance of Boundary conditions and further explain: **[6]**

i) Essential Boundary Conditions.

ii) Natural Boundary Conditions.

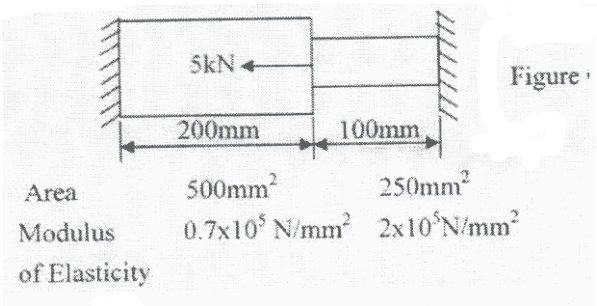
b) Why quality of meshing is important in FEA and how it is ensured and how the convergence of element in FEA formulation is achieved? **[4]**

OR

Q2) a) Explain the principle of Galerkin's Weighted Residual Method. **[6]**

b) Write a step by step procedure for Weak Formulation in elemental formulations. **[4]**

Q3) Determine the nodal displacements and element stresses by finite element formulation for the following figure. **[10]**

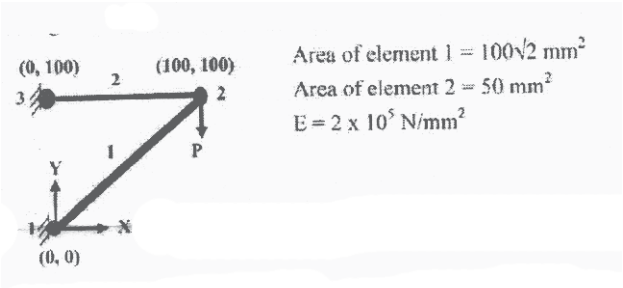


Figure

OR

P.T.O.

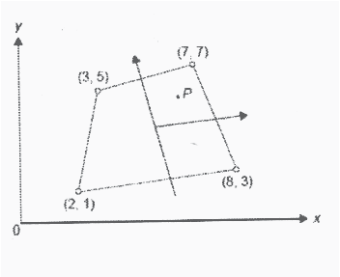
Q4) a) For the truss shown in figure acted by a force P. the displacements of node 2 is found to be Ux = 0.01 mm and Uy = –.02 mm, Determine the Force P. **[6]**



b) Explain method of Penalty for solution of equation [K] {X} = {F} where, [K] is a stiffness matrix, {X} is displacement vector and {F} is load vector. **[4]**

Q5) a) What is meant by ISO, SUPER and SUB parametric element and for structural analysis which is mostly preferred? **[6]**

b) Determine the Cartesian coordinate of the point $P(\zeta = 0.5, \eta = 0.5)$ shown in Fig. **[6]**



c) State and explain the three basic laws on which isoparametric concept is developed. **[6]**

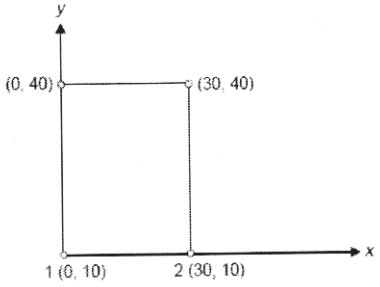
OR

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

i) Uniqueness of mapping of isoparametric elements.

ii) Jacobian matrix.

b) For the element shown in Fig. assemble Jacobian matrix and strain displacement matrix for the Gaussian point (0.7, 0.5). **[10]**



Q7) a) Write down governing equation of steady state Heat Transfer and also write down elemental stiffness matrix and compare with Bar element. **[6]**

b) Consider a brick wall of thickness 0.6m, k = 0.75 W/m°K. The inner surface is at 15°C and the outer surface is exposed to cold air at –15°C. The heat transfer coefficient associated with the outside surface is 40 W/m^2 °K. Determine the steady state temperature distribution within the wall and also the heat flux through the wall. Use two elements and obtain the solution. **[10]**

OR

Q8) a) Heat is generated in a large plate (K = 0.5 W/m °C) at the rate of 2000W/m^3. The plate is 10 cm thick. Outside surface of the plate is exposed to ambient air at 30°C with a convective heat transfer coefficient of 40 W/m^2 °C. Determine the temperature distribution in the wall. **[10]**

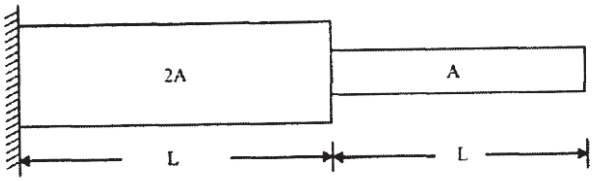
b) Derive FEA stiffness matrix for Pin Fin Heat Transfer Problem. **[6]**

Q9) a) Write down Consistent Mass and Lumped Mass Matrix for **[6]**

i) Bar Element

ii) Plane Stress Element

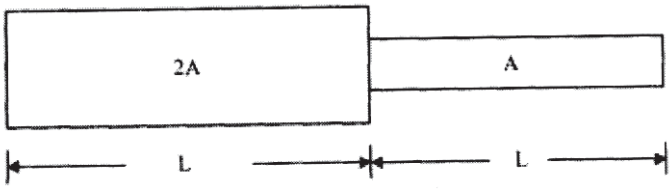
b) Find the natural frequencies of longitudinal vibrations of the same stepped shaft of areas A = 12000 mm^2 and 2A = 2500 mm^2 and of equal lengths (L = 1m), when it is constrained at one end, as shown below: **[10]**



OR

Q10)a) Explain difference between consistent and lumped mass matrix technique for modal analysis of structure. **[6]**

b) Find the natural frequencies of longitudinal vibrations of the unconstrained stepped shaft of areas A and 2A and of equal lengths (L), as shown below: **[10]**



Total No. of Questions : 10]

SEAT No. :

P2994

[Total No. of Pages : 3

[5154]-559

B.E. (Mechanical Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2012 Course) (Semester - II) (End Sem.) (402050C) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) 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 $1m^3$ of water per min. the pump has a stroke of 400 mm. The diameter of the piston is 200mm. the delivery & suction head are 20 m & 5 m respectively. Find the slip of the pump & power required to drive the pump. **[5]**

OR

Q4) a) What is slip in pump? Explain the meaning of negative slip. **[5]**

b) A single acting reciprocating pump has a plunger diameter 250 mm & stroke of 450 mm runs at 60 rpm. The length & diameter of delivery pipe are 60m & 100 mm respectively. Determine the power saved in overcoming friction in the delivery pipe by fitting an air vessel on the delivery side of the sump. Assume friction factor = 0.01. **[5]**

P.T.O.

Q5) a) Explain performance of axial fan with graph. **[8]**

b) 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 180m^3/ min of air at suction pressure of 1.013 bar & temperature of 430C and delivers it at 750 mm of W.G. taking the efficiencies of the blower and drive as 80% & 82% respectively. Determine the power required to drive the blower and the state of air at exit. **[8]**

OR

Q8) a) Write short note on selection of blowers for a desired application. **[8]**

b) A centrifugal fan has the following data: **[8]**

Inner diameter of the impeller	=	18cm
Outer diameter of the impeller	=	20cm
Speed	=	1450 rpm
relative velocity at entry	=	20 m/s
absolute velocity at entry	=	21 m/s
relative velocity at exit	=	17 m/s
absolute velocity at exit	=	25 m/s
flow rate	=	0.5 kg/s
motor efficiency	=	78%
Density of air	=	1.25 kg/m^3

Determine:

i) stage pressure rise

ii) degree of reaction

iii) power to drive the fan

Q9) a) Explain enthalpy-entropy diagram for centrifugal compressor. **[8]**

b) Draw velocity triangles at the entry & exit for the following axial compressor stage. **[10]**

i) R = ½

ii) R < ½

OR

Q10)a) Waht 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. :

P2995

[Total No. of Pages : 2

[5154]- 560

B.E. (Mechanical - Sandwich)

AUTOMOBILE ENGINEERING (Self Study - III)

(2012 Pattern) (End Sem.) (Semester - I) (402064)

Time :3 Hours] *[Max. Marks :100*

Instructions to candidates:

1) ***Answer any three questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION-I

Q1) a) Explain different types of chassis (any three). **[8]**

b) Explain with neat sketch torque tube drive. **[8]**

OR

Q2) a) Describe with neat sketch typical front axle. **[8]**

b) Describe with neat sketch all wheel drive layout. **[8]**

Q3) a) Is an Automobile gearbox speed reducing device or increasing device? Justify your answer. **[8]**

b) Explain construction of alloy wheel with neat sketch. **[8]**

OR

Q4) a) Describe with neat sketch differential unit. **[10]**

b) Why propeller shaft is used instead of solid shaft in automobile transmission? **[6]**

Q5) a) Explain following terminologies related to steering. **[8]**

i) Toe out ii) Camber
iii) Toe in iv) Scrub radius

b) Draw the layout of air system and explain its working principle. **[10]**

OR

P.T.O.

Q6) a) Explain with neat sketch hydraulic braking system. **[8]**

b) Explain with neat sketch leaf spring suspension system. **[10]**

SECTION - II

Q7) a) Describe active safety and passive safety in details. **[8]**

b) Explain following sensors used in modern automobile **[8]**

i) Rain Sensor ii) Air mass flow sensor

iii) Camshaft Sensor iv) Speed sensor

OR

Q8) a) Write short note on importance of ergonomics in automobile safety. **[6]**

b) What is engine management system? Explain with block diagram engine management system. **[10]**

Q9) a) Explain the following in short. **[8]**

i) Endurance Test ii) Coast down test

b) Why stability of vehicle is important? Justify. **[4]**

c) Describe various types of road tracks. **[4]**

OR

*Q10)*a) Explain different vehicle performance parameters with graphs. **[10]**

b) Describe vehicle emission Test in detail. **[6]**

*Q11)*a) Explain the constructional details of power driven roller. **[8]**

b) Draw and explain various types of Tractors and its layout. **[10]**

OR

*Q12)*a) Draw and explain Typical layout of Dump Truck. **[8]**

b) Draw and explain typical layout of Earth Loader. **[10]**

Total No. of Questions : 12]

SEAT No. :

P2996

[Total No. of Pages : 3

[5154]-561

B.E. (Mechanical Sandwich)

POWER PLANT ENGINEERING

(2012 Pattern) (Semester - I) (Self Study - IV) (402065)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer three questions from section I and three questions from Section II.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain with neat sketch the Bomb calorimeter. **[8]**

b) A steam turbine receives steam at 30 bar and 350°C and exhaust to condenser at 0.08 bar. Determine the thermal efficiency, Specific steam consumption and work ratio of ideal Rankine cycle. **[8]**

OR

Q2) a) What are different methods to increase the efficiency of Rankine cycle. Explain with neat sketch Reheat cycle. **[8]**

b) Methane (CH_4) is burned with atmospheric air. The analysis of products on a 'dry' basis is as follows CO_2 = 10%, O_2 = 2.37%, CO = 0.53, N_2 = 87.10%. **[8]**

i) Determine the combustion equation.

ii) Calculate air fuel ratio.

Q3) a) Explain with neat sketch Benson boiler. What are the advantages of Benson boiler. **[8]**

b) Compare induction draught and forced draught. **[8]**

OR

Q4) a) Give the classification of flue gas cleaning devices and explain electrostatic precipitator. **[8]**

b) Give detailed classification of steam turbine. **[8]**

P.T.O.

Q5) a) Discuss the parameters on which the selection of site for a hydraulic power plant depend. **[6]**

b) Write note on selection of turbines. **[6]**

c) Explain what do you mean by storage and pondage. Why are they required? **[6]**

OR

Q6) a) Explain what do you mean by storage and pondage. Why are they required. **[6]**

b) What do you mean by **[6]**

i) Hydrograph

ii) Flow duration curve

c) Explain with neat sketch Kaplan turbine. **[6]**

SECTION - II

Q7) a) Explain the working of Boiling water reactor. **[6]**

b) Enlist advantages and disadvantages of diesel power plant. **[6]**

c) Write note on nuclear waste disposal. **[6]**

OR

Q8) a) What are the parameters considered while selecting diesel power plant. **[6]**

b) What do you mean by radioactive decays and radioisotopes. **[6]**

c) Explain heat balance sheet of diesel power plant. **[6]**

Q9) a) Why thermal efficiency of gas turbine is high at high altitude. Compare open cycle and closed cycle gas turbine. **[8]**

b) Explain tidal power plant with neat sketch. **[8]**

OR

Q10)a) What are various methods used to improve the performance of gas turbine plant. Explain open cycle gas turbine with intercooling. **[8]**

b) Explain the working principle of fuel cell. Explain with neat sketch Ion exchange membrane cell. **[8]**

Q11)a) Explain base load plants and peak load plants. Why base load plants are loaded heavily? **[8]**

b) Explain with neat sketch geothermal power plant. **[8]**

OR

Q12)a) Explain the method of drawing load duration curve using load curve. What is ideal and realised load curve. **[8]**

b) The rated capacity of power plant is 400 MW. The peak load on the plant is 350 MW. The various consumer groups having maximum demand of 120MW, 100 MW, 80MW and 90 MW are connected to the power plants. The annual load factor is 0.8. Calculate **[8]**

i) The average load

ii) Capacity factor

iii) Demand factor

iv) Reserve factor

x x x

Total No. of Questions : 10]

SEAT No. :

P2997

[Total No. of Pages : 4

[5154]-562

B.E. (Mechanical - Sandwich)

MECHANICAL VIBRATIONS

(2012 Course) (Semester - II) (End Semester) (402066)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, and Q.9 or Q.10.***
2) ***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) Four masses A, B, C and D are completely balanced. Masses C and D make angles of 90° and 210° respectively with B in the same sense. The planes containing B and C are 300 mm apart. Masses A, B, C and D can be assumed to be concentrated at radii of 360 mm, 480 mm, 240 mm and 300 mm respectively. **[10]**

The masses B, C and D are 15 kg, 25 kg and 20 kg respectively. Determine:

a) mass A and its angular position

b) position of planes A and D.

OR

Q2) a) Discuss the effect of damping on vibratory system. What is meant by under damping, over damping & critical damping? **[4]**

b) An unknown mass ‘m’ is attached to one end of a spring of stiffness ‘k’ having natural frequency of 6 Hz. When 1 kg mass is attached with m, the natural frequency of the system is lowered by 20%. Determine the value of unknown mass m and stiffness k. **[6]**

Q3) a) Define logarithmic decrement. Derive an expression for logarithmic decrement in terms of damping ratio. **[4]**

P.T.O.

b) Determine suitable expression for equation of motion of the damped vibratory system as shown in following fig 1. Find the critical damping coefficient when a = 0.10 m, b = 0.13 m, k = 4900 k/m and M = 1.5 kg. **[6]**

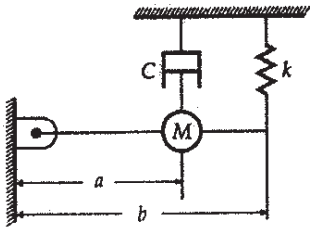


Fig. 1

OR

Q4) a) Find the natural frequency of oscillation for the roller rolling on horizontal surface without slipping, as shown in Fig.2 The mass of roller is 5 Kg, radius of roller is 50mm, and stiffness of spring is 2000 N/m. **[4]**

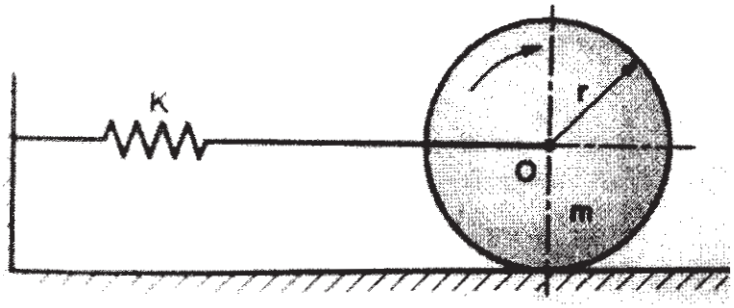


Fig. 2

b) A horizontal spring mass system with Coulomb damping has a mass of 5.0 kg attached to a spring of stiffness 980 N/m. If the coefficient of friction is 0.025, **[6]**

Calculate

i) The frequency of free oscillations,

ii) The number of cycles corresponding 50 % reduction in amplitude, if the initial amplitude is 50 mm and

iii) The time taken to achieve 50 % reduction.

Q5) a) Explain frequency response curves with neat diagram. **[8]**

b) The springs of an automobile trailer are compressed 0.1 m under its own weight. Find the critical speed, when the trailer is passing over a road with a profile of sine wave whose amplitude is 80 mm and its wavelength is 14 m. Find the amplitude of vibration at a speed of 60 km/hr. **[8]**

OR

Q6) a) Explain the following terms: **[6]**

i) Critical damping coefficient

ii) Whirling speed of shaft

iii) Quality factor

b) Derive, using vector approach, the expressions for **[10]**

i) Amplitude of steady state vibrations and

ii) Phase angle for a spring mass damper system subjected to an external periodic force $F_0 \sin(\omega t)$

Q7) Find the frequencies of the system shown in following fig. 3 **[16]**

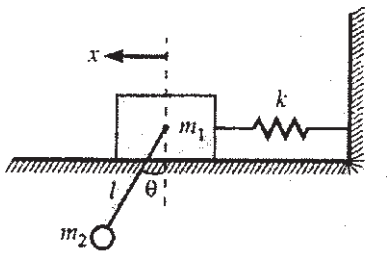


Fig. 3

OR

Q8) a) Explain with neat diagram mathematical model of a car. **[6]**

b) Two equal masses of weight 400 N each and radius of gyration 40 cm are keyed to the opposite ends of a shaft of 60 cm long. The shaft is 7.5 cm diameter for the first 25 cm of its length, 12.5 cm diameter for the next 10 cm and 8.5 cm diameter for the remaining of its length. Find the frequency of free torsional vibrations of the system and position of node. Assume $G = 0.84 \times 10^{11} N/m^2$. **[10]**

Q9) a) Explain with neat diagram the working principle of FFT Analyser. **[6]**

b) Explain the construction and working of piezoelectric accelerometer with neat diagram. **[6]**

c) A machine of 100 kg mass has a 20 kg rotor with 0.5 mm eccentricity. The mounting springs have $k = 85 \times 10^3$ N/m, damping factor = 0.02. The operating speed of machine is 600 rpm and the unit is constrained to move vertically. Find the force transmitted to the supports. **[6]**

OR

Q10)a) Explain various methods of vibration control? **[6]**

b) Explain the principle and working of undamped dynamic vibration absorber with neat diagram. **[6]**

c) A vibrometer having the amplitude of vibration of the machine part as 4 mm and damping factor as 0.2, performs harmonic motion. If the difference between the maximum and minimum recorded value is 10 mm, determine the natural frequency of vibrometer, if the frequency of vibration part is 12 rad/sec. **[6]**

x x x

Total No. of Questions : 10]

SEAT No. :

P2998

[Total No. of Pages : 2

[5154]- 564

B.E. (Mechanical - Sandwich)

INDUSTRIAL HYDRAULICS & PNEUMATICS

(2012 Pattern) (Semester - II) (End Sem.) (402067)

Time :2½ Hours] *[Max. Marks :70*

Instructions to candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answers will be valued as a whole.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Explain in brief various applications of fluid power. **[10]**

b) Distinguish between pneumatic and hydraulic systems. **[10]**

OR

Q2) a) Explain in detail the working principle of Weight loaded accumulator. **[10]**

b) Explain in brief the classification of pumps and their basis. **[10]**

Q3) a) Explain the working of Regenerative circuit with a neat sketch. **[8]**

b) Write short note on types of flow control valves. **[8]**

OR

Q4) a) Write short note on direction control valves & their types. **[8]**

b) Explain and draw synchronization circuit. **[8]**

Q5) a) Differentiate between pneumatic and electro pneumatic systems. **[8]**

b) Explain the working of Pneumatic clamp. **[8]**

OR

Q6) a) Write short note on compressed Air Generation and Distribution System. **[8]**

b) Explain in brief the applications of Pneumatics in Industrial Automation. **[8]**

P.T.O.

Q7) a) Explain in brief the process of selection of components from the manufacture's catalogue. **[9]**

b) Explain the factors considered for designing a Pneumatic system. **[9]**

OR

Q8) a) Discuss and explain in detail the maintenance and trouble shooting procedures for hydraulic system. **[9]**

b) Explain the factors considered for designing a Hydraulic system. **[9]**

Total No. of Questions : 10]

SEAT No. :

P2999

[Total No. of Pages : 5

[5154]-565

B.E. (Mechanical Sandwich)

REFRIGERATION AND AIR CONDITIONING

(2012 Course) (Semester - II) (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 indicates full marks.***
3) ***Use of logarithmic tables slide rule, Mollier charts, Electronic pocket calculator, Steam table and p-h chart is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define Ton of Refrigeration. What are the conversions factors to convert it in to kW and Btu/hr. **[4]**

b) A refrigerator using Carnot cycle has a COP of 4. **[6]**

i) Determine the ratio of T1/T2.

ii) If the net work input is 10 kW, determine refrigeration effect in TR.

iii) If the cycle is used as heat pump, determine its COP.

OR

Q2) a) Explain the effects of superheat on the COP of VCRS in following three cases with neat sketch and Ph diagram wherever necessary: **[6]**

i) superheating is done in evaporator

ii) superheating is done in the suction pipe and

iii) superheating is carried out in liquid - vapour heat exchanger.

b) Derive equation for COP of a Bell-Coleman refrigeration cycle. **[4]**

P.T.O.

Q3) a) Explain the need of replacement of CFC refrigerants. **[4]**

b) A vapour compression cycle using Ammonia operates between –20ºC and 40ºC. The liquid refrigerant is sub cooled to 35ºC. The vapour leaving evaporator is dry saturated. **[6]**

Assuming isentropic compression calculate:

i) Refrigeration effect in kJ/kg.

ii) Work of Compression in kJ/kg

iii) COP

Temperature	Specific Enthalpy kJ/kg		Specific Entropy KJ/kgK	
ºC	hf	Hg	Sf	Sg
–20	108.6	1437.2	0.6543	5.9025
35	366.1	1488.6	1.5660	5.2086
40	390.4	1490.4	1.6437	5.1558

OR

Q4) a) Explain Ammonia-water vapour absorption system with neat sketch. **[6]**

b) What is the need of using cascading system in very low temperature applications? **[4]**

Q5) a) In an air conditioning unit 5 m^3/s of air at 30ºC DBT, 21ºC WBT and standard atmospheric pressure enters the unit and flows over a cooling coil. The exit air from cooling coil is then heated with the help of steam coil by 5ºC. The leaving condition of the air is 18ºC dry bulb temperature and 65% relative humidity. Using properties from psychrometric chart, calculate: **[8]**

i) Refrigeration capacity of cooling coil

ii) Heating capacity of steam coilr

iii) SHF of the cooling process

iv) Bypass factor of heating coil if surface temperature of heating coil is 22ºC.

b) What is difference between ventilation & infiltration? Explain Sick building syndrome. **[6]**

c) Explain following terms: **[4]**

i) Dry bulb temperature

ii) Wet bulb temperature

iii) Dew point temperature

iv) Humidity ratio

OR

Q6) a) 300 kg/hr of air saturated at 5ºC is mixed with 150 kg/hr of air at 30ºC and 55% RH. The barometric pressure can be taken as 760 mm of Hg. Determine the final state (DBT and moisture content) of air without using psychrometric chart. Use of steam table is allowed. **[8]**

b) Write a short note on comfort chart. **[6]**

c) Explain following terms: **[4]**

i) Degree of saturation

ii) Humid specific heat

Q7) a) Explain working all air, all water and air-water air conditioning systems. Discuss the applications of the three types. **[8]**

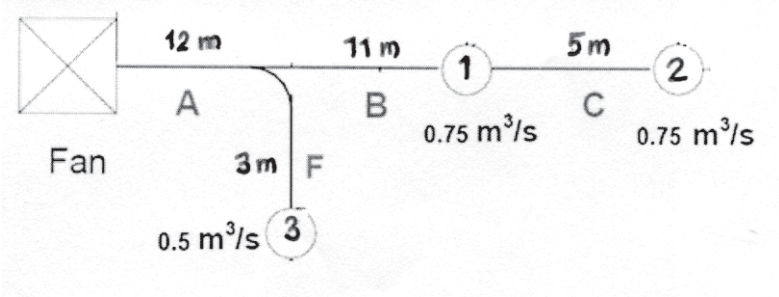
b) Explain working of Scroll compressors with neat sketch. What are the advantages, limitations and application areas of scroll compressors. **[8]**

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 over constant pressure expansion valve? **[8]**

b) What are the different types of evaporators used in refrigeration systems? Explain working of flooded type evaporator with neat sketch. **[8]**

Q9) a) The following figure shows a typical duct layout. Design the duct system using equal friction method. Take the velocity of air in the main duct (A) as 450 mpm. Assume dynamic loss coefficient for elbows as 0.22. Static regain factor R = 0.75. Static pressure at each outlet may be taken as 3 mm of H2O. Find the FTP required and the amount of dampening required at each outlet. **[12]**



b) Explain commonly used Duct materials. What are the desirable properties of duct material. **[4]**

OR

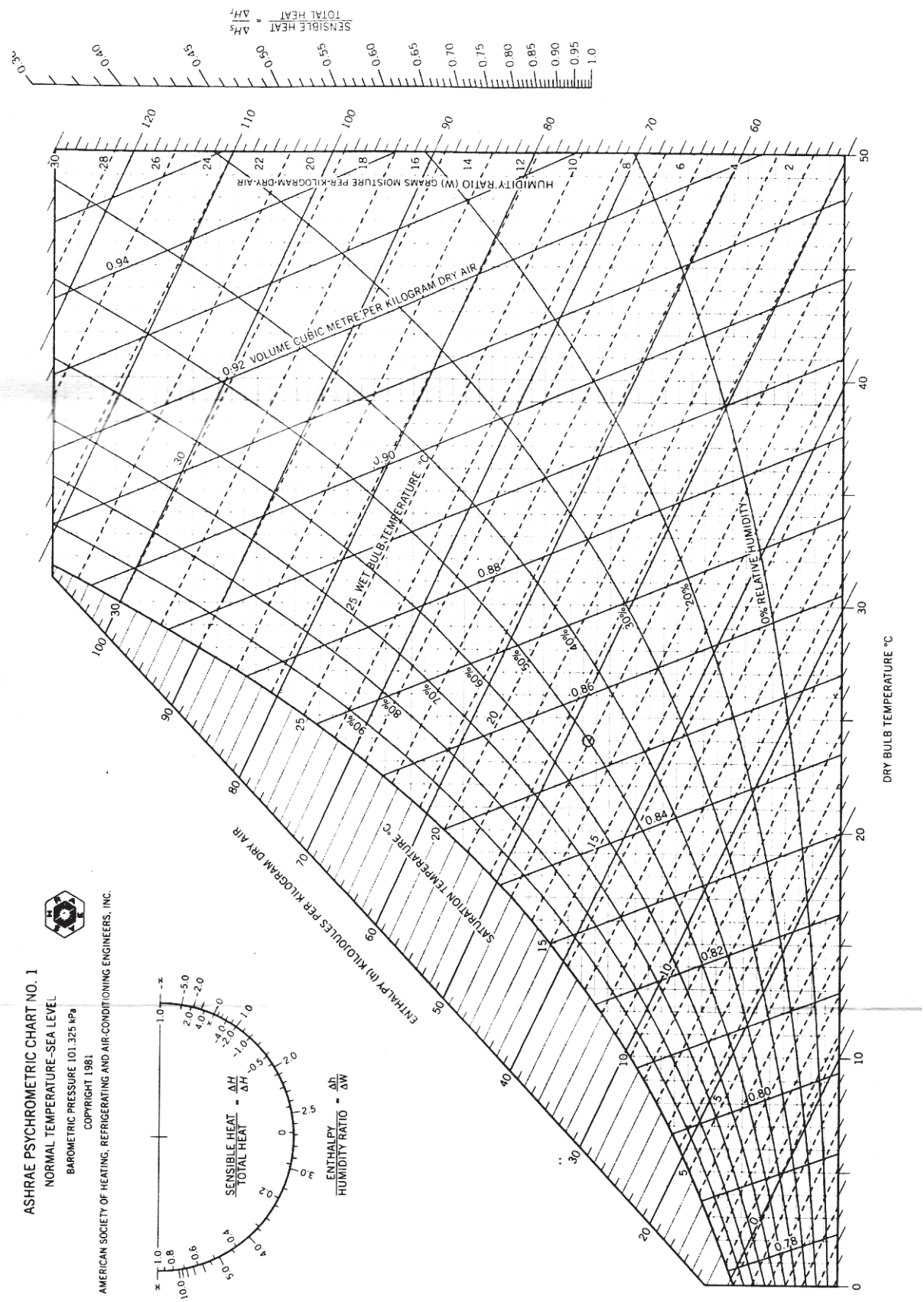
Q10)a) A duct of size 1000 mm × 300 mm carries 100 cmm of air having density of 1.2 kg/m^3. Determine diameter of equivalent circular duct if: **[8]**

i) Same air quantity in both the ducts.

ii) Same air velocity in both the ducts.

If friction factor is f = 0.012, find the pressure loss per unit length of the circular duct in both the cases and the rectangular duct.

b) What are the different types of pressure losses in duct systems? Write a short note on duct friction chart. **[8]**


ASHRAE PSYCHROMETRIC CHART NO. 1
NORMAL TEMPERATURE–SEA LEVEL
BAROMETRIC PRESSURE 101.325 kPa
COPYRIGHT 1981
AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.
SENSIBLE HEAT / TOTAL HEAT = ΔHs / ΔHt
HUMIDITY RATIO (W) GRAMS MOISTURE PER KILOGRAM DRY AIR
VOLUME CUBIC METRE PER KILOGRAM DRY AIR
WET BULB TEMPERATURE °C
ENTHALPY (h) KILOJOULES PER KILOGRAM DRY AIR
SATURATION TEMPERATURE °C
% RELATIVE HUMIDITY
DRY BULB TEMPERATURE °C
SENSIBLE HEAT / TOTAL HEAT = ΔH / ΔH
ENTHALPY / HUMIDITY RATIO = Δh / ΔW

Total No. of Questions : 10]

SEAT No. :

P3000

[Total No. of Pages : 2

[5154]-566

B.E. (Mechanical Sandwich)

COMPUTATIONAL FLUID DYNAMICS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to right indicate full marks.***

Q1) a) Discuss experimental and simulation methodology of investigating the fluid flow and the merits and demerits of the same. **[7]**

b) Explain the term Substantial derivative along with local derivative and convective derivative and their relevance in the CFD. **[7]**

OR

Q2) a) Explain importance of CFD in modern design process with suitable examples and sketches. **[7]**

b) Explain meaning of divergence of velocity from the point of view of a fluid dynamist. **[7]**

Q3) a) What is discretization? Comment further on it in relation with consistency and stability of governing equations. **[7]**

b) Explain the lax windroff technique. **[7]**

OR

Q4) a) By giving suitable example explain in detail any one application of CFD simulation. Also state clearly the expected methodology to analyze results from such simulation. **[7]**

b) Explain the requirement of stability criteria in numerical calculations. **[7]**

P.T.O.

Q5) Explain the method to obtain the solution of first order wave equation using upwind scheme. **[14]**

OR

Q6) Considering an unsteady 2 dimensional heat conduction equation as model equation as given below, explain how ADI technique is used to obtain the solution. Also give advantages of ADI technique. **[14]**

$$\frac{\partial T}{\partial t}=\alpha\left(\frac{\partial^2 T}{\partial x^2}+\frac{\partial^2 T}{\partial y^2}\right)$$

Q7) a) Solve following Tridigonal Matrix system using Thomas algorithm. **[7]**

$$\begin{bmatrix} 2.25 & -1 & 0 & 0 \\ -1 & 2.25 & -1 & 0 \\ 0 & -1 & 2.25 & -1 \\ 0 & 0 & -2 & 2.25 \end{bmatrix} = \begin{bmatrix} T1 \\ T2 \\ T3 \\ T4 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

b) Give features, advantages and disadvantages of finite volume method. **[7]**

OR

Q8) Explain SIMPLE algorithm used in CFD solutions. **[14]**

Q9) a) Explain Mac Cormack Scheme. **[7]**

b) Discuss Different types of Grids used in CFD solution and comment on quality of mesh. **[7]**

OR

Q10) Write Short Notes on any two of the followings: **[14]**

a) Use of Scalar and vector plots in post processing.

b) Various types of boundary conditions used in CFD simulations.

c) Reynolds averaged Navier Stokes equations.

Total No. of Questions : 10]

SEAT No. :

P3001

[Total No. of Pages : 3

[5154]-567

B.E. (Mechanical Sandwich Engineering)

DESIGN OF PUMPS, BLOWERS AND COMPRESSORS

(2012 Course) (Semester - II) (End Sem.) (402068C) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10..***
2) ***Use only one answer book & supplement if required.***
3) ***Use of scientific calculator, steam table, mollier chart is allowed.***
4) ***Figures to right indicate full marks.***

Q1) a) Write a note on dimensionless parameters. **[5]**

b) Write the basic equation of Energy Transfer between fluid and rotor and explain the terms involved in it. **[5]**

OR

Q2) a) Write a short note on stage velocity triangles. **[5]**

b) Explain the following terms: **[5]**

i) Fan

ii) Blower

Q3) a) Draw Indicator diagram for Reciprocating Pump. **[5]**

b) For a single acting reciprocating pump piston diameter is 150mm, stroke is 300 mm, rotational speed is 50 RPM and water is to be raised through 18m. Determine theoretical discharge, if the actual discharge is 4 lit/sec. Determine volumetric efficiency and slip if mechanical efficiency is 80%. **[5]**

OR

Q4) a) Derive an expression for work done and power required to drive for single acting reciprocating pump. **[5]**

P.T.O.

b) Consider a single acting single cylinder reciprocating pump having the following details: **[5]**

$D = 125$ mm $L = 225$ mm $H_{atm} = 10.5$m

$D_s = 75$ mm $L_s = 3.5$m $H_s = 2.5$m

$D_d = 75$ mm $L_d = 13.5$ m $H_d = 9.0$ m

Safe minimum pressure head = 2.4m

If air vessel is provided on delivery side close to cylinder find the maximum speed at which pump can be run and the discharge.

Q5) a) What are main causes for noise generation in fan? What are methods for reducing the fan noise? **[8]**

b) Explain the following terms with respect to **[8]**

i) Surge

ii) Stall

OR

Q6) a) Explain the different mechanisal losses in fans and blowers? **[8]**

b) Write a note on classifications of blowers. **[8]**

Q7) a) Explain design procedure for selection and optimization of Blowers. **[8]**

b) A centrifugal blower takes in 180 m^3/min of air $P_1 = 1.013$ bar and $t_1 = 43°c$ and delivers it at 750 mm 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) Derive the expression for stage with downstream guide vane. **[8]**

b) An axial fan stage consisting of only a rotor has the following data:- **[8]**

Rotor blade air angle at exit = 10^o

Tip diameter = 60cm

Hub diameter = 30cm

Rotational speed = 960rpm

Power required = 1kW

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.

Q9) a) What is the work done factor for an Axial flow compressor stage? How does it vary number of stage? **[8]**

b) Draw performance curves for centrifugal compressor. **[10]**

OR

Q10)a) Explain the different impeller flow losses. **[8]**

b) What are basic design features in Axial Flow Compressor? **[10]**

Total No. of Questions : 10]

SEAT No. :

P3002

[Total No. of Pages : 2

[5154]-568

B.E. (Mechanical S/W)

CAD/CAM AND AUTOMATION

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) A triangle with vertices P (2, 2) Q (12, 2) and R (7, 10) is mirrored about line passing through origin and point 10, 10.

Find the concatented matrix and new coordinate of tringle. **[10]**

OR

Q2) a) Compare Geometrical Transformation and Mapping. **[4]**

b) Find parametric equation of circle having two diametrically opposite points P(3, 3) and Q(10, 3). Find number of points on circle when increment in angle is 45°. **[6]**

Q3) a) Explain Bezier curve and state its advantages over cubic spline curve. **[6]**

b) Explain concept of shape function for 1D element. **[4]**

OR

Q4) Truss is shown in figure 1. Determine deflection and stresses in element and reaction force. **[10]**

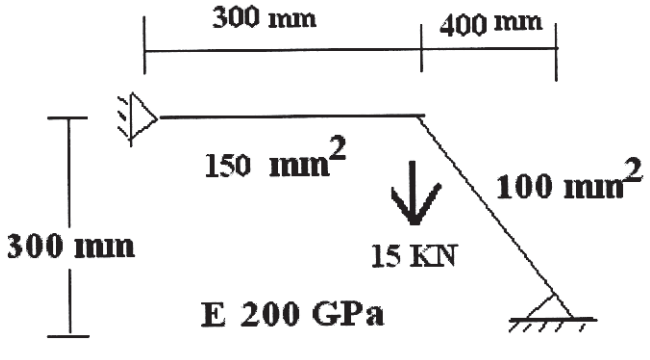


Figure 1

P.T.O.

Q5) a) Classify NC machines. **[8]**

b) Explain Canned cycle for Drilling and Tapping operation. **[10]**

OR

Q6) a) Explain G02, G41, M01, M07 code in part programming. **[6]**

b) Explain CNC program to cut shape shown in figure 2. Assume suitable data. **[12]**

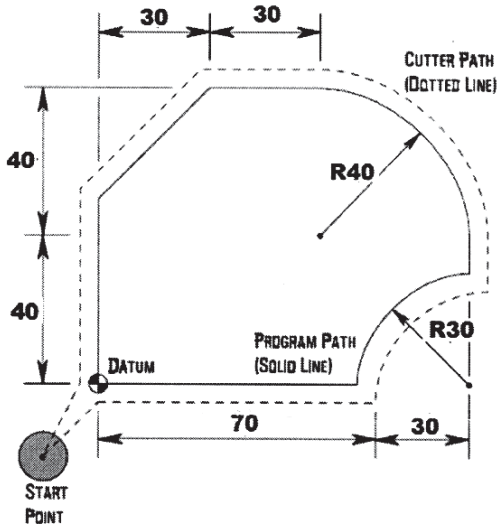


Figure 2

Q7) a) Explain basic steps in RP process. **[6]**

b) Explain Fused deposit manufacturing RP process. **[10]**

OR

Q8) a) Explain Stereo Lithography method of rapid prototyping with advantages and limitation. **[12]**

b) Application of RP Aerospace industry. **[4]**

Q9) a) Classify Robots on the basis of configuration. Explain Articulated configuration robots with Construction working and applications. **[10]**

b) Explain any one Mechanical gripper with figure. **[6]**

OR

*Q10)*a) Explain the concept of Group technology with its layout. **[8]**

b) Explain various types of automation. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3003

[Total No. of Pages : 2

[5154]-569

B.E. (Mech. - Sandwich Engg.)

ENERGY AUDIT & MANAGEMENT

(402069A) (2012 Course) (Semester - II) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write a short note on Energy action Planning. **[6]**

b) Describe relation between Environment and Energy. **[4]**

OR

Q2) a) Explain Four Principles of Energy Management. **[6]**

b) Write short note on Energy conservation act 2001. **[4]**

Q3) a) Explain Energy Conservation opportunities in Boiler. **[6]**

b) Explain Need of Energy Audit in India. **[4]**

OR

Q4) a) Explain Energy Conservation opportunities in Compressed air system. **[6]**

b) Why Pre-audit and Post-audit is important during Energy audit? **[4]**

Q5) A cogeneration system installation is expected to reduce an annual company's bill by Rs. 20 Lacks. If the capital cost of the new cogeneration installation is Rs. 60 Lacks. & Rs. 5 Lacks per year on an average required maintaining & operating plant. Calculate simple payback period & % return on Investment (%ROI). What is the future value of Rs. 1000/- after 3 years if the interest rate is 10%? **[10]**

OR

P.T.O.

Q6) Describe the factors influencing costing and typical cost of steam, natural gases and electricity? **[10]**

Q7) a) Calculate Thermal Efficiency of boiler and Evaporation ratio by direct method with the help of following data: **[6]**

Type of boiler : Coal fired.

Quantity of Steam generated: 10 TPH.

Quantity of Coal consumed : 1.6TPH.

Steam Pressure and Temperature: 10kg/cm^2(guage)/ 190ºC.

Feed water Temperature : 79ºC.

GCV of Coal : 12500 kJ/kg.

Enthalpy of saturated steam at 10 kg/cm^2 pressure: 1685 kJ/kg.

Enthalpy of feed water: 310 kJ/kg.

b) Energy Performance Assessment Steam Distribution System, explain with neat sketch. **[6]**

OR

Q8) a) Explain different efficient steam distribution systems. **[6]**

b) List the energy saving opportunities in pumping system. **[6]**

Q9) a) Explain the term Copper losses and Luminous Efficiency. **[7]**

b) Write a short note on the Electricity Act 2003. **[7]**

OR

Q10)a) Explain the selection and location of Capacitors for improving power factor. **[7]**

b) Explain the term Color Rendering Index (CRI) and Ignitors. **[7]**

Q11)a) What are the heat wheels? Explain with neat sketch. **[7]**

b) Write short note on Carbon Credit. **[7]**

OR

Q12)a) Describe cogeneration cycles with suitable practical examples. **[7]**

b) Explain with flow chart CDM project. **[7]**

Total No. of Questions : 12]

SEAT No. :

P3004

[Total No. of Pages : 6

[5154]-570
B.E. (Mechanical Sandwich)
OPERATIONS RESEARCH
(2012 Course) (Semester - II) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) A company manufacturers three products namely X, Y and Z. Each of the products requires processing on three machines, Turning, Milling and Grinding. Product X requires 10 hours of turning, 5 hours of milling and 1 hour of grinding. Product Y requires 5 hours of turning, 10 hours of milling and 1 hour of grinding and Product Z requires 2 hours of turning, 4 hours of milling and 2 hours of grinding. In the coming planning period, 2700 hours of turning, 2200 hours of milling and 500 hours of grinding are available. The profit contribution of X, Y, and Z are Rs. 20, Rs. 15 and Rs. 20 per unit respectively. Formulate the LPP and find the optimal product mix to maximize the profit. **[8]**

OR

Q2) a) What are merits and shortcoming decision tree. **[4]**

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

i) Decision tree

ii) Decision node

P.T.O.

Q3) Solve the following Transportation problem involving three sources and four destinations. The cell entries represent the cost of transportation per unit. Obtain IBFS by VAM method. Find optimum solution by using Steeping Stone Method. **[8]**

		Destinations				
		1	2	3	4	Supply
Sources	1	3	1	7	4	300
	2	2	6	5	9	400
	3	8	3	3	2	500
	Demand	250	350	400	200	

OR

Q4) Five workmen of a factory are to be assigned to five jobs which can be done by any of them. Because of different number of year with the firm, the workers get different wages per hour. These are Rs. 5 per hour for A, B and C each and Rs. 3 per hour for D and E each. The amount of time taken by each employee to do a job is given in table below. Obtain the assignment pattern that: **[8]**

a) Minimizes the total time taken and

b) Minimizes the total cost of getting five units of work done.

		Workmen				
		A	B	C	D	E
Job	I	7	9	3	3	2
	II	6	1	6	6	5
	III	3	4	9	10	7
	IV	1	5	2	2	4
	V	6	6	9	4	2

Q5) Solve the following game by method of sub game. **[6]**

		Player B		
		1	2	3
Player A	1	1	3	11
	2	8	5	2

OR

Q6) Following figures related to the toy manufacturing company, **[6]**

Sell price per unit = Rs. 14

Total units sold = 50,000

Fixed cost = Rs. 12,000

Calculate:

a) P/V ratio

b) B.E.P. in units

c) B.E.P. in sales

d) Margin of safety

e) Total profit.

Q7) a) The production department for a 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. Find: **[8]**

i) optimal lot size

ii) optimal order cycle time

iii) minimum yearly total cost

b) A fleet owner finds from his past records that the cost per year of running a truck and resale values whose purchase price is Rs. 6000/- are given as under. At what stage the replacement is due? **[8]**

Year	1	2	3	4	5	6	7
Running cost in Rs.	1000	1200	1400	1800	2300	2800	3400
Resale value in Rs.	3000	1500	750	375	200	200	200

OR

Q8) a) A fast moving item has a demand of 18,000 units/year. The cost of one procurement is Rs. 50 and inventory carrying or holding cost is Rs. 1.20 per unit/per year. It is assumed that supply is received as soon as the order is placed and no shortage or stock permitted. Cost of one unit is Rs. 8. **[8]**

Determine:

i) EOQ

ii) Number of Orders/Year

iii) Interval between orders

iv) Total cost per year

b) A machine costs Rs. 500/-. Operation and maintenance costs are zero for the first year and increase 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? **[8]**

Q9) a) A T.V. repairman 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 repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? **[8]**

b) Five jobs P, Q, R, S and T are to be made on the three groups of machines f_1, f_2 and f_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 f_1 to the finishing of last job on f_3, also find idle time for machine during elapsed time. **[8]**

Job	P	Q	R	S	T
Time for f_1 (min.)	20	27	31	15	19
Time for f_2 (min.)	7	9	6	12	14
Time for f_3 (min.)	27	31	16	14	16

OR

Q10)a) The arrivals at a telephone booth are considered to be the following Poisson law of distribution with an average time of 10 minutes between one arrival and the next. Length of the phone call is assumed to be distributed exponentially with a mean of 3 minutes. **[8]**

i) What is the probability that a person arriving at the booth will have to wait?

ii) What is the average length of queue that forms from time to time?

iii) The telephone department will install a second booth when convinced that an arrival would expect to wait at least three minutes for the phone. By how much must the flow of arrivals be increased in order to justify a second booth?

b) There are five (tasks jobs) each of which must go through two machines A and B in the order of AB. Processing times are given in table below. Determine a sequence for five jobs (tasks) that will minimize the elapsed time and also calculate the total idle time. **[8]**

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

Q11)a) The following table lists the jobs of a network along with their time estimates: **[8]**

i) Draw the project network.

ii) Calculate the length and variance of the critical path.

Activity	T_o	T_m	T_p
1-2	1	3	5
2-3	2	5	6
2-4	4	6	7
2-5	8	10	12
3-5	0	0	0
3-6	4	8	9
4-7	5	7	14
5-7	7	10	16
6-7	0	0	0
6-8	6	9	12
7-9	1	3	7
8-9	3	5	7

b) A 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 project consists of 13 activities. Their precedence relationships and duration in days is given in table: **[12]**

Activity	Predecessor	Duration (Days)
A	-	6
B	A	4
C	B	7
D	A	2
E	D	4
F	E	10
G	-	2
H	G	10
I	J, H	6
J	-	13
K	A	9
L	C, K	3
M	I, L	5

i) Construct the project network.

ii) Find the critical path.

iii) Find total completion time of the project.

b) A firm manufacturing two components, radio and transistors which must be processed through assembly and finishing department. Assembly has 90 hours available finishing can handle upto 72 hours of work. Manufacturing one radio needs 6 hours in assembly and 3 hours in finishing. Each transistor needs 3 hours in assembly and 6 hrs in finishing. If profit is Rs. 120 per radio and Rs. 90 per transistor, calculate the best combinations of radio and transistor to realize profit of Rs. 2100. **[4]**

Total No. of Questions : 10]

SEAT No. :

P3005

[Total No. of Pages : 2

[5154]-570-A
B.E. (Mechanical Sandwich)
ROBOTICS
(2013 Course) (Semester - II) (Elective - II) (402069 C) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt all questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Use of pocket non programmable electronic calculator is allowed.***

Q1) a) What is D-H parameter and obtain an expression for D-H parameter. **[5]**

b) Explain sensor selection criteria for robotic applications. **[5]**

OR

Q2) a) Differentiate between serial and parallel manipulator. **[5]**

b) Explain mobility concept of parallel robots. **[5]**

Q3) a) With the help of illustration, explain the differentiate between forward and inverse kinematics. **[5]**

b) Suggest configuration of robot suitable for following application and justify. **[5]**

i) Spray Painting.

ii) Pick & Place.

iii) Fastening a screw to car body.

OR

P.T.O.

Q4) a) Determine the position and orientation of the cup with respect to the gripper. If the position and orientation of the gripper with respect to base co-ordinate frame is given by T_3 such that **[5]**

$$T=\begin{vmatrix} 1 & 0 & 0 & -3.294 \\ 0 & 1 & 0 & 5.685 \\ 0 & 0 & 1 & 8 \\ 0 & 0 & 0 & 1 \end{vmatrix}$$

b) Explain properties of Jacobian matrix a manipulator. **[5]**

Q5) a) Role of homogeneous transformations in robots. **[10]**

b) Explain with neat sketch static forces in manipulator. **[8]**

OR

Q6) a) (UVW) is obtained from (XYZ) by rotation of 90° about Z-axis followed by rotation of 30 degree about X axis. Then (UVW) locates a point P at u = 30, V = 20, W = 50. Determine its co-ordinate with respect to (XYZ). **[10]**

b) Explain general block diagram of robot control system. **[8]**

Q7) a) Explain different types of controllers used in industrial robots. **[8]**

b) Explain control law of positioning. **[8]**

OR

Q8) a) Explain in brief proximity sensors used in Robots. **[8]**

b) What are general considerations in trajectory planning? **[8]**

Q9) a) Explain, why is machine vision system is a part of artificial intelligence? **[8]**

b) Explain with block diagram of machine vision system for Robots. **[8]**

OR

Q10)a) Explain the steps of Image processing & Analysis. **[8]**

b) Write short notes on need of artificial intelligence in robotics. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3006

[Total No. of Pages : 2

[5154]-570-B
B.E. (Mechanical S/W)
TRIBOLOGY
(2012 Course) (Elective - II) (402069 D) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarithmic tables and electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Give a comparison of sliding and rolling contact bearings with reference to the following points: **[6]**

i) Magnitude of load.

ii) Nature of load.

iii) Speed.

iv) Life.

v) Frictional loss.

vi) Space requirement.

b) Define friction. Explain basic modes of lubrication. **[4]**

OR

Q2) a) State and explain applications of importance of tribology in industries. **[6]**

b) Explain the factor affecting the friction. **[4]**

Q3) Derive from basic principles two dimensional Reynolds equation taking usual notations. **[10]**

OR

Q4) a) Draw and explain the classification of wear measuring machines along with sketches of at least three types. **[6]**

b) Differentiate between long journal bearing and short journal bearing. **[4]**

P.T.O.

Q5) Derive equations for flow rate, pressure distribution and load carrying capacity of hydrostatic step bearing. **[16]**

OR

Q6) a) A circular plate is approaching an oily fixed plane surface with velocity 'V' at the instant, the film thickness is h1, if both the surfaces are separated by a lubricant of viscosity 'μ'. Derive the expression for the time 't' taken to reduce the film thickness from h1 to h2. **[10]**

b) State and explain different types of energy losses in hydrostatic bearing. **[6]**

Q7) a) Explain the phenomenon of Elastohydrodynamic lubrication and state its applications. **[6]**

b) Explain the working principal of Gas lubrication bearing, state the merits, demerits and its applications. **[10]**

OR

Q8) Using modified Reynold's equation for elastohydrodynamic lubrication, derive Ertel-Grubin equation as: $\frac{h_0}{R}=1.19\left(\frac{ELR}{W}\right)^{1/11}\left(\frac{\mu_o U\alpha}{R}\right)^{8/11}$ **[16]**

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

a) Lubrication in Rolling and Forging with neat sketches.

b) Electroplating process with neat sketch.

c) Porous bearing and foil bearing.

d) Hybrid bearing.

OR

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

a) Tribological aspects of wheel on rail road.

b) Surface Engineering.

c) Mechanics of tyre road interaction.

d) Lubrication in Drawing and Extrusion with neat sketches.

Total No. of Questions : 9]

SEAT No :

P 3007

[Total No. of Pages :2

[5154]-571

B.E. (Automobile Engg.)

AUTOMOTIVE REFRIGERATION AND AIRCONDITIONING

(2012 Course) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Figures to the right side indicate full marks.***
2) ***Use of steamtables, sliderule, electronic calculator, and psychrometric chart is allowed.***
3) ***Assume suitable data if necessary.***
4) ***Solve 6 question 1 or 2, 3 or 4, 5 or 6, 7 or 8,9 is compulsory.***

Q1) a) Write down need of Refrigeration and explain term "tonne of refrigeration". **[6]**

b) Explain Reverse Carnot Cycle. **[4]**

c) A refrigerator system operates on the reverse Carnot cycle. The Higher temperature of refrigerant in the system is 35°C and the lower temperature is –15°C. The capacity is to be 12 tonnes. Determine: **[6]**

i) C.O.P. ii) Heat rejected from the system per hour and

iii) Power required.

OR

Q2) a) Draw p-h & T-s diagram of reversed Carnot cycle. Derive an expression for COP. **[8]**

b) A cold storage is to be maintained at –5°C while the surronding are at 35°C. The heat leakage from the surrounding into the cold storage is estimated to be 29 kW. The actual C.O.P. of the refrigeration plant is one third of an ideal plant working between the same temperatures. Find the power required to drive the plant. **[8]**

Q3) Define"refrigerant" and explain Properties of refrigerants. **[4]**

OR

Q4) Explain ozone depletion, Global Warming issue & need of alternative refrigerant. **[4]**

Q5) a) Define following Properties. **[8]**

i) Specific Humidity ii) Relative Humidity

iii) Degree of saturation iv) WBT & DBT

P.T.O.

b) Calculate psychometric properties without using Psychometric chart of moist air at 36°C &20°C WBT. **[8]**

OR

Q6) a) With the help of Psychometric chart find out the following if the air is at 24°C DBT and 50% relative humidity. **[8]**

i) DPT ii) WBT

iii) Enthalpy of air & iv) Specific Humidity

b) Show following process on skeleton psychometric chart. **[8]**

i) Sensible heating & sensible cooling

ii) Cooling with dehumidification

iii) Humidification with heating

iv) Adiabatic mixing of two streams

Q7) a) A retail shop located in a city at 30°N latitude has the following loads: Room sensible heat= 58.15 kW Room latent heat= 14.54 kW The summer outside and inside design conditions are outside:
40°C DBT, 27°C WBT Inside : 25°C DBT, 50% RH
70m^3/min of ventilation is used. Determine the following, if the bypass factor of cooling oil is 0.15
Determine. i) Ventilation load; ii) ERSHF iii) Grand total heat 4.ADP. **[8]**

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

i) sensors and actuators ii) pressure switching devices

OR

Q8) AC bus design for following parameter: Outside condition 40°C DB &28°C WB. Inside condition 25°C DB & 50 % RH. Solar heat gain through body = 5.87 kW, Solar heat gain through glass = 5.52 kW, Occupant = 25, SH gain per person = 58 kW, LH gain per person = 60 W, Internal lighting load = 15 lamps of 100 Watt & 10 fluorescent tubes of 80 Watt, SH gain other sources = 11.6 kW, Infiltration air = 15 m^3/min, if 25% fresh air & 75% recirculated air is mixed passed through the conditioner coil, Assume BF 02, Draw schematic diagram & calculate 1. Amount of air required m^3/hr 2. Dew point of temperature of coil 3. The condition of supply air 4. Capacity of conditioning. **[16]**

Q9) Write a note on any three of the following. **[18]**

a) Initial vehicle inspection

b) Refrigerant storing

c) Refrigerant recovery & recycling

d) Leak detection

e) Compressor servicing

✈ ✈ ✈

Total No. of Questions : 9]

SEAT No. :

P3008

[Total No. of Pages : 2

[5154]-572
B.E.(Automobile)
AUTOMOTIVE CHASSIS AND SYSTEMS
(2012 Pattern) (Semester - I) (End Sem.)

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) ***Question no 09 is compulsory.***

Q1) a) Describe any two types of stub axles. **[6]**

b) Write a short note on wheel balancing. **[4]**

OR

Q2) a) Describe Ackerman steering geometry. **[6]**

b) What is tire remolding process; describe any one type in brief. **[4]**

Q3) a) Describe Double wish bone type suspension. **[4]**

b) Describe Torsion bar spring with its advantages, limitations and application. **[4]**

c) Explain castor angle. **[2]**

OR

Q4) a) What is sprung and unsprung mass? **[4]**

b) Write a note on Antiroll bar. **[4]**

c) Explain Camber angle. **[2]**

Q5) a) Describe Disc brakes along with advantages and limitations. **[8]**

b) Write a note on hydraulic brake fluids. **[8]**

OR

P.T.O.

Q6) a) Describe Hydraulic braking system with proper layout. **[8]**

b) Describe Vacuum servo assisted brake. **[8]**

Q7) a) Write note on Electronic Stability program. **[8]**

b) What is Active safety;give any four examples of it. **[4]**

c) Write short note on Regenerative braking system. **[6]**

OR

Q8) a) Write note on Roll over mitigation system. **[8]**

b) Describe Head Restraint as passive safety device. **[4]**

c) Describe Antilock Braking System. **[6]**

Q9) a) Describe any two types of automotive chassis frames. **[8]**

b) Write note on chassis failure. **[8]**

❄ ❄ ❄

Total No. of Questions : 10]

SEAT No. :

P3009

[Total No. of Pages : 2

[5154]-573
B.E.(Automobile)
MACHINE & VEHICLE DYNAMICS
(2012 Pattern) (Semester-I) (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.***
3) ***Assume suitable data, if necessary.***

Q1) Four masses A, B, C, D carried by rotating shaft at 80 mm, 100 mm, 160 mm & 120 mm respectively are completely balanced. Mass B, C, D are 8kg, 4kg & 3kg respectively. Determine mass A & relative positions, when they placed at 500 mm apart. **[10]**

OR

Q2) a) Find out primary & secondary forces with direct & reverse crank method. **[6]**

b) Explain types of vibration in brief. **[4]**

Q3) A mass of 2kg is supported on a spring of 3KN/m & has a dashpot having damping coefficient of 5 N-sec/m. If the initial displacement of 8mm is given find.

a) Damped natural frequency

b) Logarithmic decrement

c) Amplitude after 3 cycles. **[10]**

OR

Q4) a) Find out generalize equation of forced damped vibrations with constant harmonic excitation by graphical method. **[6]**

b) Write a short note on transmissibility. **[4]**

Q5) a) How stabality of vehicle attects its performance on slope? Explain with neat sketch of forces. **[8]**

b) Explain difference between vehicle fixed co-ordinate & earth fixed co-ordinate system. **[8]**

OR

P.T.O.

Q6) a) Explain following terms in brief: **[8]**

i) Draw Bar pull

ii) Acceleration

b) Explain concept of equivalent mass & equivalent moment of Inertia. **[8]**

Q7) a) Find generalize equation of power limited acceleration by considering inertia effect. **[8]**

b) Explain following terms in brief:

i) Stopping Time

ii) Brake factor. **[8]**

OR

Q8) a) Explain vehicle acceleration with the help of engine performance curve in detail. **[8]**

b) Explain Brake Efficiency & factors affecting it in brief. **[8]**

Q9) a) Explain Quarter car model in brief. **[6]**

b) Inlist vehicle excitation sources which affect ride & explain any one in brief. **[6]**

c) Differentiate constant steer angle test with constant radius test. **[6]**

OR

Q10)Explain following terms in brief: **[3×6=18]**

a) Steady state responce.

b) Constant speed test.

c) Modal Analysis.

Total No. of Questions : 10]

SEAT No. :

P3010

[Total No. of Pages : 2

[5154]- 574

B.E. (Automobile Engineering)

FUNDAMENTALS OF COMPUTATIONAL FLUID DYNAMICS

(2012 Pattern) (Semester - I) (End Sem.) (Elective - I) (416491 A)

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) *Figures to the right indicate full marks.*

Q1) a) Explain advantages and disadvantages of CFD. **[4]**

b) Explain time marching in explicit approach. **[6]**

OR

Q2) Explain first order (forward, Backward & central difference approximation) using Taylor series in brief. **[10]**

Q3) a) Explain cartesian grids in detail. **[6]**

b) Explain infinitesimal control volume method of flow modeling. **[4]**

OR

Q4) Explain divergence of velocity. **[10]**

Q5) a) Explain solution of first order wave equation by Lax wendroff scheme. **[8]**

b) Explain CFL number as Stability condition. **[8]**

OR

Q6) a) Explain solution of first order wave equation by Maccormack method. **[8]**

b) Assess the Central differencing Scheme for CFD analysis. **[8]**

Q7) a) Describe the numerical procedure using SIMPLEX Algorithm. **[8]**

b) Explain Finite descrifization method in brief. **[8]**

OR

P.T.O.

Q8) a) Explain Rayleighritz method in brief. **[8]**

b) Explain Application of CFD to flow through Pipe. **[8]**

Q9) a) Write a short note on Reynold Averaged Navier-stroke equation (RANS). **[9]**

b) Explain Noslip, free slip, rotating wall boundary condition. **[9]**

OR

Q10)a) Write a short note on selection of physics & material properties. **[9]**

b) Explain analysis of the plots of various parameters. **[9]**

Total No. of Questions : 8]

SEAT No. :

P3011

[Total No. of Pages : 5

[5154]-575

B.E. (Automobile Engineering)

FUNDAMENTALS OF FINITE ELEMENT ANALYSIS

(2012 Course) (Semester - I) (Elective - I) (416491 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
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 concept of FEM briefly & discuss the advantages & disadvantages of FEM over classical method & Finite difference method. **[6]**

b) Determine the nodal deflection and slopes & reaction at support for the beam as shown in figure 1.1. Consider the force P = 200 kN, EI = 4000 kN/m^2. **[8]**

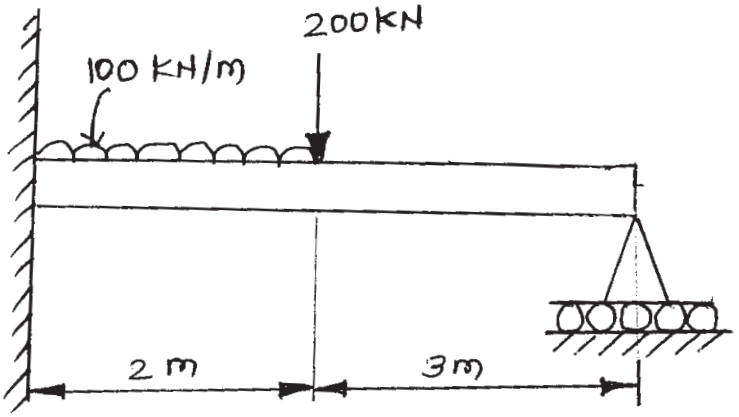


Figure. 1.1

c) Using area coordinate derive the shape function for CST element. **[6]**

OR

Q2) a) Explain the Reyleigh-Ritz & Galerkin Methods. **[6]**

b) Determine the extension of the bar as shown in figure 2.1. Consider two elements and $E = 2 \times 10^5$ N/mm^2. **[8]**

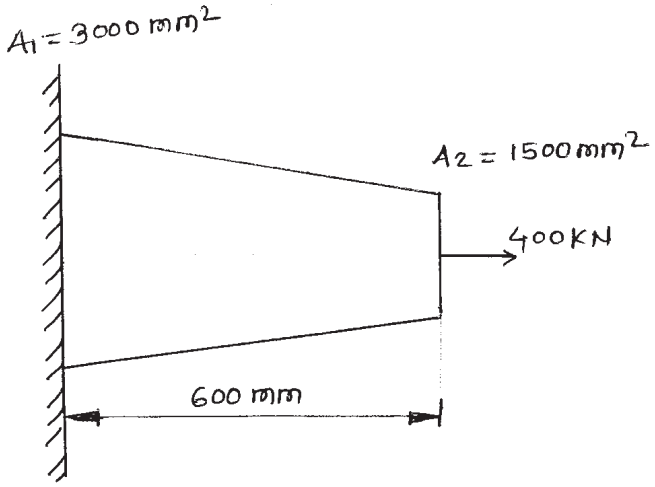


Figure 2.1

c) Evaluate the shape function N_1 N_2 & N_3 for triaguler element shown in figure 2.2. **[6]**

Point	X Coordinate	Y Coordinate
1	1.5	2
2	7	3.5
3	4	7
P	3.85	4.8

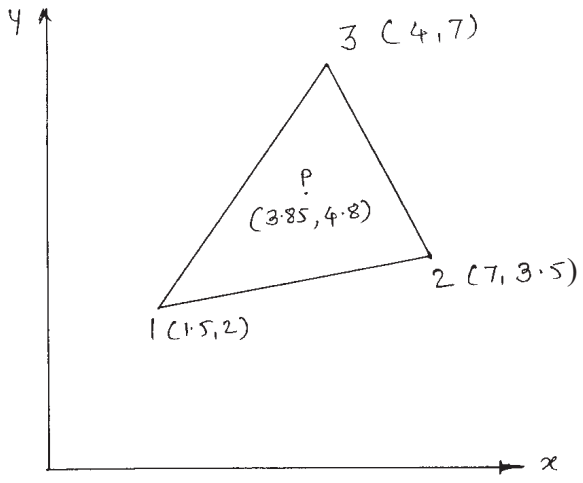


Figure 2.2

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

i) Substructuring

ii) Submodeling

iii) Patch Test

iv) Full and Reduced integration

b) Evaluate the integrals using Gaussian quadrature. (5 marks each) **[10]**

i) $I = \int_0^1 \left(1/\left(1+x^2\right)\right) dx$

ii) $I = \int_{-1}^1 \left(1 + x + 2x^2 + 3x^3\right) dx$

OR

Q4) a) Derive shape function for 8 nodded rectangular serendipity element. **[8]**

b) The iso-parametric shape functions for CST element as shown in Figure 4.1 are given as N1 = ζ, N2 = η, and N3 = 1-ζ-η. Evaluate shape funcitons at interior point P. Also, if temperatures at node 1, 2 and 3 are 25°, 30°, and 50° respectively, evaluation the temperature at the interior point P. **[10]**

Point	X Coordinate	Y Coordinate
1	2	2
2	5	3
3	3	10
P	3	6

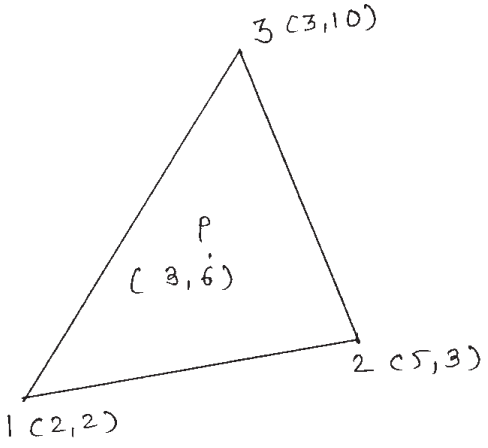


Figure 4.1

Q5) a) Derive elements stiffness matrix formulation for one dimensional steady state Heat Conduction problems. **[8]**

b) Determine the temperature distribution through the composite wall subjectd to convection heat loss on the right side surface with convective heat transfer coefficient as shown in figure 5.1. The ambient temperature is - 5°C. **[8]**

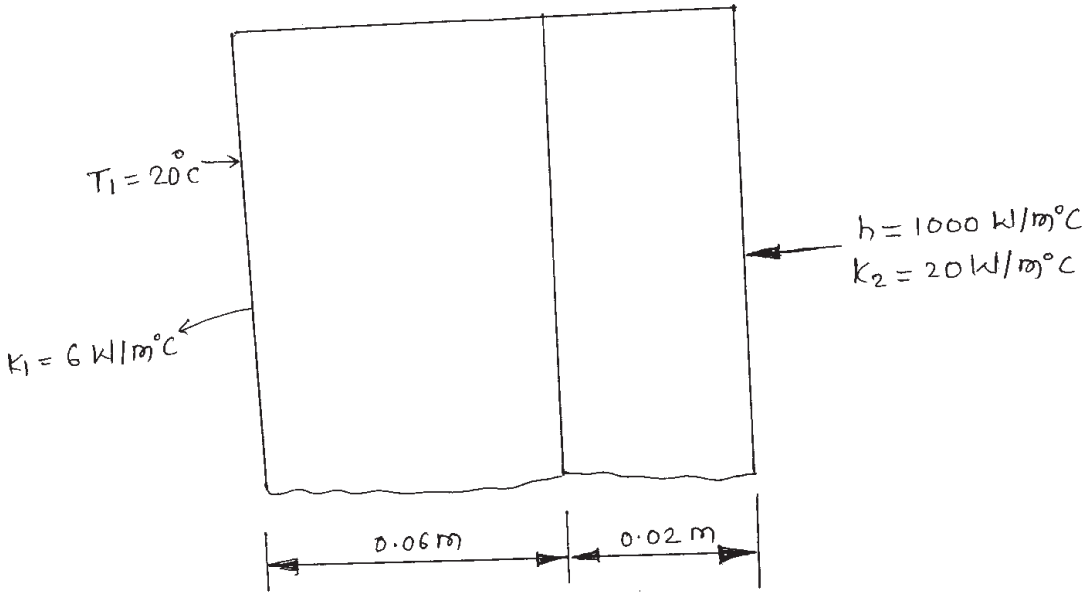


Figure 5.1

OR

Q6) The fin shown in Figure 6.1 is insulated on the perimeter. The left end has a constant temperature of 100°C. A positive heat flux of q = 5000 W/m^2. Acts on the right end. Let K*xx* = 6 W/(m°C) and cross sectional area A = 0.1 m^2. Determine the temperatures at L/4, L/2, 3L/4, and L where L = 0.4m. **[16]**

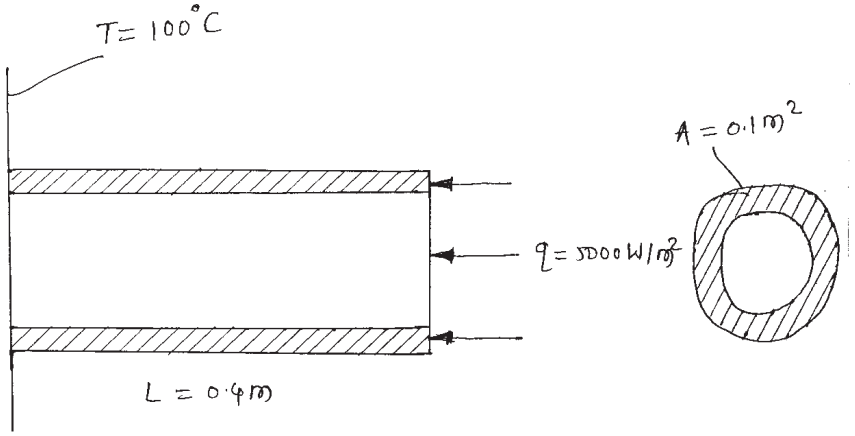


Figure 6.1

Q7) a) Explain the term lumped mass matrix and consistent mass. Why combination of mass matrices is more advantageous than lumped mass matrix & consistent mass matrix individually? **[6]**

b) For bar element shown in figure 7.1 with length L = 2.5 m, E = 210 GPa, ρ = 7850 kg/m^3. Determine the first two natural frequencies by using lumped mass matrix. Consider two elements. **[10]**

Lumped Mass Matrix $\left[m^e\right] = \frac{\rho A l}{2}\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

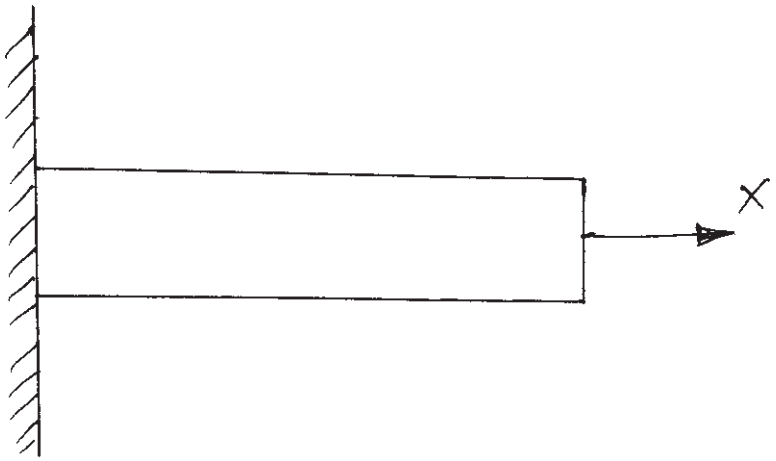


Figure 7.1

OR

Q8) a) Explain h-refinement, p-refinement, and r-refinement of mesh which is used in adaptive mesh refinement process. **[6]**

b) Using only one finite element, obtain an expression for the natural frequency of a uniform cantilever Euler-Bernoulli beam. Do not consider rotary inertia of the cross section. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3012

[Total No. of Pages : 3

[5154]-576

B.E. (Automobile)

CAE AND AUTOMATION

(2012 Course) (Semester - I) (End Semester) (Elective - I) (416491 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write a short note on Hermite cubic spline curve. **[6]**

b) Describe feature based modelling. **[4]**

OR

Q2) a) Write a short note on Isometric projections as applied to CAD. **[6]**

b) A cubic spline curve is defined by the equation, $P(u) = C_3u^3 + C_2u^2 + C_1u + C_0$, $0 \leq u \leq 1$ where C_3, C_2, C_1 and C_0 are the polynomial coefficients. Assuming these coefficients are known, find the four control points that define an identical Bezier curve. **[4]**

Q3) A line has coordinates A(5,4,5) and B(10,10,9). The line is to be uniformly scaled by a factor 2 about point A. Determine the new coordinates of the line. **[10]**

OR

Q4) Temperature at Node 1 is 200°C and at Node 2 is 80ºC. The length of element is as shown in Fig.1, is 250 mm. Evaluate the shape function associated with node 1 and node 2. Calculate the temperature at point 'p' situated at 100 mm from node 1. Assume a linear shape function. **[10]**

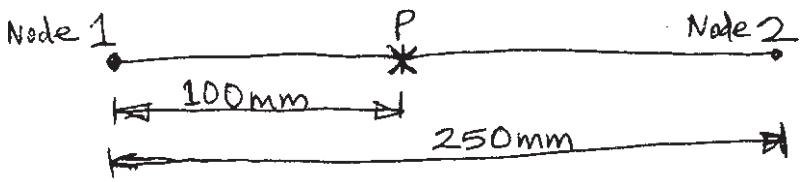


Fig. 1

P.T.O.

Q5) a) Discuss with neat sketch different types of Adaptive control systems. **[6]**

b) Describe with neat sketch Retrieval type or variant process planning system. **[6]**

c) Explain Selective Laser Sintering Process of RP. **[6]**

OR

Q6) a) What do you mean by Linear interpolation, circular Interpolation and canned cycles. **[6]**

b) Write a manual part program for the component shown in Fig.2 . Assume the raw product as cast and the machining is to achieve the various dimensions. The thickness of the casting is 10 mm. **[12]**

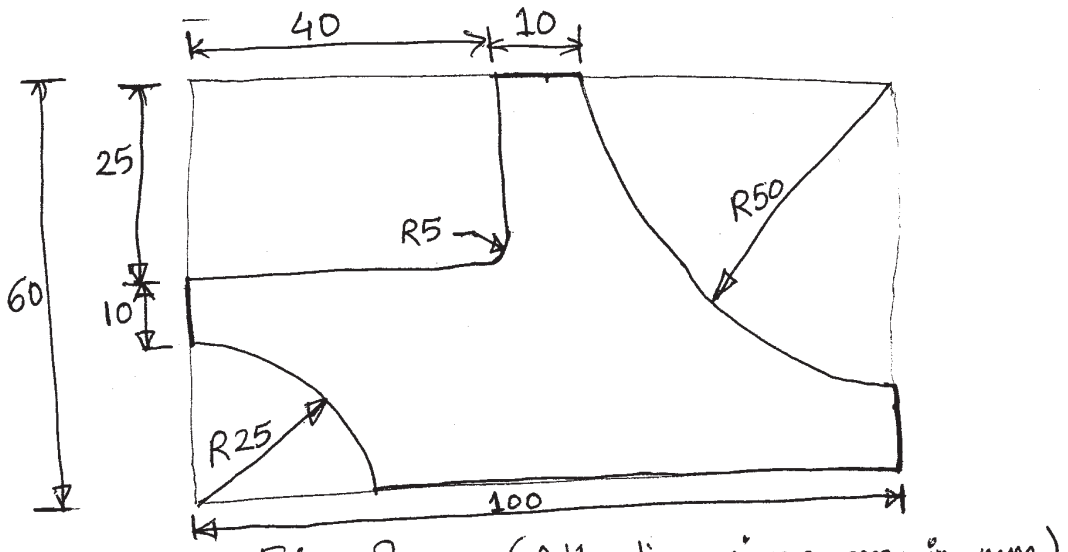


Fig. 2. (All dimensions are in mm.)

Q7) a) Why automation is required? Discuss Hard automation, soft (programmable) automation and Flexible automation. **[8]**

b) What do you mean by Automated storage and Retrieval systems? Explain in detail. **[8]**

OR

Q8) a) What is AGV? Discuss different types of AGV. **[8]**

b) Describe optiz coding system used in group Technology. **[8]**

Q9) a) Describe with neat sketch **[8]**

i) Slider Crank Mechanism Gripper.

ii) Swivel Link Gripper.

b) Discuss different kinds of Robot Joints with sketches. **[8]**

OR

Q10) a) Describe with neat sketch **[8]**

i) Cartesian workspace configuration.

ii) Cylindrical workspace configuration.

b) Discuss different Robot drives and Actuation Systems. **[8]**

x x x

Total No. of Questions : 12]

SEAT No. :

P3013

[Total No. of Pages : 2

[5154]-577

B.E. (Automobile Engineering)

HYBRID AND FUEL CELL VEHICLE

(2012 Course) (Semester - I) (Elective - II) (End Semester) (416492 A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Draw the layout of Electric Vehicle and explain its components. **[6]**

OR

Q2) With neat sketch explain the working of synchronous Motor. **[6]**

Q3) Write a short note on Road laod calculation. **[6]**

OR

Q4) Write a note on Grid connected Hybrid Vehicle. **[6]**

Q5) With neat layout of Series hybrid architecture. Explain its working and also give applications. **[8]**

OR

Q6) Explain the working of mild hybrid. Give suitable examples. **[8]**

Q7) a) Explain matching of Electrical drive and ICE. **[8]**

b) What is meant by sizing the propulsion motor. Explain. **[8]**

OR

Q8) a) Explain construction and working of lead acid battery. **[8]**

b) Explain various battery parameters. **[8]**

P.T.O.

Q9) a) Explain construction and working of proton exchange Membrane. **[8]**

b) Explain construction and working of phosphoric acid fuel cell. **[8]**

OR

Q10)a) Explain construction and working of molten carbonate fuel cell. **[8]**

b) Explain construction and working of super and ultra capacitors. **[8]**

Q11)a) Explain different types of hydraulic accumulators. **[9]**

b) Explain construction and working of continuously variable transmissions. **[9]**

OR

Q12)a) Explain any one Nonelectric Hybrid Systems. With neat sketch. **[9]**

b) Explain construction and working of Pneumatic hybrid engine systems operation modes. **[9]**

x x x

Total No. of Questions : 12]

SEAT No. :

P3014

[Total No. of Pages : 2

[5154]-578

B.E. (Automobile)

AUTOMOTIVE MATERIALS

(2012 Course) (Semester - I) (Elective - II) (End Semester) (416492 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Figures to the right side indicate full marks.***
2) ***Use of slide rule, electronic calculator is allowed.***
3) ***Assume suitable data, if necessary.***
4) ***Solve 6 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 & Q.11 or Q.12.***

SECTION - I

Q1) a) Draw a neat sketch of material property chart for modulus strength and label it properly. **[3]**

b) Explain significance of material property chart & write its application for material selection. **[3]**

OR

Q2) a) Write down selection criteria for shape factor and elastic extrusion. **[3]**

b) Explain selection criteria for bending and twisting with applications in automobiles. **[3]**

Q3) a) Write properties and applications of MEMS materials. **[3]**

b) Give three applications of Nano materials in automobiles. **[3]**

OR

Q4) a) Write down properties and applications of P & N type semiconductors in automobiles. **[3]**

b) Write applications of superconductors in automobiles. **[3]**

Q5) a) Explain characteristics of composite material and give its applications in automobiles. **[4]**

b) Explain the different methods of processing of plastics. **[4]**

OR

P.T.O.

Q6) a) Explain different characteristic features of Plastics. **[4]**

b) Write down different types of plastics and its applications in automobiles. **[4]**

SECTION - II

Q7) a) Explain following mechanical surface treatments in detail-Case hardening & hard facing. **[8]**

b) Explain Electroplating and its applications in automobiles. **[8]**

OR

Q8) a) Explain with sketch diamond coating. **[8]**

b) Explain mechanical surface treatments ceramic and organic coating. **[8]**

Q9) a) Explain properties and applications of refractory metals. **[8]**

b) Explain mechanical properties and applications of High strength low alloy steel in automobiles. **[8]**

OR

Q10)a) Explain four applications of metal foams in automobiles. **[8]**

b) Explain mechanical properties of smart materials and its applications in automobiles. **[8]**

Q11)a) Explain material selection criteria for Cylinder block in detail. **[6]**

b) Explain material selection criteria for Crank case in detail. **[6]**

c) Explain the nonmetallic material polymer and its applications in automobiles. **[6]**

OR

Q12)a) Explain the material selection criteria of Piston in detail. **[6]**

b) Explain the material selection criteria of camshaft in detail. **[6]**

c) Explain the nonmetallic material ceramic and its applications in automobiles. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3015

[Total No. of Pages : 3

[5154]-579

B.E. (Automobile)

AUTOMOTIVE HYDRAULICS & PNEUMATICS

(2012 Pattern) (Semester - I) (Elective - II) (End Sem.) (416492 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any three 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 electronic calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What is force, power & displacement relation? **[6]**

b) Differentiate between positive displacement pump & rotodynamic pumps. **[4]**

OR

Q2) a) Enlist different losses in pipe. How frictional losses can be calculated for laminar & turbulent flow. **[6]**

b) Explain types of seals used in hydraulic system with materials. **[4]**

Q3) a) Explain with neat sketch radial plunger pump. **[6]**

b) Draw symbols for **[4]**

i) Pilot operated pressure reducing value

ii) Hose

iii) Accumulator

iv) Cushioned cylinder

OR

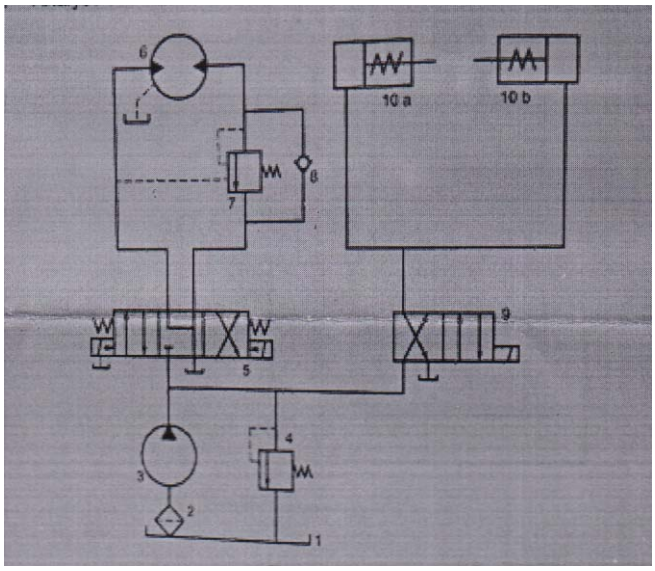
P.T.O.

Q4) a) Explain construction & Working of solenoid actuated valve. **[4]**

b) Write Classification of DCV & Explain with neat sketch shuttle valve. **[6]**

Q5) a) Explain with neat sketch meter in & meter out circuits. **[8]**

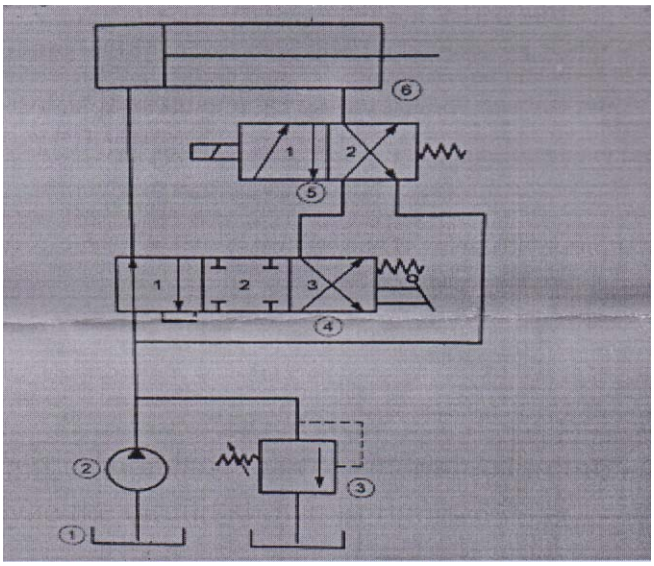
b) Analyze the circuit shown in fig. **[8]**



OR

Q6) a) Explain with neat sketch regenerative circuit. **[8]**

b) Analyze the circuit shown in fig. **[8]**



Q7) a) Write short note on "lubricators, mufflers & dryers" for pneumatic system. **[8]**

b) A hydraulic system consist of two cylinder required to be operate as per the following sequences **[8]**

i) Cylinder A extends

ii) Cylinder B extends

iii) Cylinder A Retracts

iv) Cylinder B retracts

Develop pneumatic circuits using pilot operated 4/2 DCV & roller operated valves.

OR

Q8) a) Draw a Pneumatic circuits consist of the following components **[8]**

i) Shuttle valve

ii) Quick exhaust valve

b) Explain selection criteria for compressor. **[8]**

Q9) a) Discuss in detail the application of hydraulic accumulator as a hydraulic shock absorber. **[8]**

b) Draw & explain power steering circuit used in automotive. **[10]**

OR

Q10)a) Discuss in detail the application of hydraulic accumulator (Piston type). **[8]**

b) Draw & explain pneumatic circuit for door operation in vehicle. **[10]**

x x x

Total No. of Questions : 10]

SEAT No. :

P3016

[Total No. of Pages : 2

[5154]-580

B.E.(Automobile Engineering)

VEHICLE PERFORMANCE & TESTING

(2012 Pattern) (Semester-II) (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.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain following performance parameters in brief **[5]**

i) Fule Economy

ii) Durability

iii) Comfort

b) Enlist the types of suspension system. Explain any one of them. **[5]**

OR

Q2) a) What are the types of Braking System? Explain any one. **[5]**

b) Explain gradability as vehicle performance parameter. **[5]**

Q3) a) Describe EGR and explain, how if affect vehicle performance. **[5]**

b) Explain Antilock Braking system. **[5]**

OR

Q4) a) Explain catalytic converter and its advantages. **[5]**

b) Explain tyre wear pattern and its causes. **[5]**

P.T.O.

Q5) a) Explain active and passive safety with examples. **[8]**

b) What is ESP? Explain with neat sketch. **[8]**

OR

Q6) a) Enlist the types of seat belt and explain in details. **[8]**

b) What are the ergonomics consideration for driver safety. **[8]**

Q7) a) What are types of dummies. Explain any two. **[9]**

b) Write a short note: **[9]**

i) Frontal Impact Test

ii) Rear Impact Test

iii) Side Impact Test

OR

Q8) a) Explain in details crash test and sensors. **[9]**

b) What do you mean by crashworthiness. Explain it important. **[9]**

Q9) a) What are the source of noise in vehicle? **[8]**

b) Explain the instruments use in vehicle testing. **[8]**

OR

Q10)a) Explain the mechanism of noise generation. **[8]**

b) What is function of wind tunnel. Enlist its types and explain any one. **[8]**

Total No. of Questions : 10]

SEAT No :

P3017

[Total No. of Pages :3

[5154]-581

B.E. (Automobile Engineering)

AUTOMOTIVE SYSTEM DESIGN

(2012 Pattern) (End Sem.) (Semester-II) (416496)

Time : 2½ Hours *[Max. Marks :70]*

Instructions to the candidates:

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

Q1) a) Answer the followings : **[6]**

i) What are the design requirements of clutch?

ii) Discuss in detail frictional material and their properties for clutch.

b) Explain the selection of gearboxes bearing in gearboxes. **[4]**

OR

Q2) a) An engine develops 5.9 k W at 2100 rpm. Find the suitable size of clutch plate having the friction lining riveted on both sides to transmit the power ,under the following conditions. **[6]**

i) Intensity of pressure on the surface not to exceed 6.87×10^4pa

ii) Slip torque and losses due to wear is 35% of engine torque.

iii) Coefficient of friction on contact surface is 0.3.

iv) Inside diameter of friction plate is 0.55 times the outside diameter.**[4]**

b) Explain gear boxes with different speed gears.

Q3) a) A four speed gear box is to have following gear ratios, 1, 1.50,2.48 and 3.93. the center distance between the lay shaft and the main shaft is 73.12mm and the smallest pinion is have at least 15 teeth with a diametric pitch of 3.25mm. find the number of teeth of variables wheels .Find the exact gear ratios. **[6]**

b) Why is tubular section propeller shaft normally used? **[4]**

OR

Q4) Solve Any Two.

a) What causes the clutch to slip? **[10]**

b) What are the merits of cross type joint?

c) Explain the general design procedure of front axle.

P.T.O.

Q5) a) A motor cycle has wheel base 2.64m. The height of its centre of gravity above the ground is 0.61 m and it is 1.12m in front of the rear axle. If the car is travelling at 40km/hr on a level track, determine the minimum distance in which the car may be stopped, when **[10]**

i) The rear wheel are braked,

ii) The front wheels are braked, and

iii) All wheels are braked.

The coefficient of friction between tyre and road may be taken as 0.6

b) Explain components used in hydraulic brake system. **[6]**

OR

Q6) a) A vehical having a mass of 1275kg is brought to rest in a distance of 45m from a speed of 90km/hr by its disc brakes fitted to all four wheels. the effective diameter of the wheels is 0.7m. the disc units have two caliper fitted to each wheel, and one to each rear wheel the caliper piston each have an area of 25.2cm^2 having two piston per calliper and the brake pads are sittuated at a radius of 105mm from the disc axis of coefficient of friction is 0.4. determine the brake fluid pressure in the system during the breaking period. **[10]**

b) Solve Any two. **[6]**

i) Properties of friction lining.

ii) Brake fade & Brake torque.

iii) Why disc brakes are preferred for front wheel & the drum brake for rear wheel.

Q7) a) A vehicle spring of semi elliptic type has leaves of 75 mm width and 10 mm thickness, effective length is 900 mm. If the stress is not to exceed 220725kPa, when the spring is loaded to 4905 N, estimate the required number of leaves and the deflection under this condition. If the spring is just flat under load, what is the initial radius take E=196.2×10^6 kPa. **[12]**

b) What are the functions of steering system. **[6]**

OR

Q8) a) Solve Any three. **[12]**

i) What is nipping in leaf spring? Write a note on air spring.

ii) Discuss general design considerations of suspension system.

iii) Discuss the use of helical spring in vehicle suspension.

iv) State and explain any one steering gear mechanism.

b) The gear ratio of steering box is 14:1. when the driver applies a force of 25N with each hand on the streering wheel of 0.38 m diameter, the torque transmitted to the drop-arm shaft is 110Nm. determine the percentage efficiency of the steering meachanism. **[6]**

Q9) A tensile bar of length 400mm is subjected to the constant tensile force of 3000N. Design the bar with the objective of minimizing the material weigth, using optimum material from the list in following table: **[16]**
Consider factor of safety is 2.

Material	MassDensity ρ Kg/m3	Materialcost per UnitMass C,Rs/kg	Yield strength S_{yt} N/mm^2
Plain Carbon steel	7800	28	400
Aluminum Alloy	2800	132	150
Titanium Alloy	4500	2200	800

OR

Q10) Solve Any Four: **[16]**

a) What is Ergonomics?
b) Explain aspects of Aesthetic Designe.
c) Define Mechanical reliability.
d) Write note on statistical considerations in design.
e) Discuss 'Adequate and Optimum Design.

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3018

[Total No. of Pages : 2

[5154]- 582

B.E. (Automobile Engineering)

AUTOMOTIVE NVH

(2012 Pattern) (Semester - II) (Elective - III) (End Sem.)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Use of Logarithmic tables, Sliderule, Electronic pocket calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) What is of noise, vibration and harshness and role in vehicle design? **[6]**

b) What are the causes of noise and vibration in vehicle? **[6]**

OR

Q2) a) What are the advantages and disadvantages of noise and vibration? **[6]**

b) What are the different Physiological effect of NVH? Explain remedies for it. **[6]**

Q3) What are the types of vibration? Explain any two in details. **[8]**

OR

Q4) Explain mathematical model. Draw the mathematical model for car. **[8]**

Q5) a) What are the types of sound propagation? Effects of reflecting surfaces on sound propagation. **[10]**

b) Explain mechanism of hearing loudness in details. **[8]**

OR

Q6) a) Draw the Anatomy of Human Ear and explain Mechanism of hearing. **[8]**

b) Derive the equation that shows relation between sound power, sound intensity and sound pressure level. **[10]**

P.T.O.

Q7) a) Explain pass by noise test with the help of neat sketch. **[8]**

b) Explain Fast Fourier Transform with neat sketch. **[8]**

OR

Q8) a) Explain Drive by noise test with the help of neat sketch. **[8]**

b) What are the different techniques use for vibration measurement? Explain any one. **[8]**

Q9) Write a short Note on : (Any four) **[16]**

a) Transmission noise

b) Aerodynamics noise

c) Tyre noise

d) Noise control methods.

e) Vibration control Techniques.

OR

Q10)a) Explain pass by noise test with the help of neat sketch. **[8]**

b) What is mean by FFT? Explain FFT with neat sketch. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3019

[Total No. of Pages : 2

[5154]- 583

B.E. (Automobile Engineering)

OFF ROAD VEHICLES

(2012 Pattern) (Elective - III) (Semester - II) (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 side indicate full marks.***
3) ***Assume Suitable data, if necessary.***

Q1) a) Explain history and overview of an off-road machines. **[4]**

b) Write down the applications of off road vehicles based on the capacity in Indian industries. **[6]**

OR

Q2) a) Give the applications of dozer. **[4]**

b) Explain the construction and working of any power plant used in road construction. **[6]**

Q3) a) Explain the construction and working of dipper shovel. **[4]**

b) Explain the construction and working of dragline with a neat sketch. **[6]**

OR

Q4) a) Explain the construction layout of a scraper with a neat sketch. **[4]**

b) Differentiate between crawler mounted tractors and wheel mounted tractors. **[6]**

Q5) a) Distinguish between Continuous running drive P.T.O and Independent drive P.T.O. **[8]**

b) Explain with a neat sketch disc plough & rotary plough. **[8]**

OR

Q6) Explain any Special features and constructional details of tankers. **[16]**

P.T.O.

Q7) a) Explain Kinematics for loader and bulldozer operational linkages. **[8]**

b) Describe the hydraulic components of the system in Off-road vehicles with neat sketch. **[8]**

OR

Q8) a) Explain loader bucket and water tank of sprinkler in brief. **[8]**

b) What are the safety features and safe warning systems in Dumpers? **[8]**

Q9) a) Explain the layers of soil diagramatically with all horizons. **[10]**

b) Discuss the types of soils with its characteristics. **[8]**

OR

Q10)Explain following. **[18]**

a) Dynamic behavior and traction on wet soil.

b) Soil-vehicle Mechanics.

Total No. of Questions : 10]

SEAT No. :

P3020

[Total No. of Pages : 2

[5154]- 584

B.E. (Automobile)

ALTERNATIVE FUELS AND EMISSION CONTROL

(2012 Pattern) (End Sem.) (416497 C) (Semester - II) (Elective - III)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Write a note on biogas as a fuel for IC engine? **[4]**

b) Discuss important qualities of SI and CI engine fuel. **[6]**

OR

Q2) a) Explain storage, handling and dispensing process of Hydrogen? **[6]**

b) How SI and CI engine fuels are rated? **[4]**

Q3) a) Explain the Properties of hydrogen Fuel & give its advantages over conventional & fuels. **[4]**

b) Explain any two synthetic fuels with its properties, advantages, disadvantages & handling. **[6]**

OR

Q4) a) Write note on alcohol as fuel for IC engine. **[4]**

b) What are the different synthetic fuels used in IC engines? Explain its effect on engine performance. **[6]**

Q5) a) What is the effect of compression ratio on SI engine emission? **[8]**

b) What is positive crankcase ventilation? Explain. **[8]**

OR

P.T.O.

Q6) a) Describe the sources and causes of soot and particulet formation? **[6]**

b) Explain effect of design and operating parameters on SI engine emission? **[10]**

Q7) Explain effect of design and operating parameters on CI engine emission. **[16]**

OR

Q8) a) Why turbocharger is used in automobile engines, explain effects of turbocharging on emission? **[8]**

b) How will you reduce the NOx emission in IC engine? **[8]**

Q9) Write a note on.

a) Effect of NOx emission on human as well as on environment. **[6]**

b) Indian emission norms. **[6]**

c) Ambient air quality monitoring. **[6]**

OR

Q10)a) Explain the remedies for engine emission. **[9]**

b) List the negative effects of CO emission on human health, what is treatment to CO intoxication person? **[9]**

Total No. of Questions : 10]

SEAT No. :

P3021

[Total No. of Pages : 2

[5154]-585

B.E. (Automobile Engineering)

TRANSPORT MANAGEMENT AND MOTOR INDUSTRIES

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define the term: **[6]**

i) LMV

ii) Motor Car

b) Give details of learners license. **[4]**

OR

Q2) a) Give details regestration of new vehicle. **[6]**

b) Need of NOC. **[4]**

Q3) a) Objective of taxation. **[6]**

b) Difference between Insurance & Assurance. **[4]**

OR

Q4) a) Effect of non-payment of tax & refund of tax. **[6]**

b) Explain taxation structure for passenger & goods transport vehicle. **[4]**

Q5) a) What are the modes of road transport & write classification of transport operation? **[8]**

b) Write in brief about passenger ammunities. **[8]**

OR

P.T.O.

Q6) a) Give basic element of transport system. **[8]**

b) What is the procedure for transportation of petrolium product. **[8]**

Q7) a) Give the function of good transport organisation & also explain the structure. **[8]**

b) Describe the schedule structure of good transport organisation. **[8]**

OR

Q8) a) Explain management information system. **[8]**

b) Write in brief about vehicle fitness certificate. **[8]**

Q9) a) What is VRDE & facilities available at VRDE. **[10]**

b) Explain Advance technique in traffic management. **[8]**

OR

Q10)Describe in brief: **[18]**

a) Global position system.

b) Traffic control in towns.

Total No. of Questions : 10]

SEAT No. :

P3022

[Total No. of Pages : 4

[5154]-586

B.E. (Automobile Engineering)

OPERATION RESEARCH

(2012 Course) (Elective - IV) (Semester - II) (416498B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Logarithmic tables, Sliderule, Electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) Solve the following LPP by Simplex Method **[10]**

Max $Z = 30X_1 + 20X_2$ Subjected to the following constraints

$30X_1 + 20X_2 \leq 1500$

$X_1 + X_2 \leq 1000$

OR

Q2) Solve the following assignment problem to minimize the total cost of production. **[10]**

Jobs	Machines			
	A	B	C	D
I	5	7	11	6
II	8	5	9	6
III	4	7	10	7
IV	10	4	8	3

P.T.O.

Q3) Solve the following Transportation Problem involving three sources and four distinations. The cell entries represents the cost of transportation per unit. Obtain solution by VAM Method. Find optimum solution by using MODI Method. **[10]**

Sources	Destinations				
	A	B	C	D	Supply
1	3	1	7	4	300
2	2	6	5	9	400
3	8	3	3	2	500
Demand	250	350	400	200	

OR

Q4) a) Define Operation Research? Also discuss the scope of OR **[6]**

b) Why Transportation Model is used in industries? **[4]**

Q5) a) A project Schedule has the following characteristics. **[12]**

Activity	Time (Days)	Activity	Time (Days)
1-2	4	5-6	4
1-3	1	5-7	8
2-4	1	6-8	1
3-4	1	7-8	2
3-5	6	8-10	5
4-9	5	9-10	7

i) Compute the Network.

ii) Find the Critical Path.

iii) Compute E & L and Total Float for each activity.

b) Enlist the different types of the floats. Explain each one in short. **[4]**

OR

Q6) a) There are five jobs each of which must go through two machines A and B in the order A B. 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 themachine should be replaced. The resale value of the machine is negligibly small. What is the weighted average cost of owning and operating the machine. **[10]**

b) Find the cost of the individual replacement policy of an installation of 300 bulbs, given the following: **[8]**

i) Cost of individual replacement of bulb is Rs. 2.

ii) Conditional probability of failure of bulbs is as follows:

Weekend	0	1	2	3	4
Probability of Failure	0	0.1	0.3	0.7	1.0

Total No. of Questions : 8]

SEAT No :

P 3023

[Total No. of Pages :2

[5154]-591
B.E. (Electronics)
VLSI DESIGN
(2012 Course) (Semester-I) (404201) (End-Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, or 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) Prove that to achieve completely symmetric input output characteristics for a CMOS inverter, the design requires to have $(W/L)_P=2.5(W/L)_N$ Assume that the gate oxide thickness t_{ox}, and hence the gate oxide capacitance C_{ox} have the same value for both NMOS and PMOS transistors. **[7]**

b) Explain function and procedure with examples. **[6]**

c) Write VHDL code for 4:1 MUX with test bench. **[7]**

OR

Q2) a) Draw and Explain I_{ds}-V_{ds} characteristics of PMOS. **[7]**

b) Draw FSM diagram and write VHDL code for 111 Mealy sequence detector. **[7]**

c) Draw the block diagram and explain the architecture of FPGA. **[6]**

Q3) a) Draw the schematic of DRAM Cell with necessary peripherals and explain read write cycles with the help of timing diagram. **[8]**

b) Explain memory organization in details. **[8]**

OR

Q4) a) Draw and explain the schematic of SRAM cell with necessary peripherals. **[8]**

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

i) Bitline conditioning and column circuitary

ii) Sense amplifier

P.T.O.

Q5) a) What are the challenges in routing? Explain switchbox routing. **[8]**

b) Explain floorplanning. Its purpose and the rules. **[8]**

OR

Q6) a) What is Global Routing. Explain line probe routing Algorithms in details. **[8]**

b) Explain Power distribution and power optimization in details. **[8]**

Q7) a) What are stuckopen, stuck short faults? Also explain stuck at 1 and stuck at 0 faults with an example. **[9]**

b) What is built in self test? Explain BIST for RAM. **[9]**

OR

Q8) a) What is Test access port? Explain TAP Controller with the help of state machine. **[8]**

b) With reference to BIST, explain the following terms. **[6]**

i) LFSR

ii) Scan chain for flip flop

c) Explain **[4]**

i) Controllability

ii) Observability

Total No. of Questions : 8]

SEAT No. :

P3024

[Total No. of Pages : 2

[5154]-592
B.E.(Electronics)
ELECTRONICS SYSTEM DESIGN
(2012 Course) (Semester-I) (404202) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer the questions-Q(1) or Q(2), Q(3) or Q(4), Q(5) or Q(6), Q(7) or Q(8).***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of Electronic calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Explain the different soldering techniques used in large scale production and high reliability product. **[8]**

b) Why error budget analysis is required? Explain with case study. **[6]**

c) What are the factors affecting on selection of buses and protocols in high speed electronics product. **[6]**

OR

Q2) a) Explain the pilot production batch. Explain product design stages. **[8]**

b) What is need of signal conditioning circuits? Explain with example. **[6]**

c) Design and explain Interfacing of relay circuit with microcontroller. **[6]**

Q3) a) Explain different stages of software development in electronic product. **[8]**

b) What types of documentation practices are required in C and C++ languages. **[8]**

OR

Q4) a) Explain the factors affecting on the choice of assembly language and high level language with example. **[8]**

b) Explain debugging tools required for software's. **[8]**

P.T.O.

Q5) a) What are the different PCB Design issues of analog and mixed signal Circuits. Explain in details. **[10]**

b) Explain the importance of shielding and grounding. **[8]**

OR

Q6) a) Explain PCB design issues for high speed digital circuits. **[10]**

b) What is EMI? Explain for analog and digital circuits. **[8]**

Q7) a) What is Monte Carlo method? Explain the use of logic analyzer for fault findings. **[8]**

b) Explain the need of environmental testing with example. **[8]**

OR

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

i) Digital storage oscilloscope

ii) Mixed single oscillsocopes.

b) Explain fault finding stages in analog and digital circuits. **[8]**

❄ ❄ ❄

Total No. of Questions : 8]

SEAT No. :

P3025

[Total No. of Pages : 2

[5154]-593
B.E.(Electronics)
ADVANCED POWER ELECTRONICS
(2012 Pattern) (Semester-I) (End Sem.) (404203)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain any two power factor improvement techniques for single phase semi/full converter. **[8]**

b) What is the need of PWM rectifiers? Explain the operation of 3 phase PWM bridge rectifiers along with its advantages. **[8]**

c) Compare Diode Clamped, Flying Capacitors and Cascaded Multilevel inverter. **[4]**

OR

Q2) a) With the help of neat circuit diagram and waveforms explain the operation of three phase dual converter. **[8]**

b) What are the causes and effects of EMI and Power Quality problems in controlled rectifiers? **[6]**

c) With the help of neat circuit diagram and waveforms explain the operation of single phase full bridge Cascaded Multilevel inverter. State its features, advantages and disadvantages. **[6]**

Q3) a) With the neat circuit diagram and suitable waveforms explain the operation of single phase full converter controlled dc drive for continuous & discontinuous motor current. **[8]**

b) List the advantages offered by d.c. chopper drives over line commutated converter controlled d.c. drives. **[2]**

c) Draw and explain the block schematic of a 4 quadrant, microcomputer controlled d.c. drive system. Also explain suitable algorithm for the same. **[6]**

OR

P.T.O.

Q4) a) Draw the circuit and explain the operation of three phase full converter drive. Also sketch the output voltage waveforms for firing angle of 60 and 90 degree (assume highly inductive load). **[8]**

b) Explain briefly following methods of breaking a d.c. motor **[8]**

i) Regenerative breaking

ii) Dynamic breaking

Q5) a) Enlist various methods of speed control of 3 phase induction motor.**[4]**

b) Discuss the variable frequency control method of 3 phase induction motor speed control. Also explain the operation for the following modes

i) Operation below the rated frequency

ii) Operation above the rated frequency **[8]**

c) With the help of suitable circuit diagram and waveforms explain the working of variable frequency PWM VSI Drives. **[6]**

OR

Q6) a) Draw torque-speed curve of induction motor. Also explain various operating regions like motoring, generating and plugging. **[6]**

b) State the importance of and explain soft acceleration and soft deceleration for 3 phase induction motor. **[6]**

c) What is the need of vector control in Induction Motors? Briefly explain vector control of induction motors**.** **[6]**

Q7) a) With the help of a neat circuit diagram and waveforms explain the operation of 3 phase brushless dc motor drive. **[8]**

b) With the help of block schematic explain the working of Stepper motor drive. **[8]**

OR

Q8) Write short notes on(any two): **[16]**

a) Universal motor drive

b) Servo motor drive

c) Switched reluctance motor drive.

Total No. of Questions : 10]

SEAT No. :

P3026

[Total No. of Pages : 2

[5154]- 594
B.E. (Electronics)
IMAGE PROCESSING & MACHINE VISION
(2012 Pattern) (Semester - I) (Elective - I)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Your answers will be valued as a whole.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Explain in detail spatial & gray level resolution and its significance. **[5]**

b) Justify the statement median filter is an effective tool to minimize salt & pepper noise considering the image. **[5]**

$$I = \begin{bmatrix} 24 & 22 & 33 & 25 & 22 & 24 \\ 34 & 255 & 24 & 0 & 26 & 30 \\ 23 & 31 & 32 & 34 & 27 & 25 \end{bmatrix}$$

OR

Q2) a) In short explain following parameters for an image & calculate all these parameters for segment of an image given below: **[6]**

i) Mean ii) Varience iii) Standard deviation iv) Histogram

$$img = \begin{bmatrix} 20 & 140 & 100 & 20 \\ 20 & 140 & 100 & 20 \\ 240 & 140 & 240 & 240 \\ 240 & 140 & 240 & 240 \end{bmatrix}$$

b) What is color model? Explain RGB to YIQ color model and its application. **[4]**

Q3) a) Compare DFT & DCT. **[5]**

b) Explain one arithmatic & one logical operation between two images. Give its application. **[5]**

OR

P.T.O.

Q4) a) Explain following concepts in image enhancement. **[6]**

i) Gray level slicing.

ii) High - boost filtering

b) With reference to a 2-D transform, Explain. **[4]**

i) Separability.

ii) Basis image.

Q5) a) Compare the performance of first & second derivative w.r.t an image? Which one would you perfer for detecting edges? Why? **[8]**

b) Explain Global & local thresholding in image segmentation. **[8]**

OR

Q6) a) Explain Region based segmentation of an image. **[8]**

b) How Hough transform is used for edge detection. **[8]**

Q7) a) What is the meaning of data redundancies. Explain in detail the three redundancies present in an image. **[8]**

b) What is Loss-Less and Lossy compression and where it is used. Explain in detail. Loss - Less & Lossy predictive technique for compression with the help of encoder & decorder. **[10]**

OR

Q8) a) Explain arithmatic coding with example and compare with Huffman coding. **[10]**

b) What is JPEG? Explain image compression using JPEG. **[8]**

Q9) a) Explain any four noise models w.r.t image processing. **[8]**

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

i) Acoustic imaging

ii) Remote sensing using image processing.

OR

Q10)a) How is image restoration different from image enhancement ? Explain the various methods used for restoration of an image. **[8]**

b) Explain the application of character Recognition using image processing. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3027

[Total No. of Pages : 2

[5154]- 595

B.E. (Electronics Engg.)

EMBEDDED SYSTEMS AND RTOS (Elective - I)

(2012 Pattern) (End Sem.) (Semester - I) (404204B)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain the µcos-II RTOS features. **[5]**

b) Explain the design steps involved for developing vending machine. **[5]**

OR

Q2) a) Define embedded systems. Explain Different Categories of Embedded System application. **[5]**

b) Define & Explain interrupt, interrupt latency time, interrupt response time and interrupt recovery time. **[5]**

Q3) a) Explain priority inversion problem and solution for the same. **[5]**

b) Draw and explain the task state transition diagram of µcos - II. **[5]**

OR

Q4) a) Explain models used in Software development. **[5]**

b) What is relationship between tasks, ISRs & a semaphore in µ C/OS - II? **[5]**

Q5) a) What are µC/OS-II event flag services? **[8]**

b) Draw and explain the µcos-II Architecture. **[8]**

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]**

P.T.O.

Q7) a) Explain the Embedded Systems application Digital Camera. **[8]**

b) Explain the data structure of Semaphore and Mutex ECB. **[8]**

OR

Q8) a) Explain steps involved in Porting µcos-II **[8]**

b) Explain any three scheduling algorithms. **[8]**

Q9) a) Explain the steps to build a Linux system. **[8]**

b) Explain the concept of loadable device driver for Linux kernel. **[10]**

OR

Q10)a) Explain execution context in embedded Linux environment. **[8]**

b) Explain the steps to boot the embedded linear kernel? **[10]**

Total No. of Questions : 8]

SEAT No. :

P3028

[Total No. of Pages : 2

[5154]- 596
B.E. (Electronics)
BIOMEDICAL INSTRUMENTATION (Elective - I)
(2012 Pattern) (End Sem.) (Semester - I) (404204C)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain with block diagram a bio medical instrumentation system. **[8]**

b) What is cardiac Arrhythmia? Explain different types of Arrhythmias. **[6]**

c) Discuss how ECG is used clinically in diagnosing various diseases. **[6]**

OR

Q2) a) With suitable circuit explain measurement of two bio medical potential. **[8]**

b) Write down procedure to perform EMG. **[6]**

c) Write short note on vectocardiography. **[6]**

Q3) a) What is Pacemaker? Write need for pacemaker with typical ranges of pacemaker parameters. **[8]**

b) What is shielding? Explain different type of shielding of bio-medical application. **[8]**

OR

Q4) a) Describe the Coulter method of electronic blood cell counting . **[8]**

b) Write down objective of central monitoring system & its advantages. **[8]**

P.T.O.

Q5) a) Give different type of leakage current associated with biomedical equipment. Explain with block schematic one method for reducing the leakage current. **[8]**

b) Explain in detail life saving device Ventilator. **[8]**

OR

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

b) Describe the operation of DC defibrillator with circuit diagram and waveform. **[8]**

Q7) a) With the help of neat block schematic describe the working of X ray machine & gives the properties of X ray machine. **[10]**

b) Explain how LASER is used in Vision correction. **[8]**

OR

Q8) a) What is basic principle of CT scanner? Explain working of CT scan machine with block diagram. **[10]**

b) Explain the component of Bio-Telemetry system. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3029

[Total No. of Pages : 2

[5154]- 597

B.E. (Electronics)

ADVANCED MEASUREMENT SYSTEMS

(2012 Pattern) (Semester - I) (Elective - I) (404204D)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) State and Explain in detail signal integrity design issues. **[6]**

b) Draw and explain arbitrary waveform generator. **[8]**

c) State and explain electrical validation and debug with MSO Series Oscilloscopes. **[6]**

OR

Q2) a) What are the signal integrity testing challenges and possible solutions? **[6]**

b) Draw the architecture and explain in detail logic analyzer. State applications. **[8]**

c) Explain hardware design and testing methods of spectrum analyzer. **[6]**

Q3) a) Explain embedded communication using CAN. **[8]**

b) What are the different interfacing techniques? Explain interfacing of graphic LCD display. **[8]**

OR

Q4) a) Explain serial bus decode test instruments for USB and PCI Express. **[8]**

b) Write short note on the following. **[8]**

i) RF Modules

ii) Interfacing of thermal printer.

P.T.O.

Q5) a) Draw and explain the fundamental set up for advanced radar system. **[8]**

b) What are microwave enclosures and electromagnetic compatibility? Explain EMI and EMC measurements. **[8]**

OR

Q6) a) Explain hardware and software role in virtual instrumentation. **[8]**

b) Explain Lab View based Data acquisition system design. **[8]**

Q7) a) Explain application of counter for frequency and capacitance meter. **[6]**

b) What are the types of ADC and DAC? Enlist the specifications of ADC and DAC. **[6]**

c) Explain data loggers in detail. **[6]**

OR

Q8) Write short note on any three. **[18]**

a) Automation in digital instruments.

b) Sample & Hold.

c) V to F converter.

d) Universal Counter.

Total No. of Questions : 10]

SEAT No. :

P3030

[Total No. of Pages : 3

[5154]-598
B.E. (Electronics)
DSP PROCESSORS
(2012 Course) (Elective - II) (404205 A) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Your answers will be valued as a whole.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) For the FIR filter **[6]**

$$y(n)=\frac{x(n)+x(n-1)+x(n-2)}{3}$$

Determine

i) system function
ii) impulse response
iii) poles and zeros

b) Draw and explain the block schematic of decimation process using a decimation factor M. **[4]**

OR

Q2) a) Discuss the single MAC implementation of an 8 - tap FIR filter with suitable black schematic. **[6]**

b) Consider a MAC unit whose inputs are 16-bit numbers. If 256 products are to be summed up in this MAC, how many guard bits should be provided for the accumulator to prevent overflow condition from occuring? **[4]**

Q3) a) Discuss the concepts of parallelism and pipelining in detail. **[6]**

b) Suppose we want to implement an 8-tap FIR filter what will be the maximum sample rate for **[4]**

i) One MAC
ii) Two MAC
iii) Pipe lined (8 multipliers and 8 adders)

OR

P.T.O.

Q4) a) Discuss the functional diagram of the barrel shifter of TMS 320 C54XX processor. **[6]**

b) List the data addressing modes of TMS320 C67xx. **[4]**

Q5) a) What is Q-notation? What is meant by Q15 & Q7? What values are represented by the fixed point number N = 4000 h in Q15 and Q7 notations? **[8]**

b) Write the difference equation and system function equation of FIR & IIR filter. **[2]**

c) Draw the block diagram of FIR filter implementation. Discuss the FIR filter algorithm for implementing on TMS320C54XX processor. **[6]**

OR

Q6) a) i) What is interpolation filter? **[2]**

ii) Draw the block schematic for digital interpolation with interpolation factor L. **[3]**

iii) How do we achieve the digital interpolation using polyphase subfilters having interpolation factor as 5. **[3]**

b) Determine the value of each of the following 16 bit numbers represented using the given notation **[8]**

i) 4400h as Q0 number.

ii) 4400h as Q15 number.

iii) 4400h as Q7 number.

Q7) a) Determine the following for a 64 - point FFT computation. **[8]**

i) Number of stages.

ii) Number of butterflies in each stage

iii) Number of butterflies needed for the entire computation.

iv) Number of butterflies that need no twiddle factors.

b) Derive the equations to implement a general butterfly encountered in DIF FFT implementation along with basic butterfly computation structure. **[8]**

OR

Q8) a) Draw the signal flow graph for an 8-point DIT, FFT computation.

Discuss the overflow and scaling during the butterfly computation. **[8]**

b) A time domain sequence of 73 elements is to be convolved with another time- domain sequence of 50 elements. Using DFT to transform the two sequences, multiplying them and then doing IDFT to obtain the resulting time domain sequence. To implement DFT and IDFT, DIT-FFT algorithm is used.

Determine the total number of complex multiplications needed to implement the convolution (Assume that each butterfly computation requires one complex multiplication.) **[8]**

Q9) a) Discuss the memory map of TMS 320C54XX with suitable diagram.**[8]**

b) Draw and discuss the flow chart of interrupt handling by the typical DSP processor. **[10]**

OR

Q10)a) Discuss the interface of TMS320C54XX to a 10-bit ADC and 8-bit DAC. The sampled signal read from the ADC is to be written to DAC after adjusting its size. The start of the conversion is to be initiated by the Tout signal of the timer. **[10]**

b) Discuss

i) DMA operation configuration.

ii) Register subaddressing for DMA configuration. **[8]**

x x x

Total No. of Questions : 10]

SEAT No. :

P3031

[Total No. of Pages : 3

[5154]-599

B.E. (Electronics Engineering)

ROBOTICS AND AUTOMATION

(2012 Course) (Semester - I) (Elective - II) (404205 B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain need of automation in industry and relation of automation with productivity. **[4]**

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

i) Reach & Stroke

ii) Revolute joint & prismatic joint

iii) Soft & Hard automation.

OR

Q2) a) Write applications of automation. Explain one application in detail. **[5]**

b) How does the SCARA arm geometry differ from the vertical articulated arm? Why is the SCARA arm more ideal for assembly applications. **[5]**

Q3) a) List various specifications of a robotic system. Explain any one in detail What is difference between precision and accuracy? **[5]**

b) Explain the slider crank mechanism with neat diagram. Comment on work envelopes traced by it. **[5]**

OR

Q4) a) With the help of neat diagram explain structure of NC systems. **[4]**

b) Write short note on any two **[6]**

i) range sensors

ii) Robotic vision sensor

iii) Pressure sensors

P.T.O.

Q5) a) For the point 2i + 6j + 4k, perform following operations **[6]**

i) Rotate 45 deg about x-axis

ii) Translate 4 units along y-axis.

iii) Rotate 30 deg about x-axis & translate 4 units along z-axis.

iv) Translate 3 units along y-axis then rotate 60 deg about z-axis

b) Explain the forward & backward kinematics solution.

What is its significance? Give typical set of forward & backward equations. **[6]**

c) Sketch neat Joint & link diagram and define the terms: **[6]**

i) Joint angle

ii) Joint distance

iii) Link length

iv) Link twist angle

Name the variable parameters for the revolute and prismatic joints

OR

Q6) a) What is D-H representation? Discuss D-H algorithm with the help of neat diagram. **[9]**

b) What is Inverse kinematic solution? Why the Inverse kinematic solutions are not unique? **[5]**

c) Write short note on Jacobian. **[4]**

Q7) a) Explain the term Robot arm dynamics. Discuss the E-L formulation used for a robotic manipulator. **[10]**

b) What is path planning? What is trajectory? Differentiate path and trajectory. **[6]**

OR

Q8) a) Explain with the block diagram different parameters involved in Trajectory Planning problem? Explain different steps in Trajectory planning. **[10]**

b) Discuss Kane's Method used for formulation of dynamical equations. **[6]**

Q9) a) Draws the block diagram of fuzzy controller and explain. **[8]**

b) Explain with neat block diagram how vision system is used in complex control system. **[8]**

OR

Q10)a) With the help of neat block diagram explain neural controller. **[8]**

b) Draw block diagram of trajectory tracking controller and explain. How vibrations can be minimized. **[8]**

x x x

Total No. of Questions : 8]

SEAT No. :

P3032

[Total No. of Pages : 2

[5154]-600

B.E. (Electronics)

ELECTRONICS IN AGRICULTURE

(2012 Pattern) (Semester - I) (End Semester) (404205 C) (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) ***Assume Suitable data if necessary.***

Q1) a) What do you mean by SCADA? Explain any one application of SCADA in the field of agriculture. **[8]**

b) Compare various types of communication protocols used for agriculture field network. **[8]**

c) State the parameters needed to be detected for soil analysis. **[4]**

OR

Q2) a) What is effect of water deficiency on health of the plant?

What way would you prefer for exact water deficiency analysis?

Explain with suitable diagram. **[8]**

b) State various ways of gas analysis. Draw & explain principle of gas analysis based on gas density. **[8]**

c) What are the considerations while designing PH meters? **[4]**

Q3) a) Write a short notes on **[6]**

i) Precision livestock farming.

ii) Components of precision agriculture.

b) What is positioning system? **[6]**

What are the components of Global positioning system?

State the types of GPS receivers for agriculture.

c) State the advantages & applications of GIS & GPS in precision farming. **[4]**

OR

P.T.O.

Q4) a) Define Precision farming. Describe issues in developing automated farm machinery. **[6]**

b) What are the local, national & global applications of GIS in the field of agriculture? **[6]**

c) Enlist various types of farm machinery in agriculture sector. **[4]**

Q5) a) Draw neat sketch of Drip irrigation system & explain its components in details. **[6]**

b) What do you mean by protected cultivation? Compare various instrument technologies for protected cultivation. **[6]**

c) What are the limitations of traditional agricultural monitoring? **[4]**

OR

Q6) a) What are the various temperature monitoring systems? Explain best suitable electronic temperature monitoring system for greenhouse application. **[6]**

b) State the sources of moisture. Explain relative humidity measurement with suitable diagram. **[6]**

c) How to select tools, equipments for planting specific crop. **[4]**

Q7) a) Draw & explain microcontroller based greenhouse control device. **[6]**

b) Describe any three roles of E-governance in agriculture sector. **[6]**

c) With respect to crop handling, explain the following **[6]**

i) Cooling methods

ii) Storage

iii) Pest control

OR

Q8) a) Explain any six benefits of crop protection in agriculture sector. **[6]**

b) Compare the process of natural drying and field drying. **[6]**

c) What are the objectives & services of E governance delivered to Agriculture sector? **[6]**

X X X

Total No. of Questions : 8]

SEAT No. :

P3033

[Total No. of Pages : 2

[5154]-601
B.E. (Electronics)
MOBILE COMMUNICATION
(2012 Course) (End Semester - I) (404205 D) (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, and 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) Explain with neat figure various techniques to improve coverage and capacity of cellular system. **[8]**

b) Derive an expression for the received signal of a free space propagation model. **[6]**

c) With neat diagram explain the working of RAKE receiver. **[6]**

OR

Q2) a) With neat diagram, explain co-channel interference and adjecent channel interferences in cellular system. **[6]**

b) Classify types of small scale fading based on multipath time delay spread and Doppler spread. **[6]**

c) Classify equalizers. With neat diagram, explain the structure of a linear transversal equalizer. **[8]**

Q3) a) Explain the properties of block codes. Derive the equation for bandwidth efficiency of channel coding. **[8]**

b) With neat block diagram explain the working of a subband coder and decoder. **[8]**

OR

P.T.O.

Q4) a) Explain the significance of TDMA frame structure. Derive an expression for the frame efficiency of a TDMA system. **[8]**

b) Explain in brief, with block diagram GSM speech encoder and decoder. **[8]**

Q5) a) Explain with neat diagram the traffic routing techniques in wireless network. **[8]**

b) With neat diagram explain the working of common channel signalling network architecture. **[8]**

OR

Q6) a) Draw and explain SS7 protocol architecture. **[8]**

b) With neat diagram, explain the cellular packet switched architecture for a metropolitan area network. **[8]**

Q7) a) List GSM services. With neat block diagram explain GSM system architecture in detail. **[6]**

b) Classify GSM logical channels for carrying usar data and control signals. **[6]**

c) Explain forward CDMA channel modulation process with neat block diagram for CDMA system. **[6]**

OR

Q8) a) Explain reverse IS - 95 channel modulation process for a single user with neat diagram in CDMA system. **[6]**

b) Draw various interfaces used in GSM and explain significance of each with neat diagram. **[6]**

c) Draw and explain GSM frame structure. **[6]**

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Total No. of Questions :10]

SEAT No. :

P3034

[Total No. of Pages :2

[5154] - 602

B.E. (Electronics)

COMPUTER NETWORK

(2012 Course) (Semester - II) (404209)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) List the advantages and disadvantages of computer networks. **[4]**

b) With diagram explain the working of circuit switching. **[3]**

c) Discuss types of framing techniques at datalink layer. **[3]**

OR

Q2) a) Briefly explain the various types of network topologies. **[4]**

b) Explain with diagram and application fiber optic cable. **[3]**

c) Briefly explain any one random access multiple access technique. **[3]**

Q3) a) What is horizontal and vertical communication in network? **[4]**

b) Write a note on satellite communication. **[3]**

c) Explain any one channelization multiple access techniqe. **[3]**

OR

Q4) a) Explain various types of networks. **[4]**

b) What is the difference between circuit and virtual circuit switching? **[4]**

c) Explain PPP. **[2]**

P.T.O.

Q5) a) Compare IPv4 and IPv6. **[8]**

b) Explain ARP and RARP. **[6]**

c) Explain any two parameters contributing to Quality of service. **[4]**

OR

Q6) a) What are the functions of Transport layer? **[6]**

b) Explain shortest Path algorithm. **[6]**

c) Compare UDP and TCP. **[6]**

Q7) a) Explain the working of SMTP and SNMP. **[6]**

b) How does TELNET work? **[6]**

c) Write note on HTML programming. **[4]**

OR

Q8) a) Write a note on WWW. **[6]**

b) How is P2P file sharing done? **[4]**

c) How do PING and Trace Route work? **[6]**

Q9) a) With diagram explain how symmetric key algorithm works. **[6]**

b) How does hash function work? **[4]**

c) What is the use of Protocol Analyzer and Network tester? **[6]**

OR

Q10)a) Explain any one Public key algorithm. **[6]**

b) Write a note on network simulation. **[4]**

c) How is internet accessed through DSL and Leased line? **[6]**

EEE

Total No. of Questions :10]

SEAT No. :

P3035

[Total No. of Pages :3

[5154] - 603

B.E. (Electronics Engg.)

PROCESS AUTOMATION

(2012 Course) (Semester - II) (End Sem.) (404210)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Draw the following P&ID symbols. **[5]**

i) Stand-alone Instrument.

ii) Shared Display or control.

iii) Computer Function.

iv) Programmable Logic Controller (PLC).

v) Orifice Plate.

b) Enlist different process loop tuning methods and explain any one method in detail. **[5]**

OR

Q2) a) State the equation for a proportional integral controller. Draw a circuit diagram for a proportional integral (PI) mode controller. **[5]**

b) State different control valve selection creiteria. **[5]**

P.T.O.

Q3) a) Explain with suitable example process control block diagram. **[4]**

b) How would you realize PID controller using operational amplifier. Explain with the help of neat circuit diagram. **[6]**

OR

Q4) a) State the following control system evaluation criteria. **[4]**

i) Minimum Area Criteria.

ii) Quarter amplitude Criteria.

b) What is the necessity of actuators? How actuators are classified? Explain any one actuator? **[6]**

Q5) a) Explain with neat diagram architecture of a PLC? Give important specifications of a PLC. **[9]**

b) Develop the physical ladder diagram for a motor with the following. NO START button, NC STOP button, thermal overload limit switch opens on high temperature, green light when running, red light for thermal overload. **[8]**

OR

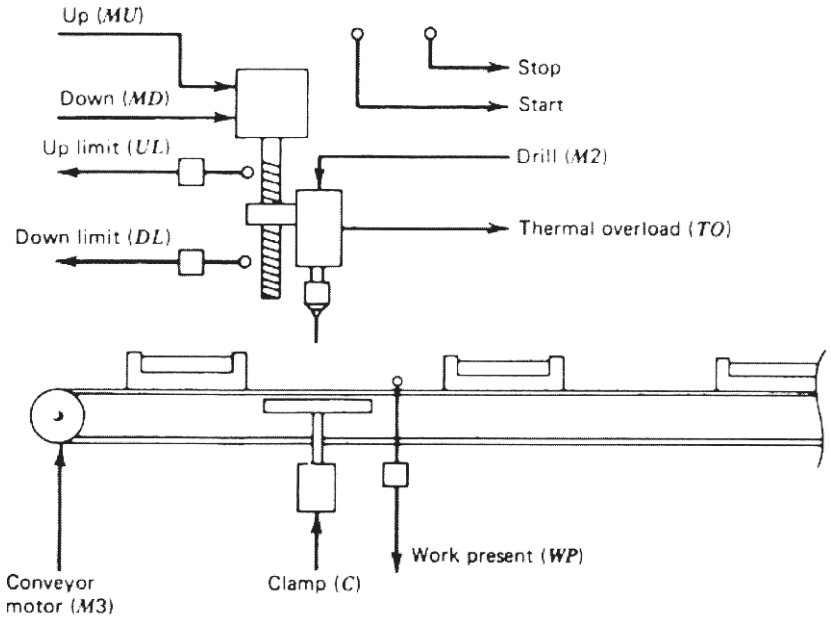
Q6) a) Explain the PLC operation with respect to **[9]**

i) I/O scan mode

ii) Execution mode

iii) Scan time

b) The system shown in figure has the objective of drilling a hole in an object moved on a conveyor belt. Develop the ladder diagram that accomplishes this objective. **[8]**



Q7) a) Explain feed forward control scheme for a heat exchanger. **[9]**

b) Explain inferential control scheme to control tops product composition in a distillation column. **[8]**

OR

Q8) a) Explain with neat P & I diagram Air: Fuel ratio control in a boiler. **[9]**

b) Explain with block diagram the concept of Model Predictive Control. **[8]**

Q9) Write short notes on:

a) Virtual Instrumentation. **[8]**

b) Direct Digital Control. **[8]**

OR

Q10)a) Explain with suitable block diagram architecture of a typical Distributed Control System (DCS). **[8]**

b) State applications of SCADA. Explain the functions of RTU and MTU. **[8]**

EEE

Total No. of Questions : 10]

SEAT No. :

P3036

[Total No. of Pages : 2

[5154]-604

B.E.(Electronics Engineering)

SPEECH AND AUDIO SIGNAL PROCESSING

(2012 Pattern) (Semester - II) (End Sem.) (Elective - III)

(404211 A) (Theory)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8 Q.9 OR Q.10.***
2) ***Figures to the right side indicate marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) How can the voiced /unvoiced decision can be taken using parameters such as energy of segment, ZCR and pitch period? **[5]**

b) Explain stops, fricatives. How are fricatives produced. **[5]**

OR

Q2) a) Explain simplified model of cochlea with neat diagram. **[5]**

b) Describe LTI model for speech production. Write assumptions clearly. **[5]**

Q3) a) Explain AMDF. Write expression for AMDF. How pitch frequency can be calculated from AMDF. **[5]**

b) Explain in brief the functions of outer ear, middle ear and inner ear. **[5]**

OR

Q4) a) Write a short note on spectral features. **[5]**

b) Differentiate between narrow band and broad band spectrogram. **[5]**

Q5) a) Explain applications of LPC parameters as pitch detection and formant analysis. **[8]**

b) Explain Levinson-Durbin recursive algorithm for calculation of predictor coefficients. **[8]**

OR

P.T.O.

Q6) a) Explain melscale and bark scale with mathematical expression. Explain the non-linear frequency scale suitable for ear. **[8]**

b) Explain the auditory system as a filter benk has uniform and non uniform filter bank. **[8]**

Q7) a) Explain cepstrum. How to evaluate the cepstrum of a speech segment? **[8]**

b) Explain relation between formats & LPC. **[8]**

OR

Q8) a) Explain the procedure for calculation of MFCC with a block schematic. Clearly explain how the integration of power is done on mel scale filters. **[8]**

b) With the help of block diagram explain homomorphism speech processing. **[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) Explain Text to Speech conversion system with block schematic? State different applications of TTS. **[8]**

OR

Q10)a) State different distortion measures used for Automatic Speech Recognition system. **[8]**

b) What are temporal features for musical wave? Explain the ADSR envelope. How will you extract the positive envelope of the music wave? **[10]**

Total No. of Questions : 10]

SEAT No. :

P3037

[Total No. of Pages : 2

[5154]-605

B.E.(Electronics Engineering)

AUDIO AND VIDEO ENGINEERING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers 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 aspect ratio & vertical resolution. For TV receiver of 21 inch size, determine height & width of its screen. **[5]**

b) Estimate the magnitude of Chroma C and Luminance Y for following colour information: i) Red ii) Green iii) Blue. **[5]**

OR

Q2) a) Compare LCD Vs LED. **[5]**

b) Explain PAL decoder with block diagram. **[5]**

Q3) a) Draw composite video signal & timing of various components. **[5]**

b) Write short notes on:

i) DTH

ii) Video Streaming **[5]**

OR

Q4) a) Compare Interlaced Scanning and Progressive Scanning. **[5]**

b) Enlist important features of HDTV. What is the difference between 1080i and 1080p format? **[5]**

Q5) a) write short notes on: **[8]**

i) UHDTV ii) H.264

b) Compare Camcorder and Webcam. **[8]**

OR

P.T.O.

Q6) a) What are the features of IPTV? Explain the architecture of IPTV. **[8]**

b) Draw a neat labeled block diagram of Wi-Fi transmitter and explain the function of each block. **[8]**

Q7) a) Discuss in brief various types of special microphones and speakers. **[8]**

b) Discuss the design of Acoustic Studio with respect to the following terms: **[8]**

i) Resonance

ii) Reflection

iii) Refraction

iv) Diffusion

OR

Q8) a) What is the relation between loudness and decibels? State and explain what is acoustic impedance and how is it related to intensity? **[8]**

b) Discuss the cordless microphone PA system. **[8]**

Q9) a) Describe ITU-T (G) compression standards and enumerate their applications. **[10]**

b) Compare CD, DVD & Blue-ray DVD on various parameters. **[8]**

OR

Q10) Write short notes on: **[18]**

a) CD/DVD player.

b) MP3 player.

c) Dolby 5.1 Sound system in DTV.

Total No. of Questions : 8]

SEAT No. :

P3038

[Total No. of Pages : 2

[5154]-606

B.E.(Electronics Engineering)

OPTICAL AND MICROWAVE COMMUNICATION

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

(End Sem.) (404211 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer questions 1 or2, 3 or 4, 5 or 6, 7 or 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) Explain Block diagram of optical Fiber communication system in detail. **[8]**

b) What are the different types of Fibers and write their characteristics. **[6]**

c) Explain how light is propagated within a Fiber. Define the following terms with respect to an optical Fiber. **[6]**

i) Acceptance cone

ii) Numerical aperture

OR

Q2) a) Explain the concept of wavelength Division multiplexing along with neat diagram.State the key Features of the same. **[8]**

b) Explain the working of LASER diode. Compare LASER with LED. **[6]**

c) Draw and explain the working principle of EDFA optical amplifier. **[6]**

Q3) a) Explain the following parameters of directional coupler.

i) Coupler Factor

ii) Directivity

iii) Isolation

iv) Insertion loss **[8]**

b) A rectangular waveguide has dimensions 2.5 × 5 cms. Determine the guide wavelength, phase constant β and phase velocity Vp at wavelength of 4.5 cms for the dominant mode. **[10]**

OR

Q4) a) State and explain the properties of Scattering matrix. **[6]**

b) An isolator has an insertion loss of 0.5db and an isolation of 30dB. Determine the scattering matrix of the isolator if the isolated ports are perfectly matched to the junction. **[6]**

c) Explain the working and construction of Directional coupler. **[6]**

Q5) a) Draw schematic structure of two cavity Klystron amplifier. Explain its working principle and operation. **[8]**

b) A reflex klystron operates at the peak mode of n = 2 with $v_o = 280$ v and $I_o = 22$ mA and signal voltage $V_1 = 30$v. Determine **[8]**

i) the input power

ii) the output power and

iii) the efficiency.

OR

Q6) a) Enlist the different types of Magnetron. Explain how mode jumping is avoided in magnetron. **[8]**

b) Explain the construction and working of Travelling Wave Tube (TWT) in details. **[8]**

Q7) a) Explain with neat diagram construction and working of MESFET. **[8]**

b) Explain power Frequency limitations of microwave BJT. **[8]**

OR

Q8) Write short notes on the following along with applications. **[16]**

a) Tunnel diode.

b) Microwave Trasister.

c) Schottky diode.

d) Gunn diode.

Total No. of Questions : 10]

SEAT No. :

P3624

[Total No. of Pages : 3

[5154]-607

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

SOFT COMPUTING

(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 side indicate full marks.***
4) ***Use of logarithmic tables slide rules, Mollier charts, electronic pocket calcultor and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Discuss the following learning mechanisms with mathematical expressions: **[6]**

i) Hebbian Rule

ii) Delta Rule

b) Develop the mathematical model for Rosenblatt's perceptron. **[4]**

OR

Q2) a) Using your own institution, plot the fuzzy membership function for the age of people. Let A denote the age in years. **[6]**

The linquistic variables are defined as,

i) Very Young (VY) - $A < 15$

ii) Young (Y) - $12 \leq A < 30$

iii) Middle aged (M) - $25 \leq A < 50$

iv) Old (O) - $45 \leq A < 65$

v) Very Old (VO) - $60 < A$

b) What are the two types of Hopfield net? **[4]**

P.T.O.

Q3) a) What is convex fuzzy set? State the properties of a convex fuzzy set. **[6]**

b) Comment on following terms with respect to Linear Vector quantization: **[4]**

i) Supervised/Unsupervised net

ii) Type of learning algorithm used

OR

Q4) a) A Hopfield network has the following standard binary patterns : **[6]**

S = [1 1 1; 1 0 1; 1 0 0]

Find the weight matrix.

b) Define activation function. **[4]**

Write mathematical equation for

i) Binary Sigmoid

ii) Bipolar Sigmoid

iii) Bipolar step function

Q5) a) Define Implication. Write the mathematical statements for : **[8]**

i) Dienes-Rescher Implication

ii) Mamdani Implication

iii) Zaden Implication

b) Explain with neat diagram : **[10]**

i) Mamdani Fuzzy Model

ii) Sugeno Fuzzy Model

OR

Q6) a) Discuss the implementation of simple two input single output FIS employing Mamdani Model. Draw neat diagram. **[8]**

b) Describe following defuzzification methods with suitable diagram and mathematical equations : **[10]**

i) Centroid Method

ii) Weighted Average Method

Q7) a) With a neat block diagram, explain the architecture of Fuzzy Logic Controller. **[8]**

b) Compare conventional PID controller with Fuzzy Logic Controller. **[8]**

OR

Q8) a) What are the steps involved in designing Fuzzy Logic Controller? Describe in brief. **[8]**

b) Describe the role of Fuzzy Logic Controllers used in Aircraft Landing Control Problem. **[8]**

Q9) a) Explain the ANFIS architecture with the Fuzzy Sugeno Model. **[8]**

b) Discuss the advantages and limitations of ANFIS. **[8]**

OR

Q10)a) What is Hybrid Learning? Explain the Hybrid Learning Algorithm in detail. **[8]**

b) Write in detail : The application of ANFIS for regression. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P3039

[Total No. of Pages : 2

[5154]-608

B.E. (Electronics)

BIOMEDICAL SIGNAL PROCESSING

(2012 Pattern) (404192) (Semester - II) (Elective - IV) (End Sem.) (Revised)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
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 Polarization, depolarization, Repolarization, absolute refractory period, relative refractory period for a Bio Cell. What is the value of Polarization Potential? What is the value of action Potential? **[8]**

b) Write a short note on Cardio-vascular system. **[6]**

c) Explain sources of variability of noise. **[6]**

OR

Q2) a) Explain EEG signal acquisition by 10 -20 electrode placement. **[8]**

b) Write a note on direct and indirect blood pressure measurement. **[6]**

c) Explain Nervous System with its Structure and functions of Neurons. **[6]**

Q3) a) State advantages and disadvantages of STFT. **[8]**

b) Explain EEG rhythms & waveform. Also explain categorization of EEG activity & its recording techniques. **[8]**

OR

Q4) a) Explain Band Pass, Band Stop and Band Reject Integer Filters with their basic design concept in detail. **[8]**

b) Draw and explain the block diagram for Brain computer interface. **[8]**

P.T.O.

Q5) a) Write a short note on Use of EEG to diagnose Brain disorders like Epilepsy & sleep disorders. **[8]**

b) Explain Adaptive Filters with its basic concept. Also explain principle noise cancellation model of the same. **[8]**

OR

Q6) a) Write a short note on Isolation amplifier, Grounding and shielding techniques. **[8]**

b) Explain adaptive cancellation of maternal ECG form fetal ECG of Interest. **[8]**

Q7) a) Explain QRS detection using Multivariate analysis method PCA. **[10]**

b) Explain how FIR or IIR filters are used specifically for event detection in ECG. **[8]**

OR

Q8) a) State the difference between stationary and non-stationary signals. Support the answer with relevant application to biomedical domain. **[10]**

b) State the ICA algorithm and its significance. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

P3040

[Total No. of Pages : 2

[5154]-609
B.E. (Electronics)
NONO ELECTRONICS & MEMS (Elective - IV)
(2012 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answers any one question out of Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Write a short note on "nano technology" **[6]**

b) Explain in detail properties of nano structured materials. **[7]**

c) Define nano technology. Write few applications of nono technology in electronics. **[7]**

OR

Q2) a) Write a short note on "Tools for measuring nano structures'. **[6]**

b) Explain in detail applications of carbon nano tubes. **[7]**

c) Describe applications of nano technology in biomedical electronics. **[7]**

Q3) a) What is etching? What do you mean by wet etching and dry etching? **[9]**

b) Write short note on "Lithography". **[9]**

OR

Q4) a) Explain concept of MEMS in details. **[9]**

b) Enlist Micro machining Processes. Explain one of them in detail. **[9]**

Q5) a) Describe Analog control of MEMS. **[8]**

b) Write a note on different materials used for MEMS. **[8]**

OR

P.T.O.

Q6) a) Describe in detail Digital control of MEMS. **[8]**

b) Enlist various limitations of silicon material technology. **[8]**

Q7) Write short note on: **[16]**

a) Accelerometers.

b) Gyroscopes.

c) Chemical Sensors.

d) Biological Transducers.

OR

Q8) Write short note on: **[16]**

a) Actuators.

b) Pressure Sensors.

c) Cell-bosed biosensors.

d) Chemical actuators.

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Total No. of Questions : 10]

SEAT No. : ____

P3041

[Total No. of Pages : 2

[5154]-610
B.E. (Electronic)
SYSTEMS ON CHIP
(2012 Course) (Semester - II) (404212C) (Elective -IV) (End Sem.)

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

Instructions to the candidates:

1) ***Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw neat diagrams.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain different low power microsystems technology and applications. **[6]**

b) Draw and explain flow chart used for microsystem development. **[4]**

OR

Q2) a) Explain in the TRIMEDIA processor specifications and performance metrics. **[6]**

b) Explain in detail MPEG-2 decoder terrestrial transmission. **[4]**

Q3) a) Draw and explain RTL based chip design flow. **[6]**

b) Why at RTL stage, it is very difficult to know the actual delays? **[4]**

OR

Q4) a) How synchronizer is used to avoid metastability in clock domain crossing? **[6]**

b) When transistors consume power? Explain all cases with example. **[4]**

Q5) a) Explain working of PVD? Which PVD process is used in MEMS and SoC fabrication? **[8]**

b) What is LEGAL? Explain LEGAL algorithm steps. **[8]**

OR

P.T.O.

Q6) a) What do you mean by scaling in electromagnetic force? Justify: electromagnetic force is $F \propto l^4$. **[8]**

b) What kind of improvement inculcated in LEGAL in context to earlier routing algorithms? **[8]**

Q7) a) Explain pros and cons of transistor basic orientations in horizontal or vertical direction. **[8]**

b) Which features a designer expect in synthesis tool? **[8]**

OR

Q8) a) Explain design methodology for semicustom components. **[8]**

b) Explain abstraction levels of hardware descriptions used in sysnthesis. **[8]**

Q9) a) Explain the terms: **[9]**

i) Homogeneous Modeling.

ii) Heterogeneous Modeling.

b) Draw and explain a generic fault simulation procedure flowchart. **[9]**

OR

Q10)a) Explain features of co-design tool with an example. **[9]**

b) Explain analog boundary scan cell in detail. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P3042

[Total No. of Pages : 2

[5154]-610-A
B.E. (Electronics Engineering)
MECHATRONICS
(Elective - IV) (2012 Course) (404212) (Semester - II)

Time : 2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain with neat diagram key elements of mechatronics system. **[8]**

b) Explain with neat block diagram conceptual design of self-optimizing systems. **[6]**

c) Explain key elements of controlled Mechatronics system with neat block diagram. **[6]**

OR

Q2) a) Write a short note on (any two): **[8]**

i) Brakes.

ii) Gears.

iii) Springs.

b) Explain key aspects of a self-optimizing systems. **[6]**

c) Explain role of controls in mechatronics system. **[6]**

Q3) a) Explain in detail TIA/EIA serial interface standards. **[10]**

b) Explain with neat data format serial asynchronous communication. **[8]**

OR

Q4) a) Write short note on (any two): **[10]**

i) Point-to-point Vs multi-point communication system.

ii) Programmable logic controller. (PLC)

iii) Half-duplex and full-duplex communication.

b) Explain universal Asynchronous receiver transmitter (UART) with heat diagram. **[8]**

P.T.O.

Q5) a) Explain with neat block diagram basic elements of a data-logging system. **[8]**

b) What are the software options available in Data-logging systems? **[8]**

OR

Q6) a) What are the Hardware options available in Data-logging systems? **[8]**

b) Explain in detail offline-analysis in data logging systems. **[8]**

Q7) a) Explain in detail x-ray based fabrication of MEMS. **[10]**

b) What are the materials involved in designing and fabricating of MEMS devices. **[6]**

OR

Q8) Write a short note on (any two): **[16]**

a) Inertial MEMS sensors.

b) Micromachined pressure sensors.

c) Micro channel heat-sink.

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Total No. of Questions : 8]

SEAT No :

P 3043

[Total No. of Pages :2

[5154]-611

B.E.(Electronics & Telecommunication)

VLSI DESIGN & TECHNOLOGY

(2012 Pattern) (End Semester) (404181)

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

Q1) a) Explain the following: **[10]**

i) Constants ii) Variables

iii) Signals iv) Functions

v) Procedures

b) Write VHDL code for half adder by structural and behavioral modelling technique. **[10]**

OR

Q2) a) Describe the PLD design flow. **[10]**

b) Write the VHDL programming for D flip-flop and its test bench. **[10]**

Q3) a) Derive the static and dynamic power dissipations in CMOS. **[7]**

b) Explain the following terms. **[4]**

i) Clock jitter ii) Clock skew

c) Draw and explain CMOS transfer characteristics. **[7]**

OR

Q4) a) Define Scaling and explain any one type of scaling. **[6]**

b) Explain the following: **[4]**

i) Channel Length Modulation ii) Body effect

c) Explain the working of a transmission gate and Implement a circuit of 2:1 multiplexer using transmission gate. **[8]**

P.T.O.

Q5) a) Draw and explain active load inverter in detail. **[8]**

b) Explain current sink and current source and their characterization with their areas of improvement. **[8]**

OR

Q6) a) Draw and explain CMOS operational amplifier with voltage gain and output resistance. **[8]**

b) Draw the schematic of CMOS differential amplifier and give the expressions for output resistance, CMRR & ICMR. **[8]**

Q7) a) Explain the fault models with examples. **[8]**

b) Explain the need of DFT with suitable example. **[8]**

OR

Q8) a) Draw the TAP controller state diagram and explain. **[10]**

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

i) Partial scan

ii) Full scan

iii) JTAG

Total No. of Questions : 10]

SEAT No. :

P3044

[Total No. of Pages : 2

[5154]-612
B.E.(E & TC)
COMPUTER NETWORKS
(2012 Course) (Semester - I) (End Sem.) (404182)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer the questions-Q(1) or Q(2), Q(3) or Q(4), Q(5) or Q(6), Q(7) or Q(8), Q(9) or Q(10).***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of Electronic calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Draw & explain Star topology with advantages & disadvantages. **[4]**

b) Explain function of physical layer with OSI diagram. **[6]**

OR

Q2) a) Explain coaxial cable with characteristics, application, advantages & disadvantages. **[6]**

b) Explain with suitable example different address used in TCP/IP suit? **[4]**

Q3) a) Explain stop & wait ARQ? **[5]**

b) Draw & explain transition state diagram used in PPP protocol. **[5]**

OR

Q4) a) Prove that throughput of slotted ALOHA is around 37%. **[4]**

b) Explain different transmission medium defined for IEEE 802.3? **[6]**

Q5) a) Explain classful Addressing? **[6]**

b) Explain encapsulation of ARP packet? **[4]**

c) Explain Bootstrap Protocol? **[7]**

OR

P.T.O.

Q6) a) Draw and explain function of each field of DHCP message format? **[9]**

b) Explain design goal often used in Routing algorithm? **[8]**

Q7) a) Draw & explain state diagram for simple connection management scheme at Transport Layer. **[7]**

b) Explain four ways of releasing using three way handshake in TCP protocol? **[10]**

OR

Q8) a) Explain different services provided by transport layer? **[6]**

b) Explain real time transport protocol? **[5]**

c) Which are parameters for the service primitives and library procedures? **[6]**

Q9) a) List basic security requirement for high security in line encryptor. **[6]**

b) Write a short note on World Wide Web? **[5]**

c) Write components of DNA? **[5]**

OR

Q10)a) State & explain Post office Protocol? **[6]**

b) State advantages &disadvantages of HTML? **[5]**

c) State & explain Security attacks? **[5]**

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Total No. of Questions : 8]

SEAT No. :

P3045

[Total No. of Pages : 3

[5154]-613
B.E.(E&TC)
MICROWAVE ENGINEERING
(2012 Pattern) (Semester-I) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Why waveguides are required at microwave frequencies? Explain the following parameters of a waveguide. **[7]**

i) Phase Velocity

ii) Guide wavelength

iii) Cut off frequency

b) Explain the Faraday's rotation principle? Explain in brief the working principle of an isolator. **[7]**

c) Explain the properties of E plane Tee with the help of a neat diagram. Also state its Scattering matrix. **[6]**

OR

Q2) a) An air-filled rectangular waveguided of inside dimensions 7× 3.5 cm operates in the dominant TE mode. **[7]**

i) Find the cut off frequency

ii) Determine the phase velocity of the wave in the guide at frequency of 3.5 GHz.

iii) Determine the guided wavelength at the same frequency.

b) Define with expressions the following parameters of directional coupler.**[7]**

i) Coupling Factor

ii) Directivity

iii) Insertion loss

iv) Isolation

c) When is it necessary to carry out Microwave Network Analysis? **[6]**

P.T.O.

Q3) a) What are the high frequency limitations of transistor? Explain the techniques to minimize this along with the performance parameters of transistor at high frequency. **[9]**

b) Explain in detail the construction, operation, advantages and applications of a TWT amplifier. **[9]**

OR

Q4) a) A two cavity Klystron amplifier has the following specifications: **[10]**

Beam Voltage: V_0=1000V

Beam Current: I_0=25mA

Frequency: f=3 GHz

Gap spacing in either cavity: d=1 mm

Spacing between centers of cavities: L=4 cm

Effective shunt impedance excluding beam loading: R_{sh}: 30kΩ

Determine:

i) The input gap voltage to give maximum output voltage V2

ii) Find voltage gain, neglecting the beam loading in the output cavity.

iii) Find the efficiency of the amplifier, neglecting beam loading.

b) What are cross field devices? Explain the Cavity Magnetron with Hull cut off condition in detail. **[8]**

Q5) a) Explain the working principle, advantages and disadvantages of Tunnel Diode in detail. **[8]**

b) Draw equivalent circuit of Varactor diode. Explain in detail its construction and operation. **[8]**

OR

Q6) a) Explain construction, working and applications of PIN diode in detail. **[8]**

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

i) Microwave Transistor

ii) Schottky Barrier diode.

Q7) a) Explain attenuation measurement technique in detail. **[8]**

b) Enlist methods of measuring the Q of a cavity resonator. Explain any one method in detail. **[8]**

OR

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

i) Tunable detector

ii) Microwave Power Measurement

b) Explain any two methods of measuring Impedance of a terminating load in a microwave system. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3046

[Total No. of Pages : 3

[5154]-614

B.E. (Electronics & Telecommunication)

DIGITAL IMAGE PROCESSING

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

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 and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe spatial resolution in images. **[4]**

b) List image file formats. Which information is available in the header of image file. **[2]**

OR

Q2) a) Explain the terms: **[4]**

i) City block distance

ii) Chess board distance

b) Explain YIQ colour space. List its application. **[2]**

Q3) a) Explain the difference between point processing and mask processing operation with the help of suitable example. **[4]**

b) What is meant by image smoothing? Write one application of the same. **[3]**

OR

Q4) a) Explain image restoration with the help of block diagram. **[4]**

b) Which filter is used to remove salt and pepper noise effectively? Justify your answer. **[3]**

P.T.O.

Q5) a) Explain the need of fidelity criteria in image compression. Write any two fidelity measures. **[4]**

b) How the entropy of image is calculated? Write significance of entropy in image processing. **[3]**

OR

Q6) a) Generate Huffman code for following data. Calculate efficiency of Huffman code. **[4]**

Graylevel	Probability
a_1	0.1
a_2	0.4
a_3	0.06
a_4	0.1
a_5	0.04
a_6	0.3

b) What is meant by blocking artifact? Where is it observed? **[3]**

Q7) a) What is image dilation? Perform image dilation of matrix A using structuring element S. **[9]**

$$A=\begin{bmatrix}0&0&0&0&0\\0&1&1&1&0\\0&1&1&1&0\\0&1&1&1&0\\0&0&0&0&0\end{bmatrix} \quad S=\begin{bmatrix}0&1&0\\1&1&1\\0&1&0\end{bmatrix}$$

b) What is image segmentation? Explain adaptive thresholding. Write its application. **[9]**

OR

Q8) a) Explain how boundary extraction is achieved using dilation and erosion. Explain any one application of boundary extraction. **[9]**

b) Explain thinning and thickening operations in image morphology. Explain the term morphology. **[9]**

Q9) a) What are chain codes? Explain with the help of example. **[8]**

b) What is image representation? Explain any two image representation techniques. **[8]**

OR

Q10)a) Explain boundary descriptors used in image processing. **[8]**

b) What is principal Component Analysis? Explain in detail and write its application. **[8]**

Q11)a) Explain template matching for object recognition with example. **[8]**

b) Explain the concept of classifier with the help of block diagram explain steps in typical object recognition process. **[8]**

OR

Q12)a) Explain character recognition system with the help of block diagram. **[8]**

b) What is content Based Image Retrieval? Explain one application in detail. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3047

[Total No. of Pages : 2

[5154]-615

B.E. (Electronics & Telecommunication)

EMBEDDED SYSTEM & RTOS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No2, 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) ***Neat diagram must be drawn wherever necessary.***
4) ***Use of non programmable electrronics pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain features of embedded system and classify them with example. **[5]**

b) Explain various processor technologies in design of embedded processors. **[5]**

OR

Q2) a) Explain difference between V model and Water fall model of software design. **[5]**

b) Explain design metrics with respect to camera as embedded system. **[5]**

Q3) a) Explain kernel architecture & configuration for RTOS. **[5]**

b) Explain the importance of clock tick in function 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 OSMailboxCreate( ) and OSMailboxPost( ) function. **[5]**

P.T.O.

Q5) a) Compare BIOS with boot loader in embedded system. **[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. **[8]**

Q9) a) Explain the use of ICE for testing embedded system with diagram. **[9]**

b) Explain mobile phone with its hardware & software requirements. **[9]**

OR

Q10)a) Explain embedded system hardware & software requirements in automatic chocolate vending machine. **[9]**

b) Explain GNU debugger. What is hardware assisted debugging? **[9]**

Total No. of Questions : 8]

SEAT No. :

P3048

[Total No. of Pages : 2

[5154]-616
B.E. (E & TC)
SOFTWARE DEFINED RADIO
(2012 Course) (Elective - I) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) State and explain characteristics of SDR alongwith benefits. **[8]**

b) Explain power management issues in DSP, FGPA. **[6]**

c) State the need of interpolation. **[6]**

OR

Q2) a) Explain the role of RF filter and low noise amplifier in SDR. **[8]**

b) State and explain the distortions in data converters. **[6]**

c) State the need of decimator. **[6]**

Q3) a) State and explain the benefits of smart antenna. **[9]**

b) Explain advantages and disadvantages of MIMO. **[9]**

OR

Q4) a) Draw and explain switched beam antenna array. **[9]**

b) Explain with neat diagram space time block coding for MIMO. **[9]**

Q5) a) Draw and explain cognitive radio cycle. **[9]**

b) Define spectrum efficiency. Explain spectrum efficiency gain in SDR and CR. **[9]**

OR

P.T.O.

Q6) a) Explain IFFT block used in OFDM transmitter. **[9]**

b) Explain the principle of OFDM. List the advantges of OFDM. **[9]**

Q7) a) Explain challenges and issues in implementation of SDR, for advance communication system. **[7]**

b) Explain Beagle Board based SDR. **[7]**

OR

Q8) Write a short note on: **[14]**

a) Network interoperability.

b) CR for public safety.

Total No. of Questions : 8]

SEAT No. :

P4837

[Total No. of Pages : 2

[5154]-617
B.E. (E&TC)
INDUSTRIAL DRIVES & CONTROL [End-Semester]
(2012 Pattern)

Time : 2.½ Hours] *[Maximum Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Assume suitable data, if necessary. Neat Diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answers will be valued as a whole.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic packet calculator and steam tables is allowed.***

Q1) a) What are DC drives? Explain wtiht circuit diagram & waveforms working of 3ϕ seperately excited DC Motor drive. Comment on p.f. & characteristics. **[7]**

b) Compare chopper fed drives with conver fed drives. **[6]**

c) What is the principle of induction Motor? Explain with block diagram working of 3ϕ I.M speed control technique by $\frac{v}{f}$ method. **[7]**

OR

Q2) a) Explain in brief self controlled synchronous motor drives? State its advantages & disadvantages. **[7]**

b) What are braking techniques in induction motor drives? Explain any one type. **[6]**

c) What is PLL? Explain with block diagram speed control technique of DC motor using PLL for varying loads conditions. **[7]**

Q3) a) What are BLDC motors? Explain with diagram working of BLDC motor dirve. State its features & application. **[10]**

P.T.O

b) What is the need of stepper motor drives in Industries? Explain any one type. **[6]**

OR

Q4) a) What are AC synchronous motors? Explain with diagram. comment on Tq-N-characteristics. **[10]**

b) Compare AC drives with DC drives? Justify why AC drives are prefered over DC drives in industries. **[6]**

Q5) a) Explain fixed speed & variable speed operation in wind power system. **[8]**

b) What are the limitations of Back ot Back converter in wind power systems? Explain of state its advantages. **[10]**

OR

Q6) a) What is the role of power electronics in the wind energy conversion sytem? Explain. **[8]**

b) What are different types of batteries used for solar applications? Explain float cum Boost charging method for various lead acid batteries. **[10]**

Q7) a) What is fuzzy logic? Explain with diagram fuzzy logic based induction motor drive. **[8]**

b) What are fuzzy sets? Explain various properties with examples. **[8]**

OR

Q8) a) Explain the operation of Neutral Networks based PWM controller. **[8]**

b) Explain in details, Artificial intelligence applications in electrical machines & Drives. **[8]**

▲ ▲ ▲

Total No. of Questions : 8]

SEAT No. :

P3049

[Total No. of Pages : 3

[5154]-618
B.E. (E & TC)
MULTIRATE AND ADAPTIVE SIGNAL PROCESSING
(2012 Pattern) (Elective - II) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
3) ***Assume Suitable data, if necessary.***

Q1) a) Design, at block diagram level, a two stage decimator that downsamples an audio signal by a factor of 30 and satisfies the following specifications. **[16]**

i) i/p sampling frequency, $f_s \rightarrow 240$ kHz.

ii) Highest frequency of interest in the data $\rightarrow$ 3.4 kHz.

iii) Passband ripple, $\delta_p \rightarrow 0.05$.

iv) Stopband ripple, $\delta_s \rightarrow 0.01$.

Filter length, $$N = \frac{-10.109(\delta_p \delta_s) - 13}{14.6 \Delta f} + 1$$

where Δf = normalized transition width.

Assume decimation factors of 15 & 2 for stages 1 & 2 respectively.

b) For the decimator in part (a), calculate the total number of multiplications per second (MPS) and the total storage requirements (TSR). **[4]**

OR

Q2) For a given signal, $x(t)$

$x(t) = t \qquad 0 \leq t \leq 1$

$= 2 - t \qquad 1 < t \leq 2$

Find:

a) average time. **[2]**

b) energy in $x(t)$. **[2]**

P.T.O.

c) Variance in time-domain. **[4]**

d) Energy in $\frac{d}{dt}x(t)$. **[2]**

e) Variance in frequency domain. **[4]**

f) Time-Bandwidth Product. **[2]**

g) Find $\langle x(t) \cdot \psi(t) \rangle$ where $\psi(t)$ is Haar Wavelet function. **[4]**

Q3) a) Explain Wavelet Packet Analysis. **[6]**

b) Derive the magnitude and phase response of

i) Haar first order LPF used on analysis side. **[6]**

ii) Haar first order HPF used on analysis side. **[6]**

OR

Q4) For the signal, $y(t)$ shown in fig. (1)

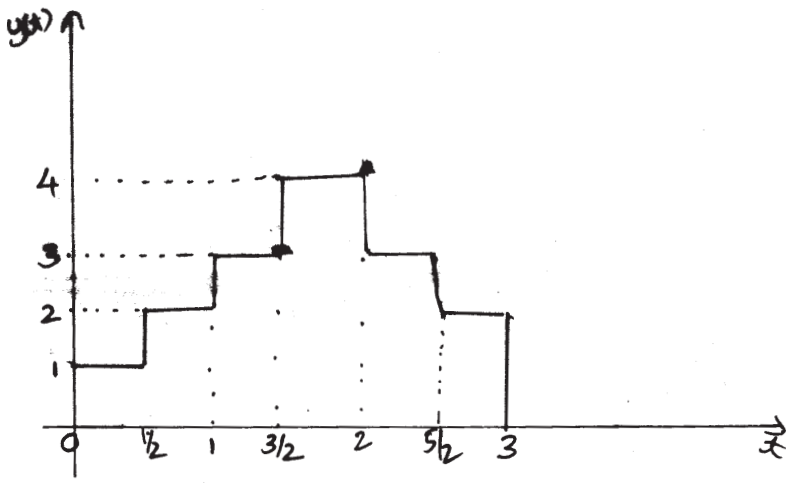

fig 1

a) State which V subspace $y(t)$ belongs to and why. **[2]**

b) Calculate the piecewise constants such that $y(t)$ belongs to V_0 & W_0 subspace. **[6]**

c) Using Haar $\phi(t)$, plot projections and span of $y(t)$ on V_0 and using Haar $\psi(t)$, plot projections & span of $y(t)$ on W_o. **[4]**

d) Reconstruct the original signal. Show that $V_1 = V_0 \oplus W_0$. **[6]**

Q5) a) Derive the Wiener-Hopf equation. Starting with the equation of the mean square error. **[8]**

b) Explain the adaptive noise cancellation alongwith the suitable diagram and equations. **[8]**

OR

Q6) For an adaptive filter,

inputs, $X_1 = \begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}$ and $X_2 = \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}$

have target (desired) values, $y_1 = -1$ & $y_2 = 1$ respectively.

The convergence factor $\mu = 0.2$. The initial weights of the filter are W = [0 0 0]. The filter is trained using LMS algorithm, for four iterations. The inputs applied to the filters follow the sequence,

X_1, X_2, X_1 & X_2.

Find:

a) Find the weight vector at the end of each iteration. **[8]**

b) Also find the error at the end of each iteration. **[4]**

c) Find mean square error at the need of second and fourth iteration. **[4]**

Q7) $x[n] = \{36, 8, 32, 4, 46, 2, 12, 0\} \in V_3$.

a) Show smoothing effect. **[8]**

b) Reconstruct after suppressing coefficients in W_j subspaces. **[8]**

OR

Q8) a) Given $x(n) = \{12, 14, 8, 6\} \in V_2$.

i) Develop Wavelet lifting scheme. Decompose signal upto V_o subspace. **[6]**

ii) Clearly show 'split', 'update' & 'predict' stages with their outputs. **[2]**

b) Discuss the application of wavelets in compression. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3050

[Total No. of Pages : 2

[5154]-619

B.E. (Electronics & Telecommunication)

ELECTRONIC PRODUCT DESIGN

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable additional data if necessary.***
5) ***Use of non programmable calculator is permitted.***

Q1) a) Explain man machine dialogue. **[8]**

b) What are the issues while formulating a test plan? **[8]**

c) What are the metrics in software designing? **[4]**

OR

Q2) a) What is shielding? Explain with neat diagrams. **[8]**

b) What are the performance and efficiency measures in hardware testing? **[6]**

c) Explain different software models with advantages and disadvantages. **[6]**

Q3) a) What is bypassing and decoupling issue in PCB? Explain with suitable example. **[6]**

b) What are the grounding methodologies? Explain with suitable sketches. **[6]**

c) Write in brief about routing topologies. **[6]**

OR

Q4) a) What is functional partitioning? Explain critical frequency concept. **[8]**

b) What are the techniques used in ESD protection. **[6]**

c) Calculate the characteristic impedance for a stripline geometry when the thickness of PCB laminates is 1.6mm and its relative permittivity is 3.2. The width of embedded track is 1mm and its thickness is 35 microns. **[4]**

P.T.O.

Q5) a) What is role of A to D converter in product design? Explain the parameters while designing A to D converter. **[6]**

b) What is integration, verification and validation in electronic product designing? **[6]**

c) What is an operational amplifier explain with typical application. **[4]**

OR

Q6) a) What is testing and debugging? Explain the steps in debugging. **[8]**

b) What are electromechanical components? Explain any two electromechanical components. **[8]**

Q7) a) Define documentation and explain different types of documentation. **[6]**

b) What is accountability and liability? **[6]**

c) Write in brief on presentation and preservation of documents. **[4]**

OR

Q8) a) What is the importance of bill of material? Explain bill of material with suitable example. **[8]**

b) Explain the layout of documentation. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3051

[Total No. of Pages : 2

[5154]-620
B.E. (E & TC)
PLC's & AUTOMATION
(2012 Pattern) (End Sem) (Elective - II) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 and Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calcualtor and steam tables is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) Define term automation? List and explain the types of automation with suitable examples. **[8]**

OR

Q2) Explain: **[8]**

a) Human aided control system.

b) Automatic control system.

Q3) List the different signal standards used in Process Industry. Why current transmitter are prefered? **[6]**

OR

Q4) Write a short note on Differential Pressure Transmitters. **[6]**

Q5) Explain role of stepper motors in Industrial Automation with suitable example. **[6]**

OR

Q6) Define term Actuator. Explain spring & diaphragm type pneumatic actuator. **[6]**

P.T.O.

Q7) a) Define the term programmable logic controller with suitable block diagram explain the architecture of PLC. **[8]**

b) Explain: **[10]**

i) ERP system

ii) Bar code

OR

Q8) a) What is ladder diagram? Draw the block diagram for bottle filling plant and construct ladder diagram for the same. **[10]**

b) List different PLC specifications. **[4]**

c) Explain networking of PLC's. **[4]**

Q9) a) What is SCADA? Explain the role of each element in SCADA system. **[8]**

b) Explain in detail architecture of commercial DCS system. **[8]**

OR

Q10)a) List various applications of SCADA. Explain any one in detail. **[8]**

b) Explain in brief about input output modules used in DCS. **[8]**

Q11)a) What are basic components of numerical control system. Discuss advantages of each input medium. **[8]**

b) Explain in brief: **[8]**

i) Foundation Field bus

ii) CAN

OR

Q12)a) Classify the CNC machines based on: **[8]**

i) Point to point control system.

ii) Straight line control system.

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

i) HART Protocol

ii) TCP/IP

Total No. of Questions : 8]

SEAT No. :

P3052

[Total No. of Pages : 2

[5154]-621

B.E. (Electronics & Telecommunication)

ARTIFICIAL INTELLIGENCE

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Assume suitable additional data if necessary.***
5) ***Use of non programmable calculators is permitted.***

Q1) a) What is intelligent Agents? Explain the nature of environments & structure of agents in details. **[8]**

b) Explain Local search algorithms and optimistic problems in detail. **[6]**

c) Explain role of knowledge engineering in first order logic. **[6]**

OR

Q2) a) What is problem solving? Explain problem solving agent in detail. **[8]**

b) Explain online search agents and unknown environments. **[6]**

c) Explain syntax and semantics for first order logic. **[6]**

Q3) a) Explain forward chaining and Backward chaining in details. **[10]**

b) What is Ensemble Learning? Explain in detail. **[8]**

OR

Q4) a) Explain different methods of Learning with suitable examples. **[10]**

b) Explain Logical formulation of Learning in detail. **[8]**

Q5) a) Explain Expert system with architecture and functionality. **[8]**

b) What is perception? Explain perception confined to vision. **[8]**

OR

P.T.O.

Q6) a) Explain perception confined to speech recognition. **[8]**

b) Explain Expert system constituents with an example of 'Medical diagnosis system'. **[8]**

Q7) a) Explain in detail Ambiguity and disambiguation in detail. **[8]**

b) Explain probabilistic langauge processing with example. **[8]**

OR

Q8) a) Explain Augmented grammars and semantic interpretation in detail. **[8]**

b) What is the need of NL? Explain formal grammar for a fragment of English. **[8]**

Total No. of Questions :10]

SEAT No. :

P3053

[Total No. of Pages :3

[5154] - 622

B.E. (E & TC)

MOBILE COMMUNICATION

(2012 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain the assumptions in **[5]**

i) Pure chance traffic

ii) Statistical equilibrium.

b) Explain different channel assignment strategies in mobile cellular system. **[5]**

OR

Q2) a) With a neat diagram explain the term progressive grading in detail. **[5]**

b) Why is handoff necessary in mobile cellular system? Explain Mobile Assisted handoff. **[5]**

Q3) a) Explain the concept of time slot interchange (TSI) in time division switching. **[5]**

P.T.O.

b) During busy hour, 1200 calls were offered to a group of trunks and six were lost. The average call duration was 3 minutes.
Find **[5]**

i) Traffic offered

ii) Traffic carried

iii) Traffic lost

iv) Grade of service

v) Total duration of periods of congestion.

OR

Q4) a) What is a Microcell zone concept? How is it used to improve capcity. **[5]**

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

i) PCM signaling.

ii) Inter-register signaling.

Q5) a) State and explain different types of channels used in AMPS. **[8]**

b) With a proper flow diagram explain. **[10]**

i) Mobile station registration in GSM network.

ii) Mobile call setup and Termination.

OR

Q6) a) Write a short note on basic radio transmission parameters of the GSM system. **[8]**

b) Draw a neat diagram of GSM Architecture and explain the functions of each block. **[10]**

Q7) a) State and explain data services in GSM. **[8]**

b) With the suitable diagram, explain the frame structure of **[8]**

i) Mobile terminated SMS messages.

ii) Mobile originated SMS messages.

OR

Q8) a) Write a short note on Radio Link Protocol (RLP). **[8]**

b) With a neat diagram explain operation of GMSK modulator. **[8]**

Q9) a) Explain the basic types of pseudo random sequence used in spread spectrum CDMA system. **[8]**

b) Compare between technical parameters of WCDMA & IS-95. **[8]**

OR

Q10)a) Draw the block diagram of Rake receiver & explain its operation. **[8]**

b) Draw and explain the basic receiver structure for DS-CDMA. **[8]**

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Total No. of Questions : 10]

SEAT No :

P3054

[Total No. of Pages :2

[5154]-623
B.E (E & TC)
BROAD BAND COMMUNICATION SYSTEM
(2012 Pattern) (End Semester) (Semester-II)

Time : 2½ Hours *Max. Marks : 70*

Instructions to candidates:

1) ***All questions are compulsory***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks..***
4) ***You are advised to attempt not more than 5 questions.***
5) ***Your answers will be valued as a whole.***
6) ***Use of logarthmic tables side rule, molliar charts, electronic pocket calculator steam tables is allowed.***

Q1) a) What are photodetectors? Explain with diagram working of Avalanche photodiode (APD) **[6]**

b) What is linear scattering? Explain in brief. **[4]**

i) Rayleigh Scattering?

ii) Mie Scattering.

OR

Q2) a) What are graded index fibers? Explain with diagram how does ray transmission takes place in the graded Index Multimode fiber. **[6]**

b) A Multimode Graded index fiber exhibits total pluse broadening of 0.1 μsec over a distance of 15km. Estimate. **[4]**

i) The maximum possible Band width on the Link assuming no inter symbol Interference.

ii) The pulse dispersion per unit length

iii) the Bandwidth length product for the fiber.

Q3) a) What are various types of optical sources? Explain with diagram and characteristics working of LED. State its specifications, advantages and disadvantages. **[6]**

b) What is EDFA? Explain. **[4]**

OR

Q4) a) What is the need of optical power budget? Explain Link power budget with the help of optical power loss model for a point to point communication. **[6]**

b) What is multichannel transmission in optical (fibers) links? Explain any one method to achieve multichannel transmission. **[4]**

P.T.O.

Q5) a) What are the Elements of satellite communication? Explain with basic structure of satellite communication. **[8]**

b) Compare LEO, MEO, & GEO satellite orbits with its application. **[8]**

OR

Q6) a) Explain various Look angles for satellite communication. **[8]**

b) Describe the Launch sequence used in Inject satellite. **[8]**

Q7) a) What are various losses in uplink and downlink analysis? Explain. **[10]**

b) What are orbital effects in communication system performance? Explain **[8]**

OR

Q8) a) What are different types of Antennas used in satellite systems? Explain importance of each. **[8]**

b) Explain the following **[10]**

i) Communication subsystem.

ii) Antenna subsystem.

Q9) a) Explain the procedure for satellite communication link Design **[8]**

b) Explain any two. **[8]**

i) Attitude control system.

ii) Orbital control system.

iii) Tracking, telemetry and command system.

OR

Q10)a) State and Explain Kepler's three Laws of planetary motion. **[8]**

b) Explain system noise temperature and $\frac{G}{T}$ Ratio. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3055

[Total No. of Pages : 2

[5154]-624
B.E.(E&TC)
SPEECH AND AUDIO SIGNAL PROCESSING
(2012 Pattern) (Semester-II) (Elective-III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the classification of speech signal based on place and manner of articulation. **[6]**

b) Draw a neatly labelled block diagram to represent speech production mechanism. **[4]**

OR

Q2) a) Explain pitch period estimation using autocorrelation method. **[6]**

b) Draw a neatly labelled block diagram to represent LTV model of speech generation. **[4]**

Q3) a) Explain the modelling of human auditory system. **[6]**

b) What is a spectrogram of a speech signal? What information you can get from a spectrogram? **[4]**

OR

Q4) a) Compare Mel scale and Bark scale. **[6]**

b) Define the following terms related to speech processing: **[4]**

i) Short term energy

ii) Spectral Roll off

iii) Spectral Centroid

iv) Short time ZCR

P.T.O.

Q5) a) Explain auto-covariance method of LPC analysis. **[8]**

b) Explain lattice formulation of LPC coefficients. **[8]**

OR

Q6) a) Explain Covariance method of linear predictive analysis. **[8]**

b) With the help of block diagram, explain an application of LPC. **[8]**

Q7) a) What is the cepstrum domain? How will you extract the pitch information and vocal tract information from the cepstrum? **[8]**

b) Compare real and Complex cepstrum. **[8]**

OR

Q8) a) What is Mel cepstrum? Explain its application. **[8]**

b) How do you perform pitch and formant estimation of speech signal using cepstrum? **[8]**

Q9) a) Draw a block diagram and explain the operation of Text-To-Speech (TTS) converter. **[6]**

b) What is Musical instrument classification? **[6]**

c) How do you perform isolated word recognition using vector quantization? **[6]**

OR

Q10) Write a note on the following: **[18]**

a) Speech Enhancement

b) Isolated word recognition using DTW

c) Speaker recognition

Total No. of Questions : 10]

SEAT No. :

P3056

[Total No. of Pages : 2

[5154]-625
B.E.(E & TC)
RF CIRCUIT DESIGN
(2012 Pattern) (Semester-II) (Elective-III) (404191B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Discuss the method of open circuit time constants to estimate the bandwidth. **[5]**

b) Discuss the design of Shunt Peaked amplifier with suitable diagram. **[5]**

OR

Q2) a) Describe with suitable example, relation between Rise time and Bandwidth. **[5]**

b) What is the standard recipe for computing bandwidth? **[5]**

Q3) a) Describe Neutralization and unilateralization. **[5]**

b) List out Key components of a mobile phone with respect to RF Processing. **[5]**

OR

Q4) a) Describe in brief stabilization methods. **[5]**

b) Explain Bandwidth enhancement techniques. **[5]**

Q5) a) Differentiate between Single ended and differential ended LNA. **[8]**

b) With the help of schematic in detail, explore the design steps of single ended LNA. **[8]**

OR

P.T.O.

Q6) a) Explain LNA Topologies with suitable diagrams. **[8]**

b) Design LNA to operate at 500 MHz Design suitable bias. Compute device width degenerating inductance, noise figure & Lg. Assume suitable data. **[8]**

Q7) a) Describe describing function model and start up model of Colpitts Oscillator. **[6]**

b) How we can use describing functions to analyze oscillators? **[6]**

c) Explain with appropriate diagram basic LC Feedback Oscillator. **[6]**

OR

Q8) a) What is describing function? Explain with suitable examples. **[6]**

b) Discuss Negative resistance oscillator. **[6]**

c) Illustrate how Function generator is used to analyze oscillators. **[6]**

Q9) a) Explain with respect to Mixer following Characteristics. **[8]**

i) Noise Figure

ii) Spur

b) With schematic & mathematical expressions explain multiplier & square law MOSFET mixers in detail. **[8]**

OR

Q10)a) Explain Single diode mixer and double diode mixer. **[8]**

b) Derive an expression for conversion gain of single ended MOSFET mixer. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3057

[Total No. of Pages : 2

[5154]-626

B.E.(Electronics & Telecommunication)

AUDIO VIDEO ENGINEERING

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

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 Caluclator is allowed.***
5) ***Assume Suitable data if necessary***

Q1) a) Draw a simplified block diagram of PAL decoder and explain. **[5]**

b) Define following term: i) Hue, ii) Saturation, iii) Brightness **[5]**

OR

Q2) a) Draw chromatacity diagram and explain what information is obtained from it. **[5]**

b) Explain in brief:

i) Remote control system for TV receiver,

ii) Field Strength meter. **[5]**

Q3) a) What are the advantages of digital technology used in TV systems? List the DTV standards. **[5]**

b) Explain the lossless and lossy compression technique. List different video compression techniques. **[5]**

OR

Q4) a) Why the progressive scanning is preferred in HDTV? List the different types of display used for HDTV. **[5]**

b) Compare CAS and DTH. **[5]**

P.T.O.

Q5) a) What are the features of IPTV? Explain the architecture of IPTV. **[8]**

b) What is a video projector? What are the different projection technologies? **[8]**

OR

Q6) a) Write a short note on digital satellite TV. **[8]**

b) Explain the video transmission in 3G mobile system. **[8]**

Q7) a) Draw the block diagram of disc recording and reproducing system and explain the function of each block. **[10]**

b) Compare Blu-ray disc and DVD. Explain their working. **[8]**

OR

Q8) a) Describe high density method of video recording and reproduction. **[10]**

b) Explain the terms:

i) Stereo sound system,

ii) Dolby digital sound system. **[8]**

Q9) a) What are the requirements for good auditorium for pleasant listening? Give salient features of acoustic design for an auditorium. **[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. :

P3058

[Total No. of Pages : 2

[5154]-627

B.E.(Electronics & Telecommunication)

SOFT COMPUTING (Elective - III)

(2012 Pattern) (Semester - II) (End-Semester) (404191D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) State the perceptron learning rule and comment on its convergence. **[8]**

b) What is the basic limitation of a perceptron network? Explain with a suitable example.How is it overcome using multi-layered perceptrons?**[6]**

c) State the algorithm and essential processes in a Self Organized Feature Map network. **[6]**

OR

Q2) a) State the various activation functions used in artificial neural networks. What are the requirements of an activation function? Explain with suitable examples. **[8]**

b) State and explain the popular topologies of neural networks. **[6]**

c) Explain the RBF network and state its learning mechanism. **[6]**

Q3) a) Explain Fuzzy rules and Fuzzy algorithms with a suitable example. **[8]**

b) Explain Fuzzy inference system and its advantages. **[8]**

OR

Q4) a) Define the terms core, support , boundary and crossover points for a fuzzy membership function. **[8]**

b) Compare and contrast Crisp and Fuzzy logic. **[8]**

P.T.O.

Q5) a) Explain the procedure for designing a simple fuzzy control system. **[8]**

b) Draw and explain the architecture of a typical FLC. **[8]**

OR

Q6) a) State the fuzzy compositional rules used for fuzzy relationship computation. **[8]**

b) Given a rule: IF x is A, THEN y is B, where

$$A = \left\{\frac{0.2}{1}, \frac{0.5}{2}, \frac{0.7}{3}\right\} \text{ and } B = \left\{\frac{0.6}{5}, \frac{0.8}{7}, \frac{0.4}{9}\right\}$$

Infer B' for another rule: IF x is A', THEN y is B', where

$$A' = \left\{\frac{0.5}{1}, \frac{0.9}{2}, \frac{0.3}{3}\right\}$$, using Mamdani implication rule. **[8]**

Q7) a) Draw and explain the architecture of a typical FLC. **[10]**

b) State the Architecture of ANFIS. **[8]**

OR

Q8) a) State the various applications of FLC. **[10]**

b) Write a short Note on "Hybrid Learning Algorithm employed in ANFIS". **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P3059

[Total No. of Pages : 2

[5154]-628

B.E. (Electronics & Telecommunication)

BIOMEDICAL SIGNAL PROCESSING

(Elective - IV)(2012 Pattern) (404192A) (End- Semester) (Semester- II)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q4, 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 & explain block of biomedical instrumentation system. **[8]**

b) Explain the Cardio Vascular system with the blood flowing through the heart. **[6]**

c) Explain the structure and function of neuron. **[6]**

OR

Q2) a) Write brief notes on Bio-Potential Electrode? What happens if electrodes are either placed dry or loose? **[8]**

b) Write short 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. 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]**

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Total No. of Questions : 8]

SEAT No. : ____

P3060

[Total No. of Pages : 2

[5154]-629
B.E. (E & TC)
NANO ELECTRONICS & MEMS (Elective - IV)
(2012 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary.***

Q1) a) What are the various types of Defects in crystal structure. Explain in Detail. **[7]**

b) Explain different levels of contamination reduction in detail. **[7]**

c) Explain Band Structure of Silicon in Detail. **[6]**

OR

Q2) a) Explain the different methods of thin film depostion in detail. **[7]**

b) Describe the advantages of Quantum Dots. **[7]**

c) Explain FinFET technology in detail. **[6]**

Q3) a) Describe various types of MEMS packages in detail. **[9]**

b) Write short note on: **[9]**

i) Thermocouple

ii) Thermister

iii) Actuator

OR

Q4) a) What are important sensor characteristics. **[9]**

b) What are three major sources of noise in MEMS that needs to be considered by designer. **[9]**

P.T.O.

Q5) a) Describe the applications of MEMS in industry. **[8]**

b) Compare major sensing methods on the basis of their advantages and disadvantages. **[8]**

OR

Q6) a) What are different types of acceleration measurement? Explain in detail. **[8]**

b) What are major advantages and disadvantages of electrostatic sensors and actuators. **[8]**

Q7) Write short on: **[8]**

a) i) Hall Effect.

ii) Hot probe method

b) Explain electorn microscopy tool used for analysis of wafer. **[8]**

OR

Q8) a) Explain principle of Contact Type profilometer. **[8]**

b) Explain in detail the Fourier Transform Infrared Spectroscopy. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P3061

[Total No. of Pages : 2

[5154]-630
B.E. (E & TC)
DETECTION AND ESTIMATION THEORY
(2012 Course) (Semester - II) (404192C) (Elective - IV)

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

Instructions to the candidates:

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

Q1) a) Write short note on Composite Hypothesis testing. **[5]**

b) What is Bayes criteria. Derive the expression for Bayes Decision rule. Under what condition Bayes criteria reduces to LRT and MAP. **[5]**

OR

Q2) a) Explain Best Linear Unbiased Estimator (BLUE)? **[5]**

b) Explain how decision rule is framed in case of multiple hypothesis tests. **[5]**

Q3) a) Write a short note on Minimum Variance Unbiased Estimator. **[5]**

b) 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) Explain Bays estimator, least square estimator in detail. **[5]**

Q5) a) Find maximum likelihood estimator of power of WGN with variance $\sigma 2$ unknown with hypothesis H0 and H1 with K no. of samples producing zero and m output respectively. **[8]**

b) Explain Kalman's filter in context of estimation theory. **[8]**

OR

P.T.O.

Q6) a) Write a note on Discrete Wiener Filters. **[8]**

b) Write a note on Best Linear Unbiased Estimator. **[8]**

Q7) a) Derive the likelihood ratio test (LRT), under the Neyman Pearson (NP) criterion for a binary hypothesis problem. **[8]**

b) A ternary communication system transmits one of the three amplitude signal {1,2,3} with equal probabilities. The independent received signal samples under each hypothesis are **[8]**

H1 : Yk = 1 + N K = 1,2..K

H2 : Yk = 2 + N K = 1,2... K

H3 : Yk = 3 + N K = 1,2, ... K

The additive noise N is Gaussian with mean zero and variance $\sigma 2$. The costs are Cii = 0 and Cij = 1 for i $\neq$ j. Ij, j = 1,2, 3 determine the decision regions.

OR

Q8) a) In a binary detection problem, the transmitted signal under hypothesis H1 is either s1 (t) or s2(t), with respective probabilities P1 and P2. Assume P1 = P2 = 1/2, and s1(t) and s2(t) orthogonal over the observation time t$\in$ [0,T]. No signal is transmitted under hypothesis H0. The additive noise is white Gaussian with mean zero and power spectral density N0/ 2. Obtain the optimum decision rule, assuming minimum probability of error criterion and P(H0) = P(H1) = 1/2. **[8]**

b) Explain three criteria of likelihood ratio testing. **[8]**

Q9) a) Explain the Radar Elementary concepts- Range, Range Resolution, and Unambiguous Range. **[9]**

b) Give a Review of Some CFAR Detectors. **[9]**

OR

Q10)a) What is CFAR Detection and state the Principles of Adaptive CFAR Detection. **[9]**

b) Write short note on Neyman-Pearson detector. **[9]**

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Total No. of Questions : 8]

SEAT No. : ____

P3062

[Total No. of Pages : 2

[5154]-630-A
B.E. (E & TC)
WIRELESS NETWORKS (THEORY)
(2012 Pattern) (Semester - II) (Elective - IV) (404192D)

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

Instructions to the candidates:

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

Q1) a) Explain the concept of following: **[8]**

i) TDD and FDD.

ii) TDMA.

iii) FDMA.

iv) CDMA.

b) Explain the any two Security services provided in 802.11. **[6]**

c) Explain architecture of 3Gpp. release 4 Network. **[6]**

OR

Q2) a) What is cell Sectorization? Give the advantages of cell Sectorization in mobile communication. **[8]**

b) List the Wifi Configurations. Explain the Enterprise application configurations. **[6]**

c) Compare TD-CDMA and TD-SCDMA. **[6]**

Q3) a) Explain various releases of LTE with major features and wireless access technology. **[9]**

b) Explain uplink logical channel structures with functionality. **[6]**

c) Describe self Organizing Networks. **[3]**

OR

P.T.O.

Q4) a) What is the advantages of MIMO in LTE. Describe e mode B 4×4 configuration. **[9]**

b) Give the scheduler decisions involved in LTE with Policies. **[9]**

Q5) a) Give neat block diagram of the WiMAX network architecture. Explain the function of each block in detail. **[8]**

b) Draw and explain 802.16m TDD, 802.16m FDD and super frame structure. **[8]**

OR

Q6) a) Which are the different frequency bands and channel bandwidth used for WiMAX. **[8]**

b) Describe various interfaces for WiMAX. **[8]**

Q7) a) With neat sketch explain the function of each layer in VOLP Protocol. **[8]**

b) With neat signal flow diagram, Explain the fast connect procedure in H.323. **[8]**

OR

Q8) a) How the call establishment and release operation performed in SIP. **[8]**

b) With example explain IP to 557 connectivity using SIGTRAN. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

P3063

[Total No. of Pages : 2

[5154]-630-B
B.E. (E & TC)
ADVANCED AUTOMOTIVE ELECTRONICS
(2012 Pattern) (Semester - II) (Elective - IV)
(End sem.) (Open Elective)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary.***

Q1) a) With suitable block diagram explain antilock braking system. What are the advantages of it over normal braking system? **[8]**

b) What are competitive standards & microcontroller functions in automotive. **[8]**

c) State various types of Electronics systems in engine. **[4]**

OR

Q2) a) What is Tire pressure monitoring system? How does it work? Explain direct TPMS system. **[8]**

b) State the types of power train based on fuel used. Compare battery electrical vehicle, hybrid electrical vehicle and fuel cell electrical vehicle. **[8]**

c) Explain the concept of transmission system used in the vehicle. **[4]**

Q3) a) Write about Bluetooth, IEEE 802.11x, and LIN in detail. **[6]**

b) With respect to CAN explain error handling and protocol extension. **[6]**

c) Explain common methods of interfacing automotive applications. **[4]**

OR

P.T.O.

Q4) a) What way Flex Ray is superior to CAN? State key features of it. **[6]**

b) State the advantages & applications of the following in automotive domain: **[6]**

i) Telematics.

ii) Flex ray.

c) Write a note on automotive GPS Navigation system. **[4]**

Q5) a) Outline & explain components of an electronically controlled engine with suitable diagram. **[6]**

b) Explain procedure to analyze the costs and benefits of model-based software development in automotive industry. **[6]**

c) Compare analog & digital cruise control system. **[4]**

OR

Q6) a) Discuss superset of variables sensed in engine control system. **[6]**

b) What is Model based development? Explain the role of Model based development in Automotive embedded systems development. **[6]**

c) State and explain reasons of using model based development in automotive sector. **[4]**

Q7) a) Explain various types of diagnostics techniques. Enlist various diagnostic tools & equipment. **[6]**

b) Draw & explain traction control integrated with a ABS. **[6]**

c) Enlist various types of Noise you come across during diagnosis & state possible sources of noise. **[6]**

OR

Q8) a) State various driver assistance systems and explain any two in detail. **[6]**

b) With neat sketch explain electric window control circuit & door lock circuit. **[6]**

c) Comment on knowledge and skills needed for accurate fault diagnostics. **[6]**

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Total No. of Questions : 10]

SEAT No. : ____

P3064

[Total No. of Pages : 2

[5154]-630-C

B.E. (Information Technology, Computer Engineering & Electronics and Telecommunications)

UNIFIED COMMUNICATIONS AND CONTACT CENTER APPLICATIONS

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

Subject code:

414464 E : Open Elective (Information Technology)
410452 : Elective - IV (Computer Engineering)
404192 : Elective - IV (Electronics and Telecommunications)

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

Instructions to the candidates:

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

Q1) a) What are the various components required by an enterprise for communication? Explain. **[5]**

b) What is the functionality of RAS? List different type of RAS messages. **[5]**

OR

Q2) a) Explain in detail about different type of response 1xx, 2xx and their meaning. **[5]**

b) Draw a SIP session setup example with SIP trapezoid. **[5]**

Q3) a) With reference to SIP explain the terms Address-of-Record, Back-to-Back User agent. **[5]**

b) Draw a neat diagram of H.323 protocol stack. **[5]**

OR

Q4) a) With reference to SIP explain the terms Redirect Server and Registrar. **[5]**

b) Draw a diagram to show the messages involved in setting up a call in ISDN. **[5]**

P.T.O.

Q5) a) What are the functional roles in a Contact Center? What are their responsibilities? What are the supporting components for each of them? **[8]**

b) What is blending? How does it work? **[8]**

OR

Q6) a) Explain the functionalities of PABX, ACD Self Service and CTI in an Inbound Call Center. **[8]**

b) Explain STUN, TURN. **[8]**

Q7) a) What is an Email MIME? Explain how MIME headers play a role in Email management in a Contact Center. **[8]**

b) What is outbound CPA and call classification? Explain how call classification is done at a high level and how it helps outbound contact centers. **[8]**

OR

Q8) a) Explain the significance of reporting and analytics in contact center. **[8]**

b) With reference to cloud explain CAPEX anc OPEX. **[8]**

Q9) Write notes on: **[18]**

i) Workforce management components in contact center.

ii) Chat protocols.

iii) HTML5.

OR

Q10) Write notes on: **[18]**

i) VXML.

ii) Websocket.

iii) REST.

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Total No. of Questions : 10]

SEAT No :

P 3065

[Total No. of Pages :2

[5154]-631
B.E.(Electrical)
POWER SYSTEM OPERATION & CONTROL
(2012 Course) (Semester-I) (403141)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the solution of swing equation by point by point method. **[5]**

b) Explain the factors affecting the transient stability. **[5]**

OR

Q2) a) What is Sub synchronous resonance? Explain its causes and effects. **[5]**

b) Explain methods to analyze transient stability and steady state stability. **[5]**

Q3) a) What is the necessity of reactive power control? Explain the various sources reactive power. **[5]**

b) With neat diagram, explain the STATCOM. **[5]**

OR

Q4) a) Discuss any one type of FACTS controllers used for reactive power control. **[5]**

b) Draw a loading capability curve of a synchronous generator and explain reactive power generation and absorption by the unit. **[5]**

Q5) a) Draw and explain the complete block diagram of proportional and integral load frequency control of an isolated power system. **[12]**

b) A 1000 MW, 50 Hz generator operating with load of 500 MW. If change in load is 1% for 1% change in frequency, find----

i) Power system gain Kps. ii) Power system time constant Tps.

Assume inertia constant of generator is 5 kJ/kVA. **[6]**

OR

P.T.O.

Q6) a) Explain with neat block diagram, explain load frequency control of Two Area Case. Also sketch the Frequency response. **[12]**

b) Define Automatic generation control, control area, area control error. **[6]**

Q7) a) Discuss hydro constraints and thermal constraints used for unit commitment. **[6]**

b) Discuss economic scheduling of thermal plant considering effect of transmission losses. **[10]**

OR

Q8) a) Explain priority list method used for Unit Commitment. **[8]**

b) Explain the recursive function of dynamic programming for unit commitment task. **[8]**

Q9) a) Explain economy interchanges evaluation between interconnected utilities. **[8]**

b) Explain the Reliability evaluation of Generation system with ---- **[8]**

i) Generation Model ii) Load Model

OR

Q10)a) Explain the customer and energy based Reliability indices. Also enumerate the importance of power system reliability evaluation. **[8]**

b) Write short notes on. **[8]**

i) Emergency power interchange.

ii) Energy banking.

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Total No. of Questions : 8]

SEAT No. :

P3066

[Total No. of Pages : 2

[5154]-632
B.E.(Electrical)
PLC and SCADA Applications
(2012 Pattern) (Semester - I) (End Semester) (403142)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***

Q1) a) State advantages of Programmable Logic Controller in detail. **[8]**

b) Explain Ton timer along with its three bits. **[8]**

c) What is the difference between input and output devices? Give one example of each. **[6]**

OR

Q2) a) What are different applications of PLC? **[6]**

b) Draw the ladder diagram for the following function table **[8]**

Inputs-I1, I2 Outputs-Q1,Q2,Q3,Q4

I1	I2	Q1	Q2	Q3	Q4
0	0	1	0	1	0
0	1	0	1	0	1
1	0	0	1	0	1
1	1	1	0	1	0

c) Explain PID control of continuous process. **[8]**

Q3) a) Explain any one electromechanical sensor. **[8]**

b) How level of water in the tank is measured? **[8]**

OR

P.T.O.

Q4) a) Draw and explain controller for DC motor. **[8]**

b) Write a short note on AC motor overload protection. **[8]**

Q5) a) Write a short note on SCADA system used in Petroleum Refining Process. **[8]**

b) Explain with block diagram use of SCADA in power system generation. **[8]**

OR

Q6) a) Define SCADA and state its desirable properties. **[8]**

b) What are the different applications of SCADA system? **[8]**

Q7) a) Explain TCP/IP layered architecture. Also explain functions of TCP/IP model layers. **[8]**

b) Explain Control Net protocol in detail. **[8]**

OR

Q8) a) Explain IEC61850 layered architecture protocol. **[8]**

b) Explain DNP3 protocol. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P3067

[Total No. of Pages : 3

[5154]-633
B.E. (Electrical)
CONTROL SYSTEM - II
(2012 Course) (Semester - I) (403145)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) A unity feedback system is represented by an open loop transfer function $(S)=\frac{K}{s(s+2)}$. Design a suitable Lag Compensator such that phase margin of compensated system is 40°. Take $K_v = 10$ and $\varepsilon = 4°$. **[10]**

b) Obtain State Observer Gain matrix G for the system given by

$$\dot{X}=\begin{bmatrix}-1 & 1\\ 0 & -2\end{bmatrix}X+\begin{bmatrix}1\\ 1\end{bmatrix}u \text{ and } y=\begin{bmatrix}1 & 0\end{bmatrix}X$$

The desired Eigen values for the observer matrix are $-3 \pm 2j$. **[6]**

c) Obtain the transfer function of the state model given by

$$\dot{X}=\begin{bmatrix}-3 & 1\\ 0 & -1\end{bmatrix}X+\begin{bmatrix}1\\ 1\end{bmatrix}u \text{ and } y=\begin{bmatrix}1 & 1\end{bmatrix}X$$ **[4]**

OR

Q2) a) Obtain the state response and output response for the system represented by a homogeneous state model as: **[10]**

$$\dot{X}=\begin{bmatrix}0 & 1\\ -6 & -5\end{bmatrix}X \text{ and } y=\begin{bmatrix}1 & 1\end{bmatrix}X$$. Take $X_0 = [1 \quad 0]^T$.

P.T.O.

b) Comment on the controllability of the system using Kalman's test, given that **[6]**

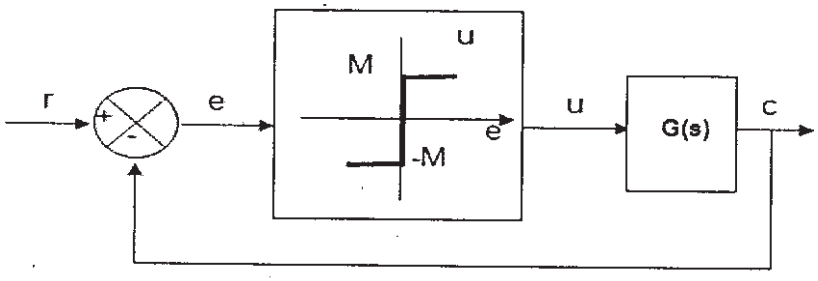
$$A=\begin{bmatrix} -2 & 1 & 0 \\ 0 & -3 & 1 \\ -3 & -4 & -3 \end{bmatrix} \text{ and } B=\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$$

c) What is Lead Compensator? Draw its pole-zero plot and Bode plot and write down its transfer function. **[4]**

Q3) a) Explain method of isoclines for drawing phase trajectory for the given non linear system. **[8]**

b) For a unity feedback system as shown in figure, determine amplitude and frequency of limit cycle if it exists by describing function method. Also comment on the stability of system. M = 1,

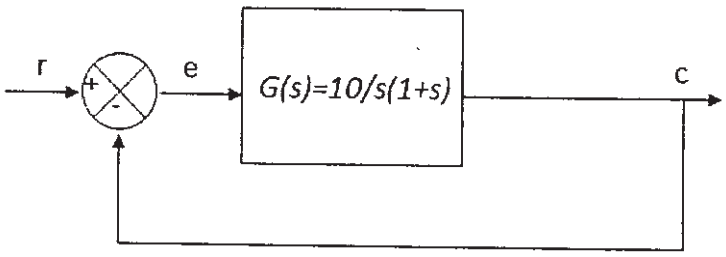
$$G(s) = \frac{10}{s(s+2)(s+6)}.$$ **[8]**



OR

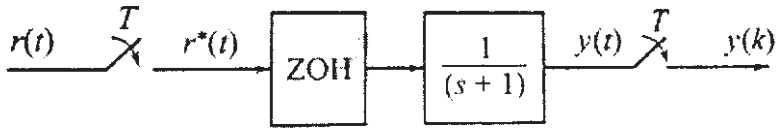
Q4) a) What are the singular points in phase plane? Draw phase portraits of singular points pertaining to various types of Eigen values of 2nd order linear system. **[8]**

b) For a second order linear control system as shown in figure, if the input applied is Unit step, draw the phase trajectories using method of Isoclines, assuming zero initial conditions. **[8]**



Q5) a) Draw the block diagram of digital control system & Explain the function of each block in short. **[8]**

b) Find the transfer function G(z) of the system shown in figure. Also find y(k) for unit step input. (Assume T = 1) **[10]**



OR

Q6) a) What is Zero order hold (ZOH)? Derive its transfer function. **[8]**

b) Solve the following difference equation by using z-transform method. **[10]**

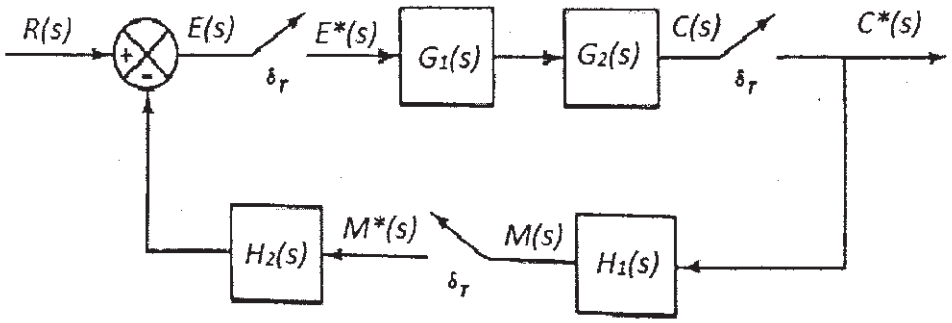
$x(k + 2) + 4x\ (k + 1) + 3x\ (k) = u(k + 1)$

where $x(0) = 0$; $x(1) = 1$. The input function $u(k)$ is given by

$u(k) = 1,\ k = 0, 1, 2, ...$

Q7) a) Write a short note on Digital PID Controller. **[8]**

b) Obtain the closed loop pulse transfer function C(z)/R(z) for the given system. **[8]**



OR

Q8) a) Define Pulse transfer function. State General procedure for obtaining Pulse-transfer function. **[8]**

b) Obtain direct and cascade realization from given transfer function. **[8]**

$$D(z) = \frac{z^3 + 0.9z^2 + 0.26z + 0.024}{z^3 + 5z^2 + 8z + 6}.$$

Total No. of Questions : 8]

SEAT No. :

P3068

[Total No. of Pages : 2

[5154]-634
B.E. (Electrical)
SPECIAL PURPOSE MACHINES
(2012 Course) (Semester - I) (Elective - I) (403143 A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Explain mechanism of energy stored and forces acting in a single excited magnetic field system. **[10]**

OR

Q2) Deduce necessary equations for a-b-c to α-β and α-β to d-q transformations. **[10]**

Q3) Compare sinusoidal and trapezoidal motors. Also state applications of PMSM machine. **[10]**

OR

Q4) Explain with block diagram constant torque operation of PMSM. **[10]**

Q5) a) Explain different construction and configurations of reluctance machine. **[10]**

b) With diagram explain field orientation control of Reluctance Synchronous Machine. **[8]**

OR

Q6) a) Discuss torque production in switched reluctance machine taking into saturation in to account. **[9]**

b) How performance of plain reluctance machine can be improved? List application of SRM. **[9]**

P.T.O.

Q7) Solve any two. **[16]**

a) Write in detailed on close loop control of stepper motor.

b) Explain different characteristics of stepper motor.

c) Explain micro stepping control of stepper motor.

Q8) Solve any two. **[16]**

a) Explain different types of linear induction machines.

b) Explain applications of linear induction machines.

c) Explain principle of operation of linear induction machine also state important characteristics.

x x x

Total No. of Questions : 10]

SEAT No. :

P3069

[Total No. of Pages : 2

[5154]-635
B.E. (Electrical)
POWER QUALITY
(2012 Course) (Semester - I) (Elective - I) (403143 B) (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 indicates full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Define Power Quality in general sense. What are the objectives of grounding? **[5]**

b) State & describe various power quality issues related to voltage. **[5]**

OR

Q2) a) Define and explain

i) Short duration voltage fluctuations

ii) Long duration voltage fluctuations **[5]**

b) Explain power quality issues like overvoltage, undervoltage, voltage sag and voltageimbalance. **[5]**

Q3) a) Define voltage flicker and explain one method for voltage flicker mitigation. **[5]**

b) Explain in brief the impact of voltage sag on various equipment. **[5]**

OR

Q4) a) Explain various voltage flicker parameters obtained from flicker measurements. **[5]**

b) Explain in brief various voltage sag characteristics. **[5]**

P.T.O.

Q5) a) What are the causes and explain effects of harmonics on power system equipment. **[8]**

b) Write detail note on triplen harmonics. **[8]**

OR

Q6) a) Explain different harmonic indices. **[8]**

b) What is displacement and true power factor, explain its significance in Power Quality. **[8]**

Q7) a) Discuss in detail various principles of controlling harmonics. **[8]**

b) Explain passive filter design procedure for harmonic reduction. **[8]**

OR

Q8) a) Write note on devices for controlling harmonic distortion. **[8]**

b) Explain the concept of point of common coupling and its use in harmonic study. **[8]**

Q9) a) Explain use of various equipment required for power quality monitoring. **[10]**

b) Write note on choosing PQ monitoring duration. **[8]**

OR

Q10)a) Explain the need of power quality monitoring? What are different approaches? **[10]**

b) Explain the role of oscilloscopes, data loggers in power quality measurements. **[8]**

X X X

Total No. of Questions : 8]

SEAT No. :

P3070

[Total No. of Pages : 3

[5154]-636
B.E. (Electrical)
RENEWABLE ENERGY SYSTEMS
(2012 Course) (End Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Figures to the right indicate full marks.***

Q1) a) Define: **[5]**

i) Zenith angle

ii) Declination angle

iii) Surface azimuth angle

iv) Air mass

v) Latitude

b) Calculate the declination angle, LAT corresponding to 10 am (IST) and hour angle for the collector located in Bombay (19.12 N, 72.51 E) and is pointing due south on October 1. **[6]**

Give: The standard time is based on 82.5ºE, Equation of time correction (in minutes) E = 9.87 sin 2B - 7.53 cos B-1.5 sin B

where $B = (n-81)\left(\frac{360}{364}\right)$

c) Classify the materials used for manufacturing of solar PV cell. **[4]**

d) Compare Horizontal and vertical Axis wind turbine. **[5]**

OR

P.T.O.

Q2) a) What is sun tracking mechanism? Briefly explain the types of tracking systems. **[6]**

b) How is a solar PV module different from a solar PV cell? How can a solar PV module be made using individual solar cells? **[6]**

Assuming V_{OC} = 0.6 V, I_{SC} = 0.8A for individual solar cell, plot I - V characteristics for the following combinations.

i) Single cell alone

ii) Two cells in series

iii) Two cells in parallel

iv) Series & parallel combination of cells. (Assume 4 cells)

c) What are the different components of Wind Electric System? Explain with a neat block diagram. **[8]**

Q3) a) What are the biomass resources? Explain with the help of block diagram a biomass based power generation. **[8]**

b) Write a short note on any one gasifier. Draw a neat labelled diagram. **[8]**

OR

Q4) a) Discuss the method of power generation from liquid waste land fill gas. **[8]**

b) The following data is given for a biogas digester suitable for the output of five cows : retention time 20 days, temp 30°C, dry matter consumed/ day = 2 kg, biogas yield is 0.24 m^3 per kg, η of burner = 60%, methane proportion is 0.8, Heat of combustion of methane = 28 mJ/m^3, density of dry material = 50 kg/m^3. **[8]**

Calculate

i) Volume of biogas digester.

ii) Power available from the digester.

Q5) a) What is a fuel cell? Describe the principle of Hydrogen oxygen fuel cell with diagram. **[8]**

b) Write briefly on the various methods of Hydrogen storage. **[10]**

OR

Q6) a) Classify different methods of energy storage system. Explain one mechanical storage system. **[10]**

b) What are the different losses in a electrochemical cell? Give the information about battery parameters. **[8]**

Q7) a) Explain Grid connected PV system with a neat block diagram. **[8]**

b) Compare simple payback period with life cycle costing. **[8]**

OR

Q8) a) What are the different parameters required for synchronisation of renewable energy source with grid. **[4]**

b) Define & explain: **[6]**

i) Time value of money

ii) Net Present Value

iii) Initial Rate of Return

c) A person wants to purchase solar water heating system of Rs. 30,000/-. It is required to do a down payment of Rs. 5000/-. An annual end of year payment of Rs. 3400/- is required for 10 yrs. But the person paid Rs. 3200/- yearly and a balance payment at the end. Determine the value of balance payment if money is worth 10% interest. **[6]**

x x x

Total No. of Questions : 10]

SEAT No. :

P3071

[Total No. of Pages : 2

[5154]-637
B.E. (Electrical)
DIGITAL SIGNAL PROCESSING
(2012 Course) (Semester - I) (Elective - I) (403143D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Give detail classification of DTS. **[5]**

b) State and explain any two properties of 'z' transform. **[5]**

OR

Q2) a) State and prove any two properties of DTFT. **[5]**

b) Find the 'z' transform of following sequences with ROC **[5]**

i) $x(n)=\left\{1,2,3,\overset{\downarrow}{4}\right\}$

ii) $x(n)=\left\{\overset{\downarrow}{1},2,3,4\right\}$

Q3) a) Explain frequency response of first order Discrete time system. **[5]**

b) Find linear convolution of following sequence **[5]**

i) $x(n)=\left\{1,2,\overset{\downarrow}{1},2,1,2\right\}$

ii) $h(n)=\delta(n-1)+\delta(n)+\delta(n+1)$

OR

Q4) a) State and explain sampling theorem. **[5]**

b) What are the methods used for z - transform? Explain any one in detail. **[5]**

P.T.O.

Q5) a) State and prove relation between 'z' transform and DFT. **[8]**

b) Explain DITFFT algorithm. **[8]**

OR

Q6) a) State and prove linear convolution using DFT. **[8]**

b) State and prove any two properties of DFT. **[8]**

Q7) a) Explain Impulse Invariance method in designing of IIR Filter. **[8]**

b) Explain direct form structure of IIR Filter. **[8]**

OR

Q8) a) Describe ideal selective filters with associated graph and equations. **[8]**

b) Give the difference between analog and digital filter. **[8]**

Q9) a) Compare FIR and IIR Filter. **[8]**

b) Explain design of FIR filter with window technique. **[10]**

OR

Q10)a) With block diagram explain application of DSP in power factor correction. **[9]**

b) With block diagram write short note on "Application of DSP in Harmonic analysis". **[9]**

x x x

Total No. of Questions : 8]

SEAT No. :

P3072

[Total No. of Pages : 2

[5154]-638

B.E. (Electrical)

RESTRUCTURING AND DEREGULATION

(2012 Course) (403144 A) (End Semester - I) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answser 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) ***Assume suitable data if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) What are the challenges before the Indian power sector undergoing reform. **[6]**

b) Explain following economic terms of power sector. **[6]**

i) Fixed and variable cost.

ii) Profitability indices.

iii) Working capital.

c) What are the socio economic aspects of deregulations and explain. **[8]**

OR

Q2) a) Write a short note on Renewable energy Credit and carbon credits. **[8]**

b) Explain TOD tariff and tariff structure for agricultural consumers. **[6]**

c) Explain the regulatory process in India and explain perforamance based regulation. **[6]**

Q3) a) Write short note on wholesale competition, retail competition based on industry structure and contractual arrangements. **[8]**

b) Explain various ISO (Independent System Operator) models. **[8]**

OR

P.T.O.

Q4) a) Compare between competition for the market and competition in the market. **[8]**

b) Explain electricity reforms of Nordiac pool. **[8]**

Q5) a) Specify peculiarities of electricity as a commodity. Explain rules that govern the electricity market. **[8]**

b) Compare integrated trading model and decentralized trading model. **[8]**

OR

Q6) a) Write brief note on ancillary service market, spot market, reserve market. **[8]**

b) What are the impacts of market reform on regulation and externalities. **[8]**

Q7) a) What is importance of transmission pricing under open access condition? State and explain major components of transmission costs. **[9]**

b) Explain the key features of Indian Grid Code and also explain transmission congestion issues. **[9]**

OR

Q8) a) Explain the concept of open access, transmission rights and locational marginal pricing. **[8]**

b) Explain three parts of ABT. Also explain how with implementation of ABT, the grid corporation is improved in Indian power sector. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3073

[Total No. of Pages : 3

[5154]-639

B.E. (Electrical)

ELECTROMAGNETIC FIELDS (Elective - II)

(2012 Pattern) (403144 B) (End Semester) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answser 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) ***Use of logarithmic tables, slide rules, Mollier Charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Derive an expression for electric field intensity at point P due to uniform charge distribution along an infinite line with uniform charge density ρ_1 C/m. **[6]**

b) Show that the potential field given below satisfies the Laplace's equation $V = 2x^2 - 3y^2 + z^2$. **[4]**

OR

Q2) a) If two parallel plates of area 2 m^2 are separated by a distance 1 mm and two dielectrics of value 1.5 and 3.5 are stacked side by side. Calculate the overall capacitance. **[6]**

b) Answer the following questions: **[4]**

i) Write the relation between magnetic flux and flux density.

ii) List the applications of Ampere's circuital law.

Q3) a) Derive the expression for potential due to electric dipole at any point P. Also find the electric field intensity at the same point. **[6]**

b) List the Maxwell's equations in integral and point form for static electric and magnetic field for free space conditions. **[4]**

OR

P.T.O.

Q4) a) Determine the divergence and the curl of the given field $F=30\hat{a}_x+2xy\,\hat{a}_y+5xz^2\hat{a}_z$ at (1, 1, –0.2) and hence state the nature of the field. **[6]**

b) Show continuity equation in integral and differential form. What do you understand from current continuity equation? **[4]**

Q5) a) A conductor 6m long lies along z-direction with a current of 2A in $\hat{a}z$ direction. Find the force experienced by conductor if B = 0.08 $\hat{a}x$ (T). **[8]**

b) Define inductance. Derive an expression for inductance per meter for length of co-axial cable of inner radius *a* and outer radius *b*. **[8]**

OR

Q6) a) Derive the boundary conditions at an interface between two magnetic media having permeability μ_1 and μ_2 in terms of magnetic field intensity and magnetic flux density. **[8]**

b) Explain diamagnetic, paramagnetic and ferromagnetic materials. **[8]**

Q7) a) List the Maxwell's equation in point from and integral form for time varying fields. State the significance of each equation. **[8]**

b) Define Lorentz force equation and derive an expression for force or a differential current element. **[8]**

OR

Q8) a) State the Maxwell's equation in integral form for time varying fields. With the help of Maxwell's fourth equation explain displacement current. **[8]**

b) Find the amplitude of the displacement current density: in the air space at a point within a large power distribution transformer where B = 0.8

$\cos[1.257 \times 10^{-6}(3 \times 10^{8}t - x)]\ \hat{a}_y$ T . **[8]**

Q9) a) Define uniform plane wave. With respect to uniform plane wave explain the following terms: **[10]**

i) Attenuation constant

ii) Phase velocity and

iii) Propagation constant

b) Explain with equations the properties of plane waves in conducting medium and lossy dielectric. **[8]**

OR

Q10)a) Define Poynting theorem. Derive an expression for Poynting vector. State the significance of each term in equation of Poynting vector. **[10]**

b) Summarize point form of Maxwell's equation in phasor form. Give the physical interpretation of Maxwell's first and second equation. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3074

[Total No. of Pages : 2

[5154]-640
B.E. (Electrical)
EHV AC TRANSMISSION
(2012 Course) (Semester - I) (403144) (End Semester) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Prove that a one 750 KV line power handling capacity of a.c. transmission line carry as much power as four 400 KV circuits for equal distance of transmission. **[8]**

b) Derive expression for inductance of multi conductor lines & state Maxwells coefficients. **[8]**

c) The field strength on the surface of a sphere of 1 cm radius is equal to the corona inception gradient in air of 30 KV/cm. Find the charge on the sphere. **[4]**

OR

Q2) a) Write note on dampers and spacers Draw the neat sketches. **[8]**

b) Explain the field of a sphere gap. **[8]**

c) Calculate Geometric Mean Radius (GMR) of a bundled conductor for 400kV AC line having two sub conductors, each of 1.59 cm radius and sub conductor spacing 45 cm. **[4]**

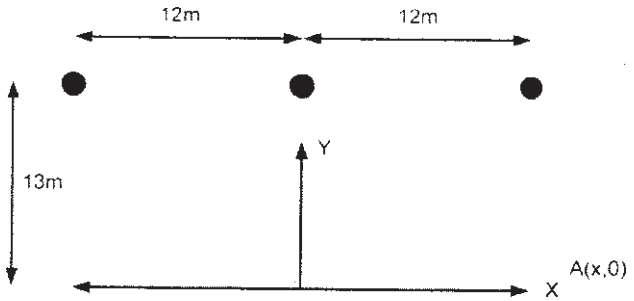
Q3) a) Discuss effect of power frequency magnetic fields on human health and specify permissible limits. **[9]**

b) Evaluate the horizontal, vertical and total value of electrostatic field components near the single circuit transmission line, which are energized by three phase voltages. **[9]**

OR

P.T.O.

Q4) a) Compute the r.m.s. value of ground level electrostatics field of a 400 kV Line at its maximum operating voltage of 420 kV given: single circuit configuration H = 13m, S = 12m, conductor 2*3.18cm diameter, B = 45.72cm, N = 2, Assume Di = Di. **[9]**



b) Derive the expression for voltages induced in the conductors of un energized circuit of double circuit three phase line. **[9]**

Q5) a) With a simple block diagram, explain the Audible noise measuring circuit in Extra high voltage ac lines. **[8]**

b) Explain the corona formation and methods to reduce the corona effects. **[8]**

OR

Q6) a) From charge voltage diagram derive an expression for corona loss for ac voltage of conductor and compare it with Ryan Hen line formula. **[8]**

b) Explain the quantities on which the Audible noise level depends for the Extra high voltage ac lines. **[8]**

Q7) a) State and explain at least four factors to be considered in the design of ehv lines based upon the steady state limits. Also state their limiting value. **[8]**

b) Biref, line insulation design based upon transient over voltages. **[8]**

OR

Q8) a) Explain in detail properties of cable insulation materials. **[8]**

b) Define tan δ loss factor & derive an expression for insulation resistance of a cable. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3075

[Total No. of Pages : 2

[5154]-641

B.E. (Electrical)

INTRODUCTION TO ELECTRICAL TRANSPORTATION SYSTEMS

(2012 Course) (End Sem) (Elective - II) (403144) (Semster - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain Needs and Importance of Mobility? Discuss various applications of Electric Mobility. **[12]**

b) Explain Evolution of Transportation System in Detail. **[8]**

OR

Q2) a) Explain different types of batteries with their characteristics. **[12]**

b) What are the various sources of energy used in transportation and explain their characteristics. **[8]**

Q3) a) Explain different types of Mechanical Drives with its characteristics. **[12]**

b) How road safety is achieved? **[4]**

OR

Q4) a) Explain the concept of driverless vehicle with a neat Block diagram. **[10]**

b) Compare BLDC Machines versus DC machines. **[6]**

Q5) a) Explain Modern AC traction for high speed rail application. **[10]**

b) Explain in detail one of the configurations of hybrid cars with a neat diagram. **[8]**

OR

P.T.O.

Q6) a) Explain typical power train architecture of hybrid cars. **[10]**

b) Compare series parallel configuration of hybrid cars. **[4]**

c) Explain AC and DC type of Traction. **[4]**

Q7) a) Explain the concept of special vehicles in detail. **[8]**

b) Explain the control scheme used in traction type of elevators. **[8]**

OR

Q8) a) Explain control schemes in elevators with new power electronics controlled drives. **[8]**

b) Explain load characteristics of Elevator systems. **[8]**

Total No. of Questions :10]

SEAT No. :

P3076

[Total No. of Pages :3

[5154] - 642

B.E. (Electrical)

SWITCHGEAR & PROTECTION

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

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
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 different effects of faults in power system. **[4]**

b) Define following terms w.r.t. circuit breaker switching **[6]**

i) RRRV

ii) Recovery voltage

iii) Restriking voltage

OR

Q2) a) In a system of 132 kV the phase to ground capacitance is 0.01 μF & the inductance per phase is 6H. Calculate the voltage appearing across the pole of a circuit breaker if magnetising current of 10Amp (instantaneous) is interrupted. Also find the value of resistance to be used across contact space to eliminate the restriking voltage transients. **[4]**

b) With neat diagram explain working of vacuum circuit breaker. **[6]**

P.T.O.

Q3) a) Classify relays on the basis of operating time of relay. **[4]**

b) Explain following ratings of circuit breaker **[6]**

i) Rated making capacity.

ii) Rated breaking capacity.

OR

Q4) a) State chemical properties of SF_6 gas. **[4]**

b) Determine the time of operation of a relay having rating of 5A, IDMT type & having relay setting of 125% TSM = 0.6. The relay is connected to a supply circuit through a C.T. of ratio 400/5. The fault current in system is 4000A. Given the following relay characteristics curve. **[6]**

PSM	5	8	12
Time (sec)	4	3.15	2.8

Q5) a) Draw block diagram of static relay & explain its working. **[8]**

b) With neat diagram, describe direct & indirect lightning strokes. **[8]**

OR

Q6) a) Explain: **[8]**

i) Sampling theorem

ii) Antialiasing filter

b) Draw & explain block diagram of PMU. **[8]**

Q7) a) Explain protection of alternator against- **[12]**

i) Unbalanced loading

ii) Loss of prime-mover

iii) Loss of excitation

b) A 3 phase 66 kV/ 11 kV, Star-Delta connected transformer is protected by Merz price system. The CT's on LT side have a ratio of 420/5. Find the CT ratio on HT side. **[6]**

OR

Q8) a) With neat diagram explain construction & working of Buchholz relay. State its advantages & disadvantages. **[12]**

b) The neutral point of a 3 phase 20 MVA, 11 kV alternator is earthed through a resistance of 5Ω. The relay is set to operate when there is out of balance current of 1.5 Amp. The CT's have ratio of 1000/5. What is the percentage of winding protected against earth faults.

If 90% of winding is required to be protected against earth fault, calculate the value of neutral earthing resistance. **[6]**

Q9) a) Draw block diagram & explain components of Power Line Carrier Communication (PLCC). **[8]**

b) Draw & explain protection of bus-bar using high impedance differential relay. **[8]**

OR

Q10)a) Explain effect of **[8]**

i) arc resistance

ii) power swings

on the operation of distance relay.

b) Draw & explain three zone distance protection for transmission lines.**[8]**

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Total No. of Questions : 10]

SEAT No. :

P3077

[Total No. of Pages : 3

[5154]-643
B.E.(Electrical)
POWER ELECTRONICS CONTROLLED DRIVES
(2012 Pattern) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are different load torque components? Explain with their characteristics. **[5]**

b) A drive has following equations for motor and load torques: **[5]**

$T = (15 + 0.5\omega_m)$ and $T_1 = 5 + 0.6\omega_m$ Obtain the equilibrium points and comment on their 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. **[4]**

b) Explain following braking methods along with their torque speed characteristics of DC separately excited motors. **[6]**

i) Regenerative Braking

ii) Dynamic braking.

P.T.O.

Q3) a) A 220 V, 970 rpm, 100 A dc separately excited motor has an armature resistance of 0.05Ω. It is braked by plugging from an initial speed of 1000 rpm. Calculate the resistance to be placed in armature circuit to limit braking current to twice the full load value. **[6]**

b) With a neat diagram explain the regenerative braking mode of DC separately excited motor using class B chopper. **[4]**

OR

Q4) a) A star connected squirrel cage induction motor has following ratings and parameters:400 V, 50 Hz, 4 pole 1370 rpm $R_s = 2\Omega$, $R_r' = 3\Omega$,

$X_s = X_r' = 3.5\Omega$. **[5]**

For regenerative braking Assuming motor speed torque characteristics from full load motoring to full load braking to be parallel straight lines, calculate Speed for a frequency of 30 Hz and 80% of full load torque.

b) Explain the thyristorised stator voltage control of 3 ph induction motor. What are its demerits? **[5]**

Q5) a) Explain the principle of vector control. How Induction Motor is converted to Characteristics of DC Motor? **[10]**

b) Compare and comment on relative merits and demerits of VSI and CSI for induction motor drives. **[6]**

OR

Q6) a) How speed control is achieved using Vector control of induction motor? Draw vector diagram and explain. **[10]**

b) Write in brief about control and applications of AC Servo Drives. **[6]**

Q7) a) Draw neat diagram to explain Permanent Magnet Brushless DC Motor.**[8]**

b) Explain unity power factor control of Permanent Magnet Brushless DC

Motor. **[8]**

OR

Q8) a) How constant torque angle control is used for Permanent Magnet Brushless DC Motor? **[8]**

b) Comment on use of Sensorless control of PM BLDC drives. **[8]**

Q9) Solve any three:

a) What special considerations are needed for inverter duty motors? **[6]**

b) What are the requirements of drive for rolling mill operations? **[6]**

c) Why controlled torque starting is necessary in Textile machinery drives? How is it achieved? **[6]**

d) What are the requirements of drive in sugar mills? Explain duty cycle of sugar centrifuge. **[6]**

OR

Q10)Solve any Three:

a) What are various motor duty patterns? How are motors classified based on duty? **[6]**

b) Which motors are used widely for machine tool drives? Why? **[6]**

c) How motor duty and heating and cooling cycle affects the temperature of motor? Explain. **[6]**

d) Why 4 quadrant operation of drive is needed for rolling mill drive? **[6]**

Total No. of Questions : 8]

SEAT No. :

P3078

[Total No. of Pages : 2

[5154]- 644

B.E. (Electrical)

HIGH VOLTAGE ENGINEERING

(2012 Pattern) (Semester - II) (End Sem.) (Elective -III) (403149A)

Time :2½ Hours] *[Max. Marks :70*

Instructions to candidates:

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

Q1) a) Derive Townsend's current growth equation in presence of primary and secondary ionization processes. State limitations of Townsend's theory. **[7]**

b) Explain statistical method of insulation coordination. **[6]**

c) Find power law dependence equation from following observation obtained while testing liquid dielectric material. **[7]**

Gap Distance (cm)	4	6	8	10
Breakdown voltage (kV)	88	135	165	212

OR

Q2) a) Explain streamer mechanism of breakdown. State its advantages and disadvantages. **[7]**

b) Describe in detail Intrinsic breakdown in case of solid dielectric material. **[6]**

c) With neat diagram explain mechanism of Lightning. **[7]**

Q3) a) Draw a neat diagram of 3 stage cascade transformer and explain its working. Also state its advantages and disadvantages. **[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

P.T.O.

Q4) a) With a neat diagram explain working of Tesla Coil. State its advantages and applications. **[8]**

b) Explain the generation of High Impulse Current with a suitable diagram. Also describe its main parts. **[8]**

Q5) a) What is dielectric loss and dielectric constant? Explain the method of measurement of dielectric constant and loss factor. **[9]**

b) An impulse generator has 8 stages with condenser rated for 0.16 μ F and 125 kV. The load capacitor available is 1000 pF. Find the series resistance and damping resistance needed to produce 1.2/50 μ sec impulse wave. What is the maximum output voltage of generator, if the charging voltage is 120 kV? **[9]**

OR

Q6) a) State the different methods of partial discharge measurement and explain any one in detail. **[9]**

b) With suitable figure explain the working of generating voltmeter. Also state its advantages. **[9]**

Q7) a) Explain the different test carried on bushings in high voltage testing laboratory. **[8]**

b) Classify the different High voltage laboratories and give salient features of each of them. **[8]**

OR

Q8) a) State and explain the different high voltage tests carried on surge arresters. **[8]**

b) Explain the design, planning and layout of a typical High voltage laboratory. **[8]**

Total No. of Questions : 9]

SEAT No. :

P3079

[Total No. of Pages : 3

[5154]-645
B.E.(Electrical)
HVDC and FACTS
(2012 Pattern) (Semester - II) (End Semester) (Elective-III)
(403149B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Explain the effect of source inductance on the operation of three phase bridge converter. Derive the expression for dc current in terms of delay and extinction angle. **[10]**

OR

Q2) Compare HVDC system with EHV AC system. **[10]**

Q3) Explain types of HVDC systems and discuss advantages of each system. **[10]**

OR

Q4) What is HVDC Light? How it is different than conventional HVDC system? Explain structure of HVDC light. **[10]**

Q5) Solve any two of the following: **[16]**

a) Explain DC link topologies used in AC controllers.

b) Explain three phase voltage source converter. Draw necessary waveforms.

c) Differentiate voltage source inverter with current source inverter.

P.T.O.

Q6) a) With suitable control characteristics explain working of TCSC. **[8]**

b) Explain control actions of TCR+FC and TSC. Draw three phase configurations of each. **[10]**

OR

Q7) a) Explain with suitable diagrams modes of operation of STATCOM. **[9]**

b) Explain operation of TCR + TSC. **[5]**

c) Enumerate benefits of STATCOM over SVC. **[4]**

Q8) a) How active power and reactive power is controlled by using UPFC? Draw necessary diagrams. **[8]**

b) Discuss role of UPFC in transmission system. **[8]**

OR

Q9) a) Explain modes of operation of UPFC. **[10]**

b) Are there any constraints in operation of UPFC? Explain. **[6]**

Total No. of Questions : 8]

SEAT No. :

P3080

[Total No. of Pages : 3

[5154]-646
B.E.(Electrical)
DIGITAL CONTROL SYSTEMS
(2012 Pattern) (Semester-II) (Elective-III) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers the questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***

Q1) a) For a given sequence: $x(n) = \{\underset{\uparrow}{6}, 5, 0, 2, 3\}$ **[4]**

i) Delay the sequence by 2 samples.

ii) Fold & advance the sequence by 2 samples.

iii) Downscale the sequence by time 2 samples.

iv) Up-scale the sequence by amplitude scales.

b) Obtain STM of the difference equation x(k+1) = Gx(k) + Hu(k)

Where

$$G = \begin{pmatrix} 0 & 1 \\ -0.2 & -1 \end{pmatrix}; \; H = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$ Also find its solution if $x(0) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$. **[8]**

c) Describe design procedure of digital lead compensator using bode plot for discrete time system. **[8]**

OR

Q2) a) Check whether the following systems are **[8]**

i) Static or Dynamic

ii) Linear or non-Linear

iii) Time invariant or Time variant

1) $Y(n) = e^{x(n)}$

2) $Y(n) = x(n) - x(n-1)$

P.T.O.

b) Show how mapping of left half of S-plane is done into the Z plane with stable and unstable Region. **[4]**

c) Examine the stability of the following characteristic equation by Jury's test. $P(z) = Z^4 - 0.6Z^3 - 0.81Z^2 + 0.67Z - 0.12 + 0$. **[8]**

Q3) a) Define controllability & Observability for discrete time control system, Explain any one method to determine it. **[6]**

b) Given $x(k+1) = \begin{pmatrix} 0.1 & 0.1 & 0 \\ 0.3 & -0.1 & -0.2 \\ 0 & 0 & -0.3 \end{pmatrix} x(k) + \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$ & $y(k) = \begin{pmatrix} 1 & 0 & 1 \end{pmatrix} x(k)$

Determine controllability & observability of the system. **[10]**

OR

Q4) a) What is full order Observer? With the help of proper block diagram explain it. **[6]**

b) Design a full state observer for the system having

$$G = \begin{pmatrix} 0 & 20.6 \\ 1 & 0 \end{pmatrix}; \quad H = \begin{pmatrix} 1 \\ 0 \end{pmatrix}; \quad C = \begin{pmatrix} 0 & 1 \end{pmatrix}$$

Desired Eigen values of observer matrix are $Z = -1.8 + j2.4$, $Z = -1.8 - j2.4$. **[10]**

Q5) a) Consider the pulse transfer function of discrete time system given as

$$\frac{Y(z)}{U(z)} = \frac{b_0 z^n + b_1 z^{n-1} + b_2 z^{n-2} + \text{-------} + b_n}{z^n + a^1 z^{n-1} + a_2 z_{n-2} + \text{---------} + a_n}$$

Derive its Controllable canonical form & Observable canonical form. **[10]**

b) Define Euler's forward, backward method & Trapezoidal method with suitable example. **[6]**

OR

Q6) a) Consider the system defined by $\frac{Y(z)}{U(z)} = \frac{4z^2 - 3z + 0.5}{z^3 + z^2 - z - 0.75}$

Determine State space representation in Controllable canonical form & Observable canonical form. **[10]**

b) Consider the pulse transfer function of discrete time system given as

$$\frac{Y(z)}{U(z)} = \frac{b_0 z^n + b_1 z^{n-1} + b_2 z^{n-2} + \text{-------} + b_n}{z^n + a^1 z^{n-1} + a_2 z_{n-2} + \text{---------} + a_n}$$

Derive its Jordan canonical form. **[6]**

Q7) a) Draw a neat block diagram of digital temperature control scheme and explain the function of each block. **[10]**

b) Explain Stepper motor control with proper block diagram. **[8]**

OR

Q8) a) Explain Computer program structure for simulation of discrete time control system with algorithm & flow charts. **[8]**

b) Explain Hybrid system simulation with block diagram & their application. **[10]**

Total No. of Questions : 8]

SEAT No. :

P3081

[Total No. of Pages : 2

[5154]-647
B.E.(Electrical)
INTELLIGENT SYSTEMS AND ITS APPLICATION IN ELECTRICAL ENGINEERING
(2012 Pattern) (403149) (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 side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Draw and explain single Neuron Model. **[6]**

b) Explain supervised Vs unsupervised learning. **[6]**

c) Explain storage & RECALL algorithms. **[8]**

OR

Q2) a) Give Historical views on ANN. **[6]**

b) Explain Activation functions used in ANN. **[6]**

c) Explain Bi-directional Associative memory. **[8]**

Q3) a) Explain in detail about Fuzzy versus crisp set. **[9]**

b) Explain various fuzzy sets and its mathematical operator. **[9]**

OR

Q4) a) Explain fuzzy relations in detail. **[9]**

b) Explain various properties of fuzzy set. **[9]**

Q5) a) What is defuzzification? Explain in brief. **[8]**

b) What is fuzzy Quantifiers? **[8]**

OR

P.T.O.

Q6) a) Explain Mamdari Interface system. **[8]**

b) Write short note on " Fuzzy Rule based systems". **[8]**

Q7) a) Explain various GA operators. **[8]**

b) Explain process incurred in Expert system. **[8]**

OR

Q8) a) Explain selection & cross over process used in genetic algorithm. **[8]**

b) Write rule based system in expert systems. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3082

[Total No. of Pages : 2

[5154]- 648
B.E. (Electrical Engineering)
SMART GRID
(2012 Pattern) (Semester - II) (Elective - IV(a)) (End Sem.)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Give present development and international policies in smart grid. **[8]**

b) Explain the concept Plug in Hybrid Electric Vehicles. **[6]**

c) Explain phase measurement unit and its importance in smart grid. **[6]**

OR

Q2) a) Explain the Resilient and self healing grid. **[8]**

b) Explain how automatic meter reading can make the system smarter. **[6]**

c) write a note on, "IED". **[6]**

Q3) a) Explain concept of microgrid, and its need and application. **[8]**

b) Explain about protection and control of microgrid. **[8]**

OR

Q4) a) Explain about formation of microgrid and also its need. **[8]**

b) Explain architecture of microgrid. **[8]**

Q5) a) Explain EMC and its importance in smart grid. **[8]**

b) Explain Web based power quality monitoring. **[8]**

OR

P.T.O.

Q6) a) High light the issues related to power quality in smart grid. **[8]**

b) Explain the power quality audit and its importance in smart grid. **[8]**

Q7) a) Explain cloud computing and its need. **[9]**

b) Explain the, concept WAN related to smart grid. **[9]**

OR

Q8) a) Write a note on Wi- Max based communication in smart grid. **[9]**

b) Explain the importance of Bluetooth in smart grid. **[9]**

Total No. of Questions : 8]

SEAT No. :

P3083

[Total No. of Pages : 2

[5154]- 649

B.E. (Electrical Engineering)

ROBOTICS AND AUTOMATION

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

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q1 or Q2; Q3 or Q4; Q5 or Q6; Q7 or Q8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Your answer will be valued as a whole.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) 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 prothesis Automation. **[7]**

c) Write in detail about Historical information of Robot science. **[6]**

Q3) a) Explain with neat sketch about Homogeneous coordinate. **[8]**

b) Explain co-ordinate reference frame. **[8]**

OR

Q4) a) Explain Homogeneous matrix in detail. **[8]**

b) How many parameters are required for specifying position and orientation of rigid body? Explain. **[8]**

P.T.O.

Q5) a) Explain Euler-Lagrange method to control robot motions and hence comment on Euler angle. **[9]**

b) Write short note on inverse kinematic problem using fixed frame rotation. **[9]**

OR

Q6) a) How end effecter rotary motion about an arbitrary axis can be achieved using dynamic control. **[9]**

b) Explain Kinematic Chain with neat sketch. **[9]**

Q7) a) Explain various linear control schemes. **[8]**

b) Explain resolved motion position control. **[8]**

OR

Q8) a) Explain joint position control. **[8]**

b) Explain resolved motion rate control. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3625

[Total No. of Pages : 3

[5154]-650

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

ILLUMINATION ENGINEERING

(2012 Pattern) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagram must be drawn wherever necessary.***
2) ***Figures to the right indicates full marks.***
3) ***Use of Electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) State six advantages of artificial light over natural light. **[6]**

b) With suitable diagram explain any two methods of controlling natural litght. **[4]**

OR

Q2) a) Compare incandescent lamp with gas discharge lamp. **[6]**

b) State good and bad effects of light. **[4]**

Q3) a) Give detail classification of dimmers used for control of light. **[6]**

b) With suitable diagram explain semi direct lighting system and semi indirect lighting system. **[4]**

OR

P.T.O.

Q4) a) With suitable diagram explain construction and working of - Halogen lamp. State the applications of this lamp. **[6]**

b) With suitable diagram explain working of salt water dimmer. **[4]**

Q5) a) What is polar curve? Explain it with suitable example. **[8]**

b) Define following terms : Luminous intensity, Maintenance factor, Reflection factor, Candle power. **[8]**

OR

Q6) a) A room of size 15m × 6m is to be illuminated by 20 number of lamp with rating 200 watt each. The MSCP of each lamp is 250. The depreciation factor is 1.2 and depreciation factor is 0.6. Calculate average illumination produced on the floor. **[8]**

b) State and elaborate factors to be considered while designing lighting scheme for healthcare centres (hospitals). **[8]**

Q7) a) With suitable diagrams explain different arrangements of projectors for flood lighting. **[8]**

b) A front side of a building measures 30m × 20m. It is to be illuminated by flood lighting scheme. 500 watt lamps are used with 8450 lumen output per lamp. The coefficient of reflection of building is 0.2, beam factor is 0.6 and waste light factor is 1.2, maintenance factor is 0.8. Determine the number of lamps needed. **[8]**

OR

Q8) a) Describe the factors to be considered for indoor sports complex. **[8]**

b) Explain lighting for advertisements and hoardings. **[8]**

Q9) a) Compare LED with other types of lamps. **[6]**

b) With suitable diagram explain conduit lighting. **[6]**

c) State advantages of OLEDs over flat panel displays. **[6]**

OR

Q10)a) State the difference between conventional lighting and OLED lighting. **[6]**

b) With suitable diagram explain any one type of fiber optic light guide. **[6]**

c) Explain any two types of LED fixtures with suitable diagram. **[6]**

Total No. of Questions : 10]

SEAT No. :

P3084

[Total No. of Pages : 2

[5154]- 650 - A
B.E. (Electrical)
VLSI DESIGN
(2012 Pattern) (Semester - II) (Elective - IV) (403150 D) (End Sem.)
(Open Elective)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***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) Explain EDA tool design flow. **[6]**

b) Differentiate between combinational circuit and sequential circuits. **[4]**

OR

Q2) a) Explain in brief different modeling styles used in VHDL. **[6]**

b) Draw state diagram of 1011 detector using Mearly Machines. **[4]**

Q3) a) Write VHDL code for 3 bit synchronous UP counter. **[6]**

b) Explain 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]**

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]**

P.T.O.

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:

i) Body effect

ii) Hot Electron Effect and

iii) Velocity saturation w.r.t CMOS. **[8]**

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 a head adder with diagram. **[8]**

OR

Q10)a) Explain the example of Fixed point division in VHDL. **[10]**

b) Develop 8 × 8 RAM using VHDL. **[8]**

Total No. of Questions : 12]

SEAT No :

P3085

[Total No. of Pages :2

[5154]-651
B.E. (Instrumentation & Control)
PROCESS INSTRUMENTATION-I
(2012 Course) (Semester-I) (406261) (End sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

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

Q1) a) Explain Multicapacity system with an example. **[7]**

b) Explain process degree of freedom.

OR

Q2) a) Explain self-regulating & non-self regulating process. **[7]**

b) Explain linear & Non-linear process.

Q3) Write short note on - Linearizing an equal % value. **[7]**

OR

Q4) Explain scaling & its types. **[7]**

Q5) a) Explain elements of feedback control system. **[3]**

b) Find PID gain coefficient for following FOPDT Model. **[3]**

$$Gp(s)=\frac{1.1e^{-4s}}{37S+1}$$

OR

Q6) Explain fine tuning of controller tuning constants. **[6]**

P.T.O.

Q7) a) Explain selective control system with an example. **[8]**

b) Explain feedback-feed forward control algorithms, tuning issues. **[8]**

OR

Q8) a) Explain Limiters & dead zones as nonlinear elements in Loop. **[8]**

b) Explain Implementation issues related to ratio control cas cade control systems. **[8]**

Q9) a) Explain MIMO System with an example. **[9]**

b) Explain Interactions in MIMO System & also explain how to minimize interactions. **[9]**

OR

Q10)a) Explain Decoupling concept in Case of MIMO system. **[9]**

b) Explain Loop pairing concept. **[9]**

Q11)Explain sequence of design steps with an example. **[16]**

OR

Q12)a) Explain guidlines for process control design. **[8]**

b) Comment on control structure & Algorithms. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3086

[Total No. of Pages : 2

[5154]-652

B.E.(Instrumentation and Control Engineering)

PROJECT ENGINEERING & MANAGEMENT

(2012 Pattern) (Semester-I) (406262) (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 should be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary.***

Q1) Explain the Roles and responsibilities of project team members and team leader. **[10]**

OR

Q2) a) Explain Project Cost Estimation and budgeting in brief. **[6]**

b) Write a note on project risk management. **[4]**

Q3) a) Explain Instrument Tagging procedure in brief. **[5]**

b) What are interactions involved in Project? Explain its role in project development. **[5]**

OR

Q4) a) Enlist various Project scheduling and Planning Tools. **[3]**

b) Develop the loop diagram for flow control loop. **[7]**

Q5) a) Explain cable Selection procedure for specific applications. **[6]**

b) What is FAT, CAT, SAT? Write the importance of the same. Also prepare FAT report for any typical instrumentation item. **[10]**

OR

P.T.O.

Q6) a) Enlist and Explain purpose of different ISA Standards used in instrumentation project. **[6]**

b) What is meant by failsafe wiring Practice? Which standards are usually followed to achieve this? **[5]**

c) Write in brief about Plant layouts and General arrangement drawing. **[5]**

Q7) a) Give Hazardous area classification & elaborate its effect on design. **[10]**

b) Explain Cold Commissioning and hot commissioning. **[6]**

OR

Q8) a) Draw the control room layout and explain engineering design considerations behind it. **[9]**

b) Explain Project Estimation, Project Planning, Project Commissioning, Project Hardware w.r.t. Instrumentation & Control, **[7]**

Q9) Explain following terms in connection with project Engineering. **[18]**

a) Performance trials and final hand over.

b) Calibration records,

c) Test and inspection reports.

OR

Q10)a) Prepare a Purchase order for purchasing of I/P Converter. Explain important terms concerned with PO. **[10]**

b) Write Notes on **[8]**

i) Panel testing Procedure.

ii) Need and Procedure for Calibration report.

❄ ❄ ❄

Total No. of Questions : 10]

SEAT No. :

P3087

[Total No. of Pages : 3

[5154]-653

B.E. (Instrumentation and Control)

DIGITAL CONTROL

(2012 Pattern)(End Sem.)(Semester - I) (406263)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain Sample and Hold Circuit with the help of diagram. Also explain Tracking Mode and Hold Mode of the circuit. **[6]**

b) Determine the Z-transform of $F(S)=\frac{2}{S(S+2)^2}$ **[4]**

OR

Q2) a) Explain the various types of sampling and one application of each type of sampling. **[6]**

b) Determine inverse Z-transform of $F(Z)=\frac{1}{(Z+1)^2(Z+2)}$ **[4]**

Q3) a) Compare Positional form and Velocity 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 given by the characteristic equation as shown below is stable by using Jury's Stability Test.

$$P(Z)=1+K\left(\frac{1.1353Z+0.5941}{4Z^2-4.5412Z+0.5412}\right)$$ **[10]**

P.T.O.

Q5) a) Find the Pulse Transfer Function from the following State Space Model.

$$X(K+1)=\begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}X(K)+\begin{bmatrix} 0 \\ 1 \end{bmatrix}U(K)$$

$$Y(K) = [1\ 0]\ X(K)$$ **[10]**

b) Obtain the State Space Model from the following Pulse Transfer Function by using Direct Form.

$$PTF=\frac{3Z^2-11Z}{(Z-1)(Z-2)(Z-3)}$$ **[8]**

OR

Q6) a) Obtain the state transition matrix $\psi(K)$ for the following discrete time control system. Obtain the state X(K) and output Y(K) when input

U(K)=1 for K= 0,1,2,....assume initial state $X(0)=\begin{bmatrix} X_1(0) \\ X_2(0) \end{bmatrix}=\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

X(K+1) = G X(K)+ H U(K) and Y(K) = C X(K) where

$$G=\begin{bmatrix} 0 & 1 \\ -0.16 & -1 \end{bmatrix};\ H=\begin{bmatrix} 1 \\ 1 \end{bmatrix};\ C = [1\ 0]$$ **[18]**

Q7) a) Consider the discrete time system defined by the following equations

X(K+1) = G X(K)+ H U(K) and Y(K) = C X(K) where

$$G=\begin{bmatrix} 0 & -0.16 \\ 1 & -1 \end{bmatrix};\ H=\begin{bmatrix} 0 \\ 1 \end{bmatrix};\ C = [0\ 1]$$

Design the State Feedback Gain Matrix 'K' if the desired closed loop poles are : $Z = 0.2 \pm j\ 0.2$ **[10]**

b) Define State Controllability and State Observability. Explain in short how and when the Determinant Test and Rank Test is used to check the same. **[6]**

OR

Q8) a) Find the State Controllability and State Observability for the following system. **[12]**

$$X(K+1) = \begin{bmatrix} 1 & -2 \\ 1 & 1 \end{bmatrix} X(K) + \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} U(K)$$

$$Y(K) = \begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix} X(K)$$

b) Explain in short the need of observer circuit. List the various types of observers. **[4]**

Q9) a) Define Quadratic Performance Index. **[4]**

b) Write a short note on Optimal Control and List the various applications of Optimal Control and explain any one application in short. **[12]**

OR

Q10) Consider the discrete time system defined by the following equations. **[16]**

$$X(K+1) = G\,X(K) + H\,U(K)$$

$$G = \begin{bmatrix} 0 & 1 \\ -0.5 & 1 \end{bmatrix};\ H = \begin{bmatrix} 1 \\ 1 \end{bmatrix};\ X(0) = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$$

Determine Optimal Control Law to minimize the following performance index and also find $J_{MIN.}$

$$J = \frac{1}{2}[X^*(4)\,S\,X(4)] + \frac{1}{2}\sum_{K=0}^{3}[X^*(K)\,Q\,X(K) + U^*(K)\,R\,U(K)]$$

$$Q = S = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix};\ R = 1$$

Total No. of Questions : 10]

SEAT No. :

P3088

[Total No. of Pages : 2

[5154]-654

B.E.(Instrumentation & Control)

ADVANCED BIO–MEDICAL INSTRUMENTATION

(2012 Pattern) (Semester-I) (406264A) (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 are the different Blood Cell components? Explain the importance of each Blood Cell component. **[6]**

b) With block diagram explain the working of Coulter Blood Cell counter. **[4]**

OR

Q2) a) List the various image reconstruction techniques in Tomography. Explain any one technique in detail. **[6]**

b) With block diagram explain X-Ray machine in detail. **[4]**

Q3) a) What is the operating principle of MRI? Explain in detail. **[5]**

b) Compare X-ray, CT Scan and MRI. **[5]**

OR

Q4) a) Explain A, B and M mode of ultrasound. **[5]**

b) Explain the working of PET scanner. **[5]**

Q5) a) What is electrosurgical diathermy? What do you mean by bipolar and unipolar modes of ESU? Explain, why patient plate is having more area active electrode is pointed tip type in ESU **[8]**

b) Draw and explain the Heart-Lung Machine. State the type of Pump that is used in Heart-Lung Machine. **[8]**

OR

P.T.O.

Q6) a) What is defibrillator? Explain Internal and External defibrillator. **[8]**

b) Explain the functioning of cardioverter with a neat diagram. Why it is necessary to apply defibrillator shock in synchronization with ECG? **[8]**

Q7) a) Explain LASER applications in Ophthalmology. **[8]**

b) Explain thermal and non thermal interaction of tissue with LASER. **[8]**

OR

Q8) a) Describe different types of lasers used in Biomedical applications. **[8]**

b) Explain types of endoscope. **[8]**

Q9) a) Explain in brief various types of dialysers used for haemodialysis. **[10]**

b) Define orthotic and prosthetic devices. **[8]**

OR

Q10)a) Draw and explain the structure of a kidney. **[8]**

b) Draw and explain the various types of artificial kidney. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3089

[Total No. of Pages : 2

[5154]-655

B.E.(Instrumentation & Control)

BUILDING AUTOMATION - I

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the Structure of Intelligent Building with neat sketch. **[6]**

b) Define the following Term: **[4]**

i) Vacuum Pressure

ii) Gauge Pressure

iii) Sealed Pressure

iv) Relative Humidity.

OR

Q2) a) What is BAS? Explain Importance of FAS in System with neat sketch. **[6]**

b) Write a short notes on Facilities management. **[4]**

Q3) a) List Various Types of damper explain opposed blade type damper with neat sketch. **[6]**

b) Explain Role of Architect in Process BAS Design **[4]**

OR

Q4) a) Explain the Role of plate type heat exchanger in HVAC system with neat sketch. **[6]**

b) Write a short notes on Importance of Co2 in BAS system. **[4]**

P.T.O.

Q5) a) Explain the Term Control Reset used in HAVC System. **[8]**

b) Explain Single duct variable air volume system with neat sketch. **[8]**

OR

Q6) a) Difference between series fan powered, parallel fan powered. **[8]**

b) What is CRAC? Explain CRAC System with neat sketch. **[8]**

Q7) a) List Various Types of heat pump. Explain any two with neat sketch. **[10]**

b) Explain Absorption Chiller with neat sketch. **[8]**

OR

Q8) a) List Different types of Boiler, Explain water tube type of boiler with neat sketch. **[10]**

b) Explain Expansion device used in vapour compression cycle with neat sketch. **[8]**

Q9) a) What is BAS System, Explain Field level components in BAS System with neat sketch. **[8]**

b) What is MODBUS? Explain MODBUS ASCII and MODBUS RTU With neat sketch. **[8]**

OR

Q10)a) Explain Architecture of DDC with neat sketch. **[8]**

b) Explain in LON protocol with neat sketch. **[8]**

Total No. of Questions : 12]

SEAT No. :

P3090

[Total No. of Pages : 3

[5154]-656
B.E.
INSTRUMENTATION & CONTROL
Advanced Control System
(2012 Course) (Elective - I) (406264)

Time : 2½ Hours] *[Max. Marks : 100*

Instructions to the candidates:

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

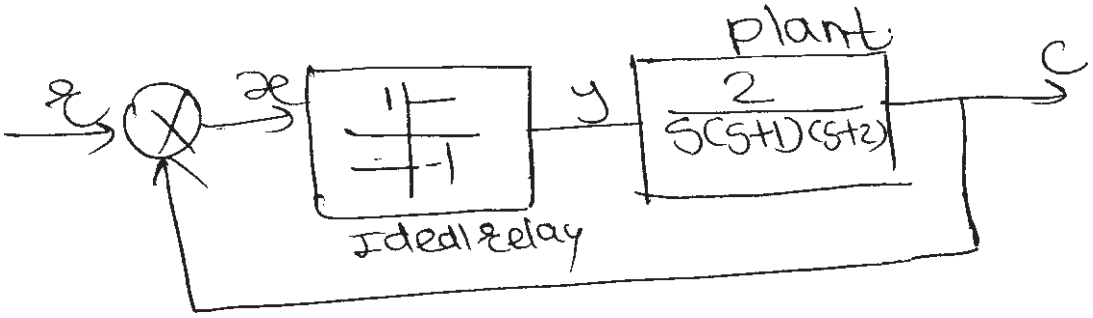
SECTION - I

Q1) a) What are the characteristics of phase plane method. **[8]**

b) What is mean by jump resonance explain with reference to soft spring & hard spring. **[8]**

OR

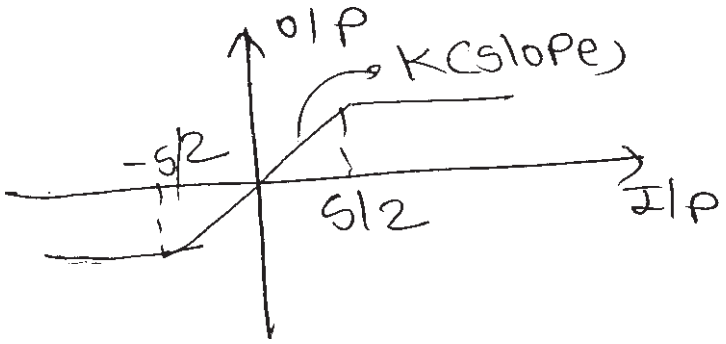
Q2) a) Obtain the stability of system as shown by Describing function method. **[8]**



b) Compare linear and nonlinear control systems. **[8]**

P.T.O.

Q3) a) Find describing function of saturation nonlinearity as shown below **[8]**



b) Explain in brief frequency domain stability criteria. **[8]**

OR

Q4) a) Select i) $U = 2x_1^2 + x_2^2$

ii) $U = x_1^2 + 2x_2^2$ as Lipapunov function and determine the stability for each case. The system is given below $\dot{x}_1 = x_2 \;\; \dot{x}_2 = -x_1 - 2x_2$ **[8]**

b) Explain : **[8]**

i) Positive definite.

ii) Negative definite.

iii) Positive semidefinite.

iv) Negative semidefinite.

Q5) a) Explain different elements of model reference adaptive control system with neat block diagram. **[9]**

b) Explain in detail MIT Rule approaches for designing of model reference adaptive controller. **[9]**

OR

Q6) a) Explain in brief direct and indirect model reference adaptive control with block diagram. **[9]**

b) Explain Lyapunov and MIT rule approaches for designing of model reference Adaptive controller. **[9]**

SECTION - II

Q7) a) Explain the different approaches to self tuning regulators. **[8]**

b) Explain recursive estimator used in self tuning regulator. **[8]**

OR

Q8) a) Explain in detail general purpose adaptive regulator. **[8]**

b) Explain Implicit & Explicit self tuning regulators. **[8]**

Q9) a) Explain any one in detail different Industrial products in corporating adaptive control system. **[8]**

b) Explain in detail robustness studies multivariable system. **[8]**

OR

Q10)a) Explain the adaptive control technique for temperature control in CSTR system. **[8]**

b) Explain the necessary conditions of optimality. **[8]**

Q11)a) Explain the requirements for the formulation of an optimal control problem. **[9]**

b) Discuss performance measures of optimal control problems. **[9]**

OR

Q12)Write short notes on **[18]**

a) Applications of Adaptive control.

b) Optimal control applications.

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Total No. of Questions : 10]

SEAT No. :

P3091

[Total No. of Pages : 2

[5154]-657

B.E.(Instrumentation & Control)

ADVANCED SENSORS

(2012 Pattern) (Semester-I) (Elective-I) (406264D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figure to the right candidates indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain static characteristics of sensor with examples. **[5]**

b) Give detail classification of level sensor with their operating principles. **[5]**

OR

Q2) a) Explain dynamic characteristics of sensor with examples. **[5]**

b) Give detail classification of temperature sensor with their ranges and operating principles. **[5]**

Q3) a) Discuss design considerations and selection criteria for sensor fabrications. **[5]**

b) With neat block diagram explain manufacturing process of sensor. **[5]**

OR

Q4) a) Enlist different techniques used for sensor fabrication. Explain any one. **[5]**

b) Explain recent trends in sensor fabrication. **[5]**

Q5) a) List different chemical sensing mechanisms. **[8]**

b) Explain working of fibre optic sensor with block diagram. **[8]**

OR

P.T.O.

Q6) a) Give different types of gas sensors. Explain any one in detail. **[8]**

b) Give classification of biosensors. **[8]**

Q7) a) Write short note on smart sensor. **[8]**

b) Explain selection criteria for smart sensor. **[8]**

OR

Q8) a) Explain signal conditioning and signal conversion in smart sensors. **[8]**

b) Enlist smart temperature IC sensors. Explain any one in detail. **[8]**

Q9) a) Explain any applications of Chemical sensors in detail. **[9]**

b) Explain any application of biosensors. **[9]**

OR

Q10)a) Explain application of fiber optic sensor with neat sketch. **[9]**

b) Discuss application gas sensors in industry. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3092

[Total No. of Pages : 2

[5154]-658

B.E.(Instrumentation & Control)

ADVANCED DIGITAL SIGNAL PROCESSING

(2012 Pattern) (406264E) (Elective-I) (Semester-I)

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) State the need of TFD with example. **[5]**

b) Explain WVD with its properties. **[5]**

OR

Q2) Explain imaging phenomenon in upsampling. How to overcome it? **[10]**

Q3) a) Explain multirate signal processing with suitable example. **[5]**

b) Discuss interpolation with polyphase filters. **[5]**

OR

Q4) Increase the sampling frequency of 100 Hz signal from 1000 Hz to 4000 Hz. **[10]**

Q5) a) Explain Barttlet method of PSD estimation. State its features. **[10]**

b) Define Mean, Variance and Bias for PSD estimator. **[6]**

OR

Q6) a) Explain ARMA parametric PSD estimation with suitable diagram. **[10]**

b) Explain applications of PSD estimation. **[6]**

P.T.O.

Q7) a) Derive the filter updating relation for adaptive filter using RLS algorithm. **[10]**

b) Explain echo cancellation in communication channel using adaptive filtering. **[8]**

OR

Q8) a) Define cepstral coefficients. State properties of complex spectrum. **[10]**

b) Explain homomorphic signal processing with suitable example. **[8]**

Q9) Explain architecture of DSP processor ADSP 21xx with suitable diagram. **[16]**

OR

Q10)a) Explain status registers in DSP processors. **[8]**

b) Explain barrel shifter block of DSP processor. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3093

[Total No. of Pages : 2

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B.E. (Instrumentation & Control)

OPTO-ELECTRONICS INSTRUMENTATION

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

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer the questions: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***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 application of Laser in holography with neat diagram. **[7]**

b) Explain various losses in optical fibers. **[7]**

c) List out the optical detectors used in optical fiber system. Distinguish between them. **[6]**

OR

Q2) a) Explain the properties of Laser light. **[7]**

b) Explain the total internal reflection, Brewster's angle and numerical aperture in optical fiber. **[7]**

c) Explain the structures of LED with neat diagram. **[6]**

Q3) a) Explain various configurations of optical amplifiers. **[10]**

b) Write short note on 'Integrated Optics'. **[6]**

OR

Q4) Explain following optical components with neat diagram:

a) Beam splitter. **[8]**

b) Optical switches. **[8]**

P.T.O.

Q5) a) Explain the encoding based position sensors. **[6]**

b) Explain the advantages and disadvantages of Fiber Optic Sensing (FOS). **[10]**

OR

Q6) a) Describe the intensity modulation based transduction technique in FOS. **[8]**

b) Explain the application of optical fiber sensor for displacement measurement. **[8]**

Q7) a) Explain any one application of fiber grating technology in detail. **[10]**

b) Explain the configuration of Laser interferometer. **[8]**

OR

Q8) a) Explain the ring laser gyroscope (RLG) in detail. **[9]**

b) Explain any one configuration of laser-doppler velocimetry. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3094

[Total No. of Pages : 2

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B.E. (Instrumentation & Control)

ENVIRONMENTAL INSTRUMENTATION

(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, 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) Write a short note on : Ultraviolet analyzers. **[5]**

b) Explain the stationary analytical instruments. **[5]**

Q3) a) Explain the different Water Quality parameters. **[5]**

b) Discuss water quality standards for raw and treated water. **[5]**

OR

Q4) a) Explain the pH analyser with their applications. **[6]**

b) Explain the design criteria of settling tank. **[4]**

Q5) a) What is floating? Explain its types. **[8]**

b) Write short notes on Coagulation. **[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]**

P.T.O.

Q7) a) Define Air pollution. Explain the Methods of air pollution control. **[10]**

b) Discuss the waste water measurement techniques. **[8]**

OR

Q8) a) Explain the Acoustic noise measurement and monitoring system. **[10]**

b) Compare Non-open channel flow measurement and open channel waste water flow measurement. **[8]**

Q9) a) Explain the necessity of Rain water harvesting. List the methods of same. **[8]**

b) Define sound pollution. Explain its effect to environment. **[8]**

OR

Q10) Write short notes on : **[2 × 8 = 16]**

a) Virtual Instruments Environmental Engineering Laboratory

b) Barometer.

Total No. of Questions : 10]

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P3095

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B.E. (Instrumentation & Control Engineering)

ROBOTICS & AUTOMATION

(2012 Pattern) (End Sem.) (406265 C) (Elective - II) (Semester - I)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) How a typical robot is specified? Explain. **[6]**

b) How a robot can be explained with block -diagram? **[4]**

OR

Q2) a) Explain how robots are classified. **[6]**

b) Explain how different types of end effectors are used in robots. **[4]**

Q3) a) Which points are important for robot - user interface; explain. Consider image processing application. **[5]**

b) Why laws of robotics are important? **[5]**

OR

Q4) a) Enlist different sensors used in robots. **[5]**

b) Explain how robots are used in object recognition. **[5]**

Q5) a) Write a short note on homogeneous transformations, **[4]**

b) Why robot kinematics & dynamics are important; explain. **[10]**

c) What is path planning; explain. **[4]**

OR

Q6) a) Explain position control system for robots. **[9]**

b) Explain force control system for robots. **[9]**

P.T.O.

Q7) a) Which different programming languages were used for robots? Now which languages are used? Explain. **[10]**

b) Which problems might occur in programming of robots? Explain. **[6]**

OR

Q8) Explain in detail how PLC and robots come together. **[16]**

Q9) a) Explain any one case study of a typical robot. **[8]**

b) How robot cell design is achieved? **[8]**

OR

Q10)a) Explain points to be considered while selecting a robot. **[8]**

b) How multiple robots work together? What care should be taken? **[8]**

Total No. of Questions : 10]

SEAT No. :

P3096

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B.E. (Instrumentation & Control)

SENSOR NETWORKS

(2012 Pattern) (Elective - II) (406265 D) (Semester - I)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) Explain field programmable gate array (FPGA) in detail. **[5]**

b) With suitable diagram explain wireless sensor networks. **[4]**

c) Write a short note on :

i) Design constraints of WSN **[3]**

ii) Security in WSN **[3]**

OR

Q2) a) Explain Inductive loop in traffic control. **[5]**

b) Explain IMote Node Architecture in detail. **[5]**

c) Explain basics of sensor classifications in WSN with examples. **[5]**

Q3) a) Describe prototype of pipeline monitoring in detail. **[10]**

b) Explain single damage detection and multiple damage detection using natural frequencies. **[5]**

OR

Q4) a) Explain the processing components of the artificial retina in detail with suitable diagram. **[5]**

b) Explain global and local inspection techniques in structural health monitoring system in detail. **[5]**

c) Describe architecture of a wireless sensor node. **[5]**

P.T.O.

Q5) a) Explain digital communication system in detail with basic components. **[7]**

b) Describe signal propagation using the relationship between the transmitted power and the Received power. **[8]**

OR

Q6) a) Explain quadratic amplitude modulation in detail. **[7]**

b) Explain source encoding with calculations of efficiency of a source encoder in detail. **[8]**

Q7) a) Explain the contension free and contension based medium access protocol in detail. **[7]**

b) Explain Zebra MAC in detail of hybrid MAC protocols. **[8]**

OR

Q8) a) Explain the five characteristics of MAC protocols in sensor networks. **[7]**

b) Write a short note on mobility adaptive hybrid MAC. **[8]**

Q9) a) Explain flooding and Gossiping in detail in network layer. **[5]**

b) Explain Hierarchical routing with suitable diagrams. **[5]**

OR

Q10)a) Explain optimized link state routing of proactive routing. **[5]**

b) Write a short note on SPIN-PP of data centric Routing. **[5]**

Total No. of Questions :10]

SEAT No. :

P3097

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B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION- II

(2012 Course) (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.***
5) ***Use of calculator is allowed.***

Q1) State objectives of process models. With suitable example, develop a mathematical model which represents its dynamics as second order system. **[10]**

OR

Q2) Explain coordinated control and split range control systems used in heat exchangers. **[10]**

Q3) Explain air-fuel ratio control system used in boilers. **[10]**

OR

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

a) Boiler safety standards.

b) Boiler inspection procedures.

Q5) a) Explain recipe management of batch reactors. **[8]**

b) Explain typical cascade control system used in continuous reactors. **[8]**

OR

P.T.O.

Q6) a) State and explain various interlocks required in reactors. **[8]**

b) Explain sequencing logic control used in batch stirred tank reactors. **[8]**

Q7) a) State importance of reflux ratio in distillation. With neat sketch explain composition control of bottoms product. **[10]**

b) Discuss on importance of predictive control used in distillation Column. **[6]**

OR

Q8) Discuss on following typical Distillation Column Controls.

a) DCS based Control System. **[8]**

b) ANN Based Control System. **[8]**

Q9) a) Explain in brief surge phenomenon in compressors. **[8]**

b) Explain use of anti-surge control system used in compressors. **[10]**

OR

Q10) Write a note on any two: **[18]**

a) Basic controls used in pump.

b) On-off level control of dual pump station.

c) Override control in compressor.

EEE

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

P3098 [Total No. of Pages : 2

[5154]-665

B.E. (Intsrumentation & Control)

INDUSTRIALAUTOMATION

(2012 Pattern) (Semester-II) (End Semester) (406268)

Time : $2^{1}/_{2}$ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) What is the role of automation in industries? **[7]**

OR

Q2) Compare PLC & SCALDA on the basis of performance criteria. **[7]**

Q3) Write short note on communication standard RS 485. **[6]**

OR

Q4) Explain OSI/ISO reference model in communication system. **[6]**

Q5) Explain the High Speed Counter function used in PLC. **[7]**

OR

Q6) Explain the architecture of PLC. **[7]**

Q7) a) Explain in detail about structured text and functional block diagram of PLC programming. **[8]**

b) Explain the procedure for interfacing a PLC with SACDA system using different communication protocols. **[8]**

OR

Q8) a) With an example explain the role of PLC in a SCADA system. **[8]**

b) Explain analog control using PLC. **[8]**

P.T.O.

Q9) a) List and explain with block diagram the basic functions of DCS System. **[10]**

b) Describe how DCS supports ERP. **[8]**

OR

Q10) a) Explain in detail specifications of DCS system to any automation project. **[10]**

b) List and explain advantages and limitations of DCS system. **[8]**

Q11) a) Explain the different layers of protection. **[8]**

b) Explain the importance of Process Hazard Analysis (PHA). **[8]**

OR

Q12) a) With the help of block diagram explain "ESD Systems". **[8]**

b) Write on applications of safety system. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3099

[Total No. of Pages :2

[5154]-666

B.E. (Instrumentation & Control)

DIGITAL IMAGE PROCESSING

(2012 Course) (Semester-II) (406269A) (Elective-III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) With block diagram explain the fundamental steps in Digital Image Processing. **[6]**

b) Write short note on "Wavelet Transform". **[4]**

OR

Q2) a) Enlist various image formats. Explain any four image formats. **[6]**

b) Describe Perspective Transformation. **[4]**

Q3) a) What is the necessity of Image Enhancement? Explain Image Enhancement through different types of Point operations. **[6]**

b) Explain Mean filters in detail. **[4]**

OR

Q4) a) Enhance following image using Histogram Equalization **[6]**

[10 20 30; 10 20 30; 40 50 60]

b) Explain Contrast Intensification in detail. **[4]**

Q5) a) What is Image Segmentation? Explain Region Oriented Segmentation. **[10]**

b) Explain Image Segmentation based on Thresholding. **[8]**

OR

P.T.O.

Q6) a) Explain the different types of detection of discontinuities in image segmentation. **[10]**

b) Describe Regional Descriptors in detail. **[8]**

Q7) a) Explain Lempel Ziv Welch Image Compression technique. **[8]**

b) Find the Huffman Code for the following stream of data **[8]**

{ 1,1,1,1,1,1,1,2,2,2,2,2,2,3,3,3,3,3,4,4,4,4,5,5,5,6,6,7 }

OR

Q8) a) Explain Arithmetic Coding technique of Image Compression. **[8]**

b) Describe Run Length Encoding and Vector Quantization in detail. **[8]**

Q9) a) Explain the applications of DIP in Medical field. **[8]**

b) Enlist the applications of DIP in Agriculture field. Explain any one application in detail. **[8]**

OR

Q10) Write Short Notes on (Any Two) **[16]**

a) Use of DIP in Biometrics

b) Applications of DIP in Military

c) Importance of DIP in Space

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3626

[Total No. of Pages : 2

[5154]-667

B.E. (Instrumentation & Control) (Semester - VIII)

BUILDING AUTOMATION - II

(2012 Pattern) (Elective - III (B))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Give classification of fire alarm system. **[5]**

b) What are the factors affecting sensitivity of conventional detectors. **[5]**

OR

Q2) a) Explain in detail various components of FACP. **[6]**

b) Explain the fire standard IS2189 in detail. **[4]**

Q3) a) Explain construction and working of ionization type smoke detector. **[6]**

b) Explain how self compensation is done in addressable devices. **[4]**

OR

Q4) a) Discuss the cause and effect matrix of fire alarm system. **[6]**

b) Explain concept of water leak detection system. **[4]**

Q5) a) Explain the operation of fire hydrants? **[8]**

b) Explain in detail devices used in fire suppression system. Also explain its necessity in fire alarm system. **[6]**

P.T.O.

OR

Q6) a) Explain wet pipe sprinkler and dry pipe sprinkler system in detail. **[8]**

b) How does FM-200 system works? What are the advantages of an FM-200 fire suppression system? **[6]**

Q7) a) Explain in detail the components of access control system. What are the benefits of access control system? **[9]**

b) Write a short note on: Smart card , Proximity Card and MI fare card related to access control system. **[9]**

OR

Q8) a) Explain the protocols LON, Modbus, BACnet used for access control system. **[9]**

b) Explain in detail secure and non secure concept in access control system. **[9]**

Q9) a) List various types of cameras used in CCTV. Explain anyone in detail. **[9]**

b) Explain terms: CIF, MPEG, MP4 & POE. **[9]**

OR

Q10)a) Explain video management system in details. **[9]**

b) What is intrusion system? Explain one application of intrusion system. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3100

[Total No. of Pages : 3

[5154]-668

B.E. (Instrumentation and Control)
PROCESS MODELING AND OPTIMIZATION
(2012 Pattern) (Elective-III)(Semester-II) (End-Sem.) (406269C)

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 parallel 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 sine wave testing. **[5]**

b) With an example explain identification by ATV method. **[5]**

Q5) a) Calculate the Niederlinski index for the system. **[10]**

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} \frac{2.9e^{-2.8s}}{9.5s+1} & \frac{-0.49e^{-2.3s}}{18s+1} & \frac{-0.46e^{-3s}}{17.8s+1} \\ \frac{9.17e^{-4.5s}}{39.5s+1} & \frac{-3.5e^{-5.5s}}{17s+1} & \frac{-0.218e^{-7.2s}}{19.9s+1} \\ \frac{44.18e^{-12.6s}}{8.5s+1} & \frac{39.6e^{-13.5s}}{15.6s+1} & \frac{1.37e^{-1.9s}}{14.8s+1} \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$$

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

OR

P.T.O.

Q6) a) Calculate the RGA for the system represented by transfer function matrix.

$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} \frac{2.9e^{-2.8s}}{9.5s+1} & \frac{-0.49e^{-2.3s}}{18s+1} & \frac{-0.46e^{-3s}}{17.8s+1} \\ \frac{9.17e^{-4.5s}}{39.5s+1} & \frac{-3.5e^{-5.5s}}{17s+1} & \frac{-0.218e^{-7.2s}}{19.9s+1} \\ \frac{44.18e^{-12.6s}}{8.5s+1} & \frac{39.6e^{-13.5s}}{15.6s+1} & \frac{1.37e^{-1.9s}}{14.8s+1} \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$$ **[10]**

b) With an example explain the concept of robustness. **[8]**

Q7) a) For the following functions determine convexity and concavity.

i) $9x^2$

ii) $14x$

iii) $-9x^2$

iv) $3x^2 - x^3$ **[8]**

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.

i) $4x_1^2 + 8x_1x_2 + 3x_2^2 + 7x_1 + 9x_2 + 24$.

ii) $x_1^2 + x_1x_2 + 2x_2 + 4$. **[8]**

b) With an example explain classification of optimization problem based on Number of objective functions. **[8]**

Q9) a) Find the maximum value of $Z = 2x + 3y$ subject to the constraints

$$\begin{aligned} x + y &\le 30, \\ x - y &\ge 0, \\ y &\ge 3, \\ 0 \le y &\le 12, \\ 0 \le x &\le 20. \end{aligned}$$ **[10]**

b) Explain the Newton's method for unidimensional search. **[6]**

OR

Q10)a) Maximize $Z = 100x_1 + 40x_2$ **[10]**

Subject to constraints

$$10x_1 + 4x_2 \leq 2,000$$
$$3x_1 + 2x_2 \leq 900$$
$$6x_1 + 12x_2 \leq 3,000$$
$$x_1, x_2 \geq 0$$

b) Explain direct methods for unconstrained multi-variable optimization.**[6]**

✡ ✡ ✡

Total No. of Questions : 10]

SEAT No. :

P3101

[Total No. of Pages :2

[5154]-669
B.E. (Instrumentation)
VIRTUAL INSTRUMENTATION
(2012 Course) (Semester-II) (Elective-III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

SECTION-I

Q1) a) Compare graphical programming vs conventional programming. **[8]**

b) Draw counter block. **[2]**

OR

Q2) a) How local and global variables are declaired in labview. **[5]**

b) Least features on ELVIS. **[5]**

Q3) a) What is difference between VISA and IVI. **[6]**

b) Explain file I/O in labview. **[4]**

OR

Q4) a) Write step to publish data acquired by DAQ to web in Labview. **[6]**

b) Explain IF-Else loop blok. **[4]**

Q5) a) Explain power spetrum block along with panel window and diagram window. **[9]**

b) Explain experimental setup to find frequency response of a filter where function generator and oscilloscope both are implemented using Labview. **[9]**

OR

P.T.O.

Q6) a) List various blockes available in control simulation toolkit. Explain any one in detail. **[9]**

b) List various analysis toolkits available in Labview and explain any one. **[9]**

Q7) a) How FIR filter can be implemented in LabView. **[8]**

b) Write steps to and draw diagram for implementation digital multimeter. **[8]**

OR

Q8) a) What is hybrid programming concept explain with example. **[8]**

b) How differential equations can be implemented in LabView. **[8]**

Q9) a) With an example explain the application of distributed I/O. **[8]**

b) Write a VI code to interface with any third party HMI system. **[8]**

OR

Q10)a) With an example explain the motion control application. **[8]**

b) Explain the various function blocks used in Vision Module. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3627

[Total No. of Pages : 2

[5154]-670

B.E. (Instrumentation & Control)

COMPUTER TECHNIQUES & APPLICATIONS

(2012 Pattern) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables slide rules, Mollier charts, electronic pocket calcultor 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) Write short notes on: **[10]**

a) Demand Paging.

b) Systolic Arrays.

Q3) What is a deadlock? Explain the four conditions necessary for occurrence of deadlocks. **[10]**

OR

Q4) What are real time systems? Explain the different types of Real Time systems giving examples of each. **[10]**

P.T.O.

Q5) Write Short Notes on: **[16]**

a) Industrial Ethernet.

b) IEEE 1394.

OR

Q6) a) Explain LAN and LAN topologies. **[8]**

b) Write a note on IEEE 802.3 with respect to following points: **[8]**

i) Data Frame

ii) Description of Working

Q7) a) What are exceptions in processors? List the seven exception types along with their interrupt vector addresses of ARM processors. **[9]**

b) List and explain the architectural features of ARM 7 processors. **[9]**

OR

Q8) a) Explain the operating modes of ARM 7TDMI processors. **[9]**

b) Discuss any 3 applications of ARM 9 processors in detail. **[9]**

Q9) a) What is software development life cycle? Explain the importance of Software Design in it. **[8]**

b) Explain white box and black box testing. Discuss the advantages and limitations of each. **[8]**

OR

Q10)a) What is software testing? Discuss the various software testing strategies. **[8]**

b) Write a note on CASE tools. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3102

[Total No. of Pages : 2

[5154]-670-A

B.E. (Instrumentation and Control)

SMART MATERIAL AND SYSTEMS (Elective - IV)

(2012 Pattern) (406270A) (End Sem.) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***

Q1) a) What are the applications of smart material? **[5]**

b) Explain in detail what is smart system. **[5]**

OR

Q2) a) List out different types of smart materials & its property. **[5]**

b) Explain in detail dielectric elastomer material. **[5]**

Q3) a) Explain in detail piezoelectric property. List out its applications. **[5]**

b) Explain in detail working of shape Memory alloy. **[5]**

OR

Q4) a) Explain in detail wide scope of magnetorheological material. **[5]**

b) Explain in detail about polymer Jel material. **[5]**

Q5) a) Explain with neat sketch working of acclerometer. **[8]**

b) Explain with neat sketch working of conductometric gas sensor. **[8]**

OR

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

b) Explain with neat sketch electrodynamics actuator. **[8]**

P.T.O.

Q7) a) Explain with neat sketch different steps of lithography process. **[8]**

b) Explain with neat sketch etching process. **[8]**

OR

Q8) a) Explain with neat sketch chemical vapor deposition technique. **[8]**

b) Explain with neat sketch Sputtering deposition technique. **[8]**

Q9) a) Explain with neat sketch the working of different component of Lab on chip. **[9]**

b) Explain with neat sketch the working of sensor and actuator used in air bag control. **[9]**

OR

Q10)a) Explain with neat sketch the working dosing system in health care. **[9]**

b) What are the advantages of dosing system. Also mention the applications dosing system in biomedical field. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3103

[Total No. of Pages : 2

[5154]-670-B

B.E. (Instrumentation & Control)

INSTRUMENTATION IN AGRICULTURE AND FOOD PROCESSING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
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 index properties of soil. **[5]**

b) What is Humidity? Explain Relative and Absolute Humidity in details. **[5]**

OR

Q2) a) Write note on sonic anemometer. **[5]**

b) Explain construction and working of fine wire thermocouple. **[5]**

Q3) a) Explain the instrumentation for juice extraction process in sugar industry. **[6]**

b) Explain process of pasteurization in dairy industry. **[4]**

OR

Q4) a) Explain any 2 soil moisture measurement techniques. **[6]**

b) Compare overhead and micro irrigation methods. **[4]**

Q5) a) Explain various Hydraulic controls in farm tractor. **[8]**

b) List any 4 pumps used for agricultural purpose. Draw and explain any 1 in details. **[8]**

OR

Q6) a) Explain selection criteria for pump in detail. Explain installation of pump. **[8]**

b) Write a short note on soil volumetric water content measurement using time domain reflectometry (TDR). **[8]**

P.T.O.

Q7) a) Explain food quality measurement and food safety in food processing. **[8]**

b) Write a note on International code of hygiene for various products in food processing. **[8]**

OR

Q8) a) Write a short note on Design consideration for cold storage & atmospheric controllers. **[8]**

b) Write note on Biosensors. **[8]**

Q9) Construct the ladder diagram for PLC application in packaging industry. Assume suitable data for the conveyor control. Also draw the diagram for above system. **[18]**

OR

Q10) Write short notes on: **[18]**

a) Application of SCADA in food packing industry.

b) Trends in modern food processing.

Total No. of Questions : 10]

SEAT No. :

P3104

[Total No. of Pages : 2

[5154]-670-D

B.E. (Instrumentation and Control Engineering)

AUTOMOBILE INSTRUMENTATION

(2012 Course) (Semester - II) (Elective - IV) (End Sem.) (406270D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Write short notes on: **[10]**

a) Automotive electronic dashboard instruments.

b) Electronic interface suppression in automobile.

OR

Q2) Draw and explain construction and principle of operation of electronic spark plug timing and control. **[10]**

Q3) Explain series motor used in automobile for starting the engine. What are its characteristics? **[10]**

OR

Q4) Explain the fuel management systems used in automobiles. **[10]**

Q5) Explain the following with respect to automobile: **[16]**

a) Oxygen sensor.

b) Fuel metering.

OR

Q6) Write short note on: **[16]**

a) Write short note automatic seat belt tightener system.

b) Coolant Temperature Measurements.

P.T.O.

Q7) Elaborate on: **[16]**

a) Head light dazzling.

b) Earth return system.

OR

Q8) a) Explain in detail the principle of operation of emission measuring instruments. **[8]**

b) Explain in details Bharat & Euro Norms. **[8]**

Q9) a) Explain central locking system with diagram. **[9]**

b) Explain the importance of ventilation system and measures used for proper ventilation. **[9]**

OR

Q10)Describe briefly: **[18]**

a) Garage door opening system.

b) Tyre pressure control system.

Total No. of Questions : 8]

SEAT No :

P 3105

[Total No. of Pages :2

[5154]-671

B.E.(Computer Engineering)

DESIGN AND ANALYSIS OF ALGORITHMS

(2012 Course) (Semester-I) (410441)

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 indicate full marks.***
3) ***Draw neat diagrams wherever necessary.***
4) ***Make suitable assumptions wherever necessary.***

Q1) a) Explain Big Oh (O), Omega (Ω) and Theta (θ) notations in detail along with suitable examples. **[6]**

b) Write an algorithm for Knapsack problem using Greedy Strategy. **[6]**

c) Write a short note on 8-queens problem. Write algorithm for the same. **[8]**

OR

Q2) a) Calculate the Average case time complexity of $f(n) = 3n(n^2–n)+ 2n + 5$ using running time complexity. **[6]**

b) Write an algorithm for optimum binary search tree. **[6]**

c) Explain in detail backtracking strategy and give control abstraction for the same. **[8]**

Q3) a) Give and explain relationship between P, NP, NP complete and NP Hard. **[8]**

b) Explain Non-Deterministic clique problem along with algorithm. **[8]**

OR

Q4) a) Give and Explain Non-Deterministic sorting algorithm. **[8]**

b) Prove that Vertex cover problem is NP-complete. **[8]**

P.T.O.

Q5) a) Explain in detail Dining philosopher's problem. **[8]**

b) Give and explain Minimum Spanning Tree algorithm. **[8]**

OR

Q6) a) Write an algorithm for finding Parallel shortest paths. Also comment on the time complexity of this algorithm. **[8]**

b) Explain in detail with example Sequential and Parallel computing. **[8]**

Q7) a) Give and explain Dijkstra-Scholten algorithm. **[9]**

b) Explain in detail Sorting algorithm for embedded Systems. **[9]**

OR

Q8) a) Write a short note on Internet of Things Algorithm. **[9]**

b) Give and explain String matching algorithm. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3106

[Total No. of Pages : 3

[5154]-672

B.E.(Computer Engineering)

PRINCIPLES OF MODERN COMPILER DESIGN

(2012 Pattern) (Semester-I) (410442)

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 down the regular expression for the following **[4]**

i) Comment in C.

ii) Floating point number.

b) Write a Syntax directed translation scheme for Boolean Expression. **[6]**

OR

Q2) a) Consider the statement: **[4]**

X[i, j]:=Y[i+j,k]+z.

The maximum dimensions of X are [d1,d2] and of Y are [d3,d4].

Generate three address code.

b) What are synthesized and inherited attributes? What are Marker Non terminal symbols? Give example. **[6]**

Q3) a) Write a short note on I/P buffering used in Lexical Analyzer. **[4]**

b) Check whether the following grammar LL(1) or not. **[6]**

$E \rightarrow TE'$

$E' \rightarrow *TE'/\in$

$T \rightarrow FT'$

$T' \rightarrow \hat{}T/\in$

$F \rightarrow (E)/id$

P.T.O.

OR

Q4) a) What is need of Semantic Analysis? Explain the position of Type Checker with diagram. **[4]**

b) Show that the following grammar is not SLR (1) **[6]**

$S \rightarrow Aa\ Ab|B\ b\ Ba$

$A \rightarrow \in$

$B \rightarrow \in$

Q5) a) Write a note on application of Directed Acyclic Graph (DAG) in code generation. **[6]**

b) Write an algorithm for copy propogation. **[6]**

c) Write a short note on Data flow equations and iterative data flow analysis. **[6]**

OR

Q6) a) Describe in detail about a simple code generator with the appropriate algorithm. **[6]**

b) Discuss about the following: **[6]**

i) Dead-code Elimination and

ii) Code motion.

c) Show the steps involved on generating the code for the expression: **[6]**

(x+y)/(p+q)

Q7) a) Discuss source language issues related to Object Oriented languages. **[6]**

b) Explain code generation for control flow statements. **[6]**

c) Explain Polymorphic typing with respect to Functional languages. **[4]**

OR

Q8) a) Explain following related to Haskell program. **[6]**

i) Offside rule.

ii) Lists.

b) Explain following with respect to Functional languages. **[6]**

i) Referential transparency.

ii) Lazy evaluation.

c) What is activaton record? Explain possible structure of an activation record? **[4]**

Q9) a) Discuss the issues in Tuple Space implementation. **[6]**

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

i) JIT

ii) nmake

c) Explain following shared variable models **[4]**

i) Locks

ii) Monitors

OR

Q10)a) Explain cross compilation using XMLVM. **[6]**

b) Discuss following with respect to Parallel object oriented languages. **[6]**

i) Object location

ii) Object migration

c) What is interpreter? Explain JVM interpreter. **[4]**

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Total No. of Questions : 8]

SEAT No. :

P3107

[Total No. of Pages : 2

[5154]-674

B.E.(Computer Engineering)

IMAGE PROCESSING

(2012 Pattern) (Semester-I) (410444A) (End Sem.) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Que. 1 or Que.2, Que.3 or Que.4, Que. 5 or Que. 6, Que. 7 or Que. 8.***
2) ***Neat diagram should be drawn wherever necessary.***
3) ***Use of electronic pocket Calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Fundamental steps of image processing considering any real life application. **[6]**

b) Distinguish between mask processing and point processing techniques. Explain any two methods from each. **[8]**

c) Explain the types of pixel adjacency observed in an image. **[6]**

OR

Q2) a) Explain Image digitization process in detail? **[8]**

b) Explain any three edge detector operators with its properties in detail and state its category (first derivative or second derivative). **[6]**

c) Explain region split and merge technique with example and draw its quad tree representation. **[6]**

Q3) a) Define compression ratio. Explain how we can achieve image compression using run length coding for given image and calculate compression ratio.

$$\begin{bmatrix} 3 & 3 & 3 & 2 \\ 2 & 3 & 3 & 3 \\ 3 & 2 & 2 & 2 \\ 2 & 1 & 1 & 0 \end{bmatrix}$$

[8]

b) With suitable example, explain feature extraction in an image. **[8]**

OR

P.T.O.

Q4) a) Explain any two object recognition method. **[8]**

b) Explain the methods used for lossless image compression. **[8]**

Q5) a) What are the different modalities used for ionizing radiation? Discuss what are the issues involved in it. **[10]**

b) List three ways in which the contrast is maximized in mammography with a short explanation of the principles behind each. **[8]**

OR

Q6) Write a short note on any three: **[18]**

a) Images from X-rays and its application

b) PACs

c) Does and risk

d) Ultrasound

Q7) a) Discuss workflow of digital photogammetric process. **[8]**

b) Explain different stereo imaging concepts from satellites. **[8]**

OR

Q8) Write shorts note on any two: **[16]**

a) Block triangulation

b) Photogrammetric Imaging devices

c) 3D viewing in digital photogrammetry

Total No. of Questions : 12]

SEAT No. :

P3108

[Total No. of Pages : 2

[5154]-675

B.E.(Computer Engineering)

COMPUTER NETWORK DESIGN AND MODELING

(2012 Pattern) (Semester-I) (410444B) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Explain how "Requirement gathering and Analysis while designing a network" can be carried out. **[6]**

OR

Q2) What is the need of developing service metric? With the help of suitable diagram explain the requirement analysis process. **[6]**

Q3) a) Enlist and explain the performance characteristics of network. **[4]**

b) Explain Environment-specific Thresholds and limit in detail. **[4]**

OR

Q4) Write a short note on:

a) Requirement mapping. **[4]**

b) Development of service metrics. **[4]**

Q5) Develop a flow model for real time flows. Explain in detail how to characterize the flows for the developed model. **[8]**

OR

Q6) Explain in detail flow prioritization and specification. Give example for both. **[8]**

P.T.O.

Q7) a) What is equipment evaluation? Explain evaluation process with respect to vendors, service providers and equipments. **[8]**

b) What is importance of Network Layout for analyzing network performance? **[4]**

OR

Q8) a) Explain various routing mechanisms in details. **[8]**

b) How network management mechanisms are helpful in network addressing? **[4]**

Q9) a) What are the different addressing mechanisms strategies explain in details? **[8]**

b) State and explain role of architectural considerations of network management. **[10]**

OR

Q10)a) What are the developing goals for network performance and design? **[8]**

b) What are the roles of design traceability and design metrics for analyzing network performance? **[10]**

Q11)a) Enlist the tools used for network simulation and eloborate any one of them. **[4]**

b) Explain the concept of emulation capabilities in network design and analysis. **[6]**

c) What is the principle of discrete event simulation? Explain in details the components of discrete event simulation? **[8]**

OR

Q12)a) What is Object aggregation Explain various event in NS-3 or equivalent. **[6]**

b) Write a short note on: **[12]**

i) Compiling and running the simulators.

ii) Analyzing the results.

iii) Scalability with distributed simulation.

Total No. of Questions : 10]

SEAT No. :

P3109

[Total No. of Pages : 2

[5154]-676

B.E.(Computer Engineering)

ADVANCED COMPUTER PROGRAMMING

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram should be drawn wherever necessary.***
3) ***Figure to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain with examples distributed lock using Timestamp. **[5]**

b) What is concurrency? What are the basic approaches to achieve concurrency. **[5]**

OR

Q2) a) Explain with examples single copy and multi copy distributed shared memory. **[5]**

b) What is JVM? Why Java is called platform independent programming languages? What is the difference between JDK and JRE? **[5]**

Q3) a) What is thread? Describe the complete life cycles of thread. **[5]**

b) Explain following Java collection framework. **[5]**

i) Hashmap

ii) Treemap

iii) Iterators.

OR

Q4) a) What are the main benefits of SOA? How to achieve loose-coupling in SOA? **[5]**

b) What is Reflection in Java? What are its drawbracks and practical usages? **[5]**

P.T.O.

Q5) a) What are advantages of JSP over Java servlets? Also explain WSDL. **[8]**

b) What is cloud computing? Explain its framework model in detail. **[9]**

OR

Q6) a) What is Ajax? What are Ajaxs applications? What are the advantages and disadvantages of Ajax? Also write difference between Ajax and Javascript. **[8]**

b) What is the real difference between HTML and HTML5? Write short notes on JSP architecture. **[9]**

Q7) a) What are the column oriented databases? Compare column oriented databases with relational databases. **[8]**

b) What are the best features of Hadoop? What are the advantages of Hadoop over traditional RDBMS? **[8]**

OR

Q8) a) Explain with examples. **[8]**

i) HDFS Daemons

ii) Hadoop YARN

iii) Word Count Program.

b) What are document oriented databases? Give mongoDB database examples for Hotel database application. **[8]**

Q9) a) Draw a diagram for Map Reduce system showing different phases/stages like input-split, shuffle, sort, combine etc. **[8]**

b) Explain with examples data types and complex data types in pig. **[9]**

OR

Q10)a) Explain word count implementation via Hadoop framework. **[8]**

b) Explain the functionalities of: **[9]**

i) Mapper

ii) Combiner.

iii) Reducer

Total No. of Questions : 8]

SEAT No. :

P3110

[Total No. of Pages : 3

[5154]-677

B.E.(Computer Engineering)

DATA MINING TECHNIQUES AND APPLICATIONS

(2012 Pattern) (Semester-I) (410444D) (End Sem.) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are the different data normalization methods? Explain them in brief. **[6]**

b) Consider the training examples shown in the table below for a binary classification problem. **[6]**

Instance	A1	A2	Class
1	T	T	Yes
2	T	T	Yes
3	T	F	No
4	F	F	Yes
5	F	T	No
6	F	T	No
7	F	F	No
8	T	F	Yes
9	F	T	No

i) What is the entropy of this collection of training examples with respect to the 'Yes' class

ii) What are the information gains of A1 and A2 relative to these training examples?

c) Explain with suitable example the frequent item set generation in Apriori algorithm. **[8]**

OR

P.T.O.

Q2) a) What is data preprocessing? Explain the different steps in data preprocessing. **[6]**

b) Explain with example K-Nearest-Neighbor Classifier. **[6]**

c) Explain the following terms: **[8]**

i) Support count

ii) Support

iii) Frequent itemset

iv) Closed itemset.

Q3) a) What are interval-scaled variables? Describe the distance measures that are commonly used for computing the dissimilarity of objects described by such variables. **[8]**

b) What is meant by complete link hierarchical clustering? **[6]**

c) Consider the following vectors x and y. x=[1,1,1,1] y=[2,2,2,2].

Calculate:

i) Cosine Similarity

ii) Euclidean distance. **[3]**

OR

Q4) a) Explain with suitable example K-medoids algorithm. **[8]**

b) Differentiate between the following: **[6]**

i) Partitioning and hierarchical clustering

ii) Centroid and average link hierarchical clustering

iii) Symmetric and asymmetric binary variables.

c) How the Manhattan distance between the two objects is calculated? **[3]**

Q5) a) What is Web content mining? Explain in brief. **[7]**

b) Assume 'd' is the set of documents and 't' is the term. Write the formulas to determine. **[8]**

i) Term frequency freq(d, t)

ii) Weighted term frequency TF(d, t)

iii) Inverse document frequency IDF(t)

iv) TE-IDF measure TF-IDF(d, t)

c) What is Web crawler? **[2]**

OR

Q6) a) Compare the different text mining approaches. **[9]**

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

i) Recommender system

ii) Inverted index

iii) Feature vector

iv) Signature file.

Q7) a) Explain with neat diagram systematic machine learning framework. **[8]**

b) Write short notes on: **[8]**

i) Big data

ii) Multi-perspective decision making.

OR

Q8) a) What is reinforcement learning? Explain. **[8]**

b) Write short notes on: **[8]**

i) Wholistic learning

ii) Machine learning

Total No. of Questions : 10]

SEAT No. :

P3111

[Total No. of Pages : 2

[5154]- 678

B.E. (Computer Engineering)

PROBLEM SOLVING WITH GAMIFICATION

(2012 Pattern) (Semester - I) (End Sem.) (Elective - II) (410445 A)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Attempt question Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Assume suitable data, if necessary:***

Q1) a) Explain the significance of the phrase "House always wins" in the context of Gamification? **[5]**

b) How Gamification could be employed to improve the efficiency of an individual. **[5]**

OR

Q2) a) With suitable example explain SAPS (status, acess, power, stuff) **[5]**

b) What is Loyalty? How Loyalty useful to have customer engagement of Airline travel? **[5]**

Q3) a) Why people play games. **[2]**

b) What are the different types of players? **[8]**

OR

Q4) a) What is motivation? Why is it required? **[2]**

b) Explain Intrinsic and Extrinsic motivation in detail. **[8]**

Q5) a) How Levels and Leader boards acts as game mechanics for Designing games? **[5]**

b) How the engagement or participation of user can be increased in social Networking. **[10]**

c) What do you mean by game dynamics? **[3]**

OR

P.T.O.

Q6) a) Describe significance of following points with respect to designing of game? **[5]**

i) Experience points
ii) Redeemable points
iii) Skill points
iv) karma points
v) Reputation points.

b) Describe role of Components, Mechanics and Dynamics with respect to gamification? **[10]**

c) Define Game Aesthetics in short? **[3]**

Q7) a) Discuss How Gamification applied to Marketing Industry for product promotion. **[10]**

b) For a game of your choice, write pseudo code to identify different levels for player activities. **[6]**

OR

Q8) a) Discuss How Gamification applied to Health care Industry. **[10]**

b) How engagement of user can be increased with the help of game mechanics? **[6]**

Q9) a) What are the facility available on mambo platform to improve e-learning and training activity? **[8]**

b) List and explain required features of any gamification tool for discussion forum? **[8]**

OR

Q10)a) How the customers loyalty can be increased using the feature provided by Bigdoor? **[8]**

b) List the advantage of any Gamification tool. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3112

[Total No. of Pages : 2

[5154]- 679

B.E. (Computer Engineering)

PERVASIVE COMPUTING

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

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Attempt question Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Outline five core properties that characterize UbiCom system. **[5]**

b) Explain how CoolTown model can be implemented at workplace and home. **[5]**

OR

Q2) a) Discuss smart dust and tiny OS. **[5]**

b) How dynamic adaptation is performed in IBM's transcoding application. **[5]**

Q3) a) Why user interfaces are primarily visible? Discuss benefits of using auditory interface. **[5]**

b) What is PostHuman technology model? **[3]**

c) Define Planned action & situated action. **[2]**

OR

Q4) a) What are different design characteristics of iHCI model? **[5]**

b) Write short note on device connectivity. **[5]**

Q5) a) Explain core capabilities for context aware applications. **[5]**

b) Write short note on Contextual services. **[5]**

c) Discuss "Odyssey" system and comment whether it is uses application-level or System-level adaptation. **[8]**

OR

P.T.O.

Q6) a) Discuss actuator services in detail. **[6]**

b) What is meaning of following terms in adaptation: **[6]**

Agility, Fidelity & concurrency

c) What is mobile agent? Give it's architecture. **[6]**

Q7) a) Explain various security issues & challenges in Pervasive Computing. **[8]**

b) Define Authentication & authorization in detail with any case study as an example. **[8]**

OR

Q8) a) Explain Social networking & media exchange example for smart interaction. **[8]**

b) What is Secure resource discovery. **[4]**

c) Give collaborative defense strategies for Network Security. **[4]**

Q9) a) Explain graduated levels & system support for each of UbiCom property. **[5]**

b) Write short note on seven challenges highlighted by Grinter & Edwards for using ubiquitous applications in smart environment. **[7]**

c) Differentiate in between Human Intelligence & Machine Intelligence. **[4]**

OR

Q10)a) Review following technologies & justify whether they are disruptive or sustaining technologies: Mobile, Radio, email and eBook **[8]**

b) Compare and contrast the following techniques for lowering energy use:

i) Passive electronic components. **[8]**

ii) MEMS

iii) Energy harvesting

iv) Ultra-capacitors and fuel cells.

Total No. of Questions : 10]

SEAT No. :

P3113

[Total No. of Pages : 2

[5154]- 680
B.E. (Computer)
EMBEDDED SECURITY
(2012 Pattern) (Semester - I) (Elective - II) (End Sem.)

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

Q1) a) Explain in detail CVSS (Common Voluntary Scoring System) with its advantages and limitations? **[6]**

b) What is the difference between Embedded Security and Embedded system security? **[4]**

OR

Q2) a) Explain in brief BYOD with its advantages, disadvantages and security considerations? **[6]**

b) What is TrustZone? Why do we need a Trusted Execution Environment? **[4]**

Q3) a) Explain in detail next generation EPID? **[4]**

b) Explain in detail Ring-3 root kit attack and its components and limitations. **[6]**

OR

Q4) a) Explain the buliding blocks of the security and the management engine? **[4]**

b) Explain in detail memory protection control for threat analysis and mitigation in security and management engine? **[6]**

Q5) a) Explain in detail : Intel Boot Guard and clearly state the difference between measured boot and verified boot? **[8]**

b) Explain how Software can use a Trusted Platform Module to authenticate hardware devices? **[8]**

OR

P.T.O.

Q6) a) Explain in detail Architecture for Embedded IPT (Intel Platform Trust Technology)? **[8]**

b) Explain the different types of boot attacks? **[8]**

Q7) a) Explain in brief Digital Rights Management (DRM) with suitable block diagram? **[6]**

b) Explain DAL Architecture with neat diagram? **[6]**

c) Write a short note on : Intel Wireless display (WiDi)? **[5]**

OR

Q8) a) Explain in detail End-to-End Content Protection? **[6]**

b) Explain in detail the Closed-Door Model? **[6]**

c) Explain in detail HDCP (High bandwidth digital content protection)? **[5]**

Q9) a) Explain the key properties of IoT that create several issues for security and raises additional requirements for security? **[6]**

b) Explain the Building Blocks for Embedded Security? **[6]**

c) Write a note on Protected Input and Output? **[5]**

OR

Q10)a) Explain the High Security Requirements for IoT? **[6]**

b) Explain how embedded security is provided for IoT (Internet of Things). **[6]**

c) Explain in short : Anonymous Authentication and Secure Session Establishment? **[5]**

Total No. of Questions : 9]

SEAT No. :

P3114

[Total No. of Pages : 2

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B.E. (Computer Engineering)

MULTIDISCIPLINARY NATURAL LANGUAGE PROCESSING

(2012 Pattern) (Elective - II) (End Sem.) (410445 D) (Semester - I)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Q.9 is Compulsory.***
2) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain with suitable example : Scope Ambiguity. **[6]**

b) Write a note on : Metaphors. **[4]**

OR

Q2) a) What is Lexical Knowledge Networks? Explain in brief. **[6]**

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

(i) Language Modeling (ii) Discourse Processing

Q3) a) Draw FST for the following words : **[6]**

heavy, heavier, heaviest.

b) Enlist Various Unsupervised Methods in NLP. Explain any one method in short. **[4]**

OR

Q4) a) Explain the term : **[6]**

(i) Log-Linear Models (ii) HMM Ergodic models

b) What is HMM? Why HMM is called as 'Doubly Embedded Stochastic process'? **[4]**

Q5) a) What is Auditory physiology ? Explain with suitable example, The Physiology of Speech Production. **[8]**

b) Explain in terms: **[8]**

(i) Speech Perception (ii) Speech Synthesis.

OR

P.T.O.

Q6) a) Compare adaptation level phenomenon with Sentence-level Phenomena. **[8]**

b) What is Speech Processing? Explain in detail, the Biology of Speech Processing. **[8]**

Q7) a) Explain in detail : Lexical Knowledge Networks. **[8]**

b) Give Various approaches of Word Sense Disambiguation. **[8]**

OR

Q8) a) Give the importance of Multilingual Dictionaries with Bilingual Dictionaries. **[8]**

b) What is the significance of Semantic Roles in linguistic theory? Explain with example. **[8]**

Q9) Write a short Note on : (Any Three) **[18]**

a) Text Entailment.

b) Web mining and Text mining.

c) Robust and Scalable Machine Translation.

d) Database interface in NLP.

e) Natural Language Tool Kit (NLTK) in Programming Language.

Total No. of Questions :10]

SEAT No. :

P3115

[Total No. of Pages :2

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B.E. (Computer Engineering)

SOFTWARE DESIGN METHODOLOGIES AND TESTING

(2012 Pattern) (Semester - II) (410449)

Time : 2½Hours] *[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 briefly Web Service Protocols. **[5]**

OR

Q2) a) Draw use case diagram for online digital Library information system with all advanced notations. **[5]**

b) What are the major classification of design pattern? Explain in breif with few example patterns under each class. **[5]**

Q3) a) What do you mean by software design? Explain its importance. **[5]**

b) What is singleton pattern? Explain one example scenario where you will singleton pattern to get applied. **[5]**

OR

Q4) a) What is 4+1 architecture view model? Explain with suitable diagram. **[5]**

b) Describe Real time Software architecture in brief. **[5]**

Q5) a) Explain V test model with suitable block diagram? **[8]**

b) Differentiate between verification and validation? **[8]**

OR

P.T.O.

Q6) a) Explain various principle of testing? **[8]**

b) What is defect management? Discuss the generic steps in defect management process? **[8]**

Q7) a) Explain Equivalence partitioning and Boundary value analysis in black box testing. **[6]**

b) Explain system testing. What is the significance of system testing? **[6]**

c) For the given piece of code, draw flow graph and compute the cyclomatic complexity of the same. **[6]**

```
int f1(int x,int y)
        {
while (x != y)
        {
if (x>y) then
        x=x-y;
else y=y-x;
        }
return x;
        }
```

OR

Q8) a) Differentiate between alpha and beta testing. **[6]**

b) Explain integration testing? Explain Big-bang approach of integration testing? **[6]**

c) What is unit testing? List the benefits of unit testing. **[6]**

Q9) a) Difference between functional and nonfunctional testing. **[8]**

b) Differentiate between automated and manual testing? **[8]**

OR

Q10)a) What is mobile testing? Mention the challenges in mobile testing? **[8]**

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

i) JUnit

ii) Selenium

EEE

Total No. of Questions : 8]

SEAT No. :

P3116

[Total No. of Pages : 2

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B.E. (Computer Engineering)

HIGH PERFORMANCE COMPUTING

(2012 Pattern) (Semester -II) (410450) (End Sem.)

Time : 2 ½ Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***First Two Questions are Compulsory. Answer three questions [(Q.3 or Q.4), (Q.5 or Q.6), (Q.7 or Q.8)].***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume Suitable data if necessary.***

Q1) a) What are applications of Parallel Computing? **[4]**

b) Explain Granularity, Concurrency, and Dependency Graph **[6]**

Q2) a) What are principles of Message Passing Programming **[6]**

b) Explain Non-Blocking communications using MPI. **[4]**

Q3) a) Describe Logical Memory Model of a thread? **[7]**

b) Why synchronization in important? Enlist Thread APIs for Mutex Synchronization. **[8]**

OR

Q4) a) Implement Merge sort using synchronization primitives in Pthreads. **[7]**

b) Illustrate importance of read-write lock for Shared address space Model. **[8]**

Q5) a) What are different partitioning techniques used in Matrix-Vector Multiplication. **[7]**

b) Describe Cannon's Algorithm for Matrix multiplication with suitable example. **[8]**

OR

Q6) a) Describe different techniques for Latency Hiding. **[7]**

b) How Latency Hiding is different than Latency Reduction? **[8]**

P.T.O.

Q7) a) Write a short note on (Any Two) **[15]**

i) Parallel Depth-First-Search.

ii) Search Overhead Factor.

iii) Power Aware Processing.

b) Elucidate Thread Organization in detail. **[5]**

OR

Q8) a) Write a short note on (Any Two) **[15]**

i) Distributed Memory.

ii) Optical Computing.

iii) Green Computing.

b) Intricate sorting issues in parallel computers. **[5]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3117

[Total No. of Pages :2

[5154]-684

B.E. (Computer Engineering)

MOBILE COMPUTING

(2012 Course) (Semester - II) (Elective-III) (End Sem.) (410451A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Compare Wired and Wireless Networks based on advantages and disadvantages. **[5]**

b) Explain using block diagram the process of authentication in a GSM Service. **[5]**

OR

Q2) a) Why CSMA/CD is not used in Wireless Networks? **[5]**

b) Explain WPAN and WLAN with one example of each and what is WiMAX? **[5]**

Q3) a) Explain different wireless switching Techniques. **[5]**

b) Explain various mobile operating systems and their features. **[5]**

OR

Q4) a) Differentiate between CDMA and TDMA. **[5]**

b) What is handover? When handover in mobile communication take place? **[5]**

Q5) a) Describe the registration of a visiting mobile node on handover. **[6]**

b) What do you mean by tunneling, encapsulation and de-capsulation? How does a tunnel differ from a route? **[6]**

c) Explain Mobile TCP? Give the advantages and disadvantages of Mobile TCP. **[6]**

OR

P.T.O.

Q6) a) What is MANET? Explain DSR protocol in detail. **[6]**

b) In tunneling, why the "Time to Live" is set to one when IP packet tunnels from the home to the foreign agent? **[6]**

c) Explain Snooping TCP. Give the advantages and disadvantages of Snooping TCP. **[6]**

Q7) a) Explain what do you mean by data dissemination? **[5]**

b) What do we mean by selective tuning? Discuss the methods used for selective tuning. **[7]**

c) Explain the synchronization process. **[4]**

OR

Q8) a) Describe Push-based data-delivery mechanism. What are the advantages and disadvantages of Push-based data-delivery? **[8]**

b) Explain the reason for communication asymmetry in mobile network. Give examples of asymmetric communication architecture for data dissemination. **[8]**

Q9) a) What is mobile agent? Explain in detail the advantages of using a mobile agent. **[8]**

b) Explain basic characteristics of mobile operating systems and write difference between iOS and Android OS. **[8]**

OR

Q10)a) Explain the requirments of a mobile file system over the conventional one, also describe CODA file system. **[8]**

b) Write Short note on. **[8]**

i) Mobile-agent-based architecture

ii) Android application development platform.

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3118

[Total No. of Pages :2

[5154]-685

B.E. (Computer Engineering)

WEB TECHNOLOGY

(2012 Pattern) (Semester - II) (End Sem.) (410451B) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, and Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) What is the difference between IoT, IoE and M2M? **[6]**

b) What are the Risks to a Smart City IoT Platform? **[4]**

OR

Q2) a) What is Internet of things with its elements? **[6]**

b) Which four pillars support Internet of things. **[4]**

Q3) a) Explain, how SMARTIE strengthen security, privacy and trust at different IoT Layers. **[8]**

b) Write uses of smart transportation? **[2]**

OR

Q4) a) What are four aspects in business to Master IoT. **[8]**

b) Write functionality of sensor node. **[2]**

Q5) a) Explain the difference between Data Interoperability and Semantic Interoperability? **[8]**

b) What are the standardization related to Iot? Explain the importance of Standardization with respect to Internet of Things. **[8]**

OR

Q6) a) Describe the Dimensions of Interoperability briefly. **[8]**

b) Explain in detail the deployment scenario for OGC sensor web enablement. **[8]**

P.T.O.

Q7) a) Explain why identity management is important in IoT. Discuss Identity portrayal in detail. **[8]**

b) Discuss the difference between Local identity and Network identity. **[8]**

OR

Q8) a) Explain **[10]**

i) User-centric identity management

ii) Device-centric identity management

b) Explain the need of identity management in Internet of Things. **[6]**

Q9) a) Write Short Note on Identity Trust Paradigms w.r.t. : **[12]**

i) Third Party Approach

ii) Public Key infrastructure?

b) Explain the difference between Attribute certificate and public key certificate. **[6]**

OR

Q10)a) Write short note on **[12]**

i) Web of trust models

ii) Fuzzy approach for trust

b) Explain the Authentication and Access control policies w.r.t. to IoT. **[6]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3119

[Total No. of Pages :2

[5154]-686

B.E. (Computer Engineering)

CLOUD COMPUTING (Elective - III)

(2012 Pattern) (Semester - II) (End Semester) (410451C)

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 conceptual architecture of Open Stack and its modes of operation. **[5]**

b) List and explain primary challenges in cloud computing. **[5]**

OR

Q2) a) Explain different operational and economical benefits of using cloud. **[5]**

b) Elaborate role of Grid Computing technologies in Cloud Computing. **[5]**

Q3) a) What do you mean by virtualization? Differentiate between full virtualization and para virtualization. **[5]**

b) Write a short note on : HDFS. **[5]**

OR

Q4) a) Discuss the significance of Hypervisor in cloud? Define Server virtualization and Application virtualization. **[5]**

b) Write a short note on : GFS(Google File System). **[5]**

Q5) a) Explain virtual machine migration techniques in detail. **[8]**

b) Elaborate Anatomy of cloud infrastructure. **[8]**

OR

Q6) a) Explain scheduling techniques in cloud computing. **[8]**

b) Explain VM provisioning process in detail. **[8]**

P.T.O.

Q7) a) Write a short note on : Federated Cloud Computing. **[6]**

b) Differantiate SOAP v/s REST. **[6]**

c) Explain key components of SLA. **[6]**

OR

Q8) a) Differentiate HPC v.s. Cloud Computing. **[6]**

b) Compare performance of HPC system and HPC on cloud. **[6]**

c) Explain Life Cycle of SLA. **[6]**

Q9) a) Explain technologies for Data Security in cloud Computing. **[8]**

b) Write a short note on : Security-As-A-Cloud service. **[8]**

OR

Q10)a) List and explain risks in cloud computing. **[8]**

b) Write a short note on : Identity management and access control in cloud computing. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P3120

[Total No. of Pages :2

[5154]-687

B.E. (Computer Engineering)

CYBER SECURITY (Elective - III)

(2012 Pattern)(Semester - II) (End Sem) (410451D) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is cryptanalysis? Expalin various cryptanalysis techniques. **[5]**

b) Using Playfair cipher encrypt message. "We live in a world full of beauty" use key "ANOTHER" **[5]**

OR

Q2) a) Draw and explain operational model of network security. **[5]**

b) Explain the operation in key Expansion process in AES algorithm. **[5]**

Q3) a) Explain Ciper Feedback Mode(CFB) Block cipher. **[5]**

b) What is weak key in DES algorithm? Explain with example. **[5]**

OR

Q4) a) Use RSA algorithm to encrypt the plaintext "3" use following parameters p = 11, q = 3, e = 13 **[5]**

b) What is authentication? Explain various methods for authentication. **[5]**

Q5) a) Explain working of PGP algorithm in detail. **[9]**

b) Explain the operation of Secure Socket Layer(SSL) protocol in detail. **[8]**

OR

Q6) a) Explain ISAKMP protocol of ISPEC. **[6]**

b) What is VPN? Explain types of VPN. **[6]**

c) List and explain various participants involved in Secure Electronic Transaction(SET). **[5]**

P.T.O.

Q7) a) What are the challenges of intrusion detection. **[6]**

b) List and explain any two password management practices. **[6]**

c) What are the various characteristics of firewall. **[5]**

OR

Q8) a) Explain various types of firewall. **[6]**

b) Explain anomaly-based intrusion detection system. **[6]**

c) What is Trusted System. **[5]**

Q9) a) What is War dialing for remote connectivity? Explain software used for war dialing. **[8]**

b) Explain attacks and counter measures on application and data with examples. **[8]**

OR

Q10)a) What is VOIP hacking? What are the counter measures for it? **[8]**

b) Explain various hacking devices used for hacking. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3121

[Total No. of Pages : 3

[5154]-688

B.E. (Computer Engineering)

BUSINESS ANALYTIC AND INTELLIGENCE

(2012 Pattern) (Semester -II) (Elective-IV (A))

(End Sem.) (410452A)

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

Instructions to the candidates:

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

Q1) a) Explain Business Intelligence Cycle with suitable diagram. **[5]**

b) What are the factors responsible for successful Business Intelligence project. **[5]**

OR

Q2) a) Explain Decision Support System with its limitations. **[5]**

b) Explain any one application of Decision Support System in detail. **[5]**

Q3) a) Explain the data warehouse architecture with its components. **[5]**

b) Differentiate between Snowflake schema and Fact Constellation (Galaxy) Schema with suitable example. **[5]**

OR

Q4) a) Describe top down approach for designing Data warehouse. **[5]**

b) Explain the Extract-Transform-Load (ETL) process. **[5]**

Q5) a) What is the need of data pre-processing? Explain various data transformation techniques. **[6]**

b) Explain concept hierarchy generation for categorical data. **[5]**

c) Explain HOLAP and DOLAP in detail. **[6]**

OR

P.T.O.

Q6) a) Explain clustering-based outlier analysis. **[6]**

b) Suppose that the data for analysis includes the attribute age. The age values for the data tuples are (in increasing order) 13,15,16,16,19,20,20,21,22,22,25,25,25,25,30,33,33,35,35,35,35, 36,40,45,46,52,70. **[6]**

i) What is the mean of the data?

ii) What is the mode of the data? Comment on the data's modality (i,e., bimodal, trimodal, etc.)

iii) Give the five-number summary of the data.

c) Discuss different methods for handling noisy data in the data cleaning process. **[5]**

Q7) a) Explain the important factors to consider while planning for availability of Business Intelligence system. **[8]**

b) Write short note on business continuity. **[5]**

c) Explain the term "Resilience" in the context of business continuity. **[4]**

OR

Q8) a) Explain Security Management in terms of Business Intelligence infrastructure. **[6]**

b) Explain the usage of Business Intelligence tools to handle Business Intelligence Infrastructure. **[6]**

c) Explain steps in designing business Intelligence system. **[5]**

Q9) a) Explain Business Analytics with suitable example. **[6]**

b) Assume a suitable banking database and use appropriate Business Intelligence technique to classify whether the customer is eligible to get the loan or not. **[6]**

c) How Business Intelligence is applied in CRM? **[4]**

OR

Q10) Explain the applications of Business Intelligence in:

a) Fraud Detection. **[5]**

b) Telecommunications. **[5]**

c) Market Basket Analysis. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P3122

[Total No. of Pages : 4

[5154]-689

B.E. (Computer Engineering)

OPERATION RESEARCH FOR ALGORITHMS IN SCIENTIFIC APPLICATIONS

(2012 Pattern) (Elecitve-IV) (Open Elective) (EndSemester) (Semester - II) (410452B)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q4, 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) Define Operations Research and explain the methodology of Operations Research. **[5]**

b) What do you understand by Deterministic and Probabilistic models with reference to Operations Research. **[5]**

OR

Q2) a) Formulate the following problem as linear programming problem Let us consider a company making single product. The estimated demand for the product for the next four months are 1000,800,1200,900 respectively. The company has a regular time capacity of 800 per month and an overtime capacity of 200 per month. The cost of regular time production is Rs.20 per unit and the cost of overtime production is Rs.25 per unit. The company can carry inventory to the next month and the holding cost is Rs.3/unit/month the demand has to be met every month. Formulate a linear programming problem for the above situation. **[5]**

b) Solve following system of equation with graphical method. **[5]**

$x_1 + 7x_2 = 4$

$x_1 + 5x_2 = 5$

$2x_1 + 3x_2 = 9$ such that $x_1, x_2 > 0$.

P.T.O.

Q3) a) Solve following LP Problem using Simplex Method. **[5]**

Maximize $Z = 4x_1 + 3x_2$ subject to the constraints.

$8x_1 + 6x_2 \leq 25,\ 3x_1 + 4x_2 \leq 15$ and $x_1, x_2 \geq 0.$

b) Describe steps of Simplex algorithm for obtaining an optimal solution to a linear programming problem. **[5]**

OR

Q4) a) State the steps of solving Assignment Problem. **[5]**

b) Obtain an initial basic feasible solution, using the north-west corner rule for the following transportation problem. **[5]**

	Demand 1	Demand 2	Demand 3	Availability
Source 1	2	7	4	5
Source 2	3	3	1	8
Source 3	5	4	7	7
Source 4	1	6	2	14
Demand	7	9	18	34

Q5) a) Paraphrase summary of various types of queuing models. **[8]**

b) Solve the following game with Pay-off matrix. **[5]**

	B1	B2	B3	B4
A1	1	7	3	4
A2	5	6	4	5
A3	7	2	0	3

c) In a game of matching biased coins, player A gets Rs 8 if two heads turn up and Rs 1 if two tails turn up. Player B gets Rs 3 if it is otherwise. Solve the game. **[5]**

OR

Q6) a) Discuss with respect to game theory **[10]**

i) Two person Zero Sum Games.

ii) Games with Saddle Point.

iii) Games without Saddle Point.

iv) Dominance Property.

b) A TV repairing man finds that the time spent on repairing has an exponential distribution with mean 30 minutes per unit. The arrival of TV sets is Poisson with an average of 10 sets per day of 8 hours. What is his expected idle time per day? How many sets are there on the average? **[8]**

Q7) a) Describe following terminologies with PERT Chart **[8]**

i) Total Float.

ii) Free Float.

iii) Independent Float.

iv) Dummy Arrows in a network.

b) For the following activity data draw the network, find the critical path and float for each activity. **[8]**

Activity	1-2	1-4	2-3	3-5	3-8	4-8	5-6	5-8	6-7	7-8	7-9	8-9	9-10
duration	4	36	2	15	10	2	4	9	9	9	8	20	20

OR

Q8) a) Explain various application area of PERT / CPM techniques. **[8]**

b) Explain algorithm of finding critical path. **[8]**

Q9) a) What is Dynamic programming? Describe mathematical model of Bellman's Principal of optimality. **[8]**

b) Explain Mathematical formulation of Multistage Model. **[8]**

OR

Q10)a) What is importance of decision tree with respect to Dynamic Programming? State a sufficient condition for two stage optimization problem to be solved by Dynamic programming. **[8]**

b) Describe the recursive equation approach to solve dynamic programming problem. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P3123

[Total No. of Pages : 2

[5154]-690

B.E. (Computer Engineering)

MOBILE APPLICATIONS (Elective - IV)

(2012 Pattern) (Semester - II) (End Sem.) (410452C)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is WAP1 ? Explain in detail. **[4]**

b) Explain third party frameworks. Explain anyone in detail. **[6]**

c) State the mobile myths. **[2]**

OR

Q2) a) Explain JSON in detail. **[4]**

b) Explain Debugging of Web Services. **[6]**

c) Which tools are used for mobile web development? **[2]**

Q3) a) Explain strategies used for design & user experience. **[6]**

b) Explain browsers and web platform in detail. **[6]**

OR

Q4) a) Explain: **[6]**

i) WML

ii) CSS for mobile

b) Explain HTML5 compatibility levels in detail. **[6]**

P.T.O.

Q5) a) Explain XHTML mobile profile in detail. **[5]**

b) Explain elements for HTML5 form with their example. **[7]**

c) What is document body? **[3]**

OR

Q6) a) How web apps are installed? Explain with example. **[5]**

b) Explain debugging and performance for Mobile media. **[7]**

c) Explain server side detection for mobile media. **[3]**

Q7) a) Explain J2ME and JQuery Mobile. **[7]**

b) Explain: **[8]**

i) iUI

ii) jQTouch

OR

Q8) a) State difference between Java & Mobile Libraries. **[7]**

b) Explain UI frameworks in details. **[8]**

Q9) a) Explain storage and network for mobile apps. **[6]**

b) How mobile apps are executed in background? **[6]**

c) What is ENYO? **[4]**

OR

Q10)a) Explain JQuery Mobile with example. **[6]**

b) Explain distribution and social web 2.0. **[6]**

c) What is use of offline apps? Explain with example. **[4]**

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Total No. of Questions : 10]

SEAT No. :

P4838

[Total No. of Pages : 3

[5154]-690-B

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

PROGRAMMING PARADIGMS FOR COMPLEX PROBLEMS-CASE STUDIES IN PYTHON

(2012 Pattern) (Open Elective)

Time : 2.30 Hours] *[Maximum Marks : 70*

Instructions to the candidates:

1) ***Attempt questions Q1 or Q2,Q3 or Q4 Q5 or Q6, Q7 or Q8 and Q9 or Q10.***
2) ***Assume suitable data, if necessary. Neat Diagrams must be drawn whenever necessary.***

Q1) a) What is a sequence? What is permutation of sequence? With suitable example discuss CONS and APPEND operation of sequence. **[6]**

b) Write assertion for program that computes intermediate results the quotient and remainder arising from dividing a non negative integer by a positive integer. **[4]**

OR

Q2) a) What is type system? How type system acts as tools for reasoning about programs. **[6]**

b) Specify Typing rules for Booleans with respect to typing relations. **[4]**

Q3) a) What do you mean by proof by induction? State AXIOM for principle of induction on NATURAL numbers. **[6]**

b) Specify Typing rules for numbers with respect to typing relations. **[4]**

OR

Q4) a) What are features of Declarative programming paradigms? **[4]**

b) State and explain rule of substitution and transitivity with respect to proposition. **[6]**

P.T.O

Q5) a) Give a recursive definition of fibonacci series 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) $0 + n = n = n + 0$

ii) $1 * n = n * 1$

iii) $K + (m + n) = (K + m) + n$

OR

Q6) a) Describe following evaluation policies for program defined functions. **[9]**

i) Innermost Evaluation

ii) Outermost Evaluation

b) What are higher order functions? with suitable example demonstrate the significance of higher order functions. **[9]**

Q7) a) What are strict and Non-strict functions? Enlist advantages of the same. **[8]**

b) Describe role of List constructor and selector. **[8]**

OR

Q8) a) Describe functionality of following build-in functions **[8]**

i) itertools.chain ( )

ii) itertools.chain.from_iterable ( )

iii) zip ( )

iv) itertools.zip_longest ( )

b) What are curried functions? How curried functions are useful for expression evaluation? **[8]**

Q9) a) Discuss significance of FAB tool for execution of tasks. **[8]**

b) What are responsibilities of module developer during installing third party modules? **[8]**

OR

Q10) a) What is Relation between distribution and package? **[8]**

b) What is referential transparency? How it is important for expression evaluation? **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3124

[Total No. of Pages : 2

[5154]-690-C

B.E. (Computer Engineering)

CONCURRENCY ON OPEN SOURCE SYSTEMS

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

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

Q1) a) What are deadlocks? How these are detected? **[5]**

b) Explain "Sleeping Barber" problem. **[5]**

OR

Q2) a) Explain clocking problem in distributed systems. **[5]**

b) Explain the global snapshot problem in distributed system. **[5]**

Q3) a) What is RMI? Explain the difference between RMI and RPC. **[5]**

b) Explain syntax structure of the Calculus of Communicating Systems (CCS). **[5]**

OR

Q4) a) Explain program expression strategies to express communication. **[5]**

b) Explain event driven calls for signal with example. **[5]**

Q5) a) Explain in detail a message passing architecture. **[10]**

b) What are the different models of computation for concurrent processing? **[8]**

OR

Q6) a) Explain communication of processes in concurrent system. **[6]**

b) Explain how messages are implemented via shared memory. **[6]**

c) Explain message passing through open binder in client server systems. **[6]**

P.T.O.

Q7) a) Explain graph theoretical modeling of resource deadlocks. **[8]**

b) Differentiate between sequential and distributed computing. **[8]**

OR

Q8) a) Explain operational semantics of the CCS calculus. **[8]**

b) Differentiate between true concurrency and Pseudo concurrency. **[8]**

Q9) a) Describe operational semantics and algebraic semantics with respect to CSP. **[8]**

b) How will you avoid deadlocks while simultaneously updating register? **[8]**

OR

Q10) a) Explain Denotational semantics w.r.t. CSP. **[4]**

b) What is the use of bully algorithm? Model it using CSP. **[6]**

c) Explain ring algorithm. How it is modeled using CSP? **[6]**

Total No. of Questions : 10]

SEAT No :

P 3125

[Total No. of Pages :2

[5154]-691
B.E.(Information Technology)
INFORMATION AND CYBER SECURITY
(2012 Course) (414453)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers Question 1 or 2, 3 or 4, 5 or 6, 7 or 8 and 9 or 10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Compute the inverse of 17 in mod 23 arithmetic. Show steps clearly. **[6]**

b) State Euler's theorem. **[4]**

OR

Q2) a) Show with proper working that 13 is a primitive root of 19. **[6]**

b) In Diffie-Hellman key exchange between two parties A and B where A picks his secret as 9 and B picks his secret as 6. Apply 13 as the primitive root of 19, for this Diffie-Hellman exchange and show the shared secret. Show the math working steps clearly. **[4]**

Q3) a) What do you mean by cryptanalysis. Mention the applications of public key cryptography. **[6]**

b) List out the problems of one time pad. **[4]**

OR

Q4) a) Write down the purpose of S-box in DES. **[6]**

b) Give the types of attacks with examples. **[4]**

Q5) Consider the following threats to web security and describe how each is countered by particular feature of SSL. **[16]**

a) Brute force attacks.
b) Known plaintext attacks.
c) Replay attacks.
d) Man-in-the-middle attacks.
e) Password sniffing.
f) IP spoofing.
g) IP hijacking.
h) SYN flooding.

OR

P.T.O.

Q6) a) What is the difference between tunnel and transport mode in IPSEC And how does it defend replay attacks. **[8]**

b) What protocols comprise SSL? What is the difference between SSL connection and SSL session. **[8]**

Q7) a) What is the statistical anamoly detection and rule based instrusion detection and explain the differences between them. **[8]**

b) Consider a machine M1, hosting a https-based public website www.tech.net is it possible for an intruder with no access to M1 to setup a fake website with the same URL www.tech.net in his machine M2 and go unnoticed? **[8]**

OR

Q8) a) Explain in brief : trap doors, trojan horses, worms and zombies. **[8]**

b) With a neat diagram explain the process of digital signing and digital verification. **[8]**

Q9) Write notes on : **[18]**

a) Cyberstalking

b) Cybercrime and cloud computing

c) Phishing

OR

Q10) Write notes on : **[18]**

a) Social engineering attacks

b) ITA 2000

c) DoS and DDos attacks

Total No. of Questions : 10]

SEAT No. :

P3126

[Total No. of Pages : 2

[5154]-692

B.E.(Information Technology)

SOFTWARE MODELING AND DESIGN

(2012 Pattern) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw appropriate diagrams using UML 2.0 notations.***
4) ***Use of non programmable electronic calculator is allowed.***

Q1) a) Elaborate the keywords class, association name, association end name and multiplicity with an example. **[6]**

b) Elaborate extend, include with the context of use case diagram using an example. **[4]**

OR

Q2) a) Elaborate on association, aggregation and composition with an example. **[6]**

b) Write a short note on representation of constraints using UML2.0 **[4]**

Q3) a) Define a state, transition, entry, exit, and do action in the context of state diagram. **[6]**

b) Explain the expansion region in the context of activity diagram. **[4]**

OR

Q4) a) What is the relation between use cases and sequence diagram? Explain the keywords participants, time line, focus of control, synchronous message with respect to sequence diagram. **[6]**

b) Elaborate composite state and concurrent state with an example. **[4]**

Q5) a) Describe batch transformation and continuous transformation. **[8]**

P.T.O.

b) Write the purpose of deployment diagram. Draw & explain the following element of deployment diagram. **[8]**

i) Node
ii) Artifact
iii) Node instance

OR

Q6) a) Explain layered architecture & partitions. **[8]**

b) Draw component diagram for online shopping system. **[8]**

Q7) a) What is design pattern? Explain 4 essential elements of patterns. **[8]**

b) Explain the Design pattern documentation. **[8]**

OR

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

i) Observer design pattern.

ii) State design pattern.

b) Write the classification, motivation, class diagram and uses of adapter design pattern. **[8]**

Q9) a) Differentiates between Black box testing and white box testing. **[8]**

b) Draw and explain V-model of testing. **[10]**

OR

Q10)a) Test Driven development: Explain in brief **[8]**

b) Define software validation and software verification. **[10]**

Explain verification and validation concept by considering the following statements:-

i) Are we building the product right?

ii) Are we building the right product?

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Total No. of Questions : 10]

SEAT No. :

P3127

[Total No. of Pages : 2

[5154]-693
BE (IT)
MACHINE LEARNING
(2012 Pattern) (414455) (Semester-I) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Draw neat diagrams wherever necessary.***
2) ***Assume suitable data, if necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Write Mathematical form of the following: **[5]**

i) Classification

ii) Class probability estimation

iii) Regression.

Which one out of these three is more precise? Which one leads to overfitting?

b) Prove with an example FP=Neg-TN. **[5]**

OR

Q2) a) Write output code matrix for one-versus-one symmetric case. Assume three classes. **[5]**

b) Justify use of Machine Learning to solve following task: "Prediction of sale value of a car based on the locality of the property". **[5]**

Q3) a) Explain VC dimension. **[5]**

b) Explain kernel methods for non-linearity. **[5]**

OR

Q4) a) What is Machine Learning? Explain any one application where Machine Learning can be used. **[5]**

b) Explain Support Vector Machine. **[5]**

P.T.O.

Q5) a) Find all 3 -item itemsets from this set with minimum support=2. **[9]**

Trans_id	Itemlist
T1	{K, A, D, B}
T2	{D, A, C, E, B}
T3	{C, A, B, E}
T4	{B, A, D}

b) Write K-means algorithm. **[9]**

OR

Q6) a) Explain silhouettes. **[9]**

b) Discuss various distance measures. **[9]**

Q7) a) Write a note on compression based models. **[8]**

b) Explain Naive Bayes Classification Algorithm. **[8]**

OR

Q8) a) Define the terms: **[8]**

i) Bernoulli distribution

ii) Binomial distribution

iii) Multinomial distribution

iv) Gaussian distribution

b) Explain discriminative learning. **[8]**

Q9) a) Explain on-line learning. **[8]**

b) Explain multi task learning **[8]**

OR

Q10)a) Explain the concept of penalty and award in reinforcement learning. **[8]**

b) Explain ensemble learning. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3128

[Total No. of Pages : 2

[5154]-694

B.E. (Information Technology)

SOFT COMPUTING

(2012 Pattern) (Elective - I) (Semester - I) (414456A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is soft computing? Explain its components. **[6]**

b) What are performance issues in Error Back Propagation Algorithm. **[8]**

c) Explain resonance in Adaptive - Resonance - Theory networks with diagram. **[6]**

OR

Q2) a) Comment on the nature of problems solved with soft computing. **[6]**

b) What are the weaknesses of EBP algorithm? **[8]**

c) Explain how Neural networks can be used for clustering task. **[6]**

Q3) a) What is meant by fuzzy logic? Illustrate it with examples. **[8]**

b) Explain the Alpha-cut method for discrete fuzzy sets to perform arithmetic operations: **[8]**

i) Addition

ii) Division

OR

Q4) a) List out the characteristics features of fuzzy systems. **[8]**

b) List and explain following fuzzy set operations with example. **[8]**

i) Normal fuzzy set

ii) Product of fuzzy set

P.T.O.

Q5) a) Compare: **[8]**

i) evolutionary strategy and

ii) evolutionary programming

b) Explain the basic operations in Genetic Algorithms **[8]**

OR

Q6) a) Explain how Genetic Algorithms are different from Evolutionary Strategy. **[8]**

b) With the neat flowchart explain operation of evolutionary programming. **[8]**

Q7) a) Describe an application how soft computing can be used in semantic web. **[9]**

b) Describe applications of Evolutionary Computing in image processing. **[9]**

OR

Q8) a) Describe an application how soft computing can be used in information retrieval. **[9]**

b) Describe an applications of fuzzy for character recognitions. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3129

[Total No. of Pages : 2

[5154]-695
B.E. (I.T.)
USABILITY ENGINEERING
(2012 Course) (Semester - I) (Elective - I) (414456B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) How will you measure the usability Android OS Grid view Icons with respect to traditionally associated usability attributes? **[6]**

b) Define Usability. Explain cost saving with an example. **[4]**

OR

Q2) a) Explain Interface Evaluation with Severity Ratings. **[6]**

b) List & explain in short any four discipline contributing to HCI. **[4]**

Q3) a) Explain good error messages with example. **[6]**

b) What care will you take while designing the interface for the blind person. **[4]**

OR

Q4) a) List various issues related to interaction design. Explain in short with example. **[6]**

b) Why we require short cut keys in user interface. **[4]**

Q5) a) How Questionnaires & Interviews are helpful to understand user satisfaction about interface. **[10]**

b) Explain Test Budget in detail. **[8]**

OR

P.T.O.

Q6) a) Explain the importance of Experimenter in usability testing. **[10]**

b) Explain formative & Summative techniques of evaluation. **[8]**

Q7) a) List & explain guidelines for Internationalization. **[8]**

b) How Tutorials & Manuals are useful to understand user interfaces. **[8]**

OR

Q8) a) Explain dangers of standards in details. **[8]**

b) How Message box & Dialog box standards are helpful to provide information about user interface. **[8]**

Q9) a) Explain intelligent user interfaces with examples. **[8]**

b) Explain User Interface Management System. **[8]**

OR

Q10) Write a short note on (Any 2): **[16]**

a) Ethics of Usability.

b) Theoretical Solutions.

c) Organizational role and structure in usability.

Total No. of Questions : 8]

SEAT No. :

P3130

[Total No. of Pages : 2

[5154]-696

B.E. (Information Technology)

MODERN COMPILERS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data wherever necessary.***
4) ***Neat diagram must be drawn where ever necessary.***

Q1) a) Write Tree representation of a straight - line program statements: **[6]**

```
a = a + 10;
b = b + 20;
print(a, b);
```

b) Compare CISC machine and RISC machine architecture. What is the architecture of Pentium Processor? **[6]**

c) Explain copying garbage collection with a neat diagram. Write Cheney's algorithm and comment on its cost. **[8]**

OR

Q2) a) Define callee-save and caller-save registers. How do the use of registers save time for programming languages? **[6]**

b) What is a trace? Write the algorithm for traces generation. **[6]**

c) Explain reference counting for garbage collection. Discuss the problems with this technique using suitable example. **[8]**

Q3) a) Define inline expansion. Explain the rules for inline expansion. **[6]**

b) What are the facilities for testing class membership in Java? Explain type coercions and type cases in brief. **[6]**

c) Explain different techniques for optimization of lazy functional programming. **[6]**

OR

P.T.O.

Q4) a) Explain Higher-order functions and Functional programming language in brief. What are three flavors of Functional programming language? **[6]**

b) Explain call-by-name and call-by-need with respect to lazy evaluation. **[6]**

c) Explain tail position with suitable example. Write the steps to implement tail call. **[6]**

Q5) a) What is inter-procedural optimization? Describe different kinds of inter-procedural optimizations. **[8]**

b) Differentiate between register allocation and assignment? Discuss different approaches for the same. **[8]**

OR

Q6) 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]**

Q7) a) What are the different techniques to speed up dataflow analysis? **[8]**

b) Explain Worklist algorithm. **[4]**

c) What is incremental dataflow analysis? Explain any one technique to avoid repeated computation. **[4]**

OR

Q8) a) What are reasons for variable aliases? Explain variable aliases based on type and based on flow. **[8]**

b) What is reaching definitions?Write in and out definitions for reaching definitions. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3131

[Total No. of Pages : 2

[5154]-697
B.E. (I.T.)
PARALLEL ALGORITHMS AND DESIGN
(2012 Course) (Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) With respect to hypercube model, what is a hypercube connection? What is the diameter of an n-node hypercube? **[4]**

b) Design the parallel algorithm to construct merging network and use the same for merge sort. **[6]**

OR

Q2) a) Write bitonic merge sort algorithm. Explain the order of comparators being used in a bitonic merge sort algorithm for 'n' data values. **[5]**

b) What is PRAM model for parallel algorithms? What is the impact of eliminating shared write from PRAM? **[5]**

Q3) a) Write a short note on any 2 with respect to parallel computational model: **[6]**

i) Perfect shuffle computers

ii) Tree model

iii) Pyramid model

b) What is mean by speed up in parallel algorithms? How much performance gain is achieved by parallelizing a given application over a sequential implementation? **[4]**

OR

P.T.O.

Q4) a) Given A, a parallel algorithm with computation time t if parallel algorithm A performs m computational operations, then processor can execute algorithm A in time t+(m–1)/p. Prove this. **[6]**

b) What is Amdahls Effect? Explain. Also discuss Amdahls law. **[4]**

Q5) a) Explain the combinotorial algorithm with example. **[8]**

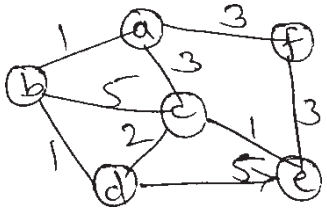
b) Analyse MESH Transpose. Check Mesh Transpose algorithm for optimality. **[8]**

OR

Q6) a) Explain Conjugate Gradient Method-Sequential Algorithm. **[8]**

b) Devise a PRAM algorithm to perform a pre order traversal of a rooted Binary tree. Is this algorithm cost optimal? **[8]**

Q7) a) What is MST? Solve Given problem using Kruskal parallel computing algorithm. **[10]**



b) Discuss hyperquick sort algorithm with an example. **[8]**

OR

Q8) a) Define Graph? State and explain type of Graphs with example. **[10]**

b) Explain the need of BFS Traversal of graph algorithm. **[8]**

Q9) a) What is computer algebra system? Draw and explain its framework. **[8]**

b) Explain Homomorphism-based Structured in Parallel Programming. **[8]**

OR

Q10)a) Explain the knapsack problem with branch and bound algorithm. **[8]**

b) Explain the terms and its stages with neat Diagram. **[8]**

i) Pipelines

ii) Homomorphism

Total No. of Questions : 10]

SEAT No. :

P3132

[Total No. of Pages : 2

[5154]-698
B.E.(I.T.)
CLOUD COMPUTING
(2012 Pattern) (End-Semester) (Semester-I) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer 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) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Describe in brief the services offered by cloud computing. **[6]**

b) Explain in brief following terms with reference to cloud computing: **[2]**

i) On demand self provisioning

ii) Elasticity

iii) Cost reduction

iv) Application program interfaces

OR

Q2) a) Which type of Cloud service is provided by *'gmail'*? justify. **[6]**

b) Define cloud computing as per NIST. **[2]**

Q3) a) Explain the virtualization techniques in cloud computing. **[6]**

b) Enlist features of federation types. Explain any one in brief. **[6]**

OR

Q4) a) Discuss in brief following basic principles of cloud computing. **[6]**

i) Federation

ii) Independence

iii) elasticity

b) Compare KVM, Xen and HyperV. **[6]**

P.T.O.

Q5) a) Discuss the top security concerns for cloud users. **[8]**

b) Enlist & describe security risks posed by shared images. **[8]**

OR

Q6) a) Describe in brief 'Operating System Security'. **[8]**

b) Enlist and explain different forms of Trust. **[4]**

c) Discuss different aspects related to contract between the user and the Cloud Service Provider to minimize security risks. **[4]**

Q7) a) Explain Google App Engine with the help of diagram. **[8]**

b) State and explain any two cloud computing applications. **[8]**

OR

Q8) a) Explain the storage services offered by Amazon EC2 cloud. **[8]**

b) Write short note on 'Open Nebulla'. **[8]**

Q9) a) Describe Context Aware operational life cycle. **[10]**

b) Discuss any four common myths about ubiquitous computing. **[8]**

OR

Q10)a) Describe methods to acquire user Inputs related to human centered design. **[8]**

b) Explain the following service architectural models: **[10]**

i) Multi tier client service model

ii) Service oriented computing model.

Total No. of Questions : 10]

SEAT No. :

P3133

[Total No. of Pages : 2

[5154]-699

B.E. (Information Technology)

BUSINESS INTELLIGENCE

(2012 Course) (Semester - I) (Elective - II) (414457 A) (End Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain BI with different types of Business Models. **[4]**

b) What are the different types of facts used in data warehouse design? Explain in detail. **[6]**

OR

Q2) a) Explain following operations of OLAP with suitable example. **[6]**

i) Drill-down

ii) Pivot

iii) Dice

b) Explain in short Data profiling and Data Linage report. **[4]**

Q3) a) Write a short note on multi-valued dimension and dimesion attributes. **[4]**

b) Explain dimensional model for retail sales industry. Model should have at least one fact table and two dimensional tables. **[6]**

OR

Q4) a) What are the common data anomalies encountered during ETL process? How are they handled? **[4]**

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

i) Star schema.

ii) Fact constellation schema.

iii) Snow flake schema.

P.T.O.

Q5) a) How does the metadata layer, presentation layer, and Data layer support the Reporting architecture of Data warehouse? **[8]**

b) What is Materialized view? Explain with example. What are the advantages of it? **[8]**

OR

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

i) Dashboards as Reporting tool

ii) Adhoc Reporting

b) Explain ETL scheduling. How data level security is handled in ETL process. **[8]**

Q7) a) What is clustering? Explain K-means clustering algorithm. Suppose the data for clustering {2, 4, 10, 12, 3, 20, 11, 25}. Given K = 2. Cluster the given data with K-means algorithm. **[8]**

b) Compare and contrast In-DB and In-memory analytics. How Google analytics works? **[8]**

OR

Q8) a) Define Data visualization and list its major advantages. List in brief different directions in data visualization. **[8]**

b) Explain the process of text-mining. What is the role of inverted index in text mining? **[8]**

Q9) Write short notes on any 3 of following: **[18]**

a) Spotfire

b) Log based change data capture

c) Real time BI

d) My Report

OR

Q10)a) What is agile Business Intelligence? How does it support and enhance business operations? **[8]**

b) Explain Cloud Business Intelligence Architecture with the help of neat diagram. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3134

[Total No. of Pages : 2

[5154]-700

B.E. (Information Technology)

SERVICE ORIENTED ARCHITECTURE

(2012 Course) (Semester - I) (Elective - II) (414457 B)

(End Sem.) (Theory)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain how contemporary SOA promotes discovery. **[5]**

b) List and explain different roles, service assumes during runtime processing of a message. **[5]**

OR

Q2) a) Explain in brief service description with WSDL. **[5]**

b) Justify. "Contemporary SOA is loosely coupled. **[5]**

Q3) a) State and explain types of message exchanging patterns (MEP). **[5]**

b) What are different delivery assurances in reliable messaging, explain each with diagram. **[5]**

OR

Q4) a) Explain following terms of WS-security. **[5]**

i) Identification

ii) Authentication

iii) Authorization

iv) Confidentiality

v) Integrity

b) Explain WS-Notification and WS-Eventing **[5]**

P.T.O.

Q5) a) Compair Top down delivery strategy and bottom up delivery strategy. **[8]**

b) With neat diagram explain Agile strategy of SOA delivery. **[8]**

OR

Q6) a) Enlist and explain sources from which services can be derived and types of derived services. **[8]**

b) List and Explain Service Modeling guidelines. **[8]**

Q7) a) Explain high level service oriented design phase. **[9]**

b) Explain WSDL related XML Schema language basics. **[9]**

OR

Q8) a) Explain following elements of WSDL language basics. **[9]**

i) definition element

ii) types element

iii) message and parts element

iv) port Type, interface and operations element

b) Explain different considerations for positioning core SOA standards. **[9]**

Q9) a) Explain steps of designing entinty centric business service. **[8]**

b) Explain service design guidelines. **[8]**

OR

Q10)a) Explain any four elements of WS-BPEL language basics. **[8]**

b) Explain high level process for designing business processes. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3135

[Total No. of Pages : 2

[5154]-701

B.E. (Information Technology)

E & M GOVERNANCE

(2012 Course) (Semester - I) (Elective - II) (414457 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) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Imagine that you are the manager of a small e-bookshop. Describe what 'e-business strategy' you would prefer to compete with large competitors like Amazon.com and Bol.com. Include the following terms: long term planning, corporate objectives and environment. **[6]**

b) What is meant by the terms front-office and back-office systems? **[2]**

OR

Q2) a) Define e-Commerce. Explain different types of e-Commerce. What is the importance of World Wide Web for e-Business? **[6]**

b) Distinguish between: e-Commerce & e-Business. **[2]**

Q3) a) Explain similarities and differences between the following concepts: business unit value chain, industry value chain, supply chain, logistics.**[6]**

b) What is a business process? List the seven characteristics of a business process. **[4]**

OR

Q4) a) Describe the four key elements of the strategic planning process and explain how they are interrelated. **[6]**

b) How would you define Business - IT alignment? Explain why it is important. **[4]**

P.T.O.

Q5) a) Which are the three factors contributing to the success of e-markets? Give one example for each factor. **[8]**

b) List and explain the key advantages of an e-procurement solution. **[8]**

OR

Q6) a) Explain why it is important for an industrial company to have full management attention for its purchasing process. **[8]**

b) What products are most likely to be trades successfully through an e-market place: commodities or speciality goods. Explain why and give one example of both types of goods. **[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) Define m-commerce and explain how an e-government could use it to increase its efficiency and effectiveness. **[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. :

P3136

[Total No. of Pages : 2

[5154]- 702
B.E. (I.T.)
GEO INFORMATICS SYSTEM (Elective - II)
(2012 Pattern) (Semester - I) (End Sem.) (414457 D)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10*
2) *Figure to the right indicate full marks.*

Q1) a) Define GIS and explain fundamental operations of GIS. **[5]**

b) With example write scales of measurement. **[5]**

OR

Q2) a) Explain different types of map projections with neat diagram. **[5]**

b) Classify imaging sensor system. **[5]**

Q3) a) Draw and explain a theoretical schme of sensor target interaction. **[5]**

b) Write down steps to train the dataset. **[5]**

OR

Q4) a) What is geometric correction? When it is used. **[5]**

b) What is spatial filtering? What is the need? Explain. **[5]**

Q5) a) Why graphic data is represented in spatial data? Draw spatial data model with example. **[8]**

b) Explain any two transformation techniques in detail. **[8]**

OR

Q6) a) What is attribute data? What is the use of attribute data in GIS? **[8]**

b) What are sources of errors in GIS? Explain different types of errors in detail. **[8]**

P.T.O.

Q7) a) What are the types of raster GIS models? Explain it with suitable example. **[8]**

b) Compare vector and raster based data models with advantages and disadvantages. **[8]**

OR

Q8) a) Explain vector data analysis. **[8]**

b) What is GIS modeling? Explain any two basic elements of GIS modelling. **[8]**

Q9) Write short note on (any 2) **[18]**

a) Components of ITS

b) Analysis of traffic data in GIS

c) Open source GIS.

OR

Q10)a) Explain what are upcoming technologies effectively used for urban and municipal planning. **[9]**

b) Explain architecture of ITS. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3137

[Total No. of Pages : 2

[5154]- 703
B.E. (I.T.)
Natural Language Processing
(2012 Pattern) (Semester - I)(Elective - II) (End Sem.) (414457 E)

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 any 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) Explain with an example semantic and pragmatic level of language understanding in natural language processing. **[6]**

b) State natural language processing system evaluation methods? **[4]**

OR

Q2) a) State and explain applications of Natural Language Processing. **[6]**

b) Which are elements of noun phrases? Explain with appropriate example. **[4]**

Q3) a) Describe the Person and Number features in natural language processing. **[6]**

b) Classify following sentences **[4]**

i) Large have green nose ii) I apple eat

For each of the following explain:

1) Syntactically correct or not, 2) Semantically correct or not

OR

Q4) a) Describe bottom-up chart parsing algorithm with example. **[6]**

b) Explain definite clause grammar. **[4]**

P.T.O.

Q5) a) Explain human preferences in encoding uncertainty during parsing **[8]**

b) Describe estimating probabilities for part of speech tagging. **[8]**

OR

Q6) a) Describe probabilistic context-free grammar with example. **[8]**

b) Describe a simple context dependent best first parser. **[8]**

Q7) a) Describe lexical resource wordnet used in natural language processing. **[8]**

b) Describe semantic web ontology and its applications? **[8]**

OR

Q8) a) Write a short note on description logic. **[8]**

b) Explain word senses and ambiguity in natural language processing. **[8]**

Q9) a) Describe automatic machine translation and metric used for its evaluation. **[9]**

b) Explain sentiment analysis with an example. **[9]**

OR

Q10) a) How is natural language processing useful in automatic speech processing. **[9]**

b) State use of natural language processing in automatic text summarization. **[9]**

Total No. of Questions :10]

SEAT No. :

P3138

[Total No. of Pages :3

[5154] - 704

B.E. (Information Technology)

DISTRIBUTED SYSTEM

(2012 Course) (Semester - II) (End Semester) (414461)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) a) A server program written in one language (for example, C++) provides the implementation of a BLOB object that is intended to be accessed by clients that may be written in a different language (for example, java). the client and server computers may have different hardware, but all of them are attached to an internet. Describe the problems due to each of the five aspects of heterogeneity that need to be solved to make it possible for a client object to invoke a method on the server object. **[6]**

b) List the various challenges during the construction of Distributed systems. Describe the challenges while designing of scalable distributed system.**[4]**

OR

Q2) a) What are types of failures? Classify the following failures based on types of failures with justification. **[6]**

i) Sudden shutdown of a system.

ii) Network crash.

iii) System reset while working.

iv) Unnoticed event handler closing a word document.

b) What are various forms of Transparency in Distributed System? Illustrate Network Transparency with an example. **[4]**

P.T.O.

Q3) a) Explain role of client and server stub procedures in RPC in the context of a procedural language. **[6]**

b) Explain two main characteristics of distributed event-based systems. **[4]**

OR

Q4) a) What is Publich-Subscribe system of Communication? **[4]**

b) What are Web Services? Explain SOAP and REST based Web Services in a nutshell. **[6]**

Q5) a) Explain the Passive and Active model of repliction for fault tolerance. **[8]**

b) Explain the Chandy-Lamport 'snapshot' algorithm for determining global states of distributed systems. **[8]**

OR

Q6) a) Explain Network Time Protocol to distribute time information over Internet. **[8]**

b) Explain Ricart and Agrawala algorithm to implement mutual exclusion between *N* peer processes that is based upon multicast. **[8]**

Q7) a) How does distributed file system differ from a file system used for a centralized time sharing system? **[8]**

b) Explain the design of Bit Torrent, a file sharing applicaiton. **[8]**

OR

Q8) a) Illustrate the concept of naming services and DNS in Distributed systems. **[8]**

b) Explain the Cluster based Distributed File Systems with suitable example of HDFS. **[8]**

Q9) a) Explain the SSL with respect to following: **[10]**

i) Record Protocol layer.

ii) Handshake layer.

b) How is a host protected from mobile code using java sandbox? **[8]**

OR

Q10)a) What do you meant by public-key Cryptography? Explain Digital Signatures with public keys. **[8]**

b) Explain the following concepts with respect to Distributed Multimedia System. **[10]**

i) Resource Management.

ii) Stream Adaptation.

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

P3139 [Total No. of Pages : 2

[5154]-705
B.E. (Information Technology)
ADVANCED DATABASES
(2012 Course) (Semester-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain fragmentation in distributed databases. **[6]**

b) Write short note on Distributed Query Processing. **[4]**

OR

Q2) a) Explain various system parameters of parallel databases. **[5]**

b) Comparsion between object relational and object oriented database. **[5]**

Q3) a) Give the DTD for an XML representation of the following nested relational schema. **[6]**

Emp = (ename, ChildrenSet set of (Children), SkillSet Set of (Skills))
Children = (name, Birthday)
Birthday = (day, month, year)
Skills = (type, Examset set of (Exams))
Exam = (year, city)
Use the DTD and write the following queries in Xqueries format.

i) Find the names of all employees who have a child who has a birthday in March.

ii) Find those employees who took an examination for the skill type "typing" in the city "Dayton".

iii) List all skill types in Emp.

b) Explain various operations performed by DynamoDB in detail. **[4]**

OR

P.T.O.

Q4) a) What is Cassandra Query Language? Explain in detail. **[5]**

b) What does column based Key-Value mean when talking about Cassandra vs DynamoDB? **[5]**

Q5) a) How stream data management system works? Explain its issues and solutions. **[8]**

b) What is Graph Mining? Also explain its advantages & applications. **[8]**

OR

Q6) a) What are the models of social network generation? Explain in detail. **[8]**

b) Write a short note on Apache Flume NG. **[8]**

Q7) a) Explain Naive Bayes classification for text categorization with example. **[6]**

b) Explain concept of data modeling for web usage mining. **[6]**

c) Explain concept of collaborative filtering using KNN. **[6]**

OR

Q8) a) Explain recommender systems. Which are the problems associated with it? **[6]**

b) Describe matrix factorization in detail. **[6]**

c) How navigational and sequential patterns are analyzed. **[6]**

Q9) a) Write short note on **[8]**

i) Spatial databases.

ii) Temporal databases.

b) Explain Query Processing in Deductive database in detail. Explain SQL & Datalog Query Processing. **[8]**

OR

Q10)a) Explain cloud database in detail. Also explain the advantages and disadvantages of cloud databases. **[8]**

b) What is semantics? Explain semantics in deductive database in detail. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No :

P3140

[Total No. of Pages :2

[5154]-706
B.E.(I.T.)
MOBILE COMPUTING
(2012 Course) (Semester-II) (Elective-III) (414463 A)(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) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain PCS architecture with diagram. **[4]**

b) Explain the types of hand off in mobile communication. **[5]**

OR

Q2) a) W.r.t. mobile computing, explain various aspects of mobility. **[4]**

b) If user enters from Network A to Network B, how location is updated in GSM Architecture? **[5]**

Q3) a) Explain the functionality of AUC and EIR available in GSM architecture in detail. **[5]**

b) Explain types of SMS with diagram. **[5]**

OR

Q4) a) Explain VLR overflow control and OI algorithm. **[5]**

b) Explain the Network Switching subsystem in GSM Architecture. **[5]**

Q5) a) How GPRS is different from GSM? Write short note on CDMA 2000. **[9]**

b) What is Wireless Application Environment? Explain the parts of WAE in details. **[8]**

OR

Q6) a) Explain Wireless Transport layer Security and draw diagram of WAP protocol stack. **[9]**

b) Explain in detail how GSM architecture is modified to support GPRS architecture. **[8]**

P.T.O.

Q7) a) Explain Smart Client Architecture and give advantages and disadvantages of same. **[9]**

b) Explain analysis, Testing and deployment phase of mobile application development. **[8]**

OR

Q8) a) Which are the factors that are required to consider while choosing the mobile application architecture? **[9]**

b) Explain Wireless Internet architecture and give advantages of same. **[8]**

Q9) a) What is the meaning of performance, scalability, modifiability and availability. Explain w.r.t. to mobile applications. **[9]**

b) What are the challenges in usability testing of mobile applications. **[8]**

OR

Q10)a) Describe role of Application framework and Dalvik VM in Android OS architecture. **[9]**

b) What are the principles of mobile applications in user Design Interface. **[8]**

Total No. of Questions : 10]

SEAT No :

P3141

[Total No. of Pages :2

[5154]-707
B.E.(I.T)
ADVANCED GRAPHICS & ANIMATION
(2012 Pattern) (Semester-II) (Elective-III) (414463 B) (End Sem)

[Time : 2½ Hours] *[Max.Marks:70]*

Instructions to the candidates:

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

Q1) a) What are meshes in 3D modeling explain with suitable diagrams. **[5]**

b) Explain knot in context with B-Spline curve. **[5]**

OR

Q2) a) Explain the following quadratic surfaces. **[5]**

i) Hyperboloids.

ii) Cylinders.

b) What are sweep surfaces? Discuss different methods of generating sweep surfaces. **[5]**

Q3) a) Write a short note on: **[5]**

Space partitioning representation.

b) What is an illumination model? Compare local and global illumination models. **[5]**

OR

Q4) a) What are the various methods of retracing? **[5]**

b) What is rendering? Explain Monte-Carlo method for rendering. **[5]**

Q5) a) Which are the features in Open GL? Explain in detail. **[8]**

b) How OpenGL is used to draw 3D objective? Explain with code snippet. **[8]**

OR

Q6) a) Explain pBuffer rendering with respect to OpenGL **[8]**

b) What is blending? Explain in detail different blending operations performed in OpenGL. **[8]**

P.T.O.

Q7) a) List and explain animation languages with suitable example. **[8]**

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

i) Frame-by-Frame Animation Techniques.

ii) Real Time Animation Techniques.

OR

Q8) a) Which are the methods of controlling animation? Explain **[8]**

b) What is meant by key-framing, tweening and morphing? Explain with suitable example. **[8]**

Q9) a) Define virtual reality. Explain the components of virtual reality. **[8]**

b) Explain the following terms in context of virtual environment: **[10]**

i) Degrees of freedom.

ii) Augmented reality.

iii) Latency.

iv) Telepresence.

OR

Q10)a) Explain three I's of virtual reality with suitable example. **[8]**

b) Write in detail about the use of VR in the field of civil engineering. **[10]**

Total No. of Questions : 10]

SEAT No :

P3142

[Total No. of Pages :2

[5154]-708
B.E.(I.T.)
INFORMATION STORAGE AND RETRIEVAL
(2012 Course) (Elective-III) (414463 C) (Semester-II)

Time : 2½ Hours *Max.Marks:70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Show how single link clusters may be derived from the dissimilarity coefficient by thresholding it. **[5]**

b) You are developing a text processing system for use in an automatic retrieval System. Explain the following parts: **[5]**
Removal of high frequency words.
Suffix stripping.
Detecting equivalent stems.

OR

Q2) a) Find the similarity of following query with D1,D2,D3, using vector model. **[6]**

Query	keywords	
q	ant, dog	
document	Text	Terms
D1	ant ant bee	ant bee
D2	dog bee dog hog dog ant dog	ant bee dog hog
D3	cat gnu dog eel fox	cat dog eel fox gnu

b) Write a short note on user oriented measures to evaluate the performance of the system. **[4]**

Q3) a) Writr a note on "Ontology based information sharing". **[5]**

b) Explain the concept of hash addressing. **[5]**

OR

P.T.O.

Q4) Consider a reference collection and its set of example information request. If q is the information request and a set Rq= (d3,d5,d9,d25,d39,d44,d50,d70, d80,d120). Now consider new retrieval algorithm has been designed and has been evaluated for information request q returns, ranking of the documents in the answer set as. **[10]**

1.d120	6.d9	11.d38
2.d84	7.d58	12.d48
3.d50	8.d129	13.d230
4.d6	9.d143	14.d113
5.d8	10.d25	15.d3

The documents that are relevant to the query q are underlined. Calculate precision and recall for the documents that are relevant to the query q.

Q5) a) Describe the architecture of distributed IR. **[8]**

b) What do you understand by multimedia query language? Explain various query predicates. **[8]**

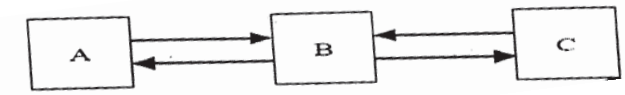
OR

Q6) a) What are the issues in distributed IR computing? Write the techniques used to address these issues. **[8]**

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

Q7) a) Write a short note on web data mining. **[8]**

b) What is page ranking? Calculate page rank of following web pages. Assume damping factor 7.0. **[10]**



OR

Q8) a) Explain centralized and distributed architecture of a search engine. **[10]**

b) What is web crawling? Explain the techniques used by web crawlers to crawl the web. **[8]**

Q9) a) What is content based recommendation? **[8]**

b) Explain semantic web in details. **[8]**

OR

Q10)a) Define Recommender system? Explain in brief collaborative filtering **[8]**

b) Discuss trends and research issues involved in web. **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No :

P3143

[Total No. of Pages :2

[5154]-709
B.E.(I.T.)
I T / ENABLED SERVICES
(2012 Course) (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, Q7or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1)a) Describe 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) Describe 'Leadership level congruence' in brief. **[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.

Q5) a) Describe Service Level Management (SLM) in brief. **[8]**

b) Explain Capacity Management process. **[8]**

OR

P.T.O.

Q6)a) What is IT Service Continuity Management (ITSCM)? Which are the measures for quick restoration from risk through ITSCM? **[8]**

b) Describe 'Insourcing' in brief. **[8]**

Q7) a) Describe different types of arrays in PHP. **[8]**
Create an associative array called $months that contains the months of the year and the number of days in the months. Display the $months array.

b) Describe custom error handler function in PHP with suitable PHP program. **[8]**

OR

Q8) a) Describe following terms in brief: **[8]**
i) UDDI
ii) SOAP

b) Describe methods to send information to PHP file through HTML form. **[8]**

Q9) a) Explain Barriers to trade in ITES and explain role of WTO & UNCTAD in ITES. **[9]**

b) Discuss current employment in IT/ITES industry. **[9]**

OR

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

b) Write a case study on Internet banking. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P3144

[Total No. of Pages :2

[5154]-710

B.E. (Information Technology)

ADVANCED COMPUTER NETWORKS (Elective - III)

(2012 Pattern) (Semester - II) (End Sem.) (414463E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Describe network architecture of ISO/OSI model. **[6]**

b) What are different network elements? **[4]**

OR

Q2) a) What are ATM traffic descriptor? Explain. **[6]**

b) What is Network address translation? **[4]**

Q3) a) Draw header structure of ATM cell at U-N interface. **[6]**

b) What is EIGRP? Explain in brief. **[4]**

OR

Q4) a) Describe internet working in ATM. **[6]**

b) List various ISDN services? **[4]**

Q5) a) What do you mean by lossless compression? State different lossless compression techniques. Explain any one detail. **[10]**

b) Describe various components of TCP congestion control? **[8]**

OR

Q6) a) What are different strategies to avoid congestion? Explain any one in detail. **[10]**

b) Define QoS? How RSVP supports to improve the overall QoS of network? **[8]**

P.T.O.

Q7) a) Explain routing protocol to support QoS. **[8]**

b) What is MPLS? Explain the operations of MPLS in detail. **[8]**

OR

Q8) a) What is GMPLS? Where it is used? Justify your answer. **[8]**

b) Discuss the challenges of traffic engineering in IP/MPLS network. **[8]**

Q9) a) Explain basic architectural stack of IEEE 802.16. **[8]**

b) Explain cluster-based wireless networks. **[8]**

OR

Q10)a) Describe high rate and low rate WPAN. **[8]**

b) Explain in detail MAC implementation of IEEE 802.16. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3145

[Total No. of Pages : 2

[5154]-710-A

B.E. (Information Technology)

BIOINFORMATICS

(2012 Course) (Semester -II) (Elecitve-IV) (414464A) (End Sem.)

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

Instructions to the candidates:

1) ***Answers Q.1 or Q.2, Q.3 or Q4, 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.***
2) ***Assume suitable data, if necessary.***

Q1) a) Explain central dogma of moleculer biology with neat diagram. **[5]**

b) What is structure visualization? Explain any two rendering tools in structure visualization. **[5]**

OR

Q2) a) Define Bioinformatics. Explain Bioinformatics application related to following areas **[5]**

i) Proteomics.

ii) Sequence Assembly.

b) Explain microarray process spotting flow with neat diagram. **[5]**

Q3) a) Explain knowledge discovery process with neat diagram. **[5]**

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

i) PAM

ii) BLOSUM

OR

Q4) a) Explain text mining with NLP process. **[5]**

b) Explain major steps in pattern recognition & discovery process. **[5]**

P.T.O.

Q5) a) Explain similarities & differences between BLAST & FASTA tools for sequence Alignment. **[8]**

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

i) Heuristic methods for sequence Alignment.

ii) Phlylogenetic.

OR

Q6) a) Explain FASTA algorithm with recommended steps for similarity searching. **[8]**

b) Explain working with BLAST. What are different services available from NCBT related to BLAST? **[8]**

Q7) a) Explain methods for protein modeling. **[8]**

b) Explain comparative modeling process with neat diagram. **[8]**

OR

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

i) Structural Bioinformatic in drug discovery.

ii) Tools for modeling & simulation.

b) Discuss components of modeling & simulation system along with the process. **[8]**

Q9) a) Define genetic Engineering. Discuss current developments in genetic engineering. **[9]**

b) What is Biotechnology? What is role of Bioinformatics in biotechnology? **[9]**

OR

Q10)a) How system biology play role in human health disease and future of medicine? **[9]**

b) Explain any two techniques of genetic engineering in detail. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P3146

[Total No. of Pages : 2

[5154]-710-B

B.E. (Information Technology)

REAL TIME & EMBEDDED SYSTEMS

(2012 Course) (Semester -II) (End Sem.) (Elecitve-IV) (414464B)

Time : 2½Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are the typical characteristics of embedded system and challenges in embedded system design? Discuss in brief. **[6]**

b) What are main features of CAN2.0 bus standards? **[4]**

OR

Q2) a) Draw & explain general architecture of embedded system & explain components in it. **[6]**

b) Comment on 'Networking buses in embedded system'? **[4]**

Q3) a) Draw SHARC core processor block diagram and explain SIMD engine (PE) composition and operation in brief. **[6]**

b) Explain I2C bus architecture and its operation in detail. **[4]**

OR

Q4) a) Draw general architectural block diagram of ARM processor. List main features of ARM processor. **[6]**

b) Compare and contrast I2C, CAN serial buses with respect to features, data rates, wire length and no of devices it can connect. **[4]**

Q5) a) Use RMS scheduler For scheduling a periodic task set of T1(2,4) & T2 (4,8). Perform schedulability check & comment on whether given task set is schedulable & schedule produced is feasible. **[10]**

b) Discuss the assumption for clock driven scheduling and explain cyclic scheduler in detail. **[8]**

OR

P.T.O.

Q6) a) Use EDF scheduler For scheduling a periodic task set of T1 (1, 3, 3) & T2 (4, 6, 6). Perform schedulability check & comment on whether given task set is schedulable & schedule produced is feasible. **[10]**

b) Write a note on 'classification of task'. **[8]**

Q7) a) What is deadlock & explain how to avoid deadlock with priority ceiling protocol. **[8]**

b) State & explain priority inversion problem with appropriate example & name protocols used to remove this problem. **[8]**

OR

Q8) a) Explain resource reclaiming algorithm in detail. **[8]**

b) Explain algorithm for scheduling aperiodic tasks & periodic tasks. **[8]**

Q9) a) How Real Time Operating System is different than Operating System, explain with respect to features & characteristics. **[8]**

b) Write note on commercial RTOS. **[8]**

OR

Q10)a) How Real Time Database is different than Database, explain with respect to features & characteristics. **[8]**

b) Write note on commercial Real Time Database. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P3147

[Total No. of Pages : 2

[5154]-710-C

B.E. (Information Technology)

GREEN IT - PRINCIPLES AND PRACTICES

(2012 Pattern) (Semester -II) (Elective-IV) (End Sem.) (414464C)

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

Instructions to the candidates:

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

Q1) a) What are P and C states of processor? How does processor C-states save energy? **[7]**

b) How do you infer the term Green IT? Explain the Green IT framework. **[7]**

OR

Q2) a) How can an organization use software sustainability for competitive advantage? **[7]**

b) How the term 'sustainability' differs from 'green'? Explain sustainable software development methodology. **[7]**

Q3) a) How would you maintain energy efficiency of data center facility. **[7]**

b) What are the different power states of a hard disk? **[7]**

OR

Q4) a) Describe the key challenges in managing data center operations. **[7]**

b) Explain the objectives of green network protocols. **[7]**

Q5) a) List and infer the business dimensions for green IT strategy implementation. **[7]**

b) Explain the hierarchy of sustainability models. What is the role of sustainability frameworks, principles, and tools? **[7]**

OR

P.T.O.

Q6) a) How would you prioritize the considerations in creation of green IT strategy. **[7]**

b) What are the key metrics for data center energy efficiency? **[7]**

Q7) a) How an organization should develop its strategy to transform itself into high-value SITS based organization? **[7]**

b) What are the major categories of information systems within an organization? Provide examples of greening enterprise activities at each level. **[7]**

OR

Q8) a) What factors will motivate an organization to green their IT activities in absence of any external pressure. **[7]**

b) Identify and discuss the four major ways in which organizations can gain value by greening an enterprise. **[7]**

Q9) a) How an organization can formulate, implement and manage its green practices. **[7]**

b) What are the enabling effects of green IT-based software application. **[7]**

OR

Q10)a) Distinguish between the direct effects of green IT and the enabling effects of green IT-based applications. **[7]**

b) What is green washing? Do you think companies engage in it? **[7]**

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Total No. of Questions : 10]

SEAT No. :

P3148

[Total No. of Pages : 2

[5154]-710-D

B.E. (Information Technology)

INTERNET OF THINGS

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

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

Instructions to the candidates:

1) ***Answers Q.1 or Q.2, Q.3 or Q4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain EPC Global Architecture frame work. **[5]**

b) Explain in detail HLSA IoT framework. **[5]**

OR

Q2) a) Explain in detail IoT Architecture with neat diagram. **[6]**

b) Write in detail Application of Internet of Things. **[4]**

Q3) a) What are the challenges and issues in RFID system. **[5]**

b) What are basic components of sensor network? **[5]**

OR

Q4) a) Discuss various components of RFID system. **[5]**

b) Explain Environment, Traffic characteristics of IoT. **[5]**

Q5) a) Explain in detail design guidelines for Internet of Things. **[8]**

b) What is Identity management in Internet of Things? Explain any 2 Identity management techniques of Internet of Things. **[10]**

OR

P.T.O.

Q6) a) Explain in detail clustering principal in Internet of Things. **[8]**

b) Explain in detail data synchronization techniques in Internet of Things. **[10]**

Q7) a) Why security required in IoT? Explain in detail various security model in Internet of Things. **[10]**

b) What is threat analysis in Internet of Things? Explain detail threat analysis. **[8]**

OR

Q8) a) What is Internet of Things security tomography? Explain in detail layered attacker mode? **[10]**

b) Explain in detail access control and message integrity of Internet of Things. **[8]**

Q9) a) Write in detail business model scenario for Internet of Things. **[6]**

b) Explain in detail application of Internet of Things in city automation and home automation. **[8]**

OR

Q10)a) Write applications of Internet of Things for e health body area network. **[6]**

b) Explain in detail business model and business innovation in internet of Things. **[8]**

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Total No. of Questions : 10]

SEAT No :

P 3149

[Total No. of Pages :3

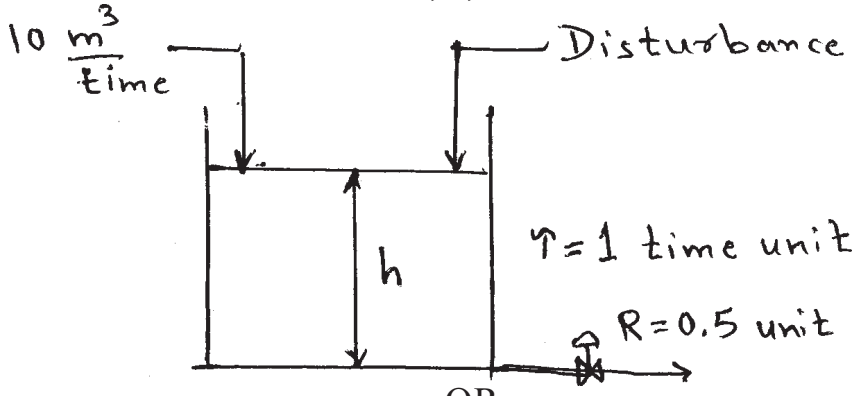
[5154]-711
B.E. (Chemical)
PROCESS DYNAMICS AND CONTROL
(2012 Course) (409341) (Semester-I) (End Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

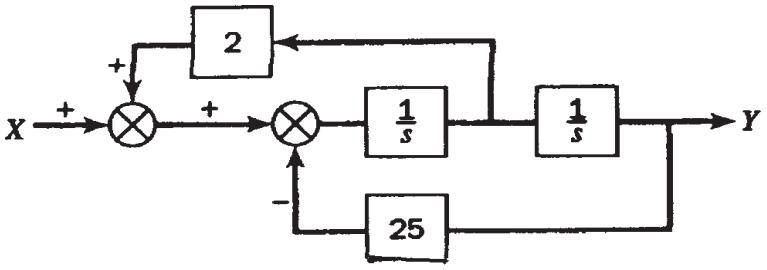
Q1) The liquid process shown in following figure is operating at steady state when the following disturbance occurs: at time t = 0, 1 m^3 water is added continuously (unit step) to the tank. Sketch the response of the level in the tank versus time and determine the level at t = 0.5, 1, and 1.5. **[10]**



OR

Q2) a) What are the types of controllers? Write their transfer functions and differentiate between them. **[5]**

b) Derive the transfer function Y/X for the control system shown in Figure. **[5]**



P.T.O.

Q3) The set point of the control system shown in following figure is given a step change of 1 unit. **[10]**

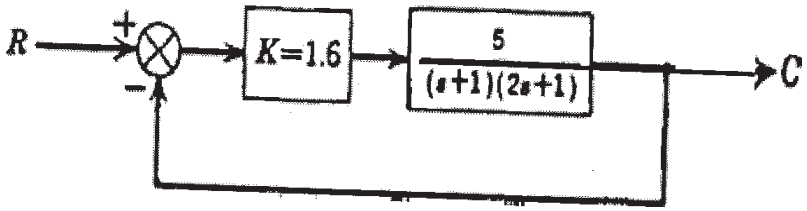
Determine:

a) The maximum value of C and the time at which it occurs.

b) The offset.

c) The period of oscillation.

Draw a sketch of C(t) as a function of time.



OR

Q4) a) Sketch the root loci for following equation $1+\frac{K}{(S+1)}=0$. **[5]**

b) Write a short note on any one **[5]**

i) Simple performance criteria for controller tuning with one quarter decay ratio.

ii) Time integral performance criteria by ISE.

Q5) a) Draw Bode Plots for $G(s)=\frac{100}{(10s+1)(s+1)}$. Comment on its stability. **[8]**

b) Write a note on Ziegler Nichols controller settings. **[8]**

OR

Q6) a) Draw Bode Plots for $G(s)=\frac{10s}{(s+1)(0.1s+1)^2}$. Comment on its stability. **[8]**

b) Describe and draw Bode plots for first order systems in series. **[8]**

Q7) a) Draw and explain at least two cascade control schemes for maintaining a distillation column distillate composition. **[8]**

b) What is a ratio control? Draw and describe a ratio control scheme for a typical absorber column. **[8]**

OR

Q8) a) What is adaptive control system? Why its need is felt in chemical process control? What are typical types of objective functions of an adaptive control scheme? **[8]**

b) Draw general structure / scheme for a feedforward and feedback control system. Differentiate between them. Also explain a feedforward control scheme used for a heat exchanger. **[8]**

Q9) a) What are the types of SCADA control system? Describe architecture of a distributed SCADA system. **[9]**

b) What is DCS control system? Describe its architecture. **[9]**

OR

Q10)a) Which type of hardware is used to convert discrete to continuous signals? Describe its functioning. **[9]**

b) What are the major components of Programmable Logic Controllers? Also describe their functioning. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3597

[Total No. of Pages : 3

[5154]-712
B.E.Chemical (Semester - I)
CHEMICAL REACTION ENGINEERING -II
(2012 Pattern) (End Semester)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*

3) *Assume suitable data, if necessary.*

4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.*

Q1) Derive conversion - time expression for cylindrical particles of constant size with ash layer diffusion as rate controlling step. **[10]**

OR

Q2) a) Derive an expression for tower height for straight mass transfer without reaction in case of fluid -fluid reaction. **[7]**

b) Explain the various kinetic terms and conversion from one form to another. **[3]**

Q3) Explain the deactivation. Explain how the deactivation kinetics can be identified in case of **[10]**

i) Batch solids, plug constant flow of fluid

ii) Batch solids, mixed constant flow of fluid.

P.T.O

OR

Q4) The catalytic decomposition of A $\rightarrow$ R is studied in a PFR filled with 2.4 mm pellets and using a very high recycle rate of product gases. The results of a long time run and additional data are given below. **[10]**

$D_e = 5\times 10^{-10}$ m^3/m cat. sec, $\rho_s = 1500$ kg/m^3 cat, $\tau^1 = 4000$ kg. sec/m^3.

t, hr	0	2	4	6
X_A	0.75	0.64	0.52	0.39

Find the kinetics of the reaction and deactivation both in diffusion free and strong pore diffusion resistance regime.

Q5) Derive an expression for Effectiveness factor for a spherical catalyst particle. Also explain the testing method of pore resistance in porous catalyst. **[18]**

OR

Q6) Explain the different methods for determining rates for **[18]**

i) Differential reactor

ii) Integral (Plug flow) reactor

iii) Mixed flow reactor

Q7) The results of the kinetic runs on A $\rightarrow$ R made in a packed bed reactor using a fixed flow rate of $F_{AO} = 10$ Kmol/hr are as follows. **[16]**

W, Kg catalyst	1	2	3	4	5	6	7
X_A	0.12	0.20	0.27	0.33	0.37	0.41	0.44

i) Find the reaction rate of 40% conversion.

ii) For a feed rate of 400 Kmol/ hr to large scale packed bed reactor, find the amount of catalyst needed for 40% conversion.

iii) Find the amount of catalyst that would be needed if the reactor is employed in a very large recycle of product stream.

OR

Q8) a) Explain the differences between the LHHW hypothesis and Eiley Rideal Mechanism. **[4]**

b) Toluene is adsorbed on the sufrace of catalyst and reacts with hydrogen in gas phase to form benzene adsorbed on solid and methane in gas phase. Then benzene gets desorbed. Develop the rate equation if surface reaction is the rate controlling step. **[12]**

Q9) Write short notes on design procedure for **[16]**

i) Slurry reactor

ii) Fluidized bed reactor

OR

Q10) Derive the M-M kinetics and how to evaluate the constants K_3 and C_M for a batch fermenter. **[16]**

▲ ▲ ▲

Total No. of Questions : 10]

SEAT No. :

P3150

[Total No. of Pages : 2

[5154]-713
B.E.(Chemical)
CHEMICAL ENGINEERING DESIGN - II
(2012 Pattern) (End-Semester) (409343) (Semester-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer 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 plate column is to be designed for the following specifications

Feed stream:3% by mole of acetone in aqueous stream, 20°C, 12800 kg/h. No. of theoretical stages 16, slope of bottom operating line = 5, slope of top opearting line = 0.57, x_D= 0.94 (98% w/w), x_W= 50 ppm, R = 1.35, plate efficiency =60%, plate pressure drop = 100 mm, Vapor density at bottom = 0.7 kg/m^3, liquid density at bottom =950 kg/m^3, surface tension at bottom = 57×10^{-3} N/m, Vapor density at top = 2.05 kg/m^3, liquid density at bottom= 753 kg/m^3, surface tension at top = 23×10^{-3} N/m, surface tension at bottom = 57×10^{-3} N/m, $K_{1\ top}$=0.09 and $K_{1\ Bottom}$= 0.075. Find the column diameter. **[10]**

OR

Q2) a) How is the total plate pressure drop calculated? Explain in detail. **[5]**

b) What are random and structured packings? When are structured packings preferred? **[5]**

Q3) a) Using Onda's method find the height of transfer unit (H_{OG}) using the following data: σ_L = 0.07 N/m, R = 0.08314 bar m^3/kmol K, d_p = 0.038 m, σ_c = 0.061 N/m, ρ_L = 1000 kg/m^3, μ_L = 1 mNs/m^2, a = 194 m^2/m^3, L_W = 16.7 kg/m^{2}s, D_L=1.7 ×10^{-9} m^2/s, V_W*=0.79 kg/m^{2}s,μ_V=0.018×10^{-3} mNs/m^2, D_V = 1.45×10^{-5} m^2/s,K_5 = 5.23, ρ_V = 1.21 kg/m^3, mol. wt. of gas = 29, mol. wt. of solvent = 18. **[7]**

b) How are pipelines supported? **[3]**

OR

P.T.O.

Q4) a) 25 kg/sec of water is to be transported through a steel pipeline to a location 2.5 km away.The frictional pressure drop across the pipeline is 50,000 N/m^2. Find the diameter of the pipeline. Roughness of pipeline is 4.1×10^{-5}. Density = 1000 kg/m^3, viscosity of water 0.8×10^{-3} $N.s/m^2$. **[6]**

b) Give the equation for estimation of pressure drop in case of Newtonian and Non-Newtonian fluids. **[4]**

Q5) a) Natural gas with a specific gravity 1.20 at 1,50,000 kPa and 45°C is being blown down to 1,09,000 kPa. The flow rate could be from 95 m^3/day to 39 m^3/day. The drop through the pressure reducing regulator is 3,100 kPa, leaving 1,000 kPa for the pipe. The pipe length is 140 m upstream of the regulator and 8.7 m downstream. Determine the upstream and downstream pipe diameters.Molecular weight of gas = 20, ψ=0.6.**[8]**

b) What are the design parameters to be considered for cross country piping? **[8]**

c) What is the function of a gasket? **[2]**

OR

Q6) a) Write a note on the types of gaskets and their selection. **[6]**

b) What are the considerations for selection of material for valves? **[6]**

c) What are the desirable properties for pipeline materials for very high and very low temperature operations? **[6]**

Q7) a) What are the methods used for treatment of water used in boilers? **[8]**

b) Explain the functioning of a tube type boiler. **[8]**

OR

Q8) a) What is Dowtherm? What are its applications? **[6]**

b) What are the different types of boilers? **[6]**

c) What do you understand by the dryness fraction of steam? How does it affect the performance of steam? **[4]**

Q9) a) Write a note on scheduled plant maintenance and its importance. **[8]**

b) How are valves maintained? **[8]**

OR

Q10)a) Write in detail about HAZOP studies. **[8]**

b) What are the methods of fire prevention? **[8]**

Total No. of Questions : 10]

SEAT No. :

P3151

[Total No. of Pages : 2

[5154]-714

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(2012 Pattern) (Semester - I) (End. Semester) (409344A) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers any Five Questions.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) What is role of standards for air in pollution control studies? **[10]**

OR

Q2) Explain the harmful effects of Lead on human health. **[10]**

Q3) How absorption is used for removal of NOx? **[10]**

OR

Q4) Explain the Operating principles of centrifugal scrubber with neat figure. **[10]**

Q5) Explain the tyeps of water pollutants and discuss their effects. **[16]**

OR

Q6) Draw a diagram of trickling filter. Label its parts. And Explain its mechanism. **[16]**

Q7) Explain the process design and basic operating principles of activated sludge (suspended growth) process. **[18]**

OR

P.T.O.

Q8) Explain the process design and basic operating principles of trickling filter (attached growth) process. **[18]**

Q9) Discuss De nitrification in detail. **[16]**

OR

Q10) Discuss Up-flow anaerobic sludge blanket reactor. **[16]**

Total No. of Questions : 10]

SEAT No. :

P3152

[Total No. of Pages : 2

[5154]-715
B.E. (Chemical)
MEMBRANE TECHNOLOGY
(2012 Pattern) (Semester - I) (Elective - I) (409344B)

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) What are the various types of membrane modules? Explain any one in detail with suitable schematic diagram. **[10]**

OR

Q2) Explain in detail the phase inversion method of membrane preparation. **[10]**

Q3) Explain following in detail: **[10]**

a) Nanofiltration

b) Ultrafiltration

c) Reverse Osmosis

OR

Q4) a) Derive Ferry-Rankin equation. **[5]**

b) Explain surface diffusion through microporous membranes. **[5]**

Q5) a) Define concentration polarization with suitable examples. **[6]**

b) Explain the effect of cross-, co-and counter - flow arrangements. **[10]**

OR

Q6) a) Explain various method to reduce membrane fouling. **[8]**

b) Explain gel layer model in detail with all governing equations. **[8]**

P.T.O.

Q7) a) Explain the method of desalination of sea water? **[8]**

b) Suggest suitable membrane process for separation of oil-water emulsion and explain same in detail. **[8]**

OR

Q8) a) Explain the applications of batch, continuous, multistep, and multistage system designs of membrane modules. **[8]**

b) Explain in detail sterile filtration of pharmaceuticals. **[8]**

Q9) a) Explain the method of oxygen/nitrogen separation process with the help of membrane separation processes. **[9]**

b) Explain in Emulsion liquid membrane in detail. **[9]**

OR

Q10)a) Discuss in detail membrane distillation. **[9]**

b) Explain electrodialysis in detail with its applications. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3153

[Total No. of Pages : 2

[5154]-716
B.E. (Chemical)
CORROSION ENGINEERING
(2012 Course) (Semester - I) (Elective - I) (409344C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No2, 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 diagram 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 erosion corrosion. **[5]**

b) How much corrosion product will be formed when 100g Mg completely corroded. **[5]**

OR

Q2) a) What are different types of corrosion that we commonly come across? **[5]**

b) Explain differential aeration corrosion. **[5]**

Q3) a) Explain the two important factors that influence the corrosion of metals. **[5]**

b) Mention the theories of corrosion and explain any one of them. **[5]**

OR

Q4) a) Distinguish between wet and dry corrosion. **[5]**

b) What are the differences between EMF and Galvanic Series. **[5]**

Q5) a) How does the corrosion product influence further corrosion. **[8]**

b) What are the factors that influence corrosion. **[8]**

OR

P.T.O.

Q6) a) Explain electrochemical theory of corrosion with suitable example. **[8]**

b) Explain the control of corrosion by the use of sacrificial anode. **[8]**

Q7) Write note on: **[16]**

a) galvanic corrosion

b) concentration cell corrosion

OR

Q8) Write note on: **[16]**

a) pitting corrosion

b) passivity

Q9) a) Discuss about the use of inhibitors in corrosion control. **[9]**

b) Explain the process of electroplating with a suitable example. Give 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. :

P3154

[Total No. of Pages : 2

[5154]-717
B.E. (Chemical Engineering)
PETROLEUM REFINING
(2012 Course) (Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What does potential of crude reservoir mean? Explain in details. **[5]**

b) What are the types of hydrocarbon compounds present in crude oil? Explain briefly. **[5]**

OR

Q2) a) What are the scientific methods for exploration of crude reserve. **[5]**

b) How exploration of crude oil is carried out? Explain the stages involved. **[5]**

Q3) a) Why and when is it necessary to carry out distillation in vacuum? Explain briefly. **[5]**

b) What is a TBP analysis of crude oil? What is meant by reflux and theoretical plates in such an apparatus? **[5]**

OR

Q4) a) Explain various parameters that distinguish different crudes. **[5]**

b) What purpose does vacuum serve in crude distillation? List different products obtained in vacuum distillation of crude oil. **[5]**

Q5) a) What are the various components of gasoline? Explain in detail. **[10]**

b) What are light ends? Give process description for recovery of light ends. **[7]**

OR

P.T.O.

Q6) a) Explain the lube oil de-asphalting by kellog-Tower Process. **[10]**

b) Distinguish in detail between a thermal cracking unit and a catalytic cracking unit. **[7]**

Q7) a) Explain in detail house-keeping practices in petroleum refining. **[10]**

b) How is bitumen manufactured? Explain it with process block diagram. **[7]**

OR

Q8) a) Why sulphur is undesirable in crude? Explain the process of sulphur recovery from the crude. **[10]**

b) Explain various components required to manufacture lubricating oils and greases. **[7]**

Q9) a) What are pollution sources in refining operations? Discuss different ways to reduce pollution in refineries. **[8]**

b) How petroleum products are transported? Dicsuss various means of transportation. **[8]**

OR

Q10)a) How the marketing of refinery products is done? Explain with suitable examples. **[8]**

b) Discuss housekeeping practices followed in refinery operations. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3155

[Total No. of Pages : 2

[5154]-718
B.E. (Chemical)
CHEMICAL PROCESS SYNTHESIS
(2012 Pattern) (End Sem) (Semester - I) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calcualtor and steam tables is allowed.***
4) ***Assume Suitable data, if necessary.***

Q1) a) Explain two methodologies of chemical process design. **[5]**

b) Discuss hierarchy of chemical process design. **[5]**

OR

Q2) a) Explain differential distillation with suitable example. **[5]**

b) Explain centrifugal separation. **[5]**

Q3) Discuss in detail reactor system for multiple reactions in series producing byproduct with respect to choice of reactor. **[10]**

OR

Q4) a) Write note on absorption for the separation of low molar mass materials. **[5]**

b) What are the methods of separation of homogeneous mixture? Explain any one. **[5]**

Q5) Explain distillation sequencing using columns with more than two products. **[16]**

OR

Q6) a) Discuss optimization of a reducible structure. **[8]**

b) What is thermal coupling of the direct and indirect sequence. **[8]**

P.T.O.

Q7) a) Explain three forms of cross pinch heat transfer. **[8]**

b) Discuss threshold problems in detail. **[8]**

OR

Q8) Explain grand composite curve related to utility selection. **[16]**

Q9) a) Discuss major hazard in process plants. **[9]**

b) Explain attenuation of hazardous materials. **[9]**

OR

Q10) Write note on:

a) Fire hazards. **[9]**

b) Safety devices. **[9]**

Total No. of Questions : 10]

SEAT No. :

P3156

[Total No. of Pages : 2

[5154]-719

B.E. (Chemical)

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

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

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) ***Assume Suitable data, if necessary.***
4) ***Neat diagrams must be drawn wherever necessary.***

Q1) Write short notes on: **[10]**

a) Intrapreneur.

b) Manager.

OR

Q2) Enlist the various schemes and their facilities available for Self-Employment. **[10]**

Q3) a) What are the different Fiscal and Tax concessions available for small scale projects. **[6]**

b) Explain the details to be included under the while writing the technical report for applying to the Government funding agency. **[4]**

OR

Q4) Explain in details: **[10]**

a) Small Industries Development Bank of India (SIDBI).

b) National Entrepreneurship Development Board (NEDB).

Q5) Explain the five stages of team development described by Tuckman. **[10]**

OR

Q6) a) Write a note on five competitive forces given by porter. **[8]**

b) Explain the Hierarchy of needs given by Abraham Maslow. **[8]**

P.T.O.

Q7) Elaborate on Kaizen. Write the requirements of Kaizen in Chemical industry. **[10]**

OR

Q8) a) Explain the following: **[8]**

i) Adding resources to the model.

ii) Resource management & crashing.

b) Write an explanatory note on Project Management. **[8]**

Q9) Write an explanatory note on: **[18]**

a) Consumer Behaviour.

b) Product and Brand Management.

c) International Marketing.

OR

Q10) Explain the following (Any three): **[18]**

a) Channel of Distribution.

b) Promotion and pricing.

c) Integrated marketing communications.

d) Product and brand management.

☛ ☛ ☛

Total No. of Questions : 10]

SEAT No. :

P3157

[Total No. of Pages : 2

[5154]-720

B.E. (Chemical)

PIPING DESIGN AND ENGINEERING

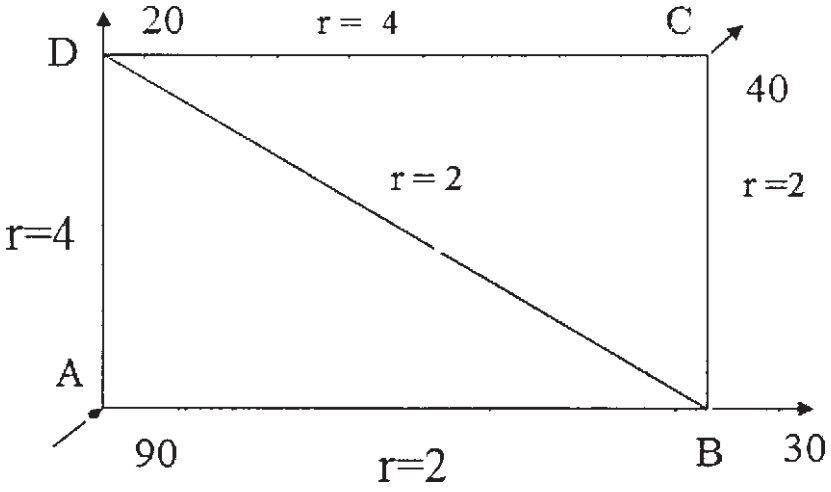
(2012 Pattern) (End Sem.) (409345 C) (Semester - I) (Elective - II)

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) Calculate the discharge in each pipe of the network as shown in figure. The Pipe network consists of 5 pipes. The head loss h_f in each pipe is given by $h_f = rQ^2$. The values of r for various pipes and also the inflow and outflow at nodes are shown in the figure. **[10]**



OR

Q2) Discuss the various types of gasket according to ASME b16.5 and b16.47 for flanges. **[10]**

Q3) Explain the desirable properties of piping materials for low temperature and high temperature services. **[10]**

OR

P.T.O.

Q4) State and explain the factors to be considered in selecting valves. **[10]**

Q5) a) Determine the size of smooth 14-gage BWG copper tubing needed to convey 15 gpm of a process liquid of kinematic viscosity 2.40×10^{-5} ft^2/s over a distance of 134 ft at ground level using a storage tank at an elevation of 20 ft. Assume minor losses from fittings in the line to account for 5 ft of head. **[8]**

b) Find the head loss due to the flow of 4,500 gpm of oil ($\nu = 1.15 \times 10^{-4}$ ft^2/s) through 1,600 feet of 8" diameter cast iron pipe. If the density of the oil $\rho = 1.75$ kg/ft^3. **[8]**

OR

Q6) a) Explain line sizing of Vacuum pipe lines. **[8]**

b) Explain line sizing of pneumatic conveying solids. **[8]**

Q7) a) Derive the expression for critical thickness of insulation. **[8]**

b) Calculate the critical radius of insulation for asbestos (k = 0.17 W/m.K) surrounding a pipe and exposed to a room air at 293 K with h = 3.0 $W(m^2.K)$. Calculate the heat loss from 473 K, 50 mm diameter pipe when covered with the critical radius of insulation and without insulation. **[8]**

OR

Q8) a) Write down the different insulation material classifications mostly used in the industrial and commercial piping industry. **[8]**

b) Discuss the design criteria used in insulation system design for piping applications. **[8]**

Q9) a) Explain list of documents required for preparation of layout for a process plant. **[8]**

b) Develop the piping system layout considerations for Distillation and heat exchangers? **[10]**

OR

Q10)a) Discuss the different types, approval, engineering and construction issues involved in the development of P & IDs? **[10]**

b) Write a note on Bill of Material (BOM) and Material take-off (MTO). **[8]**

Total No. of Questions : 10]

SEAT No. :

P3158

[Total No. of Pages : 2

[5154]-721

B.E. (Chemical)

ADVANCE SEPARATION PROCESSES

(2012 Course) (Semester - I) (End Sem.) (409345 D) (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 diagram must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) Explain the concept of K-Value and its application in design of Multicomponent distillation column. **[10]**

OR

Q2) a) Explain in detail the residue curve maps. **[5]**

b) Explain pressure swing distillation. **[5]**

Q3) Explain the reversible chemical complexation in detail with the industrial example. **[10]**

OR

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

a) Reactive distillation

b) Reactive crystallization

Q5) Write short notes on: **[18]**

a) Electro dialysis

b) Pervaporation

c) Liquid Emulsion Membrane

OR

P.T.O.

Q6) a) Explain in detail the Separation Mechanism in the MF, UF and RO in detail with suitable diagram. **[10]**

b) Explain Mass transfer aspects in the gas permeation in the membrane separation process. **[8]**

Q7) a) Explain the basic concept of liquid chromatography. **[8]**

b) Explain temperature swing adsorption with neat diagram. **[8]**

OR

Q8) a) Explain the general principle of adsorption process. **[8]**

b) Explain the application of chromatography in separation of enzymes and proteins. **[8]**

Q9) Write short notes on: **[16]**

a) Zone electrophoresis.

b) Ultra centrifugation.

OR

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

a) Zone refining.

b) Froth flotation.

Total No. of Questions :10]

SEAT No. :

P3159

[Total No. of Pages :2

[5154] - 722

B.E. (Chemical)

PROCESS MODELING & SIMULATION

(2012 Course) (Semester - II) (End Sem.) (409349)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) Define the equations and notations for Dalton's law, Raoult's law and relative volatility of an ideal vapour-liquid equilibrium system. **[10]**

OR

Q2) Explain Laminar Flow in narrow slit. **[10]**

Q3) Derive a model for cooling tower. **[10]**

OR

Q4) Derive a model for agitated vessel. **[10]**

Q5) Explain the steady state model and thermal equilibrium model for LPG vaporizer with a neat diagram. **[16]**

OR

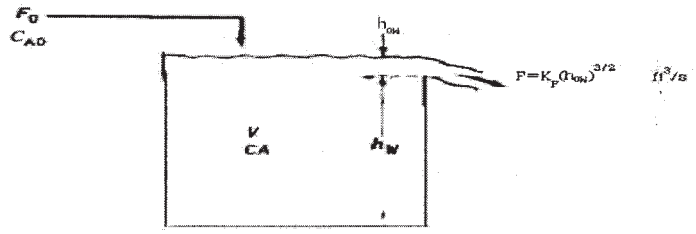
Q6) Derive the equations describing the Batch distillation column with constant hold up. **[16]**

P.T.O.

Q7) A perfectly mixed, isothermal CSTR has an outlet weit. The h_{ow} rate over the weir is proportational to the height of liquid over the weir, how to the 1.5 power. The weir height is hw. The cross sectional area of the tank is A. Assume constant density. A first order reaction takes place in the tank: **[18]**

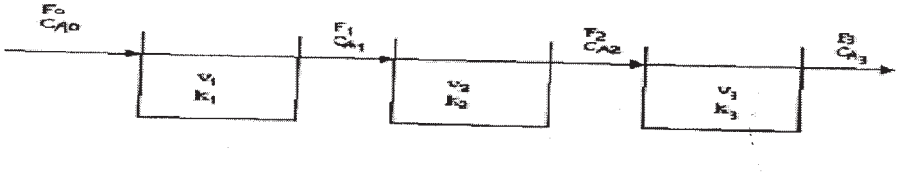
$$A \xrightarrow{K} B$$

Derive the model equations describing the system as shown in the figure.



OR

Q8) A system consisting of three isothermal constant holdup CSTRs is shown in the figure below. Product B is produced and A is consumed in each of three perfectly mixed reactor by a first order reaction occurring in the liquid. Assume density is constant throughout the system. Derive the model equations describing the system. **[18]**



Q9) What are the types of simulations? Explain the difference in it. **[16]**

OR

Q10)Explain Chemcad in detail. **[16]**

EEE

Total No. of Questions :10]

SEAT No. :

P3160

[Total No. of Pages :3

[5154] - 723

B.E. (Chemical)

PROCESS ENGINEERING COSTING & PLANT DESIGN

(2012 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

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

Q1) Write the model specification sheet for the shell and tube heat exchanger which show the following: **[10]**

a) Identification

b) Function

c) Operation

d) Material Handled

e) Basic Design data

f) Essential controls

g) Insulation requirements

h) Allowable Tolerance

i) Special information such as material of construction, gaskets, support.

OR

P.T.O.

Q2) The original value of a piece of equipment is Rs. 2200 completely installed and ready for use. Its salvage value is estimated to be Rs.200 at end of service life which is 10 years. Determine the asset value of equipment at the end of 5 years using: **[10]**

a) Straight line method.

b) Declining balance method.

c) Double declining balance.

Q3) Explain the mathematical methods for profitability evaluation in detail with neat diagrams. **[10]**

OR

Q4) A project excepted to have flow the 5 years as follows after all expences and taxes. The initial fixed capital investment is Rs. 1000000 and the working capital investment is 15% of the fixed capital investment. **[10]**

Time (Years)	Cash flow (Rs.)
0-1	2,00,000
1-2	2,70,000
2-3	3,30,000
3-4	4,00,000
1-5	4,75,000

Find the rate of return using straight line depreciation.

Q5) a) The following equation shows effects of x & y on total cost of particular operation: **[10]**

$$C_T = 2.33x + \frac{11900}{xy} + 1.86y + 10$$

Determine x & y values.

b) Explain optimization of cyclic operation. **[8]**

OR

Q6) a) Explain graphical and analytical general procedure for determining optimum condition. **[10]**

b) Find the values of X, Y, Z that minimize the function $X+2Y^2+Z^2$ subject to that X+Y+Z=1, making use of the Lagrangian Multiplier. **[8]**

Q7) a) Write a note on optimum flow rate of cooling water in condenser. **[10]**

b) Explain pinch technology in detail with the help of neat diagrams. **[12]**

OR

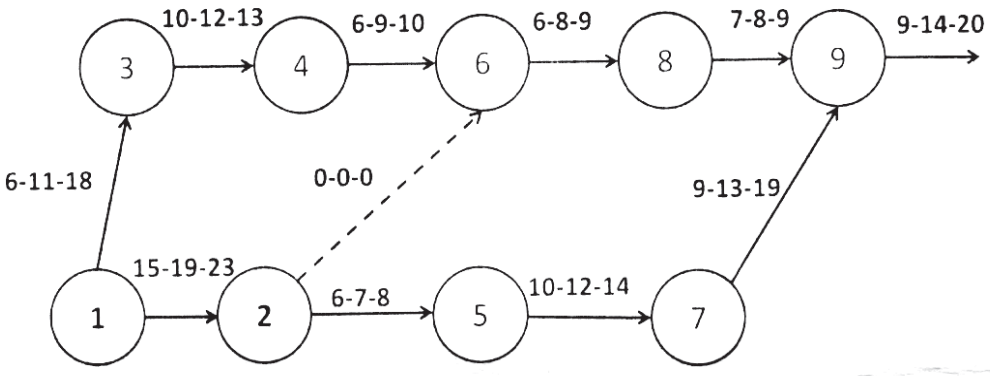
Q8) a) Write the details necessary in the prepartion of techno economic feasibility report. **[12]**

b) Draw and explain the plant layout and name the parts. **[10]**

Q9)Define CPM & PERT and explain the application of the same for setting up a new chemical plant. Define the activities involved in this project and construct the network diagram. **[10]**

OR

Q10)Determine the expected time and variance for each activity in the network shown below: **[10]**



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Total No. of Questions : 10]

SEAT No. :

P3161

[Total No. of Pages : 2

[5154]-724
B.E.(Chemical)
ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES
(2012 Pattern) (Semester - II) (End Sem.) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***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 scope of energy conservation and its importance in process industries. **[10]**

OR

Q2) Define Energy Management & State its objectives. Explain the principles of energy management. **[10]**

Q3) 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 activates for promoting energy conservation in present status. **[10]**

OR

P.T.O.

Q8) a) Distinguish between Batch & continuous process in contest of energy saving. **[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, house keeping, 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. :

P3162

[Total No. of Pages : 2

[5154]-725

B.E.(Chemical Engineering)

CHEMICAL PROCESS SAFETY

(2012 Pattern) (End Sem.) (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.***

Q1) a) Explain safety program with a neat diagram. **[5]**

b) Explain in short Dose versus Response curves. **[5]**

OR

Q2) Define and explain Hazad, Toxicity, Threshold Limit Value (TLV) and accident. **[10]**

Q3) a) Estimate in detail worker exposures to noise. **[5]**

b) Discuss the importance of safety in chemical process industry. **[5]**

OR

Q4) a) Define in short Ignition, Autoignition temperature, fire point and flammability limits. **[7]**

b) Define in short Boiling liquid expanding vapor explosion (BLEVE). **[3]**

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) Explain in detail Relief system Risk and Hazards Management. **[8]**

b) Discuss in detail miscellaneous design for preventing fires and explosion. **[8]**

Q7) a) Write a short note on Event trees and fault trees **[8]**

b) Discuss in detail Hazard and Operability Studies (HAZOP). **[10]**

OR

P.T.O.

Q8) a) Discuss in detail risk assessment with review of probability theory revealed and unrevealed failure. **[12]**

b) Explain in detail process hazards checklists. **[6]**

Q9) a) Explain in detail hazard models and risk data. **[6]**

b) Discuss various plan for emergency and risk management routines. **[10]**

OR

Q10)a) Discuss in detail Prevention of hazard human element. **[8]**

b) Explain emergency shutdown systems and role of computers in safety. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3163

[Total No. of Pages : 3

[5154]-726

B.E.(Chemical Engineering)

FOOD TECHNOLOGY

(2012 Pattern) (Semester - II) (Elective - III) (409351 C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8 and Q.9 or 10.***
2) ***Neat figures to the right indicate full marks.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the theory of irradiation along with its various types and equipment used in food processing. Also explain how it affects on food. **[5]**

b) Explain how following techniques are used in food preservation with suitable examples. **[5]**

i) Food additives

ii) Cooking

OR

Q2) a) What do mean by homogenization and pasteurization of milk? Why it is done? Explain. **[5]**

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

i) Modified atmosphere packaging

ii) Storage of food

Q3) a) Explain the process of jams and jelly making with suitable examples. What are special properties of them? **[5]**

b) Enlist various mango products and explain the process of mango processing with neat flow diagram. **[5]**

OR

P.T.O.

Q4) a) What are various sources of milk? Also give its composition. **[3]**

b) Enlist various fruit and vegetable products. **[2]**

c) Explain theory and process of butter oil and ice cream making. **[5]**

Q5) a) Define and explain in short following size reduction laws. **[10]**

i) Bonds law

ii) Rittingers law

iii) Kick's law

b) Enlist various unit operations performed in food processing. Explain any two of them in detail with neat diagram and examples. **[8]**

OR

Q6) a) Enlist various size reduction equipment along with type of forces acting in them. Also mention at least three examples of each. **[5]**

b) i) Write short note on effect of processing of food on its quality and properties.

ii) Differentiate between baking and roasting. **[10]**

Q7) a) Write a short note on following food packaging materials. **[6]**

Crates, plywood, wire bound boxes, corrugated and fibre board boxes, textile and paper sacks.

b) What are various factors that influence the success of packaging in advertising the food products. **[5]**

c) Write short note on deteriorative changes in food without packaging and extention of its shelf life due to packaging with suitable examples. **[5]**

OR

Q8) a) Explain how following factors cause deterioration in food products during its storage. **[8]**

i) Light

ii) Heat

iii) Moisture and gasses.

b) Write short note on following food packaging materials. **[8]**

Flexible packaging materials such as bags, pouches and wrappers etc.

Q9) a) Explain how assessment of fruits, vegetables, cereals and other food products is done for its quality control. **[6]**

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

i) Food adulteration and its safety

ii) Rheology of food products and its importance in food quality.

OR

Q10)a) Explain food regulation and its grades and standards along with various methodologis and acts for it. **[8]**

b) Explain the following. **[8]**

i) USFDA

ii) Trends and composition of India's foreign trade in food.

Total No. of Questions : 8]

SEAT No :

P3164

[Total No. of Pages :2

[5154]-727
B.E. (Chemical)
ADVANCED MATERIALS
(2012 Course) (Elective-III) (409351-4) (Semester-II)

[Time : 2½ Hours] *[Max.Marks:70]*

Instructions to the candidates:

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

Q1) a) Describe advanced metallic systems used for special applications. **[6]**

b) Explain composition of UHMWPE and state its extraordinary characteristics. **[6]**

c) Explain applications and limitations of MEMS. **[6]**

OR

Q2) a) Describe use of aramid fibers in polymer combosites such as Kevlar and Nomex. **[6]**

b) What are hybrid bearings? How they are superior over conventional steel bearings. **[6]**

c) How will you use ceramics as abrasives? **[6]**

Q3) a) Explain the effect of following factors on properties of fiber - reinforced composite materials - fiber length, orientation concentration, and matrix properties. **[8]**

b) Explain the effect of fiber phase on properties of fiber - reinforced composites. **[8]**

OR

Q4) a) Describe the structure and application of glass fiber - reinforced composites. **[8]**

b) Distinguish between large - particle composites and dispersion - strengthened composites. **[8]**

Q5) a) Describe applications of metal - matrix composites (MMC's). **[8]**

b) State fabrication methods for preparing ceramic - matrix composites (CMC's). **[8]**

OR

P.T.O.

Q6) a) Explain different types of reinforcement materials used in metal composites. **[8]**

b) Explain mechanical characteristics of metal composite materials. **[8]**

Q7) a) State distinguishing properties of carbon - matrix composites. **[10]**

b) What are nanomaterials and nanocomposites? **[10]**

OR

Q8) a) Which material are used for air - craft parts? **[10]**

b) Describe methods for synthesis and characterisation of nanomaterials. **[10]**

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Total No. of Questions : 10]

SEAT No. : ____

P3165

[Total No. of Pages : 2

[5154]-728
B.E. (Chemical)
CATALYSIS
(2012 Pattern) (Semester - II) (End Sem.)
(Elective - IV)(409352A)

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

Instructions to the candidates:

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

Q1) a) Explain the types of catalysis. **[5]**

b) Explain steps in catalytic reaction. **[5]**

OR

Q2) Explain in detail any one catalytic reactor used in industry. **[10]**

Q3) Explain different adsorption isotherms in detail. **[10]**

OR

Q4) For the dual functional catalyst. Following gas phase reaction: **[10]**

$A + B \rightarrow C + D$

Derive the rate expression considering surface reaction as rate controlling in terms of partial pressure of the respective components.

Q5) 8.01 gm of imported hydrogenation catalyst when studied with N_2 adsorption reveals **[16]**

Pressure, (mmHg)	6	25	140	230	285	320	430	505
Volume adsorbed (cm^3)	61	127	170	197	215	230	277	335

The volume is measured at 0 ^{0}C and 1 atm. Estimate the surface area of the catalyst.

Data: Density of liquid N_2 at -195.8 ^{0}C is 0.808 gm/cm^3.

OR

P.T.O.

Q6) a) Explain mechanism of catalyst poising. **[8]**

b) Explain prove volume distribution. **[8]**

Q7) Explain modification of Zeolites. **[16]**

Industrial application of molecular sieves.

OR

Q8) Write a short note on: **[16]**

a) Applications of zeolite.

b) ZSM-5

Q9) a) Explain Catalyst inhibitors with suitable examples. **[9]**

b) Explain any two industrial reactions where biocatalysts are sued. **[9]**

OR

Q10) Substrate A and enzyme E flow through a mixed flow reactor of volume (V) 6 lit. Find a rate equitation to represent the action of enzyme on the substrate using the following data. **[18]**

C_{Eo} (mol/lit)	0.06	0.02	0.002
C_{Ao} (mol/lit)	0.3	0.5	0.78
C_A (mol/lit)	0.06	0.28	0.7
v, (l/h)	4	6	2.2

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Total No. of Questions : 10]

SEAT No. :

P4850

[Total No. of Pages : 2

[5154]-729

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

NANOTECHNOLOGY

(2012 Pattern) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, 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 if necessary.***

Q1) a) Explain the different types of carbon based nanomaterials along with their physical properties and applications? **[6]**

b) Write a short note on Diamonded nanostructures? **[4]**

OR

Q2) a) Discuss the molecular modeling technique for nanomaterials? **[6]**

b) How nanomaterials are synthesized by Laser ablation of solid targets? **[4]**

Q3) a) Explain why MBE is one of best method as compared to other methods, with its advantages? **[6]**

b) Differentiate between electric arc discharge method and chemical vapor deposition? **[4]**

OR

Q4) a) Explain in detail Fourier transform infrared (FTIR) spectroscopy for characterizing nanomaterials? **[6]**

b) Compare the specimen preparation needed in TEM and SEM and also comment on HRTEM? **[4]**

P.T.O.

Q5) a) What are quantum dots? Why quantum dots of different size produce different colors? **[8]**

b) What is doping? Explain types of dopants used in extrinsic semiconductor? **[8]**

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 wave function? **[8]**

b) Write a note on synthesis methods of semiconductor nanoparticles along with their merits? **[8]**

Q7) a) What are the factors affecting micelle concentration? **[8]**

b) Explain in detail nanostructured photocatalysis? **[8]**

OR

Q8) a) Explain various methods for measuring surface tension? **[8]**

b) Explain with neat sketch experimental procedure for finding contact angles? **[8]**

Q9) a) Explain Nanobiotechnology and elaborate how drug-delivery helps for treatment of various diseases? **[9]**

b) Explain in brief the applications of different types of nanomaterials in nanomachines & nanodevices? **[9]**

OR

Q10) a) Which are the synthesis methods and applications of nanohydrogel? Explain any one in detail? **[9]**

b) Discuss the health and environmental impacts of nanotechnology? **[9]**

Total No. of Questions : 10]

SEAT No. : ____

P3166

[Total No. of Pages : 2

[5154]-730
B.E. (Chemical)
FUEL CELL TECHNOLOGY
(2012 Course) (Semester -II) (End Sem.) (Elecitve-IV) (409352C)

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

Instructions to the candidates:

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

Q1) a) Describe various applications of a fuel cell. **[5]**

b) What are different types of electrodes in a fuel cell? Describe them in details. **[5]**

OR

Q2) Explain in details the principle on which a fuel cell is designed. Give details of general electrode reactions and emf generated in such a cell. **[10]**

Q3) 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. **[10]**

OR

Q4) Describe in details the construction and working of a photoelectrochemical reactor design scheme. **[10]**

Q5) a) Write an electrochemical modeling approach in the design of a Proton Exchange Membrane Fuel Cell. **[8]**

b) Describe various anodic catalyst materials used in the construction of a Proton Exchange Membrane Fuel Cell and their possible functions in its working. **[8]**

OR

P.T.O.

Q6) Write short notes on **ANY THREE** **[16]**

a) Stability of a platinum cathode catalyst.

b) Persulphonic acid membrane materials.

c) Gas Diffusion Layer Materials.

d) Membrane Electrolyte Materials.

Q7) a) Describe the construction and working of a planar Solid Oxide Fuel Cell. **[8]**

b) Describe with the help of a diagram oxidation reaction on the TPB of an anode made of Ni-YSZ. **[8]**

OR

Q8) Describe completely the importance of sol gel process in the construction of a Solid Oxide Fuel Cell. **[16]**

Q9) a) Write a detailed note on steam reforming needed in fuel processing. **[9]**

b) Write a detailed note on partial oxidation needed in fuel processing. **[9]**

OR

Q10)Write short notes on any three: **[18]**

a) Carbon Monoxide Reduction in reforming.

b) Sulfer Reduction in reforming.

c) Carbon Deposition Avoidance.

d) Impurities Reduction in reforming.

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Total No. of Questions : 10]

SEAT No. : ____

P3167

[Total No. of Pages : 2

[5154]-730-A
B.E. (Chemical)
PETROCHEMICAL ENGINEERING
(2012 Course) (Semester -II) (End Sem.) (Elective-IV) (409352D)

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

Instructions to the candidates:

1) ***Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***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) Draw flow sheet for production toluene and write down its derivatives. **[10]**

OR

Q4) Write in details about the various separation and purification techniques used in Petrochemical industry? **[10]**

Q5) Enumerate the synthetic chemical intermediates and products from olefins and describe the production of ethylene by naphtha cracking process. **[16]**

OR

Q6) Write a note on furnaces used in petrochemical plants. **[16]**

Q7) a) Discuss any two mechanisms of polymerization. **[10]**

b) Compare addition polymerization with condensation polymerization. **[8]**

OR

P.T.O.

Q8) Draw and discuss process flow diagram for the production of **[18]**

a) Nylon 66

b) Polystyrene.

Q9) a) Explain recent trends in petrochemical plants & refineries in India. **[10]**

b) Major petrochemical plants in India as well as in world. **[6]**

OR

Q10)Write a note on following. **[16]**

a) How to control pollution in Petrochemical industries.

b) Write down safety norms in refining.

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